Chapter 7
Environmental Action Plan, Environmental Impact Prevention and Resolution Measures, and Environmental Impact Monitoring Measures

7.1 Introduction

The operations of the Runway and Taxiway 2 Construction Project at U-Tapao International Airport by the Thai Royal Navy (RTN) and the Eastern Economic Corridor Office of Thailand (EECO) during the construction phase and operation phase may impact environmental resources physically and biologically, as well as the human use value and quality of life value. The project has therefore established environmental impact prevention and resolution measures and environmental impact monitoring measures in the form of an action plan, which includes a summary of the project's environmental measures that are consistent with significant environmental impact assessments. Stakeholders' comments have also been considered in the preparation of the environmental impact prevention and resolution measures and environmental impact monitoring measures. This will mitigate the impacts that will occur without affecting the area's current environment and without affecting the nearby people/community, or by keeping the impacts at a minimum.

In this regard, the details of the environmental action plan for the construction phase and operation phase of the Runway and Taxiway 2 Construction Project at U-Tapao International Airport are as shown in **Table 7.1-1**

Table 7.1-1 Summary of environmental action plans for the construction and operation phase, Runway and Taxiway 2 Construction Project, U-Tapao International Airport

Measures	Construction Phase	Operation Phase
General Action Plan	√	√
Environmental Action Plan		
1) Noise Action Plan	√	√
2) Vibration Action Plan	√	√
3) Air Quality Action Plan	√	√
4) Topography Action Plan	√	-
5) Geology and Earthquake Action Plan	√	√
6) Soil Resource Action Plan	√	√
7) Surface Water Hydrology Action Plan	√	√
8) Surface Water Quality Action Plan	√	√
9) Groundwater Quality Action Plan	√	√
10) Seawater Quality Action Plan	√	√
11) Terrestrial Ecology Action Plan	-	√
12) Aquatic Ecology Action Plan	√	√
13) Waste and Wastewater Management Action Plan	√	√
14) Land Use Action Plan	√	√
15) Transportation Action Plan	√	√
16) Public Utilities and Facilities Action Plan	√	√
17) Drainage and Flooding Prevention System Action Plan	√	√
18) Economic and Social Action Plan	√	√
19) Public Engagement and Public Relations Action Plan	√	√
20) Asset Relocation and Replacement Action Plan	√	√
21) Health and Public Health Action Plan	√	√
22) Occupational Health and Safety Action Plan	√	√
23) Tourism and Scenery Action Plan	√	√
24) History and Archaeology Action Plan	√	√

Notes: The symbol (√) indicates that measures have been established.

7.2 General Action Plan

In the implementation of both the construction and operation phases, there are general environmental measures that must be taken as follows:

1. Environmental measures and action plans that the Royal Thai Navy (RTN) and the Eastern Economic Corridor Office of Thailand (EECO) must comply with:.

1.1 The RTN and EECO will be required to comply with the environmental impact prevention and resolution measures and environmental impact monitoring measures as proposed in **the Environmental Impact Assessment Report for the Runway and Taxiway 2 Construction Project at U-Tapao International Airport** by the RTN and EECO in Phala Subdistrict, Ban Chang District, Rayong, and as further specified by the expert committee per the conditions in the agreements with construction design contractors and/or construction operators and project administrators or maintainers.

1.2 The RTN and EECO must oversee and direct the design and/or construction contractors and project administrators or maintainers for compliance with the environmental impact prevention and resolution measures and the environmental impact monitoring measures as proposed in the Environmental Impact Assessment Report for the Runway and Taxiway 2 Construction Project, U-Tapao International Airport by the RTN and EECO, Phala Subdistrict, Ban Chang District, Rayong.

1.3 The RTN and EECO must find a third party to conduct monitoring and inspection in compliance with the environmental impact prevention and resolution measures and environmental impact monitoring measures as proposed in the Environmental Impact Assessment Report for the Runway and Taxiway 2 Construction Project at U-Tapao International Airport by the RTN and EECO in Phala Subdistrict, Ban Chang District, Rayong. A budget must be set and included project costs under the supervision of the RTN and EECO (and/or the project operation agency), and a committee must be appointed for monitoring and compliance with the environmental measures (comprising the RTN and EECO, Office of Natural Resources and Environmental Policy and Planning, the Pollution Control Department, Provincial Office of Natural Resources and Environment Rayong, Regional Environment Office 13, provincial representatives of Chonburi and Rayong, local administrative organizations, private development organizations and qualified persons, etc.) to oversee the monitoring and implementation of environmental measures for the project.

1.4 The RTN and EECO must compose a report on the implementation of the measures set forth in the Environmental Impact Assessment Report for the Runway and Taxiway 2 Construction Project, U-Tapao International Airport by the RTN and EECO, Phala Subdistrict, Ban Chang District, Rayong, which must be submitted to authorized agencies to review for approval or authorization. If there are no

authorizing or approving agencies, the report is to be submitted to the Office of Natural Resources and Environmental Policy and Planning and related agencies for their information every 6 months, both in the construction phase and operation phase.

2. In the event that the RTN and EECO (and/or the project operation agency) needs to amend project details or the environmental impact prevention and resolution measures or environmental impact monitoring measures with changes from those proposed in the Environmental Impact Assessment Report for the Runway and Taxiway 2 Construction Project, U-Tapao International Airport by the RTN and EECO in Phala Subdistrict, Ban Chang District, Rayong, with comments from the National Environment Board, it shall be the responsibility of the authorizing or approving agency or the project owner, as the case may be, to conduct the project according to the law and to be the reviewer, proceeding as follows:

2.1 If the authorizing or approving agency or project owner agency, as the case may be, deems that the amendments to the project details do not affect significant matters in the Environmental Impact Assessment Report that has already been reviewed or approved by the expert committee and the National Environment Board, the authorizing or approving agency, or the project owner agency, as the case may be, will notify of such amendments in accordance with the regulations and conditions set forth by the law. A copy of the amended measures will also be prepared as notification to be submitted to the Office of Natural Resources and Environmental Policy and Planning for acknowledgement.

2.2 If the authorizing or approving agency or the project owner agency, as the case may be, deems that the amendments to the project details affect significant matters in the Environmental Impact Assessment Report, the procedure will be as follows:

2.2.1 In the case of projects, businesses, or operations of state agencies with comments from the National Environment Board on the Environmental Impact Assessment Report to support Cabinet review, and for amendments to details of the project, business or operations of state agencies that require an Environmental Impact Assessment Report to be prepared for proposal to the Cabinet to support review in accordance with official regulations as follows: The authorizing or approving agency or the project owner agency, as the case may be, shall submit a report on the amendments to the project details, environmental impact prevention and resolution measures, or environmental impact monitoring measures to the Office of Natural Resources and Environmental Policy and Planning for submission to the relevant Expert Committee for review to add supplementary comments prior to amending such measures and further proposal to the National Environment Board for review. However, if the project falls under the scope of proposal to the Cabinet in accordance with official regulations, please add the comments of the National Environment Board for submission to the Cabinet for further review. Also, when the project or business has amended

the details or environmental impact prevention and resolution measures and environmental impact monitoring measures per the comments of the Expert Committee and National Environment Board or the Cabinet, the authorizing or approving agency or project owner agency, as the case may be, must inform the Office of Natural Resources and Environmental Policy and Planning of such amendments.

2.2.2 In the case of projects, businesses, or operations of state agencies in which the National Environment Board has commented on the Environmental Impact Assessment Report to support review by the Cabinet, and for amendments to details of the project, business or operations of state agencies that require an Environmental Impact Assessment Report to be prepared that do not need to be proposed to the Cabinet to support review in accordance with official regulations as follows: The authorizing or approving agency or the project owner agency, as the case may be, shall submit a report on the amendments the project details, or environmental impact prevention and resolution measures, or environmental impact monitoring measures to the Office of Natural Resources and Environmental Policy and Planning for submission to the relevant Expert Committee to review for approval prior to amending such measures and proposal to the National Environment Board for further information. After the project or business has amended such details or amended the environmental impact prevention and resolution measures or environmental impact monitoring measures per the supplementary comments from the Expert Committee and National Environment Board, the authorizing or approving agency or the project owner agency, as the case may be, must also inform the Office of Natural Resources and Environmental Policy and Planning of such amendments.

3. During project construction and operation, if it is found that the project impacts the environment or if there are any complaints, the RTN and EECO (and/or construction operators and project administrators or project maintainers) must immediately take preventative and corrective action and notify the Office of Natural Resources and Environmental Policy and Planning and related agencies so that they can jointly review the guidelines and recommendations for further resolution.

4. The RTN and EECO must set up a public relations department for the project prior to initiating construction for public relations with the local population and related organizations, such as the 5th Regional Office of Fine Arts Department, Prachinburi, the Royal Forest Department (in the event that wood is removed from the U-Tapao International Airport area), the Department of Highways, local administrative organizations, and private development organizations, etc., for acknowledgement of construction methods, project implementation plans, and expected environmental impacts, including the environmental impact prevention

and resolution measures and environmental impact monitoring measures, as well as to provide opportunities to observe and inspect the procedures for understanding and to prevent complaints.

5. General measures and environmental action plans that must be followed:

5.1 Tunnel Structure

- Inspections will be conducted on the subsidence of the compacted soil layer beside the tunnel and the tunnel roof during construction and every 2 years after the tunnel is opened by installing a settlement measuring device at the tunnel roof and beside the tunnel roof, the Runway 2 area, and the taxiway, comprising 4 sites, as the tunnel under Runway 2 will not be in use for a long period of time after construction is complete.
- A subdrain must be built beside and under the tunnel to allow water to flow through more easily, to prevent waterlogging in the tunnel, and to reduce the risk of weakening the soil layer beside the tunnel due to groundwater.

5.2 Construction Area

- Plan out the construction area boundaries in detail, including suitable blockades in accordance with the construction contractor's operations and traffic conditions for effective use of the construction site and to keep the impact on the public at a minimum.
- Install guardrails in the construction area as appropriate for the work conditions and area conditions.
- Install traffic signs and signals in accordance with the form and guidelines for installation of signs and signals from project-related agencies, both for the day time and night time.
- Soil and construction materials shall be kept as far as possible from the waterfront and must be covered with canvas or material to protect against rain or wind stress. It must be ensured that the soil/construction material pile will not be discharged into water sources, and that all transportation out of the area will be performed as quickly as possible after construction is complete.
- Equipment and machinery repair/maintenance plants must be at least 200 meters away from water sources and such areas must have an oil drain container for spent oil , as well as a simple wastewater treatment system that can separate the oil or grease to be collected in a 200 liter tank for disposal by proper methods or via services provided by a legally licensed company.
- To prevent oil and chemical leaks into water sources during construction, dig and pour a concrete over the area around the oil and chemical reservoir to collect potential oil and chemicals leaks. At the same time, operators are required to take precautions when transferring oil and chemicals to prevent leakage to protect against contamination of oil and chemicals into soil and water sources.
- Construction contractors must concrete the floors of areas where oil and gas leaks may occur; areas where machinery is maintained or repaired; areas in which machines are repaired; vehicle washing areas; and areas where fuel

tanks, engine oil tanks, and waste oil tanks are stored, etc. The concrete floors must be bordered with raised edges and the area between the concrete floor and grease trap must be connected with a continuous pipeline to collect and transport leaks from the concrete floor directly and to drain water from the grease trap into the wastewater treatment system for containment within the construction site.

In this regard, the details of the environmental impact prevention and resolution measures for the construction phase and operation phase of the Runway and Taxiway 2 Construction Project at U-Tapao International Airport are as follows.

7.3 Environmental Action Plan

7.3.1 Noise Action Plan

7.3.1.1 Principles and Rationale

Operations in both the construction and operation phase may result in noise. The main source of noise during the construction phase is from transportation of construction materials and construction machinery, due to the need for transportation of materials, drilling, area preparation, and area adjustment. Construction operations require a large number of machines to be used and are operations that may require multiple vehicles or machinery to be used at the same.

The man source of noise during the operation phase is aircrafts. The main operations that will cause noise impacts are aircraft takeoffs and landings, which will affect the communities surrounding U-Tapao International Airport.

Therefore, the project has established a noise action plan that covers the establishment of environmental impact prevention and resolution measures and environmental impact monitoring measures to reduce the impact of such project operations.

(1) Construction Phase

Loud noises from construction operations are divided into 2 cases, namely noise levels in sensitive areas and communities and noise levels in construction areas. Details are as follows:

Noise levels in sensitive areas and communities: Noise levels are evaluated from construction operations involving land adjustments/land quality adjustments/land filling, filling of roads and safety areas around taxiways/pavement structure construction, structural work on roads/road surface work, excavations, installation/extraction of pillars and tunnel roofs under the runways, foundation work, structural work, architecture work, system work and construction within the station/systematic work and architecture work within the sky train station for sensitive areas and communities surrounding the project area comprising a total of 201 sites in the range of 40 - 13,740 meters from the border of the construction area. It was found that the 24-hour average noise level was in the range of 59.6 - 85.6 dBA, most of which was in standard level for normal noise according Announcement No. 15 of the National Environment Board (1997), which requires

that the 24-hour average noise level does not exceed 70 dBA except for historical sites and religious sites, comprising 3 locations, namely the Phra Phuttha Nawikapiban Hall (Air Defense Artillery Battalion), the Shrine of Admiral Prince Abhakara Kiartivongse (Air Defense Artillery Battalion), and the Phra Siam Devadhiraj Shrine (Air Defense Artillery Battalion), which are located within 40, 90, and 180 meters, respectively, from the project area. The highest level of noise was from drilling, installation/extraction of pillars and tunnel roofs under the runways, equal to 85.6, 78.7 and 73.2 dBA respectively, which exceeds standard specifications. However, this will not cause any impacts as the area is not inhabited by people. As the historical sites and religious sites already have a relatively high noise level at present (65 dBA) and are relatively close to the construction site, the noise impact is expected to be at a low level.

Noise levels within the construction area: Impact is evaluated from workers during the construction phase with operations conducted for 8 hours per day. In cases where the machinery for each operation is working simultaneously, with noise levels calculated from noise affecting workers throughout the 8-hour period, it was found that the noise level was 84.8 - 90.0 dBA. Noise levels from excavations and the installation/extraction of pillars and tunnel roofs under the runways equaled 90.0 dBA, which exceeds the standard average level of noise allowed for employees throughout the day according to the announcement of the Labor Protection and Welfare Department 2018, which specifies that noise levels must not exceed 85 dBA. However, normal construction operations will not require machinery to be used at the same time. Therefore, it is expected that the impact on workers is high.

Noise levels from the transportation of [sic:] noise project construction materials : Evaluation results for noise levels from transporting project materials on 88 sensitive areas and communities (52 sensitive areas and 36 communities) along the 500-meter-long transportation route found that the 24-hour average noise level at destination sites along the transportation route (highway numbers 3, 332, 3126, and 3376) within a range of 12 - 416 meters was within 40.2 - 63.1 dBA, with a baseline noise level (current noise level) at 60.2 - 65.0 dBA. When evaluated in conjunction with the construction material transportation noise levels, the noise levels are at 61.3 - 67.2 DBA, which is within all normal noise level standards in accordance with Announcement No. 15 of the National Environment Board (1997), which specifies that the 24-hour average noise level must not exceed 70 dBA. Therefore, the impact of noise caused by the transportation of project construction materials is low.

(2) Operation Phase

The main operations causing noise impacts are from the increased aircraft takeoff-landings caused by the opening of runway and taxiway 2 based on the expected noise level in the form of NEF (Noise Exposure Forecast) contours using the AEDT mathematical model. In this regard, the impact of noise levels forecasted for 2048 found that sensitive areas and communities within NEF ≥ 40 and NEF 30 - 40 areas are as follows:

- NEF ≥ 40 area : amounting to 5.60 square kilometers, comprising
  - 5 sensitive areas:
    1) Saeng Song La Child Development Center 3

2) Wat Sa Kaeo School
3) Wat Sa Kaeo
4) Admiral Prince Abhakara Kiartivongse Monument (Air Defense Artillery Battalion)
5) Ban Sa Kaeo Subdistrict Health Promotion Hospital

- 93 community buildings:

- NEF 30 - 40 area : amounting to 19.75 square kilometers, comprising
  - 17 sensitive locations:
    1) Pattanavechsuksa School
    2) Pattanavech College
    3) Wat Sombun Naram School (Tem Rat Memorial)
    4) Sam Nak Thon Subdistrict Municipality Child Development Center in Wat Sombun Naram School
    5) Wat Samnak Kathon
    6) Ban Sam Nak Thon Child Development Center
    7) Admiral Prince Abhakara Kiartivongse Monument
    8) Royal Thai Naval Air Division Naval Aviation Museum
    9 The Royal Monument of King Taksin the Great (Air Defense Regiment 1)
    10) Somdej Phra Pathom (Air Defense Regiment 1)
    11) Admiral Prince Abhakara Kiartivongse Monument (Air Defense Regiment 1)
    12) Phra Phuttha Nawikapiban Hall (Air Defense Artillery Battalion)
    13) Phra Siam Devadhiraj Shrine (Air Defense Artillery Battalion)
    14) Wat Sombun Naram
    15) Wat Samnak Kathon
    16) Ban Khlong Bang Phai Subdistrict Health Promotion Hospital
    17) Ban Khao Khrok Subdistrict Health Promotion Hospital
  - 2,466 community buildings:

High level of impact

7.3.1.2 Objectives

1. To reduce and control the level of noise that may arise from project operations to be contained at minimum level, both in the construction phase and in the operation phase.
2. To prevent and resolve the impact of noise caused by project operations, both in the construction and operation phase, and to monitor the impact of the noise on the communities surrounding the project area.
3. To monitor the results of the implementation of the noise action plan and to oversee effective implementation of the plan.

7.3.1.3 Operation Area

- **Construction Phase**: Construction areas, project areas and areas that are sensitive to impact.

- **Operation Phase**: U-Tapao International Airport area and areas that are sensitive to impact.

7.3.1.4 Implementation method

(1) Environmental Impact Prevention and Resolution Measures

1) Construction Phase

- Reduce noise levels and vibrations from construction by choosing machinery/construction equipment that is in good condition and choosing the construction method techniques that produce the least noise and vibrations. Also, install the noise-reducing equipment on machinery or equipment that cause noise.
- Inspect and maintain construction machinery/equipment on a regular basis so that they are in good condition and do not cause abnormal noise.
- Loud construction operations should be carried out only during the day. Avoid construction during the night that may affect people outside the project area. In the event that it is necessary to carry out construction at night, the contractor shall notify agencies and affected persons of the plans in advance.
- Provide personal protective equipment such as ear plugs or ear muffs for all workers.
- Limit the duration of work for construction workers in loud areas to no more than 8 hours of work for areas with a volume exceeding 85 dBA.
- Provide a place that can reduce noise produced by aircrafts for construction workers to rest during working hours.
- Publicize news on project operations, construction plans and activities as well as complaint channels for residents in the vicinity and road users to stay informed through various channels periodically, such as U-Tapao International Airport public relations web boards, online media, etc.
- Assess activities that will result in an increase in noise from the baseline volume (90th percentile volume: L_{90}) to prevent complaints from the impact of noise.
- The RTN and EECO will control and oversee noise reduction from construction operations.
- Provide channels for receiving complaints about the impacts of the noise caused by project construction at the construction control office or within the U-Tapao International Airport area to acknowledge problems and impacts. In the case of noise complaints during the construction phase, measure noise disturbance and resolve the issue.

2) Operation Phase

1. Management Measures

- The EECO will consider following the guidelines of Doc 9829 AN/451, "Guidance on the Balanced Approach to Aircraft Noise Management," which are guidelines for managing noise pollution under four main principles, namely: (1) Reduction of Noise at Source, (2) Land-use Planning and Management, (3) Noise Abatement Operational Procedures, and (4) Operating Restrictions on Aircraft.
- The EECO will assess monitoring results from noise impacts and continue to take action to reduce noise impacts.
- The EECO will update/review airport development plans in relation to assessments and noise impact reduction at least every 2 years via the Impact Monitoring Committee or the working group appointed and assigned by the Impact Monitoring Committee.
- Control the number of flights so that they do not exceed the maximum number of assessments specified in the EHIA report by providing a summary of the number of flights and aircraft types every year.
- Limit loud aircrafts by specifying that aircrafts operate at a level not exceeding the level specified in Chapter 3 of Annex 16 of the Convention on International Civil Aviation or CAAT regulations to ensure that they are upheld by various airlines. If any aircrafts are found to not comply, the reason will be noted in the environmental impact prevention and resolution measures, and guidelines for resolution will be notified.
- Prepare and record annual complaint management outcomes that include complaint statistics, corrective action, and plans for reducing impacts.
- Implement measures to manage noise pollution from public airports as approved by the National Environment Board in meeting no. 6/2562 on 19 September 2019 and per the Minister's resolution of acknowledgement on 28 January 2020.
- In the event of a change in operating procedures for flights arriving and departing from U-Tapao International Airport, the EECO/or the Airport Operations Certificate holder and Aeronautical Radio of Thailand Company Limited (AEROTHAI) will jointly consider conducting a noise impact assessment in relation to the changing aviation situation to assess the impacts that will arise after the change in flight practices.
- The EECO will arrange a meeting with relevant agencies for implementation planning and to monitor noise impacts from U-Tapao International Airport, with meetings held at least once a year.
- A permanent noise monitoring station will be installed before Runway 2 is opened.

- Baseline noise levels are measured at the permanent noise monitoring stations before initiating operations at each station.
- Permanent noise monitoring stations are to be installed and maintained for the device to operate efficiently at all times.
- There is an airplane noise monitoring system that measures 24-hour noise levels daily and can analyze flight data from the Automatic Dependent Surveillance Broadcast (ADSB). The results of the measurements and aircraft flight routes will be shown online (Real Time Noise Monitoring System) to keep the public informed. The monitoring results will also be revealed to the public via websites etc., and access channels will also be publicized to the public.
- It is required that airlines using U-Tapao International Airport comply with flight and flying-landing procedures that cause the least noise pollution or as specified by the EECO. They must not affect safety factors, and must jointly consider other relevant factors, such as capacity, efficiency of traffic management, and accessibility. Flight and noise data obtained from the permanent noise monitoring station will be summarized every 6 months.
- Publicize information on U-Tapao International Airport operations and listen to complaints and recommendations from related agencies and the general public via at least 3 channels.
- The EECO will prepare a flight database that will at least be connected to a permanent noise monitoring station to support future operations.

2. Ground Noise Control Measures within U-Tapao International Airport

- In case of complaints, review the noise level from the nearby permanent noise monitoring station. If the noise level is exceedingly high, adjust the engine test time, testing the engine only during the daytime or as appropriate. Measure and monitor data closely. Show the monitoring results to the public for their information and disclose the measurement results on through the website, as well as various channels of public relations, to keep the public informed.
- The EECO will coordinate with Aerothai, airlines and ground service agencies to jointly manage ground traffic in the aviation area effectively, reducing activities that release pollutants into the environment.

3. Measures to Lower Noise Levels for Those in Areas Affected by Noise

- Airside operators must use ear protection, such as ear plugs or ear muffs throughout their period of work.
- Office buildings in the U-Tapao International Airport area must be equipped with walls and doors, and air conditioning must also be installed to prevent noise.

4. Land Use Planning Measures

- The EECO will coordinate with relevant agencies, namely local administrative organizations surrounding the project area, Rayong Office of Public Works and Town & Country Planning and the Department of Public Works and Town & Country Planning Chonburi Province, and support information for land use planning and management.
- The EECO is asked to publicize information on safety guidelines for aviation and areas impacted by noise, as well as annual guidelines on how to choose methods and materials for noise protection annually, and coordinate with local authorities for their information.

5. Compensation Measures

5.1 Reimbursement Terms

- Proceed to compensate those affected by the development of the Runway and Taxiway 2 Construction Project, U-Tapao International Airport, by considering the level of impact from the NEF contour map for 2591 and considering the building year, compensating for structures that were constructed up to the date of the EHIA report as approved by the National Environment Board. The EECO must publish the construction information to the public in advance for their information.
- Conduct surveys, prepare databases and plans to compensate those affected by noise arising from the development of the project, with a working group for surveying and considering compensation. The EECO must appoint a working group for surveying and considering compensation immediately after receiving approval from the Cabinet. The working group for surveying and considering compensation must conduct the surveys and consideration of compensation for affected persons prior to opening Runway 2.
- Prepare a compensation plan and prepare compensation progress reports as planned and conduct annual performance assessments.
- Allocate sufficient budgets to prepare compensation plans and public relations and communications plans.

- Assess compensation outcomes and prepare a summary of progress reports on compensation and public relations and communications, as well as the problems and obstacles arising from compensation measures.
- Establish measures to monitor and evaluate the implementation of measures to improve and reduce the impact of noise in the NEF 30 - 40 area within 12 months in order to reduce the impact from repeated complaints from the failure to improve buildings according to the objectives.
- Arrange staff to conduct inspections and check the deterioration of equipment installed for more than 5 years. If it is found that, due to the quality of materials, equipment is damaged faster than per normal use, recommendations for resolution and maintenance must be able to be provided or additional budgets must be supported at the discretion of the working group for considering environmental impact and quality development funds to prevent noise impact and post-compensation complaints.

5.2 Compensation Criteria

In the case of NEF ≥ 40

- The EECO will negotiate for purchasing land with buildings constructed up to the date of the EHIA report as approved by the National Environment Board. In the case that the land owner with the building does not wish to sell the land, provide support to improve the noise impacts by providing compensation for them to improve the building by themselves.
- The EECO will provide support to prevent noise in places which require extra silence, such as schools, hospitals, religious sites, etc., for buildings constructed up to the date of the EHIA report approved by the National Environment Board.

In the case of NEF 30 - 40

- The EECO will provide support for building improvements to reduce noise impacts via compensation for self-improvement of buildings and structures for buildings constructed up to the date of the EHIA report as approved by the National Environment Board.
- The EECO will provide support to prevent noise in places which require extra silence, such as schools, hospitals, religious sites, etc., for buildings constructed up to the date of the EHIA report as approved by the National Environment Board.

6. Noise Resolution Measures in the Event of a Complaint

- The U-Tapao International Airport Environmental Impact Resolution Coordination Center is the main agency for complaint handling. It is responsible for assessing, analyzing, inspecting, and informing the public of complaints, information on noise, and/or other problems arising from aircraft operations, with electronic databases that identify and link to the geographic coordinates in the area around U-Tapao International Airport, which must include at least the following details:
  - Name of person/agency filing complaint
  - House no.
  - Building
  - Time affected
  - Number of residents
  - Claims statistics
  - NEF forecast area
  - NEF monitoring area (if any)
  - Land use
  - Other related matters
- Complaint channels are available 24 hours a day.
- In the event that there is a complaint from the community about noise impacts, use the noise data from the permanent noise monitoring station connected to the flight database or from the 24-hour noise monitoring mobile unit for 7 consecutive days, with the noise measured in NEF or L_{dn} units at the said area. There is a working group to investigate the impact of the project. If the impacts are true, the EECO must proceed to provide compensation in accordance with EECO guidelines.

7. Measures to resolve noise issues in the case of runway closure for repairs

- In the case that the runway is closed for repairs according to the scheduled maintenance plans, the EECO will hold meetings/submit notification documents to relevant agencies and hold meetings with relevant agencies to plan and implement measures to support flight operations and air traffic services at U-Tapao International Airport, keeping in mind the promotion of appropriate runway use to minimize impacts on flight efficiency and noise and environmental impacts while maintaining maximum safety. Examples include managing and increasing arrival flights at off-peak times and managing flight slots by considering reducing the number of flights in relation to flight capacity if runways are closed before announcing the next season's flight schedule. Plans will be coordinated and prepared at least 6 months in advance before closing

runways for repairs prior to the allocation of the flight schedule for the next flight season.

- In case of closure for non-scheduled maintenance, the EECO shall set plans and coordinate with relevant agencies in managing air traffic effectively and with minimal impact, and will prepare a record of operations and public relations for the community.
- Prepare performance reports according to runway reparation measures, both in accordance with various scheduled maintenance and non-scheduled maintenance procedures for relevant issues such as scheduling of flight slots and number of affected flights, etc.
- Study and assess the impact of the repairs for cases in which either of the 2 runways are closed, including preparing a plan to reduce the impact of the incidents and public relations to the relevant agencies and the public for acknowledgement of the runway closure and impact reduction measures, via no less than 3 channels, such as the U-Tapao International Airport information board,, online media, public relations activities, etc.
- Assess compensation outcomes and prepare a summary of progress reports on compensation and public relations and communications, as well as the problems and obstacles arising from compensation measures.
- The EECO is asked to publicize information on safety guidelines for aviation and areas impacted by noise, as well as annual guidelines on how to choose methods and materials for noise protection annually, and coordinate with local authorities for their information.
- Building licensees, owner or occupants must uphold, maintain, or handle procedures in order to allow materials, equipment, or anything else designed to provide protection from aircraft noise to prevent noise from the aircrafts throughout the life of the building.

(2) Environmental Impact Monitoring Measures

1) Construction Phase

Monitoring Method

- Monitor the noise level in general.

Operation Area

- Monitoring stations for noise levels, vibration, and air quality (construction phase), comprising 2 stations, with details as shown in**Table 7.3-1** and **Figure 7.3-1**

Table 7.3□1 Stations for monitoring noise, vibration, and air quality (construction phase)

Station No.	Principles/Rationale for Consideration	Coordinates	
		E	N
1	**Early Childhood Daycare, RTN 6, Royal Thai Naval Air Division :** Representing educational institutions located in Phala Subdistrict, Ban Chang District, Rayong. The nearest building is 2.50 kilometers from Runway 2. The noise level from construction operations combined with the noise level in sensitive areas was 65.1 dBA, which was the highest noise level during the construction period when compared to other sensitive areas in the project study area, and therefore is a suitable representative for monitoring the impacts from project construction operations.	716324.00	1402483.00
2	**Eastern-Nong Muang Community :** Representing communities located in Phala Subdistrict, Ban Chang District, Rayong. The nearest building is 1.37 kilometers from Runway 2. The noise level from construction operations combined with the noise level in sensitive areas was 65.2 dBA, which was the highest noise level during the construction period when compared to other sensitive areas in the project study area, and therefore is a suitable representative for monitoring the impacts from project construction operations.	720404.00	1404400.99

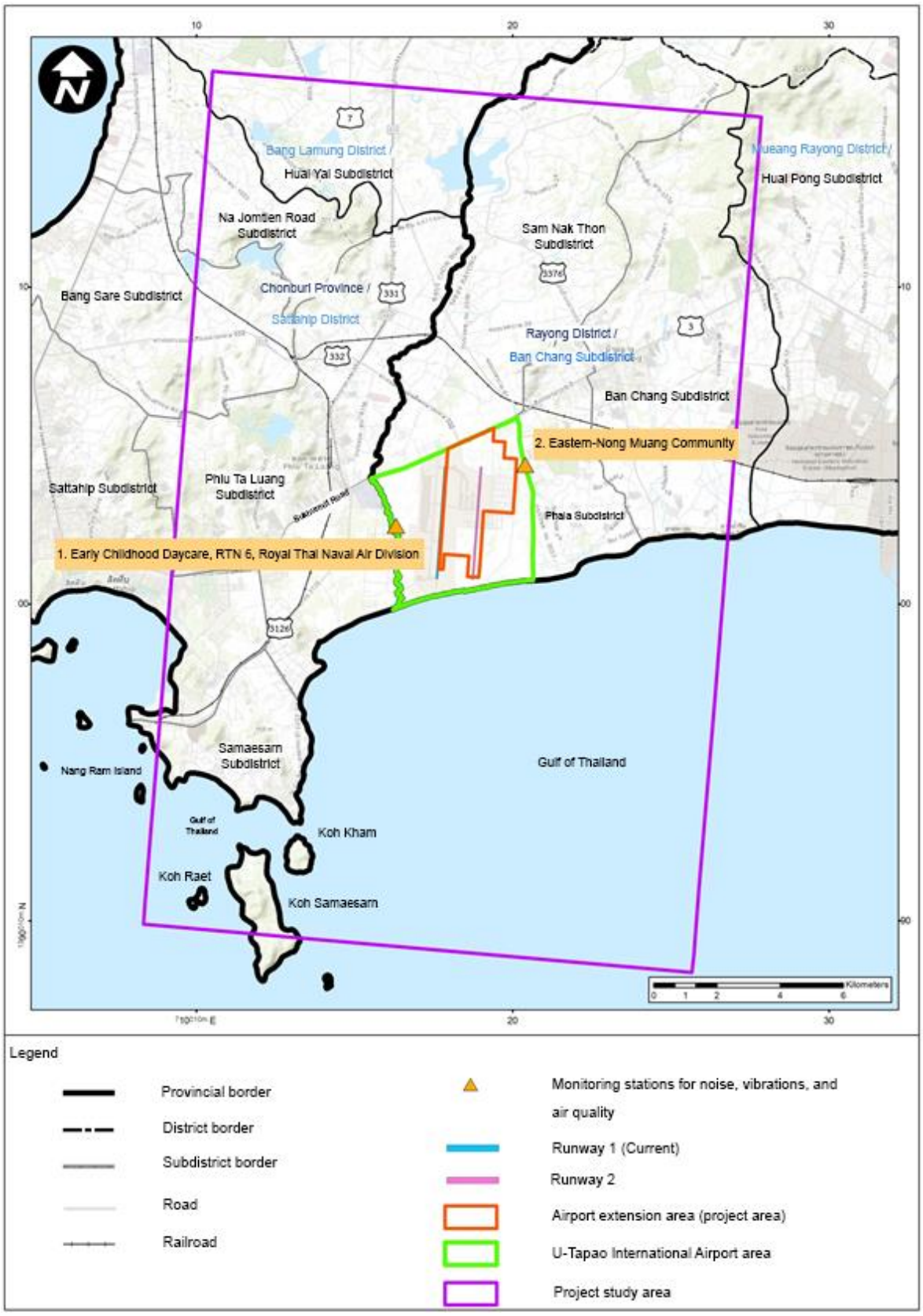

Figure 7.3□1 Station for monitoring noise, vibration, and air quality (construction phase)

Index

- 1-hour average noise level ($L_{eq\ 1\ hr}$)
- 24-hour average noise level ($L_{eq\ 24\ hr}$)
- Night time and day time average noise level (L_{dn})
- Maximum noise level (L_{max})
- 90th percentile noise level (L_{90})
- Noise disturbance level

Frequency

- Monitor general noise levels 24 hours a day for 7 consecutive days.
- Conducted once a month during project construction.

Budget

- Monitoring fee: 159,500 baht/time

2) Operation Phase

2.1) Noise from aircrafts in general areas

Monitoring Method

- Measure noise from aircrafts in general areas and record the monitoring results.
- Collect and summarize the noise level monitoring results from aircraft noise monitoring stations in all general areas.
- Report the monitoring results from every monitoring station and disclose the monitoring results to the public via websites, etc., and publicize the access channels to the public.

Operation Area

- Temporary aircraft noise monitoring station (operation phase) as detailed in **Table 7.3-2 Noise Monitoring** and shown in **Figure 7.3-2 Noise Monitoring**

Table 7.3-2 Noise Monitoring Stations (Operation Phase)

Sequence No.	Coordinates		Noise Monitoring Stations	Principles/Rationale for Consideration
	E	N		
1. Noise Monitoring Stations				
1	716816.35	1405339.05	Ban Khlong Bang Phai Subdistrict Health Promotion Hospital	Representing medical institutions (sites for providing health services to patients). The nearest building is 2.38 kilometers from Runway 2, which is a sensitive area for impacts from changes in environmental quality, located in Sam Nak Thon Subdistrict, Ban Chang District, Rayong, within a NEF 30-40 area, and therefore is a suitable representative for monitoring the impacts from project development operations.
2	718607.74	1409568.58	Ban Khao Khrok Subdistrict Health Promotion Hospital	Representing medical institutions (sites for providing health services to patients). The nearest building is 5.23 kilometers from Runway 2, which is a sensitive area for impacts from changes in environmental quality, located in Sam Nak Thon Subdistrict, Ban Chang District, Rayong, within a NEF 30-40 area, and therefore is a suitable representative for monitoring the impacts from project development operations.
3	719823.05	1412849.68	Wat Samnak Kathon School	Representing educational (sites for educational activities that require extra silence). The nearest building is 8.54 kilometers from Runway 2, which is a sensitive area for impacts from changes in environmental quality, located in Sam Nak Thon Subdistrict, Ban Chang District, Rayong, within a NEF 30-40 area, and therefore is a suitable representative for monitoring the impacts from project development operations.
4	719053.00	1406327.00	Center for the Development of Quality of Life for the Elderly, Sam Nak Thon Subdistrict Administration Organization	Representing communities in NEF≥40 areas at the end of Runway 2. As data can be implemented from the monitoring results as a basis for comparison in the case of no flights, it is a suitable representative for monitoring the impacts from project construction operations that may affect complaints from the public in the future.
2. Permanent Noise Monitoring Stations				
1	718153.21	1407936.84	Village No. 3, Ban Sa Kaeo, Sam Nak Thon Subdistrict Municipality	Representing communities in NEF ≥ 40 areas (high impact) in the upper margin of furthest noise distribution based on the results of the 2048 noise contour forecast, which can be used as a reference for community impact levels from Runway 1 and Runway 2 operations.

Table 7.3-2 Noise Monitoring Stations (Operation Phase)

Sequence No.	Coordinates		Noise Monitoring Stations	Principles/Rationale for Consideration
	E	N		
2	720323.86	1405321.46	Eastern-Nong Muang Community Health Service Center	Representing medical institutions (sites for providing health services to patients). The nearest building is 1.61 kilometers from Runway 2, which is a sensitive area for impacts from changes in environmental quality, located in Phala Subdistrict, Ban Chang District, Rayong, within a NEF 30-40 area, and therefore is a suitable representative for monitoring the impacts from project development operations.
3	716475.46	1400071.69	Southwest of Runway 1	Representing the impacts of noise distribution from the source to the surrounding area southwest of Runway 1, which can be used as a representative for NEF 30-40 areas (moderate impact) based on the noise contour map showing the impacts on the airport area in order to monitor the impact of noise in the future as the number of flights is increased.
4	720013.46	1400742.81	Southeast of Runway 2	Representing the impacts of noise distribution from the source to the surrounding area southeast of Runway 2, which can be used as a representative for NEF 30-40 areas (moderate impact) based on the noise contour map showing the impacts on the airport area in order to monitor the impact of noise in the future as the number of flights is increased.
5	718571.39	1414856.74	Village No. 13, Ban Nong Phakkut, Huai Yai Subdistrict Municipality	Representing communities in NEF 30-40 areas (moderate impact) in the upper margin of furthest noise distribution based on the results of the 2048 noise contour forecast, which can be used as a reference for community impact levels from Runway 1 operations.
6	718725.26	1410753.98	Wat Sombun Naram School (Tem Rat Memorial)	Representing educational institutions, which is an area that is sensitive to the impact of aircraft noise in the NEF 30-40 area (moderate impact), impacted by noise from Runway 1 and Runway 2 operations. It can be used as a reference for the level of impact from noise for educational institutions in yellow contour zones.

Table 7.3-2 Noise Monitoring Stations (Operation Phase)

Sequence No.	Coordinates		Noise Monitoring Stations	Principles/Rationale for Consideration
	E	N		
7	719838.92	1414172.53	Village No. 2, Ban Chak Mak, Sam Nak Thon Subdistrict Municipality	Representing communities in NEF 30-40 areas (moderate impact) in the upper margin of furthest noise distribution based on the results of the 2048 noise contour forecast, which can be used as a reference for community impact levels from Runway 2 operations.

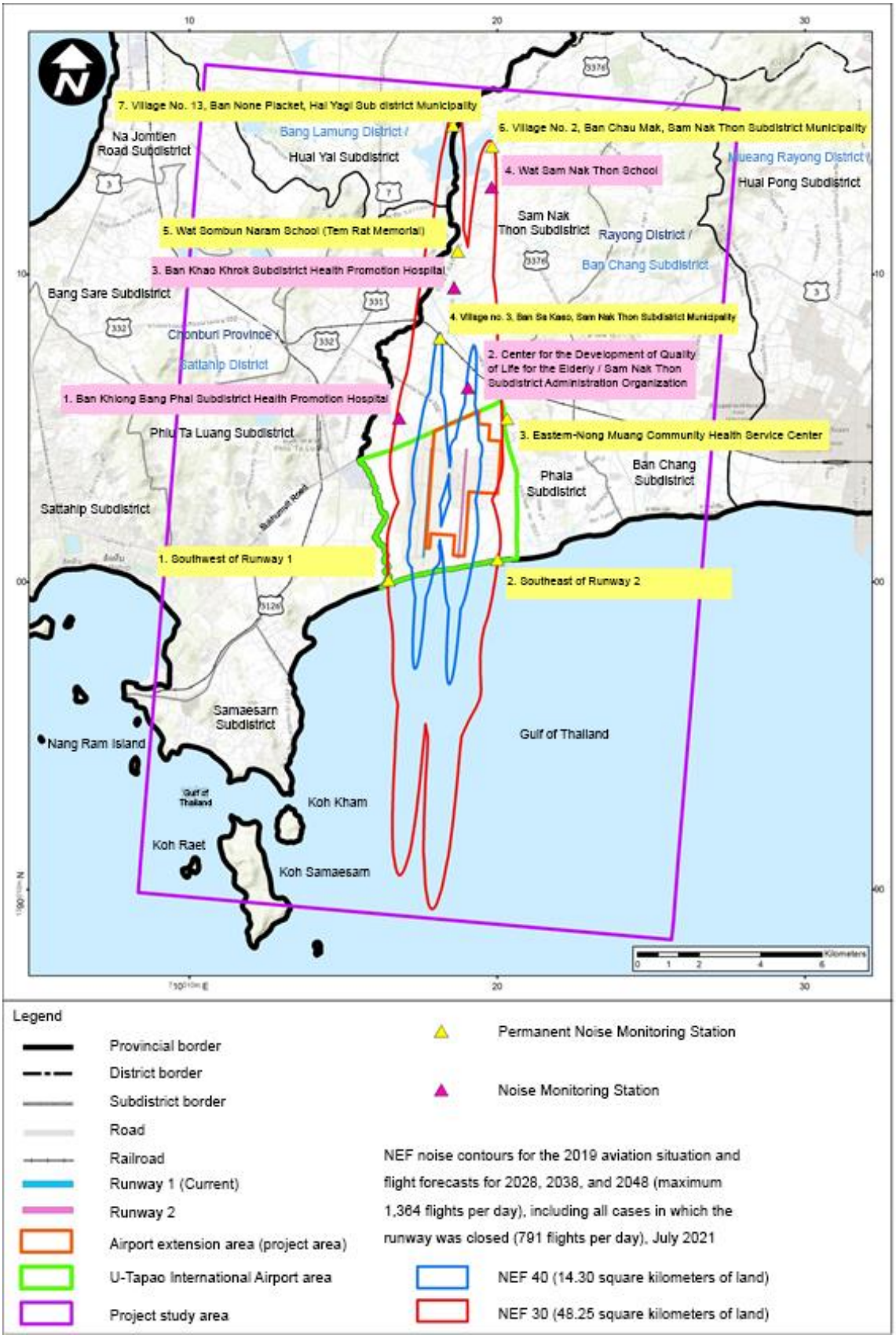

Figure 7.3-2 Noise Monitoring Stations (Operation Phase)

Index

- *Noise* level L_{AE} or SEL
- 1-hour average noise level ($L_{eq\ 1\ hr}$)
- 24-hour average noise level ($L_{eq\ 24\ hr}$)
- Night time and day time noise level (L_{dn})
- Maximum noise level (L_{max})
- 90th percentile noise level (L_{90})
- Aircraft noise level in community areas (average day-night noise level)

Frequency

- Monitored continuously 24 hours a day for 7 consecutive days throughout the duration of the project.
- Continuously throughout the duration of the project. The results will be summarized and submitted to environmental impact assessment committee to compose reports on the implementation of environmental impact monitoring measures and submitted to authorizing agencies every 6 months.

Budget

- Monitoring fee: 691,500 baht/time

2.2) Noise from sources

Monitoring Method

- Monitor noise levels at the source from the runway area using automatic noise monitoring devices continuously for 24 hours to monitor noise during aircraft takeoff and landing.
- Record data, compile and summarize the noise monitoring results from the 7 permanent noise monitoring stations, and identify potential sources of noise that could cause impacts.
- Have a system to record the aircraft noise monitoring results that is linked to the flight database.
- Have real time reports on the monitoring results from every monitoring station and disclose the monitoring results to the public via websites, etc., and publicize the access channels to the public.
- Have a work procedure record with a summary of the operation log sheet.

Operation Area

Permanent noise monitoring stations, comprising 7 stations as shown in **Table 7.3-2 Noise Monitoring** and **Figure 7.3-2 Noise Monitoring**

Index

- Noise level L_{AE} or SEL

- PNL (EPNL) noise level
- 1-hour average noise level ($L_{eq1\ hr}$)
- 24-hour average noise level ($L_{eq24\ hr}$)
- Night time and day time noise level (L_{dn})
- Maximum noise level (L_{max})
- 90th percentile noise level (L_{90})
- Aircraft noise level in community areas (average day-night noise level)

Noise in community areas

<u>Monitoring Method</u>

- Use the noise level data from permanent noise monitoring stations linked to flight databases or from the results of measurements taken for 24 hours over 7 consecutive days from mobile unit monitoring devices.
- Prepare an annual report on complaint management outcomes which contains complaint statistics, corrective action, and analysis and planning to reduce impacts for submission to the Civil Aviation Authority of Thailand (CAAT) once a year by 31 January of each year.

<u>Operation Area</u>

- Areas with complaints from the community due to impacts from noise.

<u>Index</u>

- Noise level L_{AE} or SEL
- PNL (EPNL) noise level
- 1-hour average noise level ($L_{eq\ 1\ hr}$)
- 24-hour average noise level ($L_{eq\ 24\ hr}$)
- Night time and day time noise level (L_{dn})
- Maximum noise level (L_{max})
- 90th percentile noise level (L_{90})
- Aircraft noise level in community areas (average day-night noise level)

<u>Frequency</u>

- Whenever a complaint is received.

Noise from real flight situations.

<u>Monitoring Method</u>

- Prepare a summary of the noise contour maps in NEF or L_{dn} units each year.
- Assess the impact of noise in NEF or L_{dn} units from evaluations using mathematical programs. Use real annual flight data and information on flights and aircraft types from the Automatic Dependent Surveillance

Broadcast (ADS-B) system linked to data from the permanent noise monitoring station system. If it is found that there are more areas impacted by noise in addition to those that have received compensation, conduct surveys and provide compensation for those affected as soon as possible.

- Record data, compile and summarize the noise monitoring results from all permanent noise measurement stations, and identify potential sources of noise that could cause impacts.

Operation Area

- Areas affected by noise.

Frequency

- Once a year throughout the duration of the project.

7.3.1.5 Duration of Operation

- **Construction Phase:** throughout the construction period.
- **Operation Phase:** throughout the duration of the project.

7.3.1.6 Responsible Parties

- **Construction phase**: RTN and EECO, supervising construction contractors to ensure compliance with measures
- **Operation Phase:** EECO

7.3.1.7 Evaluation

Prepare a report on the implementation of environmental impact prevention and resolution measures and environmental impact monitoring measures for submission to authorizing agencies twice a year, both during the construction phase and operation phase.

7.3.2 Vibration Action Plan

7.3.2.1 Principles and Rationale

Project operations during both the construction and operation phase may cause impacts from vibration. The main source of vibration during the construction phase is the construction of runways, comprising the construction of tunnels under the runway, excavating and transporting soil, filling and grinding soil using machinery, transportation of materials, and paving surfaces with asphaltic concrete.

The main source of vibration during the operation phase is the increase in aircraft takeoffs-landings. The project has therefore prepared a vibration action plan that covers the establishment of environmental impact prevention and resolution measures and environmental impact monitoring measures to reduce the impact caused by such project operations.

(1) Construction Phase

The impacts from vibration are evaluated by comparing the maximum particulate speed with the level of impact from vibrations affecting humans and vibrations to prevent impacts on buildings. It was found that there are 144 sensitive areas and 57 communities (201 in total) within a range of 40 - 13,740 meters. The maximum particulate speed caused by the use of a sonic device was within the range of 0.0000 - 0.0610 inches per second (0.0003 - 1.5501 millimeters/second) and the level of impact felt by people in the area. When considering the impacts on building structure, it was found that there were no impacts/damage to any types of structures, and therefore the impact is low.

(2) Operation Phase

The main operations in the operation phase of U-Tapao International Airport are the increased aircraft takeoff-landings which cause more vibrations in the air due to compressed air from the aircraft (wingtip vortices), which also increase accordingly. The results of the assessment of impacts from aircraft wingtip vortices that could affect the 201 sensitive areas and communities located in the project study areas found that there are 34 sensitive areas and communities that may be affected by the wingtip vortices as follows.

Educational institutions : There are 11 sites, namely 1) Pattanavechsuksa School, 2) Pattanavech College, 3) Saeng Song La Child Development Center 3, 4) Wat Sa Kaeo School, 5) Wat Sombun Naram School (Tem Rat Memorial), 6) Sam Nak Thon Subdistrict Municipality Child Development Center in Wat Sombun Naram School, 7) Ban Chang District Center for Non-Formal and Informal Education, 8) Wat Suwan Rangsan Community School, 9) Ban Yai Ra Child Development Center, 10) Wat Samnak Kathon School, and 11) Ban Sam Nak Thon Child Development Center.

Religious Sites : There are 11 sites, namely 1) Admiral Prince Abhakara Kiartivongse Monument (Air Defense Artillery Battalion), 2) Phra Phuttha Nawikapiban Hall (Air Defense Artillery Battalion), 3) Phra Siam Devadhiraj Shrine (Air Defense Artillery Battalion), 4) Wat Sa Kaeo, 5) Wat Sombun Naram, 6) Ban Chang Abundant Grace Church, 7) Wat Samnak Kathon, 8) Wat Suwan Rangsan, 9) Wat Nong Bot, 10) The Shrine of Luang Tia Chak Mak, and 11) Wat Chak Mak.

Medical institutions : There are 3 sites, namely 1) Ban Sa Kaeo Subdistrict Health Promotion Hospital 2) Ban Khao Khrok Subdistrict Health Promotion Hospital, and 3) Ban Sam Nak Thon Subdistrict Health Promotion Hospital.

Communities : There are 9 sites as follows.

- Sam Nak Thon Subdistrict Municipality (Sam Nak Thon Subdistrict, Ban ChangDistrict, Rayong), comprising 7 villages, namely: 1) Village No. 1, Ban Sam Nak Thon, 2) Village No. 2, Ban Chak Mak, 3) Village No. 3, Ban Sa Kaeo, 4) Sa Kaeo Community, 5) Sa Kaeo Community 2, 6) Village No. 6, Ban Khao Khrok, and 7) Village No. 7, Ban Nong Takhian.
- Huai Yai Subdistrict Municipality (Huai Yai Subdistrict, Bang Lamung District, Chonburi) comprising 2 villages, namely: 1) Village No. 11, Ban Map Fakthong, and 2) Village No. 13, Ban Nong Phakkut.

The impact of the vibration in the air caused by aircraft wingtip vortices is expected to be at moderate level.

7.3.2.2 Objectives

1. To reduce and control vibrations that may arise from project operations at minimum level, both in the construction phase and in the operation phase.

2. To prevent and resolve the impacts of vibration arising from project implementation operations, both in the construction and operation phase, and to monitor the impacts of vibration on the communities surrounding the project area.

3. To monitor the implementation outcomes of the Vibration Action Plan measures to a n d to oversee effective implementation of the plan.

7.3.2.3 Operation Area

- **Construction Phase**: Construction areas, project areas and areas that are sensitive to impact.
- **Operation Phase**: U-Tapao International Airport area and areas that are sensitive to impact.

7.3.2.4 Implementation method

(1) Environmental Impact Prevention and Resolution Measures

1) Construction Phase

- An engineer must oversee the operations and choose construction machines/equipment that are in good condition, use construction techniques that minimize vibration or install equipment to reduce vibrations in strict compliance with the instructions for the use of each type of equipment as specified by the manufacturer.
- If a steel plate is needed to temporarily cover the road surface, use extra thick steel plates and place the steel plates close to the road surface. Use rubber pads to prevent noise and vibration from road vehicles.
- The construction contractor must control or limit the vehicle load weight. The weight must not exceed 25 tons. For large trucks, the load must not exceed the weight of the down axle as specified by the law in order to reduce vibrations that will occur.
- The construction contractor must oversee truck drivers transporting construction materials to stay within the speed limit of 40 kilometers per hour when passing through community areas to reduce vibrations, which could affect and disturb the public.

2) Operation Phase

- Provide a primary channel for receiving complaints. The public should report matters to the U-Tapao International Airport Environmental Impact Resolution Coordination Center locatedat U-Tapao International Airport, every day during business hours (8.00 am - 5.00 pm).
- Send an officer to inspect the condition of the damage and prepare a record as proof in all cases to assess the repair costs. The expenses incurred must be paid from the fund for improving quality of life for the public within the estimated amount. A fund management committee will review the damages caused by compressed air in all cases.
- The EECO will conduct operations in accordance with the objectives of the fund for the remedy of environmental impacts and improving quality of life in cases of resolving impacts from falling objects caused by aircrafts and compressed air.

(2) Environmental Impact Monitoring Measures

1) Construction Phase

Monitoring Method

- Monitor vibration in community areas.

Operation Area

- Monitor areas that are sensitive to impacts near the project construction area, comprising 2 stations (**Table 7.3-1**), namely:
  - Early Childhood Daycare, RTN 6, Royal Thai Naval Air Division
  - Eastern-Nong Muang Community

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- Vibrations (Peak velocity) (mm/sec)
- Frequency (Hz)

Frequency

- Monitor vibrations in the community areas 24 hours a day for 7 consecutive days.
- Conducted once a month when construction is close to the project construction area throughout the construction period.

Budget

- Monitoring fee: 132,000 baht/time

2) **Operation Phase**

Monitoring Method

- Monitor vibration in community areas.
- Record monitoring results.
- Compile and summarize the vibration monitoring results from all monitoring stations.
- Report the monitoring results from every monitoring station and disclose the monitoring results to the public via websites, etc., and publicize the access channels to the public.

Operation Area

Vibration monitoring stations, comprising 4 stations as shown in **Table 7.3-*2*** and **Figure 7.3-3 Vibration Monitoring**

Table 7.3-2 Vibration Monitoring Stations (Operation Phase)

Station	Coordinates	
	E	N
Vibration Monitoring Stations		
1. Ban Khlong Bang Phai Subdistrict Health Promotion Hospital	716816.35	1405339.05
2. Center for the Development of Quality of Life for the Elderly, Sam Nak Thon Subdistrict Administration Organization	719053.07	1406327.31
3. Ban Khao Khrok Subdistrict Health Promotion Hospital	718607.74	1409568.58
4. Wat Samnak Khathon School	719823.05	1412849.68

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- Peak velocity of particles
- Frequency

7.3.2.5 Duration of Operation

- **Construction Phase:** throughout the construction period
- **Operations phase:** conducted twice a year throughout the duration of the project

7.3.2.6 Responsible Parties

- **Construction phase**: RTN and EECO, supervising construction contractors to ensure compliance with measures
- **Operation Phase:** EECO

7.3.2.7 Evaluation

Prepare a report on the implementation of environmental impact prevention and resolution measures and environmental impact monitoring measures for submission to authorizing agencies twice a year during the construction phase.

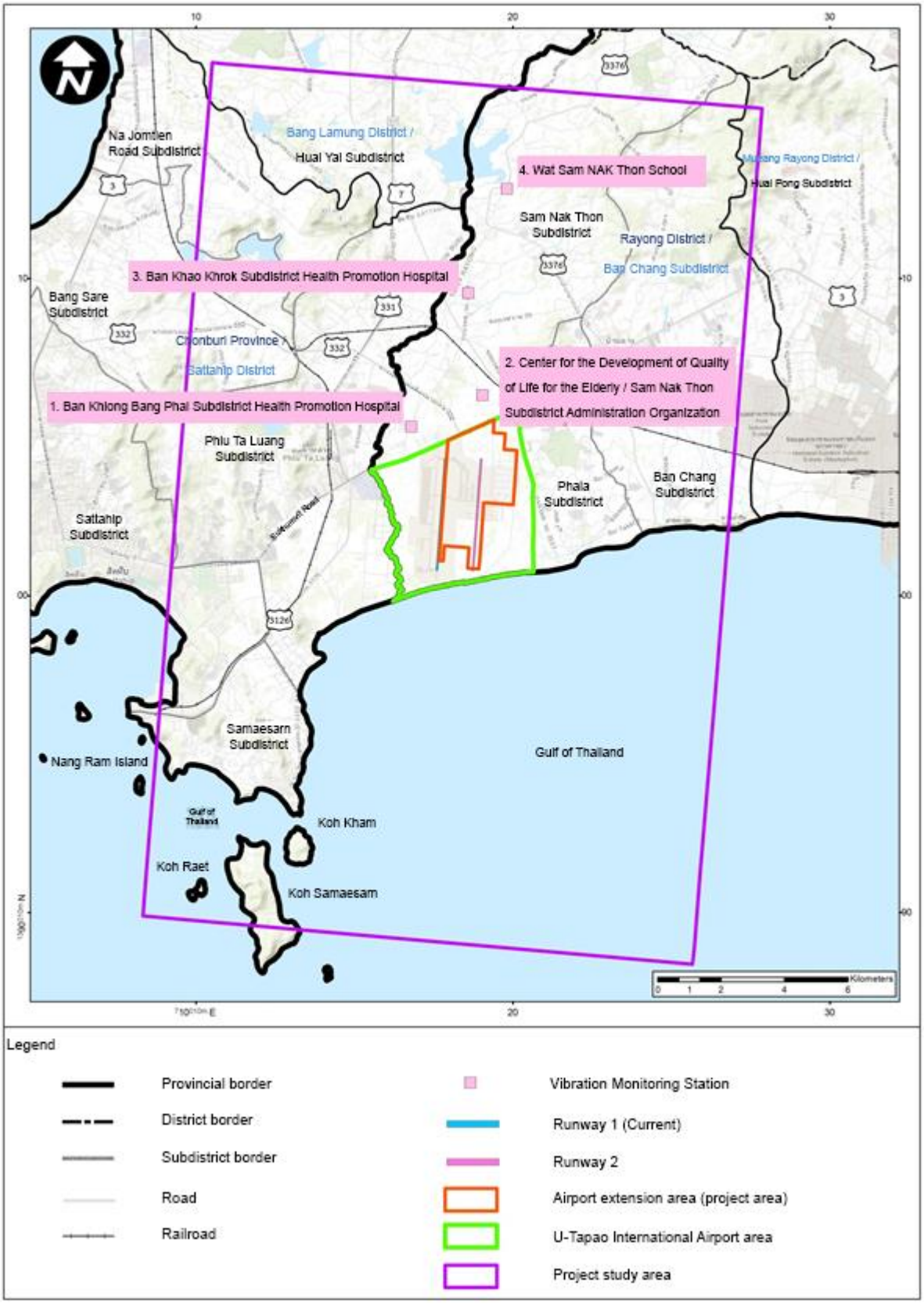

Figure 7.3-3 Vibration Monitoring Stations (Operation Phase)

7.3.3 Air Quality Action Plan

7.3.3.1 Principles and Rationale

Impacts on air in the construction phase, construction site preparation operations, land uncovering, reclamation and compaction, and construction material transportation operations during the construction phase include total suspended particulate and particulate matter with a diameter of less than 10 microns. Normally, impacts from construction particulates are temporary. Construction operations along routes are performed in a short period of time, and the air impacts from the operation phase will be caused by exhaust emitted from combustion of aircraft fuel, which may affect people living nearby in the project area along flight paths.

Therefore, the project has established an air quality action plan that covers the establishment of environmental impact prevention and resolution measures and environmental impact monitoring measures to reduce the impact of such project operations.

(1) Construction Phase

Construction operations will emit exhaust from machinery used for preparing the area, ground level adjustments, and construction. The results of air quality assessments are summarized as follows:

Predicted TSP Concentration: Based on construction activities in sensitive areas and communities around the project, the concentration range was within 1.627 - 132.226 micrograms per cubic meter, with the highest concentration in the Eastern-Nong Muang community, which is located 1,120 meters from the construction area. When the model is combined with the baseline values, the TSP concentration is in the range of 79.852 - 274.226 micrograms per cubic meter and found that all sites were within general atmospheric air quality standard range (according to Announcement No. 24 of the National Environment Board 2004 Re: Determination of General Atmospheric Air Quality Standards, which requires that 24-hour average TSP must not exceed 330 micrograms per cubic meter).

Predicted concentration of particulate matter with a diameter of less than 10 microns (PM_{10}) : Based on construction activities, the concentration range was within 0.350 - 26.912 micrograms per cubic meter, with the highest concentration being in Eastern-Nong Muang Community, located 1,120 meters away from the construction area. When the model is combined with the baseline values, the PM10 particles are within the range of 43.668 - 90.912 micrograms per cubic meter. When compared with the general atmospheric air quality standards (according to Announcement No. 24 of the National Environment Board 2004 Re: Determination of General Atmospheric Air Quality Standards, which requires that 24-hour average PM10 concentration must not exceed 120 micrograms per cubic meter), it was found that all sites were within standard range.

Predicted Carbon Monoxide (CO) Concentration : Based on construction activities, the concentration range was within 2.174 - 135.462 micrograms per cubic meter, with the highest concentration being in the area of Ban Sa Kaeo Subdistrict Health Promotion Hospital, located 2,620 meters away from the construction area. When the model is combined with the baseline values, carbon monoxide is within the range of 1,506.131 - 2,375.462 micrograms per cubic meter. When

compared with the general atmospheric air quality standards (according to Announcement No. 10 of the National Environment Board 1995 Re: Determination of General Atmospheric Air Quality Standards, which requires that the 1-hour average CO concentration must not exceed 34,200 micrograms per cubic meter), it was found that all sites were within standard range.

Predicted Nitrogen Dioxide (NO_2) Concentration : Based on construction activities, the concentration range was within 2.487 - 154.511 micrograms per cubic meter, with the highest concentration being in the area of Ban Sa Kaeo Subdistrict Health Promotion Hospital, located 2,620 meters away from the construction area. When the model is combined with the baseline values, nitrogen dioxide is within the range of 32.411 - 243.111 micrograms per cubic meter. When compared with the general atmospheric air quality standards (according to Announcement No. 33 of the National Environment Board (2009) Re: Determination of Standards for Nitrogen Dioxide in General Atmospheric Air, which requires that the 1-hour average nitrogen dioxide concentrations (NO_2) must not exceed 320 micrograms per cubic meter), it was found that all sites were within standard range when considered overall. It is expected that impacts on air pollution caused by project construction operations will be low to moderate.

(2) Operation Phase

The project has conducted air impact assessments that are consistent with the number of flights in the noise impact assessment. Results from all predicted air pollutant emissions during the project operation phase in all 11 cases and the worst case scenario (hours with a maximum of 70 flights) for 2048 are summarized as follows:

General Atmospheric Air Quality

From the predicted emission of air pollutants in the general atmospheric air quality index based on AERMOD models, it was found that 24-hour average maximum PM_{10} concentrations and 24-hour average and 1-hour average sulfur dioxide (SO_2) concentrations in all cases do not exceed general atmospheric air quality standards. However, 1-hour average nitrogen dioxide (NO_2) concentrations in all cases exceeded the standards for nitrogen dioxide in general atmospheric air. When considering air pollutant concentration in sensitive areas and communities, it was found that the maximum 24-hour average concentrations for PM_{10} particles, 24-hour average sulfur dioxide (SO_2), and 1-hour average carbon monoxide (CO) did not exceed general atmospheric air quality standards in all cases. However, 1-hour average nitrogen dioxide (NO_2) exceeded the standard range in 5 sites, namely Wat Khao Bai Si Santitham, Ban Khao Khrok Subdistrict Health Promotion Hospital, Village No. 3 Ban Sa Kaeo, Sa Kaeo Community 1, Village No. 6 Ban Khao Khrok, Village No. 8 Ban Cherng Khao, Ban Chang - Phala Community, and Wirat Phatthana Department Store.

Volatile Organic Compounds

Based on the predicted emission of volatile organic air pollutants, it was found that benzene and 1,3-Butadiene did not exceed surveillance range (per the announcement of the Pollution Control Department determining surveillance ranges for volatile organic compounds in the general atmosphere within 24 hours, comprising benzene not exceeding 7.6 micrograms per

cubic meter and 1,3-Butadiene not exceeding 5.3 micrograms per cubic meter). However, the acrolein concentration was higher than surveillance range (per the announcement of the Pollution Control Department determining surveillance values for volatile organic compounds in the general atmosphere within 24 hours, comprising acrolein not exceeding 0.55 micrograms per cubic meter). When considering the concentration of pollutants in sensitive areas and the communities, the highest 24-hour average concentrations of benzene and 24-hour average 1,3-Butadiene concentrations in all cases did not exceed surveillance range, while acrolein concentrations exceeded surveillance range in 24 sites, namely: Phra Phuttha Nawikapiban Hall (Air Defense Artillery Battalion, 2) The Shrine of Admiral Prince Abhakara Kiartivongse (Air Defense Artillery Battalion), 3) Phra Siam Devadhiraj Shrine (Air Defense Artillery Battalion), 4) The Shrine of Admiral Prince Abhakara Kiartivongse (Air Defense Regiment 1), 5) Village No. 3, Ban Khlong Bang Phai, 6) Eastern-Nong Muang Community Health Service Center, 7) Pattanavechsuksa School, 8) Village No. 3, Ban Sa Kaeo, 9) Village No. 8, Ban Cherng Khao, 10) Village No. 3, Ban Sa Kaeo, 11) Village No. 8, Ban Cherng Khao, 12) Wat Khiri Pawanaram Community, 13) Ban Chang - Phala Community, 14) Sa Kaeo 2 Community, 15) Saeng Song La Child Development Center 3, 16) Ban Sa Kaeo Subdistrict Health Promotion Hospital, 17) Wat Sa Kaeo School, 18) Sa Kaeo Community 1, 19) Ming Mongkol Community, 20) Jor Koo Community, 21) Wirat Phatthana Department Store Community, 22) Village No. 6, Ban Khao Khrok, 23) Thep Chinda Community, and 24) Ban Khao Khrok Subdistrict Health Promotion Hospital. Impact was at moderate level.

7.3.3.2 Objectives

1. To reduce and control the dispersion and emission rates of air pollutants that may arise from project operations in both the construction phase and operation phase to be contained at a minimum level.
2. To prevent and resolve the impact on air quality caused by project operations, both in the construction phase and operation phase, and for surveillance of the impacts on air quality in the communities surrounding the project area.
3. To monitor the results of the implementation of the air quality action plan and to oversee effective implementation of the plan.

7.3.3.3 Operation Area

- **Construction Phase**: Construction areas, project areas and areas that are sensitive to impact.
- **Operation Phase**: U-Tapao International Airport area and areas that are sensitive to impact.

7.3.3.4 Implementation method

(1) Environmental Impact Prevention and Resolution Measures

1) Construction Phase

- Construction areas with vehicles and work that may cause particulates, including roads within U-Tapao International Airport used for transporting

materials, equipment and workers during the construction phase that have not yet been paved or concreted must be sprinkled with water at least 2 times a day or as suitable to prevent and reduce the effect of particle dispersion into the atmosphere.

- Cover the loading compartment of vehicles used to transport materials and construction equipment that may cause dispersions using canvas or similar materials.
- Erect a 2-meter high fence around the construction area to clearly designate the construction area and to reduce the dispersion of particulate matter and exhaust from construction machinery, including the ricocheting of construction materials outside of the area.
- Wash or clean the wheels of all vehicles leaving the construction area to ensure that they are free of dirt, mud, or sand before taking the vehicle onto an external road by providing a suitable washing or cleaning area.
- Increase protection against vehicles to prevent pollution from exceeding standard range by checking construction machinery and engine conditions. If exhaust emissions exceed standard range or are defective, they must be corrected to good condition before use.
- Limit the speed of vehicles used for transporting materials in compliance with the law, with a speed limit of 60 kilometers per hour for trucks weighing over 1,200 kilograms and 45 kilometers per hour for towing trucks and trailers. In this regard, the speed limit for construction areas is 30 kilometers per hours.

2) Operation Phase

1. Management Measures

- The EECO will coordinate the relevant agencies to efficiently allocate flight schedule slots in accordance with flight capacity. In this respect, this must affect safety factors.
- Complete the installation of the automated air quality monitoring station (AQMS) before opening Runway 2.
- Conduct general atmospheric air quality monitoring to provide baseline data for the area surrounding the air quality monitoring station prior to initiating operations at each station.
- It is required that airlines using U-Tapao International Airport comply with flight and flying-landing procedures that cause the least air pollution in compliance with legal standard requirements. They must not affect safety factors, and must jointly consider other relevant factors, such as capacity, efficiency of traffic management, and accessibility.
- The EECO will prepare a flight database that is linked to the reports of results from the general atmospheric air quality monitoring stations to support future operations.

2. Ground Air Pollution Control Measures at U-Tapao International Airport

- Require aircrafts to turn off their engines when approaching a tunnel or passenger loading bridge and to use power distribution equipment and air conditioning supported by the U-Tapao International Airport public utility system.
- The EECO will coordinate with Aerothai, airlines and ground service agencies to jointly manage ground traffic in the airspace to effectively reduce waiting times for aircraft runways and to reduce pollutant emissions into the environment.
- Encourage U-Tapao International Airport employees and service users to use more public transportation, which will result in reduced energy consumption and pollution from cars.
- Promote the use of environmentally friendly vehicles, such as electric powered vehicles.
- Encourage the use of ground support equipment (GSEs) that use low-emission fuels. For instance, use electric fuel within the airside area and use natural gas or electricity within the landside area.
- Organize traffic within U-Tapao International Airport, especially around the terminal building and parking areas, to avoid congestion to reduce air pollution emissions.
- The EECO will develop/improve ground power units and pre-conditioned air service systems to cover aircraft stand taxilanes and establish measures for airlines to use such systems instead of the aircraft's auxiliary power unit (APU).

3. Air Pollution Resolution Measures in the Case of Closure for Runway Repairs

- Have public relations with the relevant agencies and the public for acknowledgement of the runway closure and impact reduction measures via various channels such as the U-Tapao International Airport information board, online media, public relations activities, etc.
- Request that airlines cooperate in parking aircrafts in the aircraft stand taxilanes while waiting for takeoff.

(2) Environmental Impact Monitoring Measures

1) Construction Phase

Monitoring Method

- Monitor general atmospheric air quality for 24 hours over 7 consecutive days.

Operation Area

- Monitor sensitive areas and communities near the project construction area, comprising 2 stations as shown in Table**Table 7.3-**1, namely:
  - Early Childhood Daycare, RTN 6, Royal Thai Naval Air Division
  - Eastern-Nong Muang Community

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- 24-hour average total suspended particulates (TSP)
- 24-hour average particulate matter with a diameter of less than 10 microns (PM_{10})
- 24-hour average particulate matter with a diameter of less than 2.5 microns ($PM_{2.5}$)
- 1-hour average nitrogen oxide (NO_2)
- 1-hour average and 8-hour average carbon monoxide (CO)
- 3-hour average non-methane hydrocarbon (NMCHC)
- 1-hour average total hydrocarbon (THC)
- 24-hour average volatile organic compounds (VOCs)
- Wind speed and wind direction (WS/WD)

Frequency

- Conducted once a month during construction periods.

Budget

- Monitoring fee: 959,700 baht/time

2) Operation Phase

1. General Atmospheric Air Quality

Monitoring Method

- Monitor general atmospheric air quality for 24 hours over 7 consecutive days.

Operation Area

- Monitor general atmosphere air quality at 5 stations. Details are as shown in **Table 7.3-** 3 and FigureFigure ***7.3-4***

Table 7.3- 3 General Atmospheric Air Quality Monitoring Station (Operation Phase)

Station No.	Principles/Rationale for Consideration	Coordinates	
		E	N
1	**Ban Khao Khrok Subdistrict Health Promotion Hospital:** Representing medical institutions (sites for providing health services to patients) located in Ban Chang Subdistrict, Ban Chang District, Rayong. The nearest building is 1.37 kilometers from Runway 2.	718607.74	1409568.58
2	**Wat Sombun Naram School (Tem Rat Memorial) :** Representing educational institutions (sites for educational activities that require extra silence), located in Sam Nak Thon Subdistrict, Ban Chang District, Rayong. The nearest building is 6.26 kilometers from Runway 2.	718725.26	1410753.98
3	**Wat Sam Nak Thon School :** Representing educational institutions (sites for educational activities that require extra silence), located in	719823.05	1412849.68

Table 7.3-3 General Atmospheric Air Quality Monitoring Station (Operation Phase)

Station No.	Principles/Rationale for Consideration	Coordinates	
		E	N
	Sam Nak Thon Subdistrict, Ban Chang District, Rayong. The nearest building is 8.54 kilometers from Runway 2.		
4	**Village No. 2, Ban Chak Mak, Sam Nak Thon Subdistrict Municipality :** Representing communities, located in Sam Nak Thon Subdistrict, Ban Chang District, Rayong. The nearest building is 9.80 kilometers from Runway 2.	719838.92	1414172.53
5	**Village No. 13, Ban Nong Phakkut Subdistrict Municipality :** Representing communities, located in Huai Yai Subdistrict, Bang Lamung District, Rayong. The nearest building is 10.67 kilometers from Runway 2.	718571.39	1414856.74

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- 24-hour average total suspended particulates (TSP)
- 24-hour average particulate matter with a diameter of less than 10 microns (PM_{10})
- 24-hour average particulate matter with a diameter of less than 2.5 microns ($PM_{2.5}$)
- 1-hour average and 8-hour average carbon monoxide (CO)
- 1-hour average nitrogen oxide (NO_2)
- 24-hour average volatile organic compounds (VOCs)
- Wind speed and wind direction (WS/WD)

Frequency

- 2 times a year throughout the duration of the project.

2. Air Quality Monitoring Systems

Monitoring Method

- Install automated air quality monitoring stations and monitor general atmospheric air quality for surveillance.

Operation Area

- Continuous air quality monitoring stations, comprising 4 stations as shown in Table 7.3-4 and **Figure 7.3-*4***

Table 7.3-4 Continuous air quality monitoring stations (air quality monitoring systems)

Station No.	Principles/Rationale for Consideration	Coordinates	
		N	E
1	**Southwest of Runway 1 :** Representing the impact of the airborne pollutants dispersed from the source to the surrounding areas southwest of Runway 1 for surveillance of the impacts of airborne pollutants in the future when the number of flights is increased.	716475.46	1400071.69
2	**Southeast of Runway 2 :** Representing the impact of the airborne pollutants dispersed from the source to the surrounding areas southeast of Runway 2 for surveillance of the impacts of airborne pollutants in the future when the number of flights is increased.	720013.46	1400742.81
3	**Eastern-Nong Muang Community Health Service Center :** Representing medical institutions (sites for providing health services to patients). The nearest building is 1.61 kilometers from Runway 2, which is a sensitive area for impacts from changes in environmental quality, located in Phala Subdistrict, Ban Chang District, Rayong, and thus is a suitable representative for monitoring the impacts from project development operations.	720323.86	1405321.46
4	**Ban Khlong Bang Phai Subdistrict Health Promotion Hospital :**Representing medical institutions (sites for providing health services to patients). The nearest building is 2.38 kilometers from Runway 2, which is a sensitive area for impacts from changes in environmental quality, located in Sam Nak Thon Subdistrict, Ban Chang District, Rayong, and is a suitable representative for monitoring the impacts from project development operations.	716816.35	1405339.05

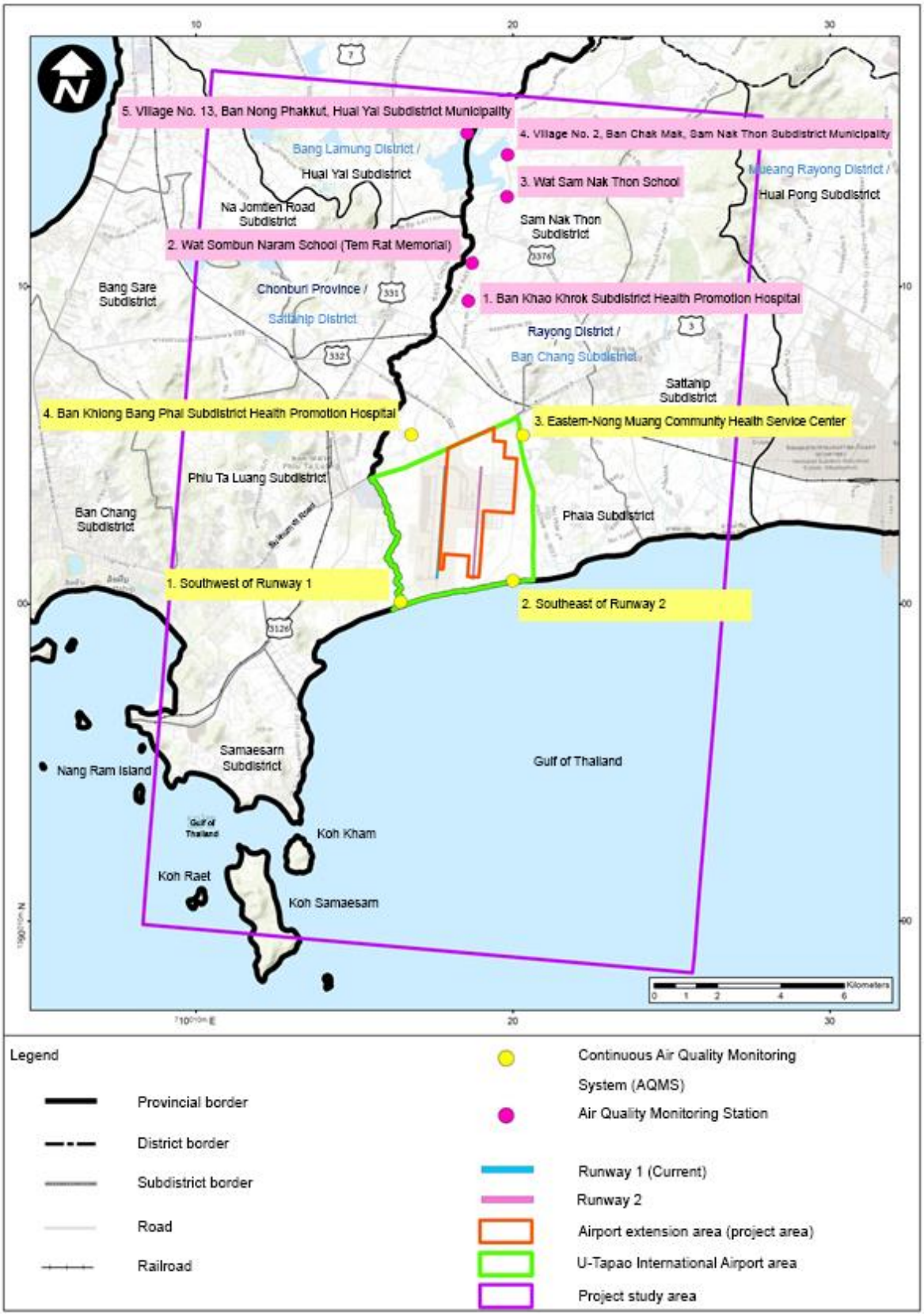

Figure 7.3-4 Air Quality Monitoring Station (Operation Phase)

Index

- 24-hour average and 1-year average particulate matter with a diameter of less than 10 microns (PM_{10})
- 24-hour average and 1-year average particulate matter with a diameter of less than 2.5 microns ($PM_{2.5}$)
- 1-hour average and 8-hour average carbon monoxide (CO)
- 1-hour average and 1-year average nitrogen oxide (NO_2)
- 24-hour average volatile organic compounds (VOCs)*
- Wind direction and wind speed (WD/WS)

Notes : *

- Conduct monitoring for volatile organic compounds (VOCs) in the atmosphere with analysis parameters, sampling methods, and assessment in accordance with the announcement of the Pollution Control Department Re: Determination of Surveillance Ranges for Volatile Organic Compounds in the General Atmosphere Within 24 Hours dated 18 December 2008 or the latest version or other relevant laws for use as guidelines for managing air pollution issues and to reduce public health risks arising from U-Tapao International Airport operations.
- Record the environmental conditions, such as the number of cars, motorcycles, and airplanes at the time of each measurement to support analysis to find the cause of increased compounds.

Frequency

- Continuously throughout the duration of the project. The results will be summarized and submitted to environmental impact assessment committee to compose reports on the implementation of environmental impact monitoring measures and submitted to authorizing agencies every 6 months.
- For VOC_S specifically, monitoring will be conducted 2 ties a year in April (representing the hot season) and December (representing the cold season) continuously throughout the duration of the project or consider flight statistics during peak flight hours for 3 retrospectives and compose a report on compliance with environmental impact monitoring measures for submission to authorizing agencies every 6 months.

Budget

- Monitoring fee: 1,854,000 baht/time

7.3.3.5 Duration of Operation

- **Construction Phase:** throughout the construction period
- **Operation Phase:** throughout the duration of the project

7.3.3.6 Responsible Parties

- **Construction phase**: RTN and EECO, supervising construction contractors to ensure compliance with measures
- **Operation Phase:** EECO

7.3.3.7 Evaluation

Prepare a report on the implementation of environmental impact prevention and resolution measures and environmental impact monitoring measures for submission to authorizing agencies twice a year, both during the construction phase and operation phase.

7.3.4 Topography Action Plan

7.3.4.1 Principles and Rationale

The project implementation activities in the construction phase may affect topography. The main source in the construction phase is caused by land adjustments for constructing Runway and Taxiway 2, which may result in changes to the topography within U-Tapao International Airport.

Therefore, the project has prepared a topography action plan covering the establishment of environmental impact prevention and resolution measures to reduce the impacts from project operations.

(1) Construction Phase

Construction of the Runway 2 and project components will be conducted within the U-Tapao International Airport area. Operations that affect topography include land preparation, land reclamation and land adjustments in the construction area. When reviewing the area, it was found that it is currently empty land, which will result in height changes to the area. However, it will not cause the overall topography of U-Tapao to change much from before and the scope of impact is limited to the project construction area.

(2) Operation Phase

Operations conducted during the operation phase are primarily related to the takeoff - landing of aircrafts and the management of U-Tapao International Airport. The land conditions in the area will mostly remain the same, and therefore there is no impact on topography.

7.3.4.2 Objectives

1. To reduce changes in topography caused by conducting project operations in the construction phase to be contained at a minimum level.
2. To prevent and resolve impacts on topography caused by project implementation operations during the construction phase.
3. To monitor the results of the implementation of the topography action plan and to oversee effective implementation of the plan.

7.3.4.3 Operation Area

- **Construction Phase**: Project construction area

7.3.4.4 Implementation method

Environmental Impact Prevention and Resolution Measures

Construction Phase

- Require the contractor to conduct land reclamation in accordance with the Land Excavation and Land Filling Act 2000 and its amendments.

7.3.4.5 Duration of Operation

- **Construction Phase:** throughout the construction period

7.3.4.6 Responsible Parties

- **Construction phase**: RTN and EECO, supervising construction contractors to ensure compliance with measures

7.3.4.7 Evaluation

Prepare a report on the implementation of environmental impact prevention and resolution measures for submission to authorizing agencies twice a year during the construction phase.

7.3.5 Geological and Earthquake Action Plan

7.3.5.1 Principles and Rationale

Project implementation operations in both the construction phase and operation phase may affect geology and land. The main source during the construction phase is due to the construction operations and adjustments to land conditions in the Runway and Taxiway 2 construction area, which may cause subsidence, resulting in changes in geology and earthquakes in the construction area.

The main source in the operation phase is due to the operation of U-Tapao International Airport, in which aircraft takeoff - landing could cause soil subsidence.

As a result, the project has established environmental impact prevention and resolution measures and environmental impact monitoring measures for geology and earthquakes to reduce the impact of such project operations.

(1) Construction Phase

From soil surveys conducted in the project area, it was found that the soil was sedimentary. Project construction includes activities such as reclamation, pavement compression, and concreting and asphalting. There are no foundational construction operations that require drilling into lower soil structures. For foundation structures of buildings or various warehouses, pillars will need to be driven into the soil structure. Building and structure designs must be in compliance with the regulations of the Ministry of Interior, which determines the load, resistance, and durability of buildings and supporting grounds for earthquake resistance, 2021, in the Government Gazette dated 4 March 2021. Project construction will therefore not affect geology. In this regard, from Thailand earthquake statistics from 2013 to 2017, it was found that Rayong does

not have any fault lines. There are no earthquake statistics for the project study area, so impact is low.

(2) Operation Phase

After initiating operations for Runway and Taxiway 2 and various components within U-Tapao International Airport, there will be takeoff - landing operations and aircraft maintenance operations. Therefore, there will be no activities that involve drilling into the lower soil levels or actions involving soil surfaces or geological conditions. Therefore, there is no impact on geology.

7.3.5.2 Objectives

1. To reduce and control soil subsidence that may arise from project operations at minimum level, both in the construction phase and in the operation phase.
2. To prevent and resolve the impacts on geology and earthquakes arising from project implementation activities both in the construction and operation phase.
3. To monitor the implementation of the geological and earthquake action plan and oversee effective implementation of the plan

7.3.5.3 Operation Area

- **Construction Phase**: Project construction area
- **Operation Phase**: U-Tapao International Airport area

7.3.5.4 Implementation method

(1) Environmental Impact Prevention and Resolution Measures

1) Construction Phase

- Pumping of groundwater for use in the construction site and construction control office is prohibited to prevent impacts on soil subsidence.
- Require that the RTN and the EECO/or construction operators submit past soil subsidence data and problems arising from using various systems from U-Tapao International Airport to be used as information for the design of future developments in U-Tapao International Airport.
- Building and structure designs must be in compliance with the regulations of the Ministry of Interior, which determines the load, resistance, and durability of buildings and supporting grounds for earthquake resistance, 2021, in the Government Gazette dated 4 March 2021.

2) Operation Phase

- Pumping of groundwater for use in the U-Tapao International Airport operations is prohibited.
- Establish an internal unit within U-Tapao International Airport to be responsible for recording soil subsidence monitoring data for Runway and Taxiway 2.

(2) Environmental Impact Monitoring Measures

Operation Phase

Monitoring Method

- Monitor soil subsidence for Runway and Taxiway 2 by surveying the height of surfaces and height of fixed horizontal and vertical control reference pins.

Operation Area

- Runway and taxiway 2 surface and the airport apron.

Index

- Height of runway and taxiway surfaces and height of fixed horizontal and vertical control reference pins

Frequency

- Once a year throughout the duration of the project.

Budget

- Analysis and study fee: 200,000 baht/time

7.3.5.5 Duration of Operation

- **Construction Phase:** throughout the construction period
- **Operation Phase:** throughout the duration of the project

7.3.5.6 Responsible Parties

- **Construction phase**: RTN and EECO, supervising construction contractors to ensure compliance with measures
- **Operation Phase:** EECO

7.3.5.7 Evaluation

Prepare a report on the implementation of environmental impact prevention and resolution measures and environmental impact monitoring measures for submission to authorizing agencies twice a year, both during the construction phase and operation phase.

7.3.6 Soil Resource Action Plan

7.3.6.1 Principles and Rationale

Project implementation operations in both the construction phase and operation phase may affect soil resources. The main source during the construction phase is due to the construction operations and adjustments to land conditions in the Runway and Taxiway 2 construction area, which may cause subsidence, resulting in changes to soil resources in the construction area.

The main source in the operation phase is due to the operation of U-Tapao International Airport, in which aircraft takeoff - landing could cause soil subsidence.

Therefore, the project has established a soil resource action plan that covers the establishment of soil resource environmental impact prevention and resolution measures and environmental impact monitoring measures to reduce the impact of such project operations.

(1) Construction Phase

1) Soil Erosion

The removal of trees or ground-covering plants from the project area to prepare for the construction of runways, taxiways, and other components may cause wind and water to easily washout the soil as the majority of the land around the project area is comprised of sand. Due to the condition of the soil having high erosion rates, during the construction phase, there will be operations that involve clearing, digging, and piling of soil, which may impact soil erosion, causing soil to erode into project area drainage channels, which could cause clogging in drainage systems.

2) Soil Subsidence

During the construction phase, the project will request to purchase tap water from the provincial waterworks in the project vicinity, namely the Provincial Waterworks Authority, Rayong branch and Ban Chang branch, in which the branches of the Provincial Waterworks Authority in Rayong do not dig or pump groundwater for use. Therefore, no soil subsidence is expected in this nature and will not affect project construction.

3) Soil Solidification

Soil solidification will be performed using different machines and tools depending on the depth of the soil to be improved based on the same principles as soil compaction, which improves soil quality by applying mechanical energy. Compaction at a shallow level is performed approximately 1-2 meters from the soil surface, and can be done by using general machinery such as rollers, water sprayers, and graders. At medium depth, it is performed 2-10 meters from the soil surface. An impact hammer weighing 7 tons or more is rapidly lifted and pounded into a 1.50 meter diameter of the hammering area, at points spaced 3.00 meters apart. It is used to improve soil in areas with very loose sand, with a thickness of 4 to 8 meters. When the compaction is complete, the resulting soil will be stable and have low subsidence, and will be able to tolerate the designated weight. Therefore, overall impact on soil resources is low.

(2) Operation Phase

Soil Erosion: The project will install 1 water pumping station at pond no. 1 to pump excess stored rain water to the outside, comprising 4 pumps with a pumping rate of 2 cubic meters per second (3 pumps in operation, 1 reserve pump). A maximum of 3 pumps will be used at the same time. The total pumping rate is 6 cubic meters per second. Water flowing from the pumping station will have a high flow rate, which may cause soil erosion.

Soil Subsidence: U-Tapao International Airport uses water received from water providers (East Water Co., Ltd.), which does not use pumped groundwater. Therefore, there are no factors that would cause or contribute to soil subsidence in the project area.

7.3.6.2 Objectives

1. To reduce and control soil subsidence that may arise from project operations at minimum level, both in the construction phase and in the operation phase.
2. To prevent and resolve the impacts on soil resources arising from project implementation activities both in the construction and operation phase.
3. To monitor the results of the implementation of the soil resource action plan and oversee effective implementation of the plan.

7.3.6.3 Operation Area

- **Construction Phase**: Project construction area
- **Operation Phase**: U-Tapao International Airport area

7.3.6.4 Implementation method

(1) Environmental Impact Prevention and Resolution Measures

1) Construction Phase

- Inspect soil layer conditions before designing the runway to find the right construction technology prior to design to reduce runway subsidence.
- To maintain the stability of the drilled holes, use polymer solutions instead of bentonite. Set this as a operation condition in the contractor's contract.
- Oversee land reclamations so that is only done in areas where construction is required and clearly specify the construction area boundaries.
- Soil piles and materials used for construction work must be kept away from surface water and seawater as much as possible, and avoid areas where erosion can easily occur.
- Prevent soil washout from the construction area into nearby drainage channels by using an embankment or barrier materials in the direction of drainage.

2) Operation Phase

- Attend to ground-covering plants in the U-Tapao International Airport area to prevent soil washout during the rainy season.

- Continuously inspect soil subsidence in the runway area by checking whether the runway surface is at the specified level. If the runway surface level is found to have more than a 13 centimeter difference, the runway surface must be immediately renovated to be smooth and level.
- Repair and maintain runways in areas where there is a large difference in the runway surface levels for take off-landing safety in compliance with the requirements of the International Civil Aviation Organization (ICAO).
- Establish an internal unit within U-Tapao International Airport to be responsible for recording soil subsidence monitoring data for the runways and taxiways.

(2) Environmental Impact Monitoring Measures

Operation Phase

Monitoring Method

- Monitor soil subsidence for the runways and taxiways by surveying the height of surfaces and height of fixed horizontal and vertical control reference pins.

Operation Area

- Runway and taxiway 2 surface and the airport apron.

Index

- Height of runway and taxiway surfaces and height of fixed horizontal and vertical control reference pins

Frequency

- Once a year throughout the duration of the project.

Budget

- Analysis and study fee: 200,000 baht/time

7.3.6.5 Duration of Operation

- **Construction Phase:** throughout the construction period
- **Operation Phase:** throughout the duration of the project

7.3.6.6 Responsible Parties

- **Construction phase**: RTN and EECO, supervising construction contractors to ensure compliance with measures
- **Operation Phase:** EECO

7.3.6.7 Evaluation

Prepare a report on the implementation of environmental impact prevention and resolution measures and environmental impact monitoring measures for submission to authorizing agencies twice a year, both during the construction phase and operation phase.

7.3.7 Surface Water Hydrology Action Plan

7.3.7.1 Principles and Rationale

Project implementation operations in both the construction phase and operation phase may affect surface water hydrology. The main source during the construction phase is due to the construction operations and collection of construction materials in the Runway and Taxiway 2 construction area, which may cause materials to fall, resulting in changes to sediment leaching from the construction area to the drainage lines.

The main source during the operation phase is due to the converting the area's land use from vacant land to a runway, which may affect drainage in the area and may cause surface water hydrology conditions in the area to change.

Therefore, the project has established an a surface water hydrology action plan that covers the establishment of environmental impact prevention and resolution measures and environmental impact monitoring measures to reduce the impact of such project operations.

(1) Construction Phase

During the construction phase, construction operations will comprise: 1) land adjustments/soil quality improvement/soil filling, 2) filling of roads and safety areas around taxiways/pavement structure construction, 3) structural work on roads/road surface work, 4) excavations, installation/extraction of pillars and tunnel roofs under the runways, 5) foundation work, 6) structural work, 7) architecture work and systematic work, and 8) construction within the station/systematic work and architecture work within the sky train station. There may be some construction debris or soil leaching into nearby canals, resulting in shallow and poor drainage in some periods of construction. Based on inspections of areas with repeated flooding in Rayong, it was found that Phala Subdistrict is not in the repeated flooding area. Therefore, project construction does not cause a risk of severe flooding. There may be some water in the form of severe flooding, but there may be some standing water in the form of a small puddle due to digging for soil surface adjustments. However, the impact is only for a short period of time. Therefore, impact is low.

(2) Operation Phase

After opening Runway and Taxiway 2 at U-Tapao International Airport, takeoff - landing of aircrafts will be increased. This will not affect flooding due to the topography of the project area, as it is adjacent to the sea. Also, statistics from the past up to the present do not report flooding within U-Tapao International Airport. Therefore, converting land use from vacant land to aircraft runways will not affect water drainage in the area or cause the area's surface water hydrology to change. Regardless, the project has 2 ponds (in which the total volume of both ponds comprise 320,077.41 cubic meters), which can hold water for at least 1 hour before discharge to the sea. They are designed to provide adequate drainage. Therefore impact is low.

7.3.7.2 Objectives

1. To reduce and control surface water hydrology that may arise from project operations at minimum level, both in the construction phase and in the operation phase.
2. To prevent and resolve the impacts on surface water hydrology arising from project implementation activities both in the construction and operation phase.
3. To monitor the results of the implementation of the surface water hydrology action plan and oversee effective implementation of the plan.

7.3.7.3 Operation Area

- **Construction Phase**: Project construction area
- **Operation Phase**: U-Tapao International Airport area

7.3.7.4 Implementation method

(1) Environmental Impact Prevention and Resolution Measures

1) Construction Phase

- Store construction materials and equipment in an orderly manner, and prevent construction debris from obstructing waterways and drainage lines in the U-Tapao International Airport area. Build embankments or barrier materials according to drainage guidelines near construction area, with sedimentation ponds to reduce sediment leaching or construction debris falling into drainage canals.
- Inspect drainage channels, especially in areas near the construction site, so that water can always be drained effectively. If it is found that there are weeds or soil sediments causing shallowness or obstructing drainage, then carry out dredging so that it returns to good working condition.
- In the event that a canal or drainage line is filled within the U-Tapao International Airport area, efficient drainage channels must be constructed as a replacement with drainage capacity that is equivalent to the original.
- Install refuse traps in drainage channels where necessary.

2) Operation Phase

- Inspect the conditions of the drainage line canal ditches in the U-Tapao International Airport area on a regular basis. If they become shallow or if the bank is eroded, carry out dredging in order to maintain the cross-section of the drainage ditch as designed.
- Inspect drainage obstructions in the ditches along the drainage canal every 6 months and take immediate action to help improve the drainage system.
- Maintain the water level in the drains near the runways, driveways, and aircraft apron so that they are as dry as possible. Residual water in the drainage system must be quickly drained. Especially in the case of rain, drain water from the drainage lines in such areas as much as possible.
- It is required to inspect and conduct regular maintenance of the drainage system within the U-Tapao International Airport area to effectively support drainage in the airport area, and to have backup pumping system in case of damage to the main pumping system.

(2) Environmental Impact Monitoring Measures

1) Construction Phase

Monitoring Method

- Monitor drainage lines and drainage canals, especially in areas near the construction area.

Operation Area

- Drains and drainage canals near the construction area

Index

- Water level, water flow direction, shallow level

Frequency

- Conducted once a year before the rainy season throughout the construction phase.

2) Operation Phase

Monitoring Method

- Compile data on water levels and water flow patterns in drainage channels and canals surrounding U-Tapao International Airport from the Royal Irrigation Department or related agencies and analyze the efficiency of such drainage canals. Prepare a report on the monitoring results, and summarize problems and provide suggestions.

Operation Area

- Drains and canals around U-Tapao International Airport

Index

- Water level
- Water flow pattern

Frequency

- Conducted once a year during the rainy season, throughout the duration of the project.

Budget

- Analysis and study fee: 3,000 baht/time

7.3.7.5 Duration of Operation

- **Construction Phase:** throughout the construction period
- **Operation Phase:** throughout the duration of the project

7.3.7.6 Responsible Parties

- **Construction phase**: RTN and EECO, supervising construction contractors to ensure compliance with measures
- **Operation Phase:** EECO

7.3.7.7 Evaluation

Prepare a report on the implementation of environmental impact prevention and resolution measures and environmental impact monitoring measures for submission to authorizing agencies twice a year, both during the construction phase and operation phase.

7.3.8 Surface Water Quality Action Plan

7.3.8.1 Principles and Rationale

Project implementation operations in both the construction phase and operation phase may affect surface water quality. The main sources during the construction phase is due to sediment leaching in the construction area into water sources and wastewater arising from construction activities and the construction control office.

The main sources during the operation phase comprise wastewater generated from U-Tapao International Airport operations, due to the opening of the runway and taxiway 2, which will result in increased traffic and wastewater. If not managed well, this can cause wastewater to contaminate the surface water sources surrounding U-Tapao International Airport.

Therefore, the project has established an a surface water quality action plan that covers the establishment of environmental impact prevention and resolution measures and environmental impact monitoring measures to reduce the impact of such project operations.

(1) Construction Phase

1) Sediment Leaching from the Construction Area

Construction activities will affect seawater quality, causing turbidity or suspended solids due to sediment leaching at the construction site into natural water sources and increased flow into the sea. Based on assessments of suspended in the sea during the rainy season on 19 July 2019 and during the dry season on 1 November 2019, from results of comparisons of suspended solid levels in seawater caused by sediment leaching, it was shown that sediment leaching trends did not have any impact during the dry season but increased during the rainy season. Regardless, the Runway and Taxiway 2 construction activities and all other components will be conducted within the U-Tapao International Airport area and wastewater from construction activities will not be discharged into natural water sources. Therefore, the impact from sediment leaching from the construction area is low.

2) Wastewater from Project Operations

Wastewater is mainly generated by water used for consumption by construction workers and construction supervisors as follows:

Phase 1: Wastewater generated by construction supervisors and construction workers arriving and resting during the day, comprising approximately 161.8 cubic meters per day. Wastewater from worker rest areas consists of approximately 318 cubic meters per day.

Phase 2: Wastewater generated by construction supervisors and construction workers arriving and resting during the day, comprising approximately 49.4 cubic meters per day. Wastewater from worker rest areas consists of approximately 97.6 cubic meters per day.

Phase 3: Wastewater generated by construction supervisors and construction workers arriving and resting during the day, comprising approximately 91.5 cubic meters per day. Wastewater from worker rest areas consists of approximately 180.5 cubic meters per day.

In this respect, the project will specify in the contractor's construction agreement for an on-site septic tank to be installed to treat wastewater generated by the projection construction control office and from the construction worker's quarters with specifications that comply with the Announcement of the Ministry of Natural Resources and Environment Re: Determination of Standards for Control of Wastewater Discharge from Certain Types and Sizes of Buildings, 2005. Such wastewater treatment system must be able to treat wastewater in the volume not lower than the wastewater volume throughout each phase before discharge into the public drainage system. Therefore, impact will be low.

(2) Operation Phase

When the project initiates operations in Runway and Taxiway 2, including the development of U-Tapao International Airport in Phase 1 (2028), Phase 2 (2038), and Phase 3 (2048), it will generate a total wastewater volume of 3,185, 5,625, and 9,212 cubic meters per day, respectively. The current central wastewater treatment at U-Tapao International Airport is an activated sludge (AS) wastewater

treatment system, which can only handle 75 cubic meters of wastewater per day and is not sufficient to treat wastewater in future.

Due to the development of public utilities to support all developments in the U-Tapao International Airport area, a sequencing batch reactor (SBR) wastewater treatment system will be built. Construction will be divided into 2 stages, comprising stage 1 (years 1-6) and stage 2 (year 7). In each stage, a wastewater treatment system comprising 8,000 cubic meters per day will be built in addition to a wastewater treatment system that can support 16,000 cubic meters of wastewater per day. 5,000 cubic meters of wastewater will be treated and recycled per day and reused, for example, to water plants in green areas (garden area) within U-Tapao International Airport. The remaining wastewater will be collected in the sewage pond before being discharged into project pond no. 2. The central wastewater treatment system will be able to sufficiently handle wastewater generated from project developments. Therefore, impact is low.

7.3.8.2 Objectives

1. To reduce and control sediment leaching and surface water contamination from project operations in both the construction phase and operation phase to be contained at a minimum level.
2. To prevent and resolve the impacts on surface water quality arising from project implementation activities and to monitor the level of impact on surface water quality both in the construction and operation phase.
3. To monitor the results of the implementation of the surface water quality action plan and oversee effective implementation of the plan.

7.3.8.3 Operation Area

- **Construction Phase**: Khlong Bang Phai and Khlong Phala area
- **Operation Phase:** Khlong Bang Phai and Khlong Phala area

7.3.8.4 Implementation method

(1) Environmental Impact Prevention and Resolution Measures

1) Construction Phase

- The construction control office area must have a sufficient number of sanitary restrooms for the number of workers and staff, with at least 3 toilets for the first 80 workers and 1 toilet for the next 50 workers and so on. An on-site septic tank must be installed that is capable of treating at least the daily amount of generated wastewater and stopping wastewater from draining into water sources in U-Tapao International Airport. Require contractors to drain wastewater into the U-Tapao International Airport central wastewater treatment system.
- Provide a wastewater reservoir for cleaning vehicle wheels to collect sediments prior to discharge into drainage canals.

- Maintenance on equipment and machinery will be carried out only in the maintenance area, which prevents oil contamination from entering drainage canals.
- Set procedures for operators to be careful when transferring oil and chemicals to prevent oil contamination from entering the drainage canal and use a hand pump or other suitable equipment for transferring oil. Also, provide protective equipment for oil leaks, with absorbent materials or oil containers such as drip trays.
- Do not dispose trash, food waste, oil, and construction debris into the drainage canals in U-Tapao International Airport. Construction contractors must provide disposals and storage for waste from workers, as well as to store used oil containers for appropriate collection and storage. The amount of solid waste and disposals must be recorded.

2) Operation Phase

- Oversee the activation of the central wastewater treatment system and regularly monitor the efficiency of the central wastewater treatment system.
- Monitor the characteristics of the treated wastewater to ensure compliance with the control of wastewater discharge standards for type A buildings in accordance with the Announcement of the Ministry of Natural Resources and Environment Re: Determination of Standards for the Control of Wastewater discharge from Certain Types and Sizes of Buildings (2005), or according to the latest version, before discharge into the drainage canal within and outside of U-Tapao International Airport.
- Reuse treated wastewater discharge that meets the standards as much as possible, such as using it to water plants and trees in the green areas of U-Tapao International Airport, etc. to reduce the amount of water that needs to be drained.

(2) Environmental Impact Monitoring Measures

1) Construction Phase

Monitoring Method

- Monitor surface water quality in the project area and use monitoring methods that comply with Announcement No. 8 from the National Environment Board (1994) Re: Determination of Surface Water Quality Standards.

Operation Area

- Surface water sources in the project area are as shown in **Table 7.3-5** and **Figure 7.3-5**

Table 7.3-5 Monitoring stations for surface water quality and surface water ecology (construction phase and operation phase)

Sequence No.	Station	Coordinates	
		E	N
W1	Khlong Bang Phai, above water discharge point : Representing water sources above the project wastewater discharge point. Above the water discharge point, most values were within standard range for surface water quality except during rainy season in which total coliform bacteria and fecal coliform bacteria > 160,000 MPN/100 mL. This is anticipated to be due to drainage of wastewater from consumption into water sources.	716229	1402379
W2	Khlong Bang Phai, below water discharge point : Representing water sources impacted by the discharge of wastewater from the project, in which the water quality in the Khlong Bang Phai area below the wastewater discharge point was within the standards as specified for all indices.	716242	1401210
W3	Khlong Bang Phai entrance, sea discharge point : Representing water quality before flowing into the sea. Most values were within range for surface water quality except during the rainy season, in which BOD was equal to 4.2 milligrams/liter, exceeding standards (designated range not exceeding 4.0 milligrams/liters).	716315	1399935
W4	Khlong Phala : A water source near the project area, on the east side. Water quality in Khlong Phala was within the standards specified for all indices.	720812	1401663

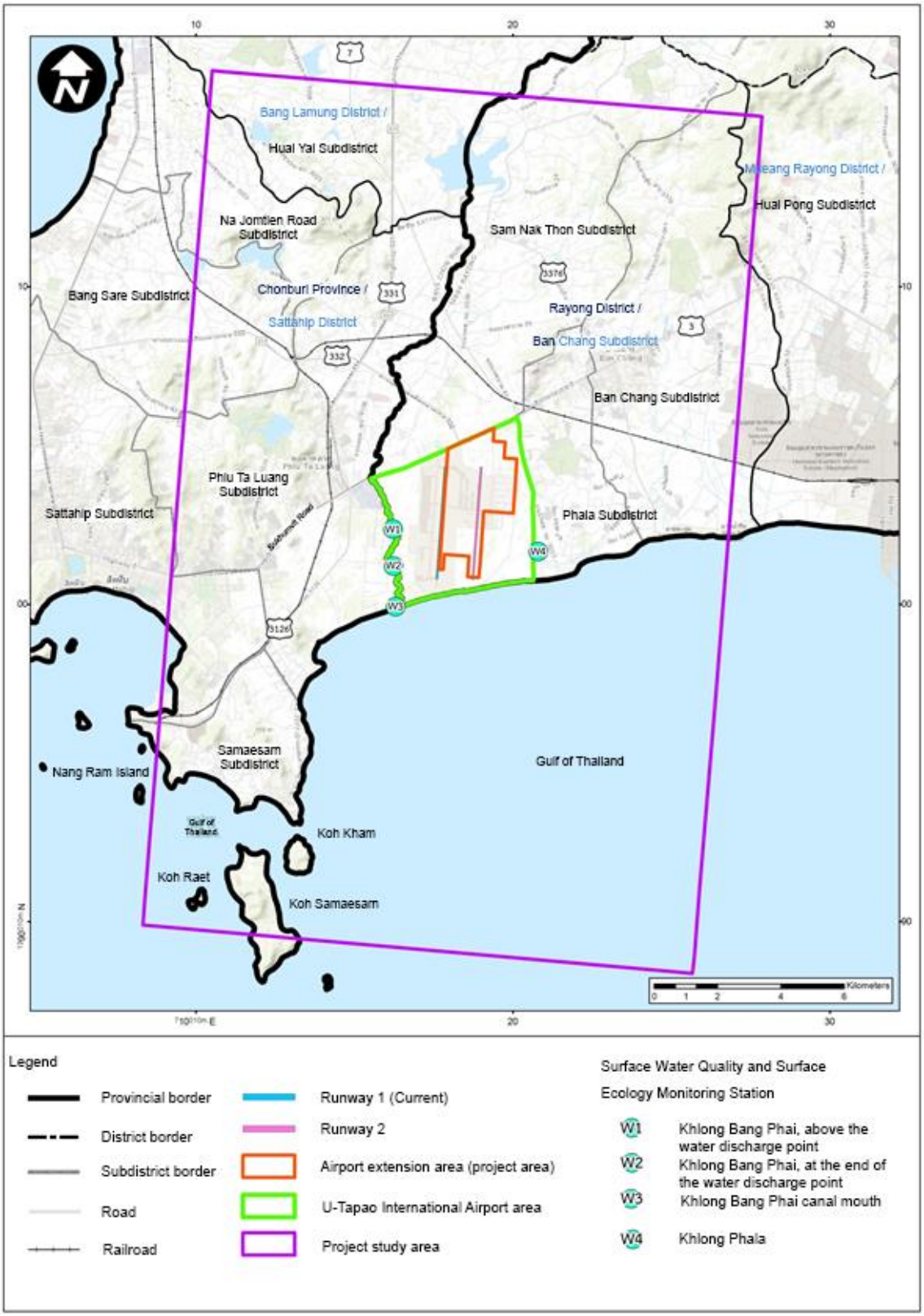

Figure 7.3-5 Monitoring stations for surface water quality and surface water ecology (construction phase and operation phase)

Index

1. Physical

- Water temperature
- Transparency
- Turbidity
- Conductivity
- Salinity

2. Chemical

- Acidity and alkalinity (pH)
- Dissolved oxygen (DO)
- BOD
- Suspended solid (SS)
- Total dissolved solids (TDS)
- Fat, oil and grease
- Nitrate (NO_3) in nitrile unit
- Phosphate-phosphorus
- Arsenic (As)
- Manganese (Mn)
- Total mercury (Total Hg)
- Zinc (Zn)
- Cadmium (Cd)
- Copper (Cu)
- Nickel (Ni)
- Chromium hexavalent (Cr^{6+})
- Lead (Pb)
- Chromium (Cr)

3. Biological

- Total coliform bacteria
- Fecal coliform bacteria

Frequency

- Conducted once a month throughout the construction period

Budget

- Analysis and study fee: 75,000 baht/time

2) Operation Phase

Monitoring Method

- Monitor and assess surface water quality in the project area and use monitoring methods that comply with Announcement No. 8 from the National Environment Board (1994) Re: Determination of Surface Water Quality Standards.

Operation Area

Surface water sources in the project area, comprising 4 sites (**Table 7.3-**5) and **Figure 7.3-*5*** are as follows:

- W1 : Khlong Bang Phai, above the water discharge point
- W2 : Khlong Bang Phai, below water discharge point
- W3 : Khlong Bang Phai, sea discharge point
- W4 : Khlong Phala

Index

1. Physical

- Water temperature
- Transparency
- Turbidity
- Conductivity
- Salinity

2. Chemical

- Acidity and alkalinity (pH)
- Dissolved oxygen (DO)
- BOD
- Suspended solid (SS)
- Total dissolved solids (TDS)
- Fat, oil and grease
- Nitrate (NO_3) in nitrile unit
- Phosphate-phosphorus
- Arsenic (As)
- Manganese (Mn)
- Total mercury (Total Hg)
- Zinc (Zn)
- Cadmium (Cd)
- Copper (Cu)

- Nickel (Ni)
- Chromium hexavalent (Cr^{6+})
- Lead (Pb)
- Chromium (Cr)

3. Biological

- Total coliform bacteria
- Fecal coliform bacteria

Frequency

- Conducted every 4 months for the first 2 years and every 6 months (during rainy season and dry season) in the following year throughout the duration of the project.

Budget

- Analysis and study fee: 75,000 baht/time

7.3.8.5 Duration of Operation

- **Construction Phase:** throughout the construction period
- **Operation Phase:** throughout the duration of the project

7.3.8.6 Responsible Parties

- **Construction phase**: RTN and EECO, supervising construction contractors to ensure compliance with measures
- **Operation Phase:** EECO

7.3.8.7 Evaluation

Prepare a report on the implementation of environmental impact prevention and resolution measures and environmental impact monitoring measures for submission to authorizing agencies twice a year, both during the construction phase and operation phase.

7.3.9 Groundwater Quality Action Plan

7.3.9.1 Principles and Rationale

Implementation of both construction and operation phase activities may affect groundwater quality, with significant sources during the construction phase arising from wastewater contamination/wastewater discharged into groundwater, wastewater generation from construction activities, and the project construction control office.

Significant sources during the operation phase comprise wastewater generated from U-Tapao International Airport operations, due to the opening of the runway and taxiway 2, which will result in increased traffic and wastewater. If not managed well, this can cause wastewater to contaminate the groundwater surrounding U-Tapao International Airport.

The project has therefore established environmental impact prevention and resolution measures and environmental impact monitoring measures to assess groundwater quality environmental impact to reduce the impact of such project activities.

(1) Construction Phase

During the construction phase, there may be effluent/wastewater contamination as construction operations and wastewater from construction staff and supervisor consumption may affect the quality of groundwater in the project area. However, the project will specify in the contractor's construction agreement for an on-site septic tank to be installed to treat wastewater generated by the project construction control office and from the construction workers' rest area with specifications that comply with the Announcement of the Ministry of Natural Resources and Environment Re: Determination of Standards for Control of Wastewater Discharge from Certain Types and Sizes of Buildings, 2005. The wastewater treatment system at the construction site must be able to treat at least 318, 97.5, and 180.5 cubic meters of wastewater per day in phase 1, phase 2, and phase 3, respectively. Also, the wastewater treatment system around the project's construction supervision office in phase 1, phase 2, and phase 3 must be able to treat at least 161.8, 49.4 and 91.5 cubic meters of wastewater, respectively, before discharge into the public drainage system. Therefore, groundwater quality will not be affected.

(2) Operation Phase

After the project is launched, the predicted number of passengers for the years 2028, 2038 and 2048 are 14 million, 38 million, and 70 million passengers per year, respectively. The anticipated resulting wastewater volumes in phase 1 (2028), phase 2 (2038), and phase 3 (2048) are 3,185, 5,625, and 9,212 cubic meters per day, respectively. The resulting wastewater volumes will be delivered for treatment by a central wastewater treatment system capable of sufficiently supporting the resulting wastewater volumes without being discharged to the ground, thus not contaminating groundwater. Therefore, groundwater quality will not be affected.

7.3.9.2 Objectives

1. To reduce and control sediment leaching and groundwater contamination from project operations in both the construction phase and operation phase to be contained at a minimum level.
2. To prevent and resolve the impacts on groundwater quality arising from project implementation activities and to monitor the level of impact on groundwater quality both in the construction and operation phase.
3. To monitor the results of the implementation of the groundwater quality action plan and oversee effective implementation of the plan.

7.3.9.3 Operation Area

- **Construction Phase**: Project construction area
- **Operation Phase**: U-Tapao International Airport area

7.3.9.4 Implementation method

Environmental Impact Prevention and Resolution Measures

1) Construction Phase

- Do not wash tools, machinery in sources of water or drainage lines.
- Do not dispose of waste or refuse into sources of water.
- Oil traps must be in place to prevent oil stains spilling from equipment onto the ground into sources of water or drainage lines.
- Check machinery weekly to prevent oil leaks.

2) Operation Phase

- Continually check the condition of the crevices or drainage ditches and rainwater drains to prevent clogging.
- Repair equipment used to pump drainage water so that it is ready to be used at all times and can be used effectively.

7.3.9.5 Duration of Operation

- **Construction Phase:** throughout the construction period
- **Operation Phase:** throughout the duration of the project

7.3.9.6 Responsible Parties

- **Construction phase**: RTN and EECO, supervising construction contractors to ensure compliance with measures
- **Operation Phase:** EECO

7.3.9.7 Evaluation

Prepare a report on the implementation of environmental impact prevention and resolution measures and environmental impact prevention and resolution measures for submission to authorizing agencies twice a year, both during the construction phase and operation phase.

7.3.10 Seawater Quality Action Plan

7.3.10.1 Principles and Rationale

Implementation of the project both in the construction phase and operation phase may impact seawater quality. Main sources in the construction phase include the discharge of wastewater into water sources and wastewater generation from construction activities and the project construction control office, which could cause wastewater contamination in the seawater.

A main source during the operation phase comprise wastewater generated from U-Tapao International Airport operations due to the opening of runway and taxiway 2, which will result in increased traffic and wastewater. If not managed well, this can cause wastewater contamination in surface water and seawater sources.

The project has therefore established environmental impact prevention and resolution measures and environmental impact monitoring measures for seawater quality to reduce the impact of such project activities.

(1) Construction Phase

1) Sediment Leaching from the Construction Area

Construction activities could cause sediment leaching from the construction site to contaminate seawater, which could cause turbidity or suspended solids due to sediment leaching at the construction site into natural water sources and increased flow into the sea. Based on assessments of suspended solids in the sea during the rainy season on 19 July 2019 and during the dry season on 1 November 2019, from the results of comparisons of suspended solid levels in seawater caused by sediment leaching, it was shown that sediment leaching trends did not have any impact during the dry season but increased during the rainy season. Regardless, all project construction activities will be conducted within the U-Tapao International Airport area, in which sediments from the construction site will flow into the surrounding wastewater drainage lines and will be collected into a wastewater reservoir for precipitation prior to being discharged into the canal and out to the sea. Therefore, impact is low.

2) Wastewater from Construction Activities

Wastewater is mainly generated by water used for consumption by construction workers and construction supervisors as follows:

Phase 1: Wastewater generated by construction supervisors and construction workers arriving and resting during the day, comprising approximately 161.8 cubic meters per day. Wastewater from worker rest areas consists of approximately 318 cubic meters per day.

Phase 2: Wastewater generated by construction supervisors and construction workers arriving and resting during the day, comprising approximately 49.4 cubic meters per day. Wastewater from worker rest areas consists of approximately 97.6 cubic meters per day.

Phase 3: Wastewater generated by construction supervisors and construction workers arriving and resting during the day, comprising approximately 91.5 cubic meters per day. Wastewater from worker rest areas consists of approximately 180.5 cubic meters per day.

In this respect, the project will specify in the contractor's construction agreement for an on-site septic tank to be installed to treat wastewater generated by the project construction control office and from the construction worker's quarters with specifications that comply with the Announcement of the Ministry of Natural Resources and Environment Re: Determination of Standards for Control of Wastewater Discharge from Certain Types and Sizes of Buildings, 2005. Such wastewater treatment systems must be able to treat wastewater in the volume not lower than the wastewater volume throughout each phase, in which no wastewater will be discharged directly into the sea. Therefore, impact will be low.

(2) Operation Phase

At the initiation of the project, it is predicted that passengers will begin to use the services of U-Tapao International Airport in 2028, 2038, and 2048, with 14 million, 38 million, and 70 million users per year respectively. This may impact wastewater and refuse volumes, which will also increase. This includes the developments for expansion of U-Tapao International Airport in Phase 1 (2028), Phase 2 (2038), and Phase 3 (2048), it will generate a total wastewater volume of 3,185, 5,625, and 9,212 cubic meters per day, respectively. The current central wastewater treatment at U-Tapao International Airport is an activated sludge (AS) wastewater treatment system, which can only handle 75 cubic meters of wastewater per day and is not sufficient to treat wastewater in future.

Due to the development of public utilities to support all developments in the U-Tapao International Airport area, a sequencing batch reactor (SBR) wastewater treatment system will be built. Construction will be divided into 2 stages, comprising stage 1 (years 1-6) and stage 2 (year 7). In each stage, a wastewater treatment system comprising 8,000 cubic meters per day will be built in addition to a wastewater treatment system that can support 16,000 cubic meters of wastewater per day. 5,000 cubic meters of wastewater will be treated and recycled per day and recycled for use, for example, to water plants in green areas within U-Tapao International Airport. The remaining wastewater will be collected in the sewage pond before being discharged into project ponds. The central wastewater treatment system will be capable of handling wastewater generated from project developments. Therefore, impact is low.

7.3.10.2 Objectives

1. To reduce and control sediment leaching and wastewater arising from project operations in both the construction phase and operation phase to be contained at a minimum level.
2. To prevent and resolve the impacts on seawater quality arising from project implementation activities and to monitor the level of impact on seawater quality both in the construction and operation phase.
3. To monitor the results of the implementation of the seawater quality action plan and oversee effective implementation of the plan.

7.3.10.3 Operation Area

- **Construction** Phase: Seawater in the project area
- **Operation** Phase: Seawater in the project area

7.3.10.4 Implementation method

(1) Environmental Impact Prevention and Resolution Measures

1) Construction Phase

- Require contractors to prepare an area for placing construction materials and use covering materials to reduce leaching into natural water sources during the rainy season.
- Require that mobile restrooms to be set up in construction sites and temporary office buildings are sent to authorized agencies for disposal.
- Make signs prohibiting construction workers from dumping solid waste and construction debris around the construction site into natural water and seawater sources.
- Require contractors to inspect the operation of machinery on a regular basis and to take care to prevent oil leaks from entering natural water sources and into the sea.
- Set procedures for operators to be careful when transferring oil and chemicals to prevent oil contamination from entering the drainage canal and use a hand pump or other suitable equipment for transferring oil. Also, provide protective equipment for oil leaks, with absorbent materials or oil containers such as drip trays.
- Do not dispose solid waste, food waste, oil, and construction debris into the drainage canals in U-Tapao International Airport. Construction contractors must provide disposals and storage for solid waste from workers, as well as to store used oil containers for appropriate collection and storage. The amount of solid waste and disposals must be recorded.

2) Operation Phase

- Conduct operations with strict compliance to the environmental impact prevention and resolution measures for surface water hydrology, surface water quality, and water ecology in the operation phase.

(2) Environmental Impact Monitoring Measures

1) Construction Phase

Monitoring Method

- Monitor and assess seawater quality in the project area and use monitoring methods that comply with Announcement of the National Environment Board

Re: Determination of Seawater Quality Standards (announced in the Government Gazette on 6 October 2021).

Operation Area

- Seawater sources in the project area, comprising 6 sites. Consider the distance of freshwater and saltwater mixing zones, as shown in **Table 7.3-6** and**Figure 7.3-6**.

Table 7.3-6 Seawater Quality and Ecology Monitoring Stations (Construction Phase and Operation Phase)

Station	Sampling station location	Monitoring point coordinates		Rationale:
		E	N	
SW1	South of Runway 1 300 meters from the shore	717615	1399956	Points expected to be impacted by project activities
SW2	South of Runway 2 300 meters from the shore	719398	1400277	Points expected to be impacted by project activities
SW3	Southeast of Runway 2 300 meters from the shore	721348	1400499	Points expected to be impacted by project activities
SW4	Southwest of Runway 1 500 meters from the shore	716258	1399334	Points that might not be directly impacted by the project
SW5	South of Runway 2 500 meters from the shore	718751	1399959	Points that might not be directly impacted by the project
SW6	Southeast of Runway 2 500 meters from the shore	721114	1400286	Points that might not be directly impacted by the project

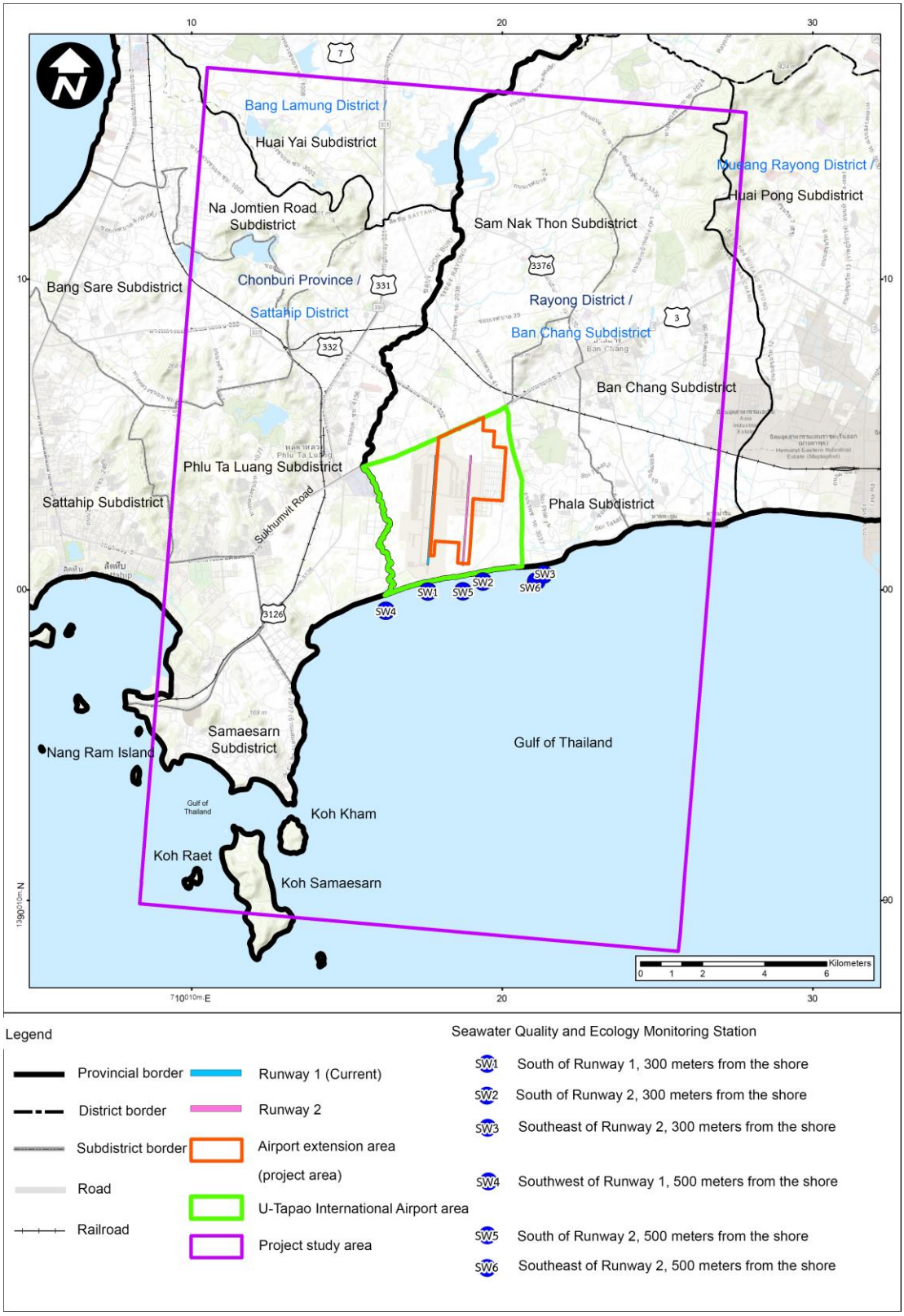

Figure 7.3-6 Seawater Quality and Ecology Monitoring Stations (Construction Phase and Operation Phase)

Index

1. Physical

- Water temperature
- Transparency
- Turbidity
- Conductivity
- Salinity

2. Chemical

- Acidity and alkalinity (pH)
- Dissolved oxygen (DO)
- BOD
- Suspended solid (SS)
- Total dissolved solids (TDS)
- Fat, oil and grease
- Nitrate (NO_3) in nitrile unit
- Phosphate-phosphorus
- Arsenic (As)
- Manganese (Mn)
- Total mercury (Total Hg)
- Zinc (Zn)
- Cadmium (Cd)
- Copper (Cu)
- Nickel (Ni)
- Chromium hexavalent (Cr^{6+})
- Lead (Pb)
- Chromium (Cr)

3. Biological

- Total coliform bacteria
- Fecal coliform bacteria

Frequency

- Every month throughout the construction period

Budget

- Analysis and study fee: 143,000 baht/time

2) Operation Phase

Monitoring Method

- Monitor and assess seawater quality in the project area and use monitoring methods that comply with Announcement of the National Environment Board Re: Determination of Seawater Quality Standards (announced in the Government Gazette on 6 October 2021).

Operation Area

- Seawater sources in the project area, comprising 6 sites as shown in**Table 7.3-6** and **Figure 7.3-6**

Index

1. Physical

- Water temperature
- Transparency
- Turbidity
- Conductivity
- Salinity

2. Chemical

- Acidity and alkalinity (pH)
- Dissolved oxygen (DO)
- BOD
- Suspended solid (SS)
- Total dissolved solids (TDS)
- Fat, oil and grease
- Nitrate (NO_3) in nitrile unit
- Phosphate-phosphorus
- Arsenic (As)
- Manganese (Mn)
- Total mercury (Total Hg)
- Zinc (Zn)
- Cadmium (Cd)
- Copper (Cu)
- Nickel (Ni)
- Chromium hexavalent (Cr^{6+})
- Lead (Pb)
- Chromium (Cr)

3. Biological

- Total coliform bacteria
- Fecal coliform bacteria

Frequency

- Conducted every 4 months for the first 2 years and every 6 months (during rainy season and dry season) in the following year throughout the duration of the project.

Budget

- Analysis fee: 143,300 baht/time

Monitoring Method

- Monitor and assess water quality and soil sedimentation to check quality before discharge into the sea.

Operation Area

Stations for monitoring and analyzing water quality and soil sedimentation, comprising 3 stations as shown in **Table 7.3-7** and**Figure 7.3-7**.

Table 7.3-7 Stations for monitoring water quality before discharge into the sea and soil sediment sampling (operation phase)

Station	Coordinates	
	E	N
1. Inside of Pond No. 1	718088.04	1401354.79
2. Inside of Pond No. 2	718963.93	718963.92
3. Pre-release to Sea Water Drainage Channel	718404.28	1400445.57

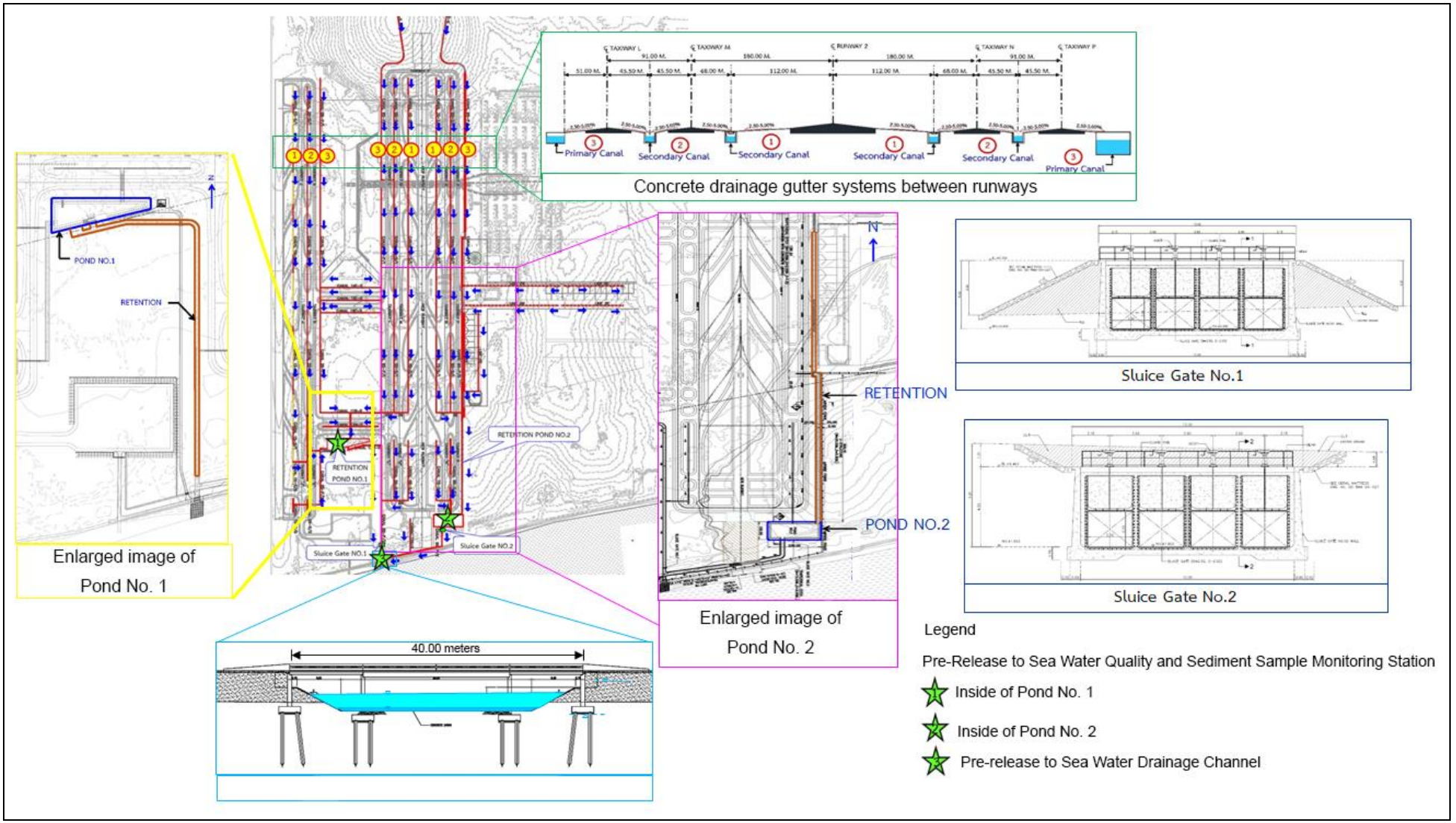

Figure 7.3-7 Stations for monitoring water quality before discharge into the sea and soil sediment sampling (operation phase)

Index

For water samples : (Referenced from the Announcement of the Ministry of Natural Resources and Environment Re: Determination of Standards for Control of Wastewater Drainage from Industrial Factories, Industrial Estates and Industrial Areas). The indices to be examined are as follows:

1. Physical

- Temperature
- Color
- Odor
- Total dissolved solids (TDS)
- Total suspended solids (TSS)

2. Chemical

- Acidity and alkalinity (pH)
- BOD
- COD
- Sulfide
- Cyanide
- Fat, oil & grease
- Formaldehyde
- Zinc
- Chromium hexavalent (Cr^{6+})
- Chromium trivalent (Cr^{3+})
- Arsenic
- Copper
- Mercury
- Cadmium
- Phenols
- Free chlorine
- Pesticides
- TKN
- Fluoride
- Surfactant
- Barium
- Selenium
- Lead
- Nickel
- Manganese
- Silver
- Total iron

3. Biological

- Total coliform bacteria
- Fecal coliform bacteria

In soil sediment samples : Indices to be examined are as follows:

- Lead (Pb)
- Chromium (Cr)
- Cadmium (Cd)
- Total mercury (Total Hg)
- Copper (Cu)
- Manganese (Mn)
- Nickel (Ni)
- Zinc (Zn)
- Arsenic (As)

Frequency

- Conducted every 4 months for the first 2 years and every 6 months (during rainy season and dry season) in the following year throughout the duration of the project.

Budget

- Analysis fee: 120,000 baht/time

7.3.10.5 Duration of Operation

- **Construction Phase:** throughout the construction period
- **Operation Phase:** throughout the duration of the project

7.3.10.6 Responsible Parties

- **Construction phase**: RTN and EECO, supervising construction contractors to ensure compliance with measures
- **Operation Phase:** EECO

7.3.10.7 Evaluation

Prepare a report on the implementation of environmental impact prevention and resolution measures and environmental impact monitoring measures for submission to authorizing agencies twice a year, both during the construction phase and operation phase.

7.3.11 Terrestrial Ecology Action Plan

7.3.11.1 Principles and Rationale

Project implementation activities in both the construction phase and the operation phase may affect land terrestrial ecology. The current condition of the project construction area is an open area covered by weeds and shrubs.

The main source during the operation phase is due to U-Tapao International Airport operations, which will provide habitats or food sources for insects or animals that could enter the U-Tapao International Airport area, which could cause various accidents.

Therefore, the project has established a terrestrial ecology action plan, covering environmental impact prevention and resolution measures and environmental impact monitoring measures in order to mitigate impacts from project activities.

(1) Construction Phase

Construction activities could result in impacts in changes to resources for forestry and wildlife, such as cutting/demolishing/removing plants within the project area, which could cause habitats, food sources, places to build bird nests, and various wildlife to decrease. Land adjustment activities could lead to loss of habitat, hiding places, food sources, and nesting places. However, wildlife can adapt and move to new habitats, hiding places, and nesting sites, and can find new food sources, so impact is low.

(2) Operation Phase

During the operation phase of runway and taxiway 2, the number of aircraft takeoffs - landings will increase. This may cause the number of accidents caused by bird strikes to increase. Based on reviews of statistical data on bird strikes between January 2017 and July 2019, there was an average of less than 1 bird strike incident per month. Bird strike statistics were highest in 2017, comprising 9 incidents. From the data, it was found that the highest number of incidents was in December, which is when birds migrate into the U-Tapao International Airport area.

For the assessment of the risk level from birds in U-Tapao International Airport, Rayong - Pattaya, the Department of Airport Safety and Standards, Airports of Thailand Public Company Limited in 2018 found that birds most likely to cause harm are large birds, medium birds and small birds, respectively. From the results of the survey of wildlife resources in the study area, with Survey 1 (during the rainy season) conducted between 15-17 July 2019 and 19-22 July 2019, and Survey 2 (dry season or migration season) conducted between 15-18 November 2019 and 18-20 December 2019, it was found that most of the birds were small (weighing less than 300 grams), followed by medium-sized birds (weighing between 300-1000 grams) and found large birds

(weighing more than 1000 g). Therefore, the likelihood of a bird causing a serious aircraft accident is low. The project has also implemented a plan to prevent aviation accidents caused by birds and animals, and thus the impact is low.

7.3.11.2 Objectives

1. To reduce and control the number of insects and wildlife and accidents arising from animals that could be a flight danger in the operation phase to be contained at a minimum level.
2. To prevent and resolve impacts on terrain ecology caused by project implementation operations during the operation phase.
3. To monitor the results of the implementation of the terrain ecology action plan and to oversee effective implementation of the plan.

7.3.11.3 Operation Area

- **Operation Phase**: U-Tapao International Airport area

7.3.11.4 Implementation method

(1) Environmental Impact Prevention and Resolution Measures

1) Construction Phase

- Compose an account of timber in the runway and taxiway 2 construction area to verify the number and location of the trees for felling or relocation, and clearly mark the trees that are to be felled or relocated.
- For large trees classified as restricted Type A trees according to the Royal Decree on Restricted Timber Species 1987, the RTN and EECO/or construction operators and contractors are to consider cutting or removing the tree and relocating it to a nearby location or other areas in the U-Tapao International Airport vicinity.
- Guidelines for felling Type A trees per the Royal Decree on Restricted Timber Species 1987 are as follows:
  (1) The construction contractor will coordinate with the RTN and EECO to inspect tree felling area boundaries and timber accounts after tree felling is complete to prevent felling of trees outside of the runway and taxiway 2 construction area.
  (2) All trees felled from outside of the runway and taxiway 2 construction area must be removed from the area for suitable use by a contractor under the supervision of the RTN and EECO.
- Guidelines for relocating Type A trees per the Royal Decree on Restricted Timber Species 1987 are as follows:
  (1) Removing and relocating of trees require specialized techniques, and must be performed with caution. Construction contractors are therefore required to coordinate with the RTN and EECO to designate a relocation site for transplanting the trees in the nearby vicinity or another area in U-

Tapao International Airport in order to remove and relocate the tree out of the construction area. Forestry scholars will be assigned to oversee the removal and relocation of restricted trees for proper transplantation in accordance with academic principles.

(2) Construction contractors must comply with the removal and relocation procedures and methods, starting from preliminary surveys for information on all tree data, equipment and tool preparation, trenching and shrubbery decoration, lifting and transportation, and transplanting.

(3) Construction contractors will conduct the removal and relocation out of the construction area and complete the transplant before project construction is complete.

- Clearly define construction boundaries and oversee that the contractors only carry out construction within the designated construction area.
- Set rules and regulations for supervising construction. It is forbidden to capture or hunt animals of any type, especially watercocks, Eurasian stone-curlews, purple herons, barn owls, Asian golden weavers, and red avadavats found in the project construction area and nearby locations, with penalties in case of violation.
- Land adjustment should be carried out with caution in order not to affect habitats, food sources, or wildlife activities or to cause harm to some types of animals, such as those that travel or move slowly.

2) Operation Phase

- Choose suitable ornamental plants and shrubs for the garden or as decoration in areas outside of the airspace to prevent them from becoming a food source or nesting place for birds.
- Mow grass to an acceptable height so that all 4 wildlife groups, namely birds, mammals, reptiles, and amphibians, cannot feed, inhabit, or lay eggs. Lawnmowers must not cause wheel grooves, which can become a place to hid or cause waterlogging, which can attract such animals.
- Destroy habitat spaces, such as by caring for perennials, removing unnecessary trees, trimming and pruning, etc. Remove sources of food for birds, such as worms and insects, including grasshoppers, beetles, caterpillars, earthworms, and larvae from other insects that can become a food source for animals.
- Regularly eliminate aquatic plants around drainage lines and ponds, especially in areas near the runway and taxiway, such as itchgrass, water hyacinths, joinvetch, narrowleaf cattails, etc. Remove the plants from the area using physical means. Do not use chemical herbicides.
- Drive away all animals looking for food or resting in takeoff - landing runways, especially before takeoff or landing for each flight and especially birds that can become a flight hindrance.

- Eliminate food sources and habitats for small mammals, such as rats and squirrels, which can become food for predatory birds. Also, collect the remains of dead frogs, toads, or other reptiles on the takeoff - landing runways to reduce the number of animals that may enter the area to eat their remains.
- Drive away and capture mammals and reptiles that enter the area, such as by setting traps to capture Asian water monitors, rats, squirrels, and snakes, and coordinate with relevant agencies to release them back into their natural habitat.
- Survey the diversity of flora and fauna in the airport surroundings, covering both the dry season (bird migration season) and rainy season.

(2) Environmental Impact Monitoring Measures

1) Operation Phase

Monitoring Method

- Compile data on various accidents using the ICAO bird strike report form and assess which type of bird causes the most disturbances by observing the characteristics of the feathers stuck to aircrafts. In the event that there is flock of birds in U-Tapao International Airport that may pose flight dangers, it is necessary to implement a bird control plan.

Operation Area

- U-Tapao International Airport area

Index

- Accident statistics, types and number of birds, and related aircraft types.

Frequency

- Record bird strikes on a daily basis and report accidents to CAAT every 3 months. Also prepare a report on the implementation of measures twice a year throughout the duration of the project.

Monitoring Method

- Survey the diversity of flora and fauna in the area surrounding U-Tapao International Airport, covering at least the dry season, rainy season, and bird migration season.

Operation Area

- U-Tapao International Airport area

Index

- Diversity of flora and fauna surveyed in the U-Tapao International Airport area.

Frequency

- Conducted twice a year throughout the duration of the project, covering the dry season, rainy season, and bird migration season.

Monitoring Method

- Record statistics on various types of birds on a daily basis.

Operation Area

- U-Tapao International Airport area

Index

- Types and number of various birds found in the U-Tapao International Airport area.

Frequency

- Conducted daily with monthly and annual outcome assessments throughout the duration of the project.

Budget

- Analysis and study fee: 403,000 baht/time

7.3.11.5 Duration of Operation

- **Construction Phase:** throughout the construction period
- **Operation Phase:** throughout the duration of the project

7.3.11.6 Responsible Parties

- **Construction phase**: RTN and EECO, supervising construction contractors to ensure compliance with measures
- **Operation Phase:** EECO

7.3.11.7 Evaluation

Prepare a report on the implementation of environmental impact prevention and resolution measures and environmental impact monitoring measures for submission to authorizing agencies twice a year during the operation phase.

7.3.12 Aquatic Ecology Action Plan

7.3.12.1 Principles and Rationale

Project implementation activities both during the construction phase and operation phase may affect surface water ecology and marine ecology. The main source during the construction phase is due to sediments from construction activities eroding into surface water and the sea, causing turbidity or increased suspended solids, impacting aquatic organisms.

The main source in the operation phase is the contamination of wastewater caused by the operations of U-Tapao International Airport into surface water and seawater, impacting aquatic organisms.

Therefore, the project has established a surface water ecology and aquatic ecology action plan, covering environmental impact prevention and resolution measures and environmental impact monitoring measures in order to mitigate impacts from project activities.

(1) Construction Phase

1) Surface Water Ecology

Sediment leaching from the construction site : During project construction, construction activities may result in eroding of sediments and debris such as rocks, soil, and sand from the construction site that may result in impacts that change the surface water quality, causing turbidity or increased suspended solids, and may affect aquatic organisms. However, as the U-Tapao International Airport vicinity is surrounded by drainage lines and all construction activities will be conducted within the U-Tapao International Airport area, with the project requirements specifying that a on-site septic tank is installed that is capable of treating wastewater from construction worker consumption without any discharge of wastewater from construction activities into natural water sources, sedimentation from construction sites will be drained into the surrounding drainage lines and will flow into the reservoir for storage before being released into public drainage systems. Therefore, the possibility of contaminating external water sources to the point of impacting aquatic life is very low. Therefore, the resulting impact is low.

Effects of salinity during dry season: From the analysis of the biodiversity index of 2 water sources, namely Khlong Bang Phai and Khlong Phala, findings showed that the aquatic ecology of Khlong Bang Phai at station W3 : Khlong Bang Phai, Sea Discharge Point had a salinity range of 4.3 - 18.8 parts per thousand and Khlong Phala had a salinity range of 0.3 parts per thousand. These points are already influenced by seawater and project developments won't change the conditions of such canals. In addition, there are no activities that will alter the influence of saltwater intrusion into both canals. Therefore, there are no additional impacts from the project area.

Wastewater from consumption - utilization by construction workers and project construction activities : Wastewater is generated mainly from consumption and utilization by construction workers and construction supervisors, as follows:

Phase 1: Wastewater generated by construction supervisors and construction workers arriving and resting during the day, comprising approximately 161.8 cubic meters per day. Wastewater from worker rest areas consists of approximately 318 cubic meters per day.

Phase 2: Wastewater generated by construction supervisors and construction workers arriving and resting during the day, comprising approximately 49.4 cubic meters per day. Wastewater from worker rest areas consists of approximately 97.6 cubic meters per day.

Phase 3: Wastewater generated by construction supervisors and construction workers arriving and resting during the day, comprising approximately 91.5 cubic meters per day. Wastewater from worker rest areas consists of approximately 180.5 cubic meters per day.

In this respect, the project will specify in the contractor's construction agreement for an on-site septic tank to be installed to treat wastewater generated by the projection construction control office and from the construction worker's quarters with specifications in compliance with the Announcement of the Ministry of Natural Resources and Environment Re: Determination of Standards for Control of Wastewater Discharge from Certain Types and Sizes of Buildings, 2005. Such wastewater treatment system must be able to treat wastewater in the volume not lower than the wastewater volume throughout each phase before discharge into the public drainage system. Therefore, impact will be low.

2) Seawater Ecology

Wastewater from consumption - utilization by construction workers : Wastewater generated from the activities of project construction workers. It was found that the volume of wastewater generated from project construction workers in phase 1 (2028), phase 2 (2038), and phase 3 (2048) was 161.8 cubic meters per day, 49.4 cubic meters per day, and 91.5 cubic meters per day, respectively.

During the construction phase, wastewater from construction worker's quarters and wastewater from the construction area will be treated by an on-site septic tank to treat wastewater generated at the project construction control office, which will comply with the specifications set in the Announcement of the Ministry of Natural Resources and Environment Re: Determination of Standards for the Control of Wastewater Discharge from Certain Types and Sizes of Buildings, 2005. There will be no discharge into the sea, and thus will not impact marine life.

Sediment leaching from the construction site : During project construction, construction activities may result in eroding of sediments from the construction site into water sources, causing turbidity or increased suspended solids, and may affect aquatic organisms. However, the U-Tapao International Airport vicinity is surrounded by wastewater drainage lines and wastewater will be contained within a sewage pond for sedimentation, which will help prevent sediment leaching into external water sources, prior to being collected into the wastewater pumping pond and transferred to the project's central wastewater treatment system. This will help water quality meet the standards set in the Announcement of the Ministry of Natural Resources and Environment Re: Determination of Standards for the Control of Wastewater Discharge from Certain Types and Sizes of Buildings, 2005, before being discharged into the public drainage system

and later discharged into the sea. In this regard, the possibility of sediments contaminating external water sources and affecting marine life is very low. Therefore, impact is low.

(2) Operation Phase

1) Surface Water Ecology

Wastewater from consumption - utilization affecting marine life : During the project operation phase, there will be an increasing number of flight takeoffs - landings per hour, as well as an increase in the number of service providers in the aviation industry and related businesses, causing wastewater volume to also increase. Wastewater will be treated and recycled for use, such as for watering plants in green areas (gardens) within U-Tapao International Airport and for other activities. For wastewater that does not meet standard requirements, it will be collected in the emergency sewage pond and pumped back into the central wastewater treatment system until the quality meets the standards set in the announcement of the Ministry of Natural Resources and Environment. The central wastewater treatment will be able to adequately handle the amount of wastewater generated from project developments without discharging wastewater into the sea. For rainwater drainage, it was found that the volume is not excessive and the project has designed a rainwater drainage system as prevention and to control the volume of water around the project area. The design of the drainage system is divided into 2 sections: 1) The secondary drainage system will drain water from runway and taxiway surfaces into an open drain system and 2) the main drainage system will transport water into the project ponds before being released into the sea. The project has designed the ponds to hold water for 1 hour before being released into the sea. The holding time will help sedimentation, which will not affect marine life. Therefore, impact is low.

2) Seawater Ecology

2.1) Wastewater from consumption - utilization affecting aquatic life

During the project operation phase, there will be an increasing number of flight takeoffs - landings per hour, as well as an increase in the number of service providers in the aviation industry and related businesses, causing wastewater volume to also increase. Wastewater will be treated and recycled for use, such as for watering plants in green areas (gardens) within U-Tapao International Airport and for other activities. For wastewater that does not meet standard requirements, it will be collected in the emergency sewage pond and pumped back into the central wastewater treatment system until the quality meets the standards set in the announcement of the Ministry of Natural Resources and Environment. The central wastewater treatment will be able to adequately handle the amount of wastewater generated from project developments without discharging wastewater into the sea. For rainwater drainage, it was found that the volume is not excessive and the project has designed a rainwater drainage system as prevention and to control the volume of water around the project area. The design of the drainage system is divided into 2 sections: 1) The secondary drainage system will drain water from runway and taxiway surfaces into an open drain system and 2) the main drainage system will transport water into the project ponds before being released into the sea. The project has designed the

ponds to hold water for 1 hour before being released into the sea, in which the holding time will help sedimentation. This will not affect marine life and therefore impact is low.

2.2) Noise impacts on rare marine animals

Studies on the status of rare marine animal resources did not find any rare marine animal habitats in the project study area, finding only sources of seagrass on the southern side of the project located approximately 800 meters from runway and taxiway 1 and 1,700 meters from runway and taxiway 2. There were no reports of rare marine animals found in the area and the nearest rare marine life habitat was the sea turtle spawning and habitation area in Koh Khram Yai, Chonburi, which is 13 kilometers from the project area, located outside of the area impacted by NEF ≥ 40 and NEF 30 - 40 noise contours in the case of the 2048 flight forecasts. Therefore, it is expected that the level of impact from aircraft noise on rare marine animals is low.

7.3.12.2 Objectives

1. To reduce and control sediment leaching and surface water and seawater contamination from project operations in both the construction phase and operation phase to be contained at a minimum level.
2. To prevent and resolve impacts on surface water ecology and marine ecology caused by project implementation operations during the construction phase and operation phase.
3. To monitor the results of the implementation of the surface water ecology and marine ecology action plan and to oversee effective implementation of the plan.

7.3.12.3 Operation Area

- **Construction** phase: construction site areas, construction control office areas, and construction worker's quarters.
- **Operation Phase** :
  - Surface water sources are shown in **Table 7.3-**5 and **Figure 7.3-*5***, comprising:
    - W1 : Khlong Bang Phai, above water discharge point
    - W2 : Khlong Bang Phai, below water discharge point
    - W3 : Khlong Bang Phai, sea discharge point
    - W4 : Khlong Phala
  - Seawater is as shown in **Table 7.3-6** and **Figure 7.3-6**, comprising:
    - SW1 : South of Runway 1, 300 meters from the shore
    - SW2 : South of Runway 2, 300 meters from the shore
    - SW3 : Southeast of Runway 2, 300 meters from the shore
    - SW4 : Southeast of Runway 1, 500 meters from the shore
    - SW5 : South of Runway 2, 500 meters from the shore
    - SW6 : Southeast of Runway 2, 500 meters from the shore

7.3.12.4 Implementation method

(1) Environmental Impact Prevention and Resolution Measures

1) Construction Phase

- Conduct operations with strict compliance to the environmental impact prevention and resolution measures for surface water hydrology and quality during the construction phase of the project.
- Maintenance on equipment and machinery will be carried out only in the maintenance area, which prevents oil contamination from entering drainage canals.
- Avoid construction during the night, as most sea turtles will come up and lay their eggs during the night.

2) Operation Phase

- Conduct operations with strict compliance to the environmental impact prevention and resolution measures for surface water hydrology and quality during the operation phase of the project.

(2) Environmental Impact Monitoring Measures

1) Construction Phase

Monitoring Method

- Survey the aquatic ecology of surface water and seawater sources in the project area.

Operation Area

- Surface water sources, comprising 4 sites, are as shown in **Table 7.3-**5 and **Figure 7.3-*5***, comprising:
  - W1 : Khlong Bang Phai, above water discharge point
  - W2 : Khlong Bang Phai, below water discharge point
  - W3 : Khlong Bang Phai, sea discharge point
  - W4 : Khlong Phala
- Seawater, comprising 6 sites, is as shown in **Table 7.3-6** and **Figure 7.3-6**, comprising:
  - SW1: South of Runway 1, 300 meters from the shore
  - SW2: South of Runway 2, 300 meters from the shore
  - SW3: Southeast of Runway 2, 300 meters from the shore
  - SW4: Southeast of Runway 1, 500 meters from the shore
  - SW5: South of Runway 2, 500 meters from the shore
  - SW6: Southeast of Runway 2, 500 meters from the shore

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- Aquatic Ecology in Surface Water Sources
- Phytoplankton, zooplankton, benthic animals, fish and aquatic plants
- Marine Ecology
- Phytoplankton, zooplankton, benthic animals and record occurrence/nonoccurrence of rare marine animals, such as dugongs, dolphins, whales, sea turtles, etc., that frequent the area.

Frequency

- Conducted twice a year (during rainy season and dry season) throughout the duration of the project.

Budget

- Analysis and study fee: 1,296,000 baht/time

2) Operation Phase

Monitoring Method

- Survey the aquatic ecology of surface water and seawater sources in the project area.
- Survey the marine ecology in the project area.
- Survey rare marine animals in the project area.
- Survey the abundance of seagrass on the southern coast of the airport.
- Observe and record frequenting of dugongs in the seagrass deposits on the southern coast of the airport.

Operation Area

- Surface water sources, comprising 4 sites, are as shown in **Table 7.3-**5 and **Figure 7.3-*5***, comprising:
  - W1 : Khlong Bang Phai, above water discharge point
  - W2 : Khlong Bang Phai, below water discharge point
  - W3 : Khlong Bang Phai, sea discharge point
  - W4 : Khlong Phala
- Seawater, comprising 6 sites, is as shown in **Table 7.3-6** and **Figure 7.3-6**, comprising:
  - SW1: South of Runway 1, 300 meters from the shore
  - SW2: South of Runway 2, 300 meters from the shore
  - SW3: Southeast of Runway 2, 300 meters from the shore
  - SW4: Southeast of Runway 1, 500 meters from the shore
  - SW5: South of Runway 2, 500 meters from the shore
  - SW6: Southeast of Runway 2, 500 meters from the shore

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1) Aquatic ecology in surface water bodies
   - Phytoplankton, zooplankton, benthic animals, fish and aquatic plants

2) Marine Ecology
   - Phytoplankton, zooplankton, benthic animals and record occurrence/nonoccurrence of rare marine animals, such as dugongs, dolphins, whales, sea turtles, etc., that frequent the area.

Frequency

- Implemented 2 times a year (during the rainy and dry seasons) throughout the project life.

Budget

- Analysis and study fee: 1,296,000 baht/time

7.3.12.5 Duration of Implementation

- **Construction Phase:** throughout the construction period
- **Operation Phase:** throughout the duration of the project

7.3.12.6 Responsible Parties

- **Construction Phase**: RTN and EECO, supervising construction contractors to ensure compliance with measures
- **Operation Phase:** EECO

7.3.12.7 Evaluation

Prepare a report on the implementation of environmental impact prevention and resolution measures and an environmental impact monitoring report for submission to authorizing agencies 2 times a year, both during the construction phase and operation phase.

7.3.13 Waste and Wastewater Management Action Plan

7.3.13.1 Principles and Reasons

Project implementation activities in both the construction phase and the implementation phase may affect waste management. Major sources of waste during the construction phase are from construction activities and activities of workers and personnel who work in the area. This increases the amount of waste that must be disposed of.

Major source of waste in the operation phase, after the project is launched, will be from increasing number of passengers who use U-Tapao International Airport, resulting in increased volume of solid waste and wastewater to be disposed of.

Therefore, the project has established a waste management action plan that covers the establishment of preventive measures and environmental impact mitigation and monitoring measures to reduce the impact of such project activities.

(1) Construction Phase

1) Solid waste

During construction of the Runway and Taxiway 2, there are 2 main sources of solid waste, namely in the U-Tapao International Airport area, the lunch canteen area, and the project construction control office and outside the U-Tapao International Airport area where workers' living quarters are located. The solid waste volumes can be assessed as follows:

Within U-Tapao International Airport area: Solid waste from sources in the U-Tapao International Airport area consists of general solid waste from daily activities of construction workers and foremen. From the assessment, the solid waste volumes to be generated during the construction period, in U-Tapao International Airport project area, in Phase 1 (2028), Phase 2 (2038), and Phase 3 (2048) will be 1,271.6 kg, 388.1 kg and 719.0 kg per day, respectively. The construction contractors must have a system for segregation and disposing of solid waste as well as a systematic solid waste management system with strict waste generation control management to prevent impact on aviation activities and the environment. Therefore, the overall solid waste and hazardous waste management within the U-Tapao International Airport project area is expected to have a moderate impact.

Outside the U-Tapao International Airport area: solid waste from the sources outside U-Tapao International Airport project area are mostly general solid waste from the daily activities of construction workers in their living quarters. The volumes of solid waste generated in workers' living quarters during the construction Phase 1 (2028), Phase 2 (2038), and Phase 3 (2048) will be 1,884, 577 and 1,068 kg per day, respectively. The construction contractor must procure and place sufficient number of waste containers and coordinate with the licensed private company or coordinate with the local administrative organizations to collect such solid waste for disposal. Therefore, the impact is expected to be low.

2) Wastewater

During construction of the Runway and Taxiway 2, there are 2 main sources of wastewater, namely in the U-Tapao International Airport area, the lunch canteen area, and the project construction control office, and outside the U-Tapao International Airport area where workers' living quarters are located. The wastewater volumes can be assessed as follows:

Within U-Tapao International Airport: During the construction phase, wastewater will be generated mainly from the water consumption of construction workers and foremen. The volumes of wastewater to be generated in Phase 1, Phase 2, and Phase 3 will be 161.8, 49.4 and 91.5 cubic meters per day, respectively. The project will specify in the construction contract requiring the contractors to install on-site septic tanks for the treatment of wastewater in compliance with the Notification of the Ministry of Natural Resources and Environment Re: Determination of standards for control of effluent discharge from certain types and sizes of buildings 2005. Such wastewater treatment system must be able to treat at least the expected volumes of wastewater in each of the phases before discharging into the public drainage system. Therefore, the impact is expected to be low.

Outside U-Tapao International Airport: Wastewater will be generated mainly from the water consumption of construction workers' living quarters located outside the U-Tapao International Airport project area. Such wastewater includes wastewater from laundry, bathing and toilets. According to wastewater calculation, wastewater to be generated in Phase 1 (2028), Phase 2 (2038), and Phase 3 (2048) will be 318, 97.6 and 180.5 cubic meters per day, respectively. The project will specify in the construction contract requiring the contractors to install on-site septic tanks for the treatment of wastewater in compliance with the Notification of the Ministry of Natural Resources and Environment Re: Determination of Standards for Control of Wastewater Discharge from Certain Types and Sizes of Buildings 2005. The wastewater treatment system at the construction site must be able to treat at least the expected volumes in each of the phases before discharging into the public drainage system. Therefore, the impact is expected to be low.

(2) Operation Phase

1) Solid waste

When the project's Runway and Taxiway 2 becomes operational, including the expansion and development of U-Tapao International Airport Phase 1 (2028), Phase 2 (2038) and Phase 3 (2048), the volumes of solid waste to be generated will be 21.71, 55.13 and 101.27 tons per day, respectively, which exceed the capacity of the existing waste management system of U-Tapao International Airport. The project has set a solid waste handling station within U-Tapao International Airport at an easily accessible location of approximately 16,000 square meters, comprising loading docks, maintenance buildings, office buildings, weighing, truck yard and vehicle washing areas, along with facilities for solid waste segregation, access road and buffer areas. The system designed to handle and manage up to approximately 102 tons of solid waste within U-Tapao International Airport. This is sufficient for the handling and management of solid waste expected during Phase 3 (2048) at 101.27 tons per day. Therefore, the impact is moderate.

2) Wastewater

When the project's Runway and Taxiway 2 becomes operational, including the areas for the expansion and development of U-Tapao International Airport in Phase 1 (2028), Phase 2 (2038) and Phase 3 (2048), the wastewater volumes generated will be 3,185, 5,625 and 9,212 cubic meters per day, respectively. The current central wastewater treatment system of U-Tapao International Airport, an activated sludge (AS) treatment type, only has the capacity to treat 75 cubic meters per day of wastewater, which is insufficient for future requirements. However, there is a plan to build a Sequencing Batch Reactor (SBR) type centralized wastewater treatment system capable of treating 16,000 cubic meters per day. With the plan to build a water treatment system capable of treating wastewater volumes to be generated in the future, the impact is expected to be low.

7.3.13.2 Objectives

1. To minimize and control solid waste and wastewater management problems that may arise from the implementation of the project activities both in the construction phase and in the operation phase

2. To prevent and resolve impacts of solid waste and wastewater management problems arising from project activities, both in the construction phase and operation phase

3. To monitor and review the implementation results of the waste management action plan and ascertain the effective implementation of the plan

7.3.13.3 Implementation area

- **Construction** phase: Construction area of the project
- **Operational Phase**: U-Tapao International Airport area

7.3.13.4 Implementation method

(1) Environmental impact prevention and resolution measures

1) Construction Phase

Measures to be taken inside U-Tapao International Airport

1. Solid waste management

1.1) Segregation and collection of solid waste

- Implement segregation of solid waste into general solid waste, construction waste, and hazardous waste
- Encourage construction workers and relevant personnel to strictly segregate solid waste in separate containers provided
- Set aside separate areas and containers for solid waste segregated into general solid waste, construction waste and hazardous waste
- Clearly label the separate areas and containers of segregated solid waste
- Provide enough containers for the volumes of segregated solid waste being generated during each collection interval
- The waste container must have a capacity of at least 3 times the volume of solid waste being generated each day. It must be made of durable material that is fire resistant. Its inner surface must be smooth and water resistant, be in good condition, not leaking, have a lid that can protect against rainwater, flies, rats, cats, dogs and other animals that may become carriers of diseases through scavenging or contact with such waste.
- The waste container placement yard must be well ventilated to prevent odors and to keep out rainwater and flies, rats, cats, dogs and other animals that may become carriers of diseases through scavenging or contact with such waste.
- The container's size must be suitable for the placement yard and is convenient for cleaning. If there is huge volume of construction waste generated daily, additional large-capacity containers for solid waste must be provided.
- The solid waste placement yard must be at least 4 meters away from

food preparation and storage areas. However, if the total waste placement yard contains over 3 cubic meters of waste, the distance must be at least 10 meters away from the said locations, and the waste must be placed where it can be moved conveniently.

1.2) Collection and disposal of solid waste

- The contractor must coordinate with the local organization responsible for solid waste management in the area to collect the solid waste for disposal on a regular basis.
- Determine the date and time for solid waste collection. The construction contractor is required to place segregated solid waste in the area determined by the RTN and EECO on a daily basis
- Provide trucks for solid waste collection. Vehicles used to collect waste must be covered to prevent odor from escaping or waste from falling off
- The method for solid waste collection must be managed and waste segregators/collectors must be controlled to ensure the collection of solid waste from waste placement area to waste disposal facilities is done in an orderly manner and does not interfere with work or cause accidents in the area.
- The frequency of waste collection must be based on the volume, characteristics of the solid waste, size and capacity of containers or placement area, the kind of activities and operations involved as well as collection time.
- Only allow solid waste collecting trucks to operate at designated locations or specified places under supervision at all time. Trucks must be inspected and access control imposed on arriving and exiting waste collecting trucks.
- The type and number of waste collecting trucks must be considered based on suitability taking into account:
  - Quantity and characteristics of solid waste to be collected
  - Method of solid waste collection. For example, in case solid waste is collected in containers, a forklift may be required in addition to trucks.
  - Characteristics of waste placement area, such as the width and condition of access road
  - Number of waste collectors/distance and means of solid waste transportation
- Construction waste, for example, wood scraps, masonry debris that cannot be recycled, must be collected and disposed of outside the area. Such waste may be used as fill or subbase material and for other purposes that do not cause any impact or be disposed of in the area specified by the RTN and EECO.
- Disposing of solid waste by outdoor burning at the construction site or at

construction control office is prohibited

- RTN and EECO shall strictly supervise transportation of all types of waste that are transported for disposal outside the U-Tapao International Airport by assigning an agency to be directly responsible for waste transportation accompanied shipping document or a manifest to prevent hazardous waste from being dumped in public land or disposed of as general solid waste.

1.3) Hazardous waste management

- Collect and dispose of hazardous waste correctly as required by the law. Hazardous waste must be collected and placed separately from general solid waste. It must be placed in watertight container to prevent seepage or discharge into public drainage system. Hazardous waste must be placed in covered areas away from sources of flame.
- Hazardous waste must be properly managed by the operator of the treatment, disposal or recycling of hazardous waste approved by the Department of Industrial Works under the Factory Act 1992. The RTN and EECO shall supervise the construction contractor's handling of hazardous waste.
- Ensure hazardous waste is segregated from general solid waste and disseminate knowledge on safe handling of hazardous waste. For example, discarded fluorescent bulbs must be placed in packaging materials to prevent breakage prior to final disposal, and such containers must not be smashed or pierced, etc.
- Set aside a dedicated area and hazardous waste container separate from general solid waste containers
- Determine the date and time that the hazardous waste will be collected for disposal, using trucks designed for hazardous waste collection.
- Place hazardous waste in the designated container or disposal area that are clearly labeled. The container for hazardous waste must have the following properties:
  - Made of strong material to protect such waste from scavenging pets or pests
  - Must be of orange in color, or gray with orange lid, or any other color that is not blue, green, yellow or red, so that it can be clearly distinguished from and are not the same or similar to containers of other types of solid waste.
  - The container must consist of sub-containers or have compartments within the container to store separate types of hazardous waste. The capacity must be sufficient for the volume of hazardous waste being generated during the specified collection intervals.
- There must be suitable compartments for different types of hazardous waste

to be correctly deposited, and such waste must be protected against unauthorized removal.

- The container must be of suitable size and height for recognizability and to prevent wrong types of waste from being put into or on top of the container.
- Prohibit the contractor from transferring, dumping, discarding hazardous waste in the public land or ways
- For storage of toxic or hazardous waste, the contractor must take the following into consideration:
  - Must be at least 1,000 meters away from an archaeological site, conservation zone and nature reserve designated under the Cabinet resolution.
  - Must be located at least 700 meters away from a private drinking water well, water source for tap water production or within a range that does not adversely affect the quality of drinking water well or water source for tap water production.
  - Keep at least 100 meters away from public water sources that are currently in use or within a range that does not adversely affect the quality of that water source.
  - The storage location should have sufficient space for volume of hazardous waste being generated over a period of 90 days.
  - The hazardous waste storage building should be an enclosed building with ventilation control system and the inner surface must be made materials resistant to breakage or leakage of hazardous waste.
  - The floor of the hazardous waste storage area must be sloped into the wastewater drainage channel and well or container for stormwater discharge from hazardous waste specifically. The hazardous waste storage area must also be equipped with fire prevention equipment.
- Hazardous waste transportation from storage location for treatment or disposal must be carried out by the contractor in compliance with the law governing hazardous substances, including application for permit to possession of hazardous substances for transportation, the rules concerning transport trucks, the transportation operators and transporters in accordance with the Notification of the Hazardous Substance Committee Re: Land Transportation of Hazardous Substances, and the guidelines for implementation of hazardous waste manifest system under the Notification of the Ministry of Industry re: hazardous waste transportation manifest system.
- On hazardous waste treatment and disposal, the following should be taken into consideration:
- Hazardous waste that can be recycled must be delivered for recycling at an authorized recycling facility under the law governing factories.

- Hazardous waste that cannot be recycled must be delivered for disposal at an authorized hazardous waste disposal facility under the law governing factories.

Measures to be taken outside of U-Tapao International Airport (construction workers' living quarters)

1) Segregation and collection of solid waste

- Segregation of general solid waste and toxic or community-generated hazardous waste, such as contaminated materials, flammable substances, corrosive substances, highly volatile substances or other substances that may cause or are likely to cause harm to persons, animals, plants, property or the environment.
- The contractor must set aside a designated area and provide separate containers for different types of waste, namely dry solid waste, wet waste, recyclable solid waste and toxic or community-generated hazardous waste.
- Clearly label the separate areas and containers of different types of solid waste
- Provide enough containers for the volumes of segregated solid waste being generated during each collection interval in areas throughout the construction workers' living quarters.
- The waste container must have a capacity of at least 3 times the volume of solid waste being generated each day. It must be made of durable material that is fire resistant. Its inner surface must be smooth and water resistant, be in good condition, not leaking, have a lid that can protect against rainwater, flies, rats, cats, dogs and other animals that may become carriers of diseases through scavenging or contact with such waste.
- The waste container placement yard must be well ventilated to prevent odors and to keep out rainwater and flies, rats, cats, dogs and other animals that may become carriers of diseases through scavenging or contact with such waste.
- The container size is suitable for the place and convenient for cleaning.
- The solid waste placement yard must be at least 4 meters away from food preparation and storage areas. However, if the total waste placement yard contains over 3 cubic meters of waste, the distance must be at least 10 meters away from the said locations, and the waste must be placed where it can be moved conveniently.

2) Collecting and disposing of solid waste

- Dispose of solid waste every day to avoid being a breeding ground of insects and other disease carriers
- Disposing of solid waste by burning outdoor burning in construction workers'

living quarters is prohibited.

- Prohibit contractors from transferring, dumping or disposing of general solid waste or toxic or hazardous waste in a public place or way. Such waste must be transferred, discarded or disposed of at the place or in accordance with the method prescribed or place provided by the local governments only.
- The solid waste container must be in good condition, not leaking, and is covered with a lid to prevent scavenging pets or pests and to avoid becoming a breeding ground for insects and other disease carriers.

3) Hazardous waste management

Follow the same hazardous waste management measures as those taken inside U-Tapao International Airport.

Contractor supervision measures

- Specified in the employment contract regarding the management of solid waste and hazardous waste being generated during the construction of the project, both inside and outside of U-Tapao International Airport, including the delivery for disposal. The waste pick-up contractor must implement such work through an operator granted an appropriate permit from a relevant government agency, and report to the RTN and EECO and/or the project management or project maintenance.
- Records of general solid waste, construction waste, and hazardous waste collected each day shall be tallied for the preparation of a monthly report for inspection and audit.

2) Wastewater management

- Construction workers' living quarters located outside the project area must have adequate sanitary facilities for the number of workers, with at least 1 toilet per 20 workers and equipped with an on-site wastewater treatment system with the capacity to process wastewater at least equal to the amount of wastewater being generated each day in order to treat wastewater according to the standard of effluent discharge from the building according to the Ministry of Natural Resources and Environment Notification of 2005 or the latest version before releasing into public drainage systems or public water sources.
- Build workers' living quarters in areas that have minimal impact on the community. Determining areas that are clearly demarcated and ensuring the living quarters are well controlled and maintained in good condition to reduce impact of workers utilizing spaces at cross purposes and disorderly expansion.
- Limit the spaces and areas that generate wastewater to the minimum
- Provide a system to prevent wastewater from construction activities and cleaning of equipment and tools going into the drainage systems of U-Tapao International Airport. This may involve the construction of embankment, absorption trench or evaporation sites. Upon completion of construction, on-site wastewater treatment tanks must be removed from the area.
- Encourage workers to conserve water to generate less wastewater

2) Operation Phase

1. Solid waste management

- For general solid waste that is recyclable and non-recyclable, the following requirements must be observed:
  - Solid waste must be collected and stored in the waste storage building.

- Non-reusable solid waste, such as sludge from central wastewater treatment system, must be stored in covered containers and used as soil amendments. The rest must go to the landfills or disposed of by operators with the permit to dispose of waste in a sanitary manner. Asphalt scraps from Runway and Taxiway repairs must be collected and stored only at the scrap yard specified by the RTN, EECO and/or the project management or project maintenance management.
- Non-recyclable solid waste must be stored in a container that can prevent leakage and diffusion and must be collected for disposal outside of U-Tapao International Airport strictly on a daily basis, including during weekends and public holidays, to ensure no buildup at the waste storage. Such waste must go to sanitary landfills or treated or disposed of as appropriate by authorized operator with a permit from government agency under the law.
- Compostable solid waste including food scraps from restaurants within U-Tapao International Airport must be collected in the food scrap storage containers placed at the sources to prevent such waste from being discarded along with general solid waste. Restaurants are required to separate plastic scraps, drinking straws, chopsticks, water bottle caps, and other contaminants into the containers for non-recyclable waste so that food scraps can be used as animal feeds. Such waste must be collected and removed from the U-Tapao International Airport on a daily basis to avoid buildup of waste.

- Infectious solid waste from a medical facility in U-Tapao International Airport upon being collected must be kept in a storage container with temperature control to keep it at 10° C or below for up to 30 days and must be delivered for disposal outside the U-Tapao International Airport by incineration in an incinerator for infectious waste or other methods as required by law, by authorized operator with a permit from government agencies or by law.
- Solid and liquid hazardous waste must be segregated and stored at specific areas separate from other types of solid waste. Hazardous waste containers must be leak-proof and diffusion-proof. Hazardous waste may be stored for up to 90 days (as required by law) and delivered for treatment, disposal or recycling in accordance with technical requirements by authorized operators with permits from government agencies to engage in treatment, disposal or recycling of hazardous waste.
- Minimize solid waste disposal by maximizing utilization of general solid waste and by reducing the moisture of segregated solid waste.
- Develop a plan and explore appropriate technology for waste management within U-Tapao International Airport and deliver waste for disposal outside

the airport as appropriate for the volumes and characteristics of general solid waste and hazardous waste that may increase in the future.

- Inspect the containers for the storage of solid waste and hazardous waste to ensure they are in good condition to prevent spillage, leakage or diffusion of solid waste and hazardous waste during transportation.
- Provide appropriate solid waste and hazardous waste hauling trucks in sufficient number for the volumes of solid waste and hazardous waste being generated. Such waste hauling trucks must be maintained in good condition ready for sustained services at all time. In case of emergency, there must be replacement trucks on standby ready for hauling services at any given time.
- Wastewater and wastewater runoff generated during the normal waste transfer and waste segregation activities must be collected and channeled into the primary wastewater treatment system at the solid waste transfer station, and must be treated to meet the effluent discharge standards of U-Tapao International Airport before being released into the central wastewater treatment system.
- Solid waste storage areas in waste storage buildings and machinery used to segregate general solid waste should be cleaned regularly to reduce odors that may cause nuisance to nearby communities.
- The recyclable material inventory area should have its floor cleaned regularly, and such materials should not kept for too long to prevent fire hazard and nuisance odors as well as to avoid problems relating to scavenging rodents and breeding ground of insects.
- Machinery and tools used for segregating waste must be maintained in good condition and be ready for use at all time.
- The removal of general solid waste, infectious waste, and various types of hazardous waste for disposal outside the U-Tapao International Airport must be accompanied by a waste transportation manifest every time, and the waste hauling trucks must be covered with canvas or other means to prevent leakage, dropping of solid waste and hazardous waste debris along the entire transportation route, in compliance with the legal requirements.
- Hire a contractor to manage solid waste generated within U-Tapao International Airport that have the ability to meet the waste management standards, have the capability to provide adequate spaces for waste disposal throughout contract period, and which has the appropriate permits from government agencies.
- Select the contractor to dispose of infectious waste generated inside the U-Tapao International Airport, which has the capability to conduct air quality monitoring from the stack emission of an incinerator to ensure compliance with air quality standards and is licensed by government

agencies as required by the law on a yearly basis.

- Randomly inspect the operations of the contractor hired for the disposal of solid waste, infectious waste and hazardous waste as well as other contractors involved in waste management activities in U-Tapao International Airport at least twice a year and conduct an on-site inspection of the waste disposal facility on standby (for all 3 waste types) at least once a year to assess their capability and efficiency in the waste disposal, and to check whether they meet the technical standards or observe the contractual terms. Failing that the RTN and EECO and/or the project management or the project maintenance management have the right to terminate the relevant contract(s) and replace the contractor hired for the disposal of solid waste, infectious waste and hazardous waste, as appropriate.

2) Wastewater management

- Provide a central wastewater treatment system that can handle wastewater volume of no less than 10,000 cubic meters per day to be generated when the number of passengers using the airport reaches 70 million per year.
- Ensure that the central wastewater treatment system is operational and staffed by personnel with knowledge and capability to control and operate the central wastewater treatment system in an efficient manner at all time.
- Recordkeeping is required for the operation of central wastewater treatment system, including records of day-to-day operational issues that can be used as input data for the control of the treatment system and to prevent problems that may arise as per Form TS 1 (recordkeeping form for detailed statistics and data on the operational status of the wastewater treatment system of the source of pollution). Prepare a summary report on the operation of the wastewater treatment system and the results of inspection of the effluent discharge quality standard once a month, and submit a report as per Form TS 2 to local authorities before the 15th of the following month, in compliance with the ministerial regulations determining rules, methods and statistical recordkeeping and recordkeeping for details relating to the wastewater treatment system and a summary report on the performance of the wastewater treatment system 2012.
- Establish regular maintenance plans for central wastewater treatment system
- Monitor the characteristics of the treated effluent discharge to ensure compliance with the control of effluent discharge standard for type A buildings in accordance with the notification of the Ministry of Natural Resources and the Environment Re: determination of standards for the control of effluent discharge from certain types and sizes of buildings (2005), or according to the latest version of the notification, before releasing into the drainage canal within the U-Tapao International Airport.
- Reuse treated effluent discharge that meets the standards as much as possible, such as using it to water plants and trees in the green areas of U-Tapao International Airport, etc.

(2) Environmental impact monitoring measures

1) Construction Phase

1. Solid waste management

<u>Monitoring method</u>

- Keep record of the volumes of solid waste and hazardous waste collected and stored each day

Implementation area

- Construction area
- Construction Control Office
- Workers' living quarters

Index

- General solid waste volume
- Construction solid waste volume
- Hazardous solid waste volume

Frequency

- Prepare monthly summary reports throughout the construction period

2. Wastewater management

Monitoring method

- Measure and analyze effluent discharge quality that has been treated by the wastewater treatment systems, using the methods of measurement and analysis according to the Ministry of Natural Resources and Environment's Notification Re: determination of standard for the control of effluent discharge from certain types and sizes of buildings 2005 or the latest version of the notification.

Implementation area

- Drainage point in the construction control office area, 1 location
- Drainage point at the site of construction workers' living quarters, 1 location

Index

- Acidity and alkalinity (pH)
- BOD
- Suspended solids
- Sulfide
- Total dissolved solid
- Settleable solids
- Fat, oil and grease
- TKN

Frequency

- Every month throughout the construction period

Budget

- Analysis and study fee: 13,300 baht/time

2) Operation Phase

1. Solid waste management

Monitoring method

- Record the volumes of solid waste and hazardous waste collected each day and prepare a monthly summary report so that it can be checked.

Implementation area

- U-Tapao International Airport area

Index

- The types or categories and volumes of general solid waste, infectious waste, and hazardous waste

Frequency

- Daily and prepare monthly summary reports throughout the project life

Monitoring method

- Prepare a register of containers for each type of waste to determine the number of containers that are in working order

Implementation area

- U-Tapao International Airport area

Index

- Conditions of container for solid waste
- Container placement areas

Frequency

- Once a month, throughout the project life

Monitoring method

- Review the operations of the ultimate operator of the solid waste and hazardous waste disposal and prepare a report so that it can be audited

Implementation area

- U-Tapao International Airport area

Index

- Documentation for solid waste and infectious waste, and manifest for the transportation of hazardous waste

Frequency

- 2 times a year throughout the duration of the project.

Budget

- Analysis and study fee: 3,000 baht/time

2. Wastewater management

Monitoring method

- Measure and analyze effluent discharge quality that has been treated by the wastewater treatment systems of U-Tapao International Airport, using the methods of measurement and analysis according to the Ministry of Industry's Notification No. 2 (1996) Re: determination of characteristics of effluent discharged from the factory, and Ministry of Natural Resources and the Environment's Notification Re: determination of standard for the control of effluent discharge from certain types and sizes of buildings (2005), or the latest version of the notification Re: determination of standard for the control of effluent discharge from certain types and sizes of buildings (type A).
- According to the Notification of the Ministry of Natural Resources and Environment, Re: determination of standard for the control of effluent discharge from sources: industrial plants, industrial estates and industrial zones, dated 29 March 2016

Implementation area

- Wastewater collection point before entering the treatment system, 1 location
- Drainage point from central wastewater treatment system, 1 location

Index

- Temperature
- Acidity and alkalinity (pH)
- COD
- BOD
- Total dissolved solid
- Suspended solids
- Fat, oil and grease
- TKN
- Lead (Pb)

- Chromium (Cr)
- Cadmium (Cd)
- Mercury (Hg)
- Copper (Cu)
- Manganese (Mn)
- Free chlorine
- Chloride

Frequency

- Once a month, throughout the project life

Budget

- Analysis and study fee: 21,000 baht/time

7.3.13.5 Duration of Implementation

- **Construction Phase:** throughout the construction period
- **Operation Phase:** throughout the duration of the project

7.3.13.6 Responsible Parties

- **Construction Phase**: RTN and EECO, supervising construction contractors to ensure compliance with measures
- **Operation Phase:** EECO

7.3.13.7 Evaluation

Prepare a report on the implementation of environmental impact prevention and resolution measures and an environmental impact monitoring report for submission to authorizing agencies 2 times a year, both during the construction phase and operation phase.

7.3.14 Land Use Action Plan

7.3.14.1 Principles and Reasons

The project implementation activities, both in the construction phase and in the operation phase, may result in impacts arising from land use. Major sources of such impacts in the construction phase are delivery of construction materials and transportation of workers, which may interfere with or hinder the ongoing land use activities of communities, households, and shops located along the transportation routes of construction materials and workers, and may lead to a change in land use at the site of workers' living quarters.

Impacts during the operation phase, when Runway and Taxiway 2 become operational, may be caused by expansion in land use for residential, commercial, and commercial services as well as in industrial services and warehouse operations.

Therefore, the project has established an action plan for land use, covering the introduction of preventive measures and environmental impact resolution, environmental impact monitoring measures in order to reduce the impact of such project activities.

(1) Construction Phase

Construction of the project is within the U-Tapao International Airport area, which in accordance with the ministerial regulations governing Rayong's comprehensive city planning 2017 (published in the Royal Gazette on 12 January 2017), together with the land use and infrastructure and public utilities development zoning of the special development zone, which are consistent with the said ministerial regulations. During the construction phase, there will be no additional expropriation of the area. People living around the project area do not need to be relocated, thus causing neither impact to land use nor land use dispute in the project area in the eastern region 2019 (published in the Royal Gazette on 20 November 2019), which designates the project area as land type Khor. Gor. -5, promotional zone for Eastern Aviation City, under special economic promotion zone for special businesses. The objective is to support important projects that form the basis for the development of the Eastern Special Development Zone according to the policy of the Eastern Development Zone. Therefore, it is in accordance with the said ministerial regulations, which during the construction phase, there will be no additional expropriation of the area, thus causing neither impact to land use nor land use dispute relating to the land use within the project area.

Other areas of study may be affected by the project's construction activities, including nuisance noise that may hinder the ongoing land use of the communities, households, and shops along the routes of transportation. In addition, there may be temporary change in land use at the sites of workers' living quarters, which generate solid waste and wastewater. Nevertheless, there may also be positive outcomes, including a marked increase in business for food vendors, shops selling consumer goods to accommodate the large number of workers. Such impacts will be temporary and will end upon the completion of the project. The impact to land use in the construction phase is low.

(2) Operation Phase

In the operation phase, there will be an increase in number of takeoffs and landings per hour, resulting in increased noise impacts in the area. Certain types of land use in the noise contour map may be rendered unsuitable according to technical recommendations regarding the appropriate noise level for land use around U-Tapao International Airport of the Pollution Control Department, when compared with the noise level deemed appropriate for land use around U-Tapao International Airport, it was found that there are 201 vulnerable sites – 170 of which are deemed suitable for land use while the other 31 sites are considered unsuitable for land use. Details are listed below:

Educational institution: 57 vulnerable sites, of which 49 are deemed suitable and the other 8 found unsuitable for the purpose under the criteria. Among sites found unsuitable, 2 sites are located in the NEF ≥ 40 area and the other 6 in the NEF30 - 40 area. There are 11 unsuitable sites, of which 2 are located in NEF ≥ 40 area, and 9 located in NEF30 - 40 area.

Healthcare establishment: 18 vulnerable sites, of which 15 are deemed suitable and 3 are found unsuitable according to the criteria. Among those sites found unsuitable 1 site is in the NEF ≥ 40 area and 2 sites in the NEF30 - 40 area.

Community: 57 vulnerable sites, of which 48 are deemed suitable and 9 found to be unsuitable. Among the sites deemed unsuitable 1 is located in NEF ≥ 40 area and 8 in the NEF30 - 40 area.

The vulnerable sites deemed unsuitable under the noise level criteria for land use around U-Tapao International Airport will be impacted by long-term aviation activities, resulting in a high level of impact.

7.3.14.2 Objectives

1. To study ways to keep impacts from changes in land use that may occur as the result of project activities both in the construction phase and in the operation phase at the lowest possible level.
2. To assess the impacts of land use arising from project activities, both in the construction phase and in the operation phase.
3. To monitor the results of the implementation of the measures under the land use action plan and to ensure effective implementation of such plan.

7.3.14.3 Implementation area

- **Construction** phase: Construction area of the project
- **Operation** phase: area surrounding U-Tapao International Airport

7.3.14.4 Implementation method

(1) Environmental impact prevention and resolution measures

1) Construction Phase

- Build workers' living quarters in areas that have minimal impact on the community. Determining areas that are clearly demarcated and ensuring the living quarters are well controlled and maintained in good condition to reduce impact of workers utilizing spaces at cross purposes and disorderly expansion.
- Prepare a plan to mitigate the impacts that may arise during the construction of the project, such as finding alternative transportation routes for construction activities, which may result in local transportation route modifications or other temporary land use activities in the construction area and surrounding areas.
- Coordinate with the provincial public works offices and city planning offices of Rayong and Pattaya and other relevant agencies so that noise contour map can be sent and incorporated into the respective comprehensive city planning in order to impose appropriate control for land use and construction of buildings around the U-Tapao International Airport that is conducive to the airport's activities and the Air Transport Security Zone, and the areas impacted by the development of the U-Tapao International Airport.
- Coordinate with local agencies in enforcing the Building Control Act, along with the specific city planning law for areas surrounding the U-Tapao International Airport to control the granting of permits for new structures.

- Coordinate and provide information to local authorities to announce and inform the public of the Air Transport Security Zone and areas impacted by noise arising from the development of the project.
- Deliver the approved noise contour map to local authorities for approval for use as a guideline for the granting of building permits in the area.
- Communicate through at least 3 channels, including websites, to inform communities of the noise contour map approved by the Cabinet to local communities.

2) Operation Phase

- Coordinate with the provincial public works offices and city planning offices of Rayong and Pattaya and other relevant agencies so that noise contour map can be sent and incorporated into the respective comprehensive city planning in order to impose appropriate control for land use and construction of buildings around the U-Tapao International Airport that is conducive to the airport's activities and the Air Transport Security Zone, and the areas impacted by the development of the U-Tapao International Airport.
- Coordinate with local agencies in enforcing the Building Control Act, along with the specific city planning law for areas surrounding the U-Tapao International Airport to control the granting of permits for new structures.
- Coordinate with and provide information to local agencies to announce and inform the public on the Air Transport Security Zone and the areas affected by the noise arising from the development of the project.
- Deliver the approved noise contour map to local authorities for approval for use as a guideline for the granting of building permits in the area.
- Publicize the noise contour map approved by the Cabinet and results of sound measurement at the permanent real-time noise monitoring stations on the website.

(2) Environmental impact monitoring measures

1) Operation Phase

Monitoring method

- Collect and study statistical data on the granting of building permits by local authorities in areas surrounding U-Tapao International Airport.
- Conduct on-location survey of land use to identify trend in land use patterns in order to update preventive measures and resolution of impact on land use.

Implementation area

- The area surrounding U-Tapao International Airport, which is located no less than 6 kilometers east and west of U-Tapao International Airport, and no less

than 10 kilometers north and south of the airport.

Index

- Information on granting of building permits and land use patterns

Frequency

- Once a year throughout the duration of the project.

Budget

- Analysis and study fee: 3,000 baht/time

7.3.14.5 Duration of Implementation

- **Construction Phase:** throughout the construction period
- **Operation Phase:** throughout the duration of the project

7.3.14.6 Responsible Parties

- **Construction Phase**: RTN and EECO, supervising construction contractors to ensure compliance with measures
- **Operation Phase:** EECO

7.3.14.7 Evaluation

Prepare a report of compliance with environmental protection and impact resolution measures as well as an environmental monitoring report to be presented to the authorizing agencies twice a year, both during the construction phase and operation phase.

7.3.15 Transportation Action Plan

7.3.15.1 Principles and Reasons

The project implementation activities in both construction and operation phases may impact transportation. Major sources during the construction phase are delivery of construction materials and transportation of workers to the construction area, which may affect traffic conditions in the area surrounding U-Tapao International Airport.

Major source of impact during the operation phase will be the increase in number of passengers and cargo resulting from increase traffic volume that may impact traffic conditions in the area surrounding U-Tapao International Airport

Therefore, the project has established a transportation action plan, covering environmental impact prevention and resolution measures, environmental impact monitoring measures in order to mitigate impacts from project activities.

(1) Construction Phase

Transportation of construction materials: Use Highways 3, 331, 332 and 3126

The forecast of traffic volume in the 3-year construction periods in Phase 1: 2021-2023 and Phase 2: 2030-2032, indicates that there will be a slight increase in traffic volume on Highway 3 or

Sukhumvit Road resulting from transportation of construction materials and construction workers. There will be no major impact. Service level will stay with A-B with good traffic flow. However, construction in Phase 3: 2040-2042 will seriously impact traffic conditions due to the combination of transportation of construction materials and workers and the increase in number of passengers following the completion of the earlier phases. The service level will drop from A to D and E levels, respectively. Therefore, during Phase 3 construction, the project will have already accommodate 38 million passengers per year, the impact on traffic condition will be high.

(2) Operation Phase

From the assessment of the impacts on traffic conditions on the road network in the future, Motorway 7, which will be built as an 4-lane elevated motorway overpassing Highway 3 (Sukhumvit Road), linking to the north side of the project and to be open for traffic in 2025, is expected to relieve traffic volume on Highway 3126 linking to the main entry and exit point of the airport, where the service level is expected to drop to F level, or highly congested by 2045.

In case all access route projects linking up to the project are completed by Phase 3 (2048), the main road network, such as Highway 3 (Sukhumvit), Highway 331, Airport Entry-Exit Road, and intercity Highway 7, the service level of all these road links is expected to drop to F level. There is a need to expand all main road links to at least 6 lanes during Phase 2 (2038), and to 10 lanes in Phase 3 of the project development (2048).

Roads within the airport will be able to accommodate traffic volume up to 2045, when they reach full capacity and need to be expanded to 6 lanes.

Highway 3216 is an access route to the airport from the south, currently under construction to expand to 6 lanes for the entire route. The highway offers a direct link to Chuksamet Port whereas intercity Highway 7, an elevated highway links up to the airport from the north, should be expanded to 6 lanes before 2047. The impact on traffic conditions is expected to be moderate.

7.3.15.2 Objectives

1. To reduce and control adverse effects on the traffic conditions around the U-Tapao International Airport area that may be caused by project activities both in the construction phase and in the operation phase to a minimum.
2. To prevent and mitigate the impacts on transportation from project activities, both in the construction phase and in the operation phase.
3. To monitor the results of the implementation of the transportation action plan and to oversee effective implementation of such plan.

7.3.15.3 Implementation area

- **Construction phase:**
  - Construction area of the project
  - Road networks around U-Tapao International Airport
  - Internal roads of U-Tapao International Airport
  - Inflow route - construction area
- **Operation Phase**:
  - Road networks around U-Tapao International Airport
  - Internal roads of U-Tapao International Airport
  - Routes – entry/exit U-Tapao International Airport

7.3.15.4 Implementation method

(1) Environmental impact prevention and resolution measures

1) Construction Phase

- Require construction contractors to propose detailed methods for traffic arrangement to the RTN and EECO for approval within 15 days of signing the employment contract. The process of planning and assessing the proposed traffic management during the construction phase, calls for the contractor, RTN and EECO to make every effort to avoid adverse impacts to traffic conditions on Sukhumvit Road or other major roads. Under temporary traffic arrangements, they must provide temporary traffic diversions, fencing, traffic signs, signals and other equipment that meet the traffic and transportation safety standards, as specified in Part 2, Volume 5 of the 2003 handbook for the use of traffic signs at construction sites of Office of Transport and Traffic Policy and Planning (OTP) at all time, day and night.
- Require construction contractors of the RTN and EECO to formulate a plan to provide temporary traffic diversion routes during the construction phase to be submitted to the RTN and EECO for approval at least 1 month prior to commencing construction of such temporary routes. The plan must demonstrate and ascertain that the methods to be used in the temporary traffic arrangements will not cause traffic congestion as specified in the contractual conditions.

- Require construction contractors of the RTN and EECO to propose detailed plan and methods for public relations and temporary traffic management during construction, to seek approval from the employers and other relevant agencies, such as the Department of Highways, Traffic Police, etc. The construction contractors must coordinate and hold joint meetings, including gathering feedback and suggestions from agencies on the public relations efforts and temporary traffic management plan in order to come up with the most effective public relations campaign and traffic management plan.
- Require construction contractors to propose a plan for the transportation of construction materials, machinery and equipment, workers and personnel involved in the construction to be submitted to the RTN and EECO before commencing such transportation. Such requirement shall be set as a condition attached to the contract of employment.
- Require construction contractors to maintain records of trips made for the transportation of materials and workers, detailing points of departure and destination along with volume of materials and number of workers, occurrence and cause of traffic accidents within the U-Tapao International Airport for reviewing, improvement and monitoring.
- Install temporary traffic signs in areas where trucks make a U-turn, which may cause traffic congestion and unsafe conditions. Install temporary signs, textual warnings, and flashing lights at construction sites in accordance with the Road Traffic Act 1979, or the latest notification, in traffic problem or accident-prone areas, such as entry-exit points of construction sites and inside construction area. All signs must be clearly visible day and night.
- Avoid transporting construction materials during the morning rush hours (06:00-09:00) and evening rush hours (16:00-20:00), or as required by law.
- Require construction contractors to ascertain that trucks used for shipping construction materials stay within the maximum allowable weight under the law, and that drivers observe a maximum speed 60 kilometers per hour for trucks with a load of over 1,200 kilograms, and a maximum speed of 45 kilometers per hour for trailers, and a maximum speed of 30 kilometers per hour for all vehicles within the construction area.
- Select the transportation routes for materials and workers that do not interfere with the main access routes at the entry-exit points of the U-Tapao International Airport used by passengers and members of communities around the airport. Areas with heavy traffic should also be avoided. Highway 3 linking to the U-Tapao International Airport from the north is designated as the main transportation route, regardless of the materials' point of origin.
- Coordinate with traffic police to facilitate the use of the transportation routes and inform motorists and people living along the routes in advance of the date

and time set for transportation of materials, tools and equipment and heavy machinery.

- Together with the Department of Highways, formulate a contingency plan in the case of emergencies and major accidents to mitigate traffic congestion by taking measures such as periodically opening the central separation barrier to allow reversible lanes to enable traffic to flow around accident sites, etc.
- In the event that the transportation of construction materials of the project causes damage to the road, the contractors under the supervision of the RTN and EECO, must coordinate with relevant agencies and immediately proceed to make repairs or take corrective measures.
- Trucks and vehicles used in the transportation of materials, tools, equipment and construction workers must comply with the Road Traffic Act of 1979 and the Road Traffic Act (No. 4) of 1992 and the Road Traffic Act (No. 12) 2019, and workers are prohibited from traveling in the uncovered bed of a truck coming into U-Tapao International Airport.
- Trucks and vehicles must be clearly labeled with logos and name of construction project along with phone numbers and vehicle ID number and name of transportation contractor, to indicate that they were transporting materials for the project, and so that members of the public may be able to verify or lodge a complaint when problems arise. These vehicles are also required to have GPS installed for tracking purpose.
- Arrange for transport vehicles for construction workers to ensure safe and orderly travel as well as to prevent theft of construction materials.
- The construction area must be fully enclosed and has only one entry-exit point to ensure effective access control and security.
- Arrange for security personnel to enforce round-the-clock access control at the entry-exit point access, set the time to opening and closing of the gate.
- Inspect vehicles and machinery of the construction companies used in construction work to ensure that they are maintained in good working order, to prevent vehicles or machinery from breakdown while in use, and conduct regular inspection of trucks transporting construction materials on a regular basis.
- Cover the loading compartment of the trucks used in the transportation of construction materials and equipment with canvas or similar materials to prevent construction materials from falling off along the transportation route. In the case of construction materials falling off on the traffic surface or the roadside, dispatch workers to clean up as soon as possible.
- Wash the wheels of all vehicles leaving the construction area to make sure they are free of dirt, mud, or sand before taking the vehicle out onto the roads outside the construction area.

- Require construction contractors to control and supervise truck drivers and machinery operators to exercise caution in the construction area and strictly comply with relevant laws and regulations, and punish those who do not follow the rules as part of the effort to prevent accidents.
- Require contractors to keep record of type and volume of traffic arriving at and leaving from the construction area on a daily basis, as well as traffic accident statistics on both internal roads of U-Tapao International Airport and external roads and report to the RTN and EECOO at least once a month throughout the construction period.
- In the case of driving in the airside area, permission must be obtained from the U-Tapao International Airport and the rules and methods of driving in the airside must be strictly followed.
- Drivers must be trained and pass the test for driving in the airside area, and the vehicles must be certified by the department responsible at U-Tapao International Airport to prevent unauthorized persons from entering the construction area and workers from construction area from entering the airside or other restricted areas.
- Establish access control at the construction area within U-Tapao International Airport, in a hierarchical system based on level of security clearance.

2) Operation Phase

- Increase the frequency of shuttle buses within U-Tapao International Airport during passenger peak hours.
- Coordinate with relevant agencies to increase access routes into U-Tapao International Airport to ensure convenience and speed for passengers at U-Tapao International Airport.
- Coordinate with relevant transportation agencies to study future access routes to the U-Tapao International Airport involving public transport systems linked up with large-scale mass transit systems to encourage the use of public transport as much as possible. As such, the government should develop projects to expand existing public transport and rail-based mass transit systems to reduce the use of personal transport for traveling to and from the U-Tapao International Airport. To this end, a major upgrade to link up public transport systems and improving access to them to ensure convenience to air passengers and prevent problems that may arise.
- Coordinate with local traffic police to improve traffic signals around U-Tapao International Airport and at U-turns located near U-Tapao International Airport, to correspond with traffic volumes, cut delays or queue lengths at intersections, while also encourage traffic police to strictly enforce traffic law, taking punitive actions or reprimanding motorists who commit traffic violations.

- Coordinate with the agencies responsible for traffic direction along the access routes to U-Tapao International Airport and the nearby connecting routes during peak hours.
- Coordinates with relevant agencies responsible for the development and improvement of the transportation networks around U-Tapao International Airport to accommodate increased traffic volume and relieve congestion.
- Coordinate with the Department of Highways to prepare a contingency plan for traffic management in the event of emergencies and major accidents to relieve traffic congestion, such as periodically opening the central separation barrier to allow reversible lanes, etc.
- Compile statistics of relevant public transport users to and from the U-Tapao International Airport, once a year for use as data input to devise measures to improve and encourage the use of mass transit and public transport systems to reduce the number of personal cars as part of the effort to alleviate traffic congestion. In addition, the EECO should gather other data relating to transportation and traffic situations around the U-Tapao International Airport from other agencies for use in developing strategic transport infrastructure policies and plans to correspond with the development of U-Tapao International Airport and land use in the surrounding areas.

(2) Environmental impact monitoring measures

1) Construction Phase

1. Traffic on the main road networks around U-Tapao International Airport

Monitoring method

- Survey traffic volume to assess traffic conditions and road performance on the main access routes around U-Tapao International Airport.

Implementation area

Road networks that are main access routes around U-Tapao International Airport, namely:

- Highway 3
- Highway 331
- Highway 332
- Highway 3126

Index

- The type and volume of traffic on an hourly basis, according to main access routes around U-Tapao International Airport.

Frequency

- Round-the-clock for 2 days, one on a weekend and another on a week day. Such survey will be conducted 3 times a year throughout the construction period.

2. Inbound-outbound traffic at U-Tapao International Airport

Monitoring method

- Keep record of the type and traffic volume in and out of the construction area.

Implementation area

- Access point to construction area

Index

- The type and volume of hourly traffic according to the access routes to and from the construction area.

Frequency

- Keep daily record of and submit monthly summary reports throughout the construction period.

3 Accidents

Monitoring method

- Collect traffic accident statistics on internal roads in U-Tapao International Airport and the main access routes around U-Tapao International Airport from contractors.

Implementation area

The internal roads within U-Tapao International Airport and the main routes around U-Tapao International Airport are:

- Internal roads within U-Tapao International Airport
- Highway 3
- Highway 331
- Highway 332
- Highway 3126

Index

- Number of road accidents according to cause, severity and damage incurred

Frequency

- Keep daily record and submit monthly summary reports

Budget

- Analysis and study fee: 480,000 baht/time

2) Operation Phase

1. Traffic on the main road networks around U-Tapao International Airport

Monitoring method

- Collect data and survey traffic volume to assess traffic conditions and road performance on the main access routes around U-Tapao International Airport.

Implementation area

Road networks that are main access routes around U-Tapao International Airport, namely:

- Internal roads of U-Tapao International Airport
- Highway 3
- Highway 331
- Highway 332
- Highway 3126

Index

- The type and volume of hourly traffic according to the arrival and departure routes.

Frequency

- Round-the-clock for 2 days, one on a weekend and another on a week day. Such survey will be conducted once a year throughout the construction period.

2. Inbound-outbound traffic at U-Tapao International Airport

Monitoring method

- Record the type and volume of inbound-outbound traffic at U-Tapao International Airport.

Implementation area

- Arrival and departure routes at U-Tapao International Airport

Index

- The type and volume of hourly traffic according to inbound-outbound routes at U-Tapao International Airport.

Frequency

- Round-the-clock for 2 days, one on a weekend and another on a week day. Such survey will be conducted once a year throughout the construction period.

3) Statistics of users of mass transit and public transport systems to and from U-Tapao International Airport

Monitoring method

- Compile statistics of users of relevant mass transmit and public transport systemsto and from U-Tapao International Airport.

Implementation area

- U-Tapao International Airport area

Index

- The number of passengers of mass transmit and public transport systems on weekend and on week day

Frequency

- Collect data monthly and prepare a summary report annually throughout the project life.

4) Occurrence of Incidents

Monitoring method

- Collect accident data on the internal roads within U-Tapao International Airport and the main access routes around U-Tapao International Airport.

Implementation area

The internal roads within U-Tapao International Airport and the main routes around U-Tapao International Airport are:

- Internal roads of U-Tapao International Airport
- Highway 3
- Highway 331
- Highway 332
- Highway 3126

Index

- Number of road accidents according to cause, severity and damage incurred

Frequency

- Keep daily record and submit monthly summary reports throughout the project life

Budget

- Analysis and study fee: 106,000 baht/time

7.3.15.5 Duration of Implementation

- **Construction Phase:** throughout the construction period
- **Operation Phase:** throughout the duration of the project

7.3.15.6 Responsible Parties

- **Construction Phase**: RTN and EECO, supervising construction contractors to ensure compliance with measures
- **Operation Phase:** EECO

7.3.15.7 Evaluation

Prepare a report on the implementation of environmental impact prevention and resolution measures and an environmental impact monitoring report for submission to authorizing agencies 2 times a year, both during the construction phase and operation phase.

7.3.16 Public utility and public service action plan

7.3.16.1 Principles and Reasons

The project activities in the construction phase and operation phase may impact water and electricity consumption. Major source of such impact in the construction phase is the demand for water and electricity of the workers and foremen.

Major source of impact during the operation phase is the demand for water of the increasing number of passengers and users of the U-Tapao International Airport

Therefore, the project has established a public utility and public facility action plan, covering the establishment of environmental impact preventive and impact resolution measures as part of the effort to mitigate impacts of the project activities.

(1) Construction phase:

1) Water use

During the construction period of Runway and Taxiway 2, the demand for water of workers and foremen can be divided into 2 phases as follows:

Within U-Tapao International Airport area

In the construction phase, the estimated demand for water, mostly from construction workers and foremen, is as follows:

Phase 1: Demand for water from construction foremen and workers who work and take a break within the airport area during daytime is approximately 202.3 cubic meters per day.

Phase 2: Demand for water from construction foremen and workers who work and take a break within the airport area during daytime is approximately 61.7 cubic meters per day.

Phase 3: Demand for water from construction foremen and workers who work and take a break within the airport area during daytime is approximately 114.4 cubic meters per day.

The project will request water supply services from East Water, which will build and provide water supply services within the project area and its service area, covering the construction phase of the project. In the case that the construction activities of the airport development (expansion) project begin before the water supply project is completed, construction contractors may request water supply services from the Provincial Waterworks Authority, Ban Change branch, which can provide adequate water supply to the project's Construction Supervision Office without affecting water users around U-Tapao International Airport. The project will specify in the employment contract requiring construction contractors to provide water reserve tanks sufficient for 3 days in case tap water runs low or water shortage. The impact is to expected be moderate.

Outside of U-Tapao International Airport area

The estimated demand for water of workers in their living quarters according to different construction phases is as follows:

Phase 1: Demand for water in workers' living quarters located outside the airport is approximately 398 cubic meters per day.

Phase 2: Demand for water in workers' living quarters located outside the airport is approximately 122.0 cubic meters per day.

Phase 3: Demand for water in workers' living quarters located outside the airport is approximately 225.6 cubic meters per day.

During the construction phase, it is possible to purchase tap water from Provincial Waterworks Authority's Rayong, Ban Chang, Paknam Prasae branches, with Ban Chang being closest to the project. Based on water use statistics, PWA's branches in Rayong province have surplus water supplies to meet the demand for water of construction workers of the project. The impact is expected to be moderate.

2) Electricity consumption

The project will receive electricity from B Grimm Power Public Company Limited. The electrical system construction project due to be completed in mid-2022, will offer electricity for sale during the construction phase of the project. In the case that construction phase of the airport development (expansion) starts before the electrical system project is completed, construction contractors may be able to request to purchase electricity from Sattahip Electricity Authority, the Royal Thai Navy Welfare Concession, which currently provides electricity to the U-Tapao International Airport area, and has the surplus output to meet the additional demand of

construction activities and construction workers. In addition, construction operations will take place over short periods. Therefore, no impact is expected.

(2) Operation phase

1) Water use

For water use, when the project is operational, the number of users or passengers will increase and the demand for tap water will rise. In this regard, the forecasts of water consumption in Phase 1 (2028), Phase 2 (2038) and Phase 3 (2048) will be 8,610, 13,046 and 19,333 cubic meters per day, respectively. Tap water supply will come from East Water tap water production system, which was designed for a maximum output of 20,000 cubic meters per day. The construction of water production system will be implemented in 2 phases. Phase 1 (covering years 1-6) and Phase 2 (year 7). Each phase will add a tap water output of 10,000 cubic meters per day and water reserve tanks with a combined storage capacity of 30,000 cubic meters. Based on the water production capacity of the system, supply will be sufficient for U-Tapao International Airport, without any impact on water use of people in surrounding communities.

2) Electricity consumption

The project's total electricity demand, based on a forecast of 98.58 MW, will be met B Grimm Power Public Company Limited, which has maximum electricity-generating output of 160 MW. All electricity generated will be supplied to U-Tapao International Airport while any surplus sold to Sattahip Electricity Authority, Royal Thai Navy Welfare Concession to enhance energy security in the area. Therefore, the electricity supply will be sufficient to meet the project's demand without causing impact to surrounding areas.

7.3.16.2 Objectives

1. To mitigate and minimize problems relating to water and electricity demand from the project activities both at the construction phase and operation phase.
2. To prevent and mitigate impacts on water and electricity use arising from project implementation activities, both in the construction phase and operation phase.
3. To monitor and assess the results of the implementation of the public utility action plan and to ascertain effective implementation of the plan.

7.3.16.3 Implementation area

- **Construction phase**: Construction Supervision Office area and construction workers' living quarters

7.3.16.4 Implementation method

Environmental impact prevention and resolution measures

Construction phase:

- Require construction contractors to provide sufficient quantity of clean drinking water and tap water for personnel and construction workers (based on average drinking

water of 5 liters per person per day and tap water of 70 liters per person per day) in Construction Supervision Office area and construction workers' living quarters.

- Provide water reserve tanks enough for 3 days in the event that tap water runs low or water shortage at Construction Supervision Office area and construction workers' living quarters.
- Opt for low-flush toilets and encourage construction workers to conserve water.
- Inspect water storage systems, pipes and sanitary ware regularly and keep them in good working order. Fix leaky or damaged plumbing as soon as possible.

7.3.16.5 Duration of implementation

- **Construction Phase**: throughout the construction period
- **Operation Phase:** throughout the duration of the project

7.3.16.6 Responsible parties

- **Construction phase**: RTN and EECO, supervising construction contractors to ensure compliance with measures
- **Operation phase:** EECO

7.3.16.7 Evaluation

Prepare a report on the implementation of environmental impact prevention and resolution measures and environmental impact monitoring measures for submission to authorizing agencies twice a year during the construction phase.

7.3.17 Drainage and Flood Prevention System Action Plan

7.3.17.1 Principles and reasons

Project implementation activities in the construction phase and operation phase may impact drainage and flood protection systems. Main source of impact during the construction phase is site runoff leading to debris escaping, causing heavy sediment deposits in waterways that negatively affect the drainage system.

Main source of impact during the operation phase is the change in land use patterns, that affects surface-water hydrology and alters drainage systems.

Therefore, the project has established drainage and flood prevention system action plan, covering development of preventive measures and mitigation of environmental impacts and environmental impact monitoring measures to reduce the impact of such project activities.

(1) Construction phase:

During the construction phase, construction activities in U-Tapao International Airport comprise: 1) land adjustments/soil quality improvement/soil filling, 2) filling of embankment and safety areas around taxiway/pavement structure construction, 3) structural work on roads/road surface work, 4) excavations, installation/extraction of pillars and tunnel roofs under the runways, 5) foundation work, 6) structural work, 7) architectural work and building service systems, and 8) construction within the

station/service systems and architectural work inside electric train station, etc. There may be some loose soil escaping from site to drainage canals, resulting in sediment buildup and poor drainage at certain stages of construction. However, with the project area being close to the sea, any impact caused will be low and only affects drainage within the U-Tapao International Airport. To mitigate the impact, the project should devise measures to prevent construction debris from escaping into the drainage system.

(2) Operation phase

When Runway and Taxiway 2 is operational, based on current conditions and with the expected change in land use patterns at the sites where various components of construction work will take place in the project area, a projection of runoff within the project area can be made taking into consideration the characteristics of the catchment area. After the completion of the project, the area covered by concrete and asphalt will be 7,531,370.73 square meters, while the area covered by grassland will be 3,578,943.56 square meters. In order to assess the amount of runoff of the project, runoff coefficient (C) is set at 0.90 for area covered by concrete and asphalt and at 0.40 for grassland. The average runoff coefficient for the project area will be C = 0.74. The project's runoff drainage system, designed to control stormwater runoff and protecting Runway and Taxiway 2, consists of two components:

1) Secondary canal system, which channels runoff and drains into 2) Primary canal system, characterized by U-shaped ditches. The combined capacity of the primary and secondary canal systems with different sizes of ditches is approximately 120.21 cubic meters per second which will transport drainage water into two retention ponds: Pond 1 with a maximum retention volume of 124,820 cubic meters and Pond 2 with maximum retention capacity of 195,257.41 cubic meters, which add up to a combined capacity of 320,077.41 cubic meters, which is sufficient to accommodate stormwater runoff from the entire project estimated at 251,691.20 cubic meters.

In addition, the project will build 1 pump station at the Pond 1 to discharge excess stormwater out of the airport area. Four pumps, each with volume flow rate of 2 cubic meters per second, will be installed. Up to three of the pumps, with a combined flow rate of 6 cubic meters per second, can be used simultaneously while the other one is put on standby. The pumping station is controlled by personnel 24 hours a day and the pumps will be maintained in good working order at all time. Pumping water out of U-Tapao International Airport will be based on guidelines that takes into consideration the rising and falling tides of sea water. The pumping station staff will coordinate close with the Meteorological Department to check on expected precipitation so as to be able to calculate rainfall and runoff to prevent flooding in the project area without causing negative impact to areas surrounding the project. Pond 1 and Pond 2 were designed as sedimentation and retention ponds. After the rain stops and water quality checked to ensure standards are met, will water be discharged. The impact is expected to be low.

7.3.17.2 Objectives

1. To minimize and control sediment escaping into the drainage system as a result of project activities during the construction phase.
2. To prevent and mitigate impacts on drainage and flood prevention that may arise from project activities both in the construction phase and operation phase.
3. To monitor the results of the implementation of the drainage and flood prevention action plan and to oversee effective implementation of the plan.

7.3.17.3 Implementation area

- **Construction phase:** Construction area and drainage canals within U-Tapao International Airport located near the construction area.
- **Operation Phase**: U-Tapao International Airport area and drainage canals within U-Tapao International Airport

7.3.17.4 Implementation method

(1) Environmental impact prevention and resolution measures

1) Construction phase

- To reconfigure topography by land grading and compacting quickly to prevent erosion and sediment escaping to drainage canal, obstructing drainage.
- Inspect and ascertain that drainage canals within U-Tapao International Airport near the construction area are transporting stormwater runoff effectively. Remove any sediment buildup or weeds obstructing drainage ditches and keep them in good working condition.
- Dredge outer canals and stormwater retention ponds within the U-Tapao International Airport using suitable machinery to remove sediment and maintain the contour line of the outer canals and holding capacity of the retention ponds to ensure full drainage efficiency as designed.
- Install trash traps on drainage canals and ditches where necessary.

2) Operation phase

- Inspect and dredge drainage canals within U-Tapao International Airport to ensure drainage efficiency at all time. Remove sediment buildup or weeds that obstruct drainage. Maintenance dredging must be carried out at least once a year to ensure drainage canals, ditches and retention ponds are in good working order before the arrival of the rainy season.
- Dredge outer canals and stormwater retention ponds within the U-Tapao International Airport using suitable machinery to remove sediment and maintain the contour line of the outer canals and holding capacity of the retention ponds to ensure full drainage efficiency as designed.
- Inspect and dredge the retention ponds to remove sediment to maintain their holding capacity, drainage efficiency and in good working order. Inspect and

dredge the retention ponds at least once a year before the arrival of the rainy season.

- Keep water level in the retention ponds within the U-Tapao International Airport low (at -1.30 to -1.40 meters of mean sea level) according to design specification) before the arrival of the rainy season.
- Provide backup water pumping systems in case the primary pumping system is damaged. In the event that the flood embankment is below the critical level (+2.77 meters of mean sea level), the embankment must be filled up in accordance with engineering principles and relevant standards.
- During the rainy season, dredging the outer canals in the southern part of U-Tapao International Airport, including the canal lines within a range of 1 kilometer above the pumping stations in the west and east, is prohibited. This is to prevent sediment from being pumped out along with stormwater from the U-Tapao International Airport. The dredging contractor must coordinate with pumping station personnel to make sure no dredging is carried out nearby while water is being pumped out of the airport. Sediment that has been dug out must not be left exposed but should be used to fill up the embankment to reinforce structural integrity of the drainage canals.

(2) Environmental impact monitoring measures

1) Construction phase

Monitoring method

- Check the water drainage canals within the U-Tapao International Airport to ensure their drainage efficiency at all time.

Implementation area

- Drainage canals within U-Tapao International Airport near the construction area

Index

- Water level, runoff flow direction, depth or shallowness of the canal, sediment buildup volume

Frequency

- Conducted once a month throughout the construction period

Monitoring method

- Collect data on results of inspection to check drainage efficiency of drainage canals within U-Tapao International Airport.

Implementation area

- Drainage canals within U-Tapao International Airport near the construction area

Index

- Data from the results of the draining efficiency inspection

Frequency

- Every 6 months throughout the construction period

2) Operation phase

Monitoring method

- Compile water level measurements and flow patterns in the canals surrounding U-Tapao International Airport from the relevant agencies and analyze the drainage efficiency of the canals and prepare a report of monitoring results and summary of problems and recommendations.

Implementation area

- Khlong Bang Phai
- Khlong Phla

Index

- Water level data
- Water flow pattern

Frequency

- Conducted once a year during the rainy season, throughout the duration of the project.

Budget

- Analysis and study fee: 3,000 baht/time

7.3.17.5 Duration of implementation

- **Construction Phase**: throughout the construction period
- **Operation Phase:** throughout the duration of the project

7.3.17.6 Responsible parties

- **Construction phase**: RTN and EECO, supervising construction contractors to ensure compliance with measures
- **Operation Phase:** EECO

7.3.17.7 Evaluation

Prepare a report on the implementation of environmental impact prevention and resolution measures and an environmental impact monitoring report for submission to authorizing agencies 2 times a year, both during the construction phase and operation phase.

7.3.18 Economic and Social Action Plan

7.3.18.1 Principles and reasons

Activities in both construction phase and operation phase may result in positive and negative socioeconomic impacts either over wide area or at specific locations and with varying levels of severity. Some issues may be ongoing or temporary. Main sources of impact during the construction phase are construction activities and the arrival of construction workers, causing public anxiety in the area, transportation problems, land use, drainage, change in community, villages, community expansion and urbanization, changes in population structure, and issues relating to public utilities and public facilities.

Main sources of impact during the operation phase are operations and activities of the U-Tapao International Airport, with increased number of takeoffs-landings per hour, growing population in the area, large number of users and passengers of the international airport along with aviation service providers and related businesses as well as labor force and unregistered population in the area. Impacts relating to noise, dust, traffic situations, inconvenience caused to motorists and expansion of the local economy and employment growth.

Therefore, the project has established an economic and social action plan covering the establishment of preventive measures and environmental impact resolution and environmental impact monitoring measures to reduce the impact of project activities in various phases.

(1) Pre-construction phase

Psychological impact from lifestyle change is expected to be moderate. Some households may feel anxious to be relocated to a new place. There is also some concern about the compensation offered and change in daily living as well as the impact on household financial planning, investment and livelihood. The impacts are expected to be moderate.

(2) Construction phase:

Construction activities may bring some positive impacts:

Economic: Construction activities may bring income redistribution as the arrival of workers and foremen to work in Phase 1, Phase 2 and Phase 3 will peak at 2,890, 882, and 1,634 persons per day, respectively (which may vary according to the construction activities). The combined duration of construction is 36 months, which create many jobs in the community. Such positive impact is expected to be moderate, temporary and limited.

Demographic change (including unregistered population): Construction phase activities do not directly affect demographic change because the unregistered population will work for construction contractors on the project and stay in worker's living quarters. These workers do not compete for locally available jobs or force them to look for jobs elsewhere.

Public utilities, public facilities: Additional public utilities and public facilities along with infrastructure will be expanded to accommodate the demand of the U-Tapao International Airport and surrounding area by relevant agencies, such as Department of Highways, State Railway of Thailand,

Provincial Electricity Authority, Provincial Waterworks Authority, etc. Such positive impact is expected to be moderate, temporary and limited.

Negative impacts include:

Psychological impact and public anxiety of the local population: According to a 2020 survey of the public opinion, it was found that 76.1% of households in the NEF ≥ 40 area felt anxious about the development of the project, while 14.4% of households in NEF 30 - 40 expressed anxiety about the development of the project. The main issues contributing to their anxiety are as follows:

Social interaction: Friction of cultural values and customs between local people and workers, particularly in the case of migrant or foreign workers. Failure to properly manage social relations between local people and workers could lead to conflict caused by misunderstanding and misconception about different cultures and customs.

Public safety, crimes and way of life: Some migrant workers may commit petty crimes, such as theft, or quarrel with local people. Contractors are required to effectively control workers' living quarters located outside the U-Tapao International Airport and to impose strict access control to limit the time workers spend outside their living quarters.

Impact on way of life, public and property safety, and basic public utility adequacy. This will pose a high level of impact that is temporary and limited.

Transportation: Large number of trips taken by dirt-hauling dump trucks will increase traffic volume and affect traffic conditions in the surrounding road networks, and at the main entry-exit access point at U-Tapao International Airport, will negatively impact the already heavy traffic, particularly at Kasemphol-Pattanavej School intersection, with traffic jam during rush hours. However, the change in traffic conditions will be gradual, making the impact moderate, temporary and limited.

Dust and noise generated by transportation of construction materials: Main source of dust and noise during the construction phase is trucks used to haul construction materials and heavy machinery, particularly a large number of earth-movers, tractors, graders and trucks used simultaneously in landscape grading that tend to generate loud noise and cause most serious impact to local people. The negative impact is considered moderate, temporary and limited.

Changes in community, villages, community expansion and urbanization: The project may cause changes in community, such as movement of people in and out of the area, proliferation of new housing estates, new businesses. These trends necessitate tight control on the types and sizes of building, especially in NEF ≥ 40 areas that is severely affected within the noise contour that render them unsuitable for habitation. Local agencies responsible for granting building permits should enforce relevant laws and regulations along with Notification of Ministry of Transport regarding the designation of areas surrounding the U-Tapao International Airport as Air Safety Zones. Such impacts are expected to be moderate, temporary and limited.

(3) Operation phase

Following such changes, activities of the project in the operation phase are expected to have positive impacts:

Economic: The expansion of the local economy and employment opportunities. During the operation phase, the number of flights arriving and departing will increase, leading to population growth. In addition to number of passengers and users of the U-Tapao International Airport, there will be aviation service providers, tourism operators and related businesses as well as growing labor force and unregistered residents. Residential real estate both temporary and permanent will grow along with commercial activities, services businesses, industries and warehouses to accommodate new economic potential and demands. Growth in local economy will lead to expanded job opportunities. Impacts are expected to be mostly positive. Business operators, including subcontractors and small business owners, such as retailers, food shops and vendors, rental accommodation, transportation. Such positive impacts are expected to be low, continuous and limited at the local level.

Land use: Population growth in the area may lead expansion of residential real estate businesses temporarily and permanently, commercial activities, services business as well as industries and warehousing that correspond with increased economic potential. These new activities will contribute to creation of new jobs and growth of local economy. Impacts are expected to be mostly positive. Business operators, including subcontractors and small business owners, such as retailers, personal businesses relating to food shops and vendors, rental accommodation, transportation. Such positive impacts are expected to be low, continuous and limited at the local level.

Negative impacts include:

Noise: For NEF ≥ 40 and NEF 30 - 40 groups, main source of noise during the operation phase is noise generated by takeoffs-landings of aircraft. Assessment of impact from noise when Runway and Taxiway 2 of U-Tapao International Airport becomes operational will be considered a negative impact of great magnitude, necessitating relocation from the area and compensation payment - purchase of properties from housing project owners and residents. The negative impact is considered high, continuous and limited at the local level.

Psychological impact and anxiety of people in the area: From group meeting/group discussion and the second public hearing, it was found that

The impact on livelihood, income, occupational change, unemployment: The traditional fishing community expressed concerns about their livelihood when the construction phase of the project is completed and some of the construction workers from outside may decide to stay on in the area and may even take up fishing as an occupation in direct competition with local fishermen and thus putting pressure on the marine ecology, resulting in reduced income.

Access to public health services: According to survey and inquiry on public health issues, it was found that currently about 10 - 20 per cent of local people who used local public health services felt that access to public health services was limited as there were too many people seeking public health services provided by understaffed health facilities. In the future, with an influx of more people into the area, the public health facilities in the area are expected to be overwhelmed that may lead to poor

access to healthcare and deterioration of service quality. The negative impact is expected to be low, temporary and limited.

Transport, traffic conditions, inconvenience to motorists: When both runways at the airport became operational, traffic volume in the area is expected to increase considerably. The hourly average of traffic situation is already heavy, and traffic congestion during rush hours. The traffic volume exceeds the traffic lanes at the main entry-exit point at the airport. The negative impact is considered low, continuous and limited to the local area.

7.3.18.2 Objectives

1. To minimize economic-social impacts that may arise from project activities both in the construction phase and in the operation phase.
2. To prevent and resolve economic-social impacts, complaints arising from project activities, both in the construction phase and in the operation phase.
3. To monitor the results of the implementation of the economic-social action plan and to oversee effective implementation of the plan.

7.3.18.3 Implementation area

- **Construction phase**: construction area and communities around U-Tapao International Airport located in the study area.
- **Operation Phase**: U-Tapao International Airport area and communities aroundU-Tapao International Airport

7.3.18.4 Implementation method

(1) Environmental impact prevention and resolution measures

1) Pre-construction phase

- Implement public information dissemination on project implementation and environmental measures through the mass media continuously within 3 months after the Runway and Taxiway 2 construction project at U-Tapao International Airport, Ban Chang District, Rayong Province, was approved by the Cabinet, using online media and websites that are easily accessible to the public, so that the local people can learn about the project information in the form of meetings, publications or posters.
- Put up 20 billboards within the project area and at public road intersections, in communities within one kilometers from the airport. The billboards should contain name of project, construction period, companies responsible for construction, budgets along with telephone numbers that members of the public can call to lodge complaint or make contact with the project.

Community relations to promote understanding

- Meet or discuss with district officials, community leaders and members of the public within 3 months after the construction project of Runway and Taxiway 2 construction project at U-Tapao International Airport, Ban Chang District, Rayong Province, was approved by the Cabinet, to learn about problems as well as finding joint solutions that address the needs and concerns of the community.
- Prior to implementing public information dissemination in the area, the chairperson/community committee or members of the local communities in the project area must be informed one week in advance verbally or in writing.
- Disseminate accurate and sufficient information to the community to promote understanding and reduce people's anxiety about the project, within 3 months after the construction project of Runway and Taxiway 2 construction project at U-Tapao International Airport, Ban Chang District, Rayong Province, was approved by the Cabinet. Such information must include the nature of the project, implementation process, duration of implementation, impacts and measures to mitigate major impacts.
- EECO will establish a foundation for damage compensation and development of people's quality of life (the Foundation) under the Civil and Commercial Code to resolve impacts from U-Tapao International Airport. The Foundation will be founded within 3 months after the project has been approved by the Cabinet. The Foundation shall be managed under the following guidelines:
  Management of the fund to address impacts from U-Tapao International Airport will be operated in the form of an emergency damage security and development of people's quality of life (the Foundation).The Foundation will be established under the Civil and Commercial Code, with an executive board of the Foundation charged with managing 2 separate funds to address impacts from the U-Tapao International Airport in accordance with the objectives of the Foundation.
  1) Emergency damage compensation fund: For quick relief of damages in case of emergency on behalf of project development at U-Tapao International Airport.
  2) Fund for the development of people's quality of life: To develop the quality of life of the surrounding communities, to conserve nature and the environment, and to operate or collaborate with charitable and public interest organizations to enhance sustainable community development opportunities.

  Definitions

  Foundation means the assets allocated by the project specifically for the purpose of providing protection against damage to provide relief quickly in the event of an emergency and to improve the quality of life of the people or surrounding communities, on a not-for-profit basis and is registered under the

Civil and Commercial Code.

Fund means the assets of the foundation that the project has set aside for both of the objectives described above.

The Foundation, which holds the assets allocated for use to meet the 2 objectives in the form of 2 funds, shall be managed by the Foundation's executive board, comprising representatives of relevant organizations, including the project's representatives, local government agencies represented by their chief officials. As for the selection of 30 representatives of people affected in the noise contour area and those outside the noise contour area but are in the project's study area, will be selected from among those affected by the impact as specified in the Articles of Association/regulations of the Foundation.

- EECO shall apply to establish the Foundation along with the Foundation's Articles of Association consisting of main sections, namely:
  1) Name of foundation: Name of symbol and office location
  2) Objectives as specified in the EHIA report
  3) Capital, assets, and acquisition of assets

  In submitting the application to register the Foundation by EECO, there will be an initial fund of no less than 500,000 baht because during the application to register the Foundation, it has not acquired the seed money for the funds. The acquisition of capital shall be in accordance with the rules, conditions and methods to acquire funds to be contributed by construction contractors, the airport management as the Foundation's executive board shall specify in the Foundation's regulations in accordance with EHIA report.
- Articles of Association of the Foundation determining the number, qualification, appointment of board members, tenure of board members, retirement of board members and board meetings. In this regard, the number of board members and composition of the executive board from various sectors shall be in accordance with the principles laid out in the EHIA report. Board members to be selected from among people affected by impact shall be in accordance with the criteria, conditions and selection methods specified in the Foundation's Articles of Association, which designates the provincial governor of the affected area as the chairperson of the selection committee to select as board members representing affected people. The selection must be completed within a period of 1 year after the date of establishment of the Foundation. If the selection process cannot be completed within a period of 1 year and the chairman of the selection committee of the Foundation's executive board having exercised discretionary judgment in good faith and deems that there is a reasonable ground and necessity to extend the period of time for the selection of such executive board members representing affected people, the chairman of the selection committee may inform the Foundation's

executive board and request an extension of the selection period for no more than 1 year.

- The authority of the Foundation's executive board shall have the main authority to consider the appropriateness of the remedies to the affected persons, fund management and fund disbursements to ensure effectiveness and to meet the objectives of the Foundation as laid out in the EHIA report.
- The Foundation's executive board shall hold 2 general meetings each year and must be attended by at least one-half of the total number of the Foundation's executive board members. As needed, the Foundation's executive board may hold an extraordinary meeting at the discretion of the chairperson of the Foundation's executive board, or when 2 or more board members make their request to hold such a meeting to the chairperson of the Foundation's executive board.
- To amend the Foundation's Articles of Association, not less than three-quarters of the total number of members of the Foundation's executive board must attend the meeting, and a resolution to approve any amendment to the Foundation's Articles of Association must be passed by a vote of not less than two-thirds of the attending board members, as specified by the Civil and Commercial Code.

In this regard, within the authority under the Foundation's Articles of Association, the Foundation's executive board shall establish regulations regarding the consideration of damages incurred by the affected persons, rules on compensation for damages to the affected persons to be paid out of the rapid response fund, regulations on compensation or financial support for community development for the development of people's quality of life, fund disbursement rules, and other regulations determining appropriate remedies to the affected persons.

After the foundation has been established and operated for 1 year, the executive board shall review and revise the management structure, affected areas eligible for benefits, and fund's budgetary allocation, etc. as specified in the Foundation's Articles of Association and regulations to cover the whole range of impacts arising from the project implementation as specified in the EHIA report.

Operation of the Foundation

The Foundation shall operate to serve the main objectives of managing the emergency damage compensation fund and for managing the fund for the development of people's quality of life. Issues covered by impact management include:

1. Community, residents, community property and private property
2. The quality of life of people in the community
3. Community economy and people
4. Community environment, such as noise, soil conditions, air conditions, drinking water and water supply
5. Historical environment

6. Land use

The Foundation shall clearly and transparently establish criteria for mitigating the impacts, disbursement rules, and supplementary measures arising from the aforementioned factors, as well as the monitoring of the outcome of the implementation of such mitigatory measures.

Acquiring assets for the Foundation's operations

The project proposed the possibility of acquiring funding for the Foundation's two funds, namely the emergency damage compensation fund and the fund for the development of people's quality of life in the construction phase and the operation phase. The sources of funding for the Foundation are as follows:

1. Money received from contractors, airport management
2. Donations
3. Government contributions
4. Other sources obtained on not-for-profit or non-commercial basis

Drafting rules on sources of funding and disbursement procedures for emergency damage compensation fund and fund for the development of people's quality of life of U-Tapao International Airport

The Foundation's executive board shall establish rules regarding sources of funding and disbursement procedures for emergency damage compensation fund and fund to improve the quality of the people of U-Tapao International Airport. In this regard, the project has proposed a draft rules on sources of funding and disbursement procedures for emergency damage compensation fund and fund to improve the quality of the people of U-Tapao International Airport as follows:

Emergency damage compensation fund
Objectives

For use as reserve fund for emergency remedy. In the event of an emergency, the affected person shall submit a case to the executive board of the Foundation and the board shall hold an extraordinary meeting to consider remedy for the affected person without delay in accordance with the rules, conditions and methods prescribed by the executive board of the Foundation.

Sources of funding

1) Construction phase: Construction contractor or operator is contributor of money to fund according to the conditions and criteria set by the Foundation's executive board, equivalent to 0.2 per cent of project value.

2) Operation phase: When the airport becomes operational, the airport management is contributor to the fund in the amount of 5 million baht/year. The airport management may allocate money from the passengers' use of airports and the use of the areas utilized by the airport management in accordance with the conditions and criteria prescribed by the Foundation's executive board.

Disbursement from funds

1) In the event of damage incurred during the construction phase, the Foundation's executive board shall use money from this reserve fund during the construction phase to remedy the affected person first and then make a legal claim for

compensation from the person responsible for the damage to reimburse the fund for the advance payment made by the fund.

2) In the event of damage incurred after the completion of the construction phase, the Foundation's executive board shall use money from this reserve fund during the operation phase to remedy the affected person first and then make a legal claim for compensation from the person responsible for the damage to reimburse the fund for the advance payment made by the fund.

In this regard, the disbursement from the fund shall be in accordance with the rules on disbursement of the Foundation's funds.

Fund for the development of people's quality of life

Objectives

To improve the quality of life of the communities surrounding the airport, protect nature and the environment, and provide initial relief from the impacts of the project, as well as supporting expenses or remuneration for fund management operations by the Foundation's executive board and other working groups as deemed appropriate by the Foundation's executive board.

Sources of funding

1) Construction phase: Construction contractor or operator is contributor of money to fund according to the conditions and criteria set by the Foundation's executive board, equivalent to 0.45 per cent of project value.

2) Operation phase: When the airport becomes operational, the airport management is contributor to the fund in the amount of not less than 15 million baht/year. The airport management may allocate money from the passengers' use of airports and the use of the areas utilized by the airport management in accordance with the conditions and criteria prescribed by the Foundation's executive board.

In accordance with the Air Transportation Act of 1954, Section 60/37, which stipulates that the departure fee may be levied on outbound passengers for the purpose of airport security, maintenance, procurement and improving airport facilities for passengers, as well as protecting the environment and reducing pollution caused by airport use.

Disbursement from funds

Construction phase and operation phase

1) 50% of the fund contributions are allocated to the communities in the noise contour area of NEF >=30 for the development of quality of life.

2) 40% of the fund contributions are allocated to communities within the 10-kilometer radius of the project that are not in the noise contour area of NEF >=30.
3) 10% of fund contributions are allocated as fund management fees and reserve fund for the community, as determined by the executive board.

In this regard, the disbursement from the fund shall be in accordance with the rules on disbursement of the Foundation's funds.

The Foundation's executive board may consider appointing one or two committees to be responsible for and implement the rules regarding the sources of funding for the emergency damage compensation fund and fund for the development of people's quality of life of the U-Tapao International Airport. Such committees shall consist of representatives of affected persons who make up more than one-half of the total members of the respective committees.

Duration of implementation of the Foundation's management of impacts from U-Tapao International Airport.

Throughout the commercial airport project life

- Give priority to recruiting people in the communities around U-Tapao International Airport who are qualified for suitable jobs.
- Collaborate with relevant agencies to support community activities, such as occupational training in agriculture and crab breeding and culture, community development, health promotion, education, traditional culture, ecotourism, etc.
- Create a detailed corporate social responsibility plan to engage local people that must be strictly implemented.

2) Construction Phase

- Select and screen would-be construction workers according to the law and keep record of construction workers' identification with photos at the project office so that they can be immediately checked and identified when problems arise or complaints are filed.
- Give priority to hiring local workers and/or supporting businesses and services provided by local operators. In case of foreign workers, construction contractors must only hire those with a legal permit to work in the country.
- Provide appropriate accommodation for construction workers built in accordance with the engineering standards and clearly proportioned in line with the principles on layout of rooms and components, toilet-workers ratio, control measures at construction sites and at workers' living quarters to avoid causing problems or nuisance, including prohibition of gambling, illicit drugs, loud noise, etc. Clearly-defined and consistent applied punitive actions must be taken in case rules/regulations are violated.

- Workers are not allowed to spend the night in the project area, but there will be no more than 5 workers in charge of the material storage area at night.
- The entry-exit access to the construction area must be controlled by security staff. Construction workers are prohibited from leaving during construction area during work hours, except with permission from a foremen or supervisor. In case of lockdown or restrictions for COVID-19 pandemic control, access control at entry-exit points must adjusted according to the measures imposed by public health authorities of Rayong and Chonburi provinces.
- Normal work hours are 8.00 - 17.00, or determined by shift work hours. For expedited work, the hours are set at the discretion of the foremen or supervisors.
- Provide security to ensure peace and orderliness. Install CCTV cameras at construction area and workers' living quarters. Instruct foremen to control and monitor the behavior of construction workers to make sure they do not cause problems or nuisance to people living nearby. This helps ease people's anxiety regarding public safety, crimes, thefts or illicit drug problems, etc.
- In the case that a complaint relating to impact from construction activities is received, every effort must be made to resolve the problem and corrective measures taken in accordance with the required environmental impact prevention and mitigation measures without delay.
- Strictly implement environmental impact prevention and mitigation measures to try to resolve the impact of the transportation and temporary traffic arrangements during the construction phase of the project.
- Coordinate with relevant agencies relating to the improvement of road networks and expansion of traffic lanes, as well as the expansion of public utility systems, which will enhance the convenience of people using such services in the area and to facilitate travel at the national level to ensure they have access to greater convenience and better services.
- Provide compensation and remedies in case of accidents causing damage. The project owner must specify in the construction contract that contractors must provide insurance cover for loss of life, bodily harm and third-party properties inside and outside the construction area that arise from construction activities, as well as other relevant insurance covers as follows:
  - Providing group accident insurance for all employees and construction workers.
  - Public liability and property damage insurance, covering property damage arising from construction activities incurred by third parties or the property of others.
  - Automobile insurance, covering equipment and machinery used in the project which may cause damage to property or harm to others while such vehicles, equipment and machinery are in use.

- Conditions for public liability or third-party property damage insurance cover are part of the construction contract of the contractor. The details are as follows:
  - Before starting work, the contractor must provide insurance cover on behalf of the project owner at the contractor's own expense (without limiting of the project owner's obligations and responsibilities under the clause relating to damage to persons and property) to cover damage, loss or injury to any property or any person, or arising from operation and maintenance of the work by the contractor and which occurred prior to issuance of a certificate of defects insurance.
  - The contractor must provide such insurance prior to starting work. The insurance must be purchased from a registered insurance company or be licensed engage in the insurance business in Thailand. The insurer, the rules, procedures, conditions and the insured amount must be approved by the project owner.
  - The contractor must show the insurance policy together with the receipts of the premium payment to the project owner.
  - The insured amount must not be less than the amount specified in the appendix of quotation for the limit of liability in each instance of accident or in a series of accidents arising from the same event, with no limit to the number of events.
  - - The terms and conditions of the insurance must specify that the insurer shall be liable to pay compensation to the project owner, engineer and engineer representative for the claim filed against them and any expenses in the event that the contractor is entitled to make compensation claim under the insurance policy purchased to provide protection cover for the project owner and the engineer.
- Collaborate with relevant agencies to support community activities, such as occupational training in agriculture and crab breeding and culture, community development, health promotion, education, traditional culture, ecotourism, etc.
- Coordinate with public works and provincial city planning agencies to determine the city plan that provide guidelines to local authorities tasked with issuing building permits in conformity to Notification of the Ministry of Transport Re: determination of nearby area around U-Tapao International Airport as Air Safety Zones.
- The project must establish an impact monitoring committee based on the principle to allow community participation in EIA Monitoring Committee within 3 months after the construction project, Runway and Taxiway 2, U-Tapao International Airport, Ban Chang District, Rayong Province, was approved by the

Cabinet to monitor and comply with the environmental measures of the project. The committee shall hold a meeting every 6 months.

- The EHIA Monitoring Committee consists of members who are representatives of 3 sectors: people sector, public sector and the project. The proportion of representation of the people sector, excluding public sector representatives, must be more than two-thirds of the total number of the committee. Details are as follows:

  1.1) Representatives of the people sector selected from the sub-districts in the study area in the EHIA report, on proportional basis or through nomination or any other methods from the communities around the project location based on local administrative area and sub-district area as follows:

  - Representatives of the people sector who are community leaders from sub-districts in the studyarea according to the EHIA report in Rayong and Chonburi provinces.
  - Representatives of the people sector who are residents of the study area according to the EHIA report in Rayong and Chonburi provinces, including those in the noise contour areas.
  - Representatives of non-governmental development organizations from Rayong and Chonburi provinces (if any)

  1.2) Representatives of government agencies involved at the central and provincial levels, comprising Office of Natural Resources and Environment Policy and Planning Office, Office of Transport and Traffic Policy and Planning, Pollution Control Department, Offices of Public Works and Town and Country Planning Offices of Rayong and Chonburi provinces, Offices of Provincial Public Health of Rayong and Chonburi provinces, and administrative organizations in Rayong and Chonburi provinces (provincial, district and local government levels).

  1.3) Representatives of the project owner, the RTN and EECO

  The committee, comprising representatives of the 3 sectors, will select 1 chairperson, 1 vice-chairperson, and 1 secretary of the committee, to be followed by the announcement of the committee members with prior approval of the committee meeting. The selection of EHIA Monitoring Committee members representing the people sector should follow the selection process as follows:

  1.1) Local government organizations shall make arrangements for residents to elect their representatives in their respective sub-district administrative areas.

1.2) Local government organizations announce selection results to local residents who may provide additional comments or feedback within 15 days from the election day.

1.3) Submit the lists of people's representatives in respective local administrative areas to the project or the committee for further action.

Note: If there is any additional comments or objections, it shall be at the discretion of the committee to make appropriate decisions, which is considered final.

2) Operation phase

- EECO shall keep local residents informed of results of noise level measurements at all time.
- Strictly implement preventive measures and resolve the impact of the noise impact throughout the operation phase of the project.
- Strictly comply with the measures to prevent and resolve the environmental impacts of transportation throughout the operation phase of the project.

(2) Environmental impact monitoring measures

1) Pre-construction phase

<u>Monitoring method</u>

- Compile affected household data and create a database of residential housing and survey opinion of target groups with the questionnaires.

<u>Implementation area</u>

- The area within a distance of not less than 6 kilometers to the east and west, and not less than 10 kilometers to the north and south of the U-Tapao International Airport's perimeter.

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- Information on economic and social conditions
- Information on the community's environmental conditions and current commuting patterns
- Knowledge of the project information, opinions and suggestions relating to the project
- Prepares monitoring reports and summary of issues and recommendations for submission to the project owners.

<u>Target population</u>

- Community leaders, executives of local administrative organizations, residents living around the airport area, covering area up to not less than 6 kilometers to the east and west, and not less than 10 kilometers to the north and south of the airport's perimeter.

<u>Frequency</u>

- Once before the start of project construction

Budget

- Analysis and study fee: 412,500 baht/time

2) Construction Phase

Monitoring method

- Conduct opinion survey on economic, social, environmental conditions and changes caused by the project activities. The survey will target community leaders, vulnerable groups, agencies and business operators an area up to not less than 6 kilometers to the east and west, and up to not less than 10 kilometers to the north and south of the U-Tapao International Airport's perimeter.
- Collect all complaints/suggestions/comments of members of the public on all issues filed through various channels, resolve problems, and prepare a monthly summary report.
- Monitor and examine the rules aimed at preventing workers from causing any impacts to the communities where they live, including penalties for those who do not follow the rules at least once a month to ensure effectiveness of such rules in preventing such impacts.

Implementation area

- The area within a distance up to not less than 6 kilometers to the east and west, and not less than 10 kilometers to the north and south of the U-Tapao International Airport's perimeter.

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Surveys of the opinion of people, local agencies, community leaders and business operators through questionnaire, consisting of:

- Information on economic and social conditions
- Information on the community's environmental conditions and current commuting patterns
- Awareness of information about the project
- Impact of construction activities
- Implement preventive measures and resolving impacts in the construction phase of the project
- Comments and suggestions on the project

Frequency

- Once before construction of the project

Budget

- Analysis and study fee: 412,500 baht/time

2) Operation phase

1) Opinion survey on the impact of project activities on economic, social, environmental conditions, residents, community leaders, and sensitive areas through questionnaire

Monitoring method

Results of questionnaire analysis

- To determine the sample size for the group in the NEF ≥ 40 area, by surveying all affected *households* that can be monitored and willing to provide information. For groups in the NEF 30 - 40 area and groups living around U-Tapao International Airport, determine the sample size as appropriate and under widely accepted social statistical standards.
- Collect all complaints/suggestions/comments of members of the public on all issues filed through various channels, resolve problems, and prepare a monthly summary report.

Implementation area

- Households, community leaders and sensitive areas in the NEF ≥ 40 area
- Households, community leaders and sensitive areas in the NEF 30 - 40 area
- The people around U-Tapao International Airport in the study area

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Opinion survey on the impact of project activities on economic, social, environmental conditions, residents, community leaders, and sensitive areas through questionnaire, consisting of:

- Information on economic and social conditions
- Information on the community's environmental conditions and current commuting patterns
- Awareness of information about the project
- The impact of the project implementation
- Implementing preventive measures and resolving impacts throughout operation phase of the project
- Comments and suggestions on the project

Frequency

- At least once a year throughout the project life

2) Establishment of the U-Tapao International Airport impact relief fund and the development of people's quality of life fund

Monitoring method

- Report on the implementation of the U-Tapao International Airport impact relief fund and the development of people's quality of life fund to monitor outcomes of the environmental impact mitigation.

Implementation area

- The area surrounding U-Tapao International Airport, covering area up to no less than 6 kilometers east and west of U-Tapao International Airport, and no less than 10 kilometers north and south of the airport's perimeter.

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- Information received through complaint channels

Frequency

- Report the results of the funds' operations once every year throughout the project life.
- Report on the monitoring committee's performance once every year throughout the project life.

Budget

- Analysis and study fee: 820,000 baht/time

7.3.18.5 Duration of implementation

- **Pre-construction** phase: Conduct once before construction of the project.
- **Construction Phase**: throughout the construction period
- **Operation Phase:** throughout the duration of the project

7.3.18.6 Responsible parties

- **Construction phase**: RTN and EECO, supervising construction contractors to ensure compliance with measures
- **Construction phase**: RTN and EECO, supervising construction contractors to ensure compliance with measures
- **Operation Phase:** EECO

7.3.18.7 Evaluation

Prepare a report on the implementation of environmental impact prevention and resolution measures and an environmental impact monitoring report for submission to authorizing agencies 2 times a year, both during the construction phase and operation phase.

7.3.19 Public Participation and Public Relations Action Plan

7.3.19.1 Principles and reasons

Based on outcome of the implementation of public participation in the project at the environmental impact assessment stage, it was found that certain groups of people in the project area still had anxiety about the project. Providing people with information along with opportunity to participate in the development of the project can reduce anxiety about the project to a certain degree as well as provide a channel of communication for exchange of ideas, suggestions on the project, public information for better understanding, reassurance and mutual trust. Public participation and public relations are considered vitally important for the project.

7.3.19.2 Objectives

1. To disseminate accurate information about the project to the public throughout the construction and operation phases of the project, clearly and continuously, especially project implementation plans, environmental impacts, outcomes of the implementation of measures to prevent and mitigate environmental impacts during both the construction and operation phases as well as results of continuous monitoring of environmental impacts on residents and members of the public.
2. To monitor, coordinate and address the impacts on the community throughout the operation phase, which will result in good relationships between the project and the community.
3. To serve as a channel for communication and for members of the public to make contact with the project.
4. To build confidence in the project's strict compliance with environmental measures.

5. To help and support the activities of the community, government agencies for the benefit of the community.

7.3.19.3 Implementation area/target group

In determining the area to implement public participation activities, consider the nature and scope of the potential impact of the project to cover all stakeholders of the project.

7.3.19.4 Implementation method

The implementation of the public participation and public relations action plans consists of 4 stages:

Stage 1 – Public Education by continuously and consistently promoting knowledge and understanding among members of the communities and relevant agencies on the operations of U-Tapao International Airport, environmental management, community engagement, public relations activities, social meetings, discussion, and participation in community activities on a regular and ongoing basis.

Stage 2 – Public Consultation involves discussion of issues of concern in order to acknowledge the actual needs of the community and relevant agencies based on the information received is Stage 1. Then, public consultation sessions can be organized based on willingness of both sides, budgetary support as well as participation by representatives of relevant sectors.

Stage 3 – Community Relations Programs to Solve their Concerns through the creation of activities and projects in close collaboration with the communities in order to resolve their issues of concern that correspond to the actual needs of the community.

Stage 4 – Evaluation Programs refers to the assessment of activities/projects that have been implemented to further improve/update to increase effectiveness and satisfactory outcomes for both parties.

Details of the community engagement and public relations action plan to promote public understanding of the project can also be classified in accordance with the phases of project implementation: pre-construction, construction, and operation phases, as detailed in Table **Table** 7.3-8 Public relations public

Table 7.3-8 Public relations public information and news updates relating to the project

Target group	Relevance/significance to the project	Communication issues, channels, and choice of media in public relations		
		Pre-construction phase	Construction phase	Operation phase
Person who may be exposed to impact	- Direct stakeholders - Who may be impacted by the project	**Communication Points** - Background, essence, benefits, details, procedures and duration of project implementation - Possible environmental impacts and measures to mitigate such impacts - The importance of developing the national air transport capability which benefits businesses, such as the travel and tourism industry. - The establishment of a working group to investigate and determine compensation, to survey and create database of affected persons and compensation plan as well as determination of damages relating to all cases of sonic boom. - Criteria for compensation for noise impact - Use commercially reasonable efforts in cases not covered by criteria of compensation for noise impact	**Communication Points** - Progress status of construction at various phases - Possible impacts and preventive and corrective measures - Corporate social responsibility (CSR) projects that are beneficial to the community or area that may be impacted by the project - Publicize communication channels to receive complaints or suggestions. - Criteria for compensation for noise impact - Use commercially reasonable efforts in cases not covered by criteria of compensation for noise impact - Progress status in establishment of U-Tapao International Airport development fund and channels for requesting annual social budget support. - Complaints on environmental impacts and sonic boom	**Communication Points** - Operational excellence measures - Environmental impact prevention and resolution measures - Corporate social responsibility (CSR) projects that are beneficial to the community or area that may be impacted by the project - Publicize communication channels to receive complaints or suggestions. - Criteria for compensation for noise impact - Use commercially reasonable efforts in cases not covered by criteria of compensation for noise impact - U-Tapao International Airport development fund and channels for receiving support from the fund. - Complaints on environmental impacts and sonic boom

Person who may be exposed to impact (continued)	- Direct stakeholders - Person who may be impacted by the project	- Progress in setting up the U-Tapao International Airport Development Fund and channels for requesting annual social budget support. - Complaints on environmental impacts and sonic boom **Format and channel** - Visits/meetings - Information kits that have been disseminated through local media, including television, radio, and printed materials. - Environmental Impact Resolution Coordination Center, U-Tapao International Airport - Media - Project information kit - Leaflets/articles/television and radio news scoops - Website http://www.utapao.com - Website https://www.EECO.or.th/th - Other communication channels, such as Line application and Facebook	**Format and channel** - Visits/meetings - Information kits that have been disseminated through local media, including television, radio, and printed materials. - Environmental Impact Resolution Coordination Center, U-Tapao International Airport - Media - Project information kit - Leaflets/articles/television and radio news scoops - Website http://www.utapao.com - Website https://www.EECO.or.th/th - Other communication channels, such as Line application and Facebook	**Format and channel** - Visits/meetings - Participating in community activities organized by the RTN and EECO/or project management or project maintenance. - Environmental Impact Resolution Coordination Center, U-Tapao International Airport - Media - Project information kit - Leaflets/articles/television and radio news scoops - Website http://www.utapao.com - Website https://www.EECO.or.th/th - Other communication channels, such as Line application and Facebook

7.3.19.5 Duration of implementation

- **Pre-construction phase**: at least 1 time before construction starts
- **Construction Phase**: throughout the construction period
- **Operation Phase:** throughout the duration of the project

7.3.19.6 Responsible parties

- **Construction phase**: RTN and EECO, supervising construction contractors to ensure compliance with measures
- **Operation Phase:** EECO

7.3.19.7 Evaluation

Prepare a report on the implementation of environmental impact prevention and resolution measures and environmental impact monitoring measures for submission to authorizing agencies twice a year during the construction phase.

7.3.20 Resettlement and replacement of assets action plan

7.3.20.1 Principles and reasons

Implementation of the project both in the construction phase and in the operation phase may result in resettlement and asset replacement. The main source of impact in the construction phase is the demolition, relocation of buildings, houses in the project area, necessitating resettlement.

The main source of impact in the operation phase is when Runway and Taxiway 2 becomes operational, with an increase in takeoffs-landings, causing impact to residents living around the airport as they will be exposed to noise from aircraft.

Therefore, the project has established a resettlement and replacement of assets action plan, covering the establishment of environmental impact prevention and resolution measures and environmental impact monitoring measures to mitigate the impact of such project activities.

(1) Construction phase:

The construction of Runway and Taxiway 2 at U-Tapao International Airport is part of the Eastern Airport City Development Project of the infrastructure development plan under the responsibility of the Eastern Economic Corridor Office of Thailand (EECO). In this regard, construction of projects is within the U-Tapao International Airport area, under the responsibility of the Royal Thai Navy. Activities in the construction phase include, land grading, filling, compaction for the construction of Runway and Taxiway 2 and transportation of materials, equipment and machinery used in construction. These activities will take place within the area of U-Tapao International Airport and the project did not move buildings and structures of residents living around U-Tapao International Airport. Therefore, project construction will have low impact..

(2) Operation phase

The impact of the noise generated by aircraft, according to projection for 2048, the sensitive areas and communities are located in the noise contour areas NEF ≥ 40 and NEF 30 - 40 as follows:

- Noise contour areas NEF ≥ 40, namely:
  - Five sensitive areas, i.e.
    1) Two educational institutions: Songlah 3 Nursery and Wat Sakaew School,
    2) Two places of worship: Wat Sakaew Buddhist temple and monument of Krom Luang Chumphon Monument (Anti-aircraft battalion),
    3) One healthcare facility: Ban Sakaew hospital
  - 93 community buildings:
- Areas located in the noise contour area NEF 30 - 40 are:
  - 17 sensitive locations:

1) Six educational institutions: Pattanavej Suksa School, Pattanavej Technological College, Wat Somboonnaram School (Tem Ratanusorn), Samnakton Nursery within Wat Somboonnaram School, Ban Samnakton Nursery and Wat Samnak Katon School.

2) Nine places of worship: Krom Luang Chumphon Monument, National Naval Aviation Museum, King Taksin the Great Monument (Air Defense Regiment 1), Somdej Ong Phra Pathom (Air Defense Regiment 1), Krom Luang Chumphon Monument (Air Defense Regiment 1), Hall of Buddha Navikaphiban (Air Defense Artillery Battalion), Siam Devadhiraj Shrine (Air Defense Artillery Battalion), Wat Somboonnaram and Wat Samnak Katon.

3) Two healthcare facilities: Ban Khlong Bang Phai Hospital and Ban Khao Krog Hospital.

  - Community of 2,466 households: in Samnak Ton Sub-district (2,358 households), Pluta Luang Sub-district (68 households), and Huai Yai Sub-district (40 households).

For households or buildings in NEF ≥ 40 area, the project plans to negotiate the purchase of land and buildings or refurbish to mitigate noise impact. As for households or buildings in NEF 30 - 40 area, the project plans to pay compensation for the refurbishment to mitigate noise impact. Such measures will result in resettlement and asset replacement. Therefore, the impact is expected to be high.

7.3.20.2 Objectives

1. To study ways to minimize impact of resettlement and asset replacement that may occur as the result of project implementation both in the construction phase and in the operation phase.

2. To evaluate the impacts of resettlement and asset replacement that may occur as the result of the project implementation both in the construction phase and in the operation phase.

3. To monitor the results of the implementation of the resettlement and asset replacement action plan and to oversee effective implementation of the plan.

7.3.20.3 Implementation area

- **Duration of implementation**: Areas exposed to noise generated by aircraft.

7.3.20.4 Implementation method

(1) Environmental impact prevention and resolution measures

1) Construction phase

- Strictly implement preventive measures and resolve the noise impact, land use in the construction phase of the project.
- Coordinate and provide information for local agencies to announce and inform the public on the Air Safety Zone, and areas exposed to noise from the development of the project.

2) Operation phase

- Strictly implement preventive measures and resolve the noise impact, land use in the operation phase of the project.

(2) Environmental impact monitoring measures

Operation phase

Monitoring method

- Collect and study statistical data on the granting of building permits by local authorities in areas surrounding U-Tapao International Airport.
- Conduct on-location survey of land use to identify trend in land use patterns in order to update preventive measures and resolution of impact on land use.

Implementation area

- The area surrounding U-Tapao International Airport, which is located up to 6 kilometers east and west of U-Tapao International Airport's perimeter, and up to than 10 kilometers north and south of the airport's perimeter.

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- Information on granting of building permits and land use patterns

Frequency

- Once a year throughout the duration of the project.

Budget

- Analysis and study fee: 3,000 baht/time

7.3.20.5 Duration of implementation

- **Construction Phase**: throughout the construction period
- **Operation Phase:** throughout the duration of the project

7.3.20.6 Responsible parties

- **Construction phase**: RTN and EECO, supervising construction contractors to ensure compliance with measures
- **Operation phase:** EECO

7.3.20.7 Evaluation

Prepare a report on the implementation of environmental impact prevention and resolution measures and environmental impact monitoring measures for submission to authorizing agencies twice a year during the construction phase and operation phase.

7.3.21 Health and Public Health Action Plan

7.3.21.1 Principles and reasons

Project implementation activities in both the construction phase and operation phase may cause health and public health impacts. Main sources of impacts in the construction phase include noise and air pollution, competing demand for public utilities, travel inconvenience, threat to social fabric/life and property safety, communicable diseases, accidents, and the readiness and adequacy of the health service system, including personnel and medical supplies

Main sources of impacts in the operation phase include travel convenience, readiness andadequacy of the public health system, including personnel and medical supplies, air traffic accidents, road traffic accidents, noise and air pollution, and sanitation.

Therefore, the project has established a public health action plan, covering environmental impact prevention and resolution measures, environmental impact monitoring measures in order to mitigate impacts from project activities.

(1) Construction Phase

Impact on people in the community

Assess the linkage between environmental and health factors, summarizing the expected impacts, as follows:

1) Noise: from construction activities, machinery and equipment used in land grading and filling and construction of Runway and Taxiway 2, as well as various components of the project, could cause nuisance noise to nearby residents living near construction area. In the case of construction projects, Runway and Taxiway 2, U-Tapao International Airport, there is no standard operation procedures to control level of noise generated by machinery, no maintenance plan for equipment used in construction. These are some of the concerns expressed by stakeholders. Therefore, the impact to the community is expected to be moderate.

2) Particulate matter: Stripping of topsoil, land grading and construction of project components may cause dust dispersion, disturbing nearby residents living near the construction area and around U-Tapao International Airport. This may cause irritation, increase the risk of respiratory diseases, interfere with visibility that may lead to accidents. The maximum expected concentrations of particulate matter from projection based on mathematics models still do not exceed standards. However, because the project does not yet have operating procedural standards that control dust from construction, and concerns expressed by stakeholders, therefore, the impact on community is considered moderate.

3) Vibration: Construction activities that generate vibrations include the use of machinery and equipment in land grading and filling and construction, could disturb residents living near the construction area. There is still no operating procedural standard to control vibration, which is a cause for concern for stakeholders. Therefore, the impact on the community is considered moderate.

4) Public utility system adequacy (drinking water and tap water): Construction activities result in increased water consumption. Any water shortage may lead to water-borne diseases. But private companies in the area (East Water) has developed a water management plan to ensure sufficient supply to all user groups. However, the cost of managing and acquiring water resources is expected to rise that may affect all groups of water users. Therefore, the impact on the community is considered moderate.

5) Travel convenience (traffic flow): Transportation of materials, equipment, machinery and construction workers, may cause traffic congestion at certain stretches of road networks. According to transportation assessment, Highways 3, 331, 332, and 3126 are expected to have higher V/C Ratio, and the traffic volume around the project area during the 3-year construction period from 2021-2023 is expected to increase slightly as the result of transportation of materials and construction workers. The level of service of each of the aforementioned highway will remain at A level, or good traffic flow. However the hauling of construction of materials and machinery is a cause for concerns among key risk groups, adults in the workforce and residents living along the transportation routes. Such transportation activities may also impact the local agencies responsible for traffic management as they have limited

budgets for maintenance and repair in case of road damage due to increased traffic and hauling of materials and machinery of the project. The impact is expected to be moderate.

6) Social fabric of the community/life and property safety: Workers from outside the community who moved in may have different way of life or they may compete for public utilities services that may give rise to conflict, quarrels, anxiety, mistrust, fear for life and property safety. The location of workers' living quarters in populated areas with no clear procedures on how to control construction workers. All these factors contributed to impact on the community at moderate level.

7) Sanitation (waste and wastewater): Unless well-managed sanitation systems are installed, the construction area and workers' living quarters could become a breeding ground for pathogens and disease-carrying animals which may lead to outbreak of infectious diseases, particularly gastrointestinal infection outbreak, which may put a strain on local public health facilities trying to cope with higher disease incidence and escalating healthcare cost that affect all population groups. The impact is expected to be moderate.

8) General communicable diseases (the main disease group transmitted through water- and food-borne pathogens, respiratory diseases, including viral epidemics, such as COVID-19): Workers from outside may bring infectious diseases to the community. In addition, unless a well-managed sanitation systems are established, worker's living quarters could become a breeding ground for water- and food-borne diseases, or acute viral respiratory infectious diseases, such as SARS or COVID-19. An increase in disease incidence and severity may put a strain on local public health facilities trying to cope with higher disease incidence and escalating healthcare cost that affect all population groups. The impact is expected to be moderate.

9) Accident: Higher traffic volume due to transportation of construction materials of the project increase the likelihood of accidents in the community, leading to loss of life and property and injuries. This could put a strain on local public health facilities which must find additional medical staff and health resources, including medical supplies. Therefore, the impact on the community is expected to be moderate.

10) Adequacy and access to healthcare services, including health personnel and medical supplies: The arrival of construction workers in the area may lead to increase in demand for public health services. Competition for health services will affect put a strain on local health facilities in terms of manpower and other resources. Unless the government improve the capability of public health facilities to cope with greater demand, local people may be affected as local health facilities will be struggling to provide adequate care with limited budget. The impact on the community is expected to be moderate.

(2) Operation phase

Impact on people in the community

According to assessment of the interconnection between environmental impact factors, environmental impact issues can be summarized as follows:

1) Noise pollution: Loud noise from aircraft can affect the hearing of residents living around the airport, as the level of noise is higher than generated by automobiles. Such noise in the residential environment may interfere with people's sleep pattern and quality, preventing them from continuous deep sleep spells. They may be woken up too early in the morning by the noise before they can get sufficient rest. According to epidemiological studies, prolonged exposure to loud noise may lead to high blood pressure and may end in cardiovascular disease. Sleep disturbances can affect hormonal and metabolic changes (including enzymes and cell functions). Long-term effects include: cardiovascular disease. In addition, the variation between day and night also affects the immune system, causing hypersensitivity, which may result in myocardial cells susceptible to stimulation to thicken or enlarge. Although the current Polysomnography has not been associated directly with occurrence of cardiovascular disease, this should serve as an index for long-term risk monitoring. As for high blood pressure, loud noise can affect stress hormones, such as epinephrine or norepinephrine, which may affect the function of the endothelial layer of artery that may lead to hardening of arteries. However, no conclusion can be drawn that noise has direct effect on the occurrence of hypertension or cardiovascular disease. In other words, loud noise may be a contributing factor to the chronic diseases mentioned above and affects only those at risk groups, such as age those who are > 35 years old, type-2 diabetes, overweight person leading sedentary lifestyle, drinkers and smokers, people living on high-fat diet, etc. In addition, prolonged exposure to loud noise can cause hearing loss. Therefore, impact on the community is considered moderate.

2) Vibration: Wake vortex, or strong turbulence generated by aircraft along the flight routes, may cause objects falling off aircraft, posing a risk to people in the communities around U-Tapao International Airport, is a source of stress and anxiety. If such incident happens, serious property damage or even loss of lives and injuries may ensue. This could put a strain on local public health facilities which must find additional medical staff and health resources, including medical supplies. Therefore, the impact on the community is expected to be moderate.

3) Adequacy of public utilities (drinking water-tap water): water shortages may lead to outbreak of water-borne infectious diseases. But private water supply provider in the area (East Water) has developed a water supply management plan to ensure access and sufficient supply to all user groups. So there should be no problem in terms of access and adequacy. But the cost to find and manage water resources will increase. All water user groups may be affected. Therefore the impact is considered moderate.

4) Travel convenience (traffic flow): When Runway and Taxiway 2 becomes operational the number of passengers passing through U-Tapao International Airport will increase, affecting traffic conditions and travel convenience. The projection of traffic conditions after Runway

and Taxiway 2 opens for service in 2048 indicates that the major road networks around U-Tapao International Airport, Highways 3, 331, 332 and 3126, will be heavily congested with level of service dropping to F level, traffic speed is extremely slow (V/C Ratio of more than 1), necessitating expansion of traffic lanes in all routes of these road networks. The impact on the community is considered moderate.

5) General communicable diseases (the main disease group transmitted through water- and food-borne pathogens, respiratory diseases, including viral epidemics, such as COVID-19): Inflow of international passengers and tourists may bring infectious diseases to the community. In addition, unless a well-managed screening of disease-carrying passengers are established, there is possibility that acute respiratory infectious diseases could spread to local residents in the community. This may lead to an increase in disease incidence putting a strain on local public health facilities struggling to cope with escalating healthcare cost that affect all population groups. The impact is expected to be moderate.

6) Public safety (road and aviation accidents): When Runway and Taxiway 2 opens for service in 2048, traffic volume on road networks linking to the airport will rise, necessitating expansions of traffic lanes that will increase the likelihood of road accidents. The project may have conducted aviation accident risk assessment and established an aviation accident prevention plan, but unplanned incidents may still happen. In case of an aviation accident that may cause extensive impacts, raising incidence of incidence of fatalities and injuries that may put a strain on the management of local public health system that has no specific plan or capability to deal with aviation accidents or accidents linked to airport operations. Different agencies also have not made arrangement to conduct joint emergency response drills on a ongoing and regular basis. The impact is expected to be moderate.

7) Sanitation (wastewater, solid waste management): The project has provided adequate wastewater management system and solid waste management system at U-Tapao International Airport in anticipation of the volumes of wastewater and solid waste that will increase with rising number of passengers. There is low possibility that U-Tapao International Airport will be unable to manage waste generated within the airport, causing impact on external parties. However, possible failure to properly management waste is a matter of public concern because that may lead to gastrointestinal infection outbreak that could increase incidence of diseases, putting a strain on local public health system, requiring higher budgetary support and that could impact all population groups. The impact is expected to be moderate.

8) Adequacy and access to health services systems, including personnel and medical supplies: A rise in number of passengers means corresponding increase in number of service providers, retailers and service workers at the airport. Many of these people are likely to use local public health services which may lead to competition with local residents for limited health services. Access to and quality of health services may be compromised unless the government provides more funding and resources. This impact on local residents is one of many interconnected impacts. Without additional funding and resources, health services will become less accessible and less convenient. The impact on the community is considered moderate.

9) Dust and air pollution: Conduct health risk assessment of exposure to air pollutants that pass through the respiratory tract by comparative description against reference values, namely (1) level of non-cancer risk according to the HQ HI value, and level of cancer risk from exposure to 4 volatile organic compounds, Acrolein, Benzene, 1,3-Butadiene and Formaldehyde, and (2) the risk level when compared to the environmental standard values for other airborne pollutants, namely nitrogen dioxide ($NO_{2)}$, sulfur dioxide ($SO_{2)}$ and $PM_{2.5}$ and PM_{10} with the exposure risk assessment (HQ) of each substance being lower than 1 except for Acrolein with HQ value that is higher than 1 by approximately 1-5 times, in the community area around U-Tapao International Airport on the North and East sides. However, this risk level does not necessitate resettlement of residents in case of emergency, since the concentration of Acrolein in the said area does not exceed the maximum concentration allowed exposure at U-Tapao International Airport on the short duration (IDLH). As for cumulative risk assessment, it was found that the HI risk value of the blood circulation system and reproductive system is lower than 1, except for the respiratory system which has HI value of more than 1 due to Acrolein. As for cancer risk from exposure to Benzene in the high concentration range is 2-4 persons per 10 million persons exposed, 1,3-Butadiene, 3 in a certain one million persons exposed, and Formaldehyde, 7 in one million persons exposed, respectively. As for the risk according to the environmental standard for the pollutants, NO_2 SO_2 $PM_{2.5}$ and PM_{10} at the highest concentration level being lower than the allowable standard. However, the greater the distance from U-Tapao International Airport, the lower the risk of exposure. In summary, air-borne pollutants from aircraft increase the risk of respiratory diseases of residents in the area. Such respiratory disease has been identified as primary cause of illness. Therefore, the impact on the community is considered moderate.

7.3.21.2 Objectives

1. To minimize and control public health problems that may arise from project activities, both in the construction phase and in the operation phase.
2. To prevent and resolve the health and public health impacts arising from project implementation activities, both in the construction phase and in the operation phase.
3. To monitor the results of the implementation of the health and public health action plan and to oversee effective implementation of the plan.

7.3.21.3 Implementation area

- **Construction phase:** Construction area and surrounding area of U-Tapao International Airport
- **Operation Phase**: U-Tapao International Airport area, sensitive areas and surrounding communities

7.3.21.4 Implementation method

(1) Environmental impact prevention and resolution measures

1) Construction phase

1. Loud noise

- Implement measures to prevent and resolve environmental impacts regarding noise pollution during the construction phase.
- Notify local health department of activities, number of workers, and duration of work.
- Open complaint channels, such as on the U-Tapao International Airport public relations website, RTN website and EECO website and online media, etc.

2. Particulate matter

- Implement measures to prevent and resolve environmental impacts regarding air quality during the construction phase.
- Notify the local health department of the activities, number of workers, and duration of work.
- Open complaint channels, such as on the U-Tapao International Airport public relations website, RTN website and EECO website and online media, etc.

3. Vibration

- Implement measures to prevent and resolve environmental impacts regarding vibration during the construction phase.
- Open complaint channels, such as on the U-Tapao International Airport public relations website, RTN website and EECO website and online media, etc.

4. Adequacy of public utilities (drinking water, tap water)

- Implement preventive measures and resolve environmental impacts regarding public utilities and public facilities during the construction phase.
- Open complaint channels, such as on the U-Tapao International Airport public relations website, RTN website and EECO website and online media, etc.

5. Travel convenience (traffic flow)

- Implement measures to prevent and resolve the environmental impacts regarding transportation and the economic and social aspects during the construction phase.
- Open complaint channels, such as on the U-Tapao International Airport

public relations website, RTN website and EECO website and online media, etc.

6. Social fabric of the community/life and property safety

- Implement measures to prevent and resolve environmental impacts regarding economic and social aspects during the construction phase.
- It is required to submit workers' dossier to local authorities before they begin working in the project, and the dossier must be inspected once a year.

7. Sanitation (waste and wastewater)

- Implement environmental protection measures and correction measures for waste and wastewater management, occupational health and safety, issues relating to the sanitation of construction workers' living quarters and the economic and social aspects of the community in the construction phase of the project. On issues relating to the provision of suitable living quarters for construction workers and supervision and management of construction area and workers' living quarters to ensure peace and order, along with the establishment of impact monitoring committee, the principle to enable active community participation applies.
- Notify local health department of activities, number of workers, and duration of work.
- Open complaint channels, such as on the U-Tapao International Airport public relations website, RTN website and EECO website and online media, etc.

8. General communicable diseases (the main disease group transmitted through water- and food-borne pathogens, respiratory diseases, including viral epidemics, such as COVID-19)

- Implement preventive measures and resolve environmental impacts regarding the management of waste and wastewater, occupational health and safety, economic and social aspects of the community during the construction phase
- Establish procedures for sanitation of living quarters, solid waste and wastewater management along with prevention and elimination of disease vectors, under strict supervision.
- Provide health check up and submit workers' dossier along with health reports to local public health authorities before they begin work in the project.
- Direct the contractor to educate workers about good hygiene, promote cleanliness and provide tips on how to protect themselves against communicable diseases by requesting local public health facilities in the project areas, such as hospitals, public health service centers, to send

health personnel to provide training, before the workers begin working in the project.

- Direct the contractor to strictly comply with laws, notifications and regulations relating to the control and prevention of communicable diseases, such as the Public Health Act, Communicable Diseases Act, and the implementation of public health measures to control the spread of infectious diseases, such as the coronavirus (SARS-CoV, COVID-19), Bird Flu, Influenza 2009, by complying with both national and international laws and regulations, such as (1) Communicable Diseases Act 2015; (2) Notification of the Department of Public Health Re: Rules, Procedures, and Prevention of Risk from coronavirus disease 2019 (COVID-19) for government sites, private workplaces and establishments 2020 (3) Notification of the Department of Health Re: Criteria, Procedures, and Prevention against Risk from coronavirus disease 2019, or COVID-19, for public transport service providers 2020 (4) Suspected Communicable Disease Universal Precaution Kit (IATA, 2017) (5) Communicable Disease Surveillance and Response Systems: Guide to Monitoring and Evaluating (WHO, 2006)
- The contractor is required to prepare a operational plan for the prevention of communicable diseases in the construction workers' living quarters, for submission to the RTN and EECO.
- The RTN and EECO are required to coordinate with local public health authorities to plan the implementation and prevention of environmental and health impacts in construction workers' living quarters of the project.
- Notify local health department of activities, number of workers, and duration of work.
- Prepare health promotion media and publicize communication channels with the RTN and EECO, and notify local public health authorities for acknowledgement, and keep record of activities in support of health authorities.
- Open complaint channels, such as on the U-Tapao International Airport public relations website, RTN website and EECO website and online media, etc.

9. Accident

- Implement measures to prevent and resolve the environmental impacts regarding transportation and the economic and social aspects of the community during the construction phase.
- Determine procedural guidelines for construction contractors/subcontractors, monitor their operations.
- Open complaint channels, such as on the U-Tapao International Airport public relations website, RTN website and EECO website and online media,

etc.

10. Adequacy and access to health services systems, including personnel and medical supplies

- The RTN and EECO are required to coordinate with local public health authorities to plan the implementation and prevention of environmental and health impacts in construction area and at workers' living quarters of the project.
- Implement CSR (Corporate Social Responsibility) activities by supporting sub-district health promotion hospitals around the project area.
- Require the RTN and EECO to engage or identify a local health facility or public health system to provide health services to the contractor's workers, which must not pose a burden to the primary healthcare facility used by local residents in the area.
- Require the RTN and EECO to provide communication channel with local public health authorities as well as to support local health authorities to ensure readiness in terms of personnel and other resources to provide health services.
- Create a list of health facilities/health authorities nearby the project area together with names and contact information, including telephone numbers, of coordinator to ensure close coordination on activity details.
- Prepare health promotion media and publicize communication channels with the RTN and EECO, and notify local public health authorities for acknowledgement, and keep record of activities in support of health authorities.

2) Operation phase

1. Noise pollution

- Implement measures to prevent and resolve environmental impacts regarding noise and economic and social conditions during the implementation phase.
- Implement continuous noise level measurement and surveillance.
- Establish a fund to remedy the environmental impacts on the community and to develop people's quality of life to mitigate impacts from the operations of U-Tapao International Airport, as part of the effort to alleviate the overall environmental and public health impacts.
- Coordinate and collaborate with local public health authorities to plan the surveillance on hearing ability of people affected by noise pollution from the operations of the U-Tapao International Airport.
- Promote and support the capability to monitor noise pollution by health agencies and health promotion volunteers.

- Open complaint channels, such as on the U-Tapao International Airport public relations website, RTN website and EECO website and online media, etc.

2. Vibration

- Implement measures to prevent and resolve environmental impacts mitigation measures for damage from wake vortex or objects falling off aircraft, and measures regarding economic and social conditions of the community during the operation phase.
- The RTN and EECO are required to coordinate with local public health authorities to plan the implementation and prevention of environmental and health impacts in communities around U-Tapao International Airport.
- Promote and support the capability in emergency management of public health and safety agencies and volunteer groups.

3. Adequacy of public utilities (drinking water, tap water)

- Implement preventive measures and resolve environmental impacts regarding public utilities and public facilities during the operation phase.
- Open complaint channels, such as on the U-Tapao International Airport public relations website, RTN website and EECO website and online media, etc.

4. Travel convenience (traffic flow)

- Implements preventive measures and resolves the environmental impacts of transportation in the operation phase.
- Determine practical guidelines for all vehicles entering and exiting the airport, and provide traffic directing system to enhance traffic flow within U-Tapao International Airport area.
- Open complaint channels, such as on the U-Tapao International Airport public relations website, RTN website and EECO website and online media, etc.

5. General communicable diseases (the main disease group transmitted through water- and food-borne pathogens, respiratory diseases, including viral epidemics, such as COVID-19)

- Strictly comply with public health measures to control the spread of infectious diseases, such as the coronavirus (SARS-CoV, COVID-19), Bird Flu, Influenza 2009, by complying with both national and international laws and regulations, such as (1) Communicable Diseases Act 2015; (2) Notification of the Department of Public Health Re: Rules, Procedures, and Prevention of Risk from coronavirus disease 2019 (COVID-19) for government sites, private workplaces and establishments 2020 (3) Notification of the Department of Health Re: Criteria, Procedures, and Prevention against Risk from coronavirus

disease 2019, or COVID-19, for public transport service providers 2020 (4) Operational considerations for managing COVID-19 cases or outbreak in aviation (WHO, 2020) (5) Aircraft cleaning and disinfection during and post pandemic (IATA, 2020) (6) Preventing spread of disease on commercial aircraft: Guidance for cabin crew (CDC, 2020) (7) Suspected communicable disease universal precaution kit (IATA, 2017) (8) ICAO guidelines for managing communicable disease in aviation (9) Communicable disease surveillance and response systems: Guide to monitoring and evaluating (WHO, 2006).

- The RTN and EECO are required to coordinate with local public health authorities to plan the implementation and prevention of environmental and health impacts in communities around U-Tapao International Airport.
- Require the RTN and EECO to provide communication channel with local public health authorities as well as to support local health authorities to ensure readiness in terms of personnel and other resources to provide health services.
- Inform local health authorities of the emergency management plan and invite them to participate in the emergency management activities, such as the development of the plan, emergency management drills, especially those relating to infectious pathogens and quarantine.
- Follow airport emergency plan regarding public health emergencies, infectious pathogens and quarantine.
- Implement surveillance for respiratory illnesses due to COVID-19 outbreak, require licensed airport operators to supervise employees and airlines to ensure strict compliance with the 2005 Emergency Decree on Public Administration in Emergency Situations and public health guidelines for the management of the COVID-19 epidemic, including measures and recommendations for establishments that remain open and certain types of activities, personal practices, preventive and disease control measures, medical service system readiness, and other aspects, such as recommendation for the use of face mask to protect against COVID-19, disinfection, sterilization and infectious waste management, and solid waste management, etc.
- Implement public information campaign and participate in emergency management drills, especially regarding infectious pathogens and quarantine.
- Promote and support the capability in emergency management of public health and safety agencies and volunteer groups.
- Keep a record of communication plans and emergency management plans, especially those related to infectious pathogens and quarantine.
- Open complaint channels, such as on the U-Tapao International Airport public relations website, RTN website and EECO website and online media,

etc.

6) Public safety (road traffic and aviation accidents)

- Implement measures to prevent and resolve the environmental impacts regarding noise, vibration, air quality, and transportation during the operation phase, with emphasis on measures for managing and mitigating damage
- Inform local health authorities of the emergency management plan and invite them to participate in the emergency management activities, such as the development of the plan, emergency management drills.
- Implement public information campaign and participate in emergency management drills.
- Establish measures requiring airlines and pilots to comply with the Civil Aviation Authority of Thailand's Notice to Airmen (NOTAM) to follow the General Procedure according to ICAO standard to prevent accidents caused by Wake Vortex Turbulence.
- Promote and support the capability in emergency management of public health and safety agencies and volunteer groups.
- Keep record of communication plan and emergency management plan.
- Compile disaster prevention and mitigation from relevant agencies.

7) Sanitation (wastewater, solid waste management)

- Implement preventive measures and environmental impacts on waste and wastewater management during the operation phase
- Open complaint channels, such as on the U-Tapao International Airport public relations website, RTN website and EECO website and online media, etc.

8) Adequacy and access to health services systems, including personnel and medical supplies

- Keep local health department informed of activities, including environmental and health management and monitoring results.
- Implement CSR (Corporate Social Responsibility) activities by supporting sub-district health promotion hospitals around the project area.
- Require the EECO to set up channel of communication with local public health authorities to stay in contact as well as to support local public health authorities to develop readiness in terms of personnel and other resources to provide health services.

9) Dust and air pollution

- Implement preventative measures and resolve the environmental impacts regarding air quality during the operation phase.
- Conduct regular air pollution monitoring, especially in areas prone to air

pollution risk.

- Coordinate and cooperate with public health authorities in the health monitoring of vulnerable groups. Provide public health authorities with results of analysis and environmental impact monitoring reports on a regular basis in order to assess potential health impacts on vulnerable groups during the operation phase, and find appropriate solutions.
- Promote and support the air pollution monitoring capability of health authorities and health promotion volunteers.
- Open complaint channels, such as on the U-Tapao International Airport public relations website, RTN website and EECO website and online media, etc.

(2) Environmental impact monitoring measures

1) Construction phase

1. Loud noise

- Follow the environmental impact monitoring measures for noise during the construction phase.

2. Particulate matter

- Follow environmental impact monitoring measures regarding air quality during the construction phase.

3. Vibration

- Follow environmental impact monitoring measures regarding vibration during the construction phase.

4. Adequacy of public utilities (drinking water, tap water)

- Follow environmental impact monitoring measures regarding public utilities and public facilities in the construction phase

5. Travel convenience (traffic flow)

- Follow transportation environmental impact monitoring measures during the construction phase

6. Social fabric of the community/life and property safety

- Follow the measures to monitor the environmental impacts on economic and social aspects during the construction phase.

  <u>Monitoring method</u>

  • Create workers' dossier

  <u>Implementation area</u>

  • Construction workers' living quarters and construction control office of the project.

Index

- Workers' dossier

Frequency

- Once a year throughout the construction period

7. Sanitation (waste and wastewater)

- Follow environmental impact monitoring measures for wasteand wastewater management, occupational health and safety, and the economic and social aspects during the construction phase.

8) General communicable diseases (the main disease group transmitted through water- and food-borne pathogens, respiratory diseases, including viral epidemics, such as COVID-19)

- Follow environmental impact monitoring measures for wasteand wastewater management during the construction phase.
- Follow environmental impact monitoring measures for occupational health and safety regarding residential sanitation standards during the construction phase.

9. Accident

- Follow transportation environmental impact monitoring measures regarding transportation during the construction phase

Monitoring method

- Keep record of all public complaints/suggestions/comments filed through various channels. Analyze and prepare a summary report on a monthly basis.

Implementation area

- Communities around the project area.

Index

- Keep record of transport accident complaints.

Frequency

- Update monthly throughout the construction period.

10. Adequacy and access to health services systems, including personnel and medical supplies

Monitoring method

- Keep record of and summarize the activities implemented in coordination with public health authorities.

Implementation area

- Public health authorities near the project construction area

Index

- Details of activities implemented in coordination with public health authorities.

Frequency

- Throughout the construction period.

2) Operation phase

1. Noise pollution

- Follow measures to monitor the environmental impact regarding noise and economic and social aspects during the operation phase.
  - **Monitoring method: Noise level surveillance**
    - Measure the noise level according to the index shown in the noise and vibration section.
    - Analyze and prepare monthly summary reports and provide clarification on impact resolution results.

    Implementation area
    - Area according to environmental measures regarding noise (details shown in the noise section).

    Index
    - Number of complaints from the public filed through various channels of the project.

    Frequency
    - The same period as that of environmental impact monitoring regarding noise.
  - **Monitoring methods: hearing ability tests for affected residents**
    - Monitor the hearing ability tests for affected residents living around U-Tapao International Airport to cover all groups of people who are affected by noise impact.
    - Analyze and prepare summary report

    Implementation area
    - Residents living in areas affected by noise impact from the operations of U-Tapao International Airport.

    Index
    - Residents' hearing ability test results.

    Frequency
    - Once a year throughout the duration of the project.
  - **Monitoring method: Establishment of funds**
    - Report on the operations of the environmental impact remedy fund and the fund for the development of quality of life in order to follow up on environmental and public health impact mitigation.
    - Review public communication plans/reports to provide overall environmental and healthcare oversight to enable members of the public to participate in the development of project's work plan or activities and to monitor the project's operations.

Implementation area

- Surrounding area of U-Tapao International Airport

Index

- In the case that the funds are in the process of being set up: Report on the progress status of the funds' establishment.
- In the case that the funds have already been established: Report on funds' operating results.
- Public communication plans/reports on overall environmental and health impact mitigation.

Frequency

- Report on the progress of the funds' establishment every 6 months.
- Report the results of the funds' operations once every year throughout the project life.
- Report of public communication activities every 6 months.

2. Vibration

Monitoring method

- Keep record of public complaints/suggestions/comments on issues relating to damage caused by wake vortex from aircraft filed through various communication channels. Analyze and prepare a summary report every month and provide clarification on impact resolutions and results.

Implementation area

- Communities around the project area.

Index

- Information from complaints regarding impact caused by wake vortex turbulence from aircraft.

Frequency

- Once a year throughout the duration of the project.

3. Adequacy of public utilities (drinking water, tap water)

- Follow environmental impact monitoring measures regarding public utilities and public facilities during the operation phase.

4. Travel convenience (traffic flow)

Monitoring method

- Use method specified in the environmental impact monitoring measures regarding transportation during the operation phase.
- Keep record of complaints/suggestions/comments from the public regarding traffic problems filed through various communication channels. Analyze and prepare a summary report every month, with clarification on resolutions and results.

Implementation area

- Communities around the project area.

Index

- Information from complaints received through various channels on traffic issues in community area or in the airport operation areas.

Frequency

- Once a year throughout the duration of the project.

5) General communicable diseases (the main disease group transmitted through water- and food-borne pathogens, respiratory diseases, including viral epidemics, such as COVID-19)

Monitoring method

- Collect statistics on main disease group causing illnesses among the local population.

Implementation area

- Public health authorities near the project area.

Index

- Collect statistics on main disease group causing illnesses among the local population.

Frequency

- Once a year throughout the duration of the project.

6. Public safety (road traffic and aviation accidents)

Monitoring method

- Conduct preliminary analysis and summarize results of disaster management drills implemented in collaboration with the community.
- Compile public complaints/suggestions/comments on public safety issues filed through various channels. Analyze and prepare a monthly summary report and provide clarification on resolutions and results.
- Review the disaster prevention and relief plan and keep it up to date.

Implementation area

- Communities around the project area.

Index

- Information from complaints on public safety issues.

Frequency

- Once a year throughout the duration of the project.

7. Sanitation (wastewater, solid waste management)

- Follow environmental impact monitoring measures for wasteand wastewater management in the operation phase.

8) Adequacy and access to health services systems, including personnel and medical supplies

Monitoring method

- Keep record of and summarize the activities implemented in coordination with public health authorities.

Implementation area

- Public health authorities near the project area.

Index

- Summarize details of activities implemented in coordination with public health authorities.

Frequency

- Once a year throughout the duration of the project.

9) Dust and air pollution

Monitoring method

- Measure air pollution according to the index shown in the air quality section.
- Compile public complaints/suggestions/comments on air pollution issues filed through various channels. Analyze and prepare a monthly summary report and provide clarification on resolutions and results.

Implementation area

- Area according to environmental measures for air quality

Index

- Results of air quality measurements in the community area.
- Number of complaints from the public filed through various channels

Frequency

- Same period as air quality environmental monitoring measures (details shown in the air quality section)

7.3.21.5 Duration of implementation

- **Construction Phase**: throughout the construction period
- **Operation Phase:** throughout the duration of the project

7.3.21.6 Responsible parties

- **Construction phase**: RTN and EECO, supervising construction contractors to ensure compliance with measures
- **Operation phase:** EECO

7.3.21.7 Evaluation

Prepare a report on the implementation of environmental impact prevention and resolution measures and an environmental impact monitoring report for submission to authorizing agencies twice a year, both during the construction phase and operation phase.

7.3.22 Occupational Health and Safety Action Plan

7.3.22.1 Principles and reasons

The activities of the construction and operation phases of the project may result in occupational health and safety impacts. Important sources of impact in the construction phase are construction activities that cause residential sanitation problems, noise pollution, and work-related accidents.

Main sources of impact in the operation phase are activities of U-Tapao International Airport that caused noise pollution, work-related accidents, and chemicals in the work environment.

Therefore, the project has established an occupational health and safety action plan, covering the establishment of preventive measures and resolution of environmental impacts and environmental impact monitoring measures to reduce the impact of such project activities.

(1) Construction Phase

The issues that are expected to impact workers/employees of the project are as follows:

1) Sanitation of construction workers' living quarters: Workers' living quarters are located outside the U-Tapao International Airport. Unless good sanitation management is in place at the workers' living quarters, workers may fall ill from disease-carrying animals or an infectious disease outbreak may occur in the living quarters that may impact public health services. Therefore, the impact is considered moderate.

2) Work environment (noise): Workers are exposed to loud noise while working, from machinery used in operations and activities of U-Tapao International Airport, which may impact hearing ability, cause illness or loss of hearing function. As the construction of the runway is implemented by a construction contractor, workers who fall ill are under the responsibility of the contractor who may not be strictly monitored and supervised to comply with occupational health and safety laws, or may not be able to adequately provide workers with personal protective equipment to reduce exposure to noise. Therefore, the impact of noise pollution on workers is at a moderate level.

3) Work-related accidents: Work-related accidents from unsafe acts and working conditions may lead to increase in illness rate, absence from work, or affect the work of workers/employees, may even result in loss of life and property. As the construction of the runway is implemented by a construction contractor, workers who fall ill are under the responsibility of the contractor who may not be strictly monitored and supervised to comply with occupational health

and safety laws, or may not be able to adequately provide workers with personal protective equipment. Therefore, the impact of noise pollution on workers is at moderate level.

(2) Operation phase

The issues that are expected to impact employees of the project are as follows:

1) Work environment (noise) : Noise pollution has an effect on increase in illness rate and employee turnover rate. Based on available data, U-Tapao International Airport has not put in place noise monitoring in the airside area. However, from a hearing ability test conducted on 20 employees working at the said area in 2019, 4 of them were found to have abnormal hearing ability. But no further tests were conducted to analyze and find out what was the cause of such abnormal hearing results. There is also no information that indicates the presence of a management system and preventive measures. Therefore, the noise impact is considered moderate.

2) Chemical materials in the working environment: Employees working in the airside area are exposed to chemicals resulting from jet engine emissions which affect illness rate, absence from work or impact on operations. There was no measurements of chemicals in the airside area and no health monitoring for employees at high risk of exposure to chemicals. The impact of chemical materials in the working environment is considered moderate.

3) Work-related accidents: Work-related accidents affect the increase in illness rate, absence from work, or cause impact to the work of workers/employees at the U-Tapao International Airport. The impactof work-related accidents on employees is considered moderate.

7.3.22.2 Objectives

1. To minimize and control occupational health and safety problems that may arise from project activities, both in the construction phase and in the operation phase.
2. To prevent and resolve the impacts of occupational health and safety arising from project implementation activities, both in the construction phase and in the operation phase.
3. To monitor the results of the implementation of the occupational health and safety action plan and to oversee effective implementation of the plan.

7.3.22.3 Implementation area

- **Construction phase:** Construction area of the project
- **Operation Phase:** U-Tapao International Airport area

7.3.22.4 Implementation method

(1) Environmental impact prevention and resolution measures

1) Construction phase

1. Sanitation at construction workers' living quarters

- Specify in the construction contract, requiring the contractor to build workers' living quarters to meet the Engineering Institute of Thailand 1010-34 standard.
- Require contractors to provide workers with training on hygiene and disease prevention, good behavior, avoid causing nuisance, stay away from illicit drugs every 6 months, as well as to distribute a safety handbook to all workers in order to enhance knowledge and awareness of work safety.
- Establish regulations for the prevention and elimination of disease vectors at construction workers' living quarters to avoid becoming a breeding ground for infectious pathogens and spread of diseases. Such regulations must be strictly supervised to ensure full compliance.
- Schedule of periodic sanitation inspections in cooperation with public health officials, local administrative organizations
- Cooperate with public health authorities upon request to implement preventive measures, such as vaccination, eliminating of disease vector sources in the event of an outbreak.

2. Work environment (noise)

- Strictly follow the environmental measures and the existing occupational health and safety management plans.
- Implement measures to prevent and resolve impacts of the sound environment during the construction phase, including:
  - Provide personal protective equipment, such as ear plugs or ear muffs for construction workers.
  - Limit the duration of work for construction workers exposed to loud noise to no more than 8 hours of work for areas with a noise level exceeding 90 dBA.
  - Provide a place that can muffle the noise produced by aircrafts for construction workers to rest during their breaks.

3) Work-related accidents

- Strictly follow the environmental measures and the existing occupational health and safety management plans.
- Requiring contractors to comply with occupational safety and work environment laws, such as:

- Occupational Safety, Health and Work Environment Act of 2011
- Notification of the Department of Labor Protection and Welfare Re: Determining Personal Safety Equipment Standards, 2011
- Labor Protection Act of 1998
- Ministerial Regulation Re: Determination of Safety Standard for Administration and Management of Occupational Health and Work Environment (No. 2), 2010
- Ministerial Regulation Re: Determination of Safety Standard for Administration and Management of Occupational Health and Work Environment in Construction Work 2008
- Notification of the Department of Labor Protection and Welfare, Re: Category and Type of Machinery and Equipment Used in Construction Work Requiring Annual Certification 2011
- Ministerial Regulation Re: Determination of Safety Standard for Administration and Management of Occupational Health and Work Environment 2006 or the latest edition of such notification.

- Keep record of and report on accident statistics.
- Investigate accidents and make recommendations to establish preventive measures.

2) Operation phase

1) Work environment (noise)

- Conduct additional noise measurements using personal sensors on employees working in the airside area or other high risk groups.
- Conduct hearing ability test every year.
- Analyze the linkage between noise exposure and hearing ability to identify likelihood of loss of hearing.
- In the event that abnormal hearing ability is detected, there must be a management plan, such as reduction of noise exposure, reduction of exposure time.
- Create a hearing health preservation project.

2) Chemical materials in the work environment

- Conduct additional chemical measurements using personal measuring devices, especially on employees working in the airside area or at risk groups.
- Provide health check up based on risk profiles
- Analyze the linkage between the levels of chemicals that workers have been exposed to and their health conditions to determine the likelihood of the impact on health from exposure to chemicals.

- In the case of contract work, there must be supervision to ensure the contractor reports results of employees' health check up at least once a year.

3) Work-related accidents

- Analyze the causes of accidents, prepare accident statistics, and analyze accident trends to find appropriate solutions and establish guidelines to prevent accidents.
- Develop a plan to prevent and reduce work-related accidents.
- Comply with the Safety, Occupational Health and Work Environment Act.
- Establish a safety committee.
- Appoint safety officers.
- Develop an occupational health and safety plan that address the following issues:
- Risk assessment, identification of high-risk areas, such as poorly-ventilated areas.
    - Identify hot work areas with noise level that does not meet the safety standards for work areas or tasks with exposure to chemicals in the work environment.
    - Establish work environment surveillance plan.
    - Provide health check up based on risk profiles.
    - Implement health promotion plan.
    - Implement work-related accident prevention and surveillance plan
    - Implement emergency response plan
- In this regard, the work plan and performance of the occupational health and safety plan must be reported to the safety committee for review at least once a year.

(2) Environmental impact monitoring measures

1) Construction phase

1. Sanitation at construction workers' living quarters

Monitoring method

- Keep record of training programs for workers on hygiene and prevention of disease, personal conduct to avoid creating nuisance, stay away from illicit drugs and promote work safety.
- Keep record of sanitation inspections of the living quarters.
- Keep record of causes of accidents, accident sites, severity and solutions.

Implementation area

- Project construction area

Index

- Keep record of training programs for workers on hygiene and prevention of disease, personal conduct to avoid creating nuisance, stay away from illicit drugs and promote work safety.
- Keep record of sanitation inspections of living quarters regarding solid waste, wastewater management.
- Keep record of accident statistics, including causes of accidents, accident sites, severity and solutions.

Frequency

- Twice a year throughout the construction period.

2) Work environment (noise)

- Strictly follow existing environmental impact monitoring measures, regarding noise and occupational health and safety management plans.

3. Work-related accidents

Monitoring method

- Compile annual summary reports on the performance of management of occupational health, safety management and work environment.

Implementation area

- Work area

Index

- Summary of Occupational Health and Safety and Work Environment Management Performance

Frequency

- Once a year throughout the construction period.

2) Operation phase

1) Work environment (noise)

Monitoring method

- Conduct measurements with noise sensors attached to person.
- Conduct analysis on the linkage between noise exposure and workers' hearing ability test results to identify the likelihood of hearing loss for the preparation of statistical data.
- Regularly monitor and update the management plan in case abnormal hearing ability is detected.
- Review and follow up on the establishment of hearing health preservation project.

Implementation area

- Work areas in the airside area and areas within the U-Tapao International Airport.

Index

- Report on the results of hearing ability tests.

- Report on the use of on-person noise measurement sensors, especially for employees working in the airside area.
- Analyze the linkage between noise exposure and hearing ability.
- Management plan in case abnormal hearing ability is detected.
- Summary report on establishment of hearing health preservation project.

Frequency

- Once a year throughout the duration of the project.

2) Chemical materials in the work environment

Monitoring method

- Use on-person chemical measurement devices in work area.
- Analyze the linkage between exposure to chemical materials and employee's health
- to determine likelihood of health impacts from exposure to chemicals.
- Supervise the contractor ensure the contractor submit employees' health check results to the RTN and EECO and/or the project management or project maintenance office a yearly basis.

Implementation area

- Work area in the airside area and areas within the U-Tapao International Airport.

Index

- Conduct additional chemical measurements using on-person measuring devices, especially on employees working in the airside area or at risk groups.
- Provide health check up based on risk profiles.
- Analyze linkage between levels of chemical exposure to personal health.
- Evidence of submission of annual employees' health check by the contractor.

Frequency

- Once a year throughout the duration of the project.

3) Work-related accidents

- **Monitoring method: Accidents**
  - Analyze the cause of the accident
  - Prepare accident statistics
  - Analyze accident trends for use in developing appropriate accident prevention guidelines.

- Supervise the contractor company to provide the statistical data on accidents to the RTN, EECOO and/or project management or project maintenance office for review on a yearly basis.

Implementation area

- Work area in the airside area and areas within the U-Tapao International Airport.

Index

- Causes of accidents analysis report.
- Report showing accident statistics and analysis results of accident trends.
- Develop a plan to prevent and reduce work-related accidents.
- Provide health check up based on risk profiles.

Frequency

- Once a year throughout the duration of the project.

- **Monitoring methods: Administrative**
  - Compile annual summary reports on the performance of management of occupational health, safety management and work environment.

Operation Area

- Work area within U-Tapao International Airport

Index

- Summary of Occupational Health and Safety and Work Environment Management Performance

Frequency

- Once a year throughout the duration of the project.

Budget

- Analysis and study fee: 312,500 baht/time

7.3.22.5 Duration of implementation

- **Construction Phase**: throughout the construction period
- **Operation Phase:** throughout the duration of the project

7.3.22.6 Responsible parties

- **Construction phase**: RTN and EECO, supervising construction contractors to ensure compliance with measures
- **Operation Phase:** EECO follows the measures by supervising operators in the airside area and the area within U-Tapao International Airport to comply with such measures.

7.3.22.7 Evaluation

Prepare a report of compliance with environmental protection and impact resolution measures as well as an environmental monitoring report to be presented to the authorizing agencies twice a year, both during the construction phase and operation phase.

7.3.23 Tourism and Scenery Action Plan

7.3.23.1 Principles and Rationale

The project implementation activities, both in the construction phase and in the operation phase, may impact tourist attractions and scenery. Major sources of such impacts in the construction phase are delivery of construction materials, machinery and the transportation of workers, which will increase the amount of traffic on the route and affect access to various tourist attractions. As for the scenery, activities in the construction area will cause obstructions to the view.

A main source during the operation phase comprise increasing number of passengers who use the U-Tapao International Airport, which may affect traffic volume and access to many tourist spots for sightseeing. This may cause obstructions to views.

As a result, the project established environmental impact prevention and resolution measures for tourism and scenery in order to reduce the impact of such project activities.

(1) Construction Phase

During the construction of the project within the area of U-Tapao International Airport, it is expected that there will be impacts on access to various tourist spots in the areas close-by U-Tapao International Airport. During the project construction period it is expected the constant transport and movement of construction materials, equipment, labor and other materials from outside sources into the construction site during the course of construction, will increase traffic along various routes, especially highway numbers 3, 331, 332 and 3126, causing traffic congestion and slowdowns that are expected to follow. This is especially the case during public holidays or festive holidays, which makes it less convenient to access various tourist attractions compared to the situation before the construction of the project. Therefore, the impact is low.

The impact on sightseeing from the transportation of construction machinery/equipment, construction materials, earth and rock piles placed in the construction area, and the dust and particle dispersion in the area disturbed by construction activities, cause the area to be unsightly and unattractive. Plants and vegetation in the area are cut/removed. However, the significant impact is only on the feelings of those viewing it. In this regard, the resulting effect does not cause any harm. Due to the nature of the project, it is a horizontal construction. There are no vertical structures, the effect is low.

(2) Operation phase

When the project opens the use of the Runway and Taxiway 2, U-Tapao International Airport, it will not cause any problems with access to the various tourist spots in the study area or other nearby areas as the project provides air transportation services, making travel more convenient. This results in increased visitors and tourist traffic in the area. In the future, the road and rail network network will be connected to U-Tapao International Airport. Therefore, it is expected that there will be a positive impact on tourism as a whole in the province and the region. Therefore, the result of the project development is considered to have a high positive impact.

As for the scenery inside U-Tapao International Airport, the area has a beautiful natural condition, and with the topography on the north side of the mountain is a forested area, the south side by the sea. On the east side is next to the intercity highway (Motorway) and the west is next to Khlong Bang Phai national highway and the naval base. The structures for the runway and taxiway 2, U-Tapao International Airport are not higher from the original ground level. Therefore, it does not affect the scenery to those who use the airport service and people who live near the project area. The landscape in and around the airport is also being improved. Therefore, it does not affect the scenery.

7.3.23.2 Objectives

1. To reduce and control problems with traffic and obstructions to view that may arise from project activities, both in the construction phase and in the operation phase, to the lowest level.
2. To prevent and resolve impacts on tourism and scenery caused by project implementation operations, both during the construction phase and the operation phase.
3. To monitor the results of the implementation of the tourism and scenery action plan and oversee effective implementation of the plan.

7.3.23.3 Operation Area

Construction phase: construction area and road around U-Tapao International Airport

7.3.23.4 Implementation method

(1) Environmental Impact Prevention and Resolution Measures

Construction Phase

- Build a wall around the construction area to hide construction activities that are unattractive and disorganized. It also helps reduce dust dispersion during construction.
- Map the construction area in accordance with construction procedures, such as clearly specifying transportation paths, entrances and exits, and the position of materials to help make it more organized.
- Strictly follow measures to prevent and resolve transportation impacts to reduce the impact of access to tourist destinations.

- Publicize news on project operations, construction plans and activities, transportation routes as well as complaint channels for residents in the vicinity and road users to stay informed in advance through various channels periodically, such as U-Tapao International Airport public relations web boards, online media, etc. so that commuters can avoid taking the route or avoid traveling during the period.

7.3.23.5 Duration of implementation

- **Construction Phase**: throughout the construction period

7.3.23.6 Responsible parties

- **Construction phase**: RTN and EECO, supervising construction contractors to ensure compliance with measures

7.3.23.7 Evaluation

Prepare a report on the implementation of environmental impact prevention and resolution measures and environmental impact monitoring measures for submission to authorizing agencies twice a year during the construction phase.

7.3.24 History and Archaeology Action Plan

7.3.24.1 Principles and Rationale

The activities of the construction and operation phases of the project may result in impacts to historical and archaeological sites. Important sources of impact in the construction phase are construction activities that cause issues with dust, vibration and may have impacts on archaeological sites and religious places.

The main source during the operation phase is the take-off and landing activities of aircraft that cause loud noise and vibration that may affect archaeological sites and religious places.

Therefore, the project has established a tourism and scenery action plan that covers the establishment of environmental impact prevention and resolution measures and environmental impact monitoring measures to reduce the impact of such project operations.

(1) Construction Phase

Air quality: Sources of pollution include stripping topsoil and emissions from construction machinery and equipment. Results of assessment conclude that all points are within the general atmospheric air quality standards. It is expected that air pollution impacts from the project's construction activities that may affect historical sites and places of worship are to be low.

Noise: For noise caused by construction activities, the 24-hour average was in the range of 65.0-85.6 dBA, mostly within the general noise level standard, as based on Notification No. 15 of the National Environment Board (1997) which specifies that the 24-hour average noise level must not exceed 70 dBA, except for the 3 historical sites and places of worship with levels exceeding the standard, including Phra Phuttha Nawikapiban Hall (Air Defense Artillery Battalion),

Admiral Prince Abhakara Kiartivongse Monument (Air Defense Artillery Battalion), the Phra Phuttha Nawikapiban Hall (Air Defense Artillery Battalion) and the Phra Siam Devadhiraj Shrine (Air Defense Artillery Battalion) with distances of 40, 90 and 180 meters from the project area respectively. But all three such places are uninhabited and are only used by those who come to practice religion on various occasions. Therefore, there is only a short-term impact and is only an impact from construction. Therefore, the noise impact is expected to be low.

For the assessment of noise levels from the transportation of the project's construction materials on historical and archaeological sites, including places of worship located along the transport route distance of 500 meters, of which there are 26 places, it was found that the noise level from the transportation of construction materials at the location of people along the transport route (Highway 3, 3126, 332 and 3376) at a distance of 32 - 411 meters, the values range from 37.3-53.9 dBA and have a baseline noise value (original sound level in current conditions) of 65.0 dBA. When assessed together with the noise level from the transportation of construction materials, it was in the range of 65.0 - 65.3 dBA. In conclusion, all values are within the Standard Noise Levels according to the Notification No. 15 of the National Environment Board (1997) which specifies that the 24-hour average noise level must not exceed 70 dBA. It is expected that the impact of noise pollution from the transportation of construction materials of the project will be low.

Vibration: The forecast for vibration from construction activities found that the 69 locations of historical and archaeological sites including places of worship surrounding the project area at a distance of 40-13,170 meters, have a peak particle velocity caused by the use of the Bore Piling Machine in the range of 0.0000 - 0.0610 inches per second (0.0003-1.5501 mm/s) and the level of impact on people in the area is at a level that cannot be felt. When considering the impact on building structures, it was found that it did not affect/damage any type of structure, so the impact is low.

Damage to archaeological sites: The survey examined the impact on historical and archaeological sites, including religious sites located in the study area of this project. It must be considered that this is a survey at the surface level only, however, operations in the construction phase include grading, drilling and excavating soil to lay the foundation of various buildings. This could damage the archaeological evidence that might be underground at the project site.

(2) Operation phase

Air Quality: The predicted emission of air pollutants in the general atmospheric air quality index consisted of carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), PM10 and $PM_{2.5}$, and using the AERMOD model, it was found that the Cmax of carbon monoxide (CO) was 1-hour average maximum and 8-hours average maximum, nitrogen dioxide (NO_2) 1-year average, sulfur dioxide (SO_2) 24-hour average maximum and 1-year average, including PM_{10} and $PM_{2.5}$ 24-hour average maximum and 1-year average. No scenarios exceeded the general atmospheric air quality standards.

The assessment of volatile organic substances compared to the surveillance values, referring to the Pollution Control Department Announcement Re: Determination of Surveillance Values for Volatile Organic Compounds in the General Atmosphere within 24 Hours of the acrolein should not exceed 0.55 micrograms per cubic meter in Thailand. Benzene and 1,3-Butadiene, 24-hour averages did not exceed the surveillance value. For chlorine, 24-hour average, the maximum concentration (Cmax) point was outside the airport at 3.261 micrograms per cubic meter, higher than the surveillance value of 0.55 micrograms per cubic meter. It was found that there are historical and archaeological landmarks, including religious sites in the study area that exceeded the surveillance value. The 4 sites include the Admiral Prince Abhakara Kiartivongse (Air Defense Regiment 1), Admiral Prince Abhakara Kiartivongse Monument (Air Defense Artillery Battalion), Phra Phuttha Nawikapiban Hall (Air Defense Artillery Battalion) and Phra Siam Devadhiraj Shrine (Air Defense Artillery Battalion). Although such a places are for religious ceremonies on various occasions for military service and there no residents, but it may affect the people who come to worship at that places.

Noise: The project's activities consist of the flight of various aircraft, and from the assessment of the noise impact, it was found that there were 9 historical and archaeological sites, including religious sites that weren't appropriate for land use according recommendations regarding the appropriate noise level for land use around U-Tapao International Airport of the Pollution Control Department, including the Admiral Prince Abhakara Kiartivongse Monument (Air Defense Artillery Battalion) and Wat Sa Kaeo, which are located in the noise contour area NEF ≥ 40, or the area with day and night averages exceeding 75 dBA. Also, the Admiral Prince Abhakara Kiartivongse Monument, National Naval Aviation Museum, King Taksin the Great Monument (Air Defense Regiment 1), Somdej Ong Phra Pathom (Air Defense Regiment 1), Phra Phuttha Nawikapiban Hall (Air Defense Artillery Battalion), Wat Somboonnaram and Wat Samnak Katon are located in the noise contour area NEF 30-40, or the area with day and night averages exceeding 65-75 dBA. It is expected that noise from the aircraft will have an impact, especially for the religious practices in various religious places. The significant historical and archeological sites, including 58 other religious sites located outside the noise contour area NEF 30 or the area with day and night averages less than 65 dBA are appropriate according to the criteria and are not expected to be impacted by aircraft noise.

Vibration : from the take-off and landing of aircraft. From the inspection of the area expected to have impact from wake vortex, it was found that are 11 religious sites located in the area under the flight path which may be affected, including Admiral Prince Abhakara Kiartivongse Monument (Air Defense Artillery Battalion), Phra Phuttha Nawikapiban Hall (Air Defense Artillery Battalion), Phra Siam Devadhiraj Shrine (Air Defense Artillery Battalion), Wat Sa Kaeo, Wat Sombun Naram, Ban Chang Abundant Grace Church, Wat Samnak Katon, Wat Suwan Rangsan, Wat Nong Bot, The Shrine of Luang Tia Chak Mak and Wat Chak Mak. The impact characteristic is that the roofing material of the building in the religious places may move, slide or fall off.

It is also noted that Wat Sombun Naram and Wat Chak Mak, while not registered archaeological sites or archaeological sites awaiting registration by the Fine Arts Department, but both temples are old temples with old structures that can be considered archaeological sites. Wat Sombun

Naram was founded as a temple in the reign of King Rama 5 (there is an old ordination hall that has been renovated) and Wat Chak Mak is an old temple, founded as a temple in the reign of King Rama 6 (there is an old ordination hall, that while being restored has some damage to the roof and the old wooden monastic dwelling at the rear, which at present it is in a very dilapidated condition and is not being used anymore). If considering the current condition of these old buildings, if there is no restoration before the start of the project they may be affected by wake vortex during the operation phase that can cause moderate to high damage, especially at Chak Mak Temple.

7.3.24.2 Objectives

1. To minimize and control problems related to archaeological and historical sites that may arise from project activities in both the construction phase and the operation phase.
2. To prevent and resolve the impacts on archaeological and historical sites arising from project implementation activities, both in the construction phase and in the operation phase.
3. To monitor the results of the implementation of the archaeological and historical sites action plan and oversee effective implementation of the plan.

7.3.24.3 Operation Area

- **Construction phase:** project construction area, and various project components including transportation routes for materials and communities located near construction activities.
- **Operation Phase**: U-Tapao International Airport area

7.3.24.4 Implementation method

(1) Environmental Impact Prevention and Resolution Measures

1. Pre-construction phase and construction phase

- Before construction, let the RTN and the EECO coordinate together and prepare a letter to the 5th Regional Office of Fine Arts Department, Prachinburi to inform them that the project will be implemented in the area, stating the period of project implementation, along with requesting for an archaeologist from the Fine Arts Department to check the area in the event that underground archaeological evidence is excavated at the construction site while grading, drilling or excavating soil to lay the foundation of various buildings (by attaching a study on the environmental impact on archaeological and historical sites, an environmental impact assessment report and measures to resolve environmental impacts related to history and archeology that have been considered by the National Environment Board).
- During the construction phase, in order to reduce the impact of the destruction of archaeological evidence that may be underground in the construction area, if any archeological evidence is found, while soil is being graded or drilled in the construction area, the operator shall stop the work in the area immediately, as well as photograph the images and coordinate with the Regional Office 5 of Fine Arts

Department, Prachinburi to consider inspecting the area to study and to collect important evidence (if any) before further construction.

- Strictly comply with preventative measures and resolve the impacts of air quality, noise and vibration during the construction phase.

2. Operation phase

- Strictly comply with environmental impact prevention and resolution measures for air quality, noise and vibration throughout the operation phase of the project.
- Strictly comply with the environmental impact prevention and resolution measures for occupational health and safety throughout the operation phase of the project.

(2) Environmental Impact Monitoring Measures

Operation phase

- Strictly comply with the measures to monitor environmental impact for noise and air quality throughout the operation phase of the project.
- Strictly comply with the measures to monitor environmental impact for occupational health and safety throughout the operation phase of the project.
- If there is a complaint of damage to the old buildings or other important buildings within 11 sites, the project must investigate the damage that occurred. If the damage is caused by the take-off and landing of aircraft, the renovation must be made to maintain strength and stability, as necessary and appropriate, and it must be carried out throughout the life of the project.

7.3.24.5 Duration of implementation

- **Pre-construction phase, construction phase**: Implement before construction and throughout the construction phase.
- **Operation Phase:** throughout the duration of the project

7.3.24.6 Responsible parties

- **Construction Phase** : RTN and EECO, coordinate with relevant agencies and supervise contractors for compliance with measures.
- **Operation phase:** EECO

7.3.24.7 Evaluation

Prepare a report on the implementation of environmental impact prevention and resolution measures and environmental impact monitoring measures for submission to authorizing agencies twice a year during the construction phase and operation phase.

7.4 Environmental Impact Prevention and Resolution Measures

The project summarizes environmental impact prevention and resolution measures in various fields, both during construction phase and operation phase, in compliance with the measures proposed in the project's environmental action plan, as follows:

Construction Phase

1. Noise
2. Vibration
3. Air quality
4. Topography
5. Geology and earthquakes
6. Soil resources
7. Surface water hydrology
8. Surface water quality
9. Groundwater quality
10. Marine water quality
11. Terrain ecology
12. Aquatic ecology
13. Waste and wastewater management
14. Land use
15. Transportation
16. Public utilities and facilities
17. Drainage and flooding prevention systems
18. Socioeconomic
19. Resettlement and replacement of assets
20. Health and Public Health
21. Occupational health and safety
22. Attractions and sightseeing
23. Archaeological and historical sites

Operation phase

1. Noise
2. Vibration
3. Air quality
4. Geology and earthquakes
5. Soil resources
6. Surface water hydrology
7. Surface water quality
8. Groundwater quality
9. Marine water quality
10. Terrain ecology
11. Aquatic ecology
12. Waste and wastewater management
13. Land use
14. Transportation
15. Drainage and flooding prevention systems
16. Socioeconomic
17. Resettlement and replacement of assets
18. Health and Public Health
19. Occupational health and safety
20. Archaeological and historical sites

Details are shown in **Table 7.4-1** and **Table 7.4-2**

Table 7.4-1 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the construction phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
1. Noise	• Reduce noise levels and vibrations from construction by choosing machinery/construction equipment that is in good condition and choosing the construction method techniques that produce the least noise and vibrations. Also, install the noise-reducing equipment on machinery or equipment that cause noise. • Inspect and maintain construction machinery/equipment on a regular basis so that they are in good condition and do not cause abnormal noise. • Loud construction operations should be carried out only during the day. Avoid construction during the night that may affect people outside the project area. In the event that it is necessary to carry out construction at night, the contractor shall notify agencies and affected persons of the plans in advance. • Provide protective equipment such as ear plugs or ear muffs for all workers. • Limit the duration of work for construction workers in loud areas to no more than 8 hours of work for areas with a volume exceeding 85 dBA. • Provide a place that can reduce noise produced by aircrafts for construction workers to rest during working hours. • Assess activities that will result in an increase in noise from the baseline volume (90th percentile volume: L_{90}) to prevent complaints from the impact of noise. • The RTN and EECO will control and oversee noise reduction from construction operations. • Provide channels for receiving complaints on impacts caused by project constructions at the construction control office or in the U-Tapao International Airport area to acknowledge the problems and various impacts and to expedite corrective action. In the case of noise complaints during the construction phase, measure noise disturbance and resolve the issue.	Areas that are sensitive to impacts near the project area	Throughout the construction period.	RTN and EECO, supervising construction contractors to ensure compliance with measures

Table 7.4-1 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the construction phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
2. Vibration	• An engineer must oversee the operations and choose construction machines/equipment that are in good condition, use construction techniques that minimize vibration or install equipment to reduce vibrations in strict compliance with the instructions for the use of each type of equipment as specified by the manufacturer. • If a steel plate is needed to temporarily cover the road surface, use extra thick steel plates and place the steel plates close to the road surface. Use rubber pads to prevent noise and vibration from road vehicles. • The construction contractor must control or limit the vehicle load weight. The weight must not exceed 25 tons. For large trucks, the load must not exceed the weight of the down axle as specified by the law in order to reduce vibrations that will occur. • The construction contractor must oversee truck drivers transporting construction materials to stay within the speed limit of 40 kilometers per hour when passing through community areas to reduce vibrations, which could affect and disturb the public.	Areas that are sensitive to impacts near the project area	Throughout the construction period.	RTN and EECO, supervising construction contractors to ensure compliance with measures
3. Air quality	• Construction areas with vehicles and work that may cause particulates, including roads within U-Tapao International Airport used for transporting materials, equipment and workers during the construction phase that have not yet been paved or concreted must be sprinkled with water at least 2 times a day or as suitable to prevent and reduce the effect of particle dispersion into the atmosphere. • Cover the loading compartment of vehicles used to transport materials and construction equipment that may cause dispersions using canvas or similar materials. • Erect a 2-meter high fence around the construction area to clearly designate the construction area and to reduce the dispersion of particulate matter and exhaust	Project construction area, including transportation routes for materials and communities located near areas sensitive to impact.	Throughout the construction period.	RTN and EECO, supervising construction contractors to ensure compliance with measures

Table 7.4-1 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the construction phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	from construction machinery, including the ricocheting of construction materials outside of the area. • Wash or clean the wheels of all vehicles leaving the construction area to ensure that they are free of dirt, mud, or sand before taking the vehicle onto an external road by providing a suitable washing or cleaning area. • Increase protection against vehicles to prevent pollution from exceeding standard range by checking construction machinery and engine conditions. If exhaust emissions exceed standard range or are defective, they must be corrected to good condition before use. • Limit the speed of vehicles used for transporting materials in compliance with the law, with a speed limit of 60 kilometers per hour for trucks weighing over 1,200 kilograms and 45 kilometers per hour for towing trucks and trailers. In this regard, the speed limit for construction areas is 30 kilometers per hours.			
4. Topography	• Require the contractor to conduct land reclamation in accordance with the Land Excavation and Land Filling Act 2000 and its amendments.	Construction area of the project	Throughout the construction period.	RTN and EECO, supervising construction contractors to ensure compliance with measures
5. Geology and earthquakes	• Pumping of groundwater for use in the construction site and construction control office is prohibited to prevent impacts on soil subsidence. • Require that the RTN and the EECO/or construction operators submit past soil subsidence data and problems arising from using various systems from U-Tapao International Airport to be used as information for the design of future developments in U-Tapao International Airport. • Building and structure designs must be in compliance with the regulations of the Ministry of Interior, which determines the load, resistance, and durability	Construction area of the project	Throughout the construction period.	RTN and EECO, supervising construction contractors to ensure compliance with measures

Table 7.4-1 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the construction phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	of buildings and supporting grounds for earthquake resistance, 2021, in the Government Gazette dated 4 March 2021.			
6. Soil Resources	• Inspect soil layer conditions before designing and constructing the runway to find the right construction technology to reduce runway subsidence. • To maintain the stability of the drilled holes, use polymer solutions instead of bentonite. Set this as a operation condition in the contractor's contract. • Oversee land reclamations so that is only done in areas where construction is required and clearly specify the construction area boundaries. • Soil piles and materials used for construction work must be kept away from surface water and seawater as much as possible, and avoid areas where erosion can easily occur. • Prevent soil washout from the construction area into nearby drainage channels by using an embankment or barrier materials in the direction of drainage.	Construction area of the project	Throughout the construction period.	RTN and EECO, supervising construction contractors to ensure compliance with measures
7. Surface water hydrology	• Store construction materials and equipment in an orderly manner, and prevent construction debris from obstructing waterways and drainage lines in the U-Tapao International Airport area. Build embankments or barrier materials according to drainage guidelines near construction area, with sedimentation ponds to reduce sediment leaching or construction debris falling into drainage canals. • Inspect drainage channels, especially in areas near the construction site, so that water can always be drained effectively. If it is found that there are weeds or soil sediments causing shallowness or obstructing drainage, then carry out dredging so that it returns to good working condition. • In the event that a canal or drainage line is filled within the U-Tapao International Airport area, efficient drainage channels must be constructed as a replacement with drainage capacity that is equivalent to the original. • Install refuse traps in drainage channels where necessary.	Construction area of the project	Throughout the construction period.	RTN and EECO, supervising construction contractors to ensure compliance with measures

Table 7.4-1 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the construction phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
8. Surface water quality	• The construction control office area must have a sufficient number of sanitary restrooms for the number of workers and staff, with at least 3 toilets for the first 80 workers and 1 toilet for the next 50 workers and so on. An on-site septic tank must be installed that is capable of treating at least the daily amount of generated wastewater and stopping wastewater from draining into water sources in U-Tapao International Airport. Require contractors to drain wastewater into the U-Tapao International Airport central wastewater treatment system. • Provide a wastewater reservoir for cleaning vehicle wheels to collect sediments prior to discharge into drainage canals. • Maintenance on equipment and machinery will be carried out only in the maintenance area, which prevents oil contamination from entering drainage canals. • Set procedures for operators to be careful when transferring oil and chemicals to prevent oil contamination from entering the drainage canal and use a hand pump or other suitable equipment for transferring oil. Also, provide protective equipment for oil leaks, with absorbent materials or oil containers such as drip trays. • Do not dispose trash, food waste, oil, and construction debris into the drainage canals in U-Tapao International Airport. Construction contractors must provide disposals and storage for waste from workers, as well as to store used oil containers for appropriate collection and storage. The amount of solid waste and disposals must be recorded.	Project construction area and construction workers' quarters	Throughout the construction period.	RTN and EECO, supervising construction contractors to ensure compliance with measures
9. Groundwater quality	• Do not wash tools, machinery in sources of water or drainage lines. • Do not dispose of waste or refuse into sources of water. • Oil traps must be in place to prevent oil stains spilling from equipment onto the ground into sources of water or drainage lines. • Check machinery weekly to prevent oil leaks.	Construction area of the project	Throughout the construction period.	RTN and EECO, supervising construction contractors to

Table 7.4-1 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the construction phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
				ensure compliance with measures
10. Marine water quality	• Require contractors to prepare an area for placing construction materials and use covering materials to reduce leaching into natural water sources during the rainy season. • Require that mobile restrooms to be set up in construction sites and temporary office buildings are sent to authorized agencies for disposal. • Make signs prohibiting construction workers from dumping solid waste and construction debris around the construction site into natural water and seawater sources. • Require contractors to inspect the operation of machinery on a regular basis and to take care to prevent oil leaks from entering natural water sources and into the sea. • Set procedures for operators to be careful when transferring oil and chemicals to prevent oil contamination from entering the drainage canal and use a hand pump or other suitable equipment for transferring oil. Also, provide protective equipment for oil leaks, with absorbent materials or oil containers such as drip trays. • Do not dispose solid waste, food waste, oil, and construction debris into the drainage canals in U-Tapao International Airport. Construction contractors must provide disposals and storage for solid waste from workers, as well as to store used oil containers for appropriate collection and storage. The amount of solid waste and disposals must be recorded.	Construction area of the project	Throughout the construction period.	RTN and EECO, supervising construction contractors to ensure compliance with measures
11. Terrain ecology	• Compose an account of timber in the runway and taxiway 2 construction area to verify the number and location of the trees for felling or relocation, and clearly mark the trees that are to be felled or relocated. • For large trees classified as restricted Type A trees according to the Royal	Project construction area, construction control office area,	Throughout the construction period.	RTN and EECO, supervising construction contractors to

Table 7.4-1 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the construction phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	Decree on Restricted Timber Species 1987, the RTN and EECO/or construction operators and contractors are to consider cutting or removing the tree and relocating it to a nearby location or other areas in the U-Tapao International Airport vicinity. • Guidelines for felling Type A trees per the Royal Decree on Restricted Timber Species 1987 are as follows: (1) The construction contractor will coordinate with the RTN and EECO to inspect tree felling area boundaries and timber accounts after tree felling is complete to prevent felling of trees outside of the runway and taxiway 2 construction area. (2) All trees felled from outside of the runway and taxiway 2 construction area must be removed from the area for suitable use by a contractor under the supervision of the RTN and EECO. • Guidelines for relocating Type A trees per the Royal Decree on Restricted Timber Species 198 are as follows: (1) Removing and relocating of trees require specialized techniques, and must be performed with caution. Construction contractors are therefore required to coordinate with the RTN and EECO to designate a relocation site for transplanting the trees in the nearby vicinity or another area in U-Tapao International Airport in order to remove and relocate the tree out of the construction area. Forestry scholars will be assigned to oversee the removal and relocation of restricted trees for proper transplantation in accordance with academic principles. (2) Construction contractors must comply with the removal and relocation procedures and methods, starting from preliminary surveys for information on all tree data, equipment and tool preparation, trenching and shrubbery decoration, lifting and transportation, and transplanting.	and construction workers' quarters		ensure compliance with measures

Table 7.4-1 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the construction phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	(3) Construction contractors will conduct the removal and relocation out of the construction area and complete the transplant before project construction is complete. • Clearly define construction boundaries and oversee that the contractors only carry out construction within the designated construction area. • Set rules and regulations for supervising construction. It is forbidden to capture or hunt animals of any type, especially watercocks, Eurasian stone-curlews, purple herons, barn owls, Asian golden weavers, and red avadavats found in the project construction area and nearby locations, with penalties in case of violation. • Land adjustment should be carried out with caution in order not to affect habitats, food sources, or wildlife activities or to cause harm to some types of animals, such as those that travel or move slowly.			
12 Aquatic ecology	• Conduct operations with strict compliance to the environmental impact prevention and resolution measures for surface water hydrology and quality during the construction phase of the project. • Maintenance on equipment and machinery will be carried out only in the maintenance area, which prevents oil contamination from entering drainage canals. • Avoid construction during the night, as most sea turtles will come up and lay their eggs during the night.	Project construction area, construction control office area, and construction workers' quarters	Throughout the construction period.	RTN and EECO, supervising construction contractors to ensure compliance with measures
13. Waste and wastewater management	**Measures to be taken inside U-Tapao International Airport** **1. Solid waste management** **1.1) Segregation and collection of solid waste** • Implement segregation of solid waste into general solid waste, construction waste, and hazardous waste • Encourage construction workers and relevant personnel to strictly segregate	Project construction area, canals surrounding the U-Tapao International Airport near the construction area,	Throughout the construction period.	RTN and EECO, supervising construction contractors to ensure compliance with measures

Table 7.4-1 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the construction phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	solid waste in separate containers provided • Set aside separate areas and containers for solid waste segregated into general solid waste, construction waste and hazardous waste • Clearly label the separate areas and containers of segregated solid waste • Provide enough containers for the volumes of segregated solid waste being generated during each collection interval • The waste container must have a capacity of at least 3 times the volume of solid waste being generated each day. It must be made of durable material that is fire resistant. Its inner surface must be smooth and water resistant, be in good condition, not leaking, have a lid that can protect against rainwater, flies, rats, cats, dogs and other animals that may become carriers of diseases through scavenging or contact with such waste. • The waste container placement yard must be well ventilated to prevent odors and to keep out rainwater and flies, rats, cats, dogs and other animals that may become carriers of diseases through scavenging or contact with such waste. • The container's size must be suitable for the placement yard and is convenient for cleaning. If there is huge volume of construction waste generated daily, additional large-capacity containers for solid waste must be provided. • The solid waste placement yard must be at least 4 meters away from food preparation and storage areas. However, if the total waste placement yard contains over 3 cubic meters of waste, the distance must be at least 10 meters away from the said locations, and the waste must be placed where it can be moved conveniently. **1.2) Collection and disposal of solid waste** • The contractor must coordinate with the local organization responsible for	construction control offices and construction workers' quarters		

Table 7.4-1 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the construction phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	solid waste management in the area to collect the solid waste for disposal on a regular basis. • Determine the date and time for solid waste collection. The construction contractor is required to place segregated solid waste in the area determined by the RTN and EECO on a daily basis • Provide trucks for solid waste collection. Vehicles used to collect waste must be covered to prevent odor from escaping or waste from falling off • The method for solid waste collection must be managed and waste segregators/collectors must be controlled to ensure the collection of solid waste from waste placement area to waste disposal facilities is done in an orderly manner and does not interfere with work or cause accidents in the area. • The frequency of waste collection must be based on the volume, characteristics of the solid waste, size and capacity of containers or placement area, the kind of activities and operations involved as well as collection time. • Only allow solid waste collecting trucks to operate at designated locations or specified places under supervision at all time. Trucks must be inspected and access control imposed on arriving and exiting waste collecting trucks. • The type and number of waste collecting trucks must be considered based on suitability taking into account: - Quantity and characteristics of solid waste to be collected - Method of solid waste collection. For example, in case solid waste is collected in containers, a forklift may be required required in addition to trucks. - Characteristics of waste placement area, such as the width and condition of access road			

Table 7.4-1 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the construction phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	- Number of waste collectors/distance and means of solid waste transportation • Construction waste, for example, wood scraps, masonry debris that cannot be recycled, must be collected and disposed of outside the area. Such waste may be used as fill or subbase material and for other purposes that do not cause any impact or be disposed of in the area specified by the RTN and EECO. • Disposing of solid waste by outdoor burning at the construction site or at construction control office is prohibited • RTN and EECO shall strictly supervise transportation of all types of waste that are transported for disposal outside the U-Tapao International Airport by assigning an agency to be directly responsible for waste transportation accompanied shipping document or a manifest to prevent hazardous waste from being dumped in public land or disposed of as general solid waste. **1.3) Hazardous waste management** • Collect and dispose of hazardous waste correctly as required by the law. Hazardous waste must be collected and placed separately from general solid waste. It must be placed in watertight container to prevent seepage or discharge into public drainage system. Hazardous waste must be placed in covered areas away from sources of flame. • Hazardous waste must be properly managed by the operator of the treatment, disposal or recycling of hazardous waste approved by the Department of Industrial Works under the Factory Act 1992. The RTN and EECO shall supervise the construction contractor's handling of hazardous waste. • Ensure hazardous waste is segregated from general solid waste and disseminate knowledge on safe handling of hazardous waste. For example,			

Table 7.4-1 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the construction phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	discarded fluorescent bulbs must be placed in packaging materials to prevent breakage prior to final disposal, and such containers must not be smashed or pierced, etc. • Set aside a dedicated area and hazardous waste container separate from general solid waste containers • Determine the date and time that the hazardous waste will be collected for disposal, using trucks designed for hazardous waste collection. • Place hazardous waste in the designated container or disposal area that are clearly labeled. The container for hazardous waste must have the following properties: - Made of strong material to protect such waste from scavenging pets or pests - Must be of orange in color, or gray with orange lid, or any other color that is not blue, green, yellow or red, so that it can be clearly distinguished from and are not the same or similar to containers of other types of solid waste. - The container must consist of sub-containers or have compartments within the container to store separate types of hazardous waste. The capacity must be sufficient for the volume of hazardous waste being generated during the specified collection intervals. • There must be suitable compartments for different types of hazardous waste to be correctly deposited, and such waste must be protected against unauthorized removal. • The container must be of suitable size and height for recognizability and to prevent wrong types of waste from being put into or on top of the container. • Prohibit the contractor from transferring, dumping, discarding hazardous waste in the public land or ways			

Table 7.4-1 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the construction phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	• For storage of toxic or hazardous waste, the contractor must take the following into consideration: - Must be at least 1,000 meters away from an archaeological site, conservation zone and nature reserve designated under the Cabinet resolution. - Must be located at least 700 meters away from a private drinking water well, water source for tap water production or within a range that does not adversely affect the quality of drinking water well or water source for tap water production. - Keep at least 100 meters away from public water sources that are currently in use or within a range that does not adversely affect the quality of that water source. - The storage location should have sufficient space for volume of hazardous waste being generated over a period of 90 days. - The hazardous waste storage building should be an enclosed building with ventilation control system and the inner surface must be made materials resistant to breakage or leakage of hazardous waste. - The floor of the hazardous waste storage area must be sloped into the wastewater drainage channel and well or container for stormwater discharge from hazardous waste specifically. The hazardous waste storage area must also be equipped with fire prevention equipment. • Hazardous waste transportation from storage location for treatment or disposal must be carried out by the contractor in compliance with the law governing hazardous substances, including application for permit to possession of hazardous substances for transportation, the rules concerning transport trucks, the transportation operators and transporters in accordance with the Notification of the Hazardous Substance Committee Re: Land			

Table 7.4-1 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the construction phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	Transportation of Hazardous Substances, and the guidelines for implementation of hazardous waste manifest system under the Notification of the Ministry of Industry re: hazardous waste transportation manifest system. • On hazardous waste treatment and disposal, the following should be taken into consideration: - Hazardous waste that can be recycled must be delivered for recycling at an authorized recycling facility under the law governing factories. - Hazardous waste that cannot be recycled must be delivered for disposal at an authorized hazardous waste disposal facility under the law governing factories. **Measures to be taken outside of U-Tapao International Airport (construction workers' quarters)** **1) Segregation and collection of solid waste** • Segregation of general solid waste and toxic or community-generated hazardous waste, such as contaminated materials, flammable substances, corrosive substances, highly volatile substances or other substances that may cause or are likely to cause harm to persons, animals, plants, property or the environment. • The contractor must set aside a designated area and provide separate containers for different types of waste, namely dry solid waste, wet waste, recyclable solid waste and toxic or community-generated hazardous waste. • Clearly label the separate areas and containers of different types of solid waste • Provide enough containers for the volumes of segregated solid waste being generated during each collection interval in areas throughout the construction workers' living quarters.			

Table 7.4-1 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the construction phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	• The waste container must have a capacity of at least 3 times the volume of solid waste being generated each day. It must be made of durable material that is fire resistant. Its inner surface must be smooth and water resistant, be in good condition, not leaking, have a lid that can protect against rainwater, flies, rats, cats, dogs and other animals that may become carriers of diseases through scavenging or contact with such waste. • The waste container placement yard must be well ventilated to prevent odors and to keep out rainwater and flies, rats, cats, dogs and other animals that may become carriers of diseases through scavenging or contact with such waste. • The container size is suitable for the place and convenient for cleaning. • The solid waste placement yard must be at least 4 meters away from food preparation and storage areas. However, if the total waste placement yard contains over 3 cubic meters of waste, the distance must be at least 10 meters away from the said locations, and the waste must be placed where it can be moved conveniently. **2) Collecting and disposing of solid waste** • Dispose of solid waste every day to avoid being a breeding ground of insects and other disease carriers • Disposing of solid waste by burning outdoor burning in construction workers' quarters is prohibited. • Prohibit contractors from transferring, dumping or disposing of general solid waste or toxic or hazardous waste in a public place or way. Such waste must be transferred, discarded or disposed of at the place or in accordance with the method prescribed or place provided by the local governments only. • The solid waste container must be in good condition, not leaking, and is covered with a lid to prevent scavenging pets or pests and to avoid becoming			

Table 7.4-1 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the construction phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	a breeding ground for insects and other disease carriers. **3) Hazardous waste management** Follow the same hazardous waste management measures as those taken inside U-Tapao International Airport. **Contractor supervision measures** • Specified in the employment contract regarding the management of solid waste and hazardous waste being generated during the construction of the project, both inside and outside of U-Tapao International Airport, including the delivery for disposal. The waste pick-up contractor must implement such work through an operator granted an appropriate permit from a relevant government agency, and report to the RTN and EECO. • Records of general solid waste, construction waste, and hazardous waste collected each day shall be tallied for the preparation of a monthly report for inspection and audit. **2) Wastewater management** • Construction workers' living quarters located outside the project area must have adequate sanitary facilities for the number of workers, with at least 1 toilet per 20 workers and equipped with an on-site septic tank with the capacity to process wastewater at least equal to the amount of wastewater being generated each day in order to treat wastewater according to the standard of effluent discharge from the building according to the Ministry of Natural Resources and Environment Notification of 2005 or the latest version before releasing into public drainage systems or public water sources. • Build workers' living quarters in areas that have minimal impact on the community. Determining areas that are clearly demarcated and ensuring the living quarters are well controlled and maintained in good condition to reduce impact of workers utilizing spaces at cross purposes and disorderly expansion.			

Table 7.4-1 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the construction phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	• Limit the spaces and areas that generate wastewater to the minimum • Provide a system to prevent wastewater from construction activities and cleaning of equipment and tools going into the drainage systems of U-Tapao International Airport. This may involve the construction of embankment, absorption trench or evaporation sites. Upon completion of construction, on-site wastewater treatment tanks must be removed from the area. • Encourage workers to conserve water to generate less wastewater			
14. Land use	• Build workers' living quarters in areas that have minimal impact on the community. Determining areas that are clearly demarcated and ensuring the living quarters are well controlled and maintained in good condition to reduce impact of workers utilizing spaces at cross purposes and disorderly expansion. • Prepare a plan to mitigate the impacts that may arise during the construction of the project, such as finding alternative transportation routes for construction activities, which may result in local transportation route modifications or other temporary land use activities in the construction area and surrounding areas. • Coordinate with the Rayong and Chonburi Office of Public Works and Town & Country Planning, and other relevant agencies so that noise contour map can be sent and incorporated into the respective comprehensive city planning in order to impose appropriate control for land use and construction of buildings around the U-Tapao International Airport that is conducive to the airport's activities and the Air Transport Security Zone, and the areas impacted by the development of the U-Tapao International Airport. • Coordinate with local agencies in enforcing the Building Control Act, along with the specific city planning law for areas surrounding the U-Tapao International Airport to control the granting of permits for new structures.	Construction area and surrounding area of U-Tapao International Airport	Throughout the construction period.	RTN and EECO, supervising construction contractors to ensure compliance with measures

Table 7.4-1 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the construction phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	• Coordinate and provide information to local authorities to announce and inform the public of the Air Transport Security Zone and areas impacted by noise arising from the development of the project. • Deliver the approved noise contour map to local authorities for approval for use as a guideline for the granting of building permits in the area. • Communicate through at least 3 channels, including websites, to inform communities of the noise contour map approved by the Cabinet to local communities.			
15. Transportation	• Require construction contractors to propose detailed methods for traffic arrangement to the RTN and EECO for approval within 15 days of signing the employment contract. The process of planning and assessing the proposed traffic management during the construction phase, calls for the contractor, RTN and EECO to make every effort to avoid adverse impacts to traffic conditions on Sukhumvit Road or other major roads. Under temporary traffic arrangements, they must provide temporary traffic diversions, fencing, traffic signs, signals and other equipment that meet the traffic and transportation safety standards, as specified in Part 2, Volume 5 of the 2003 handbook for the use of traffic signs at construction sites of Office of Transport and Traffic Policy and Planning (OTP) at all time, day and night. • Require construction contractors of the RTN and EECO to formulate a plan to provide temporary traffic diversion routes during the construction phase to be submitted to the RTN and EECO for approval at least 1 month prior to commencing construction of such temporary routes. The plan must demonstrate and ascertain that the methods to be used in the temporary traffic arrangements will not cause traffic congestion as specified in the contractual conditions. • Require construction contractors of the RTN and EECO to propose detailed plan and methods for public relations and temporary traffic management during	Project construction area and road around U-Tapao International Airport	Throughout the construction period.	RTN and EECO, supervising construction contractors to ensure compliance with measures

Table 7.4-1 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the construction phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	construction, to seek approval from the employers and other relevant agencies, such as the Department of Highways, Traffic Police, etc. The construction contractors must coordinate and hold joint meetings, including gathering feedback and suggestions from agencies on the public relations efforts and temporary traffic management plan in order to come up with the most effective public relations campaign and traffic management plan. • Require construction contractors to propose a plan for the transportation of construction materials, machinery and equipment, workers and personnel involved in the construction to be submitted to the RTN and EECO before commencing such transportation. Such requirement shall be set as a condition attached to the contract of employment. • Require construction contractors to maintain records of trips made for the transportation of materials and workers, detailing points of departure and destination along with volume of materials and number of workers, occurrence and cause of traffic accidents within the U-Tapao International Airport for reviewing, improvement and monitoring. • Install temporary traffic signs in areas where trucks make a U-turn, which may cause traffic congestion and unsafe conditions. Install temporary signs, textual warnings, and flashing lights at construction sites in accordance with the Road Traffic Act 1979, or the latest notification, in traffic problem or accident-prone areas, such as entry-exit points of construction sites and inside construction area. All signs must be clearly visible day and night. • Avoid transporting construction materials during the morning rush hours (06:00-09:00) and evening rush hours (16:00-20:00), or as required by law. • Require construction contractors to ascertain that trucks used for shipping construction materials stay within the maximum allowable weight under the law, and that drivers observe a maximum speed 60 kilometers per hour for			

Table 7.4-1 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the construction phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	trucks with a load of over 1,200 kilograms, and a maximum speed of 45 kilometers per hour for trailers, and a maximum speed of 30 kilometers per hour for all vehicles within the construction area. • Select the transportation routes for materials and workers that do not interfere with the main access routes at the entry-exit points of the U-Tapao International Airport used by passengers and members of communities around the airport. Areas with heavy traffic should also be avoided. Highway 3 linking to the U-Tapao International Airport from the north is designated as the main transportation route, regardless of the materials' point of origin. • Coordinate with traffic police to facilitate the use of the transportation routes and inform motorists and people living along the routes in advance of the date and time set for transportation of materials, tools and equipment and heavy machinery. • Together with the Department of Highways, formulate a contingency plan in the case of emergencies and major accidents to mitigate traffic congestion by taking measures such as periodically opening the central separation barrier to allow reversible lanes to enable traffic to flow around accident sites, etc. • In the event that the transportation of construction materials of the project causes damage to the road, the contractors under the supervision of the RTN and EECO, must coordinate with relevant agencies and immediately proceed to make repairs or take corrective measures. • Trucks and vehicles used in the transportation of materials, tools, equipment and construction workers must comply with the Road Traffic Act of 1979 and the Road Traffic Act (No. 4) of 1992 and the Road Traffic Act (No. 12) 2019, and workers are prohibited from traveling in the uncovered bed of a truck coming into U-Tapao International Airport. • Trucks and vehicles must be clearly labeled with logos and name of			

Table 7.4-1 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the construction phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	construction project along with phone numbers and vehicle ID number and name of transportation contractor, to indicate that they were transporting materials for the project, and so that members of the public may be able to verify or lodge a complaint when problems arise. These vehicles are also required to have GPS installed for tracking purpose. • Arrange for transport vehicles for construction workers to ensure safe and orderly travel as well as to prevent theft of construction materials. • The construction area must be fully enclosed and has only one entry-exit point to ensure effective access control and security. • Arrange for security personnel to enforce round-the-clock access control at the entry-exit point access, set the time to opening and closing of the gate. • Inspect vehicles and machinery of the construction companies used in construction work to ensure that they are maintained in good working order, to prevent vehicles or machinery from breakdown while in use, and conduct regular inspection of trucks transporting construction materials on a regular basis. • Cover the loading compartment of the trucks used in the transportation of construction materials and equipment with canvas or similar materials to prevent construction materials from falling off along the transportation route. In the case of construction materials falling off on the traffic surface or the roadside, dispatch workers to clean up as soon as possible. • Wash the wheels of all vehicles leaving the construction area to make sure they are free of dirt, mud, or sand before taking the vehicle out onto the roads outside the construction area. • Require construction contractors to control and supervise truck drivers and machinery operators to exercise caution in the construction area and strictly comply with relevant laws and regulations, and punish those who do not			

Table 7.4-1 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the construction phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	follow the rules as part of the effort to prevent accidents. • Require contractors to keep record of type and volume of traffic arriving at and leaving from the construction area on a daily basis, as well as traffic accident statistics on both internal roads of U-Tapao International Airport and external roads and report to the RTN and EECOO at least once a month throughout the construction period. • In the case of driving in the airside area, permission must be obtained fromthe U-Tapao International Airport and the rules and methods of driving in the airside must be strictly followed. • Drivers must be trained and pass the test for driving in the airside area, and the vehicles must be certified by the department responsible at U-Tapao International Airport to prevent unauthorized persons from entering the construction area and workers from construction area from entering the airside or other restricted areas. • Establish access control at the construction area within U-Tapao International Airport, in a hierarchical system based on level of security clearance.			
16. Public utilities and public facilities	• Require construction contractors to provide sufficient quantity of clean drinking water and tap water for personnel and construction workers (based on average drinking water of 5 liters per person per day and tap water of 70 liters per person per day) in Construction Supervision Office area and construction workers' quarters. • Provide water reserve tanks enough for 3 days in the event that tap water runs low or water shortage at Construction Supervision Office area and construction workers' quarters. • Opt for low-flush toilets and encourage construction workers to conserve water. • Inspect water storage systems, pipes and sanitary ware regularly and keep them in	Construction control office area and construction workers' quarters	Throughout the construction period.	RTN and EECO, supervising construction contractors to ensure compliance with measures

Table 7.4-1 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the construction phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	good working order. Fix leaky or damaged plumbing as soon as possible.			
17. Drainage system and protection against flooding	• To reconfigure topography by land grading and compacting quickly to prevent erosion and sediment escaping to drainage canal, obstructing drainage. • Inspect and ascertain that drainage canals within U-Tapao International Airport near the construction area are transporting stormwater runoff effectively. Remove any sediment buildup or weeds obstructing drainage ditches and keep them in good working condition. • Dredge outer canals and stormwater retention ponds within the U-Tapao International Airport using suitable machinery to remove sediment and maintain the contour line of the outer canals and holding capacity of the retention ponds to ensure full drainage efficiency as designed. • Install trash traps on drainage canals and ditches where necessary.	Project construction area and water drainage canal around U-Tapao International Airport near the construction area	Throughout the construction period.	RTN and EECO, supervising construction contractors to ensure compliance with measures
18. Socioeconomic	• The construction contractor will be required by law to select and conduct background check on workers for the construction of the project. Workers' dossiers with photos will be created and retained at the office of the project, which can be checked immediately when problems arise or complaints are received. • Give priority to hiring local workers or supporting local businesses. In case of foreign workers, construction contractors must only hire those with a legal permit to work in the country. • Provide suitable accommodation for construction workers that is clearly demarcated. Measures will be put in place to control and secure the construction site and workers' living quarters to prevent workers from causing problems or disturbance, such as prohibition of gambling, illicit drugs, nuisance noise, etc. Clearly-defined and consistently applied punitive actions must be taken in case rules/regulations are violated. • Workers are not allowed to spend the night in the project area, but there will	Project construction area and communities around U-Tapao International Airport	Throughout the construction period.	RTN and EECO, supervising construction contractors to ensure compliance with measures

Table 7.4-1 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the construction phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	be no more than 5 workers in charge of the material storage area at night. • The entry-exit access to the construction area must be controlled by security staff, with construction workers being able to leave construction areas only when permitted. • The construction site and workers' living quarters will be guarded by security personnel to ensure orderliness, and foremen were assigned to control and monitor behavior of workers as part of the effort to relieve public anxiety about safety issues, such as crimes and thefts, etc. • In the case that a complaint relating to impact from construction activities is received, every effort must be made to resolve the problem and corrective measures taken in accordance with the required environmental impact prevention and resolution measures without delay. • Strictly comply with the environmental impact prevention and resolution measures for transportation throughout the construction phase of the project. • Coordinate with relevant agencies relating to the improvement of road networks and expansion of traffic lanes, as well as the expansion of public utility systems, which will enhance the convenience of people using such services in the area and to facilitate travel at the national level to ensure they have access to greater convenience and better services. • Collaborate with relevant agencies to support community activities, such as occupational training in agriculture and crab breeding and culture, community development, health promotion, education, traditional culture, ecotourism, and environmental protection, etc. • The project must establish an impact monitoring committee based on the principle to allow community participation in EIA Monitoring Committee within 12 months after the construction project has been approved by the Cabinet.			

Table 7.4-1 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the construction phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	• The EHIA Monitoring Committee consists of members who are representatives of 3 sectors: people sector, public sector and the project. The proportion of representation of the people sector, excluding public sector representatives, must be more than two-thirds of the total number of the committee. Details are as follows: 1) Representatives of the people sector selected from the sub-districts in the study area in the EHIA report, on proportional basis or through nomination or any other methods from the communities around the project location based on local administrative area and sub-district area as follows: - Representatives of the people sector who are community leaders from subdistricts in the study area according to the EHIA report in Rayong and Chonburi provinces. - Representatives of the people sector who are residents of the study area according to the EHIA report in Rayong and Chonburi provinces, including those in the noise contour areas. - Representatives of non-governmental development organizations from Rayong and Chonburi provinces (if any) 2) Representatives of government agencies involved at the central and provincial levels, comprising Office of Natural Resources and Environmental Policy and Planning, Office of Transport and Traffic Policy and Planning, Pollution Control Department, Offices of Public Works and Town and Country Planning Offices of Rayong and Chonburi provinces, Offices of Provincial Public Health of Rayong and Chonburi provinces, and administrative organizations in Rayong and Chonburi provinces (provincial, district and local government levels). 3) Representatives of the project owner, the RTN and EECO The committee, comprising representatives of the 3 sectors, will select 1			

Table 7.4-1 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the construction phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	chairperson, 1 vice-chairperson, and 1 secretary of the committee, to be followed by the announcement of the committee members with prior approval of the committee meeting. The selection of EHIA Monitoring Committee members representing the people sector should follow the selection process as follows: 1) Local government organizations shall make arrangements for residents to elect their representatives in their respective subdistrict administrative areas. 2) Local government organizations announce selection results to local residents who may provide additional comments or feedback within 15 days from the election day. 3) Submit the lists of people's representatives in respective local administrative areas to the project or the committee for further action. **Note:** If there is any additional comments or objections, it shall be at the discretion of the committee to make appropriate decisions, which is considered final.			
19. Resettlement and replacement of assets	• Strictly comply with environmental impact prevention and resolution measures for noise impact and land use in the construction phase of the project. • Coordinate and provide information for local agencies to announce and inform the public on the Air Safety Zone, and areas exposed to noise from the development of the project.	Construction area and surrounding area of U-Tapao International Airport	Throughout the construction period.	RTN and EECO, supervising construction contractors to ensure compliance with measures
20. Health and Public Health	**1) Loud noise** • Comply with environmental impact prevention and resolution measures for noise pollution during the construction phase. • Notify local health department of activities, number of workers, and duration of work. • Open complaint channels, such as on the U-Tapao International Airport	Construction area and surrounding area of U-Tapao International Airport	Throughout the construction period.	RTN and EECO, supervising construction contractors to ensure compliance with measures

Table 7.4-1 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the construction phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	public relations website, RTN website and EECO website and online media, etc.			
	2) Particulate matter • Comply with environmental impact prevention and resolution measures for air quality during the construction phase. • Notify local health department of activities, number of workers, and duration of work. • Open complaint channels, such as on the U-Tapao International Airport public relations website, RTN website and EECO website and online media, etc.	Construction area and surrounding area of U-Tapao International Airport	Throughout the construction period.	RTN and EECO, supervising construction contractors to ensure compliance with measures
	3) Vibration • Comply with environmental impact prevention and resolution measures for vibration during the construction phase. • Open complaint channels, such as on the U-Tapao International Airport public relations website, RTN website and EECO website and online media, etc.	Construction area and surrounding area of U-Tapao International Airport	Throughout the construction period.	RTN and EECO, supervising construction contractors to ensure compliance with measures
	4) Adequacy of public utilities (drinking water, tap water) • Comply with environmental impact prevention and resolution measures for public utilities and public facilities during the construction phase. • Open complaint channels, such as on the U-Tapao International Airport public relations website, RTN website and EECO website and online media, etc.	Construction control office area and construction workers' quarters	Throughout the construction period.	RTN and EECO, supervising construction contractors to ensure compliance with measures
	5) Travel convenience (traffic flow) • Comply with environmental impact prevention and resolution measures for transportation and the socioeconomic aspects of the community during the construction phase.	Project construction area: Roads surroundingthe U-Tapao International	Throughout the construction period.	RTN and EECO, supervising construction contractors to

Table 7.4-1 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the construction phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	• Open complaint channels, such as on the U-Tapao International Airport public relations website, RTN website and EECO website and online media, etc.	Airport area within the project area, and communities surrounding U-Tapao International Airport located in the study area.		ensure compliance with measures
	6) Social fabric of the community/life and property safety • Comply with environmental impact prevention and resolution measures for economic and social aspects during the construction phase. • It is required to submit workers' dossier to local authorities before they begin working in the project, and the dossier must be inspected once a year.	within project area and surrounding communities U-Tapao International Airport within the study area	Throughout the construction period.	RTN and EECO, supervising construction contractors to ensure compliance with measures
	7) Sanitation (waste and wastewater) • Comply with environmental impact prevention and resolution measures for waste and wastewater management, occupational health and safety, issues relating to the sanitation of construction workers' quarters and the economic and social aspects of the community in the construction phase of the project. On issues relating to the provision of suitable living quarters for construction workers and supervision and management of construction area and workers' living quarters to ensure peace and order, along with the establishment of impact monitoring committee, the principle to enable active community participation applies. • Notify local health department of activities, number of workers, and duration of work. • Open complaint channels, such as on the U-Tapao International Airport public relations website, RTN website and EECO website and online media,	Construction area of the project and Construction control office area and construction workers' quarters	Throughout the construction period.	RTN and EECO, supervising construction contractors to ensure compliance with measures

Table 7.4-1 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the construction phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	etc.			
	8) General communicable diseases (the main disease group transmitted through water- and food-borne pathogens, respiratory diseases, including viral epidemics, such as COVID-19) • Comply with environmental impact prevention and resolution measures for the management of waste and wastewater, occupational health and safety, economic and social aspects of the community during the construction phase • Establish procedures for sanitation of living quarters, solid waste and wastewater management along with prevention and elimination of disease vectors, under strict supervision. • Provide health check up and submit workers' dossier along with health reports to local public health authorities before they begin work in the project. • Direct the contractor to educate workers about good hygiene, promote cleanliness and provide tips on how to protect themselves against communicable diseases by requesting local public health facilities in the project areas, such as hospitals, public health service centers, to send health personnel to provide training, before the workers begin working in the project. • Direct the contractor to strictly comply with laws, notifications and regulations relating to the control and prevention of communicable diseases, such as the Public Health Act, Communicable Diseases Act, and the implementation of public health measures to control the spread of infectious diseases, such as the coronavirus (SARS-CoV, COVID-19), Bird Flu, Influenza 2009, by complying with both national and international laws and regulations, such as (1) Communicable Diseases Act 2015; (2) Notification of the Department of Public Health Re: Rules, Procedures, and	Project construction area and construction workers' quarters	Throughout the construction period.	RTN and EECO, supervising construction contractors to ensure compliance with measures

Table 7.4-1 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the construction phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	Prevention of Risk from coronavirus disease 2019 (COVID-19) for government sites, private workplaces and establishments 2020 (3) Notification of the Department of Health Re: Criteria, Procedures, and Prevention against Risk from coronavirus disease 2019, or COVID-19, for public transport service providers 2020 (4) Suspected Communicable Disease Universal Precaution Kit (IATA, 2017) (5) Communicable Disease Surveillance and Response Systems: Guide to Monitoring and Evaluating (WHO, 2006) • The contractor is required to prepare a operational plan for the prevention of communicable diseases in the construction workers' living quarters, for submission to the RTN and EECO. • The RTN and EECO are required to coordinate with local public health authorities to plan the implementation and prevention of environmental and health impacts in construction workers' living quarters of the project. • Notify local health department of activities, number of workers, and duration of work. • Prepare health promotion media and publicize communication channels with the RTN and EECO, and notify local public health authorities for acknowledgement, and keep record of activities in support of health authorities. • Open complaint channels, such as on the U-Tapao International Airport public relations website, RTN website and EECO website and online media, etc.			
	9) Accidents • Comply with environmental impact prevention and resolution measures for transportation and the economic and social aspects of the community during the construction phase.	Project construction area: Roads surrounding the U-Tapao International	Throughout the construction period.	RTN and EECO, supervising construction contractors to

Table 7.4-1 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the construction phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	• Determine procedural guidelines for construction contractors/subcontractors, monitor their operations. • Open complaint channels, such as on the U-Tapao International Airport public relations website, RTN website and EECO website and online media, etc.	Airport area within the project area, and communities surrounding U-Tapao International Airport located in the study area.		ensure compliance with measures
	10) Adequacy and access to health services systems, including personnel and medical supplies • The RTN and EECO are required to coordinate with local public health authorities to plan the implementation and prevention of environmental and health impacts in construction area and at workers' living quarters of the project. • Implement CSR (Corporate Social Responsibility) activities by supporting sub-district health promotion hospitals around the project area. • Require the RTN and EECO to engage or identify a local health facility or public health system to provide health services to the contractor's workers, which must not pose a burden to the primary healthcare facility used by local residents in the area. • Require the RTN and EECO to provide communication channel with local public health authorities as well as to support local health authorities to ensure readiness in terms of personnel and other resources to provide health services. • Create a list of health facilities/health authorities nearby the project area together with names and contact information, including telephone numbers, of coordinator to ensure close coordination on activity details. • Prepare health promotion media and publicize communication channels	within the project area and communities around U-Tapao International Airport located in the study area.	Throughout the construction period.	RTN and EECO, supervising construction contractors to ensure compliance with measures

Table 7.4-1 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the construction phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	with the RTN and EECO, and notify local public health authorities for acknowledgement, and keep record of activities in support of health authorities.			
21. Occupational health and Safety	**1) Sanitation at construction workers' living quarters** • Specify in the construction contract, requiring the contractor to build workers' living quarters to meet the Engineering Institute of Thailand 1010-34 standard. • Require contractors to provide workers with training on hygiene and disease prevention, good behavior, avoid causing nuisance, stay away from illicit drugs every 6 months, as well as to distribute a safety handbook to all workers in order to enhance knowledge and awareness of work safety. • Establish regulations for the prevention and elimination of disease vectors at construction workers' living quarters to avoid becoming a breeding ground for infectious pathogens and spread of diseases. Such regulations must be strictly supervised to ensure full compliance. • Schedule of periodic sanitation inspections in cooperation with public health officials, local administrative organizations • Cooperate with public health authorities upon request to implement preventive measures, such as vaccination, eliminating of disease vector sources in the event of an outbreak.	Construction Supervision Office area and construction workers' quarters	Throughout the construction period.	RTN and EECO, supervising construction contractors to ensure compliance with measures

Table 7.4-1 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the construction phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	2) Work environment (noise) • Strictly follow the environmental measures and the existing occupational health and safety management plans. • Comply with environmental impact prevention and resolution measures for noise during the construction phase. - Provide personal protective equipment, such as ear plugs or ear muffs for construction workers. - Limit the duration of work for construction workers in loud areas to no more than 8 hours of work for areas with a volume exceeding 85 dBA. - Provide a place that can reduce noise produced by aircrafts for construction workers to rest during working hours.	Construction area of the project	Throughout the construction period.	RTN and EECO, supervising construction contractors to ensure compliance with measures
	3) Work-related accidents • Strictly follow the environmental measures and the existing occupational health and safety management plans. • Require contractors to comply with occupational health and safety and environmental laws while working, such as: - Occupational Safety, Health and Work Environment Act of 2011 - Notification of the Department of Labor Protection and Welfare Re: Determining Personal Safety Equipment Standards, 2011 - Labor Protection Act of 1998 - Ministerial Regulation Re: Determination of Safety Standard for Administration and Management of Occupational Health and Work Environment (No. 2), 2010	Construction area of the project	Throughout the construction period.	RTN and EECO, supervising construction contractors to ensure compliance with measures

Table 7.4-1 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the construction phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	- Ministerial Regulation Re: Determination of Safety Standard for Administration and Management of Occupational Health and Work Environment in Construction Work 2008 - Notification of the Department of Labor Protection and Welfare, Re: Category and Type of Machinery and Equipment Used in Construction Work Requiring Annual Certification 2011 - Ministerial Regulation Re: Determination of Safety Standard for Administration and Management of Occupational Health and Work Environment 2006 or the latest edition of such notification. • Keep record of and report on accident statistics. • Investigate accidents and make recommendations to establish preventive measures.			
22. Attractions and Scenery	• Build a wall around the construction area to hide construction activities that are unattractive and disorganized. It also helps reduce dust dispersion during construction. • Map the construction area in accordance with construction procedures, such as clearly specifying transportation paths, entrances and exits, and the position of materials to help make it more organized. • Strictly follow measures to prevent and resolve transportation impacts to reduce the impact of access to tourist destinations. • Publicize news on project operations, construction plans and activities, transportation routes as well as complaint channels for residents in the vicinity and road users to stay informed in advance through various channels periodically, such as U-Tapao International Airport public relations web boards, online media, etc. so that commuters can avoid taking the route or avoid traveling during the period.	Project construction area, including transportation routes for materials and communities located near project areas.	Throughout the construction period.	RTN and EECO, supervising construction contractors to ensure compliance with measures

Table 7.4-1 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the construction phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
23. Archaeological sites and Historical	• Before construction, let the RTN and the EECO coordinate together and prepare a letter to the 5th Regional Office of Fine Arts Department, Prachinburi to inform them that the project will be implemented in the area, stating the period of project implementation, along with requesting for an archaeologist from the Fine Arts Department to check the area in the event that underground archaeological evidence is excavated at the construction site while grading, drilling or excavating soil to lay the foundation of various buildings (by attaching a study on the environmental impact on archaeological and historical sites, an environmental impact assessment report and measures to resolve environmental impacts related to history and archeology that have been considered by the National Environment Board). • During the construction phase, in order to reduce the impact of the destruction of archaeological evidence that may be underground in the construction area, if any archeological evidence is found, while soil is being graded or drilled in the construction area, the operator shall stop the work in the area immediately, as well as photograph the images and coordinate with the Regional Office 5 of Fine Arts Department, Prachinburi to consider inspecting the area to study and to collect important evidence (if any) before further construction. • Strictly comply with preventative measures and resolve the impacts of air quality, noise and vibration during the construction phase.	Project construction area, including transportation routes for materials and communities located near project construction areas.	Throughout the construction period.	RTN and EECO, coordinate with relevant agencies and supervise contractors for compliance with measures.

Table 7.4-2 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
1. Noise	**1) Management Measures** • The EECO will consider following the guidelines of Doc 9829 AN/451, "Guidance on the Balanced Approach to Aircraft Noise Management," which are guidelines for managing noise pollution under four main principles, namely: (1) Reduction of Noise at Source, (2) Land-use Planning and Management, (3) Noise Abatement Operational Procedures, and (4) Operating Restrictions on Aircraft. • The EECO will assess monitoring results from noise impacts and continue to take action to reduce noise impacts. • The EECO will update/review airport development plans in relation to assessments and noise impact reduction at least every 2 years via the Impact Monitoring Committee or the working group appointed and assigned by the Impact Monitoring Committee. • Control the number of flights so that they do not exceed the maximum number of assessments specified in the EHIA report by providing a summary of the number of flights and aircraft types every year. • Limit loud aircrafts by specifying that aircrafts operate at a level not exceeding the level specified in Chapter 3 of Annex 16 of the Convention on International Civil Aviation or CAAT regulations to ensure that they are upheld by various airlines. If any aircrafts are found to not comply, the reason will be noted in the environmental impact prevention and resolution measures, and guidelines for resolution will be notified. • Prepare and record annual complaint management outcomes that include complaint statistics, corrective action, and plans for reducing impacts. • Implement measures to manage noise pollution from public airports as approved by the National Environment Board in meeting no. 6/2562 on 19 September 2019 and per the Minister's resolution of acknowledgement on	Within the area of U-Tapao International Airport and communities expected to be impacted	throughout the project life.	EECO by coordinating with relevant agencies

Table 7.4-2 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	28 January 2020 • In the event of a change in operating procedures for flights arriving and departing from U-Tapao International Airport, the EECO/or the Airport Operations Certificate holder and Aeronautical Radio of Thailand Company Limited (AEROTHAI) will jointly consider conducting a noise impact assessment in relation to the changing aviation situation to assess the impacts that will arise after the change in flight practices. • The EECO will arrange a meeting with relevant agencies for implementation planning and to monitor noise impacts from U-Tapao International Airport, with meetings held at least once a year. • A permanent noise monitoring station will be installed before Runway 2 is opened. • Baseline noise levels are measured at the permanent noise monitoring stations before initiating operations at each station. • Permanent noise monitoring stations are to be installed and maintained for the device to operate efficiently at all times. • There is an airplane noise monitoring system that measures 24-hour noise levels daily and can analyze flight data from the Automatic Dependent Surveillance Broadcast (ADSB). The results of the measurements and aircraft flight routes will be shown online (Real Time Noise Monitoring System) to keep the public informed. The monitoring results will also be revealed to the public via websites etc., and access channels will also be publicized to the public. • It is required that airlines using U-Tapao International Airport comply with flight and flying-landing procedures that cause the least noise pollution or as specified by the EECO. They must not affect safety factors, and must jointly consider other relevant factors, such as capacity, efficiency of traffic			

Table 7.4-2 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	management, and accessibility. Flight and noise data obtained from the permanent noise monitoring station will be summarized every 6 months. • Publicize information on U-Tapao International Airport operations and listen to complaints and recommendations from related agencies and the general public via at least 3 channels. • The EECO will prepare a flight database that will at least be connected to a permanent noise monitoring station to support future operations.			
	2) Ground Noise Control Measures within U-Tapao International Airport • In case of complaints, review the noise level from the nearby permanent noise monitoring station. If the noise level is exceedingly high, adjust the engine test time, testing the engine only during the daytime or as appropriate. Measure and monitor data closely. Show the monitoring results to the public for their information and disclose the measurement results on through the website, as well as various channels of public relations, to keep the public informed. • The EECO will coordinate with Aerothai, airlines and ground service agencies to jointly manage ground traffic in the aviation area effectively, reducing activities that release pollutants into the environment.	Within the area of U-Tapao International Airport and communities expected to be impacted	throughout the project life.	EECO by coordinating with relevant agencies
	3) Measures to Lower Noise Levels for Those in Areas Affected by Noise • Airside operators must use ear protection, such as ear plugs or ear muffs throughout their period of work. • Office buildings in the U-Tapao International Airport area must be equipped with walls and doors, and air conditioning must also be installed to prevent noise.	Within U-Tapao International Airport area	throughout the project life.	EECO

Table 7.4-2 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	4) Land Use Planning Measures • The EECO will coordinate with relevant agencies, namely local administrative organizations surrounding the project area, Rayong Office of Public Works and Town & Country Planning and the Department of Public Works and Town & Country Planning Chonburi Province, and support information for land use planning and management. • The EECO is asked to publicize information on safety guidelines for aviation and areas impacted by noise, as well as annual guidelines on how to choose methods and materials for noise protection annually, and coordinate with local authorities for their information.	Buildings and additional structures that change the levels of impacts from the noise contour map.	Compensation must be completed prior to the opening of the Runway and Taxiway 2.	EECO by coordinating with relevant agencies
	5) Compensation Measures **5.1 Reimbursement Terms** • Proceed to compensate those affected by the development of the Runway and Taxiway 2 Construction Project, U-Tapao International Airport, by considering the level of impact from the NEF contour map for 2048 and considering the building year, compensating for structures that were constructed up to the date of the EHIA report as approved by the National Environment Board. The EECO must publish the construction information to the public in advance for their information. • Conduct a survey, prepare a database and compensation plans for those impacted by noise arising from project developments. The working group will complete the surveys and compensation reviews to completion before Runway 2 is opened. • Prepare a compensation plan and prepare compensation progress reports as planned and conduct annual performance assessments. • Allocate sufficient budgets to prepare compensation plans and public relations and communications plans.	Buildings and additional structures that change the levels of impacts from the noise contour map.	Compensation must be completed prior to the opening of the Runway and Taxiway 2.	EECO

Table 7.4-2 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	• Assess compensation outcomes and prepare a summary of progress reports on compensation and public relations and communications, as well as the problems and obstacles arising from compensation measures. • Establish measures to monitor and evaluate the implementation of measures to improve and reduce the impact of noise in the NEF 30-40 area within 12 months in order to reduce the impact from repeated complaints from the failure to improve buildings according to the objectives. • Arrange staff to conduct inspections and check the deterioration of equipment installed for more than 5 years. If it is found that, due to the quality of materials, equipment is damaged faster than per normal use, recommendations for resolution and maintenance must be able to be provided or additional budgets must be supported at the discretion of the working group for considering environmental impact and quality development funds to prevent noise impact and post-compensation complaints. **5.2 Compensation Criteria** *In the case of NEF ≥ 40* • The EECO will negotiate for purchasing land with buildings constructed up to the date of the EHIA report as approved by the National Environment Board. In the case that the land owner with the building does not wish to sell the land, provide support to improve the noise impacts by providing compensation for them to improve the building by themselves. • The EECO will provide support to prevent noise in places which require extra silence, such as schools, hospitals, religious sites, etc., for			

Table 7.4-2 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	buildings constructed up to the date of the EHIA report as approved by the National Environment Board. *In the case of NEF 30-40* • The EECO will provide support for building improvements to reduce noise impacts via compensation for self-improvement of buildings and structures for buildings constructed up to the date of the EHIA report as approved by the National Environment Board. • The EECO will provide support to prevent noise in places which require extra silence, such as schools, hospitals, religious sites, etc., for buildings constructed up to the date of the EHIA report as approved by the National Environment Board.			
	6) Noise Resolution Measures in the Event of a Complaint • The U-Tapao International Airport Environmental Impact Resolution Coordination Center is the main agency for complaint handling. It is responsible for assessing, analyzing, inspecting, and informing the public of complaints, information on noise, and/or other problems arising from aircraft operations, with electronic databases that identify and link to the geographic coordinates in the area around U-Tapao International Airport, which must include at least the following details: - Name of person/agency filing complaint - House no. - Building - Time affected - Number of residents - Claims statistics - NEF forecast area - NEF monitoring area (if any)	Buildings and additional structures that change the levels of impacts from the noise contour map.	Compensation must be completed prior to the opening of the Runway and Taxiway 2.	EECO

Table 7.4-2 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	- Land use - Other related matters • Complaint channels are available 24 hours a day. • In the event that there is a complaint from the community about noise impacts, use the noise data from the permanent noise monitoring station connected to the flight database or from the 24-hour noise monitoring mobile unit for 7 consecutive days, with the noise measured in NEF or L_{dn} units at the said area. There is a working group to investigate the impact of the project. If the impacts are true, the EECO will proceed to provide compensation in accordance with EECO guidelines.			
	7) Measures to resolve noise issues in the case of runway closure for repairs • In the case that the runway is closed for repairs according to the scheduled maintenance plans, the EECO will hold meetings/submit notification documents to relevant agencies and hold meetings with relevant agencies to plan and implement measures to support flight operations and air traffic services at U-Tapao International Airport, keeping in mind the promotion of appropriate runway use to minimize impacts on flight efficiency and noise and environmental impacts while maintaining maximum safety. Examples include managing and increasing arrival flights at off-peak times and managing flight slots by considering reducing the number of flights in relation to flight capacity if runways are closed before announcing the next season's flight schedule. Plans will be coordinated and prepared at least 6 months in advance before closing runways for repairs prior to the allocation of the flight schedule for the next flight season. • In case of closure for non-scheduled maintenance, the EECO shall set plans and coordinate with relevant agencies in managing air traffic effectively and with minimal impact, and will prepare a record of	within U-Tapao International Airport	throughout the project life.	EECO

Table 7.4-2 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	operations and public relations for the community. • Prepare performance reports according to runway reparation measures, both in accordance with various scheduled maintenance and non-scheduled maintenance procedures for relevant issues such as scheduling of flight slots and number of affected flights, etc. • Study and assess the impact of the repairs for cases in which either of the 2 runways are closed, including preparing a plan to reduce the impact of the incidents and public relations to the relevant agencies and the public for acknowledgement of the runway closure and impact reduction measures, via no less than 3 channels, such as the U-Tapao International Airport information board, online media, public relations activities, etc. • Assess compensation outcomes and prepare a summary of progress reports on compensation and public relations and communications, as well as the problems and obstacles arising from compensation measures. • The EECO is asked to publicize information on safety guidelines for aviation and areas impacted by noise, as well as annual guidelines on how to choose methods and materials for noise protection annually, and coordinate with local authorities for their information. • Building licensees, owner or occupants must uphold, maintain, or handle procedures in order to allow materials, equipment, or anything else designed to provide protection from aircraft noise to prevent noise from the aircrafts throughout the life of the building.			
2. Vibration	• Provide a primary channel for receiving complaints. The public should report matters to the U-Tapao International Airport Environmental Impact Resolution Coordination Center located at U-Tapao International Airport, every day during business hours (8.00 am - 5.00 pm). • Send an officer to inspect the condition of the damage and prepare a record as	Within the area of U-Tapao International Airport and communities expected to be	throughout the project life.	EECO

Table 7.4-2 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	proof in all cases to assess the repair costs. The expenses incurred must be paid from the fund for improving quality of life for the public within the estimated amount. A fund management committee will review the damages caused by wake vortex in all cases. • The EECO will conduct operations in accordance with the objectives of the fund for the remedy of environmental impacts and improving quality of life in cases of resolving impacts from falling objects caused by aircrafts and compressed air.	impacted		
3. Air quality	**1) Management Measures** • The EECO will coordinate the relevant agencies to efficiently allocate flight schedule slots in accordance with flight capacity. In this respect, this must affect safety factors. • Complete the installation of the automated air quality monitoring station (AQMS) before opening Runway 2. • Conduct general atmospheric air quality monitoring to provide baseline data for the area surrounding the air quality monitoring station prior to initiating operations at each station. • It is required that airlines using U-Tapao International Airport comply with flight and flying-landing procedures that cause the least air pollution in compliance with legal standard requirements. They must not affect safety factors, and must jointly consider other relevant factors, such as capacity, efficiency of traffic management, and accessibility. • The EECO will prepare a flight database that is linked to the reports of results from the general atmospheric air quality monitoring stations to support future operations.	within the area of U-Tapao International Airport, sensitive areas and communities in the study area	throughout the project life.	EECO

Table 7.4-2 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	2) Ground Air Pollution Control Measures at U-Tapao International Airport • Require aircrafts to turn off their engines when approaching a tunnel or passenger loading bridge and to use power distribution equipment and air conditioning supported by the U-Tapao International Airport public utility system. • The EECO will coordinate with Aerothai, airlines and ground service agencies to jointly manage ground traffic in the airspace to effectively reduce waiting times for aircraft runways and to reduce pollutant emissions into the environment. • Encourage U-Tapao International Airport employees and service users to use more public transportation, which will result in reduced energy consumption and pollution from cars. • Promote the use of environmentally friendly vehicles, such as electric powered vehicles. • Encourage the use of ground support equipment (GSEs) that use low-emission fuels. For instance, use electric fuel within the airside area and use natural gas or electricity within the landside area. • Organize traffic within U-Tapao International Airport, especially around the terminal building and parking areas, to avoid congestion to reduce air pollution emissions. • The EECO will develop/improve ground power units and pre-conditioned air service systems to cover aircraft stand taxilanes and establish measures for airlines to use such systems instead of the aircraft's auxiliary power unit (APU).	in the area of U-Tapao International Airport and areas that may be impacted	throughout the project life.	EECO
	3) Air Pollution Resolution Measures in the Case of Closure for Runway Repairs • Have public relations with the relevant agencies and the public for acknowledgement of the runway closure and impact reduction measures via various channels such as the U-Tapao International Airport information board, online media, public relations activities, etc.	in the area of U-Tapao International Airport and areas that may be impacted	throughout the project life.	EECO

Table 7.4-2 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	• Request that airlines cooperate in parking aircrafts in the aircraft stand taxilanes while waiting for takeoff.			
4. Geology and earthquakes	• Pumping of groundwater for use in the U-Tapao International Airport operations is prohibited. • Establish an internal unit within U-Tapao International Airport to be responsible for recording soil subsidence monitoring data for Runway and Taxiway 2.	U-Tapao International Airport area	throughout the project life.	EECO
5. Soil Resources	• Attend to ground-covering plants in the U-Tapao International Airport area to prevent soil washout during the rainy season. • Continuously inspect soil subsidence in the runway area by checking whether the runway surface is at the specified level. If the runway surface level is found to have more than a 13 centimeter difference, the runway surface must be immediately renovated to be smooth and level. • Repair and maintain runways in areas where there is a large difference in the runway surface levels for take off-landing safety in compliance with the requirements of the International Civil Aviation Organization (ICAO). • Establish an internal unit within U-Tapao International Airport to be responsible for recording soil subsidence monitoring data for the runways and taxiways.	U-Tapao International Airport area	throughout the project life.	EECO
6. Surface water hydrology	• Inspect the conditions of the drainage line canal ditches in the U-Tapao International Airport area on a regular basis. If they become shallow or if the bank is eroded, carry out dredging in order to maintain the cross-section of the drainage ditch as designed. • Inspect drainage obstructions in the ditches along the drainage canal every 6 months and take immediate action to help improve the drainage system. • Maintain the water level in the drains near the runways, driveways, and aircraft apron so that they are as dry as possible. Residual water in the drainage system must be quickly drained. Especially in the case of rain, drain water from the drainage lines in such areas as much as possible.	U-Tapao International Airport area	throughout the project life.	EECO

Table 7.4-2 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	• It is required to inspect and conduct regular maintenance of the drainage system within the U-Tapao International Airport area to effectively support drainage in the airport area, and to have backup pumping system in case of damage to the main pumping system.			
7. Surface water quality	• Oversee the activation of the central wastewater treatment system and regularly monitor the efficiency of the central wastewater treatment system. • Monitor the characteristics of the treated wastewater to ensure compliance with the control of wastewater discharge standards for type A buildings in accordance with the Announcement of the Ministry of Natural Resources and Environment Re: Determination of Standards for the Control of Wastewater discharge from Certain Types and Sizes of Buildings (2005), or according to the latest version, before discharge into the drainage canal within and outside of U-Tapao International Airport. • Reuse treated wastewater discharge that meets the standards as much as possible, such as using it to water plants and trees in the green areas of U-Tapao International Airport, etc. to reduce the amount of water that needs to be drained.	Within U-Tapao International Airport area	throughout the project life.	EECO
8. Groundwater quality	• Continually check the condition of the crevices or drainage ditches and rainwater drains to prevent clogging. • Repair equipment used to pump drainage water so that it is ready to be used at all times and can be used effectively.	Within U-Tapao International Airport area	throughout the project life.	EECO
9. Marine water quality	• Conduct operations with strict compliance to the environmental impact prevention and resolution measures for surface water hydrology, surface water quality, and water ecology in the operation phase.	Within U-Tapao International Airport area	throughout the project life.	EECO
10. Terrain ecology	• Choose suitable ornamental plants and shrubs for the garden or as decoration in areas outside of the airspace to prevent them from becoming a food source or nesting place for birds. • Mow grass to an acceptable height so that all 4 wildlife groups, namely birds,	U-Tapao International Airport area	throughout the project life.	EECO

Table 7.4-2 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	mammals, reptiles, and amphibians, cannot feed, inhabit, or lay eggs. Lawnmowers must not cause wheel grooves, which can become a place to hid or cause waterlogging, which can attract such animals. • Destroy habitat spaces, such as by caring for perennials, removing unnecessary trees, trimming and pruning, etc. Remove sources of food for birds, such as worms and insects, including grasshoppers, beetles, caterpillars, earthworms, and larvae from other insects that can become a food source for animals. • Regularly eliminate aquatic plants around drainage lines and ponds, especially in areas near the runway and taxiway, such as itchgrass, water hyacinths, joinvetch, narrowleaf cattails, etc. Remove the plants from the area using physical means. Do not use chemical herbicides. • Drive away all animals looking for food or resting in takeoff - landing runways, especially before takeoff or landing for each flight and especially birds that can become a flight hindrance. • Eliminate food sources and habitats for small mammals, such as rats and squirrels, which can become food for predatory birds. Also, collect the remains of dead frogs, toads, or other reptiles on the takeoff - landing runways to reduce the number of animals that may enter the area to eat their remains. • Drive away and capture mammals and reptiles that enter the area, such as by setting traps to capture Asian water monitors, rats, squirrels, and snakes, and coordinate with relevant agencies to release them back into their natural habitat. • Survey the diversity of flora and fauna in the airport surroundings, covering both the dry season (bird migration season) and rainy season.			
11. Aquatic ecology	• Conduct operations with strict compliance to the environmental impact prevention and resolution measures for surface water hydrology and quality during the operation phase of the project.	U-Tapao International Airport area	throughout the project life.	EECO

Table 7.4-2 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
12. Waste and wastewater management	**1) Solid waste management** • For general solid waste that is recyclable and non-recyclable, the following requirements must be observed: - Solid waste must be collected and stored in the waste storage building. - Non-reusable solid waste, such as sludge from central wastewater treatment system, must be stored in covered containers and used as soil amendments. The rest must go to the landfills or disposed of by operators with the permit to dispose of waste in a sanitary manner. Asphalt scraps from Runway and Taxiway repairs must be collected and stored only at the scrap yard specified by the EECO. - Non-recyclable solid waste must be stored in a container that can prevent leakage and diffusion and must be collected for disposal outside of U-Tapao International Airport strictly on a daily basis, including during weekends and public holidays, to ensure no buildup at the waste storage. Such waste must go to sanitary landfills or treated or disposed of as appropriate by authorized operator with a permit from government agency under the law. - Compostable solid waste including food scraps from restaurants within U-Tapao International Airport must be collected in the food scrap storage containers placed at the sources to prevent such waste from being discarded along with general solid waste. Restaurants are required to separate plastic scraps, drinking straws, chopsticks, water bottle caps, and other contaminants into the containers for non-recyclable waste so that food scraps can be used as animal feeds. Such waste must be collected and removed from the U-Tapao International Airport on a daily basis to avoid buildup of waste.	U-Tapao International Airport area	throughout the project life.	EECO

Table 7.4-2 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	• Infectious solid waste from a medical facility in U-Tapao International Airport upon being collected must be kept in a storage container with temperature control to keep it at 10° C or below for up to 30 days and must be delivered for disposal outside the U-Tapao International Airport by incineration in an incinerator for infectious waste or other methods as required by law, by authorized operator with a permit from government agencies or by law. • Solid and liquid hazardous waste must be segregated and stored at specific areas separate from other types of solid waste. Hazardous waste containers must be leak-proof and diffusion-proof. Hazardous waste may be stored for up to 90 days (as required by law) and delivered for treatment, disposal or recycling in accordance with technical requirements by authorized operators with permits from government agencies to engage in treatment, disposal or recycling of hazardous waste. • Minimize solid waste disposal by maximizing utilization of general solid waste and by reducing the moisture of segregated solid waste. • Develop a plan and explore appropriate technology for waste management within U-Tapao International Airport and deliver waste for disposal outside the airport as appropriate for the volumes and characteristics of general solid waste and hazardous waste that may increase in the future. • Inspect the containers for the storage of solid waste and hazardous waste to ensure they are in good condition to prevent spillage, leakage or diffusion of solid waste and hazardous waste during transportation.			

Table 7.4-2 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	• Provide appropriate solid waste and hazardous waste hauling trucks in sufficient number for the volumes of solid waste and hazardous waste being generated. Such waste hauling trucks must be maintained in good condition ready for sustained services at all time. In case of emergency, there must be replacement trucks on standby ready for hauling services at any given time. • Wastewater and wastewater runoff generated during the normal waste transfer and waste segregation activities must be collected and channeled into the primary wastewater treatment system at the solid waste transfer station, and must be treated to meet the effluent discharge standards of U-Tapao International Airport before being released into the central wastewater treatment system. • Solid waste storage areas in waste storage buildings and machinery used to segregate general solid waste should be cleaned regularly to reduce odors that may cause nuisance to nearby communities. • The recyclable material inventory area should have its floor cleaned regularly, and such materials should not kept for too long to prevent fire hazard and nuisance odors as well as to avoid problems relating to scavenging rodents and breeding ground of insects. • Machinery and tools used for segregating waste must be maintained in good condition and be ready for use at all time.			

Table 7.4-2 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	• The removal of general solid waste, infectious waste, and various types of hazardous waste for disposal outside the U-Tapao International Airport must be accompanied by a waste transportation manifest every time, and the waste hauling trucks must be covered with canvas or other means to prevent leakage, dropping of solid waste and hazardous waste debris along the entire transportation route, in compliance with the legal requirements. • Hire a contractor to manage solid waste generated within U-Tapao International Airport that have the ability to meet the waste management standards, have the capability to provide adequate spaces for waste disposal throughout contract period, and which has the appropriate permits from government agencies. • Select the contractor to dispose of solid waste who must be licensed by a state agency to annually carry out measurements according to legal measures and procedures. • Randomly inspect the operations of the contractor hired for the disposal of solid waste, infectious waste and hazardous waste as well as other contractors involved in waste management activities in U-Tapao International Airport at least twice a year and conduct an on-site inspection of the waste disposal facility on standby (for all 3 waste types) at least once a year to assess their capability and efficiency in the waste disposal, and to check whether they meet the technical standards or observe the contractual terms. Failing that the EECO has the right to terminate the relevant contract(s) and replace the contractor hired for the disposal of solid waste, infectious waste and hazardous waste, as appropriate. **2) Wastewater management**			

Table 7.4-2 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	• Provide a central wastewater treatment system that can handle wastewater volume of no less than 10,000 cubic meters per day to be generated when the number of passengers using the airport reaches 70 million per year. • Ensure that the central wastewater treatment system is operational and staffed by personnel with knowledge and capability to control and operate the central wastewater treatment system in an efficient manner at all time. • Record keeping is required for the operation of central wastewater treatment system, including records of day-to-day operational issues that can be used as input data for the control of the treatment system and to prevent problems that may arise as per Form TS 1 (record keeping form for detailed statistics and data on the operational status of the wastewater treatment system of the source of pollution). Prepare a summary report on the operation of the wastewater treatment system and the results of inspection of the effluent discharge quality standard once a month, and submit a report as per Form TS 2 to local authorities before the 15th of the following month, in compliance with the ministerial regulations determining rules, methods and statistical record keeping and record keeping for details relating to the wastewater treatment system and a summary report on the performance of the wastewater treatment system 2012. • Establish regular maintenance plans for central wastewater treatment system			

Table 7.4-2 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	• Monitor the characteristics of the treated effluent discharge to ensure compliance with the control of effluent discharge standard for type A buildings in accordance with the notification of the Ministry of Natural Resources and the Environment Re: determination of standards for the control of effluent discharge from certain types and sizes of buildings (2005), or according to the latest version of the notification, before releasing into the drainage canal within the U-Tapao International Airport. • Reuse treated effluent discharge that meets the standards as much as possible, such as using it to water plants and trees in the green areas of U-Tapao International Airport, etc.			

Table 7.4-2 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
13. Land use	• Coordinate with the provincial public works offices and city planning offices of Rayong and Pattaya and other relevant agencies so that noise contour map can be sent and incorporated into the respective comprehensive city planning in order to impose appropriate control for land use and construction of buildings around the U-Tapao International Airport that is conducive to the airport's activities and the Air Transport Security Zone, and the areas impacted by the development of the U-Tapao International Airport. • Coordinate with local agencies in enforcing the Building Control Act, along with the specific city planning law for areas surrounding the U-Tapao International Airport to control the granting of permits for new structures. • Coordinate with and provide information to local agencies to announce and inform the public on the Air Transport Security Zone and the areas affected by the noise arising from the development of the project. • Deliver the approved noise contour map to local authorities for approval for use as a guideline for the granting of building permits in the area. • Publicize the noise contour map approved by the Cabinet and results of sound measurement at the permanent real-time noise monitoring stations on the website.	Surrounding area of U-Tapao International Airport	throughout the project life.	EECO
14. Transportation	• Increase the frequency of shuttle buses within U-Tapao International Airport during passenger peak hours. • Coordinate with relevant agencies to increase access routes into U-Tapao International Airport to ensure convenience and speed for passengers at U-Tapao International Airport. • Coordinate with relevant transportation agencies to study future access routes to the U-Tapao International Airport involving public transport systems linked up with large-scale mass transit systems to encourage the use of public transport as much as possible. As such, the government should	Roads surrounding U-Tapao International Airport, entry-exit routes to U-Tapao International Airport and roads within U-Tapao International Airport	throughout the project life.	EECO

Table 7.4-2 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	develop projects to expand existing public transport and rail-based mass transit systems to reduce the use of personal transport for traveling to and from the U-Tapao International Airport. To this end, a major upgrade to link up public transport systems and improving access to them to ensure convenience to air passengers and prevent problems that may arise. • Coordinate with local traffic police to improve traffic signals around U-Tapao International Airport and at U-turns located near U-Tapao International Airport, to correspond with traffic volumes, cut delays or queue lengths at intersections, while also encourage traffic police to strictly enforce traffic law, taking punitive actions or reprimanding motorists who commit traffic violations. • Coordinate with the agencies responsible for traffic direction along the access routes to U-Tapao International Airport and the nearby connecting routes during peak hours. • Coordinates with relevant agencies responsible for the development and improvement of the transportation networks around U-Tapao International Airport to accommodate increased traffic volume and relieve congestion. • Coordinate with the Department of Highways to prepare a contingency plan for traffic management in the event of emergencies and major accidents to relieve traffic congestion, such as periodically opening the central separation barrier to allow reversible lanes, etc. • Compile statistics of relevant public transport users to and from the U-Tapao International Airport, once a year for use as data input to devise measures to improve and encourage the use of mass transit and public transport systems to reduce the number of personal cars as part of the effort to alleviate traffic congestion. In addition, the EECO should gather other data relating to transportation and traffic situations around the U-Tapao International Airport			

Table 7.4-2 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	from other agencies for use in developing strategic transport infrastructure policies and plans to correspond with the development of U-Tapao International Airport and land use in the surrounding areas.			
15. Drainage system and protection against flooding	• Inspect and dredge drainage canals within U-Tapao International Airport to ensure drainage efficiency at all time. Remove sediment buildup or weeds that obstruct drainage. Maintenance dredging must be carried out at least once a year to ensure drainage canals, ditches and retention ponds are in good working order before the arrival of the rainy season. • Dredge outer canals and stormwater retention ponds within the U-Tapao International Airport using suitable machinery to remove sediment and maintain the contour line of the outer canals and holding capacity of the retention ponds to ensure full drainage efficiency as designed. • Inspect and dredge the retention ponds to remove sediment to maintain their holding capacity, drainage efficiency and in good working order. Inspect and dredge the retention ponds at least once a year before the arrival of the rainy season. • Keep water level in the retention ponds within the U-Tapao International Airport low (at -1.30 to -1.40 meters of mean sea level) according to design specification) before the arrival of the rainy season. • Provide backup water pumping systems in case the primary pumping system is damaged. In the event that the flood embankment is below the critical level (+2.77 meters of mean sea level), the embankment must be filled up in accordance with engineering principles and relevant standards. • During the rainy season, dredging the outer canals in the southern part of U-Tapao International Airport, including the canal lines within a range of 1 kilometer above the pumping stations in the west and east, is prohibited. This is to prevent sediment from being pumped out along with stormwater from	Canals in and around U-Tapao International Airport	throughout the project life.	EECO

Table 7.4-2 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	the U-Tapao International Airport. The dredging contractor must coordinate with pumping station personnel to make sure no dredging is carried out nearby while water is being pumped out of the airport. Sediment that has been dug out must not be left exposed but should be used to fill up the embankment to reinforce structural integrity of the drainage canals.			
16. Socioeconomic	• EECO shall keep local residents informed of results of noise level measurements at all time. • Strictly comply with environmental impact prevention and resolution measures for noise impact throughout the operation phase of the project. • Strictly comply with the environmental impact prevention and resolution measures for transportation throughout the operation phase of the project. • Establish a rehabilitation fund for affected persons and to improve the quality of life to mitigate the impacts that the public may have from U-Tapao International Airport operations in order to mitigate the overall environmental and public health impacts. • For people living in areas close to NEF≥40, such as NEF 39/38, or peopleaffected by project activities, the project has established measures to reduce the impact by providing the following Fund: - Emergency damage compensation fund for use as reserve fund for emergency remedy. In the event of an emergency, the affected person shall submit a case to the executive board of the Foundation and the board shall hold an extraordinary meeting to consider remedy for the affected person without delay in accordance with the rules, conditions and methods prescribed by the executive board of the Foundation. - Fund for the development of people's quality of life to improve the quality of life of the communities surrounding the airport, protect nature and the environment, and provide initial relief from the impacts of the	Within U-Tapao International Airport area	throughout the project life.	EECO

Table 7.4-2 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	project, as well as supporting expenses or remuneration for fund management operations by the Foundation's executive board and other working groups as deemed appropriate by the Foundation's executive board. • Give priority to recruiting people in the communities around U-Tapao International Airport who are qualified for suitable jobs. • Collaborate with relevant agencies to support community activities, such as occupational training in agriculture and crab breeding and culture, community development, health promotion, education, traditional culture, ecotourism, etc. • Establish EIA Monitoring Committee with community involvement.			
17. Resettlement and replacement of assets	• Strictly comply with environmental impact prevention and resolution measures for the noise impact, land use in the operation phase of the project.	Buildings and additional structures that change the levels of impacts from the noise contour map.	Compensation must be completed prior to the opening of the Runway and Taxiway 2.	EECO

Table 7.4-2 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
18. Health and Public Health	**1) Noise pollution** • Comply with environmental impact prevention and resolution measures for noise and economic and social conditions during the operation phase. • Implement continuous noise level measurement and surveillance. • Establish a fund to remedy the environmental impacts on the community and to develop people's quality of life to mitigate impacts from the operations of U-Tapao International Airport, as part of the effort to alleviate the overall environmental and public health impacts. • Coordinate and collaborate with local public health authorities to plan the surveillance on hearing ability of people affected by noise pollution from the operations of the U-Tapao International Airport. • Promote and support the capability to monitor noise pollution by health agencies and health promotion volunteers. • Open complaint channels, such as on the U-Tapao International Airport public relations website, RTN website and EECO website and online media, etc.	The area of U-Tapao International Airport, sensitive areas and surrounding communities U-Tapao International Airport	throughout the project life.	EECO
	2) Vibration • Comply with environmental impact prevention and resolution measures for damage from wake vortex or objects falling off aircraft, and measures regarding economic and social conditions of the community during the operation phase. • The RTN and EECO are required to coordinate with local public health authorities to plan the implementation and prevention of environmental and health impacts in communities around U-Tapao International Airport. • Promote and support the capability in emergency management of public health and safety agencies and volunteer groups.	The area of U-Tapao International Airport, sensitive areas and surrounding communities U-Tapao International Airport	throughout the project life.	EECO

Table 7.4-2 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	3) Adequacy of public utilities (drinking water, tap water) • Comply with environmental impact prevention and resolution measures for public utilities and public facilities during the operation phase. • Open complaint channels, such as on the U-Tapao International Airport public relations website, RTN website and EECO website and online media, etc.	The area of U-Tapao International Airport, sensitive areas and surrounding communities U-Tapao International Airport	throughout the project life.	EECO
	4) Travel convenience (traffic flow) • Comply with environmental impact prevention and resolution measures for transportation in the operation phase. • Determine practical guidelines for all vehicles entering and exiting the airport, and provide traffic directing system to enhance traffic flow within U-Tapao International Airport area. • Open complaint channels, such as on the U-Tapao International Airport public relations website, RTN website and EECO website and online media, etc.	The area of U-Tapao International Airport, sensitive areas and communities surrounding U-Tapao International Airport	throughout the project life.	EECO
	5. General communicable diseases (the main disease group transmitted through water- and food-borne pathogens, respiratory diseases, including viral epidemics, such as COVID-19) • Strictly comply with public health measures to control the spread of infectious diseases, such as the coronavirus (SARS-CoV, COVID-19), Bird Flu, Influenza 2009, by complying with both national and international laws and regulations, such as (1) Communicable Diseases Act 2015; (2) Notification of the Department of Public Health Re: Rules, Procedures, and Prevention of Risk from coronavirus disease 2019 (COVID-19) for government sites, private workplaces and establishments 2020 (3) Notification of the Department of Health Re: Criteria, Procedures, and Prevention against Risk from coronavirus disease 2019, or COVID-19, for	The area of U-Tapao International Airport, sensitive areas and communities surrounding U-Tapao International Airport	throughout the project life.	EECO

Table 7.4-2 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	public transport service providers 2020 (4) Operational considerations for managing COVID-19 cases or outbreak in aviation (WHO, 2020) (5) Aircraft cleaning and disinfection during and post pandemic (IATA, 2020) (6) Preventing spread of disease on commercial aircraft: Guidance for cabin crew (CDC, 2020) (7) Suspected communicable disease universal precaution kit (IATA, 2017) (8) ICAO guidelines for managing communicable disease in aviation (9) Communicable disease surveillance and response systems: Guide to monitoring and evaluating (WHO, 2006). • The EECO is required to coordinate with local public health authorities to plan the implementation and prevention of environmental and health impacts in communities around U-Tapao International Airport. • Require the EECO to set up channel of communication with local public health authorities to stay in contact as well as to support local public health authorities to develop readiness in terms of personnel and other resources to provide health services. • Inform local health authorities of the emergency management plan and invite them to participate in the emergency management activities, such as the development of the plan, emergency management drills, especially those relating to infectious pathogens and quarantine. • Follow airport emergency plan regarding public health emergencies, infectious pathogens and quarantine. • Implement surveillance for respiratory illnesses due to COVID-19 outbreak, require licensed airport operators to supervise employees and airlines to ensure strict compliance with the 2005 Emergency Decree on Public Administration in Emergency Situations and public health guidelines for the management of the COVID-19 epidemic, including measures and recommendations for establishments that remain open and certain types			

Table 7.4-2 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	of activities, personal practices, preventive and disease control measures, medical service system readiness, and other aspects, such as recommendation for the use of face mask to protect against COVID-19, disinfection, sterilization and infectious waste management, and solid waste management, etc. • Implement public information campaign and participate in emergency management drills, especially regarding infectious pathogens and quarantine. • Promote and support the capability in emergency management of public health agencies and volunteer groups. • Keep a record of communication plans and emergency management plans, especially those related to infectious diseases and quarantine. • Open complaint channels, such as on the U-Tapao International Airport public relations website, RTN website and EECO website and online media, etc.			
	6) Public safety (road traffic and aviation accidents) • Comply with environmental impact prevention and resolution measures for noise, vibration, air quality, and transportation during the operation phase, with emphasis on measures for managing and mitigating damage • Inform local health authorities of the emergency management plan and invite them to participate in the emergency management activities, such as the development of the plan, emergency management drills. • Implement public information campaign and participate in emergency management drills. • Establish measures requiring airlines and pilots to comply with the Civil Aviation Authority of Thailand's Notice to Airmen (NOTAM) to follow the General Procedure according to ICAO standard to prevent accidents caused	The area of U-Tapao International Airport, sensitive areas and communities surrounding U-Tapao International Airport	throughout the project life.	EECO

Table 7.4-2 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	by Wake Vortex Turbulence. • Promote and support the capability in emergency management of public health and safety agencies and volunteer groups. • Keep record of communication plan and emergency management plan. • Compile disaster prevention and mitigation from relevant agencies.			
	7) Sanitation (wastewater, solid waste management) • Comply with environmental impact prevention and resolution measures for waste and wastewater management during the operation phase • Open complaint channels, such as on the U-Tapao International Airport public relations website, RTN website and EECO website and online media, etc.	The area of U-Tapao International Airport, sensitive areas and communities surrounding U-Tapao International Airport	throughout the project life.	EECO
	8) Adequacy and access to health services systems, including personnel and medical supplies • Keep local health department informed of activities, including environmental and health management and monitoring results. • Implement CSR (Corporate Social Responsibility) activities by supporting sub-district health promotion hospitals around the project area. • Require the EECO to set up channel of communication with local public health authorities to stay in contact as well as to support local public health authorities to develop readiness in terms of personnel and other resources to provide health services.	The area of U-Tapao International Airport, sensitive areas and communities surrounding U-Tapao International Airport	throughout the project life.	EECO
	9) Dust and air pollution • Comply with environmental impact prevention and resolution measures for air quality during the operation phase. • Conduct regular air pollution monitoring, especially in areas prone to air	The area of U-Tapao International Airport, sensitive areas and communities	throughout the project life.	EECO

Table 7.4-2 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	pollution risk. • Coordinate and cooperate with public health authorities in the health monitoring of vulnerable groups. Provide public health authorities with results of analysis and environmental impact monitoring reports on a regular basis in order to assess potential health impacts on vulnerable groups during the operation phase, and find appropriate solutions. • Promote and support the air pollution monitoring capability of health authorities and health promotion volunteers. • Open complaint channels, such as on the U-Tapao International Airport public relations website, RTN website and EECO website and online media, etc.	surrounding U-Tapao International Airport		
19. Occupational health and Safety	**1) Work environment (noise)** • Conduct additional noise measurements using personal sensors on employees working in the airside area or other high risk groups. • Conduct hearing ability test every year. • Analyze the linkage between noise exposure and hearing ability to identify likelihood of loss of hearing. • In the event that abnormal hearing ability is detected, there must be a management plan, such as reduction of noise exposure, reduction of exposure time. • Create a hearing health preservation project.	U-Tapao International Airport area	throughout the project life.	EECO

Table 7.4-2 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	2) Chemical materials in the work environment • Conduct additional chemical measurements using personal measuring devices, especially on employees working in the airside area or at risk groups. • Provide health check up based on risk profiles • Analyze the linkage between the levels of chemicals that workers have been exposed to and their health conditions to determine the likelihood of the impact on health from exposure to chemicals. • In the case of contract work, there must be supervision to ensure the contractor reports results of employees' health check up at least once a year.	U-Tapao International Airport area	throughout the project life.	EECO
	3. Work-related accidents • Analyze the causes of accidents, prepare accident statistics, and analyze accident trends to find appropriate solutions and establish guidelines to prevent accidents. • Develop a plan to prevent and reduce work-related accidents. • Comply with the Safety, Occupational Health and Work Environment Act. • Establish a safety committee. • Appoint safety officers. • Develop an occupational health and safety plan that address the following issues: - Risk assessment, identification of high-risk areas, such as poorly-ventilated areas. - Identify hot work areas with noise level that does not meet the safety standards for work areas or tasks with exposure to chemicals in the work environment. - Establish work environment surveillance plan.	U-Tapao International Airport area	throughout the project life.	EECO

Table 7.4-2 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	- Provide health check up based on risk profiles. - Implement health promotion plan. - Implement work-related accident prevention and surveillance plan - Implement emergency response plan • In this regard, the work plan and performance of the occupational health and safety plan must be reported to the safety committee for review at least once a year.			
20. Archaeological sites and Historical	• Strictly comply with environmental impact prevention and resolution measures for air quality, noise and vibration throughout the operation phase of the project. • Strictly comply with the environmental impact prevention and resolution measures for occupational health and safety throughout the operation phase of the project. • Before initiating operations, coordinate with the abbots of various temples including the caretakers of other religious places located in the area that may be affected by the wake vortex from the take-off and landing of the aircrafts, to carry out inspections of the current condition and stability of important buildings within each religious site and renovate them to be strong and stable (in case of necessity, especially the old ordination hall in Wat Sombun Naram, including the old ordination hall and the aged wooden monastic dwelling in Wat Chak Mak. • Strictly comply with environmental impact prevention and resolution measures for vibration (caused by wake vortex) from the project • Before initiating operations, coordinate with the abbots of Wat Sombun Naram and Wat Chak Mak, including the other religious places, to carry out inspections of the current condition and stability of old buildings within the temple areas that can be considered archaeological sites, and renovate	The area of U-Tapao International Airport, sensitive areas and communities surrounding U-Tapao International Airport	throughout the project life.	EECO

Table 7.4-2 Environmental Impact Prevention And Resolution Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Environmental Impact Prevention and Resolution Measures	Operation Area	Duration of implementation	Responsible parties
	them to be strong and stable as necessary and suitable.			

7.5 Environmental Impact Monitoring Measures

The project summarizes environmental impact monitoring measures in various fields, in compliance with the measures proposed in the project's environmental action plan, as follows:

Construction Phase

1. Noise
2. Vibration
3. Air quality
4. Surface water hydrology
5. Surface water quality
6. Marine water quality
7. Aquatic ecology
8. Waste and wastewater management
9. Transportation
10. Drainage and flooding prevention systems
11. Socioeconomic
12. Health and Public Health
13. Occupational health and safety

Operation phase

1. Noise
2. Vibration
3. Air quality
4. Soil resources
5. Surface water hydrology
6. Surface water quality
7. Marine water quality
8. Terrain ecology
9. Aquatic ecology
10. Waste and wastewater management
11. Land use
12. Transportation
13. Drainage and flooding prevention systems
14. Socioeconomic
15. Resettlement and replacement of assets
16. Health and Public Health
17. Occupational health and safety
18. Archaeological and historical sites

Details are provided in **Table 7.5-1** and **Table 7.5-2**

Table 7.5-1 environmental Impact Monitoring Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the construction phase

Environmental elements	Monitoring Index	Monitoring method	Monitoring area	Frequency	Responsible parties
1. Noise	• 1-hour average noise level ($L_{eq\ 1\ hr}$) • 24-hour average noise level ($L_{eq\ 24\ hr}$) • Night time and day time average noise level (L_{dn}) • Maximum noise level (L_{max}) • 90th percentile noise level (L_{90}) • Noise disturbance level	• Monitor the noise level in general.	Numbering 2 stations, namely • Early Childhood Daycare, RTN 6, Royal Thai Naval Air Division • Eastern-Nong Muang Community (See **Table 7.3-1** and **Figure 7.3-1**)	• monitoring for 24 hours over 7 consecutive days. • Conducted once a month during project construction.	RTN and EECO
2. Vibration	• Peak velocity of particles • Frequency	• Monitor vibration in community areas.	Numbering 2 stations, namely • Early Childhood Daycare, RTN 6, Royal Thai Naval Air Division • Eastern-Nong Muang Community (See **Table 7.3-1** and **Figure 7.3-1**)	• monitoring for 24 hours over 7 consecutive days. • Conducted once a month when construction is close to the sensitive areas and communities	RTN and EECO
3. Air quality	• 24-hour average total suspended particulates (TSP) • 24-hour average particulate matter with a diameter of less than 10 microns (PM10) • 24-hour average particulate matter with a diameter of less than 2.5 microns (PM2.5) • 1-hour average nitrogen dioxide (NO2)	• Monitor general atmospheric air quality	Numbering 2 stations, namely • Early Childhood Daycare, RTN 6, Royal Thai Naval Air Division • Eastern-Nong Muang Community (See **Table 7.3-1** and **Figure 7.3-1**)	• monitoring for 24 hours over 7 consecutive days. • Conducted once a month during construction periods.	RTN and EECO

Table 7.5-1 environmental Impact Monitoring Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the construction phase

Environmental elements	Monitoring Index	Monitoring method	Monitoring area	Frequency	Responsible parties
	• 1-hour average and 8-hour average carbon monoxide (CO) • 3-hour average non-methane hydrocarbon (NMHC) • 1-hour average total hydrocarbon (THC) • 24-hour average volatile organic compounds (VOCs) • Wind speed and wind direction (WS/WD)				
4. Surface water hydrology	• Water level, water flow direction, shallow level	• Monitor drainage lines and drainage canals, especially in areas near the construction area.	• Drains and drainage canals near the construction area	• Conducted once a year before the rainy season throughout the construction phase.	RTN and EECO
5. Surface water quality	25 indexes of surface water quality: **1) Physical** • Water temperature • Transparency • Turbidity • Conductivity • Salinity **2) Chemical** • Acidity and alkalinity (pH) • Dissolved oxygen (DO) • BOD	• Monitor surface water quality in the project area and use monitoring methods that comply with Announcement No. 8 from the National Environment Board (1994) Re: Determination of Surface Water Quality Standards.	Surface water sources in the project area, 4 locations: • W1 : Khlong Bang Phai, above the water discharge point • W2 : Khlong Bang Phai, below water discharge point • W3 : Khlong Bang Phai, sea discharge point	• Conducted once a month throughout the construction period	RTN and EECO

Table 7.5-1 environmental Impact Monitoring Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the construction phase

Environmental elements	Monitoring Index	Monitoring method	Monitoring area	Frequency	Responsible parties
	• Suspended solid (SS) • Total dissolved solids (TDS) • Fat, oil and grease • Nitrate (NO_3) in nitrile unit • Phosphate-phosphorus • Arsenic (As) • Manganese (Mn) • Total mercury (Total Hg) • Zinc (Zn) • Cadmium (Cd) • Copper (Cu) • Nickel (Ni) • Chromium hexavalent (Cr6+) • Lead (Pb) • Chromium (Cr) **3) Biological** • Total coliform bacteria • Fecal coliform bacteria		• W4 : Khlong Phala (See **Table 7.3-5** and **Figure 7.3-5**)		
6. Marine water quality	25 indexes of marine water quality: **1. Physical** • Water temperature • Transparency • Turbidity • Conductivity • Salinity **2. Chemical** • Acidity and alkalinity (pH)	• Monitor and assess seawater quality in the project area and use monitoring methods that comply with Announcement of the National Environment Board Re: Determination of Seawater Quality Standards (announced in the Government Gazette on 6 October 2021).	Sources of seawater in the project area, 6 locations: • SW1 : South of Runway 1, 300 meters from the shore • SW2 : South of Runway 2, 300 meters from the shore	• Conducted once a month throughout the construction period	RTN and EECO

Table 7.5-1 environmental Impact Monitoring Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the construction phase

Environmental elements	Monitoring Index	Monitoring method	Monitoring area	Frequency	Responsible parties
	• Dissolved oxygen (DO) • BOD • Suspended solid (SS) • Total dissolved solids (TDS) • Fat, oil and grease • Nitrate (NO_3) in nitrile unit • Phosphate-phosphorus • Arsenic (As) • Manganese (Mn) • Total mercury (Total Hg) • Zinc (Zn) • Cadmium (Cd) • Copper (Cu) • Nickel (Ni) • Chromium hexavalent (Cr^{6+}) • Lead (Pb) • Chromium (Cr) **3) Biological** • Total coliform bacteria • Fecal coliform bacteria		• SW3 : Southeast of Runway 2, 300 meters from the shore • SW4: Southeast of Runway 1, 500 meters from the shore • SW5 : South of Runway 2, 500 meters from the shore • SW6 : Southeast of Runway 2, 500 meters from the shore (See **Table 7.3-6** and **Figure 7.3-6**)		
7. Aquatic ecology	1) Aquatic ecology in surface water bodies • Phytoplankton, zooplankton, benthic animals, fish and aquatic plants 2) Marine Ecology • Phytoplankton, zooplankton, benthic animals and record occurrence/nonoccurrence of rare	• Survey the aquatic ecology of surface water sources in the project area. • Survey the marine ecology in the project area. • Survey rare marine animals in the project area.	Sources of water in the project area, as follows: **1) Surface water** 4 locations: • W1 : Khlong Bang Phai, above the water discharge point	• Conducted twice a year (during rainy season and dry season) throughout the duration of the project.	RTN and EECO

Table 7.5-1 environmental Impact Monitoring Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the construction phase

Environmental elements	Monitoring Index	Monitoring method	Monitoring area	Frequency	Responsible parties
	marine animals, such as dugongs, dolphins, whales, sea turtles, etc., that frequent the area.	• Survey the abundance of seagrass on the southern coast of the airport. • Observe and record frequenting of dugongs in the seagrass deposits on the southern coast of the airport.	• W2 : Khlong Bang Phai, below water discharge point • W3 : Khlong Bang Phai, sea discharge point • W4 : Khlong Phala (See **Table 7.3-5** and **Figure 7.3-5**) **2) Marine water** 6 locations: • SW1: South of Runway 1, 300 meters from the shore • SW2: South of Runway 2, 300 meters from the shore • SW3 : Southeast of Runway 2, 300 meters from the shore • SW4: Southeast of Runway 1, 500 meters from the shore • SW5: South of Runway 2, 500 meters from the shore • SW6: Southeast of Runway 2, 500 meters		

Table 7.5-1 environmental Impact Monitoring Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the construction phase

Environmental elements	Monitoring Index	Monitoring method	Monitoring area	Frequency	Responsible parties
			from the shore (See **Table 7.3-6** and **Figure 7.3-6**)		
8. Waste and wastewater management	**1) Solid waste** • General solid waste volume • Construction solid waste volume • Hazardous solid waste volume	• Keep record of the volumes of solid waste and hazardous waste collected and stored each day	• Construction area • Construction Control Office • Workers' living quarters	• Prepare monthly summary reports throughout the construction period	RTN and EECO
	2) Wastewater • Acidity and alkalinity (pH) • BOD • Suspended solids • Sulfide • Total dissolved solid • Settleable solids • Fat, oil and grease • TKN	• Measure and analyze effluent discharge quality that has been treated by the wastewater treatment systems, using the methods of measurement and analysis according to the Ministry of Natural Resources and Environment's Notification Re: determination of standard for the control of effluent discharge from certain types and sizes of buildings 2005 or the latest version of the notification.	• Drainage point in the construction control office area, all locations • Drainage point at the site of construction workers' quarters, all locations	• Every month throughout the construction period	RTN and EECO
9. Transportation	**1) Traffic on the main road networks around U-Tapao International Airport** • The type and volume of traffic on an hourly basis, according to main access routes around U-Tapao International	• Survey traffic volume to assess traffic conditions and road performance on the main access routes around U-Tapao International Airport.	Road networks that are main access routes around U-Tapao International Airport, namely:	• Round-the-clock for 2 days, one on a weekend and another on a week day. Such	RTN and EECO

Table 7.5-1 environmental Impact Monitoring Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the construction phase

Environmental elements	Monitoring Index	Monitoring method	Monitoring area	Frequency	Responsible parties
	Airport.		• Highway 3 • Highway 331 • Highway 332 • Highway 3126	survey will be conducted 3 times a year throughout the construction period.	
	2) Traffic entering and exiting the construction area • The type and volume of hourly traffic according to the access routes to and from the construction area.	• Keep record of the type and traffic volume in and out of the construction area.	• Access point to construction area	• Keep daily record of and submit monthly summary reports throughout the construction period.	RTN and EECO
	3) Occurrence of Incidents • Number of road accidents according to cause, severity and damage incurred	• Collect traffic accident statistics on internal roads in U-Tapao International Airport and the main access routes around U-Tapao International Airport from contractors.	The internal roads within U-Tapao International Airport and the main routes around U-Tapao International Airport are: • Internal roads within U-Tapao International Airport • Highway 3 • Highway 331 • Highway 332 • Highway 3126	• Keep daily record and submit monthly summary reports	RTN and EECO
	• Water level, runoff flow direction, depth or shallowness of the canal,	• Check the water drainage canals within the U-Tapao International	• Drainage canals within U-Tapao International	• Conducted once a month	RTN and EECO

Table 7.5-1 environmental Impact Monitoring Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the construction phase

Environmental elements	Monitoring Index	Monitoring method	Monitoring area	Frequency	Responsible parties
10. Drainage system and protection against flooding	sediment buildup volume	Airport to ensure their drainage efficiency at all time.	Airport near the construction area	throughout the construction period	
	• Data from the results of the draining efficiency inspection	• Collect data on results of inspection to check drainage efficiency of drainage canals within U-Tapao International Airport.	• Drainage canals within U-Tapao International Airport near the construction area	• Every 6 months throughout the construction period	RTN and EECO
11. Socioeconomic <u>**Pre-construction phase**</u>	• Information about socioeconomic conditions, information on community's environmental conditions and current commuting patterns, knowledge of the project information, opinions and suggestions relating to the project, and preparation of monitoring reports and summary of issues and recommendations for submission to the project owners.	• Compile affected household data and create a database of residential housing and survey opinion of target groups with the questionnaires.	• The area within a distance of not less than 6 kilometers to the east and west, and not less than 10 kilometers to the north and south of the U-Tapao International Airport's perimeter. <u>Target population</u> • Community leaders, executives of local administrative organizations, residents living around the airport area, covering area up to not less than 6 kilometers to the east and west, and not less than 10 kilometers to	• Once before construction of the project	RTN and EECO

Table 7.5-1 environmental Impact Monitoring Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the construction phase

Environmental elements	Monitoring Index	Monitoring method	Monitoring area	Frequency	Responsible parties
			the north and south of the airport's perimeter.		
Construction Phase	• Conduct opinion survey on economic, social, environmental conditions and changes caused by the project activities. The survey will target community leaders, vulnerable groups, agencies and business operators an area up to not less than 6 kilometers to the east and west, and up to not less than 10 kilometers to the north and south of the U-Tapao International Airport's perimeter. • Collect all complaints/suggestions/comments of members of the public on all issues filed through various channels, resolve problems, and prepare a monthly summary report. • Monitor and examine the rules aimed at preventing workers from causing any impacts to the communities where they live, including penalties for those who do not follow the rules at least once a month to ensure effectiveness of such rules in preventing such impacts.	• Surveys of the opinion of people, local agencies, community leaders and business operators through questionnaire, consisting of: - Information on economic and social conditions - Information on the community's environmental conditions and current commuting patterns - Awareness of information about the project - Impact of construction activities - Implement preventive measures and resolving impacts in the construction phase of the project - Comments and suggestions on the project	• The area within a distance of not less than 6 kilometers to the east and west, and not less than 10 kilometers to the north and south of the U-Tapao International Airport's perimeter.	• Once before construction of the project	RTN and EECO

Table 7.5-1 environmental Impact Monitoring Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the construction phase

Environmental elements	Monitoring Index	Monitoring method	Monitoring area	Frequency	Responsible parties
12. Health and Public Health	**1) Social fabric of the community/life and property safety** • Workers' dossier	• Create workers' dossier	• Construction workers' living quarters and construction control office of the project.	• Once a year throughout the construction period.	RTN and EECO
	2) Accidents • Keep record of transport accident complaints.	• Keep record of all public complaints/suggestions/comments filed through various channels. Analyze and prepare a summary report on a monthly basis.	• Communities around the project area.	• Update monthly throughout the construction period.	RTN and EECO
	3) Adequacy and access to health services systems, including personnel and medical supplies • Summarize details of activities implemented in coordination with public health authorities.	• Keep record of and summarize the activities implemented in coordination with public health authorities.	• Public health authorities near the project construction area	• Throughout the construction period.	RTN and EECO
13. Occupational health and Safety	**1) Sanitation at construction workers' living quarters** • Keep record of training programs for workers on hygiene and prevention of disease, personal conduct to avoid creating nuisance, stay away from illicit drugs and promote work safety. • Keep record of sanitation inspections of living quarters regarding solid waste, wastewater management. • Keep record of accident statistics, including causes of accidents, accident	• Keep record of training programs for workers on hygiene and prevention of disease, personal conduct to avoid creating nuisance, stay away from illicit drugs and promote work safety. • Keep record of sanitation inspections of the living quarters. • Keep record of causes of accidents, accident sites, severity and solutions.	• Construction area of the project	• Twice a year throughout the construction period.	RTN and EECO

Table 7.5-1 environmental Impact Monitoring Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the construction phase

Environmental elements	Monitoring Index	Monitoring method	Monitoring area	Frequency	Responsible parties
	sites, severity and solutions.				
	2) Work-related accidents • Summary of Occupational Health and Safety and Work Environment Management Performance	• Compile annual summary reports on the performance of management of occupational health, safety management and work environment.	• Work area	• Once a year throughout the construction period.	RTN and EECO

Table 7.5-2 environmental Impact Monitoring Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Monitoring Index	Monitoring method	Monitoring area	Frequency	Responsible parties
1. Noise	**1) Noise from aircrafts in general areas** • Noise level L_{AE} or SEL • 1-hour average noise level ($L_{eq\ 1\ hr}$) • 24-hour average noise level ($L_{eq\ 24\ hr}$) • Night time and day time noise level (L_{dn}) • Maximum noise level (L_{max}) • 90th percentile noise level (L_{90}) • Aircraft noise level in community areas (average day-night noise level)	• Measure noise from aircrafts in general areas and record the monitoring results. • Collect and summarize the noise level monitoring results from aircraft noise monitoring stations in all general areas. • Report the monitoring results from every monitoring site and disclose the monitoring results to the public via websites, etc., and publicize the access channels to the public. • monitoring for 24 hours over 7 consecutive days.	**Temporary sound from aircraft monitoring stations** 4 locations, namely: • Ban Khlong Bang Phai Subdistrict Health Promotion Hospital • Center for the Development of Quality of Life for the Elderly, Sam Nak Thon Subdistrict Administrative Organization • Ban Khao Khrok Subdistrict Health Promotion Hospital • Wat Samnak Kathon School (See**Table 7.3-2 Noise Monitoring** and**Figure 7.3-2 Noise Monitoring**)	• Continuously throughout the duration of the project. The results will be summarized and submitted to environmental impact assessment committee to compose reports on the implementation of environmental impact monitoring measures and submitted to authorizing agencies every 6 months.	EECO
	2) Noise from sources • Noise level L_{AE} or SEL • PNL (EPNL) noise level • 1-hour average noise level ($L_{eq\ 1\ hr}$) • 24-hour average noise level ($L_{eq\ 24\ hr}$)	• Monitor noise levels at the source from the runway area using automatic noise monitoring devices continuously for 24 hours to	**Permanent noise monitoring station** 7 locations, namely: • Southwest of Runway 1	Monitored continuously 24 hours a day throughout the duration of the	EECO

Table 7.5-2 environmental Impact Monitoring Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Monitoring Index	Monitoring method	Monitoring area	Frequency	Responsible parties
	• Night time and day time noise level (L_{dn}) • Maximum noise level (L_{max}) • 90th percentile noise level (L_{90}) • The noise level of airplanes in the community area. (Night time and day time average noise level)	monitor noise during aircraft takeoff and landing. • Record data, compile and summarize the noise monitoring results from the 7 permanent noise monitoring stations, and identify potential sources of noise that could cause impacts. • Have a system to record the aircraft noise monitoring results that is linked to the flight database. • Have real time reports on the monitoring results from every monitoring site and disclose the monitoring results to the public via websites, etc., and publicize the access channels to the public. • Have a work procedure record with a summary of the operation log sheet.	• Southeast of Runway 2 • Eastern-Nong Muang Community Health Service Center • Village No. 3, Ban Sa Kaeo, Sam Nak Thon Subdistrict Municipality • Wat Sombun Naram School (Tem Rat Memorial) • Village No. 2, Ban Chak Mak, Sam Nak Thon Subdistrict Municipality Village No. 13, Ban Nong Phakkut, Huai Yai Subdistrict Municipality (See**Table 7.3-2 Noise Monitoring** and**Figure 7.3-2 Noise Monitoring**)	project. • Continuously throughout the duration of the project. The results will be summarized and submitted to environmental impact assessment committee to compose reports on the implementation of environmental impact monitoring measures and submitted to authorizing agencies every 6 months.	
	3) Noise in community areas • Noise level L_{AE} or SEL • PNL (EPNL) noise level • 1-hour average noise level ($L_{eq\ 1\ hr}$)	• Use the noise level data from permanent noise monitoring stations linked to flight databases or from the results of	• Areas with complaints from the community due to impacts from noise.	• Whenever a complaint is received.	EECO

Table 7.5-2 environmental Impact Monitoring Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Monitoring Index	Monitoring method	Monitoring area	Frequency	Responsible parties
	• 24-hour average noise level ($L_{eq\ 24\ hr}$) • Night time and day time noise level (L_{dn}) • Maximum noise level (L_{max}) • 90th percentile noise level (L_{90}) • The noise level of airplanes in the community area. (Night time and day time average noise level)	measurements taken for 24 hours over 7 consecutive days from mobile unit monitoring devices. • Prepare an annual report on complaint management outcomes which contains complaint statistics, corrective action, and analysis and planning to reduce impacts for submission to the Civil Aviation Authority of Thailand (CAAT) once a year by 31 January of each year.			
	4) Noise from real flight situations • Prepare a summary of the noise contour maps • Assess the impact of noise in NEF or L_{dn} units • Record data, compile and summarize the noise monitoring results from all permanent noise monitoring stations.	• Prepare a summary of the noise contour maps in NEF or L_{dn} units each year. • Assess the impact of noise in NEF or L_{dn} units from evaluations using mathematical programs. Use real annual flight data and information on flights and aircraft types from the Automatic Dependent Surveillance Broadcast (ADS-B) system linked to data from the permanent noise monitoring station system. If it is found that there are more areas impacted by noise in addition to those that have received compensation,	• Areas affected by noise.	• Once a year throughout the duration of the project.	EECO

Table 7.5-2 environmental Impact Monitoring Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Monitoring Index	Monitoring method	Monitoring area	Frequency	Responsible parties
		conduct surveys and provide compensation for those affected as soon as possible. • Record data, compile and summarize the noise monitoring results from all permanent noise measurement stations, and identify potential sources of noise that could cause impacts.			
2. Vibration	• Peak velocity of particles • Frequency	• Monitor vibration in community areas. • Record monitoring results. • Compile and summarize the vibration monitoring results from all monitoring stations. • Report the monitoring results from every monitoring site and disclose the monitoring results to the public via websites, etc., and publicize the access channels to the public.	**Vibration monitoring stations** 4 locations, namely: • Ban Khlong Bang Phai Subdistrict Health Promotion Hospital • Center for the Development of Quality of Life for the Elderly, Sam Nak Thon Subdistrict Administrative Organization • Ban Khao Khrok Subdistrict Health Promotion Hospital • Wat Samnak Kathon School	• monitoring for 24 hours over 7 consecutive days. • Twice a year, throughout the duration of the project. The results will be summarized and submitted to environmental impact assessment committee to compose reports on the implementation of environmental	EECO

Table 7.5-2 environmental Impact Monitoring Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Monitoring Index	Monitoring method	Monitoring area	Frequency	Responsible parties
			(See**Table 7.3-*2*** and**Figure 7.3-3 Vibration Monitoring)**	impact monitoring measures and submitted to authorizing agencies every 6 months.	
3. Air quality	**1) General Atmospheric Air Quality** • 24-hour average total suspended particulates (TSP) • 24-hour average particulate matter with a diameter of less than 10 microns (PM_{10}) • 24-hour average particulate matter with a diameter of less than 2.5 microns ($PM_{2.5}$) • 1-hour average and 8-hour average carbon monoxide (CO) • 1-hour average nitrogen dioxide (NO_2) • 1-hour average total hydrocarbon (THC) • Wind direction and wind speed (WD/WS)	• Monitor general atmospheric air quality for 24 hours over 7 consecutive days.	Monitor general atmospheric air quality 5 locations, namely: • Ban Khao Khrok Subdistrict Health Promotion Hospital • Wat Sombun Naram School (Tem Rat Memorial) • Wat Samnak Kathon School • Village No. 2, Ban Chak Mak, Sam Nak Thon Subdistrict Municipality • Village No. 13, Ban Nong Phakkut, Huai Yai Subdistrict Municipality **Table 7.3-** 3 and**Figure 7.3-*4***)	• 2 times a year throughout the duration of the project.	EECO

Table 7.5-2 environmental Impact Monitoring Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Monitoring Index	Monitoring method	Monitoring area	Frequency	Responsible parties
	2) Air Quality Monitoring Systems • Particulates smaller than 10 microns (PM_{10}) 24-hour average and 1-year average • Particulates smaller than 2.5 microns ($PM_{2.5}$) 24-hour average and 1-year average • 1-hour average and 8-hour average carbon monoxide (CO) • 1-hour average and 1-year average nitrogen oxide (NO_2) • 24-hour average volatile organic compounds (VOCs)* • Wind direction and wind speed (WD/WS) **Notes : *** - Conduct monitoring for volatile organic compounds (VOCs) in the atmosphere with analysis parameters, sampling methods, and assessment in accordance with the Pollution Control Department Announcement Re: Determination of Surveillance Values for Volatile Organic Compounds in the General Atmosphere within 24 Hours dated	• Install automated air quality monitoring stations and monitor general atmospheric air quality for surveillance.	Air quality monitoring stations, 4 locations, namely: • Southwest of Runway 1 • Southeast of Runway 2 • Eastern-Nong Muang Community Health Service Center • Ban Khlong Bang Phai Subdistrict Health Promotion Hospital (seeTable 7.3-**4** and **Figure 7.3-*4***)	• Continuously throughout the duration of the project. The results will be summarized and submitted to environmental impact assessment committee to compose reports on the implementation of environmental impact monitoring measures and submitted to authorizing agencies every 6 months. • For VOC_S specifically, monitoring will be conducted 2 ties a year in	EECO

Table 7.5-2 environmental Impact Monitoring Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Monitoring Index	Monitoring method	Monitoring area	Frequency	Responsible parties
	18 December 2008 or the latest version or other relevant laws for use as guidelines for managing air pollution issues and to reduce public health risks arising from U-Tapao International Airport operations. - Record the environmental conditions, such as the number of cars, motorcycles, and airplanes at the time of each measurement to support analysis to find the cause of increased compounds.			April (representing the hot season) and December (representing the cold season) continuously throughout the duration of the project or consider flight statistics during peak flight hours for 3 retrospectives and compose a report on compliance with environmental impact monitoring measures for submission to authorizing agencies every 6 months.	
4. Soil Resources	• Height of runway and taxiway surfaces	• Monitor soil subsidence for	• Runway and taxiway 2	• Once a year	EECO

Table 7.5-2 environmental Impact Monitoring Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Monitoring Index	Monitoring method	Monitoring area	Frequency	Responsible parties
	and height of fixed horizontal and vertical control reference pins	Runway and Taxiway 2 by surveying the height of surfaces and height of fixed horizontal and vertical control reference pins.	surface and the airport apron.	throughout the duration of the project.	
5. Surface water hydrology	• Water level • Water flow pattern	• Compile data on water levels and water flow patterns in drainage channels and canals surrounding U-Tapao International Airport from the Royal Irrigation Department or related agencies and analyze the efficiency of such drainage canals. Prepare a report on the monitoring results, and summarize problems and provide suggestions.	• Drains and canals around U-Tapao International Airport	• Conducted once a year during the rainy season, throughout the duration of the project.	EECO
6. Surface water quality	25 indexes of marine water quality: **1) Physical** • Water temperature • Transparency • Turbidity • Conductivity • Salinity **2) Chemical** • Acidity and alkalinity (pH) • Dissolved oxygen (DO) • BOD • Suspended solid (SS) • Total dissolved solids (TDS)	• Monitor and assess surface water quality in the project area and use monitoring methods that comply with Announcement No. 8 from the National Environment Board (1994) Re: Determination of Surface Water Quality Standards.	Surface water sources in the project area, 4 locations: • W1 : Khlong Bang Phai, above the water discharge point • W2 : Khlong Bang Phai, below water discharge point • W3 : Khlong Bang Phai, sea discharge point • W4 : Khlong Phala	• Conducted every 4 months for the first 2 years and every 6 months (during rainy season and dry season) in the following year throughout the duration of the project.	EECO

Table 7.5-2 environmental Impact Monitoring Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Monitoring Index	Monitoring method	Monitoring area	Frequency	Responsible parties
	• Fat, oil and grease • Nitrate (NO_3) in nitrile unit • Phosphate-phosphorus • Arsenic (As) • Manganese (Mn) • Total mercury (Total Hg) • Zinc (Zn) • Cadmium (Cd) • Copper (Cu) • Nickel (Ni) • Chromium hexavalent (Cr^{6+}) • Lead (Pb) • Chromium (Cr) **3) Biological** • Total coliform bacteria • Fecal coliform bacteria		(See **Table 7.3-5** and **Figure 7.3-5**)		
7. Marine water quality	**Monitor and assess seawater quality in the project area** 25 indexes of marine water quality, namely: **1) Physical** • Water temperature • Transparency • Turbidity • Conductivity • Salinity **2) Chemical**	• Monitor and assess seawater quality in the project area and use monitoring methods that comply with Announcement of the National Environment Board Re: Determination of Seawater Quality Standards (announced in the Government Gazette on 6 October 2021).	Sources of marine water in the project area, 6 locations: • SW1: South of Runway 1, 300 meters from the shore • SW2: South of Runway 2, 300 meters from the shore • SW3 : Southeast of Runway 2, 300 meters	• Conducted every 4 months for the first 2 years and every 6 months (during rainy season and dry season) in the following year throughout the duration of the project.	EECO

Table 7.5-2 environmental Impact Monitoring Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Monitoring Index	Monitoring method	Monitoring area	Frequency	Responsible parties
	• Acidity and alkalinity (pH) • Dissolved oxygen (DO) • BOD • Suspended solid (SS) • Total dissolved solids (TDS) • Fat, oil and grease • Nitrate (NO_3) in nitrile unit • Phosphate-phosphorus • Arsenic (As) • Manganese (Mn) • Total mercury (Total Hg) • Zinc (Zn) • Cadmium (Cd) • Copper (Cu) • Nickel (Ni) • Chromium hexavalent (Cr^{6+}) • Lead (Pb) • Chromium (Cr) **3) Biological** • Total coliform bacteria • Fecal coliform bacteria		from the shore • SW4: Southeast of Runway 1, 500 meters from the shore • SW5: South of Runway 2, 500 meters from the shore • SW6 : Southeast of Runway 2, 500 meters from the shore (See **Table 7.3-6** and **Figure 7.3-6**)		
	In the water samples **:** the 34 indexes are: **1) Physical** • Temperature • Color • Odor • Total dissolved solids (TDS)	• Monitor and assess water quality and soil sedimentation to check quality before discharge into the sea.	• Inside of Pond No. 1 • Inside of Pond No. 2 • Pre-release to Sea Water Drainage Channel The details of the monitoring station are	• Conducted every 4 months for the first 2 years and every 6 months (during rainy season and dry	EECO

Table 7.5-2 environmental Impact Monitoring Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Monitoring Index	Monitoring method	Monitoring area	Frequency	Responsible parties
	• Total suspended solids (TSS) **2) Chemical** • Acidity and alkalinity (pH) • BOD • COD • Sulfide • Cyanide • Fat, oil & grease • Formaldehyde • Zinc • Chromium hexavalent (Cr^{6+}) • Chromium trivalent (Cr^{3+}) • Arsenic • Copper • Mercury • Cadmium • Phenols • Free chlorine • Pesticides • TKN • Fluoride • Surfactant • Barium • Selenium • Lead • Nickel • Manganese		shown in **Table 7.3-7** and**Figure 7.3-7**	season) in the following year throughout the duration of the project.	

Table 7.5-2 environmental Impact Monitoring Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Monitoring Index	Monitoring method	Monitoring area	Frequency	Responsible parties
	• Silver • Total iron **3) Biological** • Total coliform bacteria • Fecal coliform bacteria in the sediment samples : the 9 indices are: • Lead (Pb) • Chromium (Cr) • Cadmium (Cd) • Total mercury (Total Hg) • Copper (Cu) • Manganese (Mn) • Nickel (Ni) • Zinc (Zn) • Arsenic (As)				
8. Terrain ecology	• Accident statistics, types and number of birds, and related aircraft types.	• Compile data on various accidents using the ICAO bird strike report form and assess which type of bird causes the most disturbances by observing the characteristics of the feathers stuck to aircrafts. In the event that there is flock of birds in U-Tapao International Airport that may pose flight dangers, it is necessary to	• U-Tapao International Airport area	• Record bird strikes on a daily basis and report accidents to CAAT every 3 months. Also prepare a report on the implementation of measures	EECO

Table 7.5-2 environmental Impact Monitoring Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Monitoring Index	Monitoring method	Monitoring area	Frequency	Responsible parties
		implement a bird control plan.		twice a year throughout the duration of the project.	
	• Diversity of flora and fauna surveyed in the U-Tapao International Airport area.	• Survey the diversity of flora and fauna in the area surrounding U-Tapao International Airport, covering at least the dry season, rainy season, and bird migration season.	• U-Tapao International Airport area	• Conducted twice a year throughout the duration of the project, covering the dry season, rainy season, and bird migration season.	EECO
	• Types and number of various birds found in the U-Tapao International Airport area.	• Record statistics on various types of birds on a daily basis.	• U-Tapao International Airport area	• Conducted daily with monthly and annual outcome assessments throughout the duration of the project.	EECO
9. Aquatic ecology	**1) Aquatic ecology in surface water bodies** • Phytoplankton, zooplankton, benthic animals, fish and aquatic plants **2) Marine Ecology** • Phytoplankton, zooplankton, benthic	• Survey the aquatic ecology of surface water sources in the project area. • Survey the marine ecology in the project area. • Survey rare marine animals in the	Sources of water in the project area, as follows: **1) Surface water** 4 locations: • W1 : Khlong Bang Phai, above the water	• Implemented 2 times a year (during the rainy and dry seasons) throughout the project life.	EECO

Table 7.5-2 environmental Impact Monitoring Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Monitoring Index	Monitoring method	Monitoring area	Frequency	Responsible parties
	animals and record occurrence/nonoccurrence of rare marine animals, such as dugongs, dolphins, whales, sea turtles, etc., that frequent the area.	project area. • Survey the abundance of seagrass on the southern coast of the airport. • Observe and record frequenting of dugongs in the seagrass deposits on the southern coast of the airport.	discharge point • W2 : Khlong Bang Phai, below water discharge point • W3 : Khlong Bang Phai, sea discharge point • W4 : Khlong Phala (See **Table 7.3-5** and **Figure 7.3-5**) **2) Marine water** 6 locations: • SW1: South of Runway 1, 300 meters from the shore • SW2 : South of Runway 2, 300 meters from the shore • SW3 : Southeast of Runway 2, 300 meters from the shore • SW4: Southeast of Runway 1, 500 meters from the shore • SW5: South of Runway 2, 500 meters from the shore • SW6 : Southeast side of		

Table 7.5-2 environmental Impact Monitoring Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Monitoring Index	Monitoring method	Monitoring area	Frequency	Responsible parties
			the 2nd runway, distance from the coast 500 meters (see **Table 7.3-6** and**Figure 7.3-6**)		
10. Waste and wastewater management	**1) Solid waste management** • The types or categories and volumes of general solid waste, infectious waste, and hazardous waste	• Record the volumes of solid waste and hazardous waste collected each day and prepare a monthly summary report so that it can be checked.	• U-Tapao International Airport area	• Daily and prepare monthly summary reports throughout the project life	EECO
	• Conditions of container for solid waste • Container placement areas	• Prepare a register of containers for each type of waste to determine the number of containers that are in working order	• U-Tapao International Airport area	• Once a month, throughout the project life	EECO
	• Documentation for solid waste and infectious waste, and manifest for the transportation of hazardous waste	• Review the operations of the ultimate operator of the solid waste and hazardous waste disposal and prepare a report so that it can be audited	• U-Tapao International Airport area	• 2 times a year throughout the duration of the project.	EECO
	2) Wastewater management wastewater quality : the 16 indices are: • Temperature • Acidity and alkalinity (pH) • COD • BOD • Total dissolved solid • Suspended solids • Fat, oil and grease	• Measure and analyze effluent discharge quality that has been treated by the wastewater treatment systems of U-Tapao International Airport, using the methods of measurement and analysis according to the Ministry of Industry's Notification No. 2 (1996) Re: determination of	• Wastewater collection point before entering the treatment system, 1 location • Drainage point from central wastewater treatment system, 1 location	• Once a month, throughout the project life	EECO

Table 7.5-2 environmental Impact Monitoring Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Monitoring Index	Monitoring method	Monitoring area	Frequency	Responsible parties
	• TKN • Lead (Pb) • Chromium (Cr) • Cadmium (Cd) • Mercury (Hg) • Copper (Cu) • Manganese (Mn) • Free chlorine • Chloride	characteristics of effluent discharged from the factory, and Ministry of Natural Resources and the Environment's Notification Re: determination of standard for the control of effluent discharge from certain types and sizes of buildings (2005), or the latest version of the notification Re: determination of standard for the control of effluent discharge from certain types and sizes of buildings (type A). • According to the Notification of the Ministry of Natural Resources and Environment, Re: determination of standard for the control of effluent discharge from sources: industrial plants, industrial estates and industrial zones, dated 29 March 2016			
11. Land use	• Information on granting of building permits and land use patterns	• Collect and study statistical data on the granting of building permits by local authorities in areas surrounding U-Tapao International Airport. • Conduct on-location survey of	• The area surrounding U-Tapao International Airport, which is located no less than 6 kilometers east and west of U-Tapao	• Once a year throughout the duration of the project.	EECO

Table 7.5-2 environmental Impact Monitoring Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Monitoring Index	Monitoring method	Monitoring area	Frequency	Responsible parties
		land use to identify trend in land use patterns in order to update preventive measures and resolution of impact on land use.	International Airport, and no less than 10 kilometers north and south of the airport.		
12. Transportation	**1) Traffic on the main road networks around U-Tapao International Airport** • The type and volume of hourly traffic according to the arrival and departure routes.	• Collect data and survey traffic volume to assess traffic conditions and road performance on the main access routes around U-Tapao International Airport.	Road networks that are main access routes around U-Tapao International Airport, namely: • Internal roads of U-Tapao International Airport • Highway 3 • Highway 331 • Highway 332 • Highway 3126	• Round-the-clock for 2 days, one on a weekend and another on a week day. Such survey will be conducted once a year throughout the construction period.	EECO
	2) Inbound-outbound traffic at U-Tapao International Airport • The type and volume of hourly traffic according to inbound-outbound routes at U-Tapao International Airport.	• Record the type and volume of inbound-outbound traffic at U-Tapao International Airport.	• Arrival-departure routes at U-Tapao International Airport	• Round-the-clock for 2 days, one on a weekend and another on a week day. Such survey will be conducted once a year throughout the construction period.	EECO

Table 7.5-2 environmental Impact Monitoring Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Monitoring Index	Monitoring method	Monitoring area	Frequency	Responsible parties
	3) Statistics of users of mass transit and public transport systems to and from U-Tapao International Airport • The number of passengers of mass transmit and public transport systems on weekend and on week day	• Compile statistics of users of relevant mass transmit and public transport systems to and from U-Tapao International Airport.	• U-Tapao International Airport area	• Collect data monthly and prepare a summary report annually throughout the project life.	EECO
	4) Occurrence of Incidents • Number of road accidents according to cause, severity and damage incurred	• Collect accident data on the internal roads within U-Tapao International Airport and the main access routes around U-Tapao International Airport.	The internal roads within U-Tapao International Airport and the main routes around U-Tapao International Airport are: • Internal roads of U-Tapao International Airport • Highway 3 • Highway 331 • Highway 332 • Highway 3126	• Keep daily record and submit monthly summary reports throughout the project life	EECO
13. Drainage system and protection against flooding	• Water level data • Water flow pattern	• Compile water level measurements and flow patterns in the canals surrounding U-Tapao International Airport from Royal Irrigation Department or related agencies and analyze the drainage efficiency of the canals and prepare a report of monitoring	• Khlong Bang Phai • Khlong Phla	• Conducted once a year during the rainy season, throughout the duration of the project.	EECO

Table 7.5-2 environmental Impact Monitoring Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Monitoring Index	Monitoring method	Monitoring area	Frequency	Responsible parties
		results and summary of problems and recommendations.			
14. Socioeconomic	**1) Opinion survey on the impact of project activities on economic, social, environmental conditions, residents, community leaders, and sensitive areas through questionnaire** Asking people's opinions with a questionnaire consisting of • Information on economic and social conditions • Information on the community's environmental conditions and current commuting patterns • Awareness of information about the project • The impact of the project implementation • Implementing preventive measures and resolving impacts throughout operation phase of the project • Comments and suggestions on the project	• Analyze the questionnaire • To determine the sample size for the group in the NEF ≥ 40 area, by surveying all affected households that can be monitored and willing to provide information. For groups in the NEF 30 - 40 area and groups living around U-Tapao International Airport, determine the sample size as appropriate and under widely accepted social statistical standards. • Collect all complaints/suggestions/comments of members of the public on all issues filed through various channels and prepare a monthly summary report.	• Households, community leaders and sensitive areas in the NEF ≥ 40 area • Households, community leaders and sensitive areas in the NEF 30 - 40 area • The people around U-Tapao International Airport in the study area	• At least once a year throughout the project life	EECO
	2) Establishment of the U-Tapao International Airport impact relief fund and the development of people's quality of life fund	• Report on the implementation of the U-Tapao International Airport impact relief fund and the development of people's quality	• The area surrounding U-Tapao International Airport, covering area up to no less than 6	• Report the results of the funds' operations once every year	EECO

Table 7.5-2 environmental Impact Monitoring Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Monitoring Index	Monitoring method	Monitoring area	Frequency	Responsible parties
	• In the case that the funds are in the process of being set up: Report on the progress status of the funds' establishment. • In the case that the funds have already been established: Report on funds' operating results.	of life fund to monitor outcomes of the environmental impact mitigation.	kilometers east and west of U-Tapao International Airport, and no less than 10 kilometers north and south of the airport's perimeter.	throughout the project life. • Report on the monitoring committee's performance once every year throughout the project life.	
15. Resettlement and replacement of assets	• Information on granting of building permits and land use patterns	• Collect and study statistical data on the granting of building permits by local authorities in areas surrounding U-Tapao International Airport. • Conduct on-location survey of land use to identify trend in land use patterns in order to update preventive measures and resolution of impact on land use.	• The area surrounding U-Tapao International Airport, covering area up to no less than 6 kilometers east and west of U-Tapao International Airport, and no less than 10 kilometers north and south of the airport's perimeter.	• Once a year throughout the duration of the project.	EECO
16. Health and Public Health	**1) Noise pollution** **Noise level surveillance** • Number of complaints from the public filed through various channels of the project.	• Measure the noise level according to the index shown in the noise and vibration section. • Analyze and prepare monthly summary reports and provide clarification on impact resolution results.	• Area according to environmental measures regarding noise (details shown in the noise section).	• The same period as that of environmental impact monitoring measures regarding noise.	EECO

Table 7.5-2 environmental Impact Monitoring Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Monitoring Index	Monitoring method	Monitoring area	Frequency	Responsible parties
	<u>hearing ability tests for affected residents</u> • Residents' hearing ability test results.	• Monitor the hearing ability tests for affected residents living around U-Tapao International Airport to cover all groups of people who are affected by noise impact. • Analyze and prepare summary report	• Residents living in areas affected by noise impact from the operations of U-Tapao International Airport.	• Once a year throughout the duration of the project.	EECO
	<u>Establishment of funds</u> • In the case that the funds are in the process of being set up: Report on the progress status of the funds' establishment. • In the case that the funds have already been established: Report on funds' operating results. • Public communication plans/reports on overall environmental and health impact mitigation.	• Report on the operations of the environmental impact remedy fund and the fund for the development of quality of life in order to follow up on environmental and public health impact mitigation. • Review public communication plans/reports to provide overall environmental and healthcare oversight to enable members of the public to participate in the development of project's work plan or activities and to monitor the project's operations.	• Surrounding area of U-Tapao International Airport	• Report on the progress of the funds' establishment every 6 months. • Report the results of the funds' operations once every year throughout the project life. • Report of public communication activities every 6 months.	EECO
	2) Vibration • Information from complaints regarding impact caused by wake vortex turbulence from aircraft.	• Keep record of public complaints/suggestions/comments on issues relating to damage caused by wake vortex from aircraft filed through various	• Communities around the project area.	• Once a year throughout the duration of the project.	EECO

Table 7.5-2 environmental Impact Monitoring Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Monitoring Index	Monitoring method	Monitoring area	Frequency	Responsible parties
		communication channels. Analyze and prepare a summary report every month and provide clarification on impact resolutions and results.			
	3) Travel convenience (traffic flow) • Information from complaints received through various channels on traffic issues in community area or in the airport operation areas.	• Use method specified in the environmental impact monitoring measures regarding transportation during the operation phase. • Keep record of complaints/suggestions/comments from the public regarding traffic problems filed through various communication channels. Analyze and prepare a summary report every month, with clarification on resolutions and results.	• Communities around the project area.	• Once a year throughout the duration of the project.	EECO
	4) General communicable diseases (the main disease group transmitted through water- and food-borne pathogens, respiratory diseases, including viral epidemics, such as COVID-19) • Statistics on main disease group causing illnesses among the local population.	• Collect statistics on main disease group causing illnesses among the local population.	• Public health authorities near the project area.	• Once a year throughout the duration of the project.	EECO

Table 7.5-2 environmental Impact Monitoring Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Monitoring Index	Monitoring method	Monitoring area	Frequency	Responsible parties
	5) Public safety (road traffic and aviation accidents) • Information from complaints on public safety issues.	• Conduct preliminary analysis and summarize results of disaster management drills implemented in collaboration with the community. • Compile public complaints/suggestions/comments on public safety issues filed through various channels. Analyze and prepare a monthly summary report and provide clarification on resolutions and results. • Review the disaster prevention and relief plan and keep it up to date.	• Communities around the project area.	• Once a year throughout the duration of the project.	EECO
	6) Adequacy and access to health services systems, including personnel and medical supplies • Summarize details of activities implemented in coordination with public health authorities.	• Keep record of and summarize the activities implemented in coordination with public health authorities.	• Public health authorities near the project area.	• Once a year throughout the duration of the project.	EECO
	7) Dust and air pollution • Results of air quality measurements in the community area. • Number of complaints from the public filed through various channels	• Measure air pollution according to the index shown in the air quality section. • Compile public complaints/suggestions/comments on air pollution issues filed	• Area according to environmental measures for air quality	• Same period as environmental impact monitoring measures for air quality (details	EECO

Table 7.5-2 environmental Impact Monitoring Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Monitoring Index	Monitoring method	Monitoring area	Frequency	Responsible parties
		through various channels. Analyze and prepare a monthly summary report and provide clarification on resolutions and results.		shown in the air quality section)	
17. Occupational health and Safety	**1) Work environment (noise)** • Report on the results of hearing ability tests. • Report on the use of on-person noise measurement sensors, especially for employees working in the airside area. • Analyze the linkage between noise exposure and hearing ability. • Management plan in case abnormal hearing ability is detected. • Summary report on establishment of hearing health preservation project.	• Conduct measurements with noise sensors attached to person. • Conduct analysis on the linkage between noise exposure and workers' hearing ability test results to identify the likelihood of hearing loss for the preparation of statistical data. • Regularly monitor and update the management plan in case abnormal hearing ability is detected. • Review and follow up on the establishment of hearing health preservation project.	• Work area in the airside area and areas within the U-Tapao International Airport.	• Once a year throughout the duration of the project.	EECO
	2) Chemical materials in the work environment • Conduct additional chemical measurements using on-person measuring devices, especially on employees working in the airside area or at risk groups. • Provide health check up based on risk	• Use on-person chemical measurement devices in work area. • Analyze the linkage between exposure to chemical materials and employee's health • to determine likelihood of health impacts from exposure to	• Work area in the airside area and areas within the U-Tapao International Airport.	• Once a year throughout the duration of the project.	EECO follows the measures by supervising operators in the airside area and the area within U-Tapao International

Table 7.5-2 environmental Impact Monitoring Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Monitoring Index	Monitoring method	Monitoring area	Frequency	Responsible parties
	profiles. • Analyze linkage between levels of chemical exposure to personal health. • Evidence of submission of annual employees' health check by the contractor.	chemicals. • Supervise the contractor ensure the contractor submits employees' health check results to the EECO on a yearly basis.			Airport to comply with such measures.
	3) Work-related accidents <u>Accidents</u> • Causes of accidents analysis report. • Report showing accident statistics and analysis results of accident trends. • Develop a plan to prevent and reduce work-related accidents. • Provide health check up based on risk profiles.	• Analyze the cause of the accident • Prepare accident statistics • Analyze accident trends for use in developing appropriate accident prevention guidelines. • Supervise the contractor ensure the contractor submits accident statistics to the EECO on a yearly basis.	• Work area in the airside area and areas within the U-Tapao International Airport.	• Once a year throughout the duration of the project.	EECO follows the measures by supervising operators in the airside area and the area within U-Tapao International Airport to comply with such measures.
	<u>Management</u> • Summary of Occupational Health and Safety and Work Environment Management Performance	• Compile annual summary reports on the performance of management of occupational health, safety management and work environment.	• Work area within U-Tapao International Airport	• Once a year throughout the duration of the project.	EECO follows the measures by supervising operators in the airside area and the area within U-Tapao International

Table 7.5-2 environmental Impact Monitoring Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Monitoring Index	Monitoring method	Monitoring area	Frequency	Responsible parties
					Airport to comply with such measures.
18. Archaeological and historical sites	When there is a claim of damage to the old buildings and other buildings within the 11 sites • Review damage • Renovate to be strong and stable as necessary and suitable	• If there is a complaint of damage to the old buildings or other important buildings within 11 sites, the project must investigate the damage that occurred. If the damage is caused by the take-off and landing of aircraft, the renovation must be made to maintain strength and stability, as necessary and appropriate, and it must be carried out throughout the life of the project.	11 places of worship, namely: • Admiral Prince Abhakara Kiartivongse Monument (Air Defense Artillery Battalion) • Phra Phuttha Nawikapiban Hall (Air Defense Artillery Battalion) • Phra Siam Devadhiraj Shrine (Air Defense Artillery Battalion) • Wat Sa Kaeo • Wat Sombun Naram • Ban Chang Abundant Grace Church • Wat Samnak Katon • Wat Suwan Rangsan, Wat Nong Bot • The Shrine of Luang Tia Chak Mak	• There have been claims of damage throughout the course of the project.	EECO

Table 7.5-2 environmental Impact Monitoring Measures, Runway and Taxiway 2 Construction Project, U-Tapao International Airport, during the operation phase

Environmental elements	Monitoring Index	Monitoring method	Monitoring area	Frequency	Responsible parties
			• Wat Chak Mak		

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