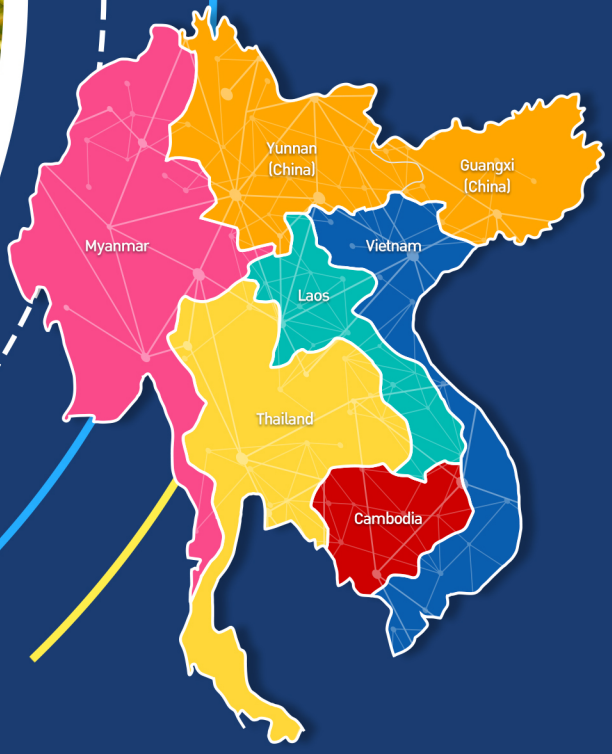
Office of Transport and Traffic Policy and Planning



A study on Developing a Model for Transportation Network Development in the Northeastern and Northern Provincial Clusters, Linked with Economic Corridor Areas under the GMS Framework to Support Economic and Tourism Development, Bangkok

Executive Summary Report

presented by

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Chapter 1

Introduction

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1. Introduction

1.1 Principles and Rationale

Currently, there is rapid economic growth along with transportation networks connected to Myanmar, Lao PDR, and Cambodia, which can conveniently link further to Vietnam and southern China. This is facilitated through economic corridors such as the Greater Mekong Subregion (GMS) Economic Cooperation Corridor, the East-West Economic Corridor (EWEC), and the North-South Economic Corridor (NSEC) along routes R9, R12, R3A, and R3B. As a result, the northern and northeastern regions serve as gateways linking the country's freight transportation and tourism.

The Cabinet, in its meeting on September 18, 2018, in Phetchabun Province, received directives from the Prime Minister to proceed with the development of the logistics system in the Northern and Northeastern Provincial Groups. This development included, for example, the improvement and development of the national highway network, airport development, and the development of the rail transport system. The Ministry of Transport was instructed to collaborate with relevant agencies to consider and expedite operations according to the necessary procedures.

At the Cabinet meeting held on December 13, 2018, in Nong Khai Province, the Cabinet acknowledged the results of a meeting that proposed studying the feasibility of investing in an integrated transport system for tourism and economic development in the Upper Northeastern Provincial Group 1 (Udon Thani, Loei, Nong Khai, Nong Bua Lamphu, and Bueng Kan). The Ministry of Transport was instructed to collaborate with relevant agencies to consider implementation based on urgency and necessity.

The Office of Transport and Traffic Policy and Planning (OTP) recognizes the necessity to develop a comprehensive model for the transportation network development in the northeastern and northern provincial clusters. This includes infrastructure, management, regulations, and facilitation measures to enhance the capacity to support the region's economic expansion, which connects to the country's main system and the subregion through the North-South and East-West Economic Corridors. Additionally, plans for transportation development in the area will be prepared to support production, services, trade, investment, tourism, and logistics systems, in alignment with national strategic development.

1.2 Project Objectives

1) To develop an overview and strategy for the development of transportation networks and logistics systems in the northeastern and northern provincial clusters, linking various modes of transport with economic corridor areas under the GMS framework and relevant international cooperation frameworks, in order to support economic and tourism development in accordance with the national strategic development timeline.

2) To establish a database for the development of transportation and traffic systems in the region, to support the integration of transportation infrastructure development at the national, regional, provincial cluster, and provincial levels, including connections with neighboring countries.

3) To develop an action plan for the development of transportation networks and logistics systems in the northeastern and northern provincial clusters, linked with economic corridor areas under the GMS framework, to support economic and tourism development during 2025–2037. This includes project plans, investment plans, and prioritization of transportation network and logistics system development in various transport modes within the northeastern and northern provincial clusters, connected to economic corridor areas under the GMS framework and relevant international cooperation frameworks, to support economic and tourism development in accordance with the national strategic development timeline.

4) To develop an integrated plan for the development of Thailand's transportation networks and logistics systems linked with the region, including transportation infrastructure networks at the provincial, provincial cluster, and regional levels, as well as connections with neighboring countries and the broader region. This plan shall also incorporate data on transportation and traffic system development in regional cities.

1.3 Scope of Work

The scope of the project includes the following main tasks that consultants must undertake in this study:

1 Part 1: Develop an overview and strategy for the development of transportation networks and logistics systems in the northeastern and northern provincial clusters, linking various modes of transport with economic corridor areas under the GMS framework and relevant international cooperation frameworks. This is to support economic and tourism development in accordance with the national strategic development timeline.

2 Part 2: Prepare action plans, investment plans, and prioritize the development of transportation networks and logistics systems in various modes of transport in the northeastern and northern provincial clusters, linking with economic corridor areas under the GMS framework and relevant international cooperation frameworks. This is to support economic and tourism development in line with the national strategic development timeline.

3 Part 3: Public relations and community participation.

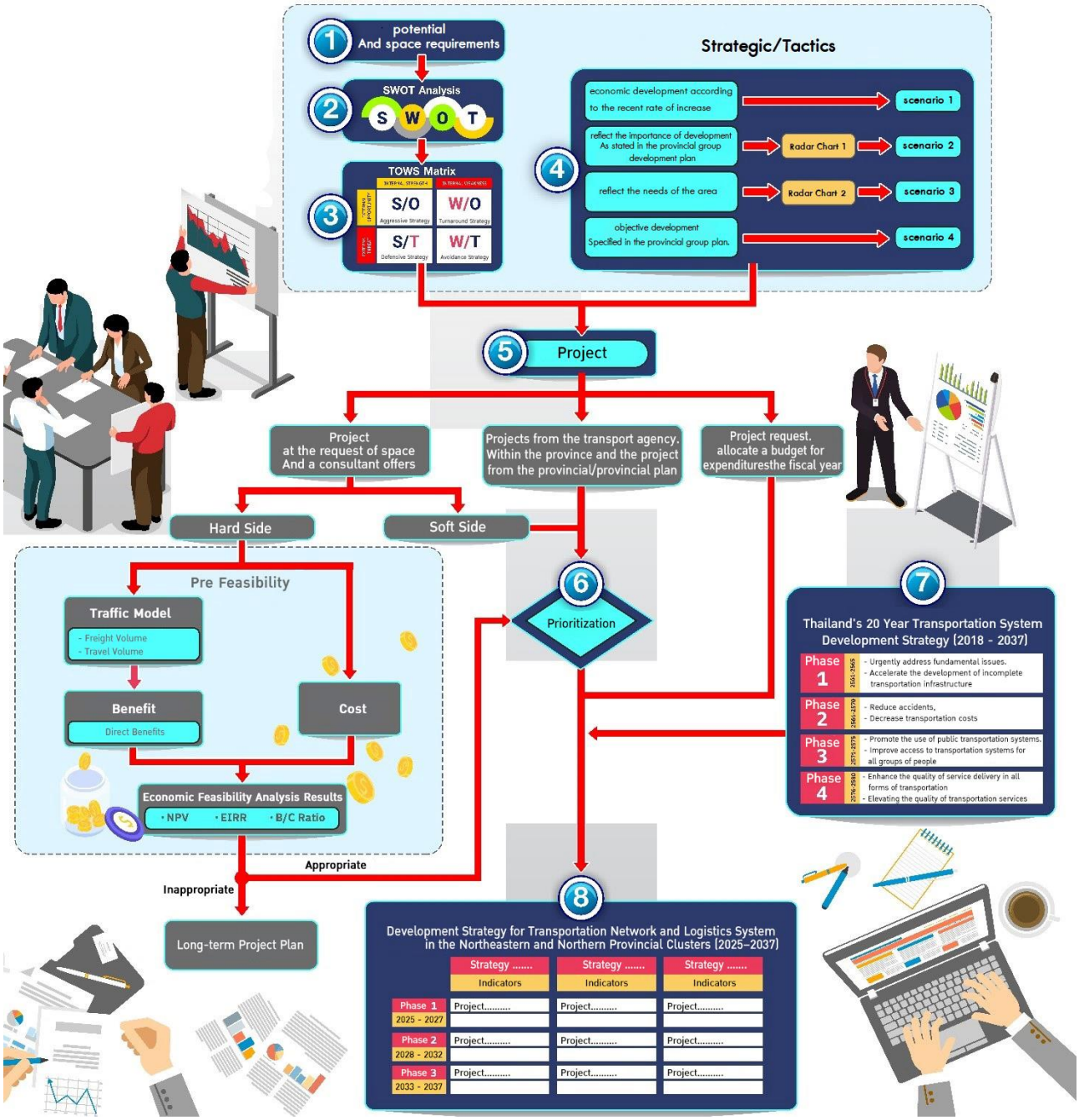
4 Part 4: Support and preparation of technical proposals, knowledge and know-how transfer, technology transfer, and the creation of promotional materials to enhance the project's image.

Based on the scope of work, the final outcome of this study will be the **strategy for the development of the transportation network and logistics system** in the Northeastern and Northern provincial clusters, linking with the economic corridors under the GMS framework to support economic and tourism development (2025–2037). The deliverables will comprise ten action plans for the respective study areas, as follows:

- Integrated Development Plan for Thailand’s Transportation and Logistics Network Linking with the Region
- Action Plan for Upper Northeastern Provincial Cluster 1
- Action Plan for Upper Northeastern Provincial Cluster 2
- Action Plan for Central Northeastern Provincial Cluster
- Action Plan for Lower Northeastern Provincial Cluster 1
- Action Plan for Lower Northeastern Provincial Cluster 2
- Action Plan for Upper Northern Provincial Cluster 1
- Action Plan for Upper Northern Provincial Cluster 2
- Action Plan for Lower Northern Provincial Cluster 1
- Action Plan for Lower Northern Provincial Cluster 2

1.4 Project Implementation Framework

The framework for the implementation of the study project on developing a model for transportation network development in the northeastern and northern provincial clusters, linked with economic corridor areas under the GMS framework to support economic and tourism development, can be summarized as shown in **Figure 1.4-1.**



Source: The Consultants

Figure 1.4-1 Project Implementation Framework

Chapter 2

Overview of Development and Strategies for the Development of Transport Networks, Logistics Systems, and Other Related Aspects in the Study Area

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2 Overview of Development and Strategies for the Development of Transport Networks, Logistics Systems, and Other Related Aspects in the Study Area

2.1 Compilation of Policies, Strategies, Programs, and National Development Plans

The consultant has reviewed project plans, study findings, policies, strategies, and various development plans within the study area (Upper Northeastern and Northern provinces), covering economic, environmental, social, and security aspects in connection with economic corridors. This review aims to assess the performance of existing development projects in the study area and to identify future challenges and key issues. The findings, based on the review of relevant policies, strategies, programs, development plans, and international frameworks, are summarized as follows:

2.1.1 20-Year National Strategy (2018 - 2037)

Thailand aims for sustainable and resilient development under the vision of “Thailand becomes a developed country with security, prosperity and sustainability in accordance with the Sufficiency Economy Philosophy” or “Stability, Prosperity, Sustainability.” By focusing on enhancing competitiveness and developing human resources, the goal is to create stability and security both domestically and regionally. This includes developing infrastructure such as transportation, water, and air transport to support economic development and trade, as well as fostering competitiveness in various sectors of the economy to bolster prosperity and economic independence. Simultaneously, there's an aim to build a fair and just society while promoting sustainable growth based on quality of life and environmental conservation. Moreover, efforts are directed towards balancing and improving public sector management systems to enhance efficiency and international cooperation for sustainable development. This involves emphasizing the connectivity of transportation and logistics systems to increase confidence in these systems and to efficiently link the Thai economy to global trade. In summary, Thailand's 20-Year National Strategy focuses on sustainable development in economic, social, and environmental aspects to strengthen prosperity, stability, and sustainability for Thailand's future.

2.1.2 Government policies

Government Policy of Ms. Paetongtarn Shinawatra Urgent Policy (Third Priority): The Government will expedite measures to reduce energy and utility costs, promote the development of public mass transit systems, and establish a unified fare structure within the Bangkok Metropolitan Region to implement the "One-Price Fare" policy across all routes, thereby alleviating the burden of travel expenses. Medium and Long-Term Policies: In terms of infrastructure development to expand opportunities, the Government will continue to invest in large-scale transportation infrastructure (Mega Projects) across rail, water, road, and air transport to ensure seamless connectivity. The objectives are to enhance road safety, reduce logistics costs, develop cold chain transportation systems, and advance the construction of double-track and high-speed railways alongside urban development that reflects local needs to achieve balanced economic growth. The policy also includes upgrading ports to increase cargo connectivity capacity, developing airports and new flight routes (e.g., Lanna Airport and Andaman Airport) with the goal of positioning Thailand as an Aviation Hub. In addition, new gateways will be established to accommodate growing travel demand. The Government will drive forward the Landbridge Project, with a focus on private sector investment, to transform Thailand into a regional transportation and logistics hub.

2.1.3 The master plan under the national strategy

Issue (07) logistics infrastructure, digital system, and alignment with issue (05) tourism, issue (09) special economic zones, issue (20) public services and state sector efficiency, and issue (22) legal and judicial processes.

The master plan under the national strategy related to the project includes the Master Plan (07) logistics, infrastructure and digital system. In the revised edition of the master plan, issue (07) specifies sub-plans: (1) Sub-plan for Transportation Infrastructure and Logistics (2) Sub-plan for Energy Infrastructure (3) Sub-plan for Digital Infrastructure. These sub-plans will be developed to enhance overall infrastructure competitiveness.

2.1.4 The 12th National Economic and Social Development Plan

In this plan, there are guidelines for the development of provinces, regions, and cities, with clearly defined target areas and target sectors for production and services. The plan also outlines important infrastructure and logistics development directions, including: Developing the railway system as a primary network for transportation and freight in the country. Supporting the development of transportation systems and logistics. It was found that the central and eastern regions have the potential to develop the railway system as a primary network for transportation and freight, according to the 12th National Economic and Social Development Plan (2017 - 2023). Additionally, the southern region has an extensive rail network that has been in use for a long time. However, there is a lack of connection between the two sides of the sea by rail, which would promote development in both tourism and trade sectors.

2.1.5 The 13th National Economic and Social Development Plan

There are two milestones related to the development of transportation and logistics systems. Milestone 5, i.e., Thailand is the region's key strategic trade, investment and logistics gateway. It emphasizes the comparative advantages in geopolitical and economic potential of Thailand, as well as trends driving the economy towards a new normal under the concept of regionalism and Milestone 8, i.e., Thailand has smart cities as well as safe and livable regions with sustainable growth. Both points indicate a commitment to accelerating infrastructure development in all forms of transportation in economically significant areas and major cities nationwide.

2.1.6 Sustainable Development Goals (SDGs)

In 2015 Thailand and the 193 member states of the United Nations adopted the 2030 Agenda for Sustainable Development and the Sustainable Development Goals (SDGs), which consist of 17 goals. Among the SDGs related to the project are Goal 3: Good Health and Well-being, which aims to reduce the number of deaths and injuries from road accidents, and Goal 9: Industry, Innovation, and Infrastructure, which includes sub-goals to develop quality, reliable, sustainable infrastructure that is resilient and adaptable to change. This encompasses infrastructure development at regional and cross-border levels to support economic development and well-being.

ที่มา: https://www.sdgmove.com/un-guidelines-use-of-sdgs-logos/

Figure 2.1-1 Sustainable Development Goals: SDGs

2.1.7 Action Plan on Thailand Logistics Development (2023 - 2027)

The number of development guidelines has increased compared to the Strategic Plan on Thailand Logistics Development (3rd Edition), including development related to customs procedures and other relevant processes, enhancing the capabilities of LSPs, and promoting research and innovation, workforce development, and logistics performance monitoring. Goals and indicators have been set at both the strategic development level and the plan level to contribute to achieving the goals of the second-tier plan on infrastructure, logistics, and digital system (sub-plan for transportation infrastructure and logistics), the sub-plan-level goals include: (1) Reduce the logistics cost of Thailand per GDP. (2) Improve Thailand's international logistics efficiency (main issue).

In addition, there is a continuous development and new issues incorporated into the Action Plan on Thailand Logistics Development (2023 - 2027) compared with the 2nd Edition and 3rd Edition. These include issues aligned with global trends to propel Thailand's competitiveness. Continuous development issues include agricultural logistics development to reduce operational costs for farmers and enhance competitiveness, development of the National Single Window (NSW) system, and digital technology advancement to adapt businesses to the online era, creating trade opportunities and environmentally friendly operations in line with the development of the bioeconomy, circular economy, and green economy.

2.2 Review of Strategies, Master Development Plans, and Study Findings of Projects Related to Transportation

2.2.1 Thailand's 20-Year Strategy for Transport Development (2017 - 2036)

It serves as a framework for long-term development of Thailand's transportation system, aligning various relevant agencies towards common goals in line with the 20-Year National Strategy (BE 2561 - 2580) and the 13th National Economic and Social Development Plan (BE 2566 - 2570), as well as the transition towards Thailand 4.0. This strategy integrates future development objectives through collaborative project planning to successfully achieve predetermined goals. The development of Thailand's transportation system strategy considers key issues such as (1) Green and Safe Transport, (2) Transport Efficiency, and (3) Inclusive Transport, ensuring accessibility and equality for all sectors of society.

2.2.2 Transport Action Plan (2023 - 2027)

The proportion of urban public transportation in Bangkok and its vinicities to total urban trips is targeted to increase by 40% by 2027, while the proportion of urban public transportation within main cities in the regions to total trips in the region is targeted to increase by 10% by 2027.

The proportion of transportation cost to the gross domestic product (GDP) of the country is targeted to be 5.0% by the year 2027. The proportion of freight transported by rail to total domestic freight is targeted to be 7.0% by the year 2027. Additionally, the proportion of freight transported by waterway to total domestic freight is targeted to be 15.0% by the year 2027. The overall passenger handling capacity of airports in the region is targeted to increase to 81.5% by the year 2027.

2.2.3 The 20-Year Intercity Motorway Development Master Plan (2017 - 2036)

The Department of Highways initiated the planning of Thailand’s intercity motorway network in 1997, following a resolution by the Cabinet. The objective was to establish an efficient transportation network that connects all regions of the country. The first master plan covered 13 routes with a total distance of over 4,000 kilometers.

In 2017, the plan was revised and expanded to include 21 routes, covering more than 6,600 kilometers. The revised plan focuses on connecting key economic zones, border trade checkpoints, and major industrial areas, while also supporting integration with other modes of transport - road, rail, water, and air.

In addition, the Department of Highways has collaborated with other relevant agencies to develop the Motorways-Rails Integrated Master Plan (MR-MAP), which aims to develop parallel intercity motorways and double-track railway systems along Thailand's major transport corridors. The MR-MAP includes nine primary routes with a total length of over 5,000 kilometers. This integrated plan is expected to reduce the reliance on road freight transport, enhance logistics efficiency, ease urban traffic congestion, and strengthen cross-border connectivity with neighboring countries in all directions.

2.2.4 Master Plan for Intercity Motorway and Rail System Development (MR-MAP)

The government, through the Ministry of Transport, has established an urgent policy to integrate the development of intercity motorways with the railway system under the Motorways-Rails Master Plan (MR-MAP). The goal is to enhance the country's transport efficiency in a systematic manner while minimizing the impacts of land expropriation and community disruption - issues that have arisen in the past from infrastructure development that directly passed through urban areas, leading to congestion, numerous intersections, and disorganized traffic.

To address these problems, the MR-MAP master plan emphasizes the planning of new, straight alignments for both highways and railways that do not overlap with existing routes and avoid densely populated areas. The plan maximizes the use of existing transport corridors to ensure optimal efficiency in integrated development.

This integrated network aims to stimulate development in new areas, ease traffic congestion in urban communities, improve travel safety and mobility, and promote efficient domestic and international freight transport.

The MR-MAP covers a total distance of 6,877 kilometers, comprising 353 kilometers currently in operation, 317 kilometers under construction, and 6,207 kilometers planned for future development.

The findings from the MR-MAP study will be used to support traffic and transport forecasting at highway intersections related to the project. These forecasts will improve the accuracy of future traffic predictions in the area and ensure consistency with the MR-MAP master plan.

2.2.5 Master Plan for Enhancing the Efficiency of Multimodal Transport Systems Linked to the Country's Key Production Bases

The Master Plan for Enhancing the Efficiency of Multimodal Transport Systems aims to connect the country's key production bases with domestic and cross-border trade gateways. It promotes the use of rail and water transport to reduce dependency on road transport and improve door-to-door logistics efficiency.

This plan is aligned with the 20-Year National Strategy and the 12th National Economic and Social Development Plan, focusing on the development of infrastructure and logistics systems to support urban growth, emerging economic zones, and systematic regional and ASEAN connectivity. The plan also includes an analysis of the expansion trends of economic centers and trade gateways to accommodate future growth in goods movement and transport demand.

2.2.6 Master Plan for the Development of Transport Infrastructure Linking Economic Hub Cities and Parallel Economic Cities

As part of the study and development project to enhance the efficiency of multimodal transport systems connected to the country's key production areas, a master plan has been formulated with a focus on developing transport infrastructure in alignment with the National Strategic Framework (2015 - 2022). The plan is driven by two primary objectives: (1) to improve the efficiency of multimodal transport systems, and (2) to strengthen connectivity between economic hub cities and parallel (or secondary) economic cities.

The master plan consists of the following key strategies:

1. Enhancing the capacity of intercity transport networks, which includes the development of 50 intercity railway projects, 141 highway projects, and 9 air transport projects.

2. Improving transport connectivity between Bangkok, its metropolitan area, and major regional cities, through 17 infrastructure development projects aimed at alleviating traffic congestion and promoting efficient connectivity.

2.2.7 The Comprehensive Intermodal Transportation Link Development Plan (2017 - 2026)

The Department of Highways (DoH) divides its service network development into three main groups: (1) The Primary Network (Structure), which includes Intercity Motorways, International Linkages, and the expansion of principal routes to 4 lanes; (2) The Support Network based on the Functional Dimension (Function), which includes adding lanes, bypass road construction, new alignment road construction, road rehabilitation and improvement, grade-separated intersections, bridges, tunnels, railway overpass construction, and paved road construction; and (3) The Support Network based on the Integrated Dimension (Agenda), which involves supporting logistics systems, addressing traffic problems in the Bangkok Metropolitan Region and its vicinity, key urban areas, and Special Economic Zones. Specifically, for major projects developing highways to connect transportation, there will be projects to enhance mobility within the highway network covering approximately 6,459 kilometers and projects to enhance the network's potential for comprehensive area accessibility covering approximately 737 kilometers.

2.2.8 Freight Transport Development Plan by Truck - Department of Land Transport (2023 - 2027)

The **Truck-Based Freight Transport Development Plan**, prepared by the Department of Land Transport, aims to enhance the quality of freight operators by establishing standards that ensure safety, efficiency, and support for national economic growth. The plan focuses on developing knowledge, technology, business networking, and support from both the public and private sectors at all levels, while also promoting international cooperation.

The plan's vision is to develop high-quality and safe freight transport operators. It is guided by three core missions:

1. Strengthening the capacity of freight operators
2. Supporting essential factors for efficient and safe operations
3. Promoting environmentally friendly transport standards

To achieve these goals, the plan sets out three main strategic pillars:

Strategy 1: Enhance the capacity and standards of freight operators in terms of skills, service quality, technology, and business networks

Strategy 2: Develop key supporting factors, including government agencies, databases, legal frameworks, and access to financial resources

Strategy 3: Expand logistics networks within industrial and economic zones and promote multimodal freight transport

2.2.9 Study of layout and design of truck terminals in bordering provinces and regional cities.

The Department of Land Transport (DLT) conducted a feasibility study and management model analysis for 17 regional freight terminals in 2015. These locations included Chiang Rai, Chiang Mai, Tak, Phitsanulok, Nakhon Sawan, Nong Khai, Mukdahan, Ubon Ratchathani, Khon Kaen, Nakhon Ratchasima, Prachinburi, Sa Kaeo, Trat, Kanchanaburi, Surat Thani, Songkhla, and Narathiwat. These proposed terminals were in addition to the three existing terminals in the Bangkok Metropolitan Region and its vicinity. Currently, the DLT's Freight Transport Bureau (FTB) is reviewing and analyzing relevant data to proceed with the Surat Thani and Mukdahan provincial freight terminal projects. The DLT plans to prioritize the Surat Thani terminal as the development of the Mukdahan terminal requires further study of related conditions.

Therefore, the DLT has reviewed and analyzed the data related to the implementation of the regional freight terminal projects to ensure alignment with current policies and situations. It has prioritized the projects, including analyzing the Public-Private Partnership (PPP) model for all 17 regional freight terminals, and sought in-principle approval from the Ministry of Transport to implement the Regional Freight Terminal Development Action Plan, Phases 1-3 (B.E. 2565 - 2570 [A.D. 2022 - 2027]), which is divided into three phases.

Phase 1 consists of Surat Thani, Nong Khai, Khon Kaen, and Mukdahan.

Phase 2 consists of Songkhla, Chiang Mai, Chiang Rai (Mae Sai), and Tak.

Phase 3 consists of Nakhon Ratchasima, Narathiwat, Phitsanulok, and Sa Kaeo.

The provinces requiring data review and project delay are Trat, Kanchanaburi, Ubon Ratchathani, Prachinburi, and Nakhon Sawan.

2.2.10 Provincial Public Transport Development Plan

The consultant compiled provincial public transport development plans from the Office of Transport and Traffic Policy and Planning (OTP), which has conducted studies and prepared master plans for the development of public transport systems in regional cities. The following plans are relevant to the study area:

1) The Master Plan Study Project for Chiang Mai Provincial Public Transport System Development was initiated to study an efficient public transport system to accommodate travel volume and solve long-term traffic problems. The Master Plan for Chiang Mai's Public Transport System, developed in B.E. 2560 (A.D. 2017), divides the network into three sub-systems: the Primary Network, the Secondary Network, and the Feeder Network.Feasibility Study and Design of the Public Transport System in Phitsanulok City. The selected routes for the Primary Network consist of three LRT lines with at-grade structures: (1) Red Line: An North-South route, starting from the Provincial Hospital in the north, passing into the western side of the old city moat, through the airport, before heading south and terminating on the way to Hang Dong District. (2) Blue Line: An East-West route, starting from Chiang Mai Zoo and Chiang Mai University in the west, passing through the city center and the railway station, and terminating on the way to San Kamphaeng District, detouring to the south of the old city moat. (3) Green Line: Starting from Ruam Chok Intersection, passing the bus terminal and Warorot Market, and terminating at Chiang Mai Airport.

2) The Feasibility Study and Design Project for the Phitsanulok Urban Public Transport System aims to elevate the public transport system in Phitsanulok city to efficiently connect travel within the urban area and link to adjacent areas, thereby supporting its role as a public transport travel hub. The plan is set for a 20-year duration. The Phitsanulok urban public transport network consists of five mass transit lines: (1) Red Line, connecting East-West travel; (2) Orange Line, connecting Southwest travel to the central city area; (3) Blue Line, connecting North-South travel; (4) Purple Line, connecting West-South travel; and (5) Pink Line, connecting travel within the city.

3) The Detailed Design Study Project for the Public Transport System in Khon Kaen Province aims to study and develop a Transit-Oriented Development (TOD) plan for areas surrounding stations or stops, and a traffic management plan for the areas around stations or stops and continuous areas along the pilot project's route.The public transport network consists of five main lines: (1) Pink Line: The inner city route, with a distance of 6 kilometers, serving the Khon Kaen Central Business District (CBD) and connecting with other lines. (2) Red Line: The Samran - Tha Phra route, with a distance of

23 kilometers, serving as a North-South corridor. (3) Yellow Line: The VIP Home - Mitsamphan route, with a distance of 22 kilometers, serving as an East-West corridor. (4) Green Line: The Nam Ton - Sila route, with a distance of 32 kilometers, serving as a Northeast-Southwest connection. (5) Blue Line: The Ban Thum - Bueng Niam route, with a distance of 41 kilometers, serving as another East-West corridor.

4) The Mass Transit System Design Study Project for Nakhon Ratchasima Urban Area aims to develop a master plan for mass transit system development, conduct preliminary design for suitable systems, study economic and financial feasibility, and conduct an initial environmental impact assessment. This will lead to the construction of a transport system that reduces traffic congestion, enhances convenience and safety, and creates long-term benefits for the city. The network comprises three main public transport routes and future extension routes, namely:

Phase 1: Green Line (Saveone Market - Mukmontri Road - Ban Naree Sawat Protection and Occupational Development Center) with a length of 11.17 kilometers and 20 stations .Note: The Cabinet Committee on Road Traffic Management (CRTM), at its meeting No. 1/2567 on December 23, 2024 (B.E. 2567), resolved in principle to change the route alignment for the Nakhon Ratchasima mass transit project from the Green Line to the Orange Line (Theparak Hospital - Jor Hor Joint Station).

Orange Line (Pradok Intersection - Chang Phueak Road - Old City Moat) with a length of 9.81 kilometers and 19 stations.

Phase 2: Purple Line (Saveone Market - Mittraphap Road - Ban Naree Sawat Protection and Occupational Development Center) with a length of 12.16 kilometers and 17 stations.

5) The Master Plan Study Project for Udon Thani Urban Public Transport System Development aims to create a master plan for the development of an efficient public transport system and connecting network, systematically and sustainably solve traffic problems, promote connectivity and convenience for public travel, and foster sustainable urban growth. Two routes have been designated: Red Line: Starts at UD Town and ends at Udon Thani International Airport, with a distance of approximately 10.80 kilometers. Orange Line: Starts at Udon Thani Railway Station and ends at Udon Thani Railway Station (a loop route), with a distance of approximately 9.80 kilometers.

2.2.11 Strategic Plan of the Ministry of Transport to Support National Logistics Development (2017 - 2022)

The Action Plan for Thailand's Logistics System Development B.E. 2566 - 2570 (A.D. 2023 - 2027) was prepared to support the implementation of the Logistics System Development Plan B.E. 2566 - 2570. This ensures that relevant agencies under the Ministry of Transport involved in logistics system development can implement and drive efforts toward achieving the goals of the National Strategy and related master plans. The operational guidelines under the Action Plan focus on developing both transportation infrastructure and facilities (Hard Side) and laws, regulations, and measures (Soft Side). There are five main strategies, which are:

1) Promote Modal Shift and Multimodal Transport: Accelerate the development of Double-Track Rail projects (Phase 1, Phase 2, and new lines).

2) Promote Infrastructure Development to Support Special Development Zones and High-Potential Areas: Including Special Economic Zones (SEZ) and the Eastern Economic Corridor (EEC).

3) Develop Transportation and Logistics Networks Linking Key Economic Areas both domestically and across borders: This involves developing both backbone (main routes) and feeder (support) networks for transportation and logistics.

4) Promote the Development of Logistics Facilities and Service Centers: Systematically and cohesively develop facilities and logistics service centers, such as Intermodal Transfer Centers, Freight Terminals, Dry Ports, and Container Yards (CY), in areas linked to the CLMVT countries (Cambodia, Laos, Myanmar, Vietnam, and Thailand).

5) Support Logistics System Operation and Management (Soft Side): Develop and revise laws, regulations, and guidelines for international transport and logistics, as well as promote the use of technology in logistics activities and foster environmentally friendly transport.

2.2.12 Thailand Logistics Development Action Plan (2023 - 2027) - Ministry of Transport Component

The main logistics systems in the Northern and Northeastern regions of Thailand comprise transport by road, rail, air, and water. Key supporting logistics infrastructure includes Inland Container Depots (ICD), Dry Ports, Intermodal Transfer Centers, Freight Terminals (Truck Terminals), and Container Yards (CY). The control and management of freight movement can be divided into two main components: the Link (routes/corridors) and the Node (interchange centers), both of which play a crucial role in efficiently linking the logistics system.

2.2.13 Action Plan for Agricultural Logistics Development (2023 - 2027)

The main logistics systems in the Northern and Northeastern regions of Thailand comprise transport by road, rail, air, and water. Key supporting logistics infrastructure includes Inland Container Depots (ICD), Dry Ports, Intermodal Transfer Centers, Freight Terminals (Truck Terminals), and Container Yards (CY). The control and management of freight movement is primarily divided into two components: the Link (routes/corridors) and the Node (interchange centers), both crucial for efficient system connectivity.

- **Dry Ports (Inland Container Depots).** There are three Dry Port areas designated for the Northeastern and Northern regions:

    1. Nakhon Sawan Province: Catchment Area covers provinces in the Upper and Lower Northern regions.
    2. Khon Kaen Province: Catchment Area covers provinces in the Upper Northeastern region.
    3. Nakhon Ratchasima Province: Catchment Area covers provinces in the Lower Northeastern region.

- There are a total of 12 projects for Intermodal Transfer Centers / Truck Terminals, divided into six for the Northeastern Region (Nong Khai Provincial Freight Terminal, Nakhon Phanom Provincial Border Transport Center, Mukdahan Provincial Freight Terminal, Khon Kaen Provincial Freight Terminal, Nakhon Ratchasima Provincial Freight Terminal, and Ubon Ratchathani Provincial Freight Terminal) and six for the Northern Region (Chiang Rai Provincial Freight Terminal, Chiang Khong Intermodal Transfer Center, Chiang Rai, Chiang Mai Provincial Freight Terminal, Tak Provincial Freight Terminal, Phitsanulok Provincial Freight Terminal, and Nakhon Sawan Provincial Freight Terminal).

- There are a total of 11 Truck Rest Areas (TRAs) designated across the two regions. The Northeastern Region accounts for nine locations, including the Udon Thani TRA, Nam Phong TRA, Sikhio TRA, Non Sung TRA (listed twice in the original text), Wang Nam Khiao TRA, Buriram TRA, Surin TRA, and Ubon Ratchathani TRA. The Northern Region accounts for two locations: the Phetchabun TRA and the Banphot Phisai TRA.

2.2.14 Special Economic Zone (SEZ) Development

The Special Economic Zones (SEZs) in Thailand are areas where the government provides support in terms of infrastructure, investment privileges, facilitating foreign labor, and necessary service convenience to promote regional and national economic development. The Special Economic Zone Policy Committee (SEZPC) has designated these areas to distribute prosperity to regions and leverage opportunities from areas connected to ASEAN countries, thereby reducing income disparity, elevating living standards, enhancing security in border areas, and increasing competitiveness and connectivity with neighboring countries. Key strategies for promoting SEZs include supporting new economic zones, infrastructure development, SME support, continuous investment, and organizing border economic zone areas.

2.2.15 Master Plan for Railway Network Development to Support Special Economic Zones, Tourism, and Area Development

The Office of Transport and Traffic Policy and Planning (OTP) has developed a Master Plan for Railway Network Development to support Special Economic Zones (SEZs), tourism, and regional development. The plan aims to connect key economic areas nationwide, positioning the rail system as the primary mode of passenger and freight transportation. It aligns with the 20-Year National Strategy and the National Economic and Social Development Plan, ensuring consistency with government policies.

Development is divided into three phases:

- Short-term (2017 - 2021): Urgent projects ready for construction within the first 5 years
- Medium-term (2022 - 2026): Projects to begin construction in years 6 - 10
- Long-term (2027 - 2036): Projects to commence after year 10

Total 20-year investment: THB 2.70 trillion (THB 1.97 trillion from the public sector and THB 0.73 trillion from the private sector), with an average annual investment of THB 135.15 billion. The plan is expected to generate economic benefits of approximately THB 408.01 billion per year.

2.2.16 State Railway of Thailand (SRT) Corporate Plan 2023 - 2027

The State Railway of Thailand's Enterprise Plan for 2023 - 2027 aims to enhance rail transport services and improve operational efficiency, develop the organization and its personnel in parallel with infrastructure investment, and strengthen its financial position to revitalize the organization. The plan features six core strategies covering the enhancement of competitiveness, revitalization of core businesses, expansion into becoming a platform service provider, development of non-rail businesses, organizational reform, and rail system development based on the BCG Model. The 2023 Action Plan focuses on developing the railway network, such as accelerating the construction of the first and second phases of double - track railways, building new lines, expanding suburban rail services, and implementing the Thai - Chinese high-speed rail project.

2.2.17 Feasibility Study Project on Developing a Comprehensive Railway Network to Cover and Connect All Areas Nationwide and Support Seamless Multimodal Transport (R-Map)

The R-Map Project is a study for developing a nationwide railway network to connect travel and freight transport between economic areas, tourist attractions, industrial zones, and neighboring countries. It also involves developing facilities and logistics centers to establish the rail system as the country's primary network. The plan covers the development of double-track railways, high-speed rail, new lines, and connections to industrial estates. It includes over 50 projects across the country in the short, medium, and long terms, divided into the following work plans:

1) Immediate-Term Work Plan (2023 - 2027)

- Development of Double-Track Railways on the Existing Rail Network (6 Projects):
  - Khon Kaen - Nong Khai section (167 km)
  - Chumphon - Surat Thani section (168 km)
  - Hat Yai Junction - Padang Besar section (45 km)
  - Jira Road Junction - Ubon Ratchathani section (308 km)
  - Pak Nam Pho - Den Chai section (281 km)
  - Surat Thani - Hat Yai Junction - Songkhla section (321 km)
- Development of High-Speed Rail (1.435-meter Gauge) (1 Project):
  - Nakhon Ratchasima - Nong Khai section (355 km)
- Development of New Rail Lines (1.000-meter Gauge) (5 Projects):
  - Surat Thani - Phang-nga - Tha Nun (MR9) section (158 km)
  - Chumphon - Ranong (MR1 8 - Landbridge) section (91 km)
  - Suphanburi - Nakhon Luang - Ban Phachi Junction (MR10) section (68 km)
  - Tha Nun - Phuket (MR9) section (18 km)
  - Thap Put - Krabi section (68 km)

2.2.18 Master Plan for the Development of Dry Ports to Establish a Regional Logistics Hub

Thailand has a policy to develop Dry Ports as a key mechanism to link rail freight transport with Laem Chabang Port, reduce reliance on trucks, and ease traffic congestion, while positioning the country as a regional logistics hub for the CLMV subregion. Four primary development sites have been designated: Nakhon Sawan, Khon Kaen, Nakhon Ratchasima, and Chachoengsao, alongside the development of Border Logistics Parks near border areas.

The development must meet key requirements such as the construction of double-track railways, installation of electric railway systems, procurement of additional locomotives and container flat wagons, as well as upgrading certain road infrastructure to serve as main truck transport routes (Truck Priority Routes).

It also includes future projects such as the Lat Krabang ICD, additional Dry Ports in several provinces, and border transport centers, in order to establish a seamless multimodal transport network both domestically and internationally.

2.2.19 Thailand's 15-Year Air Transport Development Plan (2019 - 2033)

Development Approach 1, concerning airport system development and connecting infrastructure, is the approach that directly results in the development of air transport infrastructure. The Plan primarily focuses on defining strategies and operational guidelines that fall under the responsibility of the national airport regulators. It also sets guidelines for cooperation with relevant external agencies to maximize the efficiency of the connecting infrastructure system.

This approach includes Strategy 1: Increasing the Capacity of principal hub airports (Group 1) and secondary hub airports (Group 2) to accommodate flights, passengers, and cargo; and Strategy 2: Developing regional airports (Group 3) and provincial airports (Group 4) for optimal utilization. Projects related to the study area fall under these strategies.

2.2.20 Master Plan for the Establishment of Commercial Airports in Thailand 2019 by the Civil Aviation Authority of Thailand (CAAT)

According to the Master Plan, existing airports must undergo development of both the Airside (flight operations area) and the Landside (passenger and cargo terminal area) to accommodate the increasing traffic volume in the future. In addition, it is necessary to establish two new airports: one in the Southern Region, with a suitable location identified in Khok Kloi Sub-district, Takua Thung District, Phang-nga Province, and one in the Northern Region (Chiang Mai/Lamphun area), with suitable sites identified in San Kamphaeng District, Chiang Mai Province, and Ban Thi District, Lamphun Province, because the existing airport facilities will not be able to adequately support the growth over the next 20 years.

2.2.21 Airport Development Plan by Airports of Thailand Public Company Limited (AOT)

Airports of Thailand Public Company Limited (AOT) has developed a plan to expand six airports in accordance with the airport development plan for the year 2035. The goal is for Thai airports to be able to accommodate 243.7 million passengers per year, handle 266 flight movements per hour, and process 3.62 million tons of cargo and mail annually. This expansion plan aligns with the national strategic framework for a 20-year airport development plan. The plan is subdivided into six individual plans for the following six airports: Suvarnabhumi Airport, Don Mueang Airport, Chiang Mai Airport, Hat Yai Airport, Phuket Airport, and Mae Fah Luang-Chiang Rai International Airport.

2.2.22 Port Authority of Thailand Enterprise Plan Fiscal Year 2566 - 2570

The Port Authority of Thailand Enterprise Plan B.E. 2566 - 2570 (2023 - 2027), with the Vision: "To be a World-Class Port with Excellent Logistics Services for Sustainable Growth in 2030", has established the Positioning for the development of major ports under the Port Authority of Thailand's (PAT) responsibility. The ports located in the Northern and Northeastern study areas are Chiang Saen Commercial Port/Chiang Khong Port, with the objective to be developed as ports supporting trade and transport connectivity in the Greater Mekong Subregion (GMS). Furthermore, the Plan specifies the development of Dry Ports in key areas, including the development of Dry Ports in Khon Kaen Province, Nakhon Ratchasima Province, and Chachoengsao Province. Currently, the engineering, economic, and financial studies, as well as the appropriate investment model for the development of the Khon Kaen Dry Port, have been completed. Discussions with the State Railway of Thailand (SRT) regarding the joint investment approach are ongoing.

The Khon Kaen Provincial Dry Port Development Project is a strategic investment to upgrade the country's logistics system. It is located at the Non Phayom Railway Station, Nam Phong District, on an area of over 700 rai. This location has the geographical potential to support transportation in the Northeast and connect with the CLMV countries under the GMS framework via road and rail networks. The operation is being implemented after the completion of the engineering, economic, and financial studies, in line with the government's policy of shifting transport mode from road to rail and the development of Laem Chabang Port Phase 3. Furthermore, this project will not only increase transport efficiency and reduce logistics costs but also stimulate the local economy, increase employment, and enhance the quality of life for people in the area. Regarding the progress of the Khon Kaen Dry Port development, PAT (Port Authority of Thailand) has completed the study and submitted it to the PAT Board, which suggested adding more information and studying the joint investment model with the SRT (State Railway of Thailand). PAT is currently coordinating with the SRT to discuss the joint investment approach. If the joint investment approach for the Khon Kaen Dry Port development proceeds favorably, PAT will adapt this model for the subsequent development of the Nakhon Ratchasima Dry Port.

Regarding the progress of the Nakhon Ratchasima Provincial Dry Port Development Project, it is currently in the preparation phase for a feasibility study by the Port Authority of Thailand (PAT).PAT is scheduled to propose the hiring of a consultant during June - July B.E. 2568 (2025 AD) and implement the project within Fiscal Year 2569 (2026 AD). The goals include reviewing the area, cargo volume, and guidelines for public-private cooperation.The connection with the GMS (Greater Mekong Subregion) framework is significant, as Nakhon Ratchasima is located in a strategic position in the Northeast, linking the domestic transportation network with sub-regional economic corridors and cross-border trade to CLMV countries.If the joint investment with the SRT (State Railway of Thailand) in the Khon Kaen project is successful, it will serve as a model to be expanded to the Nakhon Ratchasima project to enhance Thailand's regional competitiveness in logistics.

2.2.23 5-Year Government Action Plan 2023-2027 Marine Department (Revised Version for Fiscal Year 2025)

The Marine Department (กรมเจ้าท่า) has the mission of regulating, promoting, and developing the water transport system and maritime commerce to connect with other transport systems, covering both passenger and cargo transport, ports, shipyards, the Thai fleet, and related businesses. One of its key missions is the study, analysis, and development of water transport infrastructure, particularly the design and construction of piers/jetties. The Marine Department develops various pier projects and then hands them over to local authorities or the private sector for operation. The Marine Department's role is limited to regulating, maintaining/repairing, and dredging the waterways (shipping channels). The inland/river piers in the Northeast and Northern regions include:

1) Chiang Rai Province: Chiang Saen Pier and Chiang Khong Pier, the Chiang Saen Floating Jetty, the Golden Triangle Floating Jetty, and the Floating Jetty at the Thai-Lao Permanent Border Crossing
2) Nakhon Phanom Province: Nakhon Phanom Pier, That Phanom Pier, and Ban Phaeng District Pier.

2.2.24 Chiang mai - Vientiane economic corridor: CVEC

The Chiang Mai - Vientiane Economic Corridor (CVEC) covers five provinces in northern Thailand and three provinces in the Lao PDR, with a total length of 629 kilometers. Its objective is to enhance international economic, trade, investment, tourism, and logistics connectivity, based on the principles of sustainable economic, social, and environmental development. Four strategic pillars have been defined: (1) developing infrastructure and connectivity, (2) promoting and facilitating trade and investment, (3) strengthening society and environmental quality, and (4) promoting private sector participation and public - private cooperation, in order to increase competitiveness and position the corridor as an economic hub in the Greater Mekong Subregion.

2.2.25 Luangprabang - Indochina - Mawlamyine Economic Corridor: LIMEC

The Luang Prabang - Indochina - Mawlamyine Economic Corridor (LIMEC) is a route connecting three countries: Laos, Thailand, and Myanmar. It covers the area from Luang Prabang and Xayaburi, passing through the Phu Doo border checkpoint in Uttaradit Province to five provinces in Thailand's Lower North, and then exiting through the Mae Sot border checkpoint into Myanmar. Its key feature is that it serves as the intersection of the North-South and East-West economic corridors. The goal is to enhance cooperation in trade, investment, tourism, education, health, and logistics by developing infrastructure, regulations, and cross-border facilitation, alongside building public-private networks to ensure the seamless movement of goods, services, people, capital, and information, thereby promoting sustainable joint economic and social development. This includes:

1) Phu Doo Checkpoint (Thai-Lao Border: Phudoo/Phudoo Gate): A project to develop the Phu Doo checkpoint in Ban Khok District, Uttaradit Province, into a Permanent/ International Border Crossing to facilitate border transit, customs procedures, etc.
2) YEN-D Frontier LIMEC: A training program for New-Generation Entrepreneurs (YEN-D) from Thailand, Laos, and Myanmar along the LIMEC route to build business networks and exchange knowledge.
3) International Meeting/Grand Meeting LIMEC: An event organized to integrate public-private cooperation, build trade alliances, and develop the potential of entrepreneurs, marketing, border trade, etc.
4) LIMEC EXPO: An exhibition of goods and services by entrepreneurs from Thailand, Laos, and Myanmar in the LIMEC area to connect trade in agricultural products, small-scale industries, and tourism.
5) Green Tourism and Agro-Industry: Promoting nature-based tourism, World Heritage sites, and cultural heritage routes (e.g., Luang Prabang, Sukhothai, various National Parks), as well as value-added agriculture (e.g., processing and quality improvement of agricultural products).
6) Trade and Investment Promotion: Encouraging the exchange of business information, Business Matching among member countries, and improving border checkpoint services (e.g., customs procedures, taxes, Visa on Arrival), etc.
7) Transport/Bus/Route Connectivity: Proposals have been made for regular bus/intercity/cross-border bus routes, such as from Luang Prabang to Uttaradit, or an extension from Thailand to Myanmar, potentially starting with smaller vehicles.
8) International Cycling Route: A proposed cycling route of approximately 1,500 kilometers connecting Sukhothai - Luang Prabang, among others.

2.2.26 Development Project for National Road No. 12 (R12), Thakhek - Ban Nape Border Crossing Section, Lao People's Democratic Republic

The Marine Department has the mission of regulating, promoting, and developing the water transport system and maritime commerce to connect with other transport systems, covering both passenger and cargo transport, ports, shipyards, the Thai fleet, and related businesses. One of its key missions is the study, analysis, and development of water transport infrastructure, particularly the design and construction of piers/jetties. The Marine Department develops various pier projects and then hands them over to local authorities or the private sector for operation. The Marine Department's role is limited to regulating, maintaining/repairing, and dredging the waterways (shipping channels) only. The inland/river piers in the Northeast and Northern regions include: 1) Chiang Rai Province: Chiang Saen Pier and Chiang Khong Pier, the Chiang Saen Floating Jetty, the Golden Triangle Floating Jetty, and the Floating Jetty at the Thai-Lao Permanent Border Crossing; and 2) Nakhon Phanom Province: Nakhon Phanom Pier, That Phanom Pier, and Ban Phaeng District Pier.

2.2.27 North - South Economic Corridor, Route R3A

Route R3A is an international highway running from Bangkok through Chiang Rai - Chiang Khong - Luang Namtha - Boten into China, reaching Kunming, with a total distance of 1,887 kilometers. It provides a fast, low-cost connection between Thailand, Lao PDR, and China, serving the transport of goods, tourism, and investment. The route is part of ASEAN Highway AH3 and the Greater Mekong Subregion connectivity strategy. It helps reduce transport time, stimulate border economies, and strengthen industry, trade, logistics, and tourism, while enhancing economic, political, and social cooperation. It also creates opportunities for expanding markets and promoting cultural exchange between countries.

Route R3A is one of the most important North-South Economic Corridors (NSEC) in the Greater Mekong Subregion (GMS). It starts from Chiang Khong - Chiang Rai (Thailand), crosses the Fourth Thai-Lao Friendship Bridge (Chiang Khong - Houay Xay), passes through Bokeo Province - Luang Namtha Province (Lao PDR), enters Boten (Laos) - Mohan (China), and connects onward to Kunming (Yunnan Province, China). Its economic significance is as follows:

1) Border Trade and Logistics: R3A is a main route for transporting goods from Southern China (Kunming/Yunnan) down to Thailand - Lao PDR - Myanmar - Malaysia. It also reduces the time for transporting Thai goods to China to just 2-3 days, compared to 7-10 days by sea previously.

2) Thailand's Role: Chiang Khong District, Chiang Rai Province, has become the "Trade Gateway" connecting China and ASEAN. It features a Logistics Hub, a modern customs checkpoint, and a border industrial estate.

3) Investment and Tourism: This route attracts investment in warehousing, transport, and manufacturing for export. It also facilitates the "Three Lands" (Thailand - Lao PDR - China) tourism connection, making it easier for Chinese tourists, for instance, to travel directly into Thailand by bus or car.

4) Connectivity with Major Networks: R3A is part of the Greater Mekong Subregion (GMS) Economic Corridors and links with the China-Laos Railway project (Kunming - Luang Prabang - Vientiane - Nong Khai), making land trade even more convenient.

2.2.28 Singapore - Kunming Rail Link: SKRL

The Singapore - Kunming Rail Link (SKRL) is part of the United Nations ESCAP's Trans-Asian Railway project, aimed at connecting Asia with Europe. It covers eight countries: Singapore, Malaysia, Thailand, Cambodia, Lao PDR, Vietnam, Myanmar, and China's Yunnan Province. The network consists of three main routes - the Eastern Line (via Cambodia and Vietnam), the Western Line (via Myanmar), and the Central Line (via Lao PDR) - along with several branch lines. Some sections have already been completed, while others are under development. The Central Line will connect with the Thai - Chinese high-speed rail from Bangkok to Nong Khai. This project will strengthen ASEAN transport connectivity and enhance trade, investment, and travel potential across the region.

The Singapore - Kunming Rail Link (SKRL) network connects Southeast Asia with Southern China (Kunming, Yunnan Province) via a rail network over 7,000 km long. The Singapore - Kunming Rail Link (SKRL) project is designed in a "fishbone" structure, comprising three sub-routes (Eastern, Central, Western Routes), linking Singapore - Malaysia - Thailand - Cambodia/Laos/Myanmar - Vietnam - China. The details are as follows:

1. Eastern Route: Singapore - Kuala Lumpur - Hat Yai (Thailand) - Bangkok - Aranyaprathet (Thailand) - Poipet (Cambodia) - Phnom Penh - Ho Chi Minh City (Vietnam) - Hanoi - Guangxi/Yunnan (China).

2. Central Route: Singapore - Malaysia - Bangkok - Nong Khai (Thailand) - Vientiane (Lao PDR) - Kunming (China). (The Laos-China Railway (Vientiane - Boten - Kunming) is currently operational.)

3. Singapore - Malaysia - Bangkok - Mae Sot (Thailand) - Myawaddy (Myanmar) - Yangon - Mandalay - Lashio - Shan State - Kunming (China). (Still under discussion due to political and security issues in Myanmar.)

2.2.29 Second Master Plan for Mineral Management (2023 - 2027)

The Second Master Plan for Mineral Management (2023 - 2027) of the Department of Mineral Resources (DMR), Ministry of Natural Resources and Environment, sets out guidelines for the sustainable, transparent, and participatory utilization of mineral resources. It focuses on four main areas: (1) enhancing the efficiency of mineral management, (2) improving mechanisms for licensing, regulation, and benefit allocation, (3) conducting research and developing technologies and innovations to increase value and reduce environmental impacts, and (4) fostering public understanding and participation.

The plan emphasizes links with the Bio-Circular-Green (BCG) economy and the circular economy. The operational plan covers enhancing the competitiveness of mining operators, securing raw material supplies, and developing socially and environmentally responsible mining. Key projects include the Smart Mine initiative, identification of potential mineral sources, recycling development, and promotion of green mining. For potash - of which Thailand holds the world's second-largest reserves-the government promotes production in Udon Thani, Chaiyaphum, and Nakhon Ratchasima, along with the development of transport and logistics networks to support distribution and export.

2.2.30 Energy Management and Pipeline Transportation Plan

The Ministry of Energy has a plan to develop natural gas and oil pipeline networks in the northeastern and northern regions to enhance energy security, reduce costs, and minimize environmental impacts. Under the Gas Plan 2018, the focus is on expanding gas pipeline infrastructure to meet electricity and industrial demand, such as the Nakhon Ratchasima Gas Pipeline Project (Phases 1 - 2). Meanwhile, under the Oil Plan 2018, the northern oil pipeline (Bang Pa-in - Phichit - Lampang) and the northeastern oil pipeline (Saraburi - Khon Kaen) have been extended, along with a feasibility study for the Lampang - Chiang Mai route, to improve efficiency, reduce road transport, and maintain fuel prices in the regions close to those in Bangkok.

Most projects are implemented by private operators, such as FPT and TPN, to promote competition and investment, while supporting future clean energy and low-carbon economy goals.

2.3 Policies, Strategies, Plans, and Development Plans for Agriculture

The Consultant has reviewed policies, strategies, plans, and development plans supporting projects related to the development of transportation networks and logistics systems related to agricultural development, as follows: 1) The 20-Year Agricultural and Cooperatives Strategy (2017 - 2036) and 2) Ministry of Agriculture and Cooperatives' Action Plan (2020 - 2022)

2.3.1 20-Year Agriculture and Cooperatives Strategy (2017 - 2036)

The 20-Year Agriculture and Cooperatives Strategy (2017 - 2036) is relevant to cooperation within the Greater Mekong Subregion (GMS). It consists of: 1.) Developing cooperation in agricultural trade and investment, and linking agriculture with neighboring countries, especially within the GMS and ASEAN frameworks, to increase the competitiveness of Thai agricultural products and food, allowing Thai agricultural products easier access to regional markets, and supporting cross-border investment; and 2.) Natural Resources and Environmental Management.

2.3.2 Ministry of Agriculture and Cooperatives Action Plan 2023 - 2027

The Ministry of Agriculture and Cooperatives Action Plan (2023 - 2027) proposes five strategies for agricultural sector development. The development guidelines relevant to this project include Strategy 2: Increasing Production Efficiency and Upgrading Product Standards of the 20-Year Agriculture and Cooperatives Strategy (B.E. 2560 - 2579). Also relevant is Development Guideline 5: Linking the Agricultural Sector with Industry and other Service Sectors to upgrade and create added value for the agricultural sector, in alignment with cooperation development in the Greater Mekong Subregion (GMS). Specifically, from the 28 development guidelines in the Ministry of Agriculture and Cooperatives 5-Year Action Plan, the one related to this project is Development Guideline 8: Agricultural Infrastructure and Logistics System, under Development Issue 2: Enhancing the Competitiveness of the Agricultural Sector.

2.4 Policies, Strategies, Plans, and Development Plans for Industry

The consultant reviewed the 20-Year Thailand 4.0 Industrial Development Strategy (2017 - 2036 AD), and the main content can be summarized as follows: The strategy's targets focus on 10 S-Curve Target Industries that serve as the future economic driving mechanisms, as approved by the Cabinet (the First S-Curve and New S-Curve). These are classified into 5 Target Industry Groups: 1) Processed Agriculture, Food, and Biotechnology; 2) Public Health, Wellness, and Medical Technology; 3) Mechatronics with Electronic Control Systems, Smart Devices, and Robotics; 4) Digital; and 5) Creative Industries, Cultural Capital, and High-Value Services. Furthermore, the essential core strategies for industrial development comprise three main strategies: 1) Transforming the Thai Industrial Sector into Intelligence-Driven Industries; 2) Reforming the Industrial Ecosystem to support Intelligence-Driven Industries; and 3) Connecting Thai Industries with the Global Economy.

2.4.1 20-Year Thailand 4.0 Industrial Development Strategy (2017 - 2036 AD)

The Ministry of Industry's Strategic Plan (2017 - 2021) proposed four main strategies including: 1) enhancing the potential of the industrial sector for growth and resilience, 2) developing supporting factors to facilitate investment and industrial development to support business opportunities and reduce obstacles, 3) promoting and developing industries friendly to society and the environment to create a positive image for industries focusing on socially and environmentally friendly operations, and promoting industrial development towards sustainability, and 4) developing organizational capabilities to provide quality services, improve the system and capabilities of personnel in serving entrepreneurs and the public efficiently and ethically, and adapt to future changes.

2.4.2 Ministry of Industry's Annual Action Plan for 2025 AD

The project aligns with the Ministry of Industry’s Annual Action Plan for 2025 AD, which aims to develop Thai industry towards a new, sustainably growing industrial landscape and comprehensively links with the project's objectives, covering both the development of infrastructure and logistics systems alongside the grassroots economy and communities. The Plan sets strategic indicators such as productivity enhancement, the development of SMEs and community enterprises, the reduction of greenhouse gas emissions, and investment in the BCG industries, which can be used to appropriately support the analysis and prioritization of transport and logistics system development. Furthermore, the Action Plan also includes the improvement of laws and regulations, the development of product and service standards, and the upgrading of testing laboratories to enhance competitiveness, consistent with the project's objective of creating a supporting plan for transport and logistics network development for the 2025-2537 AD period. The integration of the organization into a Digital Organization and data linking through a Data Lake further helps establish a transport and logistics information system that can systematically connect at both the national and regional levels.

2.5 Policies, Strategies, Plans, and Development Plans for Tourism

2.5.1 ASEAN Tourism Strategic Plan (2016 - 2025 AD)

The ASEAN Tourism Strategic Plan aims to develop tourism in the region to be of high quality, unique, and diverse, under the principles of sustainable development, multisectoral participation, and environmental friendliness. It emphasizes promoting an Inclusive and Knowledge-based economy. Tourism is considered a vital economic sector that supports the economic and social growth of the people in ASEAN. This is linked to the development of transport and logistics, including the development of transportation infrastructure to facilitate and accommodate both international and domestic tourists, as well as promoting transport cooperation among ASEAN member states for smooth and convenient cross-border travel.

2.5.2 The 3rd National Tourism Development Plan (2023 - 2027 AD)

The Thai tourism industry is a crucial mechanism for driving the economy, generating income, creating jobs, and distributing prosperity to various regions, contributing over 17.79% of GDP in 2019 AD. The 3rd National Tourism Development Plan (2023-2027 AD) therefore aims to elevate the tourism industry to be valuable, sustainable, and comprehensive across the economic, social, and environmental dimensions through four main strategies: strengthening the production sector, developing fundamental factors, enhancing the tourism experience, and promoting sustainable tourism, all in order to serve high-quality tourists and comprehensively strengthen a value-based economy.

2.5.3 Strategic Plan for Driving White Tourism under the BCG Economic Model (2023 - 2027 AD)

The Strategic Plan for Driving White Tourism under the BCG Economic Model (2023 - 2027 AD) aims to promote sustainable tourism in alignment with the National Strategy, using the concepts of the Bio-Circular-Green (BCG) Economy to create added economic value, distribute income, and enhance the quality of life for the population. It also emphasizes the development of five key sectors - Agriculture and Food, Health and Medicine, Energy, Materials and Biochemicals, Tourism and Creative Economy, and Circular Economy - to ensure sustainable and inclusive growth across all sectors.

2.5.4 Sports Tourism

Sports Tourism is an industry that links businesses within the supply chain for accommodation, transport, activities, food, and handicrafts. Key stakeholders include sports service providers, input factor suppliers, and tour organizers. Event-based sports are divided into two categories: playing sports for health and playing for competition. The Ministry of Tourism and Sports established Sport City prototypes, with 6 pilot provinces in 2018 AD: Chonburi, Suphanburi, Buriram, Udon Thani, Sisaket, and Krabi. In 2019 AD, 10 more provinces were added: Ubon Ratchathani, Chiang Rai, Nakhon Ratchasima, Chanthaburi, Yala, Phatthalung, Songkhla, Trang, Phuket, and Bangkok. These are categorized by sports groups: Sports for Health, Cultural Sports, Sports for Excellence, and Basic Sports, with the aim of promoting sports tourism and developing infrastructure and personnel to meet standard requirements.

2.5.5 Integration Plan for Cooperation in Linking the Stories of Tourist Attractions along the Mekong River in Loei, Nong Khai, Bueng Kan, Nakhon Phanom, Mukdahan, Amnat Charoen, and Ubon Ratchathani Provinces (2024 AD)

The Integration Plan for Cooperation in Tourism Development along the Mekong River in 7 Northeastern Provinces aims to create a central hub connecting ASEAN and the Greater Mekong Subregion, with support from the TAT (Tourism Authority of Thailand) and local agencies, to develop tourism and promote cultural diversity. The mission focuses on preparing policy proposals, developing tourism products, conducting situation research, integrating marketing with neighboring countries, and building highly capable tourism personnel. The plan's goals are to upgrade infrastructure, tourism products, the provincial image, increase the number of tourists and revenue, while maintaining a balance of natural resources and the environment for sustainable development.

2.5.6 Soft Power Tourism Plan to Ignite Thai Tourism, 2025 - 2027 AD

The TAT (Tourism Authority of Thailand) Soft Power Tourism Plan for 2025-2027 AD aims to use tourism to create cultural and economic influence by promoting the country's image and expanding the global tourist base. The vision is focused on making Thailand a distinct destination known for its identity, culture, and innovation, while creating memorable travel experiences. The mission emphasizes developing creative content, elevating traditional events and festivals, and creating tourism experiences through activities, products, and services. The operational projects are focused on improving infrastructure, supporting facilities in event areas and tourist attractions, as well as promoting cultural activities and marketing to enhance convenience and create direct experiences for tourists.

2.6 Policy, Strategy, Plans, and Development Plans for Land Use

2.6.1 Regional Development Plan

Under the 13th National Economic and Social Development Plan (2023 - 2027), the focus is on reducing economic and social disparities and improving access to basic services through expanding opportunities and strengthening infrastructure, logistics, and digital connectivity nationwide. The regional development plans are formulated in parallel with the National Strategy to enable each region to be competitive, resilient, and sustainably developed.

- **Northeastern Region:** Northeast Regional Development Plan 2017 - 2022 AD aims to address poverty, water scarcity, and low quality of life through the use of technology and innovation to upgrade agriculture, the economy, and infrastructure, with the goal of becoming the economic hub of the Greater Mekong Subregion.
- **Northern Region:** Northern Regional Development Plan 2023 - 2027 AD focuses on area-based development to reduce inequality arising from urban expansion and tackle haze pollution, following the approach of “Creative Economy, Well-being, and Sustainable Lifestyles,” alongside environmental conservation and improving the quality of life for all population groups.

2.6.2 Regional Policy Plan

The preparation of the Regional Policy Plans for the Northeast and Northern regions is crucial for defining area-based development strategies, with an emphasis on strengthening transport and logistics infrastructure to connect with neighboring countries under the Greater Mekong Subregion (GMS) cooperation framework. This includes key transport routes such as R9 and R12, and the rail network connecting to the Lao PDR, Myanmar, and China. This will help elevate the potential of these areas to become trade, investment, and transport centers in the subregion, alongside the development of border economic zones and the sustainable enhancement of the regions' competitiveness.

2.6.2.1 Northeast Region

The Northeastern Special Economic Zones aim to enhance border trade, investment, and logistics by leveraging the potential of the Greater Mekong Subregion (GMS) framework and the ASEAN Economic Community (AEC). Three main areas - Nong Khai, Mukdahan, and Nakhon Phanom - are strategically connected to key economic routes such as the East - West Economic Corridor (EWEC) and Route R12. Development includes providing investment incentives and one-stop services, with plans to establish multiple economic clusters such as border trade in signature products, high-value agriculture, bio-industry, future industries (aviation, rail systems), cultural and Mekong river tourism, medical hubs, and special zones for innovation and digital industries. The objective is to transform the economic structure into a value-based economy driven by technology, innovation, and creativity, thereby boosting both regional and national competitiveness.

2.6.2.2 Northern Region

The Northern Region has strong potential to link trade, investment, and culture with neighboring countries. The Tak Special Economic Development Zone, located along the EWEC and connecting to Myanmar, focuses on trade, tourism, and labor-intensive manufacturing industries. The Chiang Rai Special Economic Development Zone, linking Myanmar - Lao PDR - China, emphasizes trade, tourism, and integrated logistics. The government is also developing the Northern Economic Corridor (NEC - Creative Lanna), covering Chiang Mai, Lamphun, Lampang, and Chiang Rai, as a creative economy hub connected to the EEC and other special economic zones. This initiative is driven by three main clusters: Creative Lanna, Bio Economy, and Highland Development, aiming to enhance competitiveness, distribute prosperity, reduce inequality, and sustainably improve the quality of life in border areas.

2.6.3 Provincial Cluster Development and Land Use Plan for 2023 - 2027 AD

2.6.3.1 Northeastern Region

The guidelines for preparing the Northeast Provincial and Provincial Cluster Development Plans emphasize leveraging the area's potential and opportunities to efficiently connect development. Provincial Cluster Upper Northeast 1, which borders the Lao PDR and is a center of the Greater Mekong Subregion, aims to be developed into a leading agro-industry, a hub for trade and logistics, a destination for international standard tourism, and a sustainably livable city. There are five key focus areas: tourism development; enhancing capacity for trade, investment, and border trade; elevating agricultural products to organic farming standards; maintaining the balance of natural resources and the environment; and developing human capital to improve quality of life. This is achieved by integrating technology and innovation, supporting the BCG Economy, and building sustainable competitiveness within the context of both domestic and international connectivity.

2.6.3.2 Northern Region

The guidelines for preparing the Provincial and Provincial Cluster Development Plans emphasize the potential, opportunities, and constraints of the Northern region to serve as a framework guiding integrated development in all dimensions - economic, social, and environmental - while enhancing competitiveness and providing widespread benefits to the public. The Northern Provincial Cluster Development Plan for 2023-2027 AD comprises the Upper Northern 1 and 2 and Lower Northern 1 and 2 clusters. It aims to develop the North into the country's creative economy base, link with the subregion, and achieve sustainable growth by utilizing cultural capital, local wisdom, innovation, and creativity to strengthen the internal economy of the region to its full potential.

2.6.4 Development of Economic Corridors and Special Economic Zones

Thailand's development of Special Economic Development Zones (SEZs) began in 2014 AD with the goals of distributing prosperity, reducing inequality, and enhancing security. The initiative designated 10 target border areas and expanded into four regional Special Economic Corridors (North, Northeast, Central-West, South) and connected with the EEC (Eastern Economic Corridor). The Policy Committee for Special Economic Zone Development (SEZPC) serves as the main governing mechanism, overseeing infrastructure development, investment privileges, foreign labor management, and one-stop services. The objective is to create new Growth Poles to attract investment, increase competitiveness, develop livable cities while protecting the environment, promote community economy, and encourage public participation to sustainably improve the quality of life.

2.6.4.1 Northeast Region

The Northeast Region has economic and investment potential under the Greater Mekong Subregion (GMS) cooperation framework. This is realized through the development of Special Economic Zones (SEZs) at Nong Khai, Mukdahan, and Nakhon Phanom, which connect via key Friendship Bridges with the Lao PDR and the EWEC (East-West Economic Corridor) route. This supports trade, investment, tourism, and logistics system development. Concurrently, the region promotes target industrial clusters, including automotive, electronics, processed agriculture, bio-based industries, future industries, tourism, and medical centers, as well as specialized development areas in the creative economy, digital fashion, high-value agriculture, and future industrial estates. This aligns with the NeEC (Northeast Economic Corridor) and EWEC policies to enhance the region's competitiveness and comprehensively generate increased income and quality of life for its people.

2.6.4.2 Northern Region

The Northern Region of Thailand possesses high potential for connectivity with neighboring countries in terms of transport, logistics, value chain economy, and culture. The border areas of Tak and Chiang Rai provinces were developed into Special Economic Zones (SEZs) starting in 2015 AD to enhance trade, investment, tourism, and labor-intensive or value-added industries. Tak focuses on trade, tourism, and industries utilizing labor and raw materials from Myanmar, such as textiles, leather goods, and processed wood. Chiang Rai focuses on free trade, international transport, and processed agricultural industries, gemstones, downstream textiles, and clean industries, along with developing infrastructure, customs checkpoints, and one-stop service centers. Furthermore, the establishment of the Northern Economic Corridor (NEC), covering Chiang Mai, Lamphun, Lampang, and Chiang Rai, aims to elevate the creative economy, link with the GMS (Greater Mekong Subregion), and develop bio-based economic areas and priority development zones to increase public income and quality of life, reduce inequality, promote competitiveness, and create connectivity with neighboring countries in all dimensions, including trade, investment, and tourism.

2.6.5 Land Use Development Plan

2.6.5.1 Northeast Regional Development Plan

The Action Plan and Projects for Land Use Development in the Northeast Region cover five main areas: Industry, emphasizing agro-processing industries, food innovation, and the bio-circular-green (BCG) economy; Agriculture, focusing on developing infrastructure, water sources, and logistics systems, increasing the value and competitiveness of agricultural products, and utilizing technology and innovation to enhance output; Transport and Logistics, aimed at developing the road network, logistics systems, and facilities to support trade, investment, and the tourism industry; Tourism, emphasizing the promotion of provincial cluster tourism and connectivity with neighboring countries, developing creative tourism and the creative economy, as well as tourism

infrastructure; and Special Economic Zones, focused on upgrading trade, investment, logistics, and border trade to strengthen the business sector's potential in the region. All these areas align with the goals for national economic, social, and competitive development.

2.6.5.2 Northern Regional Development Plan

The Action Plan and Projects for Land Use Development in the Northern Region cover five main areas: Industry, focusing on developing new industrial areas, revitalizing the potential of existing industries, and promoting bio-industries and food innovation; Agriculture, emphasizing the designation of agricultural zones, increasing product value, creating Mega Clusters, and developing logistics systems for efficient distribution of produce; Transport and Logistics, aimed at developing domestic and international transport networks, including new rail and airport projects to support trade, investment, and tourism; Tourism, focusing on developing creative and cultural tourism, accommodating tourist routes in the Greater Mekong Subregion and ASEAN, along with the planning of tourist community areas and tourist rail routes; and Special Economic Zones, aimed at promoting the agricultural economy, industry, and creative services, developing the Northern Economic Corridor (NEC - Creative LANNA), and Special Agricultural Economic Zones to increase the potential for trade, investment, and regional connectivity.

2.7 Policies, Strategies, Plans, and Development Plans for Trade and Investment

In accordance with the Board of Investment (BOI) Announcement No. 2/2014 AD and the 7-Year Investment Strategy (2015 - 2021 AD), the BOI emphasizes promoting value-based investment to enhance competitiveness and sustainable growth by supporting R&D, innovation, and value-addition in the agricultural, industrial, and service sectors, SMEs, environmentally friendly investment, the establishment of clusters based on area potential, including border provinces and Special Economic Zones. Promoted businesses are categorized into Group A for economically significant activities and Group B for supporting industries, with tax and machinery privileges, as well as Non-Tax Incentives. Furthermore, the Customs Department implements five strategies to facilitate trade and increase tax collection efficiency by supporting projects linking the GMS (Greater Mekong Subregion) and the AEC (ASEAN Economic Community), such as the development of NSW (National Single Window) and ASW (ASEAN Single Window), customs checkpoints, and Multimodal Transportation Centers. This establishes connectivity and enhances the potential for border trade, logistics, and international exports, enabling Thailand to integrate effectively into the GMS economic framework.

2.8 Policies, Strategies, Plans, and Development Plans for Digital Economy and Society

2.8.1 National Policy and Plan on Digital Development for Economy and Society (2018 - 2037 AD)

The Thailand's National Digital Economy and Society Development Plan (2018 - 2037 AD) has the vision "Transforming Thailand into Digital Thailand" to elevate the economy, society, and public administration through digital technology. It defines six strategies: developing nationwide digital infrastructure, driving the economy with technology, creating a high - quality and equitable society, transforming public administration into a digital government, developing human capital, and building confidence in technology use. This plan aligns with the Greater Mekong Subregion (GMS) cooperation framework, as the development of digital infrastructure and cross-border data management systems efficiently supports trade, investment, and digital logistics within the GMS area. Implementation began in 2018 AD and continues in the 5 - Year Action Plan (2023 - 2027 AD) through the development of main communication networks, high-speed broadband networks, the creation of a digital business ecosystem, and personal data protection measures to enhance the competitiveness of both the country and the region.

2.8.2 Ministry of Digital Economy and Society Strategic Plan 2020 - 2024 AD

The Ministry of Digital Economy and Society Strategy (2020 - 2024 AD) aims to drive Thailand toward Thailand 4.0 by developing nationwide digital infrastructure, driving the economy with technology and innovation, enhancing the quality of life for the public, and improving public services toward a digital government, while also building a digital workforce and trust in data usage. This plan aligns with the GMS (Greater Mekong Subregion) framework by focusing on the development of communication and telecommunication networks and cross-border data management systems, supporting trade, investment, and digital logistics in the region. Implementation began in 2020 AD and continues in the 5-year action plan (2023 - 2027 AD) through the creation of a digital ecosystem, innovation sandbox areas, co-investment in infrastructure use, and personal data protection measures, all to sustainably increase the competitiveness of the country and the region.

2.9 Strategies and Frameworks for International Cooperation

2.9.1 Greater Mekong Subregion: GMS

The Greater Mekong Subregion (GMS) Economic Cooperation Program, which began in 1992 AD, involves Thailand, Myanmar, Lao PDR, Cambodia, Vietnam, and China (Yunnan), operating under the support of the ADB (Asian Development Bank). The goal is to promote integrated development in trade, investment, agriculture, industry, tourism, energy, telecommunications, and human resource development. It covers an area of over 2.3 million square kilometers and a population of approximately 250 million people. Key projects related to this initiative include the development of the East-West Economic Corridor (EWEC) and the development of transportation systems (roads,

railways, airports), telecommunications and energy links, as well as cooperation in environmental matters, flood control, and tourism. Thailand has continuously undertaken the construction of Friendship Bridges and the support of cross-border infrastructure from 1997 AD to the present (including plans for the next 10 years) through integrated system planning, regulatory facilitation (CBTA - Cross-Border Transport Agreement), and human resource and technology development, all to maximize the efficiency of linking GMS cities, Special Economic Zones, and transport routes, thereby elevating the subregion's competitiveness.

2.9.2 Association of South East Asian Nations: ASEAN

The Association of Southeast Asian Nations (ASEAN), composed of 10 member states (Brunei, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Vietnam, and Thailand), established the ASEAN Economic Community (AEC). This initiative, consistent with efforts to build economic and infrastructure connectivity in the Mekong Subregion under the GMS (Greater Mekong Subregion) framework, began at the 13th ASEAN Summit in Cebu, Philippines, in January 2007 AD. The Summit targeted the completion of ASEAN's economic integration in 2015 AD through the AEC Blueprint 2015, which focused on a single market and production base, the free flow of goods, services, investment, and labor, enhanced competitiveness, equitable economic development, and integration into the global economy. Simultaneously, the Master Plan on ASEAN Connectivity (MPAC), including MPAC 2010 and MPAC 2025, laid out strategies for linking infrastructure, movement of people, and seamless logistics across road, rail, water, and ports. Thailand plays a crucial role in the AHN (ASEAN Highway Network), SKRL (Singapore-Kunming Rail Link), and three major ports. Moreover, the ASEAN Free Trade Area (AFTA) supports duty-free trade and reduced production costs, promoting investment and economic growth in the region, thereby enabling the GMS to effectively integrate with the AEC and connect to the global economy.

2.9.3 Bay of Bengal Initiative for Multi-Sectoral Technical and Economic Cooperation: BIMSTEC

BIMSTEC serves as an economic cooperation framework between the countries of Southeast Asia and South Asia, consisting of seven member countries: Bangladesh, Bhutan, India, Myanmar, Nepal, Sri Lanka, and Thailand. It has 14 main areas of cooperation, including trade, investment, transportation and communication, energy, tourism, technology, fisheries, agriculture, public health, poverty alleviation, combating transnational crime and terrorism, environmental management, and disaster management, aiming to develop into a joint free trade area. For Thailand, the top export product is plastic granules, followed by chemicals. The highest import value product is natural gas, followed by gemstones, silver and gold bars.

BIMSTEC helps open opportunities for Thailand to expand its relationships with countries in South Asia, especially as South Asia is a large market with significant sources of raw materials and resources, such as natural gas and hydroelectric power potential. This also results in each region of Thailand becoming a central hub linking transportation networks between the Northern-Southern and Eastern-Western economic corridors and the Southern region.

The inclusion of India and China in the ASEAN group promotes market expansion, investment model development, and trade regulation improvement towards integration into the global free trade system.

In terms of transportation progress, the Ministry of Transport is accelerating projects outlined in the master plan related to BIMSTEC transportation connectivity, focusing on road and rail transportation, seaports and water transportation, as well as aviation and airport development.

2.9.4 Mekong Lancang Cooperation: MLC

The Mekong-Lancang Cooperation (MLC) comprises 6 member countries: Cambodia, Laos, Myanmar, Vietnam, Thailand, and China. It aims to develop cooperation frameworks in the Mekong River Basin with a focus on sustainable development, reducing disparities, and promoting ASEAN integration. Member countries continuously discuss and develop cooperation frameworks in three main areas: politics and security, sustainable economic development, and social, cultural, and people-to-people exchanges. China has established the Lancang-Mekong Cooperation Special Fund with over 300 million US dollars to push forward various projects such as developing cross-border economic zones, facilitating border infrastructure development, implementing a customs tracking system, and advancing e-commerce in rural areas, as well as studying regulations related to cross-border e-commerce.

The impact of MLC (Mekong-Lancang Cooperation) on Chiang Khong District, Chiang Rai Province, Thailand, faces challenges where China is the key determinant of significant economic and security development directions. As the country of origin for the Mekong River (Lancang in China), China uses this factor to set the development agenda and control the management of the Lancang-Mekong River, exemplified by projects such as dam construction, navigation channel projects, and rapid blasting projects. The text suggests that if the five mainland ASEAN countries can achieve unified solidarity, it would give them greater negotiating leverage with China.

2.9.5 One Belt One Road

The 21st Century Silk Road Strategy, or Belt and Road Initiative (BRI), was initiated by China in 2013 AD and is expected to be completed in 2049 AD. Its goal is to connect Asia, Europe, and Africa through land and maritime networks to boost trade and economic growth. It covers six major economic corridors, such as China-Eurasia, China-Mongolia-Russia, China-Central Asia-West Asia, China-Indochina-Singapore, China - Pakistan, and China-Myanmar-Bangladesh-India. Thailand plays a key role through the Bangkok-Nong Khai High-Speed Rail Project, which connects the rail networks of Thailand, ASEAN, and China. This also includes several port projects that can link to Western China, specifically Laem Chabang Port and Chiang Khong/Chiang Saen Commercial Port, as well as the U-Tapao Aircraft Maintenance Center Project, which will be the largest MRO (Maintenance, Repair, and Overhaul) center in ASEAN. This unified network of connectivity will make ASEAN a significant part of the Belt and Road Initiative.

2.9.6 Comprehensive and Progressive Agreement for Trans - Pacific Partnership: CTCPP

The Trans-Pacific Partnership (TPP) originally had 12 member countries: the United States, Australia, Brunei, Canada, Chile, Malaysia, Mexico, New Zealand, Peru, Singapore, Vietnam, and Japan. Following the withdrawal of the United States, the membership was reduced to 11 countries (CPTPP - Comprehensive and Progressive Agreement for Trans-Pacific Partnership). The combined Gross Domestic Product (GDP) and market size of these 11 member countries are substantial both economically and in terms of market scale. In 2022 AD, China and South Korea officially joined as members (Note: As of the current time, China and South Korea have applied but are not yet official members of CPTPP).

Regarding the pros, cons, and readiness of Thailand to accept the obligations of the CPTPP Agreement, the impact on the agricultural sector involves two main critical issues: 1) Plant Varieties: Member countries must adhere to the UPOV 1991 Convention, raising concerns that farmers would be unable to save propagating material for replanting, and that Thai seed varieties could face commercial monopolization. 2) Trade in Goods: CPTPP members eliminate or reduce import tariffs on products among themselves by as much as 95 - 100%, which would affect Thai agricultural products with lower competitive potential, such as livestock and fishery products.

2.9.7 Ayeyawady-Chao Phraya-Mekong Economic Cooperation Strategy: ACMECS

The Ayeyawady-Chao Phraya-Mekong Economic Cooperation Strategy (ACMECS) is a subregional economic cooperation initiative involving Cambodia, Laos, Myanmar, Thailand, and Vietnam (the CLMVT group of countries), aimed at promoting balanced joint development and sustainable prosperity in the subregion. The cooperation strategy focuses on reducing the economic gap among member states and covers six key areas: 1) Trade and investment facilitation, 2) Cooperation in agriculture and industry, 3) International transport connectivity, 4) Tourism cooperation, 5) Human resource development, and 6) Public health cooperation.

The ACMECS Strategy aligns with the GMS (Greater Mekong Subregion) framework in developing border economic areas and increasing physical and regulatory connectivity in the region, with Thailand serving as the main coordinator. Key projects being implemented include promoting the use of local currencies in border trade, streamlining customs and cross-border transport procedures into a Single Window system, and Transport Cooperation, especially on routes R12 and R9 to connect with China. It also involves upgrading three key border checkpoints and establishing 17 pairs of border twin cities in provinces such as Buriram, Udon Thani, and Surin, in cooperation with Kampong Thom Province in Cambodia. These efforts have been underway since 2018 AD through collaboration between government, private sectors, and member countries to enhance the efficiency of trade, investment, and the movement of goods in the region.

The latest results of this cooperation include securing the first group of Development Partners: China, the United States, South Korea, India, and Australia, as well as a second group that includes New Zealand and Israel.

2.10 Reviewing Indicators Related to Transportation and Logistics

2.10.1 Logistics Indicators

Logistics systems consist of diverse and complex components, leading to varied criteria in logistics systems. These variations are aimed at achieving organizational success, resulting in different sets of performance indicators. To standardize and compare countries' levels in evaluating efficiency, the Logistics Performance Index (LPI) established by the World Bank is widely used. It serves as a comprehensive assessment tool for logistics systems to identify strategies for creating opportunities and enhancing competitiveness. Additionally, comparing logistics performance affects investment considerations within and among countries (Rezaei et al., 2018; The World Bank, 2018). The LPI comprises two parts: the International Logistics Performance Index (ILPI) and the Domestic Logistics Performance Index (DLPI). Starting from 2007, it evaluates and compares logistics performance across 160 countries. In the latest rankings in 2023, Thailand was ranked 34th out of 139 countries. The World Bank ceased data collection after the release of the 2018 LPI report.

In addition to LPI, other logisctis indicators include:

1) **National Logistics Cost (NLC)**

The Thai government has issued a total of three National Logistics System Development Strategic Plans aimed at developing logistics infrastructure and reducing related costs. The core development areas focus on transport, trade, information technology, and personnel. Furthermore, the Action Plan for the Development of Thailand's Logistics System (2023-2027 AD), designed to align with the country's development policies in a directed and efficient manner, has been established to enhance national competitiveness. This plan outlines five main development approaches: 1) Development of infrastructure and facilities; 2) Raising standards and adding value to the supply chain; 3) Improving customs procedures, import-export processes, and facilitation of international transport; 4) Enhancing the potential of Thai logistics service providers; and 5) Promoting research, development, and innovation, personnel development, and logistics performance monitoring.

2) **The Industrial Logistics Performance Index, as measured by the Ministry of Industry**

The Logistics Office of the Department of Industrial Works and Mines, Ministry of Industry, has divided the performance index into three parts: 1) Industrial Logistics Performance Index (ILPI), 2) Supply Chain Performance Index (SCPI), and 3) Logistics Management Potential Index.

2.10.2 Transportation Indicators

The Office of Transport and Traffic Policy and Planning (OTP) recognized the importance of enhancing national competitiveness through the readiness of transport and traffic systems. In 2015 AD, the OTP undertook a study to develop performance indicators for transport and traffic and to establish an information database for these indicators. Consequently, a total of 44 performance indicators suitable for Thailand were developed, covering all modes of travel and transport, and grouped into four categories: Service Capability, Service Quality, Utilization, and Safety.

Data collection involved gathering relevant strategies and policies from transport agencies under the Ministry of Transport, studying indicators through the following strategic and action plans:

1) Ministry of Transport Strategy Plan 2023 - 2027 AD (Revised)
2) Transport and Traffic System Development Plan 2023 - 2037 AD
3) Department of Highways Strategy Plan 2023 - 2027 AD
4) Executive Summary, Department of Highways Strategy Plan 2023 - 2027 AD
5) Department of Land Transport Strategy Plan 2023 - 2027 AD
6) Marine Department Strategy and Action Plan 2023 - 2027 AD
7) Action Plan under the 5-Year Strategy Plan 2023 - 2027 AD
8) Office of Transport and Traffic Policy and Planning Strategy Plan 2023 - 2027 AD

The study of logistics performance indices indicates that freight transport costs have the most significant impact on the efficiency of international logistics systems, reflecting Thailand's competitive advantages and disadvantages, and linking to logistics infrastructure, services, and management. Application within the GMS (Greater Mekong Subregion) framework can be implemented in key Thai transport strategic areas, such as Route R12 (Route 1: Nakhon Phanom Checkpoint (Thailand) - Thakhek Checkpoint (Lao PDR) - Nampao-Jalor Checkpoint (Vietnam) - Huu Nghi Checkpoint - Youyiguan Checkpoint (China); Route 2: Nakhon Phanom Checkpoint (Thailand) - Nampao Checkpoint - Jalor Checkpoint (Vietnam) - Mong Cai Checkpoint - Dongxing Checkpoint (China)) and Route R9 (connecting from the Andaman Sea (Myanmar) - through Thailand (Mae Sot-Mukdahan) - Lao PDR (Savannakhet) - South China Sea (Da Nang, Vietnam)), border checkpoints, and main border towns, starting from 2022 AD. The focus is on building infrastructure networks, improving customs procedures, and developing logistics service providers in cooperation with member countries to enhance connectivity, reduce freight costs, and raise Thailand's competitive potential in the region.

2.11 Reviewing Relevant Laws, Regulations, and Announcements

The analysis of relevant laws, regulations, and announcements, totaling 9 laws and frameworks are summarized. These include laws related to customs procedures, transportation and logistics, tourism, urban planning, and others. The summary is as shown in **Table 2.11-1**

Table 2.11-1 Reviewing Relevant Laws, Regulations, and Announcements

Relevant Law/Agreement Framework	Enacting Act/Ministerial Regulation/Related Announcement	Review Findings
1. Laws related to Customs Procedures	1.1 Customs Act B.E. 2560 (2017 AD); 1.2 Ministerial Regulation on Permission for the Establishment and Cessation of Bonded Warehouses, Stable Goods Depots, and Licensed Ports B.E. 2560 (Issued on 13 November 2017 AD) 1.3 Customs Department Announcements (No. 139/2560, No. 100/2561, No. 185/2564) on Electronic Transit Customs Procedures 1.4 Customs Department Announcement No. 140/2560 on Electronic Transshipment Customs Procedures 1.5 Customs Department Announcement No. 32/2561 on Exporting Goods outside the Kingdom by Other Means than Approved 1.6 Customs Department Announcement No. 141/2560 on Transit Customs Procedures under the Road Transport Agreement between the Government of the Kingdom of Thailand and the Government of the Lao People's Democratic Republic 1.7 Customs Department Announcements No. 132/2561 and No. 133/2561 on Electronic Customs Procedure Handbooks for Import and Export Processes 1.8 Customs Department Announcement No. 134/2561 on Electronic Customs Procedures 1.9 Customs Department Announcement No. 144/2561 on Customs Procedures for Cross-Border Movement of Vehicles under the Memorandum of Understanding on the Implementation of the GMS Cross-Border Transport Agreement in the Initial Stage (Issued on 30 May 2018 AD)	Announcements arising from the objectives of the relevant supervising agencies cover 17 laws (as per Customs Announcement No. 169/2563 on the ASEAN Transit System), requiring goods inspection and the preparation of transit documents. The purpose of these relevant laws is for national security and stability. Even if some goods are not covered by these 17 laws, the Customs Department has the authority to inspect them under Sections 104-106 of the 2017 AD Customs Act.

Relevant Law/Agreement Framework	Enacting Act/Ministerial Regulation/Related Announcement	Review Findings
2. Laws related to Transport and Trucks	2.1 Land Transport Act B.E. 2522 (1979 AD) 2.2 Motor Vehicle Act B.E. 2522 (1979 AD) and Amendments 2.3 Land Traffic Act B.E. 2522 (1979 AD) and Amendments	The laws concerning land transport and motor vehicles contain regulations on organizing road transport by vehicles, bringing foreign vehicles across the border into the country, and loading requirements for the safety of transport operators.
3. Laws related to Transport and Logistics	3.1 Civil and Commercial Code 3.2 Carriage of Goods by Sea Act B.E. 2534 (1991 AD) 3.3 Multimodal Transport Act B.E. 2548 (2005 AD)	Currently, the laws used in the logistics system are the Civil and Commercial Code concerning the nature of carriage and the Multimodal Transport Act. For international cross-border transport, in addition to the International Road Transport Act, the Cross-Border Transport Facilitation Act B.E. 2556 (2013 AD) was enacted to facilitate the transportation of goods for operators.
4. Laws related to Rail Transport	4.1 State Railway of Thailand Act B.E. 2494 (1951 AD) 4.2 Draft Rail Transport Act	The State Railway of Thailand (SRT) has a policy to allow the private sector to co-use the tracks during non-service hours, provided the private entity pays a track rental fee to the SRT. The private co-user must comply with SRT regulations and be subject to the licensing and standards supervision of the Department of Rail Transport. The policy-setting direction of the SRT and the strategy for developing rail transport must not conflict with the SRT Act.
5. Laws related to Water Transport	5.1 Navigation in Thai Waters Act B.E. 2456 (1913 AD) 5.2 Collision Prevention at Sea Act B.E. 2522 (1979 AD) 5.3 Thai Vessel Act B.E. 2481 (1938 AD) 5.4 Promotion of Commercial Navigation Act B.E. 2521 (1978 AD) 5.5 Carriage of Goods by Sea Act B.E. 2534 (1991 AD)"	The Marine Department has the duty to regulate water transport and commercial navigation and cooperate with relevant organizations both domestically and internationally, in line with international conventions and agreements. However, water transport operators still face obstacles related to various charges in the area, in addition to the rates set by the agency, which impede water transport.
6. Laws related to Air Transport	6.1 Air Navigation Act B.E. 2497 (1954 AD) 6.2 International Air Carriage Act B.E. 2558 (2015 AD)"	The Royal Ordinance on Civil Aviation of Thailand B.E. 2558 (2015 AD) defines the powers and duties of the Civil Aviation Authority in both (1) Civil Aviation Regulation and Control (e.g., setting standards, monitoring) and (2) Air Transport Economics (e.g.,

Relevant Law/Agreement Framework	Enacting Act/Ministerial Regulation/Related Announcement	Review Findings
		regulating fares, fees, and proposing the allocation of flight rights to Thai and foreign aircraft/airlines).
7. Laws related to Tourism	7.1 Tourism Authority of Thailand Act B.E. 2522 (1979 AD) 7.2 Tourism Industry Council of Thailand Act B.E. 2544 (2001 AD) 7.3 National Tourism Policy Act B.E. 2551 (2008 AD) 7.4 Immigration Act B.E. 2522 (1979 AD)"	Review of tourism-related laws found that there are multiple laws and agencies involved in setting tourism development policy, leading to duplication of duties in policy-setting for some agencies (e.g., National Tourism Policy Committee and TAT Committee). There are also public organizations focused on developing sustainable tourism in special areas defined by the National Tourism Policy Act.
8. Laws related to Foreign Labor	8.1 Royal Decree on Managing the Work of Foreigners B.E. 2560 (2017 AD) 8.2 Immigration Act B.E. 2522 (1979 AD) 8.3 Labour Protection Act B.E. 2541 (1998 AD) and Amendments 8.4 Social Security Act B.E. 2533 (1990 AD) and Amendments 8.5 Workmen's Compensation Act B.E. 2537 (1994 AD)"	Review of foreign labor laws found that the permit process may still involve multiple steps. However, employers can register foreign workers, and those who enter legally receive benefits as stipulated by Thai law, in line with ILO conventions (non-discrimination/equal national treatment).
9. City Planning Law	9.1 City Planning Act B.E. 2562 (2019 AD)	Review and analysis found that the land use, land utilization, and activities of each province are not consistent with reality, leading to non-compliance with provincial and comprehensive city planning policies for urban development, transport, and public utilities. It is recommended that joint action be considered for the process of setting comprehensive city plans for each province, as urban conditions are changing rapidly due to transport infrastructure development and urban expansion.

Source: Analyzed by the Consultant

Chapter 3

Review the existing transportation infrastructure and analyze the travel and freight demand of passengers and freight within the study area

Chapter 3

Review the existing transportation infrastructure and analyze the travel and freight demand of passengers and freight within the study area

3 Review the existing transportation infrastructure and travel demand of passengers and freight within the study area

3.1 Travel Data, Freight Transport, and Existing Infrastructure

The consultant has conducted a comprehensive review of the existing infrastructure across all modes of transportation- road, rail, water, and air. The reviewed infrastructure data were subsequently analyzed to assess the capacity and potential of the system in accommodating passenger travel and freight transport demand within the study area. In addition, the current traffic and transportation issues were examined to identify existing challenges.

3.1.1 Existing Transportation Infrastructure

The consultant has compiled information on the existing infrastructure, with details as follows:

Existing Road Infrastructure

As of the present, Thailand has a road network totaling 703,634 kilometers, which includes both national and local roads. The national road network, comprising roads managed by the Department of Highways, the Department of Rural Roads, and the Expressway Authority of Thailand, totals 102,181 kilometers. The local road network, managed by the Department of Local Administration and Bangkok Metropolitan Administration, accounts for 601,453 kilometers, as shown in **Table 3.1-1**

Table 3.1-1 Road Length in Thailand by Responsible Authority, 2022

Responsible Authority	Types of roads	Distance (Kilometers)
Department of Highways (DOH)	Primary and Secondary Roads	52,302.54
Department of Rural Roads (DRR)	Primary and Secondary Roads	49,653.79
Department of Local Administration (DLA)	**Local Roads**	597,667.33
Bangkok Metropolitan Administration (BMA)	**Local Roads**	3,785.21
Expressway Authority of Thailand (EXAT)	Expressways	224.60
Total		**703,633.47**

Source: Transport Infrastructure Report, Ministry of Transport, 2022

Existing Rail Transportation Network

Rail transport in Thailand is managed by the State Railway of Thailand (SRT). The SRT rail network providing passenger and freight services has a total length of 4,044 kilometers, consisting of approximately 2,974 kilometers of single-track lines (73.54%), about 963 kilometers of double-track lines (23.81%), and around 107 kilometers of triple-track lines (2.65%). In the Northern and Northeastern regions, the total rail length is 1,875 kilometers, as summarized in **Table 3.1-2**

Table 3.1-2 Existing Rail Line Length by Route in the Northern and Northeastern Regions

Line	From Station	To Station	Distance (kilometers)	Remarks
Northern Line	Bangkok Station	Chiang Mai Station	751	Main Line
	Ban Dara Junction	Sawankhalok	30	Branch Line (Passenger)
Northeastern Line	Ban Phachi Junction	Nakhon Ratchasima Station	174	Main Line
	Kaeng Khoi Junction	Bua Yai Junction	251	Main Line
	Nakhon Ratchasima Station	Ubon Ratchathani	311	Main Line
	Thanon Chira Junction	Nong Khai	358	Main Line
Total Distance			**1,875**	

Source: Transport Infrastructure Report, Ministry of Transport, 2022

Remark: Excludes branch lines accessing quarries for road maintenance.

Existing Water Transportation Network

Domestic water transportation in Thailand is divided into inland waterway transport and coastal transport. The inland waterway routes include the Chao Phraya, Pa Sak, Bang Pakong, Mae Klong, and Tha Chin rivers. Coastal transport routes primarily have origin or destination points along the coasts of the Central, Eastern, and Southern (Gulf of Thailand) regions. International water transportation includes maritime shipping and transport along the Mekong River between the countries of the Greater Mekong Subregion (China, Myanmar, Thailand, and Lao PDR). The collected data on water transport networks and services were obtained from relevant authorities, including the Marine Department, the Port Authority of Thailand, and the Customs Department.

Existing Air Transportation Network

At present, Thailand has nearly 100 airports, both state-owned and private. Most of these are small airports used for domestic flights and military airports, which do not provide general passenger services. Considering commercial airports, there are a total of 39 airports: 6 managed by Airports of Thailand Public Company Limited (AOT), 29 managed by the Department of Airports (DOA), 3 managed by Bangkok Airways Public Company Limited, and 1 operated by the Royal Thai Navy.

3.1.2 Transportation Connectivity with Neighboring Countries

Internationally Connected Infrastructure: The consultant has examined the framework of economic cooperation within the Greater Mekong Subregion (GMS), which comprises six countries: Thailand, Myanmar, Lao PDR, Cambodia, Vietnam, and southern China, covering an area of 2.6 million square kilometers. Within this framework, there are economic corridors related to Northern and Northeastern Thailand, totaling two corridors: 1) the North-South Economic Corridor (NSEC) and 2) the East-West Economic Corridor (EWEC).

3.2 Secondary Data on Freight Transport, Economic, and Social Conditions in the Study Area

The consultant has compiled secondary data on the economic and social aspects of the study area, as shown in **Table 3.2-1**

Table 3.2-1 Secondary data on the economic and social aspects of the study area

Region	Provincial Group	Province	Population 2023 (Million People)	No. of Households 2023 (Million ouseholds)	Gross rovincial Product (GPP) 2023 (Trillion THB)	Average Monthly Income per Household 2023 (THB)	Employment 2023 (Thousand People)	Industry Data 2023		
								Total Investment (Million THB)	No. of Workers (People)	No. of Factories (Units)
Northern Region	Upper North 1	Chiang Mai	1.797	884	154,899	29,252	1,036	12,298	11,955	363
		Mae Hong Son	0.288	122	8,261	18,509	146	54,770	5,346	121
		Lampang	0.711	305	40,402	24,039	370	21,036	22,591	266
		Lamphun	0.398	191	54,530	25,535	233	19,421	12,572	343
		Total	**3.195**	**1,502**	**258,092**	**24,334**	**1,784**	**107,524**	**52,464**	**1,093**
	Upper North 2	Chiang Rai	1.299	586	56,990	15,745	600	2,838	2,035	194
		Nan	0.473	178	19,889	20,376	254	3,572	1,873	124
		Phayao	0.458	202	18,608	17,391	177	4,065	2,066	134
		Phrae	0.426	184	17,716	25,290	202	14,002	6,528	249
		Total	**2.656**	**1,151**	**113,203**	**19,701**	**1,232**	**24,476**	**12,502**	**701**
	Lower North 1	Tak	0.692	237	32,465	22,647	288	19,795	7,156	233
		Phitsanulok	0.842	369	52,931	26,225	509	36,274	12,069	247
		Phetchabun	0.967	378	43,714	27,717	481	15,255	3,425	266
		Sukhothai	0.578	227	27,885	26,857	351	10,677	2,282	190
		Uttaradit	0.44	178	24,057	24,941	213	26,612	6,264	387
		Total	**3.518**	**1,389**	**181,052**	**26,435**	**1,841**	**108,613**	**31,196**	**1,323**
	Lower North 2	Kamphaeng Phet	0.705	288	63,230	22,442	435	56,024	7,382	233
		Nakhon Sawan	1.022	434	60,751	23,139	504	32,291	6,849	466

Region	Provincial Group	Province	Population 2023 (Million People)	No. of Households 2023 (Million ouseholds)	Gross rovincial Product (GPP) 2023 (Trillion THB)	Average Monthly Income per Household 2023 (THB)	Employment 2023 (Thousand People)	Industry Data 2023		
								Total Investment (Million THB)	No. of Workers (People)	No. of Factories (Units)
		Phichit	0.522	205	22,825	22,927	280	7,653	3,674	95
		Uthai Thani	0.322	130	16,670	20,608	145	1,780	677	82
		Total	**2.571**	**1,057**	**163,476**	**22,279**	**1,364**	**97,747**	**18,582**	**876**
	Total Northern Region		**11.94**	**5,099**	**715,823**	**20,616**	**6,191**	**338,360**	**338,360**	**114,744**
Northeastern Region	Upper Northeast 1	Bueng Kan	0.42	146	36,912	25,137	178	9,175	2,810	69
		Loei	0.635	237	34,198	23,766	271	3,372	4,278	175
		Nong Khai	0.514	188	25,641	26,201	221	10,061	2,618	277
		Nong Bua Lamphu	0.507	160	18,296	24,491	263	16,297	7,132	140
		Udon Thani	1.559	557	73,223	21,212	645	11,763	5,655	282
		Total	**3.635**	**1,288**	**188,270**	**24,161**	**1,577**	**50,668**	**22,493**	**943**
	Upper Northeast 2	Nakhon Phanom	0.714	243	26,347	22,099	288	14,535	2,070	122
		Mukdahan	0.352	125	18,031	24,925	238	11,592	3,109	81
		Sakon Nakhon	1.143	408	38,002	20,652	448	15,504	3,296	254
		Total	**2.209**	**775**	**82,380**	**22,610**	**974**	**41,630**	**8,475**	**457**
	Central Northeast	Kalasin	0.968	327	36,243	20,600	401	41,795	11,573	312
		Khon Kaen	1.779	681	132,430	19,326	961	27,528	6,452	166
		Maha Sarakham	0.938	318	36,912	21,169	416	10,874	1,756	131
		Roi Et	1.285	413	46,669	20,354	582	20,878	3,793	278
		Total	**4.97**	**1,739**	**252,254**	**20,812**	**2,361**	**101,075**	**23,574**	**887**

Region	Provincial Group	Province	Population 2023 (Million People)	No. of Households 2023 (Million ouseholds)	Gross rovincial Product (GPP) 2023 (Trillion THB)	Average Monthly Income per Household 2023 (THB)	Employment 2023 (Thousand People)	Industry Data 2023		
								Total Investment (Million THB)	No. of Workers (People)	No. of Factories (Units)
	Lower Northeast 1	Chaiyaphum	1.113	419	42,030	22,778	488	93,087	47,487	605
		Nakhon Ratchasima	2.626	1,063	197,633	27,775	1,257	82,690	27,884	327
		Buriram	1.573	498	58,412	21,961	660	21,865	6,061	216
		Surin	1.368	421	**50,138**	22,216	506	5,720	3,406	193
		Total	**6.68**	**2,401**	**348,213**	**23,108**	**2,912**	**203,362**	**84,838**	**1,341**
	Lower Northeast 2	Yasothon	0.529	187	18,968	24,439	280	9,821	2,098	224
		Sisaket	1.45	416	43,287	19,858	558	12,014	2,864	182
		Amnat Charoen	0.374	127	12,496	28,515	150	24,505	3,018	329
		Ubon Ratchathani	1.87	653	80,565	20,317	900	21,273	12,841	493
		Total	**4.223**	**1,382**	**155,316**	**23,247**	**1,889**	**67,614**	**20,821**	**1,228**
	Total Northeastern Region		**21.717**	**7,586**	**1,026,433**	**22,788**	**9,712**	**464,349**	**464,349**	**160,201**

Source : Department of Provincial Administration, Ministry of Interior, 2023
Office of the National Economic and Social Development Council (NESDC), Office of the Prime Minister, 2022
Household Socio-Economic Survey, National Statistical Office (NSO), Ministry of Digital Economy and Society, 2023
Informal Labour Survey, National Statistical Office (NSO), Ministry of Digital Economy and Society, 2023

3.2.1 Data on Agriculture and Agricultural Products

Based on the compilation of secondary data on agriculture and products, referencing the Regional Development Plan (2023 - 2027), it was found that the Northeastern Region, in 2019, had a total utilized agricultural area of 63.86 million rai, accounting for 42.8% of the country's total utilized agricultural area. The majority of this area is in the Lower Northeast, which generally has a relatively flat terrain suitable for planting rice and field crops, while the Upper Northeast has less agricultural land because its terrain consists of high mountains alternating with foothills, making it unsuitable for agriculture. Key crops produced include rice, sugarcane for factories, and cassava, and the Northeastern Region is also the largest rice-growing area in the country.

In 2019, the Gross Agricultural Product (GAP) of the Northeastern Region had a total value of 308,575 million baht, accounting for 19.3% of the Northeast's Gross Regional Product (GRP). Most farmers cultivate Hom Mali 105 fragrant rice in the central and lower areas of the Northeast, especially the Thung Kula Rong Hai area, covering the provinces of Yasothon, Sisaket, Surin, Maha Sarakham, and Roi Et, and the Thung Samrit area, covering the provinces of Nakhon Ratchasima and Buriram. Sugarcane is mostly grown in the provinces of Nakhon Ratchasima, Chaiyaphum, Khon Kaen, Kalasin, and Udon Thani, and cassava in the provinces of Nakhon Ratchasima, Chaiyaphum, and Udon Thani.

Regarding organic rice cultivation, currently 80.0% of Thailand's organic rice growing areas are in the Northeastern Region, especially in the Thung Kula Rong Hai area (Yasothon, Surin, Maha Sarakham, Sisaket, Roi Et) and Ubon Ratchathani province. The remaining 20.0% is in the Upper North. The organic rice market primarily involves exporting abroad, especially to the European Union.

The Northern Region, in 2019, had a total utilized agricultural area of 32.5 million rai, accounting for 21.8% of the country's total utilized agricultural area. The majority of this is in the Lower North, which is a flat area of 21.9 million rai. Key crops produced include rice, sugarcane for factories, and cassava. The Upper North has 10.6 million rai, which is an important area for the production of vegetables and fruits.

In 2019, the Gross Agricultural Product (GAP) of the Northern Region had a total value of 333,195 million baht, accounting for 25.6% of the North's total Gross Regional Product (GRP).

3.2.2 Data on Industry

Based on the compilation of secondary industry data, referencing the Regional Development Plan (2023 - 2027), it was found that the industries in the Northeastern Region largely consist of traditional industries involving the primary processing of agricultural goods for export to be further processed and valued in other areas, and their share has been continuously decreasing compared to the country.

In 2019, the industrial sector accounted for 21.4% of the Northeastern economic structure and 6.5% when compared to the value of the country's industrial sector. Key manufacturing industry sub-sectors include Food and Beverage Products having the highest share at 61.9%, followed by the manufacturing of Computer and Electronic Products, Rubber and Plastic Products, Chemicals and Chemical Products, Apparel and Clothing, and Other Non-Metallic Mineral Products, with shares of 8.9, 7.2, 3.9, 3.8, and 2.4, respectively.

The region's industries are mostly concentrated in main cities such as Khon Kaen and Nakhon Ratchasima provinces. The industrial production structure is still dominated by the Food and Beverage group, while the electronics, rubber and plastic products, and textile industries are starting to play a more significant role and are becoming a new income base for the region. The electronics industry is concentrated in Nakhon Ratchasima province at 97.9% of the sector. The textile industry is mostly distributed across all provinces, with the top 5 provinces by share in the region being Khon Kaen, Maha Sarakham, Nakhon Ratchasima, Chaiyaphum, and Udon Thani.

Regarding the rubber and plastic products industry, it is mostly concentrated in Nakhon Ratchasima, Udon Thani, Bueng Kan, and Buriram provinces. Industries that were previously the region's original base are starting to show an increasing trend, such as the apparel industry, which increased from 3.1% to 3.4% of the industrial sub-sectors. The top 5 provinces by share in the region are Khon Kaen, Surin, Nakhon Ratchasima, Ubon Ratchathani, and Roi Et. Regarding the renewable energy industry (Ethanol), the current average production volume is 2.3 million liters per day, or 38.5% of the total national production.

The industrial sector in the Northern Region, in 2019, accounted for 19.7% of the region's economic structure and 4.9% of the value of the country's industrial sector. Northern industries are mostly basic industries, relying on local resources such as agricultural raw materials, kaolin, and processed wood, and are primarily labor-intensive.

The important industries in the North include Food and Beverage Products having the highest share and continuously expanding at 64.9%, mostly located in Kamphaeng Phet province. Followed by the manufacturing of Computer and Electronic Products, Non-Metallic Mineral Products, Apparel, Fabricated Metal Products, and Textiles.

The Northern Industrial Estate serves as a vital production base for electronic components. In 2020, there were 23 electronics factories in the Northern Industrial Estate, accounting for 31.9% of the factories in the estate. These factories produce electronic components such as Integrated Circuits (IC), Printed Circuit Boards (PCB), and Hard Disk Drives (HDD), for which demand is increasing due to the digital technology shift and the Internet of Things (IoT).

The Food industry group ranks among the top 3 investment categories in all provincial groups of the Northeast and North. The Food industry group with the highest investment, 222,405.90 million baht, is in the Lower North 2 group. Followed by the Lower Northeast 1 provincial group, with an investment of 194,130.66 million baht. The Upper Northeast 1 provincial group has an investment of 153,452.91 million baht. The Lower North 1 provincial group has an investment of 136,240.35 million baht. The Central Northeast provincial group has an investment of 78,745.43 million baht. The Upper North 1 provincial group has an investment of 55,579.88 million baht. The Lower North 2 provincial group has an investment of 15,023.94 million baht. And the Upper North 2 provincial group has an investment of 11,707.54 million baht, respectively. The Lower Northeast 2 and Upper North 2 groups have the highest investment in the Plant Product industry group for their respective provincial groups, with 53,827.72 million baht and 32,321.18 million baht.

3.2.3 Data on Trade

The consultant has conducted a study and review of statistical data on trade and investment, which is divided into two parts: border and transit trade data and import-export data.

- Border and Transit Trade Data

Border trade is the import and export of goods between Thailand and neighboring countries that share a border with Thailand, passing through established land border checkpoints. These neighboring countries include Malaysia, Myanmar, Lao PDR, and Cambodia.

Transit trade, on the other hand, is the export and import of goods between Thailand and a third country passing through the territory of a neighboring country that shares a border with Thailand. These third countries include Singapore, China, and Vietnam.

- Value of Imports and Exports

The value of imports and exports by customs checkpoint in 2022 (B.E. 2565) is as follows:

For Import Value, the Mukdahan Customs Checkpoint had the highest import value in the study area at 158,290.73 million baht. This was followed by the Nakhon Phanom Customs Checkpoint and the Thung Chang Customs Checkpoint, with values of 25,041.08 million baht and 24,069.81 million baht, respectively.

For Export Value, the Mukdahan Customs Checkpoint also had the highest export value in the study area at 126,068.22 million baht. This was followed by the Nong Khai Customs Office and the Nakhon Phanom Customs Checkpoint, with values of 74,814.16 million baht and 60,395.21 million baht. Detailed information is shown in **Table 3.2-2**

Table 3.2-2 มูลค่าการนำเข้า - ส่งออกสินค้ารายด่านศุลกากร ปี พ.ศ. 2560 - 2565

Million THB

No.	Customs Checkpoint	Import Value (Million Baht)						Export Value (Million Baht)					
		2017	2018	2019	2020	2021	2022	2017	2018	2019	2020	2021	2022
1	Khemarat Customs Checkpoint	140.03	127.16	106.90	36.08	47.17	34.25	659.50	710.51	631.27	102.75	-	15.68
2	Chiang Khan Customs Checkpoint	407.89	285.25	135.80	82.56	68.39	117.67	441.19	457.50	291.67	23.09	-	55.66
3	Chong Mek Customs Checkpoint	5,125.31	4,029.02	4,112.90	10,915.27	10,368.02	13,565.82	11,432.12	12,141.08	11,355.02	11,850.06	13,201.45	15,674.86
4	Chong Chom Customs Checkpoint	2,141.12	1,764.07	2,355.46	3,092.41	1,368.25	2,752.32	850.54	3,348.38	5,733.19	14,035.36	9,632.65	7,180.59
5	Chong Sa-ngam Customs Checkpoint	355.57	205.13	219.73	887.12	658.01	629.90	487.02	609.45	630.20	885.73	1,487.29	1,630.80
6	Tha Li Customs Checkpoint	850.16	905.69	3,311.62	12,446.43	14,596.87	17,340.49	4,518.03	4,705.83	4,770.05	3,938.08	4,173.80	4,126.62
7	Nakhon Phanom Customs Checkpoint	21,503.94	28,568.59	17,215.68	13,544.73	19,892.58	25,041.08	55,956.26	52,187.51	64,363.18	59,477.68	104,644.92	60,395.21
8	Bueng Kan Customs Checkpoint	417.65	578.25	435.52	744.17	760.02	1,208.99	4,167.47	4,508.33	2,430.23	2,220.57	3,009.41	4,324.89
9	Mukdahan Customs Checkpoint	70,360.65	75,825.37	78,909.98	107,582.76	158,290.73	105,229.96	123,123.36	117,216.88	119,021.84	142,273.87	182,472.14	126,068.22
10	Nong Khai Customs Office (or Nong Khai Customs Checkpoint)	7,445.73	8,815.27	7,873.33	13,577.57	10,300.08	24,484.32	51,378.27	51,215.42	49,109.40	46,616.79	64,524.41	74,814.16
11	Chiang Saen Customs Checkpoint	633.52	0.38	0.07	0.07	0.10	0.25	16,494.17	16,575.03	10,725.41	6,859.28	7,530.77	7,145.18
12	Chiang Khong Customs Checkpoint	63.52	13.31	10.31	4.02	0.05	0.31	464.96	180.52	93.54	12.63	10.74	0.36
13	Chiang Dao Customs Checkpoint	0.01	-	0.06	0.07	0.22	0.38	-	-	-	-	-	-
14	Mae Sot Customs Checkpoint	101.16	64.68	17.34	1.71	6.02	5.30	1,109.26	790.27	511.47	169.59	156.38	17.97
15	Mae Sariang Customs Checkpoint	461.04	743.91	371.87	115.83	9.13	244.60	299.06	333.62	169.92	32.12	24.00	32.93
16	Mae Sai Customs Checkpoint	205.31	315.80	360.76	1,452.32	1,839.88	1,457.04	8,103.79	10,222.74	11,679.53	11,139.67	12,058.70	18,668.98
17	Mae Hong Son Customs Checkpoint	82.16	65.05	83.96	74.63	2.65	581.03	339.51	540.39	434.82	185.05	172.17	394.51
18	Thung Chang Customs Checkpoint	19,172.15	22,169.38	21,566.49	21,868.53	21,625.99	24,069.81	4,223.44	5,065.66	3,831.59	4,044.21	3,626.55	6,412.31
19	Chiang Mai Airport Customs Checkpoint	7,011.99	6,364.78	5,692.03	1,365.62	110.65	434.65	1,437.48	1,701.35	1,606.81	452.99	0.47	269.94

Source: Customs Data Center, Customs Department, Ministry of Finance, 2022

- Cross-Border and Transit Trade Data

Cross-border trade refers to the import and export of goods between Thailand and neighboring countries sharing a land border with Thailand, through checkpoints located along the border. These neighboring countries include Malaysia, Myanmar, Lao PDR, and Cambodia. In contrast, transit trade refers to the export and import of goods between Thailand and third countries via neighboring countries that share a border with Thailand, including Singapore, China, and Vietnam.

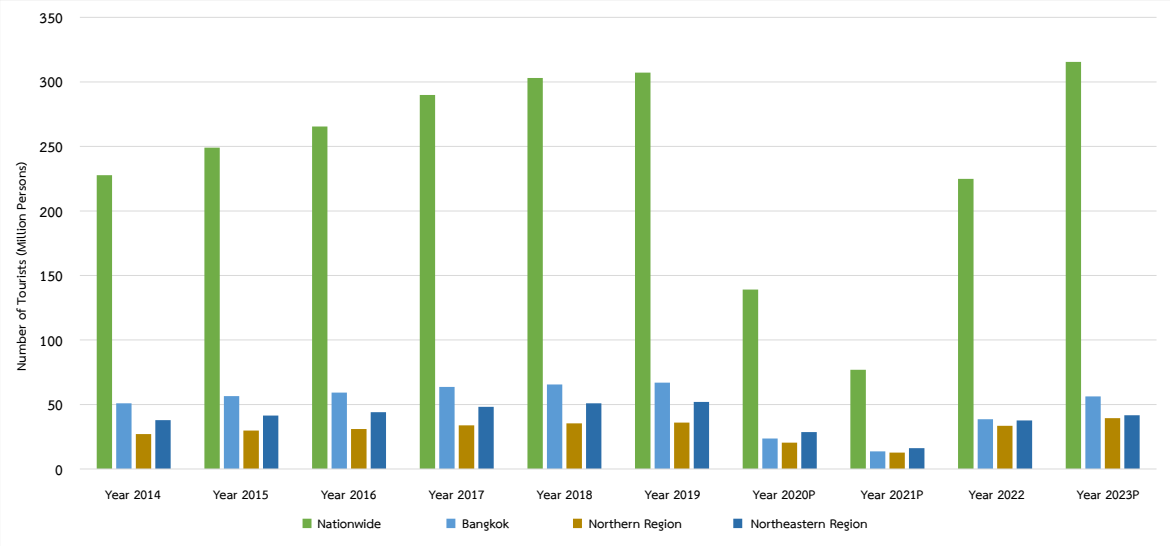
Regarding the value of imports and exports by customs checkpoints in 2022, Mukdahan Customs had the highest import value within the study area, amounting to 158,290.73 million baht, followed by Nakhon Phanom Customs and Thung Chang Customs at 25,041.08 million baht and 24,069.81 million baht, respectively. In terms of export value, Mukdahan Customs also recorded the highest export value in the study area at 126,068.22 million baht, followed by Nong Khai Customs and Nakhon Phanom Customs at 74,814.16 million baht and 60,395.21 million baht, respectively.

3.2.4 Data on Tourism

According to the Tourism and Sports Economy Division, Ministry of Tourism and Sports, in 2023, Thailand received a total of 315.5 million tourists. The annual growth rate of tourist arrivals in the country during 2014-2023 averaged 3.69% per year.

During 2020 - 2021, the COVID-19 pandemic affected Thailand and the world. The Thai government implemented measures to control and limit the number of international tourists, resulting in tourist arrivals during this period being below normal levels.

Tourist arrivals in the group of provinces in the Northeastern and Northern regions are presented in **Figure 3.2-1.**



Source: Tourism and Sports Economy Division, Ministry of Tourism and Sports, 2023

Figure 3.2-1 Tourist Arrivals, 2014 - 2023

3.2.5 Data on Population and Social Aspects

According to population statistics from the Civil Registration Office, Ministry of Interior, in 2023, Thailand had a total population of 66.053 million. The annual population growth rate nationwide during 2014-2023 averaged 0.16%.

Considering population at the regional level during 2014 - 2023, the Northeastern region, comprising Upper Northeastern Group 1, Upper Northeastern Group 2, Central Northeastern, Lower Northeastern Group 1, and Lower Northeastern Group 2, had an estimated population of approximately 21.717 million. The Northern region, comprising Upper Northern Group 1, Upper Northern Group 2, Lower Northern Group 1, and Lower Northern Group 2, had an estimated population of approximately 11.940 million.

- Gross Regional Product

The Gross Regional Product (GRP) of Thailand (chain volume measures) showed the highest 10-year backward-looking growth rate in 2019 and 2023, increasing at an average rate of 1.74% per year. The largest decline in the 10-year backward-looking growth rate occurred in 2021, with a decrease of 7.05% per year.

For the GRP at the provincial level in the Northeastern region, the highest 10-year backward-looking growth rate was observed in 2019 and 2023, increasing at an average rate of 1.88% per year. In the Northern region, the 10-year backward-looking growth rate also peaked in 2019 and 2023, with an average increase of 0.82% per year.

- Average Household Income

In 2023, the average household income in Thailand was approximately 29,030 baht per month, with the national per capita income showing an increasing trend of 2.92% per year. In the Northern region, the average household income was approximately 20,616 baht per month, with per capita income increasing at an average rate of 3.52% per year. In the Northeastern region, the average household income was approximately 22,788 baht per month, with per capita income increasing at an average rate of 3.86% per year.

- Employment

In 2023, Thailand had a total labor force of 40,091,326, with approximately 5,652,257 in Bangkok, 6,221,813 in the Northern region, and 9,712,273 in the Northeastern region. Regarding employment growth, during 2014-2023, the national labor force increased at an average rate of 0.47% per year. In Bangkok, the labor force increased at an average rate of 0.83% per year, while in the Northern and Northeastern regions, the labor force decreased at average rates of 0.57% and 0.38% per year, respectively.

3.3 Survey of Travel Demand for Passengers and Freight within the Study Area

Based on the data regarding the proportion and cost of different transportation modes (Thailand Logistics Report 2024, NESDC), it was found that Thailand's logistics cost over the past five years ranged between 13.5% and 14.3% of GDP. In 2024, this cost was as high as 13.5%, compared to the logistics cost of North America (8.7%). The high logistics cost is considered a major challenge for the country, requiring management to enhance economic competitiveness against other nations. Furthermore, Thailand is ranked 30th in the competitiveness index for 2025

Table 3.3-1 Transport System Costs in 2020

Transport Mode	Cost (Baht/ton-km)	Proportion (%)
Road	2.11	78.32
Rail	0.587	2.21
Water	0.387	19.47

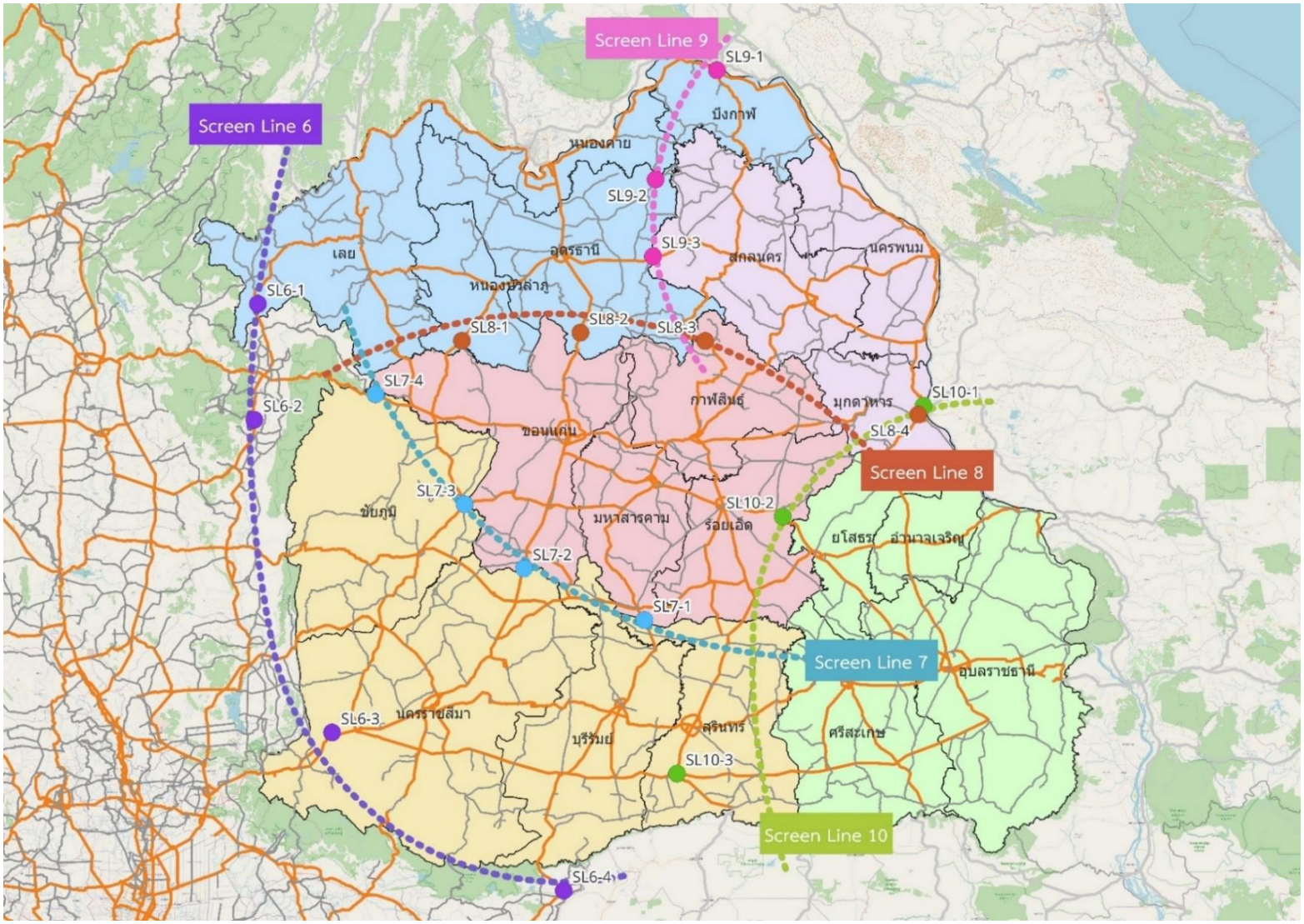
Source : Consultant, 2024

1) Traffic and Freight Volumes on Highways

1.1) Traffic Volume on the Northeastern Highway Network

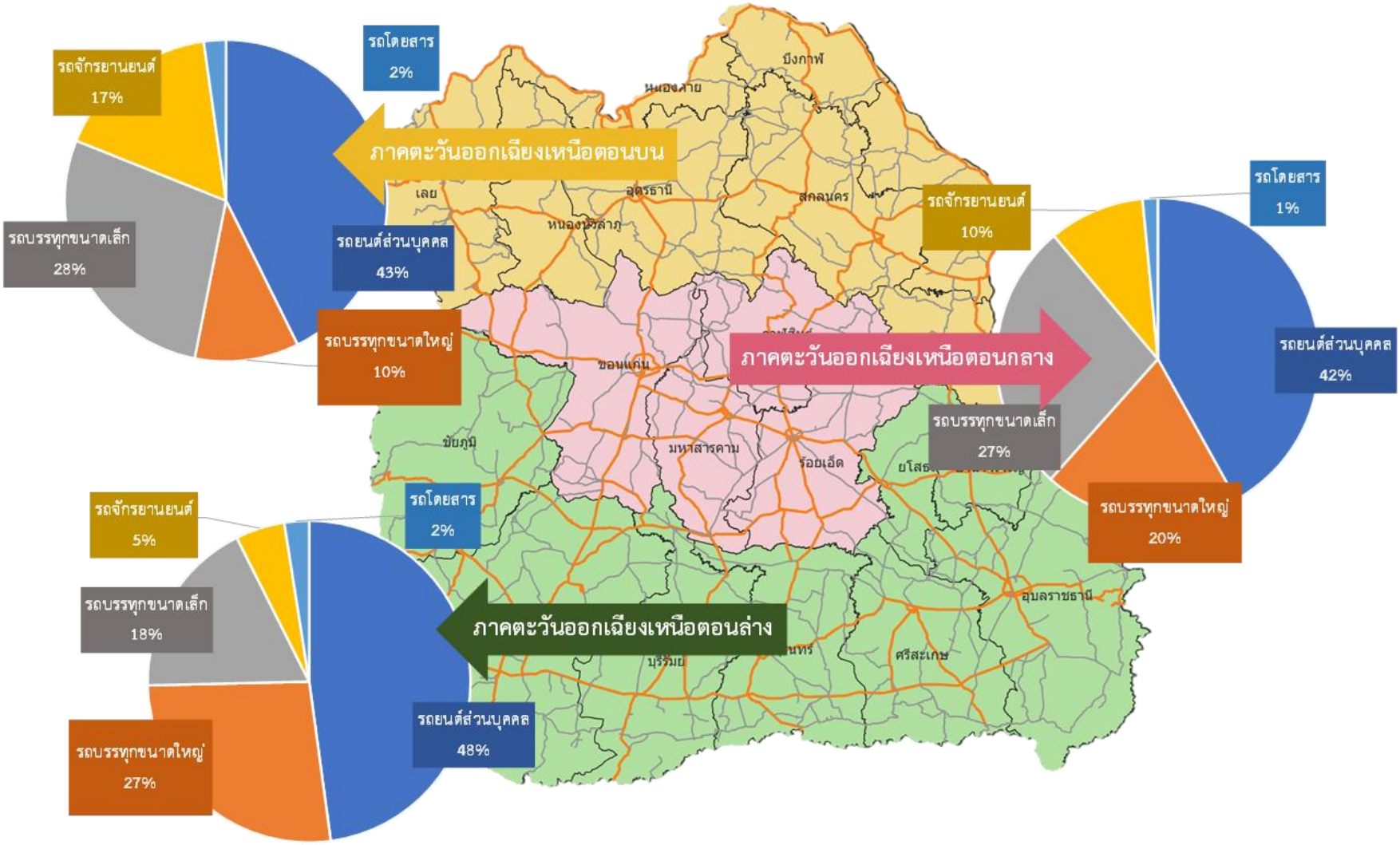
Considering traffic volumes on highways between the Northeastern sub-regions, the consultant has compiled the Annual Average Daily Traffic (AADT) for 2023 from the Department of Highways' traffic monitoring stations (on Screen Lines) under the Department of Highways' Road Safety Bureau. The data covers principal travel routes on both primary and secondary highways, as detailed in **Figure 3.3-1**.

Traffic volumes on the Northeastern highway network along the Central Corridor (Highway No. 2) ranged from 10,160 to 43,080 vehicles/day, while along the East-West Corridor (Highway No. 12), traffic volumes ranged from 5,024 to 16,387 vehicles/day. Analysis of AADT data from 2014 to 2023 indicates that, overall, traffic volumes increased at an average annual rate of 1.57%. During 2019 - 2021, traffic volumes decreased by 5.44%, likely due to the COVID-19 pandemic, but showed an upward trend of 5.37% per year during 2021 - 2023.



Source: Consultant, 2024

Figure 3.3-1 Locations of Annual Average Daily Traffic (AADT) Monitoring Stations in the Northeastern Region, 2023



Source: Road Safety Bureau, Department of Highways, 2023

Figure 3.3-2 Vehicle Composition on the Primary Highway Network in the Northeastern Region

1.2) Passenger Trips by Regular Bus Services

Travel via public transportation, specifically using public bus services, is a key travel option for citizens who don't own private vehicles. In the Northeastern Region, passenger terminals are distributed across all 20 provinces. Bus routes classified from Category 1 to Category 4 support travel connections between provinces, as well as travel to other regions in Thailand.

The Upper Northeastern Provincial Group's bus services cover all 8 provinces. Analysis showed that Udon Thani Province had the highest volume of trips. In 2019, there was a total trip volume of 1.156 million trips per day and a high passenger count of 13.51 million people. The Central Northeastern Provincial Group's bus services cover all 4 provinces. Analysis showed that Khon Kaen Province had the highest volume of trips. In 2019, there was a total trip volume of 975,612 trips per day and a high passenger count of 16.617 million people. The Lower Northeastern Provincial Group's bus services cover all 7 provinces. Analysis showed that Nakhon Ratchasima Province had the highest volume of trips. In 2019, there was a total trip volume of 1.6 million trips per day and a high passenger count of 22.43 million people.

Data on public transportation travel relative to total travel in major regional cities for 2023 is shown in **Table 3.3-2**

Table 3.3-2 Data on Public Transportation Travel at the End of 2023

Province	Total Public Transportation Passengers		Average Daily Total Trips (Person-Trips/Day)	Proportion of Public Transportation Trips in Major City Areas (%)
	Per Year (Person-Trips/Year)	Per Day (Person-Trips/Day)		
1. Nakhon Ratchasima	2,702,052	11,259	677,616	1.66
2. Khon Kaen	5,324,616	22,186	498,526	4.45
3. Udon Thani	1,888,812	7,870	358,204	2.20
4. Ubon Ratchathani	2,465,261	10,272	376,765	2.73
Overall Average (4 Provinces)				**2.76**

Remarks : 1. Data on passenger volume from the Department of Land Transport (DLT) and the State Railway of Thailand (SRT)
2. Data on travel volume from the study of public transportation travel data in major regional cities, by the Office of Transport and Traffic Policy and Planning (OTP).
3. Provinces under the Master Plan within the National Strategy (2023 - 2037) (Revised Edition)
4. Provinces that have railway stations with an origin-destination point within the city area.

English Translation

The provinces with the highest proportion of public transportation usage in their city areas are, in order: Khon Kaen Province at 4.45%, Ubon Ratchathani Province at 2.73%, Udon Thani Province at 2.20%, and Nakhon Ratchasima Province. The average proportion of public transportation usage in the city areas is 2.76%.

1.3) Freight Transportation via the Nong Khai, Mukdahan, and Chong Mek Border Checkpoints

The Nong Khai, Mukdahan, and Chong Mek border checkpoints are considered the most important international freight checkpoints in the Northeastern Region. This is because they rank as the top three checkpoints in the region by volume and value of transported goods. The Nong Khai border checkpoint is situated on the Central Economic Corridor, linking to Myanmar, Lao PDR, Southern China, and Vietnam. The Mukdahan border checkpoint is situated on the East-West Economic Corridor, linking to Myanmar, Lao PDR, and Vietnam. The border checkpoint with the highest volume of goods transported in 2022 was the Mukdahan border checkpoint, with a total volume of 2.04 million tonnes, valued at 260,140 million baht. It recorded an average annual growth rate of 19.1% from 2019 to 2022.

The subsequent rankings by trade value are the Nakhon Phanom border checkpoint, the Nong Khai border checkpoint, and the Chong Mek border checkpoint, with trade values of 90,428 million baht, 82,658 million baht, and 30,180 million baht, respectively.

2) Travel and Freight Volumes on the Rail System

The provincial groups in the Northeastern Region utilize rail transport for travel. The Northeastern Railway Line separates from the Northern Railway Line at Ban Phachi Junction Railway Station. The Lower Route passes through Saraburi, Nakhon Ratchasima, Buriram, Surin, and Sisaket provinces, terminating at Ubon Ratchathani Railway Station in Warin Chamrap District, Ubon Ratchathani Province, covering a total distance of 575 kilometers. The Upper Route separates from the Lower Route at Jira Road Junction Railway Station in Nakhon Ratchasima Province. It passes through Khon Kaen, Udon Thani, and Nong Khai provinces, crosses the First Thai-Lao Friendship Bridge, and terminates at Thanaleng Railway Station in Lao PDR, covering a total distance of 628 kilometers. Additionally, at Kaeng Khoi Junction Railway Station, there is a shortcut that connects to Bua Yai Junction Railway Station in Bua Yai District, Nakhon Ratchasima Province, on the Upper Route. Currently, almost all routes with an origin and destination that must run through the Northeast head toward their final destination of Nong Khai Province.

2.1) Passenger Travel Volume in the Northeastern Region

The consultant compiled and analyzed State Railway of Thailand (SRT) passenger volume data for the provincial groups in the Northeastern Region. It was found that in 2021, the passenger volume was 2.25 million people (accounting for 15.56% when compared to the total number of passengers nationwide). When considering the rate of change in passenger volume, a downward trend was observed between 2011 and 2021, decreasing from 7.34 million people in 2011 to just 2.25 million people in 2021, representing an annual rate of change of 10% per year. This is shown in **Table 3.3-3**

ตารางที่ 3.3-3 Volume of Rail Passenger Travel for the Northeastern Provincial Group, 2017 - 2023

Year	Number of Passengers (Persons)	Revenue (Baht)
2554	7,342,062	677,999,489.00
2555	6,760,651	574,237,327.00
2556	5,926,049	539,386,479.00
2557	5,735,190	658,080,309.00
2558	5,965,018	483,082,397.00
2559	5,807,041	481,965,831.00
2560	5,569,954	560,466,395.00
2561	5,023,129	547,143,283.00
2562	5,090,390	554,851,323.00
2563	3,655,633	376,047,184.00
2564	2,252,380	211,303,912.00
2565	2,802,844	290,743,713.00
2566	4,638,326	476,099,902.00

ที่มา: การรถไฟแห่งประเทศไทย กระทรวงคมนาคม พ.ศ. 2566

2.2) Freight Transport Volume in the Northeastern Region

Rail freight transport offers lower costs compared to other modes of transportation. However, its share relative to road freight remains significantly lower. One reason some operators do not opt for rail transport is related to scheduling reliability and the need for transshipment to other transport modes to reach final destinations.

According to the State Railway of Thailand (SRT) freight statistics, Nakhon Ratchasima and Nong Khai provinces exhibited substantial growth in rail freight volumes during 2013 - 2018, increasing from 47,343 tons in 2013 to 523,217 tons in 2018, corresponding to an average annual growth rate of 50%. Rail freight volumes declined during 2019 - 2021 at an average rate of 14% per year, coinciding with the COVID-19 pandemic. The volume rebounded in 2022, doubling to 805,954 tons.

ตารางที่ 3.3-4 Volume of Rail Freight Transport for the Northeastern Provincial Group, 2018 - 2022

Province	2018	2019	2020	2021	2022
Nakhon Ratchasima Province	29,962.99	4,278.09	30,011.52	138,585.75	352,224.78
Buriram Province	611.70	528.75	495.09	564.62	537.82
Surin Province	483.86	433.67	397.49	452.12	421.70
Sisaket Province	997.19	882.33	866.09	1,060.44	826.47
Ubon Ratchathani Province	1,154.99	1,064.44	830.99	866.15	9,172.05
Chaiyaphum Province	42.74	27.30	25.07	16.43	14.45
Khon Kaen Province	172,765.64	119,453.81	47,513.11	441.02	56,259.85
Udon Thani Province	187,188.71	142,576.01	135,176.54	71,987.75	61,661.18
Nong Khai Province	130,008.95	162,755.32	164,843.66	167,228.09	324,835.31

State Railway of Thailand (SRT), Ministry of Transport, 2022

ตารางที่ 3.3-5 Revenue from Rail Freight Transport for the Northeastern Provincial Group, 2018 - 2022

Province	2018	2019	2020	2021	2022
Nakhon Ratchasima Province	6,210,227	5,590,438	7,937,888	30,806,677	39,748,231
Buriram Province	2,114,620	1,959,066	1,776,674	1,953,112	1,888,399
Surin Province	1,896,132	1,696,164	1,464,783	1,664,658	1,606,393
Sisaket Province	3,965,150	3,511,057	3,330,708	3,948,896	3,249,122
Ubon Ratchathani Province	5,602,630	4,094,911	3,277,837	3,296,593	3,504,861
Chaiyaphum Province	106,534	77,895	53,970	50,604	53,034
Khon Kaen Province	5,210,031	5,575,235	1,711,677	1,290,737	2,866,094
Udon Thani Province	2,807,042	7,482,208	3,389,136	2,351,693	4,214,479
Nong Khai Province	4,018,867	8,621,494	5,060,373	4,763,777	37,161,376

3. Waterborne Transport and Freight Volume

Currently, Thailand's waterborne transport system is divided into inland waterway transport and coastal shipping. In the Northeastern region, passenger transport by boat is mainly used for tourism purposes. Based on statistics compiled by the Marine Department in 2023, Bueng Kan Province recorded the highest number of passenger boat trips, totaling 22,978 trips per year, with 216,372 passengers annually. This is followed by Nong Khai Province, which had 9,529 trips per year and 51,445 passengers. The provinces with the lowest number of boat trips were Mukdahan and Amnat Charoen.

4. Air Transport Volume and Demand

Currently, the Northeast region of Thailand has air travel and transport facilities comprising nine airports under the Department of Airports: Nakhon Ratchasima Airport, Buriram Airport, Ubon Ratchathani Airport, Khon Kaen Airport, Udon Thani Airport, Loei Airport, Roi Et Airport, Sakon Nakhon Airport, and Nakhon Phanom Airport.

4.1) Air travel and transport in the Upper Northeast region

The Upper Northeast provinces group has 4 airports, located in Udon Thani, Loei, Sakon Nakhon, and Nakhon Phanom provinces, with the following details:

Table 3.3-6 Number of Flights in the Upper Northeastern Provincial Group

Unit : Trips

Provinces	2019	2020	2021	2022	2023
Udon Thani Airport	18,043	12,520	5,749	12,608	12,859
Loei Airport	2,380	1,694	806	1,304	1,314
Sakon Nakhon Airport	2,857	2,530	1,184	2,280	2,396
Nakhon Phanom Airport	2,424	1,820	862	2,330	2,242
Khon Kaen Airport	14,061	9,732	4,612	10,206	10,976
Roi Et Airport	2,650	1,828	638	1,946	2,168
Nakhon Ratchasima Airport	26	0	0	38	0
Buriram Airport	3,461	2,404	841	1,732	2,042
Ubon Ratchathani Airport	12,017	8,704	4,794	8,951	8,512

Source: Airports Department, Ministry of Transport, 2025

Table 3.3-7 Passenger Statistics by Air Travel in the Upper Northeastern Provincial Group

Unit : Person

Provinces	2019	2020	2021	2022	2023
Udon Thani Airport	386,687	257,684	117,236	308,659	361,900
Loei Airport	365,924	225,284	96,772	337,713	359,189
Sakon Nakhon Airport	262,236	158,227	64,664	168,534	195,189
Nakhon Phanom Airport	2,507,926	1,410,139	659,302	1,777,551	1,898,547
Khon Kaen Airport	1,884,649	1,124,057	545,911	1,399,630	1,611,393
Roi Et Airport	383,341	212,149	74,397	266,195	348,798
Nakhon Ratchasima Airport	39	0	0	1,785	0
Buriram Airport	355,497	180,986	53,647	196,057	251,459
Ubon Ratchathani Airport	1,790,734	1,062,987	543,606	1,247,117	1,295,870

Souece: Airports Department, Ministry of Transport, 2025

Table 3.3-8 Volume of Air Freight Shipment for the Northeastern Provincial Group

Provinces	2019	2020	2021	2022	2023
Udon Thani Airport	39.52	21.39	12.10	22.26	39.05
Loei Airport	0	0.13	0	0	0
Sakon Nakhon Airport	15.67	8.46	4.05	5.29	0.73
Nakhon Phanom Airport	936.32	626.13	415.73	530.07	409.69
Khon Kaen Airport	1,884,649	1,124,057	545,911	1,399,630	1,611,393
Roi Et Airport	383,341	212,149	74,397	266,195	348,798
Nakhon Ratchasima Airport	0	0	0	0	0
Buriram Airport	0	0	0	0	0
Ubon Ratchathani Airport	575.19	259.36	169.10	339.75	313.89

Souece: Airports Department, Ministry of Transport, 2025

5. Visitor numbers and revenue

The Northeastern Region had a total of 33.5 million visitors (people traveling for tourism and other purposes, such as visiting friends/relatives) in 2022. The total revenue generated was 55,390 million baht. This was separated into 97.44% Thais and 2.56% foreigners, with an average expenditure of 1,674 baht per person for Thais and 2,637 baht per person for foreigners (data for December 2022).

Data on the number of visitors over the past 10 years (2013 - 2022) from the Ministry of Tourism and Sports shows that before the COVID-19 pandemic, during the period 2013 - 2019, the average annual increase in visitors was 5.82%. The number of visitors decreased in 2020 - 2021 and increased again in 2022, as shown in **Table 3.3-9**

Table 3.3-9 Number of Visitors and Tourism Revenue, 2013 - 2024

Year	Number of Visitors (Persons)	Total Revenue (Million Baht)
2556	31,280,716	57,017
2557	32,114,515	59,270
2558	34,931,688	66,287
2559	37,281,579	73,893
2560	40,593,815	86,722
2561	42,940,902	97,252
2562	43,857,484	11,425
2563	23,706,653	5,736
2564	13,106,658	23,140
2565	32,796,931	61,853
2566	42,342,444	94,418
2567	48,768,329	112,515

Source: Ministry of Tourism and Sports, 2025

In the Upper Northeastern Region, Udon Thani Province and Nong Khai Province had the highest numbers of visitors, equaling 4.95 million people and 3.67 million people, with revenues of 13,601 million baht and 8,615 million baht, respectively.

For the Central Northeastern Region in 2024, Khon Kaen Province had the highest number of visitors, equaling 4.68 million people, with a revenue of 15,376 million baht.

In the Lower Northeastern Region, the top three provinces with the highest numbers of visitors were Nakhon Ratchasima Province, Buriram Province, and Ubon Ratchathani Province, with visitor numbers equaling 8.89 million people, 3.89 million people, and 3.81 million people, respectively. Their corresponding revenues were 22,715 million baht, 9,404 million baht, and 6,997 million baht, respectively.

3.3.1.1 Secondary Data on Transport and Logistics in the Northern Region

When considering the volume of passenger and freight movements by transport mode road, rail, water, and air at the provincial group level in the Northern region, the details are as follows:

1. Traffic volume and freight/passenger movements on the highway network

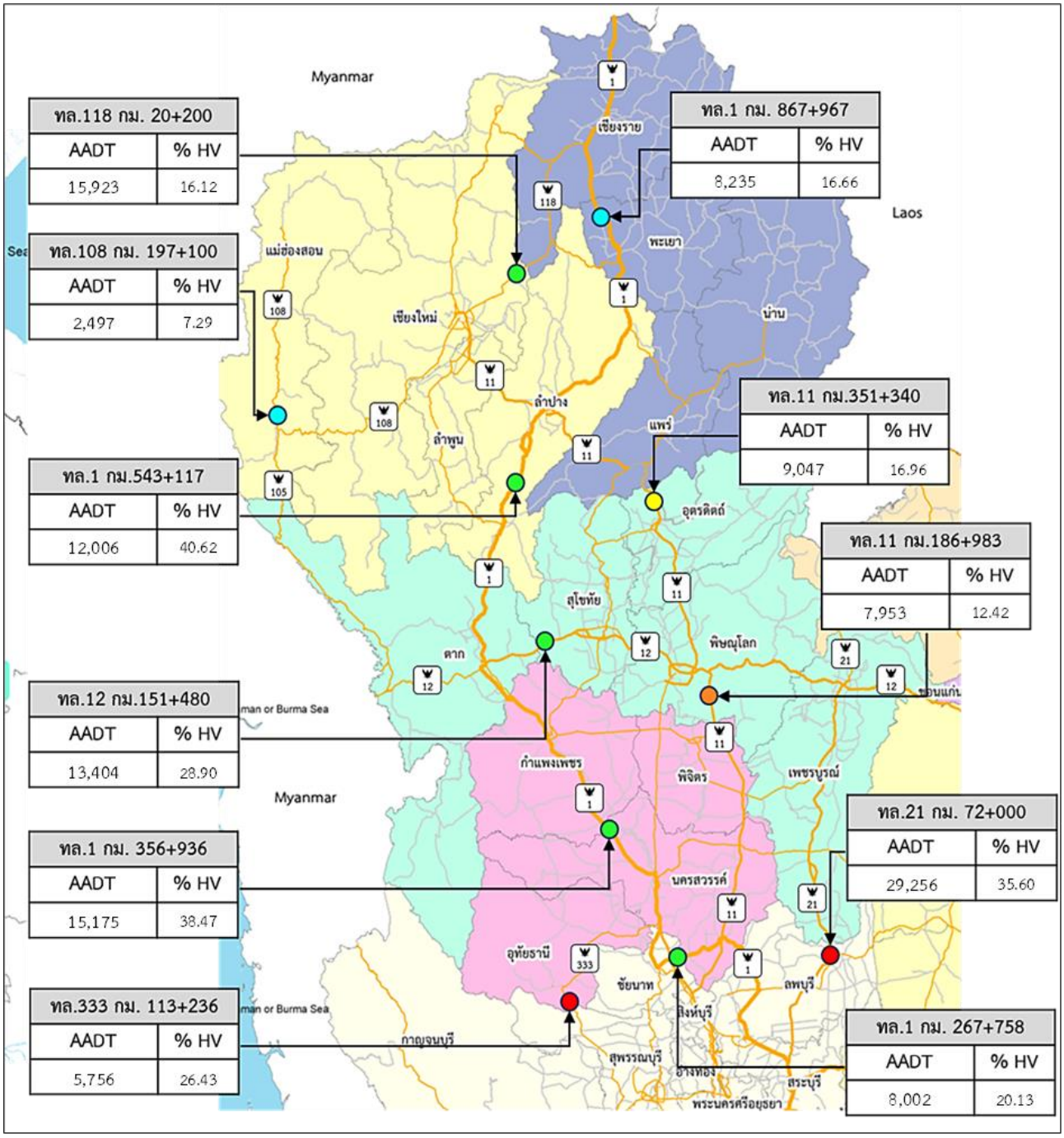
1.1) Traffic volume on the highway network in the Northern region

Considering highway traffic volume between subregions of Northern Thailand, the consultant collected Annual Average Daily Traffic (AADT) data for 2023 from the Highway Safety Office at 11 measurement stations along primary and secondary highways covering major travel corridors. Overall patterns are shown in **Figure 3.3-3**.

Traffic on the main highway entering the Upper Northern region along the GMS North-South Economic Corridor (NSEC, Highway 1) ranged from 8,002 to 15,175 vehicles/day, with heavy vehicle (HV) shares of 20.1% and 38.47%, respectively. On the East-West Economic Corridor (EWEC, Highway 12) in Sukhothai Province, traffic volume reached 13,404 vehicles/day, with heavy vehicles accounting for 28.9%.

Analysis of AADT trends between 2018 and 2023 shows a decline of 6.2% during 2018-2021, likely due to the COVID-19 pandemic.

Regarding vehicle composition on the main highway network in the Upper and Lower Northern regions (**Figure 3.3-3**), private cars accounted for 41 - 46% of passenger trips. Public transport usage was 4 - 8% in the Upper North and 1 - 2% in the Lower North. Heavy trucks represented 9 - 14% in the Upper North and 15 - 17% in the Lower North.



Source: consultant,2024

Figure 3.3-3 Location of Annual Average Daily Traffic (AADT) Survey Points, Northern Thailand, 2023

1.2) Passenger Travel by Scheduled Bus Services

- **Upper Northern Region**

Based on passenger terminal usage statistics from the Department of Land Transport, in 2019 (B.E. 2562), the Upper Northern region - which includes Chiang Mai, Mae Hong Son, Lampang, Lamphun, Chiang Rai, Nan, Phayao, and Phrae provinces - recorded a total of 1,940,669 intercity bus trips, carrying 23,035,919 passengers. Analysis of data from 2017-2019 indicates a downward trend, with the number of bus trips decreasing at an average rate of 3.56% per year and passenger volumes declining at an average rate of 5.72% per year.

- **Lower Northern Region**

Based on passenger terminal usage statistics from the Department of Land Transport for the period 2017 - 2019 (B.E. 2560 - 2562), in 2019 (B.E. 2562), the Lower Northern provinces - comprising Tak, Phitsanulok, Phetchabun, Sukhothai, Uttaradit, Kamphaeng Phet, Nakhon Sawan, Phichit, and Uthai Thani - recorded a total of 1,507,065 bus trips and 27,264,172 passengers. The data indicate an average annual decline in bus trips of 11.15% and a decrease in passenger numbers of 10.17% per year.

Data on public transportation travel relative to total travel in major regional cities for 2023 is shown in **Table 3.3-10**

Table 3.3-10 Public Transportation Travel at the End of 2023

Province	Total Public Transportation Passengers		Average Daily Total Trips (Person-Trips/Day)	Proportion of Public Transportation Trips in Major City Areas (%)
	Per Year (Person-Trips/Year)	Per Day (Person-Trips/Day)		
1. Chiang Mai [3]	2,207,520	9,198	1,202,180	0.77
8. Chiang Rai [3]	708,816	2,953	153,857	1.92
Overall Average (2 Provinces)				**1.34**

Remarks: (1) **Data on passenger volume for the Department of Land Transport (DLT) buses and the State Railway of Thailand (SRT).**
(2) **Data on public travel volume references survey data on travel behavior using public transportation in major regional cities, from the Office of Transport and Traffic Policy and Planning (OTP).**
(3) **Provinces according to the Master Plan within the National Strategy (2023 - 2037) (Revised Edition).**
(4) **Provinces that have railway stations with an origin-destination point within the city area.**

The provinces with the highest proportion of public transportation usage in their city areas are: Chiang Rai Province at 1.92% and Chiang Mai Province at 0.77%. The average proportion of public transportation usage in the city areas is 1.34%.

1.3) Cross-Border Freight via Road in Northern Region

The key road border checkpoints in the Northern region currently include six points: in Chiang Rai province, Mae Sai and Chiang Khong border checkpoints; Mae Sot checkpoint in Tak province; Huai Kon checkpoint in Nan province; Phu Du checkpoint in Uttaradit province; and Ban Huak checkpoint in Phayao province. Among these, Chiang Khong, Huai Kon, Phu Du, and Ban Huak serve as gateways for trade with the Lao PDR, while Mae Sot and Mae Sai checkpoints are trade routes with Myanmar.

Based on the 2022 data, the total inbound and outbound cargo volume at the Northern border checkpoints, ranked from highest to lowest in tons, is as follows: (1) Mae Sot, (2) Chiang Khong, (3) Mae Sai, (4) Ban Huak, (5) Huai Kon, and (6) Phu Du. Detailed information on cargo weight, value, trade balance, pre-COVID-19 growth rates, and types of imported and exported goods are presented in **Table 3.3-11**

Table 3.3-11 Northern Border Checkpoints: Cargo Volume in 2022 (Ranked High to Low, in Metric Tons)

No.	border checkpoint	Total Volume of Transport In/Out (tons)	Growth Before COVID-19 (2559-2562) (% per year)	Total Value (million Baht)	Trade Balance (million Baht)	Types of Goods	
						Exports	Imports
1	Maesot	4,462,533	5.6	134,855	78,675	Consumer goods, industrial goods	Agricultural products
2	Chiang Khong	1,882,477	12.5	76,952	27,216	Consumer goods, construction materials	Agricultural products, minerals
3	Mae Sai	855,993	6.4	17,957	14,922	Consumer goods, construction materials	Agricultural products, minerals
4	Ban Huak	476,406	57.5	1,056	702	Consumer goods, fuel, construction materials	Crushed limestone, agricultural products
5	Huai Kon	131,759	12.9	25,121	(ขาดดุล) -19,548	Consumer goods, electrical appliances, fuel	Electrical power, agricultural products, forestry products
6	Phu Du	88,458	-	2,605	2,511	Consumer goods, agricultural equipment, fuel	Agricultural products, charcoal, wickerwork

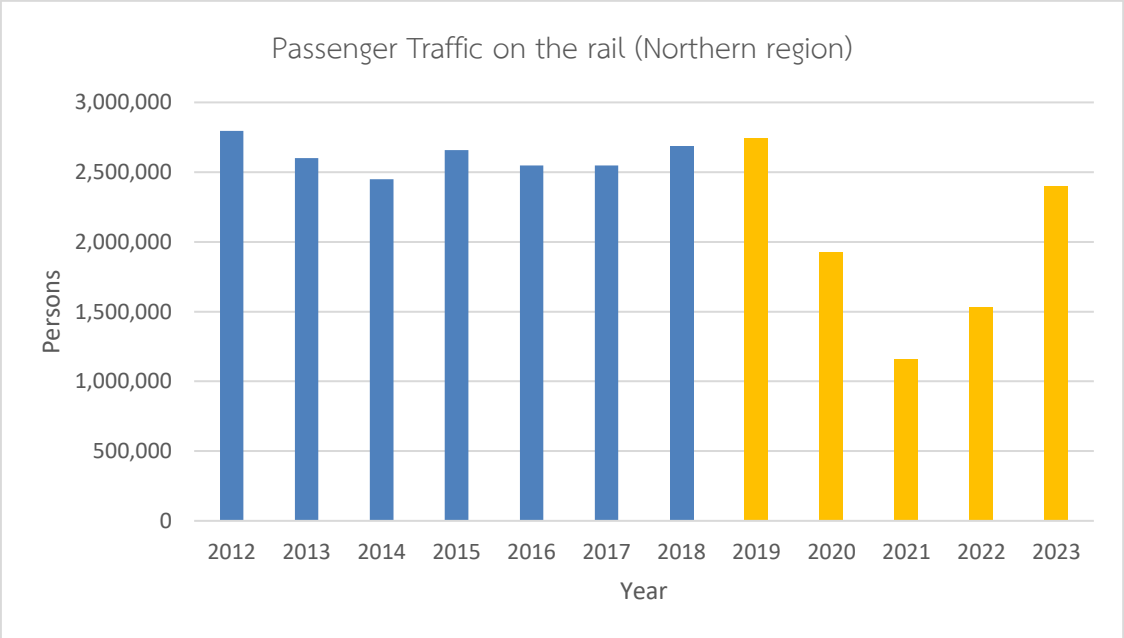
Source: Customs Informatics Center, Customs Department, Ministry of Finance, 2022

2. Rail Transport Volume

In the northern provincial group, passenger and freight movements are served by the State Railway of Thailand (SRT). Most railway lines in the region connect through the northern provinces, ultimately reaching Chiang Mai as the main terminus. An examination of the train services and routes indicates that several trains originate and terminate within the northern provincial group.

2.1) Passenger Traffic on the Rail in Northern Thailand

The consultant compiled and analyzed rail passenger data for the Northern Thailand provinces under the State Railway of Thailand (SRT) from 2013 to 2023. In 2023, there were 2,397,654 passengers (representing 5.67% of the national total of 45.83 million passengers). Considering the passenger growth rate prior to the COVID-19 pandemic, there was an average annual increase of 0.77% However, during the pandemic period (2019-2021), passenger numbers consistently declined and rebounded in 2023, as shown in **Figure 3.3-4**

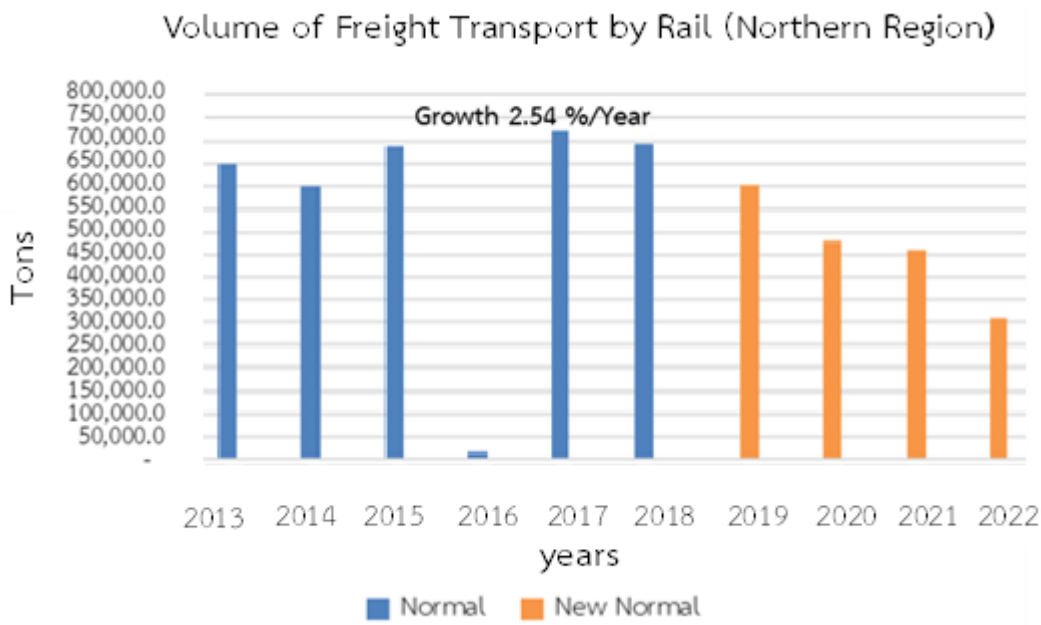


Source: The State Railway of Thailand, Ministry of Transport, 2023

Figure 3.3-4 Rail Passenger Volume in Northern Thailand (2013-2023)

2.2) Volume of Freight Transport by Rail in Northern Region

Freight transport by rail in Thailand currently operates via the State Railway of Thailand. In 2022, the total rail freight volume in the Northern region amounted to 306,862 tons (equivalent to 2.72% of the national rail freight volume of 14.1 million tons). Analysis of SRT's 10-year freight data (2013-2022) indicates that before the COVID-19 pandemic (2013-2018), freight volumes in the Northern region showed an average annual growth of 2.54%. However, during the pandemic period (2019-2022), a continuous decline in freight volumes was observed, as illustrated in **Figure 3.3-5**



Source: The State Railway of Thailand, Ministry of Transport, 2022
Note: The **State Railway of Thailand (SRT)** data for **2016** is incomplete.

Figure 3.3-5 Rail Freight Volume in the Northern Region (2013-2022)

3. Water Passenger and Freight Transport Volume

At present, Thailand's water transport system consists of inland and coastal routes. In the Northern region, cargo transport primarily occurs along two main waterways: 1 . Domestic transport via the Chao Phraya River, and 2. International transport via the Mekong River.

Upper Northern Thailand Province Cluster has four ports located in Chiang Rai Province, categorized as follows: 1. Main cargo ports (2 ports): Chiang Saen Commercial Port (Chiang Saen Port No. 2) and Chiang Khong Port. And 2. Private cargo port (1 port): Ha Chiang Port, operating under Chiang Saen Customs.

Data from the Marine Department shows that in 2022, the Upper Northern Provincial Group 2, specifically Chiang Rai Province, conducted water transport trade between Thailand and China via the Chiang Saen Commercial Port (located approximately 10 kilometers south of Wiang Chiang Saen Subdistrict Municipality).

The total number of inbound and outbound vessels was 8,834 ships, divided into 4,297 empty vessels (48.64%) and 4,537 cargo vessels (51.36%). The overall volume of goods transported totaled 306,319.40 tonnes.

Between 2013 and 2022, it was found that during the period before the COVID-19 pandemic (Normal Scenario), the rate of goods transport increased by 9.2% per year. During the pandemic period until 2023, there was an annual decrease.

Meanwhile, water transport trade between Thailand and Lao PDR via the Chiang Khong Port has seen a significant decrease in volume. This is due to the growing popularity of road transport via the Fourth Thai-Lao Friendship Bridge. In 2023, the total volume of goods transported across all three ports was 10,178.10 tonnes, of which 542.12 tonnes were inbound goods.

4. Air travel and freight transport

Currently, the Northern Region of Thailand has air travel and transport facilities consisting of nine Department of Airports (DOA) airports: Lampang, Mae Hong Son, Mae Sot, Nan Nakhon, Pai, Phetchabun, Phitsanulok, Phrae, and Tak; and two Airports of Thailand Public Company Limited (AOT) airports: Chiang Mai International Airport and Mae Fah Luang - Chiang Rai International Airport.

In the past, before the COVID-19 situation, the passenger volume and annual growth rate were high, particularly at Chiang Mai International Airport, which had a growth rate of 14.6% per year, reaching a high passenger volume of 11.14 million people in 2019. Passenger volume decreased during the COVID-19 pandemic between 2020 and 2021 and is mentioned again for 2024.

Similarly, Mae Fah Luang - Chiang Rai International Airport also had a high passenger volume and annual growth rate before the COVID situation, with a growth rate of 17.9% per year, reaching a high passenger volume of 2.89 million people in 2019. Passenger volume decreased during the COVID pandemic between 2020 and 2021. In 2022, there were 1.9 million passengers, and the passenger volume is trending upward from 2022. Details of the passenger numbers for Chiang Mai International Airport and Mae Fah Luang - Chiang Rai International Airport are shown in **Table 3.3-12 to Table 3.3-14**

Table 3.3-12 Number of Flights in the Northern Region

Unit: Flights

Province	2019	2020	2021	2022	2023
Chiang Mai International Airport	79,530	39,455	16,051	39,027	55,663
Mae Fah Luang - Chiang Rai International Airport	20,128	12,126	6,131	11,920	12,485

Source: Department of Airports, Ministry of Transport, 2025.

Table 3.3-13 Number of Air Passengers Traveling in the Northern Region

Unit: Persons

Province	2019	2020	2021	2022	2023
Chiang Mai International Airport	11,335,293	4,851,470	1,762,732	5,459,482	8,224,573
Mae Fah Luang - Chiang Rai International Airport	2,928,884	1,513,294	710,408	1,686,726	1,920,228

Source: Department of Airports, Ministry of Transport, 2025

Table 3.3-14 Volume of Air Freight Shipment in the Northern Region

Unit: Tonnes

Province	2019	2020	2021	2022	2023
Chiang Mai International Airport	12,312	4,915	3,242	5,192	5,152
Mae Fah Luang - Chiang Rai International Airport	2,537	963	586	920	875

Source: Department of Airports, Ministry of Transport, 2025.

5. Number of Visitors and Revenue

The Northern Region had a total of 41.8 million visitors (people traveling for tourism and other purposes, such as visiting friends/relatives) in 2024. The total revenue generated equaled 224,935 million baht, separated into 86.7% Thais and 13.3% foreigners. The average expenditure was 4,646 baht per person for Thais and 10,218 baht per person for foreigners (data for December 2024)

Data on the number of visitors over the past 12 years (2013 - 2024) from the Ministry of Tourism and Sports shows that before the COVID-19 pandemic, during the period 2013 - 2019, the annual increase in visitors was 6.3% per year. The number of visitors decreased in 2020 - 2021 and increased again in 2022. Details of the number and revenue from tourism are shown in Table

Year	Number of Visitors (Persons)	Total Revenue (Million Baht)
2013	24,996,364	114,224
2014	27,110,120	130,917
2015	29,798,775	147,846
2016	31,066,380	158,771
2017	33,824,436	175,454
2018	35,346,663	190,411
2019	36,012,649	195,340
2020	20,487,667	93,809
2021	12,787,588	49,317
2022	33,522,810	139,980
2023	35,920,399	209,198
2024	36,192,503	224,936

Source: Department of Airports, Ministry of Transport, 2025

3.3.3 Primary Survey on Traffic Volume and Highway Travel Data

Traffic volume and freight and passenger travel data on highways in the Northern and Northeastern study areas were collected through field surveys. The consultant team conducted three types of surveys: (1) Highway Traffic Volume Survey, (2) Passenger Roadside Interview Survey (P-RIS), and (3) Freight Roadside Interview Survey (F-RIS). The details are as follows:

1. Highway Traffic Volume Survey

Traffic volume data collected at highway survey points play a crucial role in transportation and traffic studies, including the development of traffic models. These data reflect traffic characteristics such as traffic volume by direction, hourly variation, traffic composition (by vehicle type), peak hour factor, and the proportion of truck traffic. In this study, traffic volume data will be collected for one weekday (Tuesday, Wednesday, or Thursday). The survey will be conducted by direction and by vehicle type, using 12 vehicle classifications according to the Department of Highways' standards.

The survey will cover 31 locations across 7 screen lines, encompassing areas in the Northern and Northeastern regions of Thailand. Traffic data will be collected using video recording, followed by manual counting in a laboratory setting at 15-minute intervals, and summarized on an hourly basis. Each location will be observed for 12 hours (7:00 AM - 7:00 PM). The data collection will take place during the school term in June 2024.

2. Passenger and Freight Roadside Interview Survey: P-RIS, F-RIS

Travel Demand Survey involves a random sampling method by stopping vehicles roadside and interviewing travelers regarding their passenger and freight movements. Surveyed information includes trip purpose, origin and destination points, travel time, number of passengers per vehicle, type and volume of freight, and other relevant details. Data are recorded on an hourly basis using the interview forms provided by the Office of Transport and Traffic Policy and Planning (OTP).

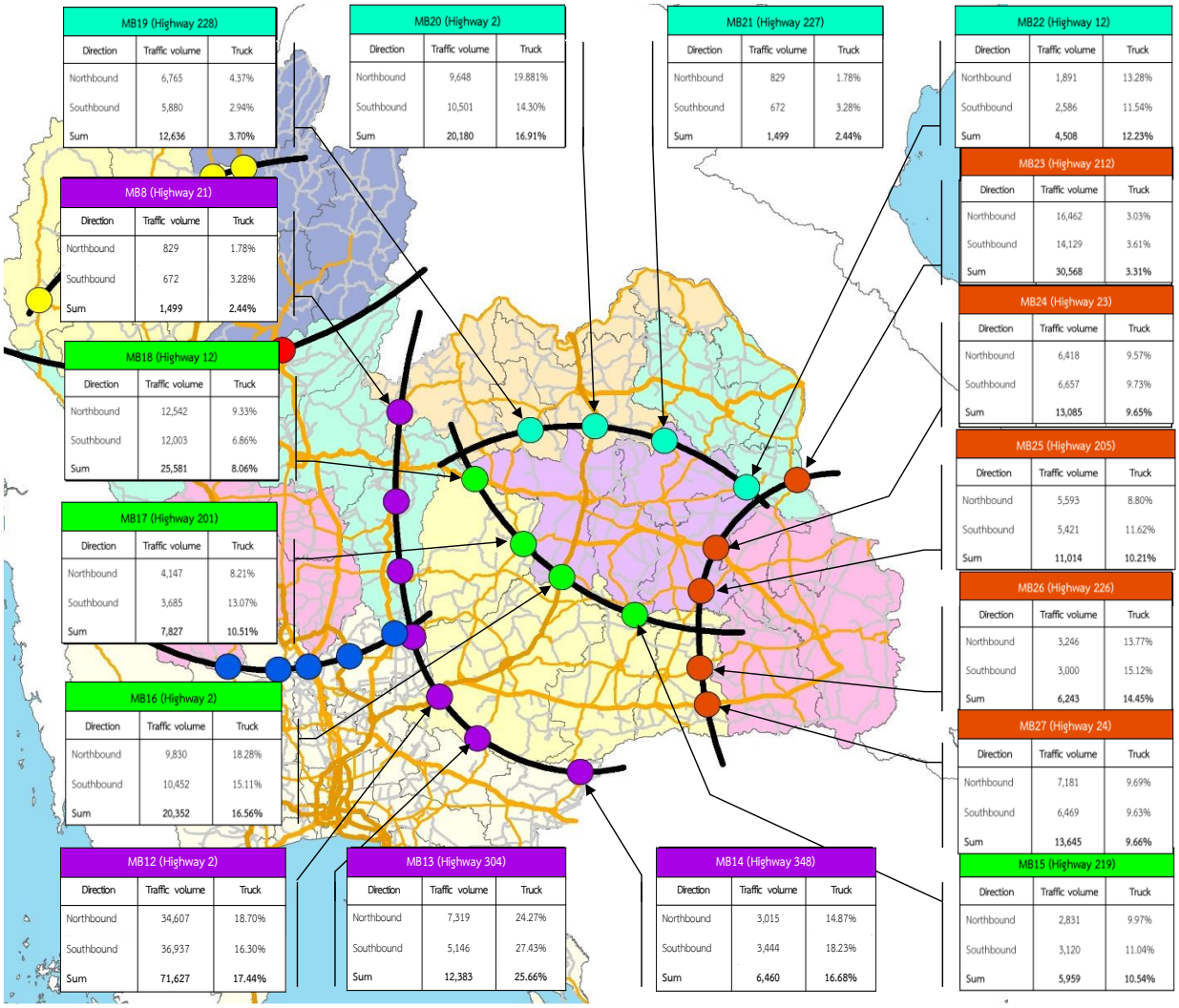
For this project, the consultant will conduct surveys at 10 locations: 5 in the Northern region and 5 in the Northeastern region. Interviews will be conducted by random sampling during a single working day (Tuesday, Wednesday, or Thursday) from 7:00 AM to 7:00 PM, during the academic session in June 2024.

3.3.2.1 Analysis Results of the Northeastern Region Survey

The analysis of traffic volume data collected from 17 survey stations along the screen line, together with passenger travel and freight transport data obtained from 5 survey stations covering the Northeastern region, provides insights into the scale and characteristics of traffic, as well as the trends in the volume and directional patterns of passenger and freight movements within the study area in the current year (2024).

1) Daily Traffic Volume (Daily Traffic)

Traffic volume surveys conducted over a 12-hour period (7:00 AM-7:00 PM) during the school semester opening in June 2024 were adjusted to represent the Annual Average Daily Traffic (AADT) using the Adjustment Factors provided by the Department of Highways, Bureau of Road Safety, for each survey station. The traffic volumes in terms of AADT by direction (vehicles/day) and the proportion of trucks at the 17 survey stations are presented in **Figure 3.3-6**.



Source: Consultant, 2024

Figure 3.3-6 Traffic Volume and Truck Proportion at Survey Stations in the Northeastern Region (vehicles/day)

2) Composition of Vehicle Types in Traffic Flow

Based on the results of the Mid-Block Classified Counts for 12 vehicle types conducted at 17 survey stations on the primary and secondary highway networks in the Northeastern region:

- **Primary Highways:** The percentage of trucks (medium, large, articulated, and semi-trailer) is relatively high, with 18% (Highway 2), 13% (Highway 12), 16% (Highway 21), and 10% (Highways 23 and 24). The highest traffic volume is dominated by passenger cars (up to 7 seats) at 26% (Highway 1), 73% (Highway 12), 63% (Highway 21), and 60% (Highways 23 and 24), respectively.

- **Secondary Highways:** The percentage of trucks (medium, large, articulated, and semi-trailer) is also significant, at 11% (Highway 202), 4% (Highway 212), 15% (Highway 226), and 26% (Highway 304). The highest traffic volume is carried by passenger cars (up to 7 seats) at 68% (Highway 202), 69% (Highway 212), 60% (Highway 226), and 60% (Highway 304), respectively.

3) Peak Hour Volume

- Based on the survey data, the traffic volume during the peak hour, expressed as a percentage of the 12-hour traffic volume (7:00 AM-7:00 PM), is approximately 11% for both the primary and secondary highways.

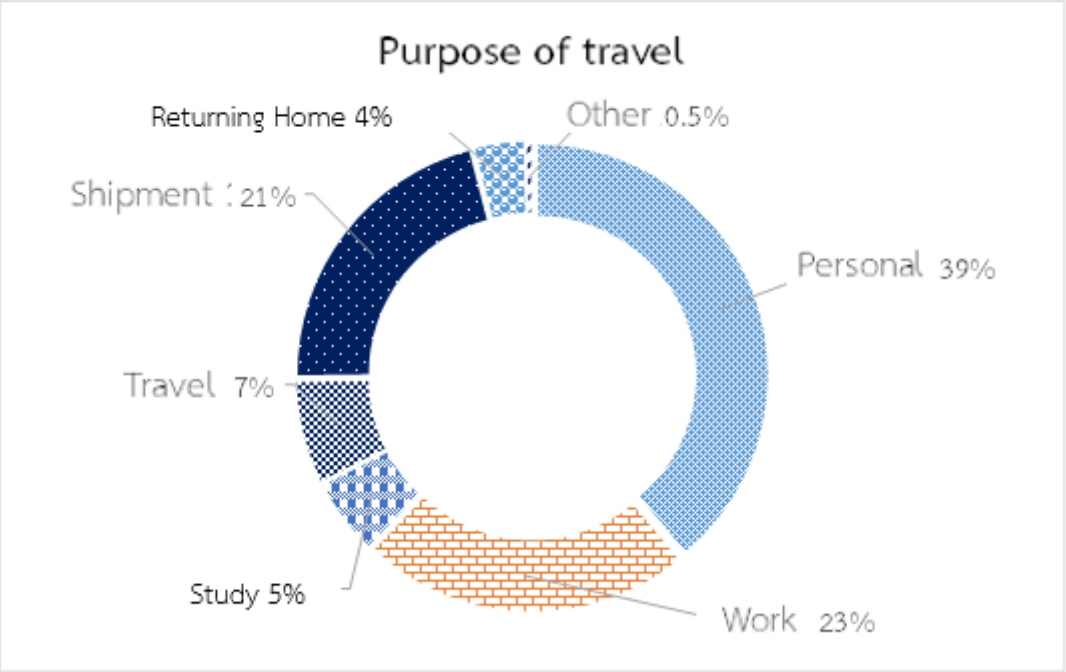
3.3.2.2 Passenger and Freight Travel Demand Data

Based on the travel survey of passengers and freight conducted through interviews at 5 survey points in the Northeastern region during weekdays from 7:00 AM to 6:00 PM at highway police checkpoints, the consultant carried out a random sampling survey with 1,150 interview samples per point, under a 5% margin of error. The details of the survey points, locations, and sample sizes are presented in Table 3.3-24. The number of questionnaires at each survey point was expanded to represent the population using the traffic volumes counted during the same period. The analysis yielded the following results:

1) Passenger Demand

- **Travel Purpose**

Based on the survey of travel purposes, the majority of trips were for personal errands, work, goods delivery, tourism, study, and returning home, accounting for 39%, 23%, 21%, 7%, 5%, and 4%, respectively. Trips for other purposes accounted for 0.5% **(Figure 3.3-7).**



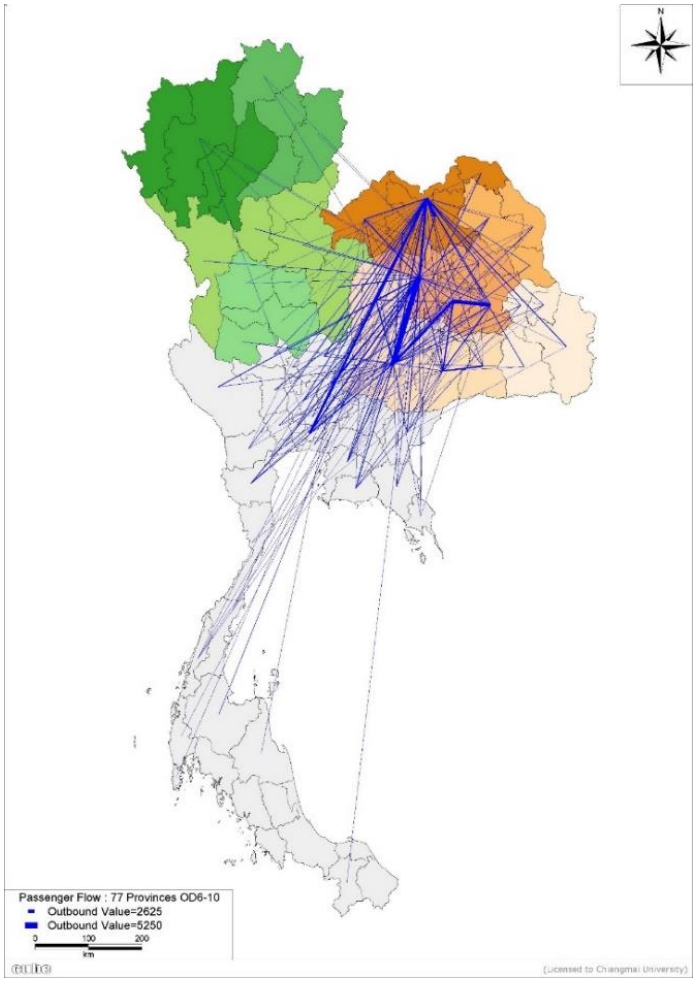
Source: Consultant, 2024

Figure 3.3-7 Purpose of Travel

- **Inter-Area Travel**

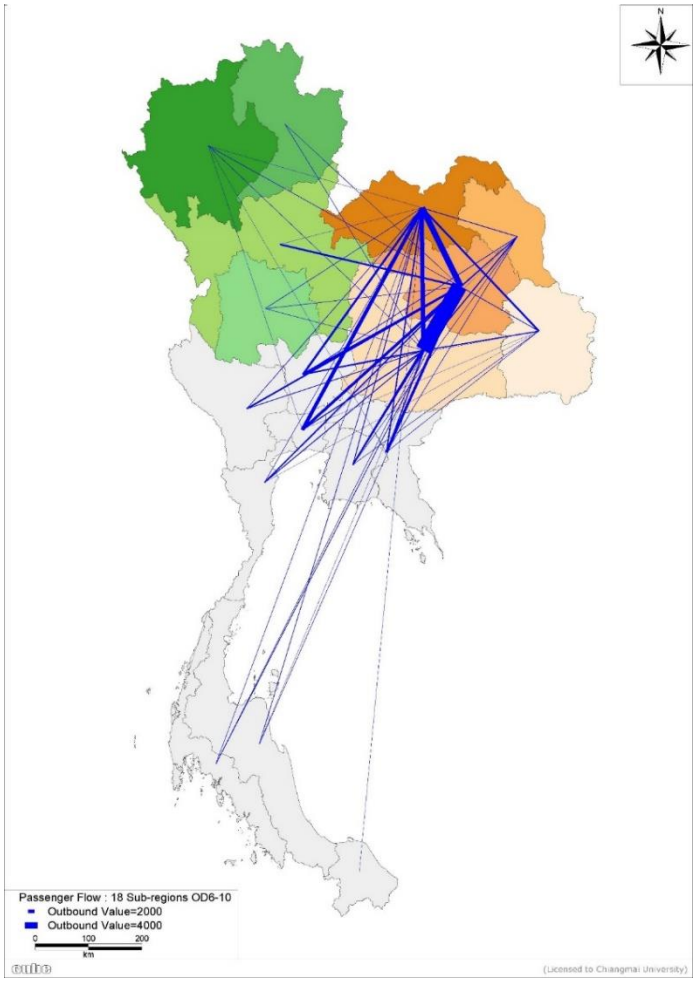
The origin-destination travel between provinces, shown in **Figure 3.3-8,** indicates that travel volumes are high among the Upper, Central, and Lower Northeastern regions. For interregional travel, trips to the Central region are higher than trips to other regions within Thailand.

For inter-provincial travel among the 18 provincial groups, as shown in **Figure 3.3-9,** travel is most intensive between provinces in the Central and Lower Northeastern regions, followed by travel between the Upper and Central Northeastern regions. Additionally, there is significant travel from the Northeastern region to the Bangkok Metropolitan Region and its vicinity.



Source: Consultant, 2024

Figure 3.3-8 Passenger Travel Flows between 77 Provinces



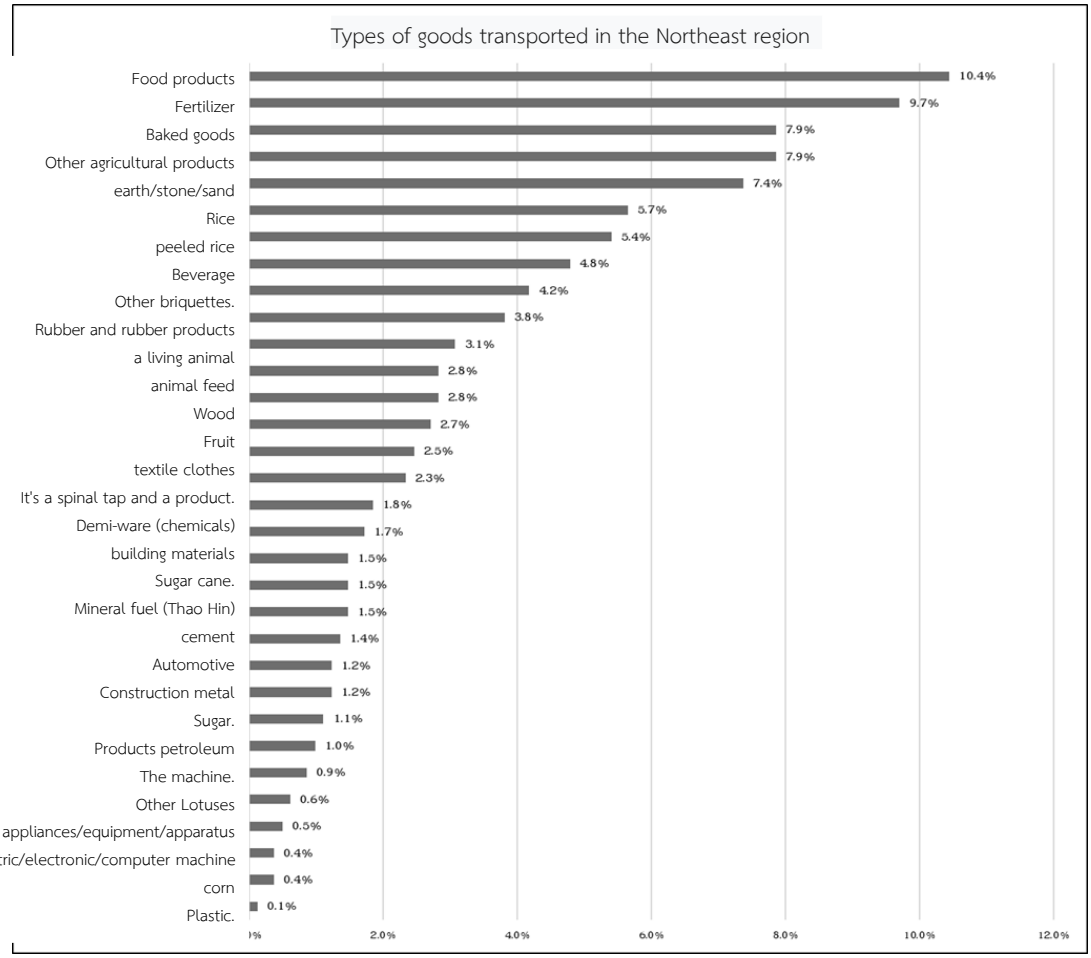
Source: Consultant, 2024

Figure 3.3-9 Passenger Travel Flows between 18 Provincial Groups

2.2) Freight Movement

- **Type of Freight**

"Based on the survey data on freight types, the distribution of transported goods indicates that the majority consist of food products, fertilizers, miscellaneous goods, other agricultural products, and construction materials including soil, rocks, and sand, as shown in **Figure 3.3-10.**

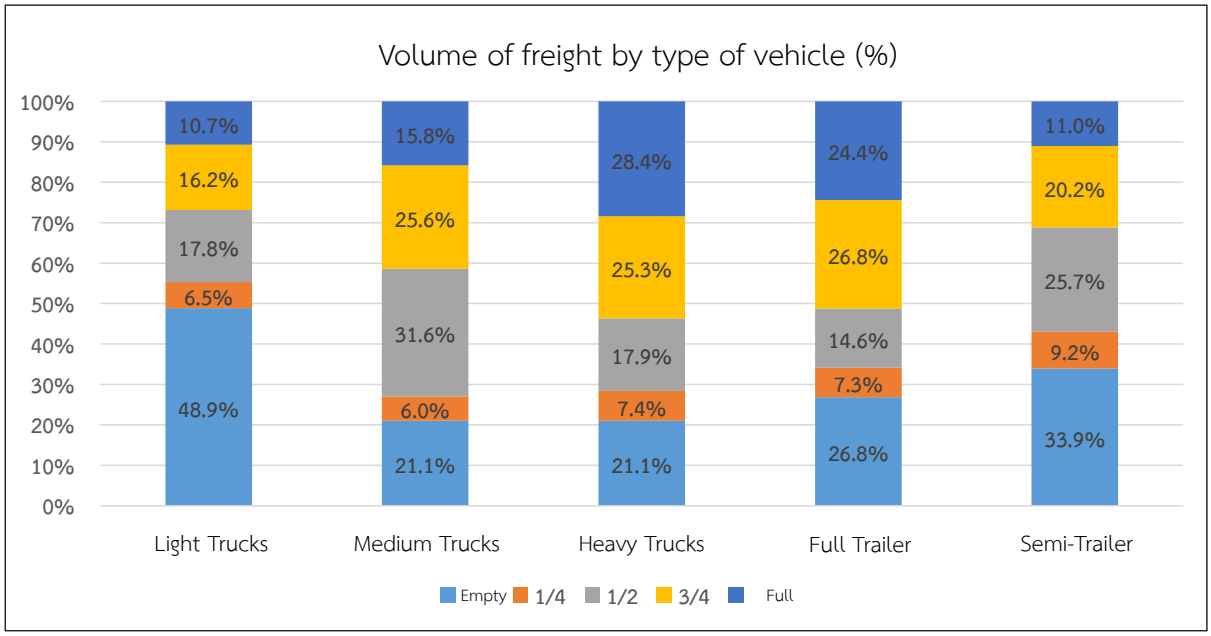


Source: Consultant, 2024

Figure 3.3-10 Distribution of Freight Types

- **Freight Load per Vehicle**

Figure 3.3-11 illustrates the freight load of small trucks, medium trucks, large trucks, articulated trucks, and semi-trailers (empty, 1/4 load, 1/2 load, 3/4 load, and full load). For the main freight vehicles, which include medium trucks, large trucks, articulated trucks, and semi-trailers, full and 3/4 load trucks account for approximately 30-50%. In contrast, small trucks (pickups) are empty in about 50% of cases.

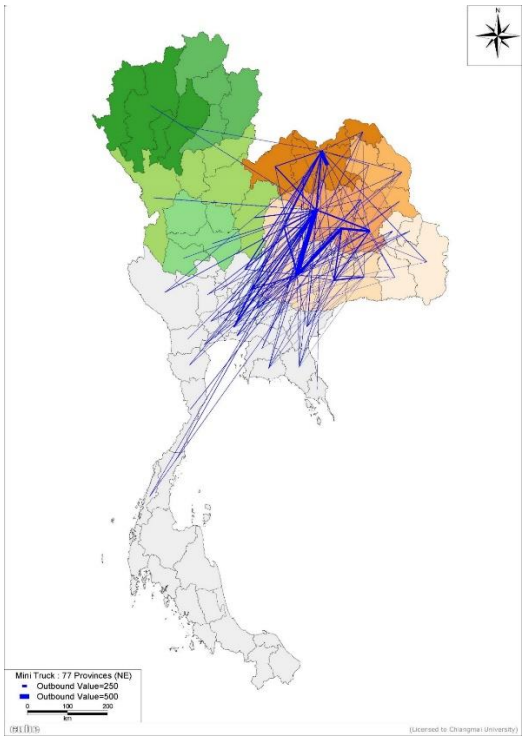


Source: Consultant, 2024

Figure 3.3-11 Volume of Freight by Type of Vehicle

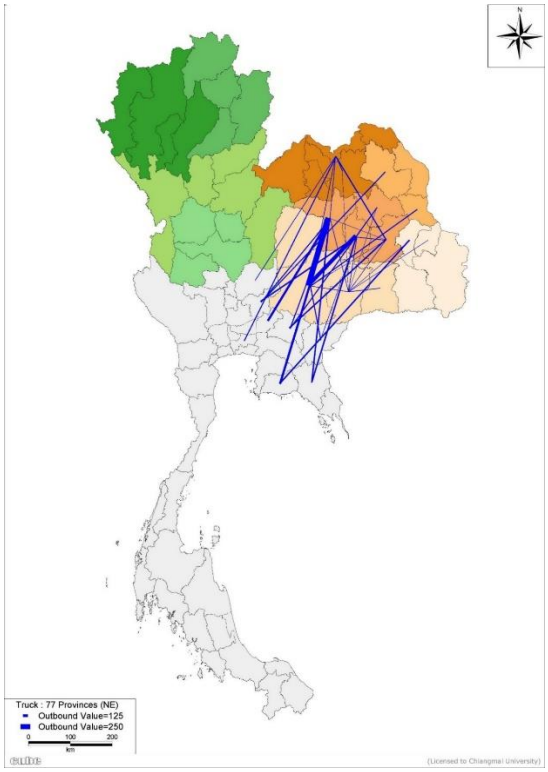
- **Inter-Area Freight Transport**

Since the survey collected freight volume data in terms of capacity without information on the cargo weight, the consultant analyzed the travel directions of freight trucks, presenting the number of trucks traveling between areas (showing freight transport flows among 77 provinces). For small trucks, medium trucks (6-wheelers), and large trucks, which are considered the main long-haul freight vehicles-including 10-wheel trucks, articulated trucks, and semi-trailers-the results are illustrated in **Figures 3.3-12** to **Figures 3.3-14**.



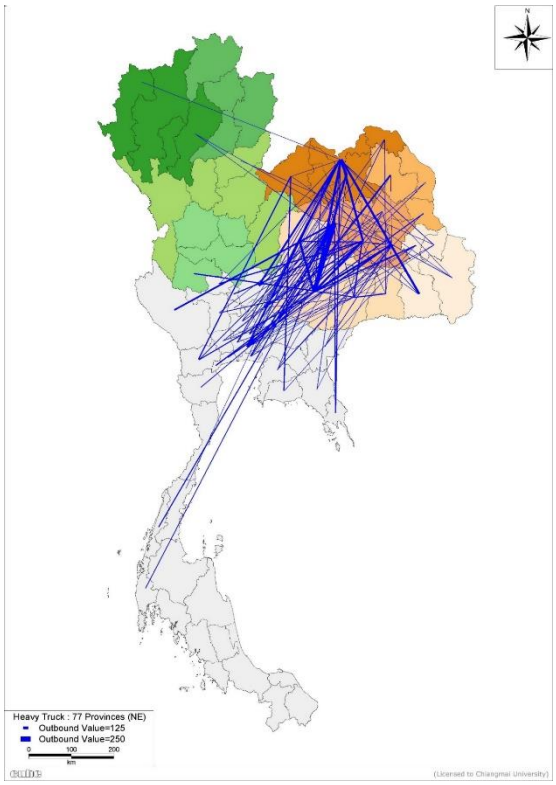
Source: Consultant, 2024

Figure 3.3-12 Origin and Destination of Freight Transport by Small Trucks (4-Wheelers)



Source: Consultant, 2024

Figure 3.3-13 Origin and Destination of Freight Transport by Medium Trucks (6-Wheelers)



Source: Consultant, 2024

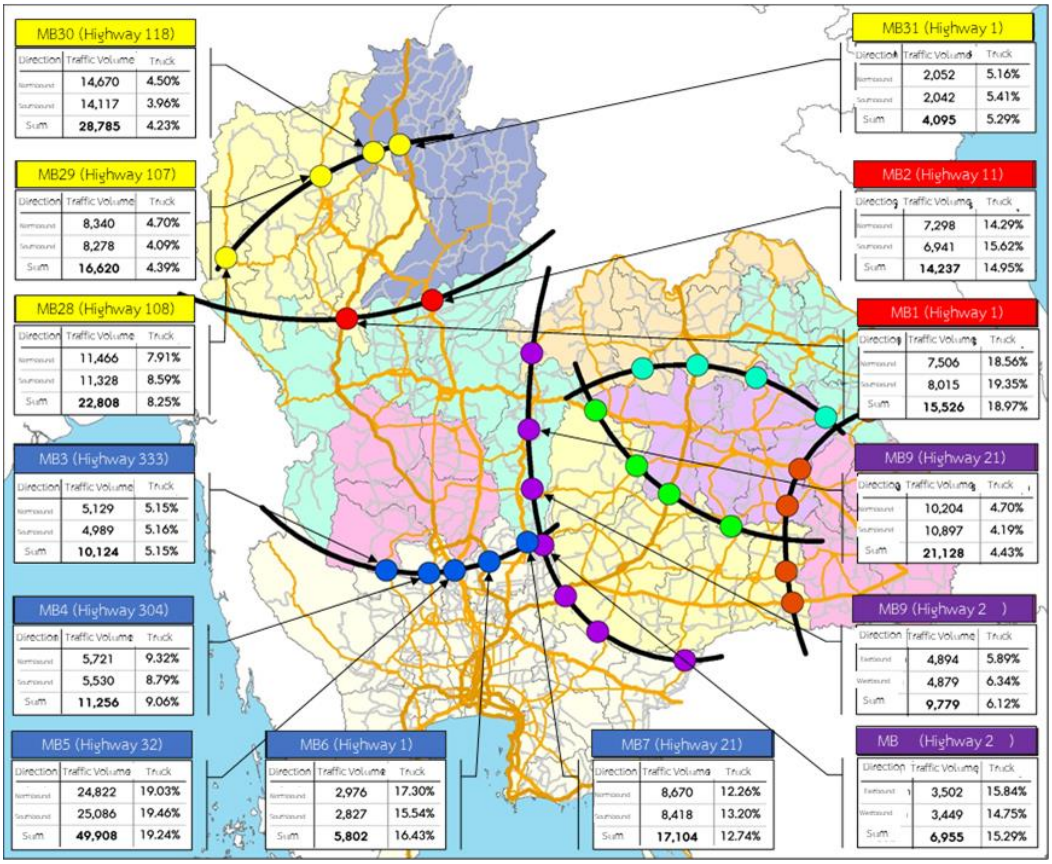
Figure 3.3-14 Origin and Destination of Freight Transport by Large Trucks (10-Wheelers, Full-Trailers, and Semi-Trailers)

3.3.2.2 Analysis Results of Survey Data in the Northern Region

The analysis of traffic volume data collected from 14 survey stations along the screen line, together with passenger travel and freight transport data obtained from 5 survey stations covering the Northern region, provides insights into the scale and characteristics of traffic, as well as the trends in the volume and directional patterns of passenger and freight movements within the study area in the current year (2024).

1.1) Daily Traffic

The traffic volume survey conducted over a 12-hour period (7:00 AM - 7:00 PM) during the school semester opening in June was adjusted to represent the Annual Average Daily Traffic (AADT) using the Adjustment Factors provided by the Bureau of Road Safety, Department of Highways, for each survey station. The traffic volumes in terms of AADT by direction (vehicles/day) and the proportion of trucks at the 14 survey stations are presented in **Figure 3.3-15** The overall traffic volumes on the primary and secondary highways can be summarized as follows:



Source: Consultant, 2024

Figure 3.3-15 Traffic Volume and Truck Proportion at Survey Stations in the Northern Region (vehicles/day)

1.2) Traffic Composition

Based on the mid-block classified traffic counts covering 12 vehicle classes on the primary and secondary highway networks at 14 survey locations in the Northern Region.

- **For the primary highways,** the proportion of freight vehicles (medium trucks, heavy trucks, trailers, and semi-trailers) was relatively high, accounting for 19% on Highway No. 1 (Hwy.1) and 15% on Highway No. 11 (Hwy.11). Passenger cars represented 35% (Hwy.1) and 41% (Hwy.11), while motorcycles accounted for 8% and 5%, respectively.

- **For the secondary highways,** the proportion of medium to large freight vehicles (medium trucks to semi-trailers) was relatively low, at only about 4-5% (e.g., on Highway No.118 and Highway No.333). In contrast, small trucks accounted for as high as 36%, passenger cars for 16-27%, and motorcycles for approximately 40%.

1.3) Hourly Variation

From the study of traffic volumes on the network within the study area, it was found that the hourly variation of traffic volumes, based on 12-hour survey data, can be characterized as follows:

- **Major arterial highways:** The hourly traffic volumes do not exhibit pronounced morning and evening peak periods as typically observed on urban highways. Instead, traffic volumes remain relatively high during the midday to afternoon period, particularly between 11:00 AM and 5:00 PM.

- **Minor arterial highways:** The hourly variation pattern is similar to that of urban highways, showing distinct peak periods in the morning (7:00-8:00 AM) and in the evening (5:00-6:00 PM).

2. Passenger and Freight Travel Demand Data

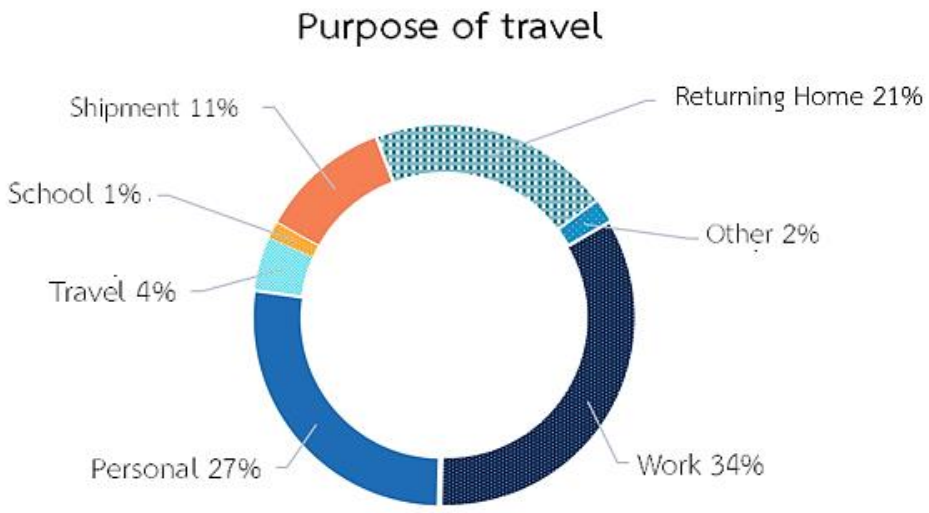
Based on the survey of passenger and freight travel conducted through roadside interviews at five survey locations in the Northern region, during weekdays between 07:00 AM and 06:00 PM at designated highway police checkpoints, a random sampling method was applied. At each location, a total of 1,150 interview samples were collected, determined according to a sampling error margin of 5 percent.

The survey points, locations, and sample sizes are summarized as follows, and the subsequent analysis produced the following results:

2.1) Passenger Demand

- **Purpose of Travel**

Based on the survey of travel purposes, most trips were made for work (34%), followed by personal errands (27%), returning home (21%), and freight/goods delivery (11%). Trips for tourism purposes accounted for a small share, representing only 4% of the total. **(Figure 3.3-16)**



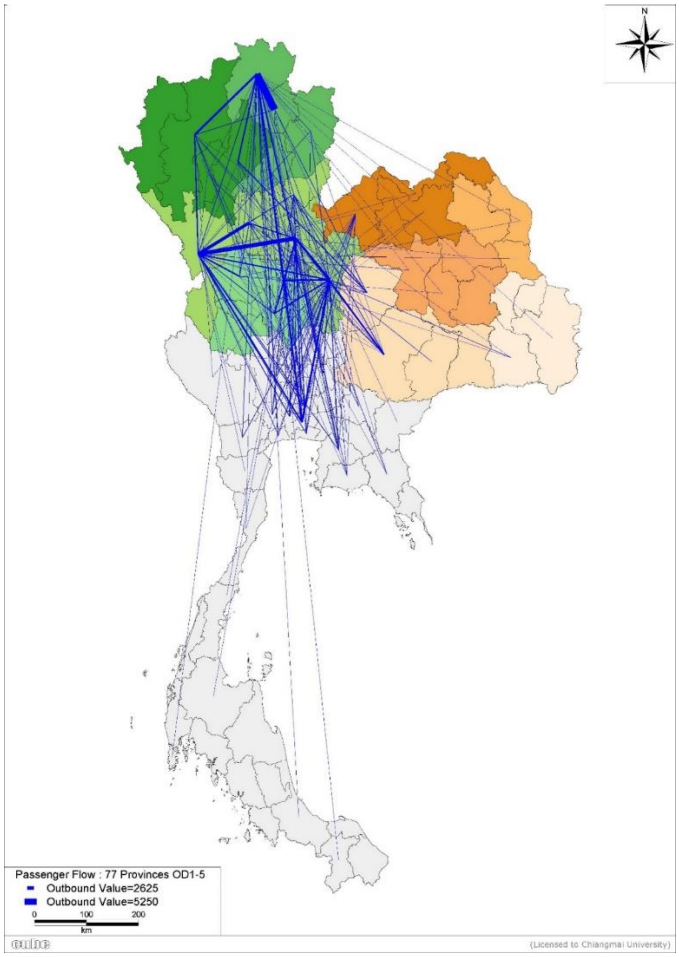
Source: Consultant, 2024

Figure 3.3-16 Purpose of travel

- **Inter-Area Travel**

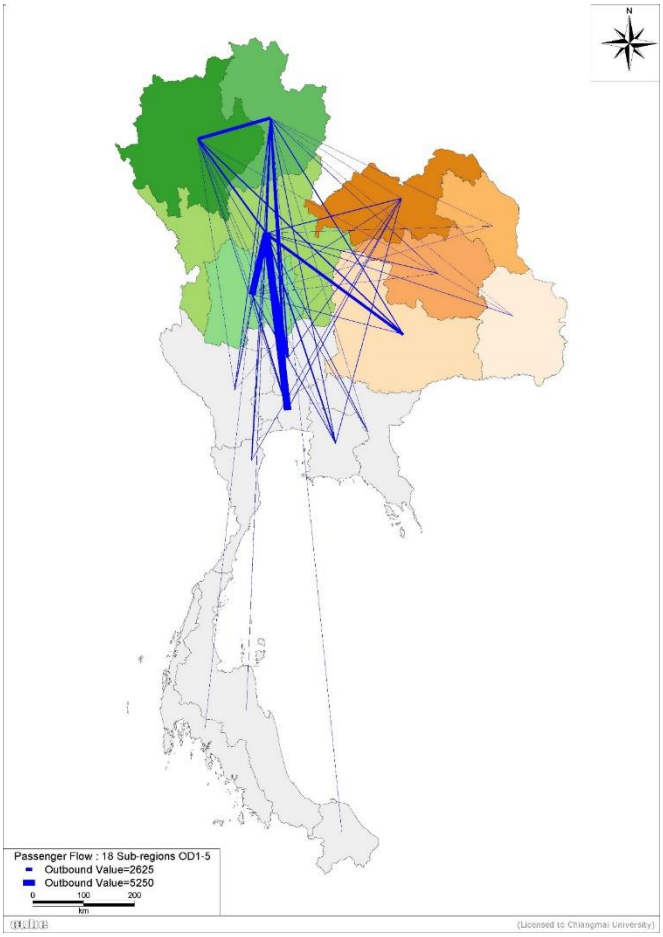
Origin-Destination Travel Between Provinces As shown in **Figure 3.3-17,** travel volumes between provinces are highest among the Central Region, Lower Northern Region, and Upper Northern Region. In contrast, travel between the Northeastern Region and the Northern Region, as well as between the Southern Region and the Northern Region, is relatively low.

Inter-Group Travel Among 18 Provincial Clusters As shown in **Figure 3.3-18**, travel is most concentrated between Bangkok and its metropolitan area and Lower Northern Region Cluster 1, as well as between Lower Northern Region Cluster 1 and Cluster 2. In contrast, travel originating from the Northeastern Region is relatively low.



Source: Consultant, 2024

Figure 3.3-17 Inter-Provincial Passenger Travel Across 77 Provinces



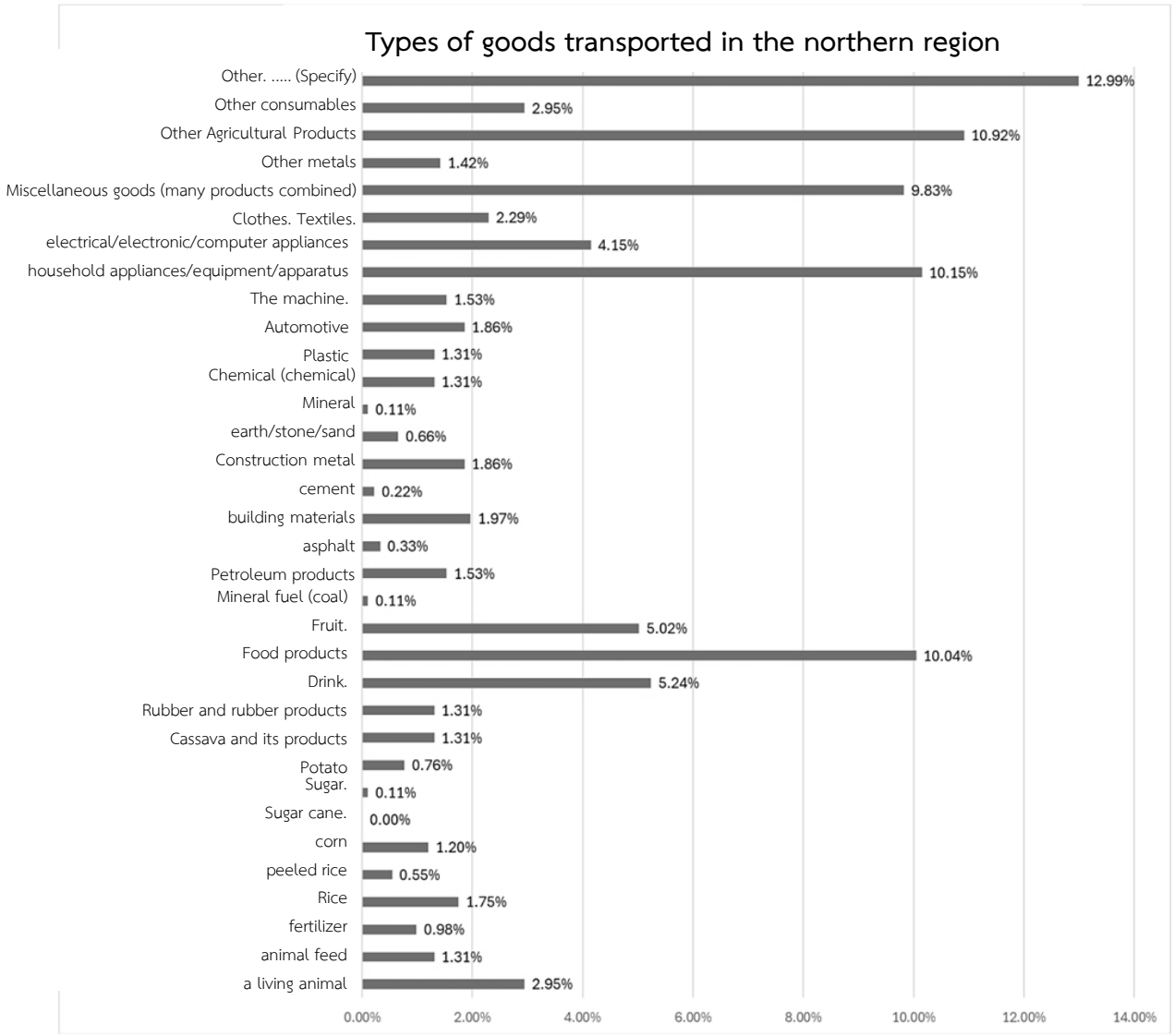
Source: Consultant, 2024

Figure 3.3-18 Inter-Cluster Passenger Travel Across 18 Provincial Groups

2.2) Freight Movement

- **Freight Types**

Based on the survey of freight types, the transported goods were categorized, revealing that the majority consisted of agricultural products, miscellaneous goods, machinery and equipment, and food products, as shown in **Figure 3.3-19.**

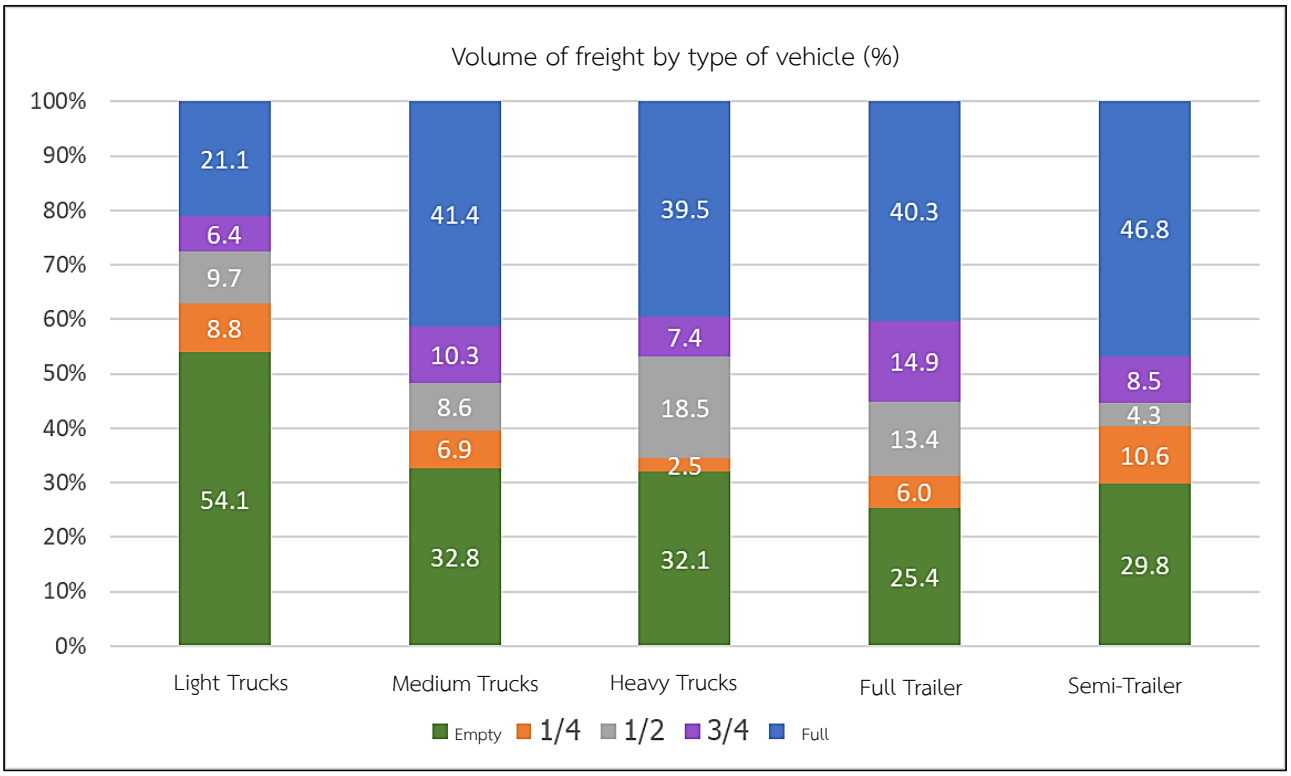


Source: Consultant, 2024

Figure 3.3-19 Freight Types

- **Freight Load per Vehicle**

Figure 3.3-20 illustrates the freight load distribution of small trucks, medium trucks, large trucks, trailers, and semi-trailers (empty, 1/4, 1/2, 3/4, and full loads). For the main freight vehicles, including medium trucks, large trucks, trailers, and semi-trailers, the proportion of 3/4 and full loads combined is approximately 50%, whereas for small trucks (pickups), about 50% of the vehicles are empty.

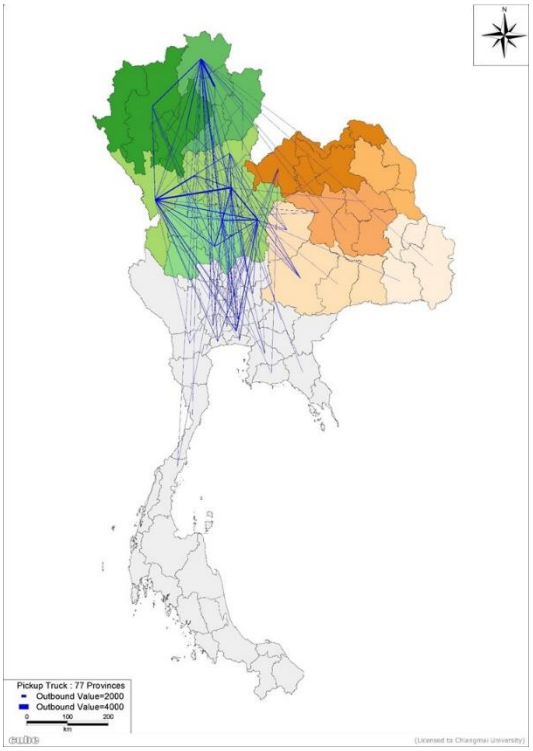


Source: Consultant, 2024

Figure 3.3-20 Freight Load Distribution of Trucks

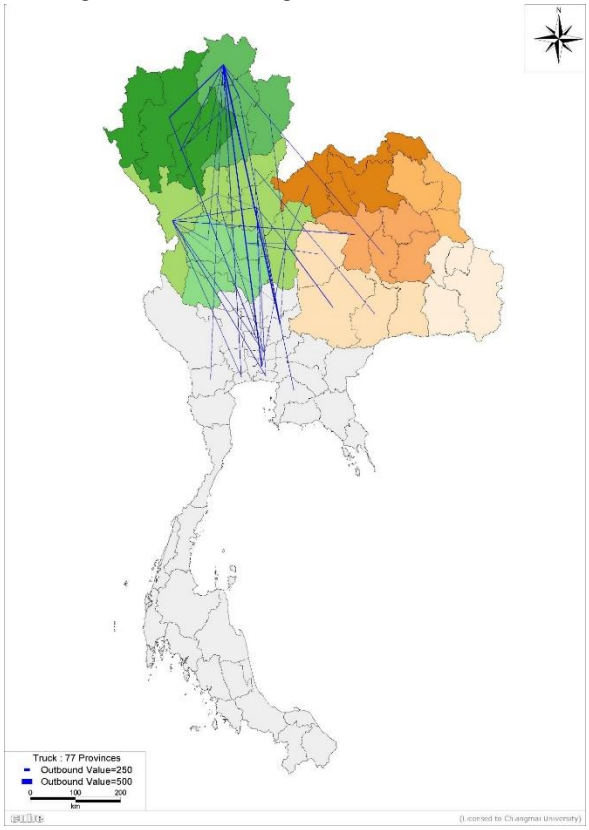
- **Inter-Area Freight Transport**

Since the survey collected only truck volume data and did not include the weight of transported goods, the consultant analyzed the travel directions of trucks and presented the number of vehicles traveling between areas, as shown in **Figures 3.3-21** to **3.3-23.** These figures illustrate the inter-area freight flows across 77 provinces for small trucks, medium trucks (6-wheelers), and large trucks, which are considered the main long-haul freight vehicles, including 10-wheel trucks, trailers, and semi-trailers.



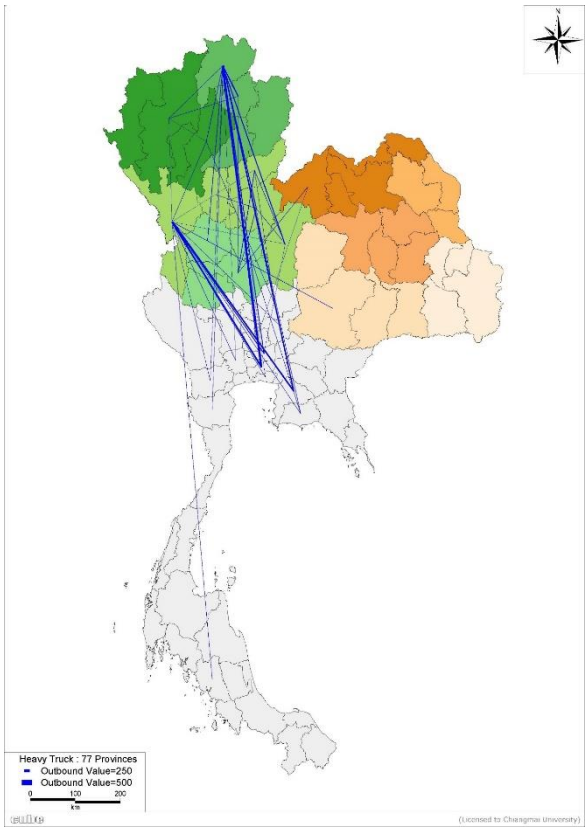
Source: Consultant, 2024

Figure 3.3-21 Origin and Destination of Freight Transport by Small Trucks (4-Wheelers)



Source: Consultant, 2024

Figure 3.3-22 Origin and Destination of Freight Transport by Medium Trucks (6-Wheelers)



Source: Consultant, 2024

Figure 3.3-23 Origin and Destination of Freight Transport by Large Trucks (10-Wheel, Full-Trailer, and Semi-Trailer Trucks)

3.3.4 Comparison of Travel and Freight Transport Behavior Under Normal Conditions and Changes Induced by the COVID-19 Pandemic

The COVID-19 pandemic had a significant impact on both domestic and international travel and freight transport. The outbreak began in December 2019 and reached Thailand for the first time in January 2020. The situation quickly escalated into a global public health crisis. To control and prevent the spread of the virus, the government implemented interprovincial travel restrictions, enforced the Emergency Decree, and closed national borders, resulting in a substantial reduction in travel and freight transport volumes.

The consultant conducted a comparative analysis of travel and freight transport behavior by examining three distinct periods: 1. Normal conditions (pre-COVID-19) - data before 2020. 2. During the COVID-19 pandemic - data from 2020-2021. And 3. Post-COVID-19 altered conditions - data from 2022 to the present.

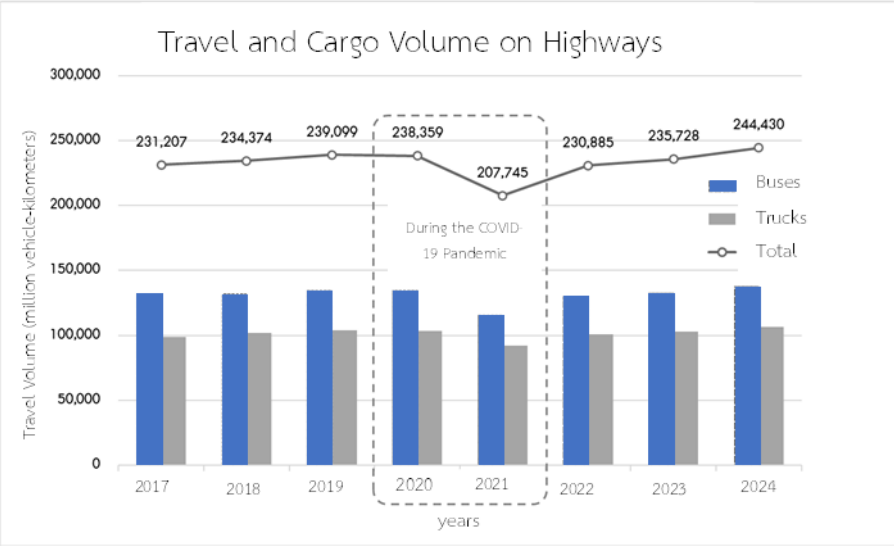
The analysis covered all modes of transportation, including road, rail, water, and air travel.

3.3.4.1 Road Travel and Freight Transport

The consultant collected road travel and freight transport data from 2017 to 2024 using secondary data sources. The analysis enabled a comparative assessment of travel and freight transport behavior during three periods: pre-COVID-19 (normal conditions), during the COVID-19 pandemic, and post-COVID-19 altered conditions, summarized as follows:

1) Vehicle Travel and Freight Volumes on Highways

The vehicle travel and freight transport volumes on national highways between 2017 and 2024 averaged 232,728 million vehicle-kilometers, with an average annual growth rate of 0.80%, as shown in **Figure 3.3-24**

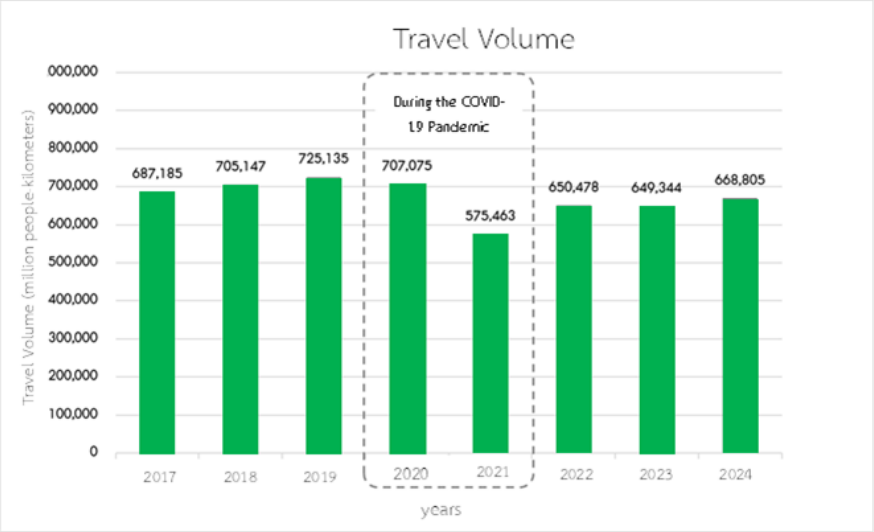


Source: Consultant, 2024

Figure 3.3-24 Vehicle Travel and Freight Transport Volumes on Highways: Comparison Before, During, and After the COVID-19 Pandemic

2) Passenger Transport Volumes

The road-based passenger travel volumes between 2017 and 2024 averaged 671,079 million passenger-kilometers, with an average annual decline of 0.39%. Due to the COVID-19 pandemic, travel volumes decreased to 575,463 million passenger-kilometers. The analysis results are presented in **Figure 3.3-25**



Source: Consultant, 2024

Figure 3.3-25 Passenger Travel Volumes: Comparison Before, During, and After the COVID-19 Pandemic

3) Freight Transport Volumes

The road-based freight transport volumes between 2017 and 2024 averaged 304,460 million ton-kilometers, with an average annual growth rate of 1.74%, as shown in **Figure 3.3-26**

Source: Consultant, 2024

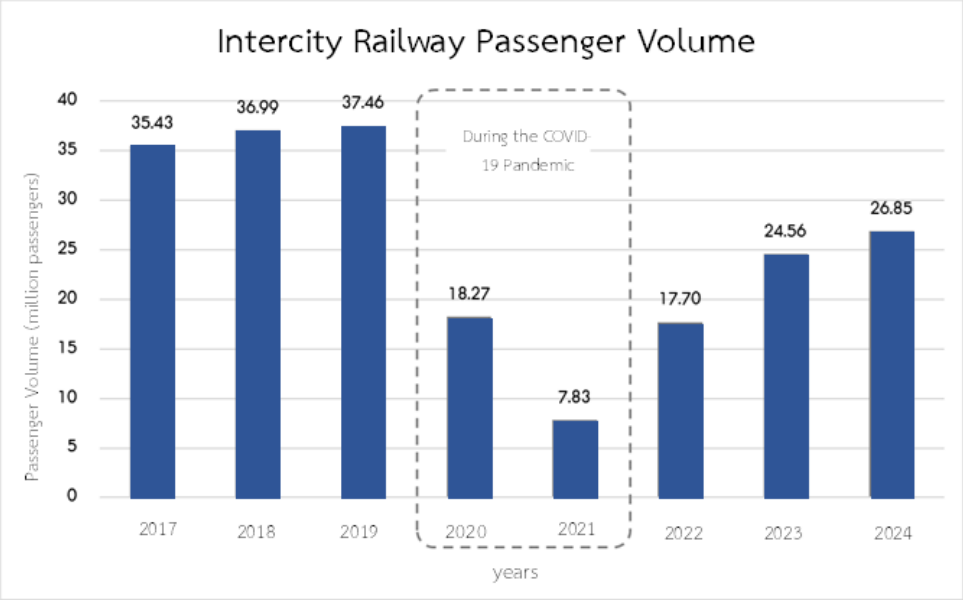
Figure 3.3-26 Freight Transport Volumes: Comparison Before, During, and After the COVID-19 Pandemic

3.3.4.2 Rail-Based Passenger and Freight Transport

The consultant collected rail passenger and freight transport data from 2017 to 2024 using secondary data sources. This allowed for a comparative analysis of rail travel and freight transport behavior during three periods: pre-COVID-19 (normal conditions), during the COVID-19 pandemic, and post-COVID-19 altered conditions, summarized as follows:

1) Intercity Rail Passenger Volumes

The consultant conducted a comparative analysis of intercity rail passenger volumes, as shown in **Figure 3.3-27**. It was found that between 2017 and 2019, before the COVID-19 outbreak, the intercity rail system carried approximately 35.43 - 37.46 million passengers per year. However, the COVID-19 pandemic had a significant impact on passenger volumes due to travel restriction measures.

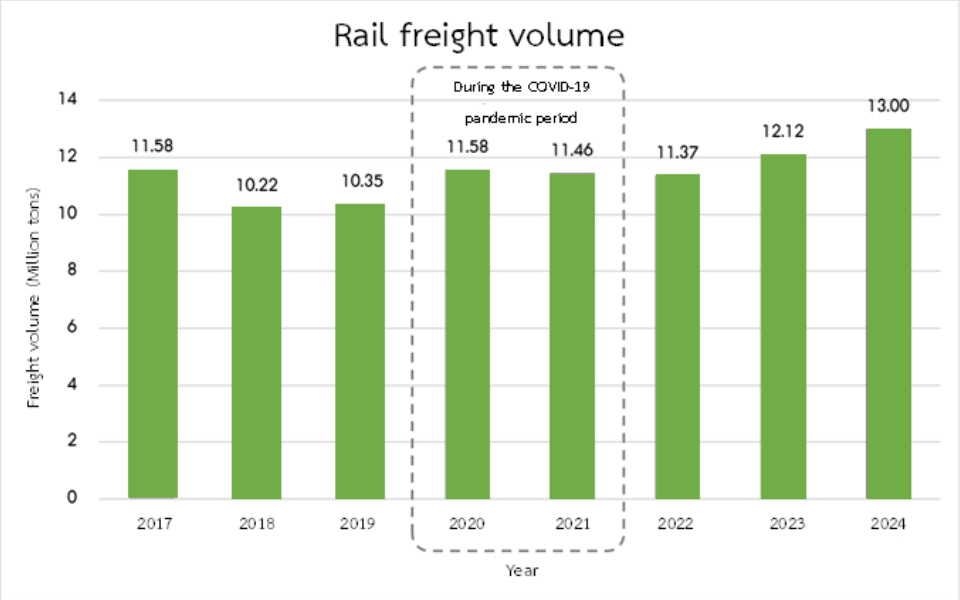


Source: Consultant, 2024

Figure 3.3-27 Intercity Rail Passenger Volumes: Comparison Before, During, and After the COVID-19 Pandemic

2) Rail Freight Transport Volumes

The consultant conducted a comparative analysis of domestic rail freight transport volumes, as shown in **Figure 3.3-28**. The analysis found that, despite the COVID-19 pandemic, rail freight volumes were largely unaffected, as the transportation of certain essential cargo, such as industrial raw materials, remained necessary throughout the pandemic period.



Source: Consultant, 2024

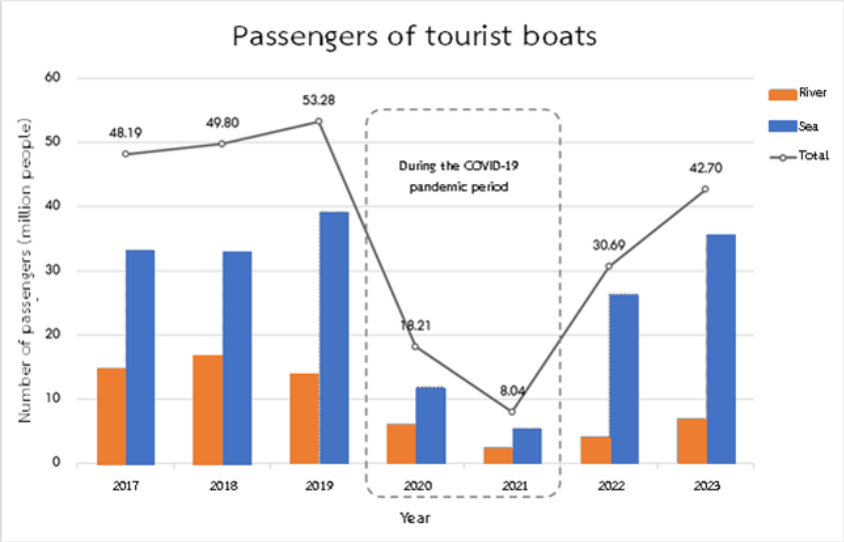
Figure 3.3-28 Rail Freight Transport Volumes: Comparison Before, During, and After the COVID-19 Pandemic

3.3.4.3 Water Transport of Passengers and Freight

The consultant collected waterborne passenger and freight transport data from 2017 to 2023 using secondary data sources. This allowed for a comparative analysis of water transport behavior during three periods: pre-COVID-19 (normal conditions), during the COVID-19 pandemic, and post-COVID-19 altered conditions, summarized as follows:

1) Tourist Passenger Volumes on Passenger Vessels

The consultant conducted a comparative analysis of tourist passenger volumes on riverine and maritime passenger vessels, as shown in **Figure 3.3-29.** It was found that between 2017 and 2019, prior to the COVID-19 outbreak, tourist passenger numbers showed a continuous upward trend, reaching 53.28 million passengers in 2019. However, the COVID-19 pandemic had a significant impact on the tourism sector due to various government control measures, resulting in a 66% decline in passenger numbers in 2020, reaching a minimum of 8.04 million passengers in 2021. Nevertheless, after the pandemic began to subside, the trend in tourist passenger volumes gradually recovered and has been steadily increasing, approaching levels comparable to those before the outbreak.

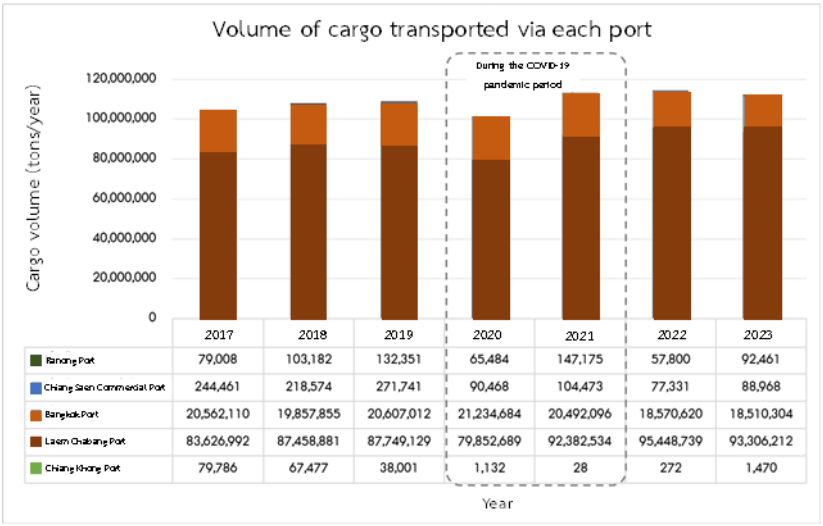


Source: Consultant, 2024

Figure 3.3-29 Tourist Passenger Volumes on Passenger Vessels: Comparison Before, During, and After the COVID-19 Pandemic

2) Waterborne Freight Transport Volumes

The consultant conducted a comparative analysis of waterborne freight transport volumes at Ranong Port, Chiang Saen Commercial Port, Bangkok Port, Laem Chabang Port, and Chiang Khong Port, as shown in **Figure 3.3-30.** It was found that prior to the COVID-19 pandemic, water freight volumes exhibited a continuous upward trend. However, during the COVID-19 outbreak in 2020 - 2021, waterborne freight transport declined noticeably, particularly at Ranong Port, Chiang Saen Commercial Port, and Chiang Khong Port. In contrast, major ports such as Laem Chabang Port and Bangkok Port experienced minimal or no impact from the pandemic. After the pandemic began to subside, waterborne freight volumes started to recover, with major ports returning to levels comparable to those before the outbreak.



	2017	2018	2019	2020	2021	2022	2023
Ranong Port	79,008	103,182	132,351	65,484	147,175	57,800	92,461
Chiang Saen Commercial Port	244,461	218,574	271,741	90,468	104,473	77,331	88,968
Bangkok Port	20,562,110	19,857,855	20,607,012	21,234,684	20,492,096	18,570,620	18,510,304
Laem Chabang Port	83,626,992	87,458,881	87,749,129	79,852,689	92,382,534	95,448,739	93,306,212
Chiang Khong Port	79,786	67,477	38,001	1,132	28	272	1,470

Source: Consultant, 2024

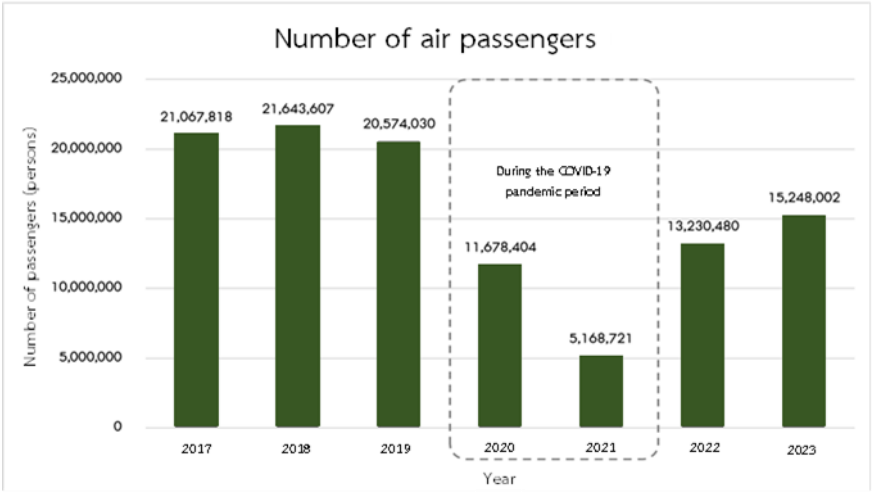
Figure 3.3-30 Waterborne Freight Volumes at Individual Ports: Comparison Before, During, and After the COVID-19 Pandemic

3.3.4.4 Air Passenger and Freight Transport

The consultant compiled data on air passenger and freight transport from secondary sources covering the period 2017 - 2023. The analysis provides a comparative assessment of air travel and air cargo transport behavior under three conditions: normal conditions before the COVID-19 pandemic, during the COVID-19 outbreak, and the post-pandemic period, as summarized below.

1) Air Passenger Volume

The consultant conducted a comparative analysis of domestic air passenger volumes, as shown in **Figure 3.3-31**. Prior to the COVID-19 pandemic, the number of air passengers ranged between 20.57 and 21.64 million per year. However, during the COVID-19 outbreak in 2020 - 2021, air travel declined sharply due to government-imposed measures restricting movement to control the spread of the virus. In 2020, air travel decreased by over 43%, and in 2021, passenger numbers fell to only 5.17 million. Following the easing of the COVID-19 situation, air travel began to recover, but volumes have not yet returned to pre-pandemic levels. This may be partially attributed to higher airfares and changes in passenger behavior.

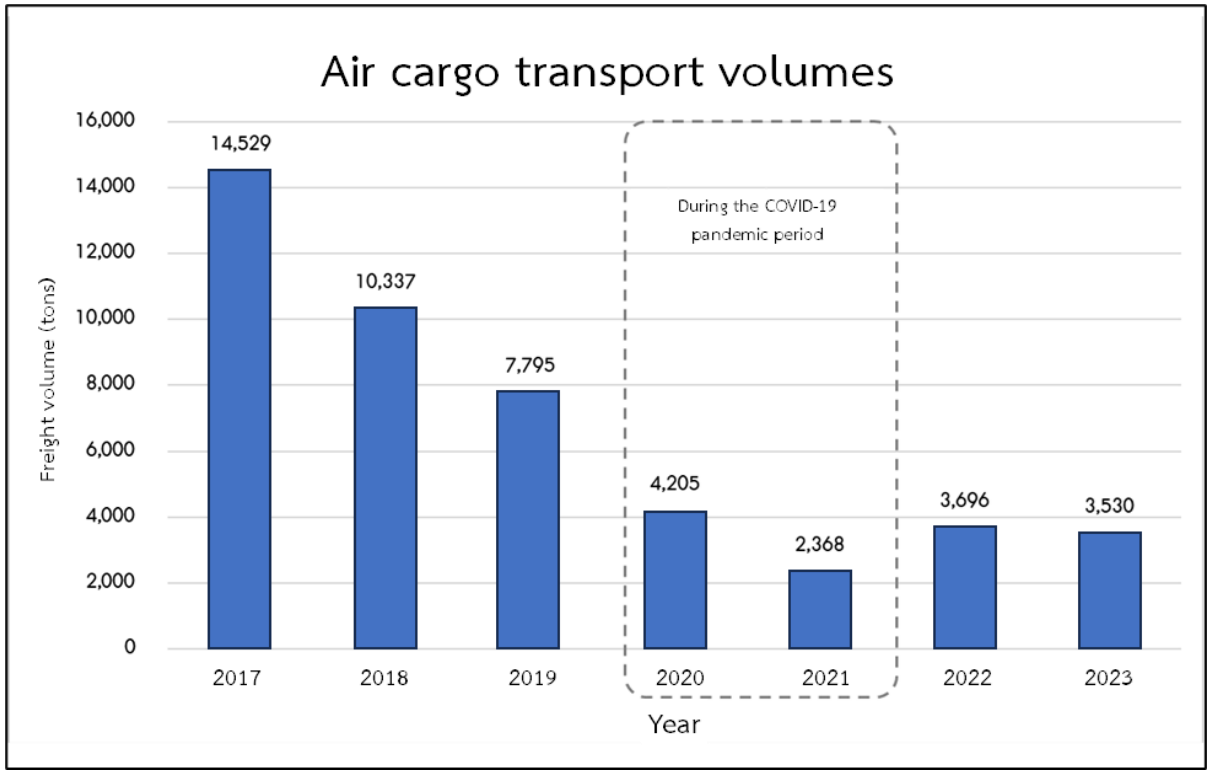


Source: Consultant, 2024

Figure 3.3-31 Domestic Air Passenger Volume: Comparison Before, During, and After the COVID-19 Pandemic

2) Air Freight Transport Volume

The consultant conducted a comparative analysis of domestic air cargo volumes using secondary data from the Department of Airports (DOA) and Airports of Thailand Public Company Limited (AOT), as shown in **Figure 3.3-32**. It was found that prior to the COVID-19 pandemic, air cargo volumes showed a declining trend, possibly due to higher transportation costs compared to other modes, leading operators to increasingly shift to alternative transport methods. During the COVID-19 pandemic (2020-2021), air cargo volumes dropped significantly due to flight restrictions and the economic downturn. However, following the pandemic, air cargo transport has shown signs of recovery, although volumes have not yet returned to pre-pandemic levels, as some operators continue to rely on lower-cost alternative transport modes.



Source: Department of Airports (DOA) and Airports of Thailand Public Company Limited (AOT), 2023.

Figure 3.3-32 Air cargo transport volumes: Comparison before, during, and after the COVID-19 pandemic.

3.4 Development of Travel and Freight Transport Models

The consultant developed an integrated transport model consisting of three sub-models: 1.Passenger Model - designed to analyze and forecast passenger travel demand. 2.Freight Model - focusing on the movement and distribution of goods across different transport modes. And 3.Cross-Border Model - addressing passenger and freight transport activities across international borders.

The Cross-Border Model simulates the movement of both passengers and freight across border checkpoints connecting Thailand with neighboring and nearby countries, namely Myanmar, the Lao People's Democratic Republic (Lao PDR), Cambodia, Vietnam, Malaysia, Singapore, and Southern China. The consultant conducted the analysis based on methodologies developed by the Japan International Cooperation Agency (JICA), which has carried out studies and research on cross-border transport infrastructure. In particular, the Phase II study emphasized cross-border transport in the Greater Mekong Subregion (GMS). The forecasting of passenger travel demand, freight transport, and cross-border flows is calibrated to align with travel and transport patterns observed in the base year (2024). Projections for future years are derived using trends in traffic conditions, economic and social development, as well as relevant policies, strategies, and plans.

3.4.1 Improvement of the Transportation Network Model and Study Area

The transportation network and study area in the previous National Transport Model (NAM) consisted of the following components:

- **Road Transport Network:** Covering both primary and secondary highways within the study area.
- **Waterway Transport Network:** Limited to transport along the Chao Phraya River and the Mekong River.
- **Rail Transport Network:** Comprising two main lines, namely the Northern Line and the Northeastern Line.
- **Air Transport Network:** Including all air routes connecting to the study area, particularly major routes from Suvarnabhumi Airport, Don Mueang Airport, and other regional airports.

3.4.2 Improvement and Development of the Passenger Transport Model

The consultant reviewed and refined the model parameters, as well as the mathematical relationship structures, by utilizing survey data and secondary data obtained from relevant projects, including:

1) Trip Generation Model

The improvement and development of the trip generation model utilized field survey data to formulate equations representing the relationship between travel demand in each province and the socio-economic characteristics of the respective provinces. The relationship was expressed in the form of a linear regression model, where the dependent variable is the number of trips, and the independent (explanatory) variables include provincial population and Gross Provincial Product (GPP). The most suitable model was selected based on the logical consistency of the variable coefficients and the equation yielding the highest adjusted R-squared value.

1.1) Population Forecasting

The consultant utilized the population forecasts from the Office of the National Economic and Social Development Council (NESDC). The forecasting methodology for Thailand's population was based on the report titled "Population Projection for Thailand, 2010-2040 (Revised Edition).

1.2) Gross Domestic Product (GDP) at the national, regional, and provincial levels

The consultant utilized historical data on gross domestic product (GDP) at the national, regional, and provincial levels from 2002 to 2023 to analyze growth rates. Linear regression methods were applied to determine the relationships, and the calculated growth rates were then used to forecast GDP for future years up to the final year of the analysis.

2) Additional analysis of travel demand from tourists (Travel Trips)

To enhance the accuracy and reliability of the national travel demand model, the consultant incorporated travel demand from both domestic and international tourists using historical secondary data from relevant agencies, such as the Tourism Authority of Thailand and the National Statistical Office. Based on the compiled data on domestic and international tourists from 2014 to 2023 provided by the Tourism Authority of Thailand, it was found that the number of tourists prior to the COVID-19 pandemic (2014-2019) grew at an average annual rate of 5.15%. During the COVID-19 pandemic, both globally and in Thailand, travel demand significantly declined in 2020-2021. Tourist travel demand began to recover in 2022, reaching levels comparable to 2014 but still below the pre-pandemic level of 2019. In 2023, the number of tourists exceeded that of 2019, resulting in an average annual growth rate of 3.47% over the period 2014 - 2023.

3) Additional Analysis of Induced Trips from High-Speed Rail Development

The development of the high-speed rail (HSR) project represents the introduction of a new high-speed travel mode capable of providing faster transportation than certain existing modes. Due to its speed and operational efficiency, the HSR is expected to induce additional travel demand beyond what would normally increase with socioeconomic growth. Accordingly, the consultants have updated the national traffic and transportation model to incorporate these effects by including special trip generators. This approach is based on prior research conducted by the National Science and Technology Development Agency (NSTDA) on special trip origins for the high-speed rail system in Thailand. The results of this study were reviewed, validated, and adapted for integration into the national-level travel demand model.

4) Improvement and Development of the Trip Distribution Model

The trip distribution model is used to allocate travel demand among different sub-areas using the Gravity Model approach. The consultants applied the results from the trip generation analysis, which considers the relationship between travel demand and the socio-economic characteristics of each area. The generated trip volumes are then distributed to the respective sub-areas, and the inter-area travel flows are calibrated using the K-Factor technique to ensure that the distributed trips accurately reflect observed travel patterns.

5) Mode Choice Model Improvement and Development

The consultants improved the mode choice model using travel survey data collected within the study area. The model was calibrated to closely reflect actual travel behavior, enabling it to better represent travelers' choices and preferences across different transport modes.

6) Improvement and Development of the Trip Distribution Model

The trip distribution model allocates travel volumes for each origin-destination subarea pair across the networks of different transport modes. After distributing the trips onto the transport networks, the consultants calibrated the model for the base year (2024) to ensure that the

forecasted results align with current real-world conditions. This calibration was performed using traffic volumes measured along predefined screen lines.

3.4.3 Improvement and Development of the Freight Model

The consultants carried out improvements and developments on the freight transport model, which is structured as a multi-stage sequential model. Each stage is detailed as follows:

1) Improvement and Development of the Trip Generation Model

The trip generation model for freight transportation forecasts the production and attraction of goods (Production Model), which is calculated based on the production capacity and consumption volume of each province. The data is categorized according to the following characteristics: (1) type of goods, (2) production volume, (3) consumption volume, (4) import volume, and (5) export volume. The output of the trip generation model represents the production and consumption of goods in each area, classified by commodity group, in units of tons per year.

2) Improvement and Development of the Freight Trip Distribution Model

The Freight Trip Distribution Model distributes the results obtained from the Freight Trip Generation Model—namely, the production and consumption of goods by commodity group in each area—across the transportation network using a Gravity Model. The distribution is divided into two separate trip matrices: (1) Direct Short-Haul Flow and (2) Long-Haul Flow. The parameters for trip allocation and the distribution function differ for the two distance categories and are customized according to each commodity group, based on a review of historical freight transport data.

3) Improvement and Development of the Travel Mode Choice Model

The choice of travel mode for freight transport is determined based on the transportation distance, with the assumption that short-distance shipments are exclusively transported by trucks. For long-distance shipments, a Modal Choice Model is applied, differentiated by distance and type of goods. The consultant reviewed the transport costs and transfer processes for each mode, as well as the expenses associated with transporting different types of goods, in order to calculate the Generalized Cost Function. Each mode's generalized cost varies depending on distance, time, and travel expenses. The resulting Generalized Cost Function is then used in the analysis of mode choice using a Gravity Model.

4) Improvement and Development of the Transport Logistics Node Model

The Transport Logistics Node (TLN) is a point used for transferring the mode of freight transport or facilitating continuous cargo movement. For the purpose of improving parameters in the freight transport model, cargo flows are divided into two categories: 1. Direct Flow - Freight is transported directly from the origin to the destination without intermediate stops. And 2.Transport via Transport Logistics Node - Freight cannot be transported directly from the origin to the destination; instead, it is temporarily handled at a Transport Logistics Node, such as an oil depot or

a distribution center where goods are consolidated before being sent to the final destination. This type of transport is referred to as Transport Chain Flow.

5) Improvement and Development of the Fine Distribution Model

The consultant reviewed and compiled secondary data sources regarding population and employment at the district level (fine spatial resolution), which serve as key input data for improving and developing the Fine Distribution Model. This model is used to distribute freight flows from the provincial level to individual districts. At this stage, the four travel matrices obtained from the previous analysis are allocated into the fine-resolution spatial system.

6) Improvement and Development of the Vehicle Model

The Vehicle Model converts the forecasted annual number of trucks into quantities of large and small trucks. In the Cube Cargo software, there are two types of vehicle models:

- **Standard Vehicle Model:** This model simulates direct origin-to-destination freight transport. It assumes that every vehicle trip follows a simple A-B-A pattern, representing a round trip from the origin (A) to the destination (B) and back.

- **Touring Vehicle Model:** This model simulates freight transport involving multiple pickups and deliveries along a single route. It assumes that the start and end points of the trip are the same, but there may be several intermediate stops to load or unload goods. For example, a trip could follow an A-B-B-B-A pattern, where A is the warehouse (start and end point) and B represents multiple delivery or pickup points along the route.

7) Improvement and Development of the Freight Assignment Model

The assignment of freight transported by trucks is carried out on the road network and is integrated with the Passenger Model for combined traffic assignment. Beyond the distribution of goods on the road network, the outputs from the Fine Distribution Model provide freight trip tables for other transport modes. These trip tables are then assigned to their respective networks as follows:

(1) **Rail Freight Trips:** Assigned to the railway network.

(2) **Air Freight Trips:** Assigned to the air transport network.

(3) **Water Freight Trips:** Assigned to the waterway network.

This approach ensures that freight flows for all transport modes are accurately represented on their respective networks, reflecting realistic travel patterns and modal interactions.

3.4.4 Improvement and Development of the Cross-Border Passenger and Freight Transport Model

The consultant has improved and developed the Cross-Border Transport Model, which simulates the movement of passengers and freight through border checkpoints adjacent to and near Thailand. This model enables travel connectivity between Thailand and neighboring countries, including Myanmar, Lao PDR, Cambodia, Vietnam, Malaysia, Singapore, and Southern China.

The analysis was conducted by referencing the methodology of the Japan International Cooperation Agency (JICA), which studied and researched cross-border transport infrastructure within the Greater Mekong Subregion in Asia.

The consultant collected the necessary data for calculating Gross Regional Domestic Product (GRDP) from secondary sources, including population data for each area from the Worldometer database maintained by the United Nations, and GDP per capita data from the World Bank. The updated road network was used to calculate travel times between areas by constructing a Skim Matrix, and the results were then used to compute the GRDP Potential for each zone.

3.4.5 Study and Analysis of Travel and Freight Transport Demand

3.4.5.1 Travel and Freight Transport Demand

Based on the results of the base year model (2024 CE / 2567 BE), domestic travel in the country currently (2024 CE) amounts to approximately 4,061,000 person-trips per day, which can be categorized into four main travel modes: private car, public transport, air travel, and rail. In the base year, the majority of domestic travelers prefer private cars, accounting for 87.98% of all trips, followed by public transport (7.68%), air travel (2.44%), and rail (1.90%).

For domestic freight transport, four main modes are identified: road, rail, water, and air. In the base year (2024 CE), total domestic freight volume across all transport modes is approximately 854 million tons per year. Road transport, offering convenient door-to-door service, is the dominant mode with a share of 86.08%, followed by water transport (12.50%), rail (1.42%), and air (0.004%).

Regarding freight transport distances, road transport accounts for 180,104 million ton-kilometers per year, followed by water transport (11,000 million ton-km/year), rail (3,068 million ton-km/year), and air (21 million ton-km/year).

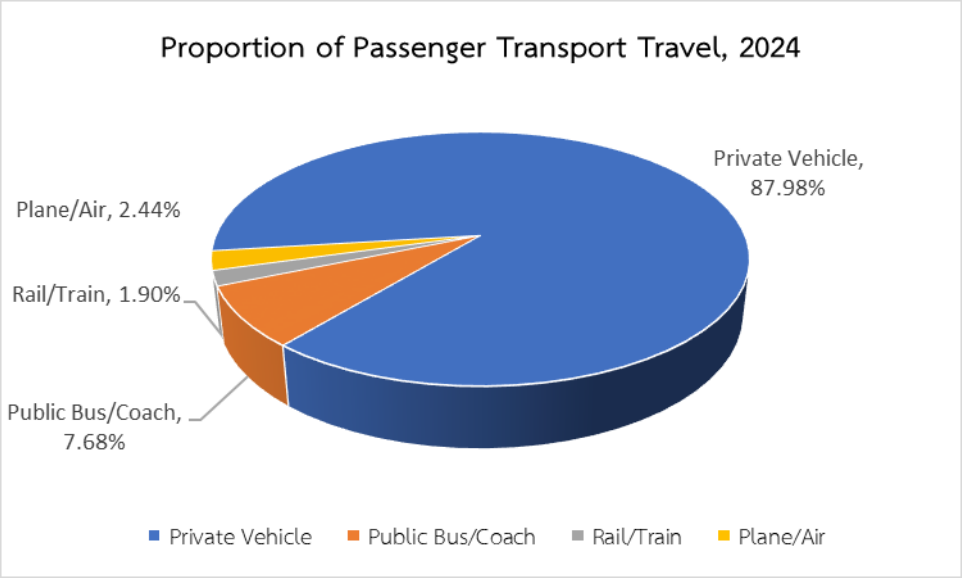


Figure 3.4-1 Proportion of Passenger Transport Travel, 2024 (Base Year)

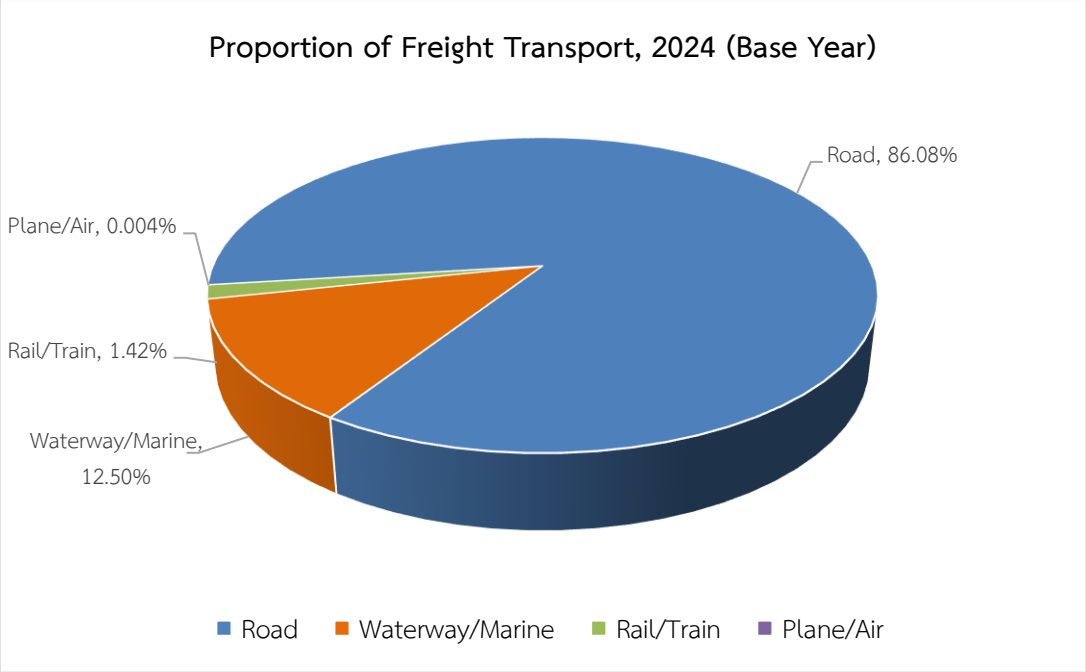


Figure 3.4-2 Proportion of Freight Transport, 2024 (Base Year)

3.4.5.2 Analysis and Assessment of Infrastructure Capacity

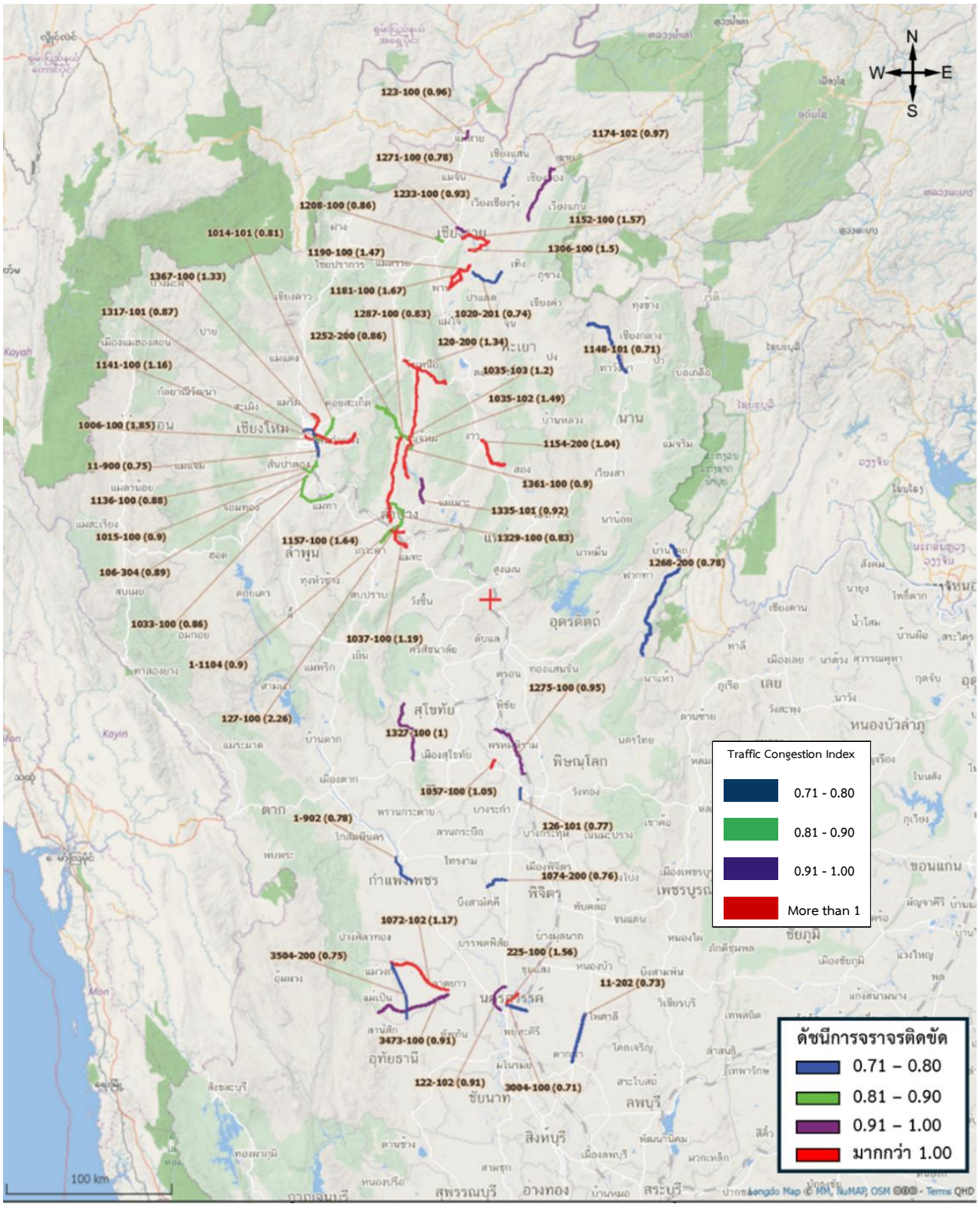
The analysis and assessment of current infrastructure capacity aims to evaluate the ability of the transportation and logistics system to accommodate travel and freight demand.

1) Road Transportation Network

Assessment of the road transportation network capacity: The consultant collected data on the Traffic Volume-to-Capacity Ratio (V/C) on highways from the annual report on congestion and traffic density analysis for the year 2023 (2566) [reported in 2567] by the Department of Highways, Office of Road Safety. The V/C values were calculated at the same locations where the Average Annual Daily Traffic (AADT) counts were surveyed for the year 2023 (2566).

Based on the analysis of the Traffic Volume-to-Capacity Ratio (V/C) in the study areas of the Northern and Northeastern regions, it was found that most of the transportation network exhibited V/C values below 0.6, corresponding to a Level of Service (LOS) A. Specifically, in the Northern region, 512 road segments with a total length of 13,007.75 kilometers fell within this range, while in the Northeastern region, 476 road segments totaling 11,988.34 kilometers were in LOS A.

However, certain road segments, particularly two-lane roads, exhibited V/C values exceeding 1, indicating LOS F and requiring urgent improvement. In the Northern region, 17 such road segments with a total length of 394.80 kilometers were identified, while in the Northeastern region, 23 segments totaling 598.54 kilometers needed upgrades.



Source: Office of Safety Management, Department of Highways (2024)

Figure 3.4-3 Service Potential of the National Highway Road Network in the Northern Region, 2023

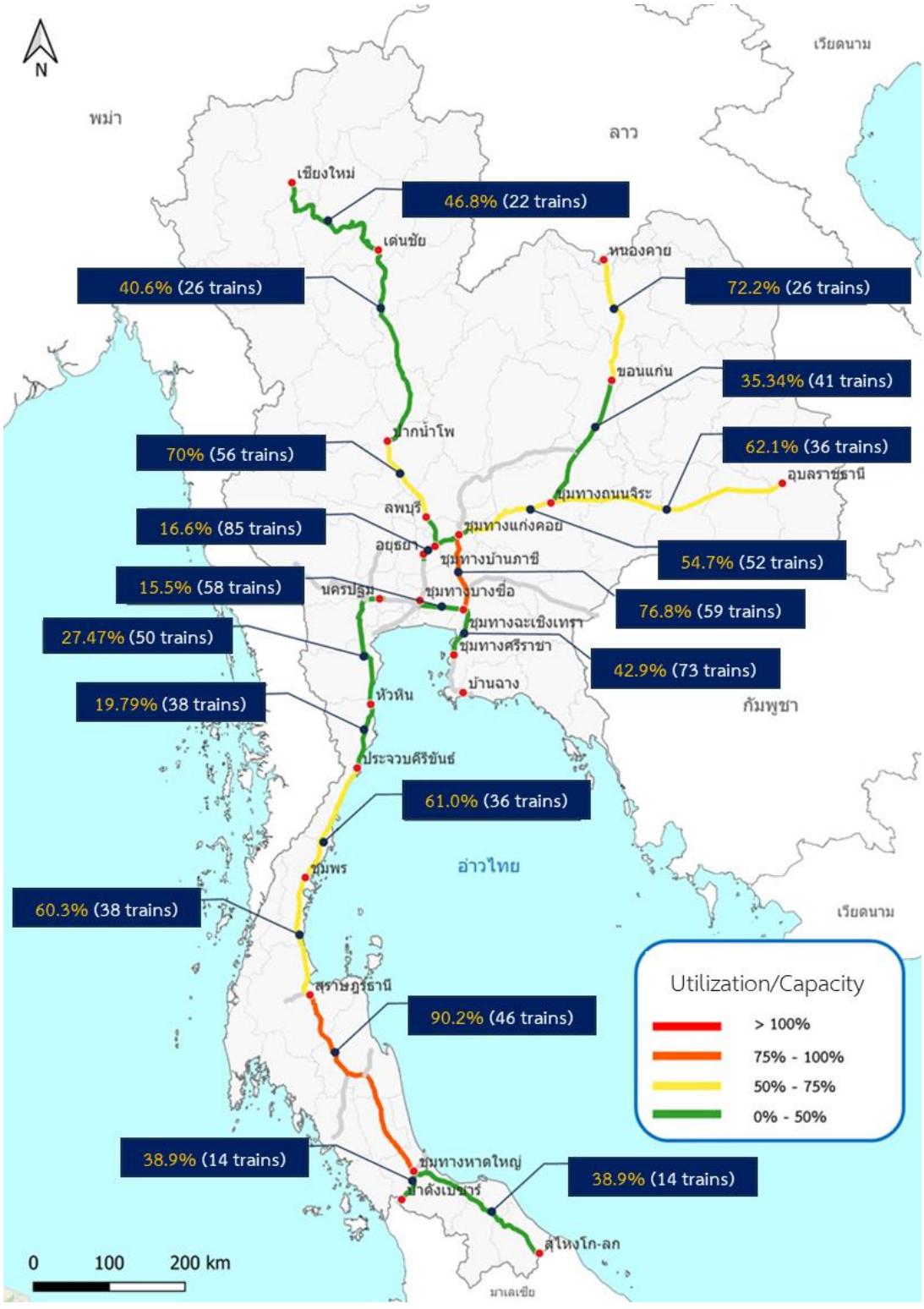
Figure 3.4-4 Service Potential of the National Highway Road Network in the Northern Region, 2023

2) Rail Transport Network

Assessment of the Rail Transport Network Capacity. The consultant collected and analyzed secondary data, including the number of passenger and freight trains and the line capacity that can currently be accommodated, to evaluate the performance of the rail network. The assessment was based on the Volume-to-Capacity ratio (V/C).

The analysis of V/C indicates that the rail transport network's ability to meet travel and freight demand ranges from 0.15 to 0.90. The Surat Thani-Hat Yai section is operating near full capacity, with a V/C of 0.90. The Chachoengsao-Kaeng Khoi section, which has been developed as a double-track line, still has a relatively high V/C of 0.75. Additionally, the Pak Nam Pho-Den Chai section on the Northern Line and the Khon Kaen-Nong Khai section on the Northeastern Line, which currently operate as single-track lines, have V/C values exceeding 0.70. Other sections of the network

are considered to have sufficient capacity to accommodate current demand. Details are as shown in **Figure 3.4.5**



Source: Consultant (2024)

Figure 3.4-5 Service Potential of the Rail Transport Network

3) Water Transport Network

Assessment of Water Transport Network Capacity. The consultant evaluated the capacity of the water transport network by analyzing container volumes, focusing on the main cargo ports: Laem Chabang Port, Bangkok Port, Songkhla Port, and Chiang Saen Port. The assessment was based on the ratio of cargo volume to the infrastructure's handling capacity (V/C).

The analysis indicates that Laem Chabang Port, Bangkok Port, and Songkhla Port are operating near their maximum handling capacities, with V/C values of 0.79, 0.86, and 0.94, respectively, suggesting that these ports are approaching their limits in accommodating current cargo transport demand.

ตารางที่ 3.4-1 Cargo Capacity of Commercial Ports

Port	2023		
	Capacity	Average Annual Volume	V/C
Laem Chabang (Million TEUs)	11	8.86	0.79
Bangkok (Million TEUs)	1.45	1.25	0.86
Songkhla (Million TEUs)	0.16	0.15	0.94
Chiang Saen (Million Tonnes)	0.80	0.45	0.56

Source: Consultant (2024)

4) Air Transport Network

Air Transport Network Capacity Assessment. The consultant collected data from relevant agencies, including Airports of Thailand Public Company Limited (AOT), the Department of Airports (DOA), and the Civil Aviation Authority of Thailand (CAAT). Passenger volumes, including both international and domestic travelers, were analyzed for the year 2024 (B.E. 2567).

The assessment found that the airports exceeding their current capacity were Don Mueang Airport, Chiang Mai Airport, Hat Yai Airport, and Phuket Airport. Other airports were still able to accommodate passenger demand. Notably, Suvarnabhumi Airport opened a new terminal building (SAT-1) in September 2023, increasing its capacity to handle up to 65 million passengers per year.

ตารางที่ 3.4-2 Service Potential and Capacity of Airports for Passengers, 2024

No.	Airport	Capacity (Passengers/Year)	Average Annual Throughput (International + Domestic Passengers) (Passengers/Year)	Utilization Ratio (Passengers/Capacity)
1	Suvarnabhumi	65,000,000	62,222,758	0.96
2	Don Mueang	30,000,000	30,480,772	1.02
3	Chiang Mai	8,000,000	9,081,147	1.14
4	Hat Yai	2,500,000	3,088,606	1.24
5	Phuket	12,500,000	17,212,530	1.38
6	Mae Fah Luang	3,000,000	1,912,665	0.64
7	Krabi International	2,920,000	2,589,594	0.89
8	Udon Thani nternational	2,336,000	1,766,258	0.76
9	Surat Thani International	2,500,000	1,342,035	0.54
10	Nakhon Si Thammarat	4,000,000	1,040,761	0.26
11	Ubon Ratchathani International	2,920,000	1,306,352	0.45
12	Khon Kaen International	2,920,000	1,569,059	0.54
13	Trang	884,760	559,844	0.63
14	Phitsanulok	2,920,000	459,412	0.16
15	Nakhon Phanom	1,089,160	354,213	0.33
16	Sakon Nakhon	913,960	330,050	0.36
17	Lampang	750,440	128,114	0.17
18	Narathiwat	922,720	185,937	0.2
19	Nan Nakhon	876,000	407,145	0.46
20	Mae Sot	484,720	102,989	0.21
21	Roi Et	913,960	342,970	0.38
22	Ranong	700,800	122,069	0.17
23	Loei	668,680	198,733	0.3
24	Chumphon	730,000	121,638	0.17
25	Mae Hong Son	1,022,000	102,989	0.1
26	Buriram	934,400	255,350	0.27
27	Hua Hin	811,760	74,242	0.09
28	Sukhothai	876,000	66,492	0.08
29	Trat	876,000	77,295	0.09
30	Samui	5,840,000	2,781,564	0.48

3.4.6 Study and Analysis of Future Travel and Freight Demand

3.4.6.1 Future Travel and Freight Demand

The consultants collected and analyzed historical and current trends in economic and social development, reviewed analyses and forecasts from various reports at both macro and regional levels across all modes of transportation, and used provincial-level OD data from mobile sources to forecast passenger travel demand. Additionally, Big Data and network development plans from the "Policy-to-Practice Transformation Project (Brain)" were utilized to forecast freight transport volumes. The forecasts are presented in five-year intervals for the analysis years 2027, 2032, 2037, and 2042.

The future travel demand forecasts indicate that the majority of travelers will continue to favor private car travel, followed by public transport, rail, and air travel. When examining trends in modal share, only rail travel (including conventional trains and high-speed rail) shows a tendency to increase its share. This growth is likely due to the completion and operation of projects such as double-track rail lines, new railway lines, and high-speed rail systems, which expand coverage across more areas and reduce travel times. As a result, some travelers are expected to shift from other modes of transport to rail.

In addition, the consultant analyzed the total system travel distance (Vehicle-Kilometers of Travel: VKT) and total system travel time (Vehicle-Hours of Travel: VHT), considering the network improvements under the development plans from the "Transforming Policy into Action" (Brain) project. The analysis indicates that implementing the planned projects would reduce both VKT and VHT, as some travelers and freight operators shift their travel and transport modes—for example, an increased transfer of freight from road to rail. Consequently, VKT and VHT decrease. Furthermore, the average travel speed across the network is projected to increase from 64.53 km/h to 70.41 km/h by 2042 following the network development. The summary of these results is presented in **Table 3.4-1.**

Table 3.4-1 Future Travel Demand: Volume and Proportion

Unit: Thousand Passenger-Trips per Day

Travel Mode	Travel Volume (% Proportion)			
	2027	2032	2037	2042
Car persons	3,729 (87.78%)	4,166 (86.95%)	4,396 (85.96%)	4,619 (85.19%)
Public Transport	327 (7.70%)	365 (7.62%)	388 (7.59%)	413 (7.62%)
Rail	89 (2.10%)	111 (2.32%)	160 (3.13%)	206 (3.80%)
High-Speed Rail	-	33 (0.69%)	47 (0.92%)	55 (1.01%)
Airplane	103 (2.42%)	116 (2.42%)	123 (2.40%)	129 (2.38%)
Total	4,248 (100%)	4,791 (100%)	5,114 (100%)	5,422 (100%)

Source: Consultant (2025)

Table 3.4-2 Future Freight Transport: Volume and Share

Mode	Mode of Transport - Freight Volume (%Proportion), Unit: Million Tons per Year			
	2027	2032	2037	2042
Road	804.43 (85.87%)	901.91 (85.61%)	994.33 (84.98%)	1,071.69 (84.19%)
Rail	14.42 (1.54%)	18.62 (1.77%)	27.81 (2.38%)	39.74 (3.12%)
Water	117.87 (12.58%)	132.95 (12.62%)	147.94 (12.64%)	161.47 (12.68%)
Air	0.04 (0.004%)	0.04 (0.004%)	0.05 (0.004%)	0.06 (0.005%)
Total	**936.76 (100%)**	**1,053.52 (100%)**	**1,170.13 (100%)**	**1,272.96 (100%)**
Mode	**Mode of Transport - Freight Transport Distance, Unit: Million Ton-Km per Year**			
	2027	**2032**	**2037**	**2042**
Road	197,706	220,882	243,089	262,007
Rail	3,697	6,018	9,600	13,792
Water	11,753	13,221	14,753	16,864
Air	23	28	33	39
Total	**213,179**	**240,149**	**267,475**	**292,702**

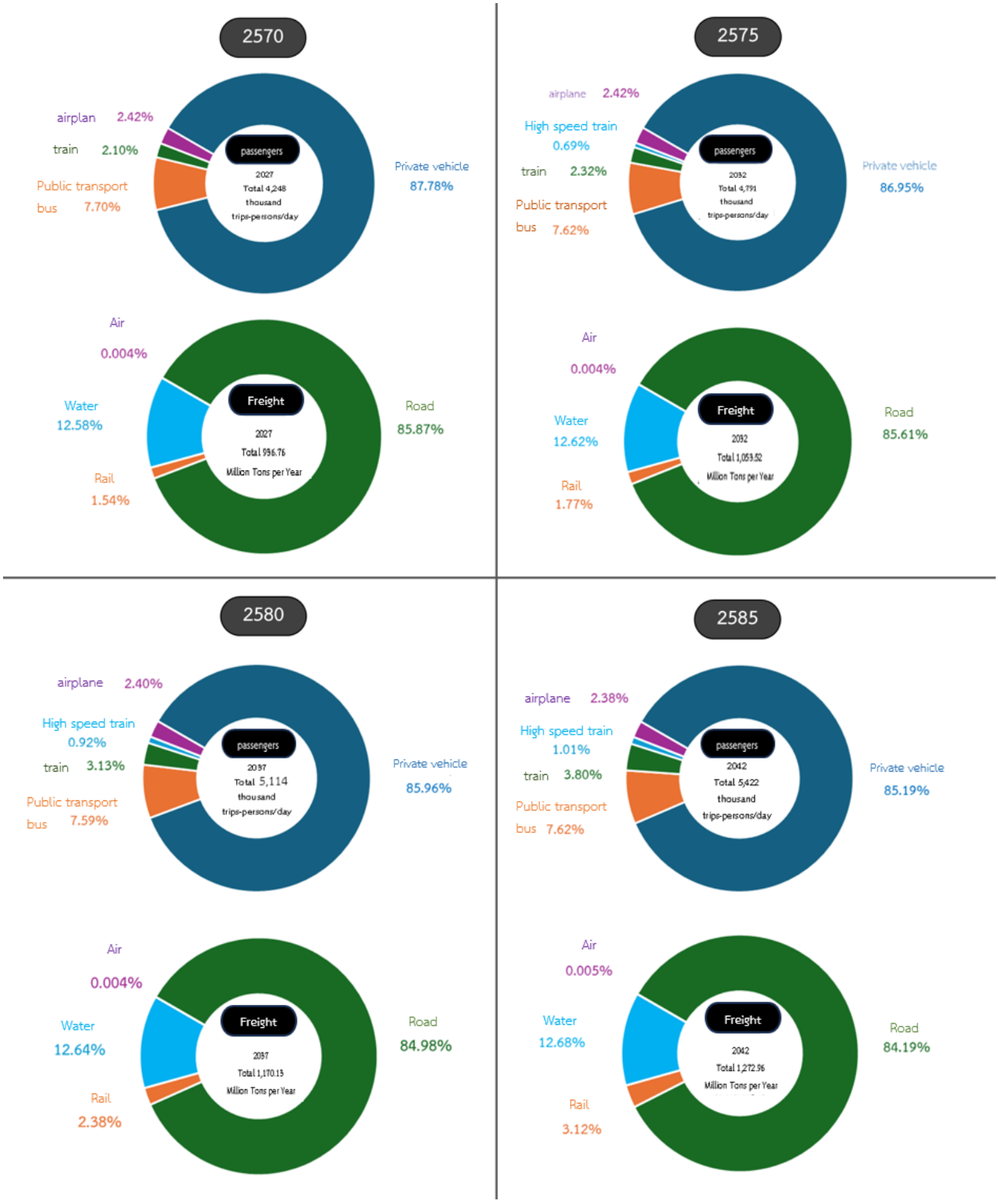
Source: Consultant (2025)

Table 3.4-3 Forecasted Total Vehicle-Kilometers and Vehicle-Hours of Travel in the System

Year	Without Project			With Project		
	VKT (PCU-km./day)	VHT (PCU-hr./day)	Speed (km./hr.)	VKT (PCU-km./day)	VHT (PCU-hr./day)	Speed (km./hr.)
2024	494,351,921	7,005,696	70.56	-	-	-
2027	527,757,328	7,605,461	69.39	526,387,131	7,428,341	70.86
2032	593,691,486	8,805,954	67.42	587,203,497	8,221,428	71.42
2037	645,025,602	9,795,328	65.85	632,891,235	8,905,347	71.07
2042	691,682,331	10,719,190	64.53	673,670,309	9,567,831	70.41

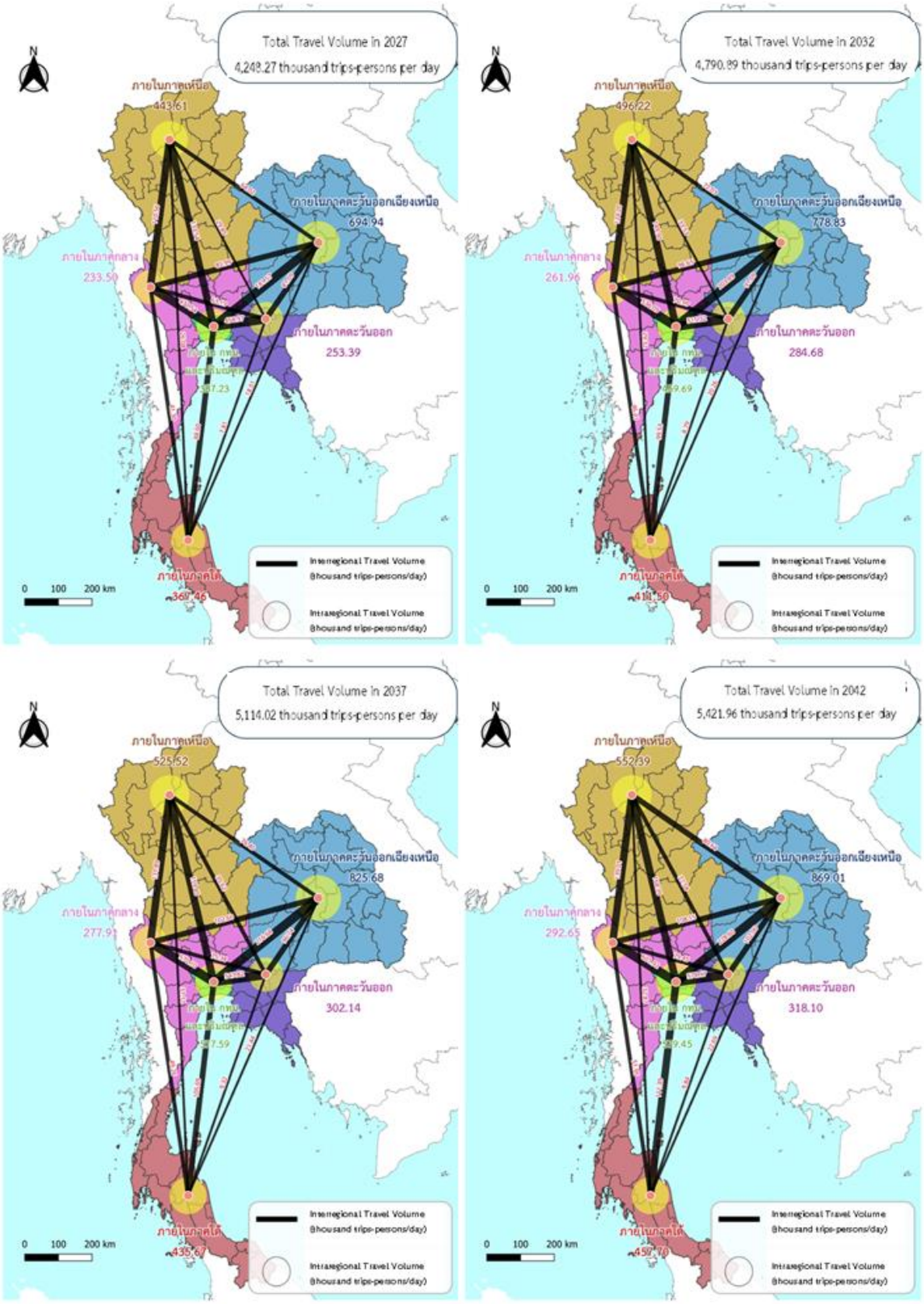
Source: Consultant (2025)

Based on the forecasted travel and freight volumes for the years 2027, 2032, 2037, and 2042, as shown in **Tables 3.4-2** and **Tables 3.4-3**, the data can be illustrated as charts representing the share of each transport mode, as presented in **Figure 3.4-6**. Additionally, the data can be distributed as Origin-Destination (OD) travel and freight volumes across each region, as shown in **Figures 3.4-7** and **Figures 3.4-8**



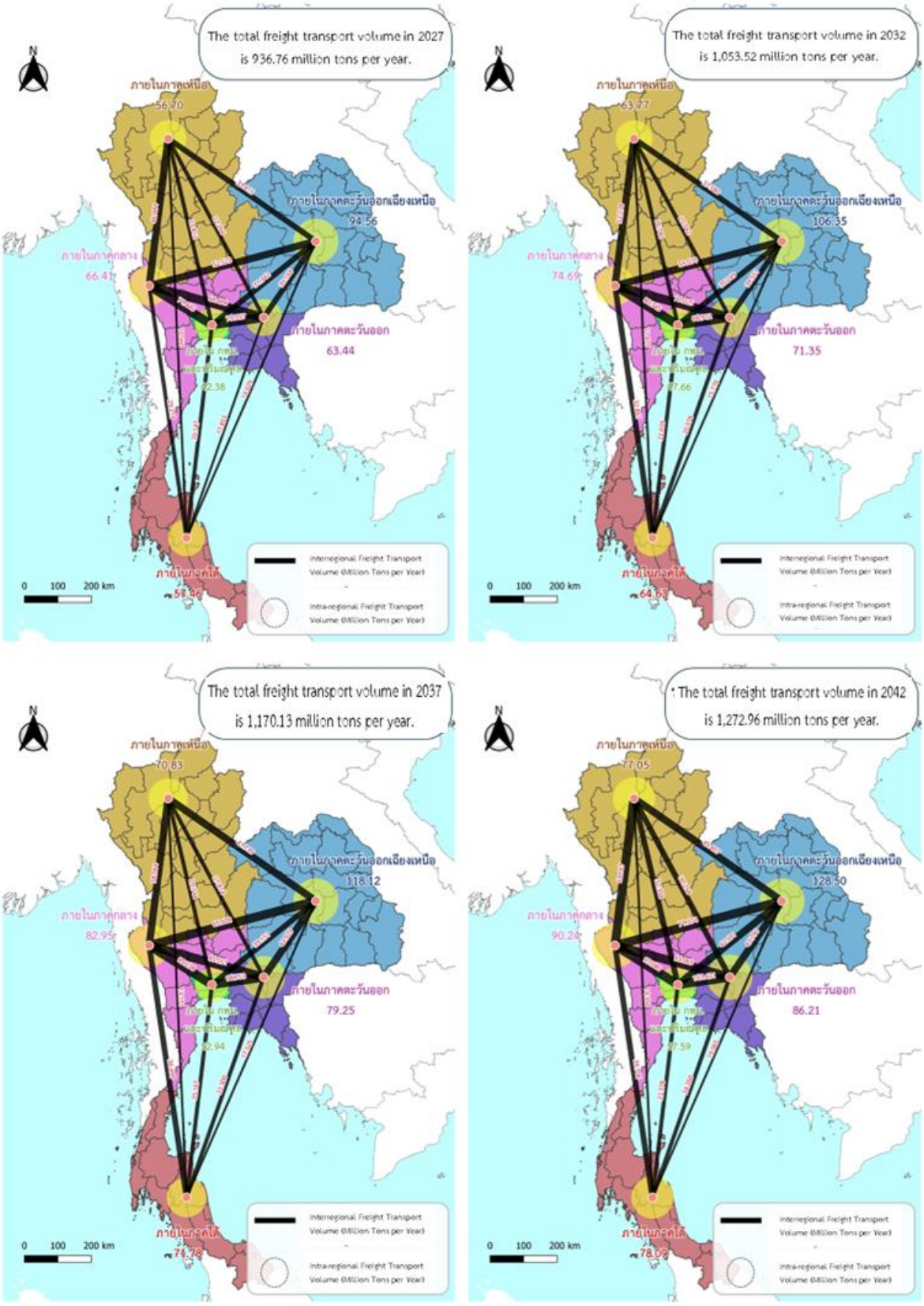
Source: Consultant (2025)

Figure 3.4-6 Forecasted Share of Travel and Freight Volumes by Vehicle Type for the Years 2027, 2032, 2037, and 2042



Source: Consultant Analysis (2025)

Figure 3.4-7 Forecasted Passenger Travel Volumes by Region for the Years 2027, 2032, 2037, and 2042



Source: Consultant Analysis (2025)

Figure 3.4-8 Forecasted Freight Transport Volumes by Region for the Years 2027, 2032, 2037, and 2042

However, when the consultant reviewed the target indicators set by the Ministry of Transport (MoT), it was specified that by 2037, the share of rail freight transport as a proportion of total freight transport must not be less than 10%. Considering the model results with the expanded future network for 2037, the rail freight share was only 2.38%, which is below the target.

Therefore, achieving the target cannot rely solely on the infrastructure planned for the future. Policy incentives are also necessary, as discussed in the policy recommendations in Section 6.5, Chapter 6. These policies are expected to shift travel and freight behavior toward greater use of rail transport.

To achieve the target indicator of at least 10% in the model, the consultant adjusted relevant parameters, particularly the Alternative Specific Constant (ASC), which represents hard-to-measure factors such as convenience, satisfaction, and ease of use for each transport mode, in the modal choice model. The adjustments aimed to increase the shift to rail transport. In addition, measures to promote Container Yards (CY) coverage across all provinces and a 15% reduction in rail freight costs were applied.

As a result, by 2037, rail freight is projected to increase to 120.93 million tons per year, representing 10.33% of total freight. Road freight decreases to 902.39 million tons per year (77.12%), while water and air freight are projected at 146.77 million tons per year (12.54%) and 0.05 million tons per year (0.004%), respectively. Forecast data for other years are presented in **Table 3.4-4.**

Table 3.4-4 Future Freight Transport Forecast In the scenario including GMS2 plan/projects and measures promoting Container Yards (CY) coverage in all provinces, along with a 15% reduction in rail freight costs

Transport Mode	Freight Volume (Million tons/year)			
	2027	2032	2037	2042
Road	789.42 (84.27%)	845.94 (80.30%)	902.39 (77.12%)	974.98 (76.59%)
Rail	30.34 (3.24%)	75.73 (7.19%)	120.93 (10.33%)	138.12 (10.85%)
Water	116.96 (12.49%)	131.81 (12.51%)	146.77 (12.54%)	159.81 (12.55%)
Air	0.04 (0.004%)	0.04 (0.004%)	0.05 (0.004%)	0.06 (0.005%)
Total	936.76 (100%)	1,053.52 (100%)	1,170.13 (100%)	1,272.96 (100%)
Transport Mode	**Freight Distance (Million ton-km/year)**			
	2027	**2032**	**2037**	**2042**
Road	194,162	201,272	211,005	228,193
Rail	7,988	30,036	48,117	56,009
Water	11,749	13,246	15,793	18,037
Air	23	28	33	39
Total	213,922	244,582	274,948	302,278
Parameter	**Forecast of Total Distance and Travel Time in the Road Network**			
	2027	**2032**	**2037**	**2042**
VKT (PCU-km/day)	522,494,117	569,461,093	602,018,695	640,256,355
VHT (PCU-hr./day)	7,359,027	7,954,618	8,431,256	9,037,613
Speed (km/hr.)	71.00	71.59	71.40	70.84

Source: Consultant Analysis (2025)

3.4.6.2 Analysis and Assessment of Future Infrastructure Capacity

The analysis and assessment of future transportation infrastructure capacity are based on the Volume-Capacity Ratio (V/C), which measures traffic volume relative to the system's capacity. The evaluation is conducted separately for four transportation modes: road, rail, water, and air. The assessment assumes that historical data can be used to forecast future conditions. Therefore, the consultants applied a time-series model, a forecasting technique that predicts future outcomes using only historical data. No additional variables are incorporated in this analysis.

The data used include historical statistics of passenger and freight transport for each mode over the past 5 - 10 years, collected from relevant agencies, as well as planned future development projects. The detailed analysis and evaluation of infrastructure performance for each transportation mode are presented as follows.

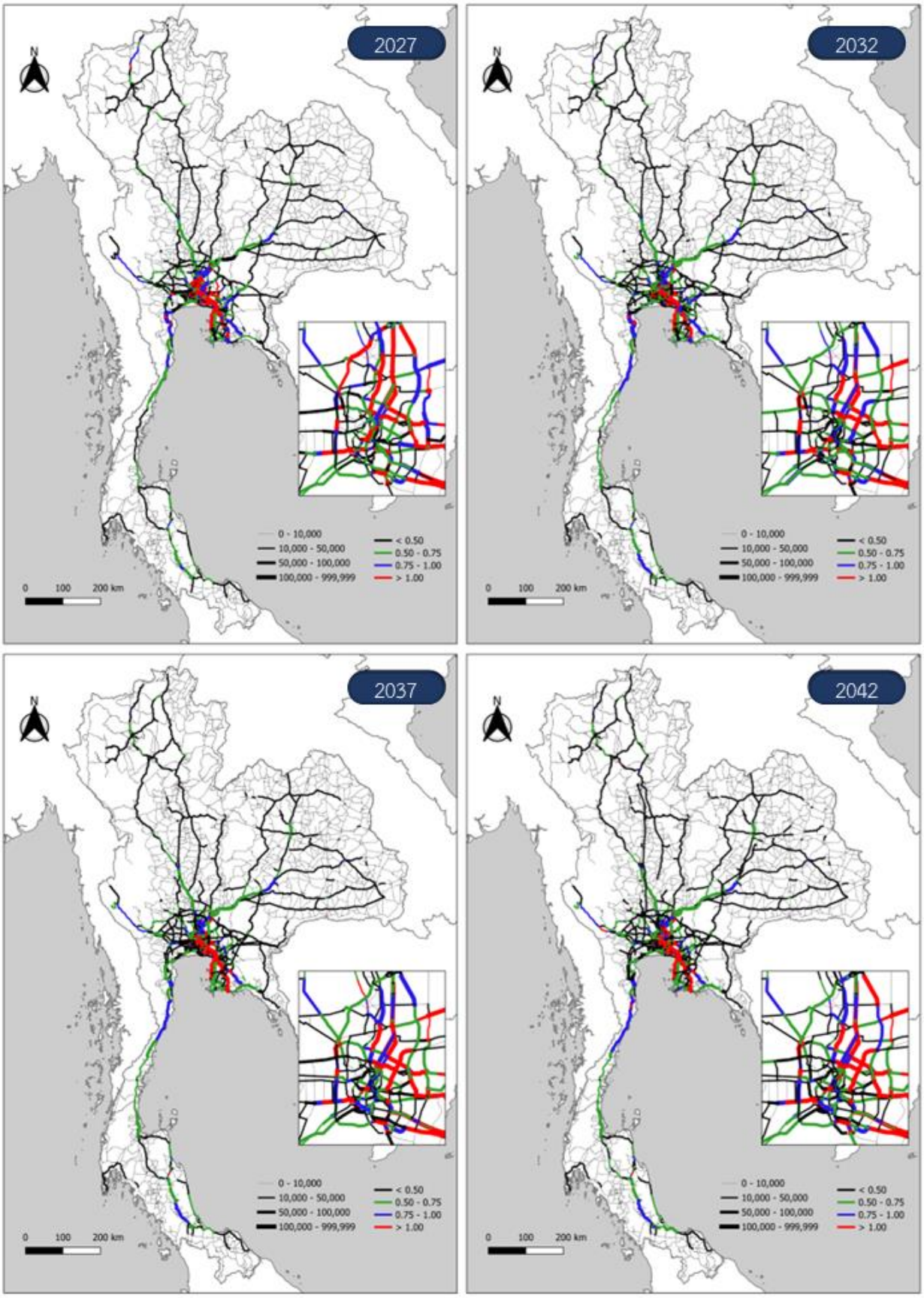
1) Road Transport Network Capacity

The road transport network serves as Thailand's primary transportation system, covering the entire country and linking travel within and between provinces, connecting regions, and facilitating cross-border travel with neighboring countries.

To assess the future capacity of the road transport network, the consultant utilized the National Transport and Traffic Model (NAM) to evaluate the network's ability to accommodate passenger and freight demand, considering the road infrastructure development projects planned by the government. The results of this capacity assessment for the road transport network are presented in **Figure 3.4-9**

2) Capacity of the Rail Transport Network

The assessment of the rail transport network capacity was conducted by the consultant based on the V/C (Volume-to-Capacity) ratio, which currently ranges between 0.15 and 0.90. The rail sections from Surat Thani to Hat Yai and from Chachoengsao to Kaeng Khoi are operating near their full capacity. For the future capacity of the rail transport network, the consultant considered the rail network development plans over the next 15-30 years, including double-track railway projects, new railway lines, and high-speed rail projects, which will enhance service capacity to better meet demand due to the increased infrastructure capacity.



Source: Analyzed by Consultant (2024)

Figure 3.4-9 Assessment of Road Infrastructure Carrying Capacity

3) Potential of Waterway Transport Network

The assessment of the capacity of waterway transport infrastructure was conducted by the consultant by collecting statistical data on cargo transportation at major ports, as compiled by the Marine Department over the past 5-10 years. The consultant then forecasted cargo volumes for the years 2027, 2032, 2037, and 2042, as shown in **Table 3.4-5**, and subsequently evaluated the capacity of the waterway infrastructure at each port.

The analysis and assessment of cargo-handling capacity at each port for the year 2027 indicate that the Map Ta Phut Port and Songkhla Port will experience cargo volumes exceeding their designed capacity. Meanwhile, Laem Chabang Port, Chiang Saen Port, and Bangkok Port are expected to be able to accommodate cargo volumes in 2027. However, when evaluating the efficiency for the period 2032 - 2042, Map Ta Phut Port is projected to exceed its capacity, while Laem Chabang Port and Songkhla Port are expected to operate near their maximum cargo-handling capacity.

Table 3.4-5 Forecast of Water Transport Cargo Volume

Port	Unit	2027	2032	2037	2042
Laem Chabang	Million TEU	9.31	11.78	14.91	17.09
Map Ta Phut	Million tons	43.44	44.25	45.06	45.87
Bangkok	Million TEU	1.44	1.47	1.50	1.53
Ranong	Million TEU	0.0052	0.0082	0.0129	0.0159
Songkhla	Million TEU	0.26	0.3	0.35	0.39
Chiang Saen	Million tons	0.49	0.54	0.60	0.66

Source: Analyzed by Consultant (2024)

4) Air Transport Network Capacity

The assessment of the air transport network capacity was conducted by analyzing both passenger and cargo traffic. Passenger analysis covered both major airports and regional airports, while cargo analysis focused only on major airports. Historical statistics of passenger movements and cargo shipments over the past 5 - 10 years were analyzed, and future projections were made using quantitative forecasting techniques. Specifically, a Time-Series Model was employed, which uses historical data to predict future trends under the assumption that past patterns can reliably indicate future outcomes. The forecasted passenger and cargo volumes are presented in **Table 3.4-6.**

Table 3.4-6 Forecast of Air Passenger and Cargo Volumes

No.	Airport	2024	2027	2032	2037	2042
Airports under Airports of Thailand Public Company Limited (AOT)						
Passengers (persons)						
1	Suvarnabhumi Airport	62,222,758	87,493,404	107,432,436	132,286,566	145,443,802
2	Don Mueang Airport	30,480,772	58,798,367	72,875,195	90,815,752	100,926,142
3	Chiang Mai Airport	9,081,147	16,129,815	18,201,180	18,843,575	19,763,136
4	Hat Yai Airport	3,088,606	5,193,717	6,410,864	8,162,605	8,565,704
5	Phuket Airport	17,212,530	25,871,911	22,748,982	23,283,513	24,108,535
6	Mae Fah Luang - Chiang Rai Airport	1,912,665	4,614,671	6,008,233	8,135,635	9,102,312
Total (persons)		**123,998,478**	**198,101,885**	**233,676,890**	**281,527,646**	**307,909,630**
Cargo (tons)						
1	Suvarnabhumi Airport	2,280,089	2,535,121	2,943,455	3,282,047	4,056,436
2	Don Mueang Airport	32,139	35,917	42,078	47,187	57,371
3	Chiang Mai Airport	9,958	11,705	14,885	18,898	22,527
4	Hat Yai Airport	6,679	7,910	9,795	11,074	13,411
5	Phuket Airport	37,583	43,678	52,800	58,870	76,089
6	Mae Fah Luang - Chiang Rai Airport	1,649	2,162	3,114	4,315	5,189
Total (tons)		**2,368,097**	**2,636,493**	**3,066,127**	**3,422,391**	**4,231,022**
Airports under Department of Airports (DOA)						
Passengers (persons)						
1	Krabi International Airport	2,589,594	5,923,048	8,151,196	11,352,564	12,114,678
2	Udon Thani International Airport	1,766,258	2,945,703	3,478,565	4,111,524	4,320,787
3	Surat Thani International Airport	1,342,035	3,016,630	4,196,913	6,166,642	6,484,650
4	Nakhon Si Thammarat Airport	1,040,761	1,573,455	1,746,407	1,928,174	1,981,978
5	Ubon Ratchathani International Airport	1,306,352	1,943,076	2,162,220	2,410,762	2,501,129
6	Khon Kaen International Airport	1,569,059	2,435,147	2,865,909	3,387,390	3,749,394

Table 3.4-6 Forecast of Air Passenger and Cargo Volumes (continued)

No.	Forecasting	2024	2027	2032	2037	2042
7	Trang Airport	559,844	755,622	798,896	856,406	840,296
8	Phitsanulok Airport	459,412	831,710	856,339	950,112	1,046,280
9	Nakhon Phanom Airport	354,213	490,587	599,573	722,485	763,437
10	Sakon Nakhon Airport	330,050	421,271	450,051	477,710	500,895
11	Lampang Airport	128,114	205,495	242,592	286,387	255,752
12	Narathiwat Airport	185,937	196,979	275,388	385,008	358,084
13	Nan Nakhon Airport	407,145	596,184	796,192	1,070,520	1,187,253
14	Mae Sot Airport	102,989	151,748	174,222	200,025	189,226
15	Roi Et Airport	342,970	371,333	469,756	594,266	587,352
16	Ranong Airport	122,069	153,844	221,868	319,970	335,123
17	Loei Airport	198,733	289,904	319,852	354,877	366,587
18	Chumphon Airport	121,638	113,261	137,764	167,567	180,030
19	Mae Hong Son Airport	102,989	98,714	117,188	139,119	156,858
20	Phrae Airport	-	53,702	69,325	89,494	77,211
21	Buriram Airport	255,350	488,604	604,424	771,415	895,449
22	Hua Hin Airport	74,242	50,536	60,332	72,027	91,881
23	Sukhothai Airport	66,492	87,601	99,533	112,651	118,688
24	Trat Airport	77,295	102,499	116,461	131,809	136,315
25	Samui Airport	2,781,564	3,207,252	4,182,784	5,597,508	5,863,082
26	U-Tapao Airport	384,881	577,322	1,039,179	1,766,604	2,215,874
Total (persons)		**16,669,986**	**27,081,227**	**34,232,929**	**44,423,016**	**47,318,288**
Cargo (tons)						
1	Krabi International Airport	2,008,885	2,178,228	1,708,672	1,955,415	2,013,950
2	Udon Thani International Airport	1,961,671	2,292,293	1,436,607	1,862,422	2,007,049
3	Surat Thani International Airport	2,084,963	2,363,379	1,622,664	1,999,648	2,115,285
4	Nakhon Si Thammarat Airport	632,436	715,950	493,498	606,822	641,342
5	Ubon Ratchathani International Airport	505,842	553,169	422,990	490,984	509,363
6	Khon Kaen International Airport	871,984	1,032,679	621,719	824,181	896,030
7	Trang Airport	409,346	441,556	351,803	399,140	411,449
8	Phitsanulok Airport	218,501	244,195	174,939	210,552	220,954
9	Nakhon Phanom Airport	316	360	243	302	321
10	Sakon Nakhon Airport	34,607	37,621	29,284	33,657	34,807

Table 3.4-6 Forecast of Air Passenger and Cargo Volumes (continued)

No.	Airport	2024	2027	2032	2037	2042
11	Lampang Airport	13,846	15,296	11,346	13,394	13,970
12	Narathiwat Airport	-	-	-	-	-
13	Nan Nakhon Airport	498	556	400	480	503
14	Mae Sot Airport	1,625	1,766	1,377	1,581	1,635
15	Roi Et Airport	-	-	-	-	-
16	Ranong Airport	270	336	174	251	282
17	Loei Airport	15,741	16,632	14,099	15,454	15,776
18	Chumphon Airport	244	275	193	235	247
19	Mae Hong Son Airport	-	-	-	-	-
20	Phrae Airport	-	-	-	-	-
21	Buriram Airport	11	12	9	10	11
22	Hua Hin Airport	-	-	-	-	-
23	Pai Airport	-	-	-	-	-
24	Nakhon Ratchasima Airport	-	-	-	-	-
25	Phetchabun Airport	-	-	-	-	-
	Total (tons)	**8,760,786**	**9,894,303**	**6,890,017**	**8,414,528**	**8,882,974**

Source: Analyzed by the consultant based on data from the Study on Translating Policy into Integrated Implementation in Transport and Logistics at Regional and National Levels, Office of Transport and Traffic Policy and Planning (OTP), 2024.

3.4.7 Comparison of National-Level Model Results

The consultant conducted a comparison of models from three studies: 1 . The study on developing a transport network model for provinces in the central and southern regions, linked to the economic corridor under the GMS framework to support economic and tourism development (GMS1 Model). 2.The consultancy project for developing a spatial model to predict broad economic returns from infrastructure investment, commissioned by the Office of the National Economic and Social Development Council (NTM Model). And 3.The current study (GMS2 Model). The comparison focused on the baseline data used in the models for forecasting, including population data and gross product data. Both the GMS2 and NTM models used the same set of baseline data, as shown in Tables

The forecasted passenger travel results from each model are presented in Table. It was found that all three models differ in both the volume and share of travel by each mode. These differences arise from the model structure and the parameters used in each model. The GMS1 and GMS2 models are based on the NAM structure and have been updated to the current year, whereas the NTM model is newly developed, incorporating additional survey data to support model development, such as travel survey data for estimating parameters in the Modal Split Model.

The forecasted freight volumes for each model are presented in Table. Similar to the passenger models, the results differ across models due to differences in model structure and parameters. The NTM model, being newly developed, features a newly designed freight model that accounts for different cargo types through production analysis, consumption analysis, and trip distribution analysis. It utilizes detailed truck GPS data classified by cargo type, as well as Revealed Preference (RP) and Stated Preference (SP) surveys for developing freight mode and route choice models. In contrast, the GMS1 and GMS2 models follow the NAM structure; however, GMS2 incorporates OD matrices for freight between provinces from Big Data to refine provincial-level freight distribution. Forecast results show that GMS1 predicts total freight increasing from approximately 936 million tons in 2027 to about 1,000 million tons in 2040, with road transport dominating at around 83-84%. For GMS2 and NTM, total freight volumes are similar. GMS2 forecasts growth from approximately 937 million tons in 2027 to about 1,273 million tons in 2042, primarily via road transport (84-86%). With GMS2 projects, including nationwide CY promotion measures and a 15% reduction in rail transport costs, road transport share is 77-84%. NTM forecasts an increase from approximately 936 million tons in 2027 to 1,272 million tons in 2042, with road transport accounting for about 85-86% of total freight.

However, a notable difference between the GMS2 and NTM freight models lies in rail transport. In GMS2, rail freight increases from approximately 14 million tons in 2027 to about 40 million tons in 2042. In the scenario including GMS2 projects and nationwide CY promotion measures with a 15% reduction in rail transport costs, rail freight rises from about 30 million tons in 2027 to roughly 138 million tons in 2042. In contrast, in the NTM model, rail freight increases from around 15 million tons in 2027 to only about 21 million tons in 2042. This difference is mainly due to the variations in future rail network assumptions between the two models. NTM uses only rail projects that are confirmed and ready for implementation, whereas GMS2 incorporates future rail projects as proposed in the integrated regional and national transport and logistics policy implementation study. These include new rail lines, new rail lines connecting industrial estates, and additional network expansions from the GMS1 and GMS2 studies. Furthermore, GMS2 considers both scenarios: one with GMS2 projects alone, and another with GMS2 projects plus nationwide CY promotion measures and a 15% reduction in rail transport costs. These factors collectively result in significantly higher rail freight volumes in GMS2 compared to NTM.

Table 3.4-6 Comparison of Population Data

Region	GMS2 or NTM (unit: persons)				GMS1 (unit: persons)			Difference between GMS1 and GMS2		
	2027	2032	2037	2042	2027	2032	2037	2027	2032	2037
Bangkok	8,481,134	8,420,596	8,269,826	8,039,050	5,225,847	5,047,983	4,876,172	-38.38%	-40.05%	-41.04%
Central	14,465,732	14,844,167	15,075,432	15,156,177	12,175,949	12,369,161	12,567,759	-15.83%	-16.67%	-16.63%
South	9,516,181	9,653,605	9,709,449	9,694,143	10,406,239	10,855,623	11,325,189	9.35%	12.45%	16.64%
East	6,251,445	6,564,391	6,836,726	7,067,532	5,183,901	5,326,343	5,472,876	-17.08%	-18.86%	-19.95%
North	10,676,641	10,291,044	9,799,196	9,213,624	12,103,923	12,177,784	12,252,673	13.37%	18.33%	25.04%
Northeast	17,785,342	17,222,229	16,490,777	15,622,223	22,981,011	23,408,614	23,844,633	29.21%	35.92%	44.59%
Total	**67,176,475**	**66,996,032**	**66,181,406**	**64,792,749**	**68,076,870**	**69,185,508**	**70,339,302**	**1.34%**	**3.27%**	**6.28%**

Source: Compiled by the Consultant (2025)

Table 3.4-7 Comparison of Gross Regional Domestic Product (GRDP) Data

Region	GMS2 or NTM (Million THB)				GMS1 (Million THB)			Difference between GMS1 and GMS2		
	2027	2032	2037	2042	2027	2032	2037	2027	2032	2037
Bangkok	6,746,269	8,107,910	9,574,174	11,111,924	5,866,353	7,209,862	8,662,798	-13.04%	-11.08%	-9.52%
Central	4,718,978	5,504,995	6,324,137	7,158,402	4,476,646	5,433,921	6,433,967	-5.14%	-1.29%	1.74%
South	1,680,996	1,844,108	1,979,495	2,081,437	1,391,310	1,679,060	1,984,579	-17.23%	-8.95%	0.26%
East	3,674,009	4,107,100	4,493,436	4,821,764	3,782,040	5,445,507	7,887,060	2.94%	32.59%	75.52%
North	1,552,488	1,697,511	1,816,583	1,905,690	1,175,499	1,399,618	1,625,693	-24.28%	-17.55%	-10.51%
Northeast	2,075,699	2,453,945	2,848,509	3,249,343	1,642,838	2,038,517	2,492,111	-20.85%	-16.93%	-12.51%
Total	**20,448,439**	**23,715,569**	**27,036,334**	**30,328,560**	**18,334,686**	**23,206,485**	**29,086,208**	**-10.34%**	**-2.15%**	**7.58%**

Source: Compiled by the Consultant (2025)

Table 3.4-8 Forecasted Passenger Travel by Model

Source	Mode of Transport		Passenger Travel Demand in the Model (Unit: Thousand trips per person per day)				Proportion (%)			
			2027	2032	2037	2042	2027	2032	2037	2042
GMS1*	Car persons		1,883	2,447	2,803	-	56.41%	55.82%	55.26%	-
	Public Transport System	Bus	1,175	1,435	1,641	-	35.20%	32.73%	32.35%	-
		Train	178	335	397	-	5.33%	7.64%	7.83%	-
		High-Speed Train	0	38	84	-	0.00%	0.87%	1.66%	-
		Airplane	102	129	148	-	3.06%	2.94%	2.92%	-
	Total		**3,338**	**4,384**	**5,072**	**-**	**100.00%**	**100.00%**	**100.00%**	**-**
NTM**	Car persons		4,863	4,913	4,982	5,049	91.74%	91.04%	90.80%	90.55%
	Public Transport System	Bus	292	291	290	291	5.50%	5.39%	5.29%	5.22%
		Train	73	79	88	99	1.38%	1.46%	1.60%	1.78%
		High-Speed Train	-	32	35	37	0.00%	0.59%	0.63%	0.66%
		Airplane	73	82	92	100	1.38%	1.52%	1.68%	1.79%
	Total		**5,301**	**5,397**	**5,487**	**5,576**	**100.00%**	**100.00%**	**100.00%**	**100.00%**
GMS2	Car persons		3,729	4,166	4,396	4,619	87.78%	86.95%	85.96%	85.19%
	Public Transport System	Bus	327	365	388	413	7.70%	7.62%	7.59%	7.62%
		Train	89	111	160	206	2.10%	2.32%	3.13%	3.80%
		High-Speed Train	0	33	47	55	0.00%	0.69%	0.92%	1.01%
		Airplane	103	116	123	129	2.42%	2.42%	2.40%	2.38%
	Total		**4,248**	**4,791**	**5,114**	**5,422**	**100.00%**	**100.00%**	**100.00%**	**100.00%**

Source: Compiled by the Consultant (2025)

* Final Report (April 2024): GMS1 Project, Data from NAM Model

** Draft Final Study Report (March 2025): Consultancy Project for Developing a Spatial Model to Forecast Broad Economic Returns from Infrastructure Investments, Data from the National Transport Model (NTM), Office of the National Economic and Social Development Council (NESDC)

Table 3.4-9 Forecasted Freight Transport by Model

Source	Mode of Transport	Freight Volume (million tons/year)				Proportion (%)			
		2027	2032	2037	2042	2027	2032	2037	2042
GMS1*	Rail	40.62	48.91	53.45	-	4.34%	5.05%	5.35%	-
	Water	106.53	110.73	115.00	-	11.38%	11.43%	11.51%	-
	Road	788.70	808.87	831.02	-	84.27%	83.51%	83.13%	-
	Air	0.06	0.06	0.06	-	0.01%	0.01%	0.01%	-
	Total	**935.91**	**968.57**	**999.53**	**-**	**100.00%**	**100.00%**	**100.00%**	**-**
NTM**	Rail	14.83	17.15	18.92	20.90	1.58%	1.63%	1.62%	1.64%
	Water	119.31	136.52	154.49	171.54	12.76%	12.96%	13.20%	13.48%
	Road	801.58	899.95	997.08	1,079.92	85.66%	85.41%	85.18%	84.87%
	Air	0.04	0.04	0.05	0.06	0.00%	0.00%	0.00%	0.01%
	Total	**935.75**	**1,053.66**	**1,170.54**	**1,272.42**	**100.00%**	**100.00%**	**100.00%**	**100.00%**
GMS2 (with GMS2 projects)	Rail	14.42	18.62	27.81	39.74	1.54%	1.77%	2.38%	3.12%
	Water	117.87	132.95	147.94	161.47	12.58%	12.62%	12.64%	12.68%
	Road	804.43	901.91	994.33	1,071.69	85.87%	85.61%	84.98%	84.19%
	Air	0.04	0.04	0.05	0.06	0.004%	0.004%	0.004%	0.005%
	Total	**936.76**	**1,053.52**	**1,170.13**	**1,272.96**	**100.00%**	**100.00%**	**100.00%**	**100.00%**
GMS2 (with GMS2 projects + CY promotion across all provinces, 15% rail cost reduction))	Rail	30.34	75.73	120.93	138.12	3.24%	7.19%	10.33%	10.85%
	Water	116.96	131.81	146.77	159.81	12.49%	12.51%	12.54%	12.55%
	Road	789.42	845.94	902.39	974.98	84.27%	80.30%	77.12%	76.59%
	Air	0.04	0.04	0.05	0.06	0.004%	0.004%	0.004%	0.005%
	Total	**936.76**	**1,053.52**	**1,170.13**	**1,272.96**	**100.00%**	**100.00%**	**100.00%**	**100.00%**

Source: Compiled by the Consultant (2025)

* Final Report (April 2024): GMS1 Project, Data from NAM Model

** Draft Final Study Report (March 2025): Consultancy Project for Developing a Spatial Model to Forecast Broad Economic Returns from Infrastructure Investments, Data from the National Transport Model (NTM), Office of the National Economic and Social Development Council (NESDC)

Chapter 4

Study and analysis of the development and Scenario Determination potential of provincial group area

Chapter 4

Study and analysis of the development and Scenario Determination potential of provincial group area

4.1 Study and analysis of the development potential of provincial group area

The consultant has studied and analyzed the development potential of provincial group areas for use in developing scenarios. The study and analysis results are detailed as follows:

4.1.1 Basic Information and Development Plans of the Northeastern Provincial Cluster

The Northeastern region consists of 20 provinces: Udon Thani, Nong Bua Lamphu, Nong Khai, Loei, Bueng Kan, Mukdahan, Sakon Nakhon, Nakhon Phanom, Khon Kaen, Maha Sarakham, Roi Et, Kalasin, Nakhon Ratchasima, Chaiyaphum, Buri Ram, Surin, Ubon Ratchathani, Amnat Charoen, Si Sa Ket, and Yasothon.

From the review of the goals and development guidelines for the Northeastern region (2023 - 2027), it was found that the Northeastern region is located at the center of the Greater Mekong Subregion (GMS). The area has basic public infrastructure, especially a road network that connects within the region, links between regions, and neighboring countries. This network facilitates the transportation of goods and passengers in multiple directions, including along the North-South Economic Corridor (NSEC) and the East-West Economic Corridor (EWEC), supporting trade, investment, and tourism with neighboring countries. This will positively impact trade between Thailand and Laos, as well as Thailand and Cambodia. Additionally, the region has an air transport system that enables domestic and international connectivity. The development strategy comprises six main strategies:

Strategy 1: Manage water resources to sufficiently support sustainable economic development and quality of life.

Strategy 2: Address poverty and improve the quality of life for low-income populations to reduce social inequality.

Strategy 3: Strengthen the internal economic base while addressing natural resource and environmental issues.

Strategy 4: Develop integrated tourism.

Strategy 5: Leverage opportunities from the development of transportation networks connecting the central economic areas and the Eastern Economic Corridor (EEC) to develop new cities and economic zones in the region.

Strategy 6: Develop cooperation and utilize agreements with neighboring countries to strengthen the economy along border areas and economic corridors.

In addition, the Northeastern provincial cluster is home to the special economic zones of Mukdahan, Nong Khai, and Nakhon Phanom provinces, as part of the policy for developing 10 special economic zones aimed at decentralizing prosperity to the regions, improving the quality of life of the people, organizing border security, and enhancing the country's competitiveness by leveraging the ASEAN Economic Community. The Mukdahan Special Economic Zone primarily aims to develop the area as a center for wholesale trade and multimodal transport. The Nong Khai Special Economic Zone focuses on developing international trade, tourism, and multimodal transport. Meanwhile, the Nakhon Phanom Special Economic Zone aims to develop border trade businesses and logistics service areas.

Additionally, the Northeastern provincial cluster, consisting of Khon Kaen, Nakhon Ratchasima, Udon Thani, and Nong Khai provinces, has been designated as the Northeastern Economic Corridor (NeEC) to develop into the country’s new bio-industrial hub (NeEC-Bioeconomy) utilizing modern technology throughout the production chain. This includes promoting investment in agriculture, bio-industry, and related industries that employ advanced technology, as well as developing marketing, public relations, and personnel in the agricultural and bio-industrial sectors. Furthermore, the development of the NeEC will help decentralize prosperity to the region, build a unique regional identity, enhance competitiveness, and improve the quality of life for local residents.

4.1.2 Basic Information and Development Plans of the Northern Provincial Cluster Area

The Northern region consists of 17 provinces: Chiang Mai, Lamphun, Lampang, Mae Hong Son, Chiang Rai, Phayao, Phrae, Nan, Phitsanulok, Tak, Uttaradit, Sukhothai, Phetchabun, Nakhon Sawan, Kamphaeng Phet, Phichit, and Uthai Thani. It serves as an economic linkage area for the Greater Mekong Subregion, South Asian countries, and the ASEAN Economic Community. The region borders the Lao People's Democratic Republic to the east and north, with the Mekong River serving as the natural boundary, and to the west, it borders Myanmar. The total area is approximately 106.03 million rai, accounting for 33 percent of the country’s land area. The upper part of the region is characterized by highlands, mountains, forests, and watershed areas. The lower part features high mountains to the west and central east, while the central area consists of fertile plains formed by the Ping, Wang, Yom, Nan, Sakae Krang, and Pasak rivers.

From the review of the goals and development guidelines for the Northern region (2023–2027), it is found that the Northern area is well-prepared to connect trade and services with the Central and Northeastern economic zones, as well as to link with countries in the Greater Mekong Subregion and South Asia. The region benefits from established transportation networks along the North–South Economic Corridor and the East–West Economic Corridor. There are plans for major infrastructure projects such as double-track railways, high-speed trains, and airport expansions. These developments create opportunities to expand the economy in tourism, trade, investment, services, international education, healthcare, and medical businesses. Additionally, there are plans to develop logistics networks to support the development of border special economic zones, including the

development of truck terminals in the Northern region in coordination with the development of dry ports in Nakhon Sawan Province. This aims to facilitate goods exchange between the Northern Special Economic Zone and the Eastern Special Economic Zone. The development strategy consists of five main strategies:

Strategy 1: Develop tourism and related service businesses to achieve high quality, create sustainable added value, and ensure equitable benefit distribution, including extending the production of goods and services.

Strategy 2: Leverage opportunities from special economic zones and connections with the Greater Mekong Subregion (GMS), BIMSTEC, and the ASEAN Economic Community (AEC) to expand the regional economic base.

Strategy 3: Upgrade to become a production base for organic and safe agriculture, linked to high value-added agricultural processing industries.

Strategy 4: Improve quality of life and alleviate poverty, develop an eldercare system involving families and communities, and enhance the skills of the service sector workforce.

Strategy 5: Conserve and restore upstream forests to maintain their integrity, implement appropriate water management systems connected to agricultural areas comprehensively, and sustainably prevent and resolve haze pollution problems.

4.2 Analysis of potential and development needs of provinces

The consultant conducted an analysis of the potential and development needs of the province using basic provincial data, including social and economic data, agricultural data, industrial data, and tourism data. The analysis of the area's development potential was based on the development direction in the provincial development strategy to analyze the dimensions of the development linkage issues derived from the provincial development plan.

The analysis results, presented in the form of a Radar Chart, allow for the comparison of different provincial development strategies and clearly illustrate the strengths of development issues. The distinctive features of the province's potential and development needs will detail the development issues aligned with the development goals of the provincial group and provide specifics about the projects and budgets. The results of the Radar Chart analysis for each province depict potential according to details in agriculture, industry, tourism, trade and investment, infrastructure and logistics, as well as natural resources and the environment.

4.3 Development Scenario Determination

4.3.1 Basic Concepts for Scenario Determination

The consultants set 4 scenarios for this study. The analysis of these 4 scenarios is based on the concept of economic development of all 9 study areas in this project. The details are as follows.

1) Scenario 1

The analysis of Scenario 1 is based on past economic development during the period 2015 - 2019. Specifically, Scenario 1 reflects the economic progress of the study area following the growth rate observed during 2015 - 2019, with no structural changes or other economic environmental factors.

2) Scenario 2

Scenario 2 is an analysis using a radar chart, which considers the weighted importance of key goals specified in the development plans of the provincial group and the provincial development plans for 2023 - 2027. In other words, Scenario 2 reflects the significance of various economic developments outlined in the provincial group development plan and the provincial development plans.

3) Scenario 3

Scenario 3 is an analysis based on the Radar Chart, which considers the weighting of important goals of various economic developments from the opinions of focus group participants in the study area. Thus, this scenario implies the demand for economic development from the study area.

4) Scenario 4

Scenario 4 analysis is based on the development outlined in the provincial group development plan for 2023 - 2027. In other words, Scenario 4 reflects economic development according to the goals specified in the provincial group development plan or according to the economic potential of the provincial group.

The basic concept for defining the scenarios, as shown in **Figure 4.3-1**, consists of: Scenario 1, which reflects the past economic development of the provincial group; Scenario 2, which reflects the support for economic development specified in the provincial group development plan and provincial development plan; Scenario 3, which reflects economic development according to the needs of the area based on input from focus group participants for the development of five economic sectors; and Scenario 4, which reflects economic development according to the goals specified in the provincial group development plan or according to the economic potential of the provincial group.

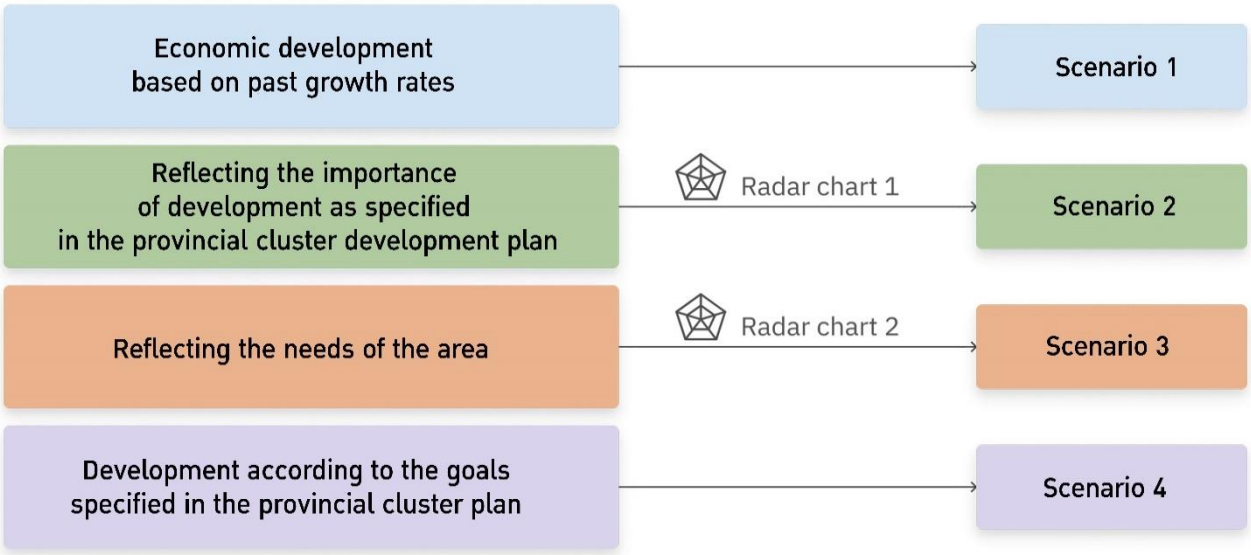


Figure 4.3-1 Basic Concept for Defining Scenarios

4.3.2 Determination of Analytical Issues in each Scenario

The determination of analytical issues in each scenario is an analysis of the overall economic activities of the study area. Therefore, the consultants use Gross Provincial Cluster Product (GPCP) data in Chain Volume Measures (CVMs), which is comprehensive data, prepared by the Office of the National Economic and Social Development Council (NESDC).

4.4 Proposed Development Scenarios

Table 4.4-1 presents the proposed economic growth rates for each study area under Scenarios 1 to 4. Under Scenario 1, the average economic growth rate across all study areas is 3.0 percent. The average rate increases to 6.0 percent under Scenarios 2, 3, and 4.

Table 4.4-1 Overall Development Scenario of the Study Area

unit: percent

Economic Growth Rate	Scenario 1	Scenario 2	Scenario 3	Scenario 4
1) Upper Northeastern Subregion 1	4.0	5.0	5.0	5.0
2) Upper Northeastern Subregion 2	2.5	5.0	5.0	5.0
3) Central Northeastern Subregion	2.5	3.5	4.0	4.0
4) Lower Northeastern Subregion 1	3.5	5.5	4.5	5.5
5) Lower Northeastern Subregion 2	4.0	4.5	4.5	4.5
6) Upper Northern Subregion 1	3.5	6.0	6.0	6.0
7) Upper Northern Subregion 2	2.0	3.5	3.5	3.5
8) Lower Northern Subregion 1	2.5	10.0	10.0	10.0
9) Lower Northern Subregion 2	1.0	10.0	10.0	10.0
Average	**3.0**	**6.0**	**6.0**	**6.0**

Notes: 1) The economic growth rate of each provincial cluster is the growth rate of the Gross Provincial Cluster Product (GPCP) on a chain volume measures basis (CVMs).
2) The average is calculated using the weighted average method and is adjusted the number up to a level of 0.5.

The consultants use the scenario analysis above to formulate proposals for each study area in the period 2023 - 2027, as shown in **Table 4.4-2**. Also, we calculate the average of the overall economic growth rate of the study area. This implies the average growth rate of the Gross Provincial Cluster Product (GPCP) on a chain volume measures basis (CVMs).

Table 4.4-2 Scenario Proposal for Study Areas during the Period 2023 - 2027

unit : percent

Economic Growth Rate	Economic Growth Rate
1) Upper Northeastern Subregion 1	5.0
2) Upper Northeastern Subregion 2	5.0
3) Central Northeastern Subregion	4.0
4) Lower Northeastern Subregion 1	5.5
5) Lower Northeastern Subregion 2	4.5
6) Upper Northern Subregion 1	6.0
7) Upper Northern Subregion 2	3.5
8) Lower Northern Subregion 1	10.0
9) Lower Northern Subregion 2	10.0
Average	**6.0**

Notes: 1) The economic growth rate of each provincial cluster is the growth rate of the Gross Provincial Cluster Product (GPCP) on a chain volume measures basis (CVMs).
2) The average is calculated using the weighted average method and is adjusted the number up to a level of 0.5.

From **Table 4.4-2**, the average overall economic growth rate of the study area is 6.0 percent. When considering individual subregions, the Lower Northern Subregion 1 (comprising Phitsanulok, Phetchabun, Uttaradit, Sukhothai, and Tak) has the highest economic growth rate at 10.0 percent, driven mainly by the service sector and agricultural sector, which are the key economic drivers in this subregion. Similarly, the Lower Northern Subregion 2 (comprising Nakhon Sawan, Kamphaeng Phet, Uthai Thani, and Phichit) also has the highest economic growth rate at 10.0 percent, with the service sector and industrial sector being the primary economic contributors. The Upper Northern Subregion 1 (comprising Chiang Mai, Lampang, Mae Hong Son, and Lamphun) ranks second, with an average economic growth rate of 6.0 percent, primarily supported by the service sector as the main driver of overall economic growth. Meanwhile, the Lower Northeastern Subregion 1 (comprising Nakhon Ratchasima, Chaiyaphum, Buri Ram, and Surin) ranks third, with an average growth rate of 5.5 percent, driven mainly by the service sector and industrial sector, which support overall economic growth in the subregion.

Table 4.4-3 presents the proposed development scenarios, showing the economic growth rates over the following periods: (1) 2023–2027, (2) 2028–2032, and (3) 2033–2037. The overall economic growth rate of the study area during the period 2028–2032 is set at 4.0 percent, and during the period 2033–2037, it is also set at 4.0 percent. The development scenarios for the periods 2028–2032 and 2033–2037 are determined based on econometric forecasting methods, which assume that structural economic changes will occur in each study area between 2023 and 2027. Subsequently, each study area will be driven by its own past economic development trajectory.

According to **Table 4.4-3**, structural economic changes in each study area during the period 2023–2027, caused by external factors (exogenous shocks), are the primary drivers of economic development in this short-term period. Consequently, the economic growth rate during 2023–2027 is higher than that of the period 2015–2019. However, the economic growth rate is expected to adjust toward the long-run trend of each study area, as indicated by the numbers in parentheses. Although the economic growth rate decreases, it remains positive, reflecting continuous economic expansion in the study areas at a rate consistent with the long-run trend. In other words, the economic size of the study areas in the period 2033–2037 will be larger than that of the period 2015–2019, following the long-run growth trend. Moreover, the declining growth rate aligns with the Law of Diminishing Marginal Returns.

Furthermore, if the 9 study areas undertake additional structural economic development in the future, the economic growth rate during 2028–2037 will continue to increase. Additionally, if the nine study areas revise their development goals or indicators, these changes can be taken into account in formulating the proposed development scenarios for these two periods to ensure better alignment with the Provincial Cluster Development Plans.

Table 4.4-3 Scenario Proposal over Time

unit : percent

Provincial Cluster	Economic Growth Rate			
	2015 - 2019	Development Scenario Proposal		
		2023 - 2027	2028 - 2032	2033 - 2037
1) Upper Northeastern Subregion 1	4.0	5.0	4.5	4.5 (3.0)
2) Upper Northeastern Subregion 2	2.5	5.0	3.5	3.5 (2.9)
3) Central Northeastern Subregion	2.5	4.0	4.0	4.0 (2.5)
4) Lower Northeastern Subregion 1	3.5	5.5	4.0	4.0 (2.7)
5) Lower Northeastern Subregion 2	4.0	4.5	4.0	4.0 (2.6)
6) Upper Northern Subregion 1	3.5	6.0	3.0	3.0 (3.0)
7) Upper Northern Subregion 2	2.0	3.5	3.0	3.0 (1.9)
8) Lower Northern Subregion 1	2.5	10.0	3.0	3.0 (2.5)
9) Lower Northern Subregion 2	1.0	10.0	3.0	3.0 (1.5)
Average	**3.0**	**6.0**	**4.0**	**4.0**

Notes: 1. The economic growth rate of each provincial cluster refers to the growth rate of the Gross Provincial Cluster Product (GPCP) based on chain volume measures (CVMs).
2. The average of the study areas is calculated using the weighted average method, with the figures rounded up to the nearest 0.5 level.
3. The economic growth rate is based on Scenario 1, which reflects the past economic development path of each provincial cluster.
4. The number in parentheses indicates the long-run trend value, which is the average economic growth rate during the period 2015–2019.

4.5 Results of Development Potential Analysis and Scenario Formulation

Chapter 4 presents an analysis of the development potential of the Northeastern and Northern provincial clusters, using the regional development goals and guidelines for 2023–2027 set by the Office of the National Economic and Social Development Council, as shown in **Figure 4.5-1**. This is combined with secondary data analysis to serve as a guideline for determining the potential of regional transportation system development. These areas are the target zones for the development of transportation and logistics systems by the Office of Transport and Traffic Policy and Planning (OTP), aiming to achieve integration of transportation and logistics systems that foster systematic connectivity and deliver tangible benefits. The chapter also includes an analysis of the goals in various sectors according to the 2023–2027 Provincial and Provincial Cluster Development Plans, including agriculture, industry, tourism, trade and investment, infrastructure and logistics, natural resources and the environment, and quality of life. The analysis is conducted using a radar chart approach.

Based on the analysis of development potential and scenario formulation, it can be concluded that the Northeastern region possesses strong potential as a production area rich in biodiversity and as a strategic trade gateway, with several permanent border checkpoints and border trade facilitation points. Strategic planning of the transportation network will help support the development of the Northeastern Economic Corridor for Bioeconomy (NeEC-Bioeconomy), covering

Nakhon Ratchasima, Khon Kaen, Udon Thani, and Nong Khai provinces. Development of the regional transportation network should focus on creating connections with the country's main transport corridors and linking to neighboring countries within the Greater Mekong Subregion (GMS), using key infrastructure such as the Thai–Lao Friendship Bridges. Proactive promotion of Special Economic Zones (SEZs) in Nong Khai, Nakhon Phanom, and Mukdahan is also recommended, along with improving accessibility to industrial zones, economic hubs, and tourist destinations. Moreover, enhancing service quality and developing transport facilities, along with improving trade regulations to facilitate cross-border trade at permanent and temporary checkpoints, will strengthen the role of these gateways. Promotion of transport infrastructure development, especially rail and waterway systems, will further unlock and enhance the region's development potential.

The Northeastern region possesses strong potential in terms of its unique identity and rich cultural capital of the Isan heritage, complemented by ancient civilizations and UNESCO World Heritage Sites located throughout the region. The development of transportation networks that improve access to tourist attractions-especially in support of designated tourism development zones such as the Mekong River Lifestyle Tourism Zone, the Isan Geopark Tourism Zone, and the Lower Isan Civilization Tourism Zone-will help promote tourism in the region. Moreover, the region is home to key tourism cities such as Khon Kaen and Nakhon Ratchasima, and includes areas with high potential for hosting conferences, sporting events, and large-scale exhibitions. This has driven the development of transport infrastructure to ensure safe and convenient travel, including preparations to host international horticultural expos in 2026 (Udon Thani) and 2029 (Nakhon Ratchasima). In planning transportation infrastructure, attention must also be paid to environmental issues, public transportation services, road safety, social and labor transitions, as well as geopolitical risks, economic volatility, technological adaptation, and cybersecurity threats, which all pose significant challenges for the region.

The Northern region has strong potential as an area rich in natural resources and strategically located to serve as a gateway to several countries in the GMS (Greater Mekong Subregion), BIMSTEC, and other international partners. With numerous permanent and temporary border checkpoints, the region offers key trade access points. Strategic transportation network planning will support the development of the Northern Economic Corridor (NEC-Creative LANNA), which includes Chiang Mai, Chiang Rai, Lampang, and Lamphun provinces. This involves enhancing connectivity between local transport routes and national core networks, while also linking to neighboring GMS countries through critical infrastructure, such as the Thai–Myanmar Friendship Bridges. Proactive promotion of Special Economic Zones (SEZs), particularly in Chiang Rai and Tak, will enhance accessibility to industrial zones, economic areas, and tourist destinations. Upgrading services and developing transport facilities, as well as streamlining trade regulations to facilitate cross-border commerce at permanent checkpoints, will strengthen the region's trade gateways. Supporting the development of temporary trade checkpoints and expanding rail and waterway infrastructure will further unlock the area's development potential. Additionally, Northern Thailand possesses a strong cultural identity and heritage capital, complemented by ancient civilizations and UNESCO World Heritage

Sites. The development of transportation networks that improve access to tourism destinations-especially those focused on Lanna civilization, cultural heritage, and "living historic cities"-will boost regional tourism. Chiang Mai stands out as a major tourism hub, while the region also includes key commercial areas aligned with the East–West Economic Corridor (EWEC) and North–South Economic Corridor (NSEC). Therefore, transport infrastructure should be developed to efficiently and safely accommodate both goods and passenger traffic. In doing so, it is essential to address environmental issues, public transport services, road safety, social and labor transitions, geopolitical risks, economic volatility, technological advancement, and cybersecurity threats, all of which pose significant challenges for the region's sustainable development.

The results obtained from the analysis of the development potential of the areas, as mentioned above, are used to create development scenarios for the Northeastern and Northern provincial clusters. These consist of four scenarios. Scenario 1 reflects the past economic development approach of the provincial clusters, while Scenario 4 represents the future economic development goals set forth in the provincial cluster development plans or the future economic development goals that reflect the economic potential of the provincial clusters. Scenario 2 reflects government support for economic development as specified in the provincial cluster development plans and provincial development plans. Scenario 3 reflects economic development according to the needs of the areas, based on the opinions of focus group participants. The analysis results from these scenarios are used to determine proposals for each study area's scenarios and to calculate the average overall economic growth rate of the study areas. In other words, this refers to the average growth rate of the Gross Provincial Cluster Product in chain volume measures (GPCP CVMs). The overall economic growth rate of the study areas is set at 6.0 percent for the period 2023–2027, 4.0 percent for the period 2028–2032, and 4.0 percent for the period 2033–2037.

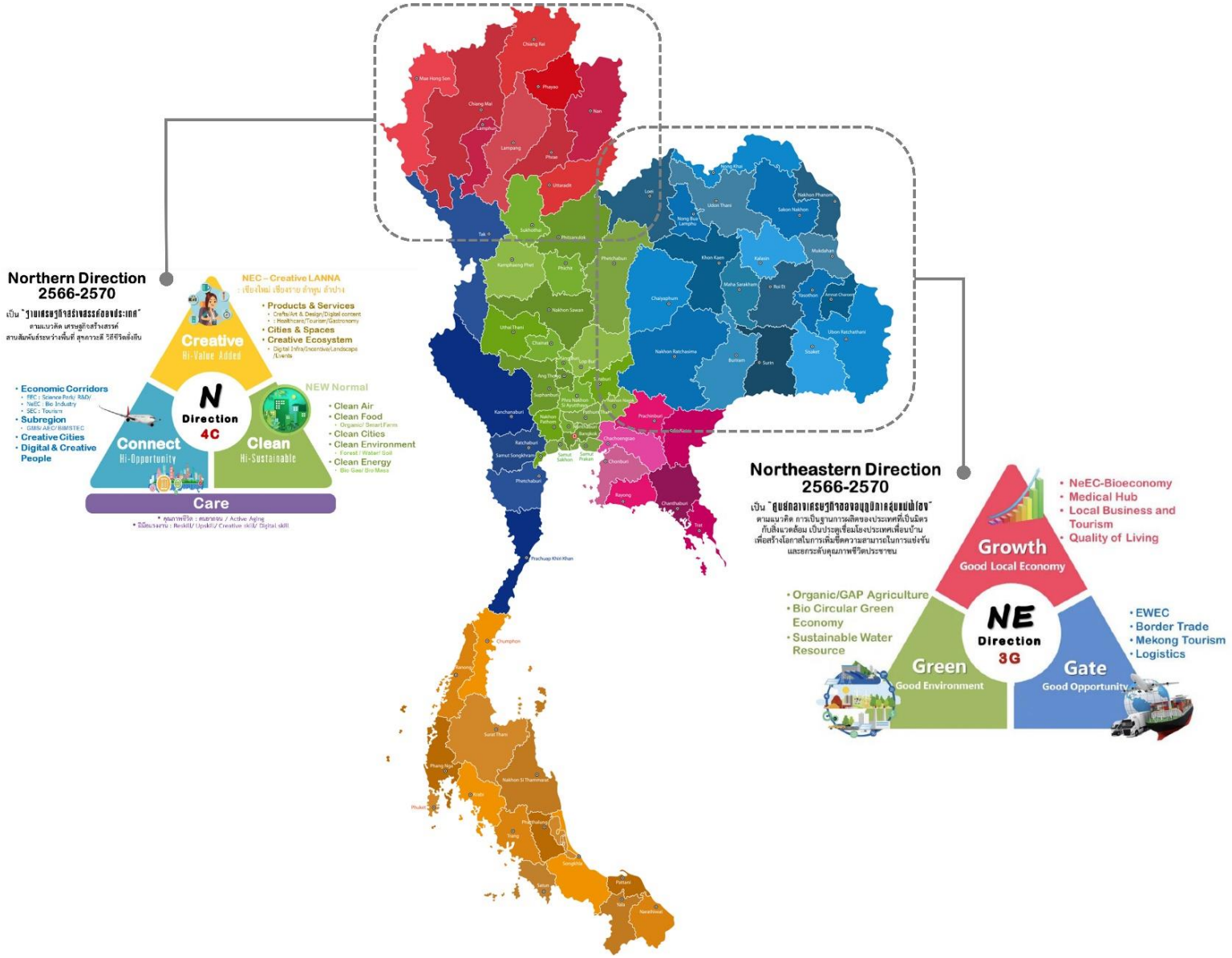


Figure 4.5-1 Summary of goals and development guidelines in the study area

Chapter 5

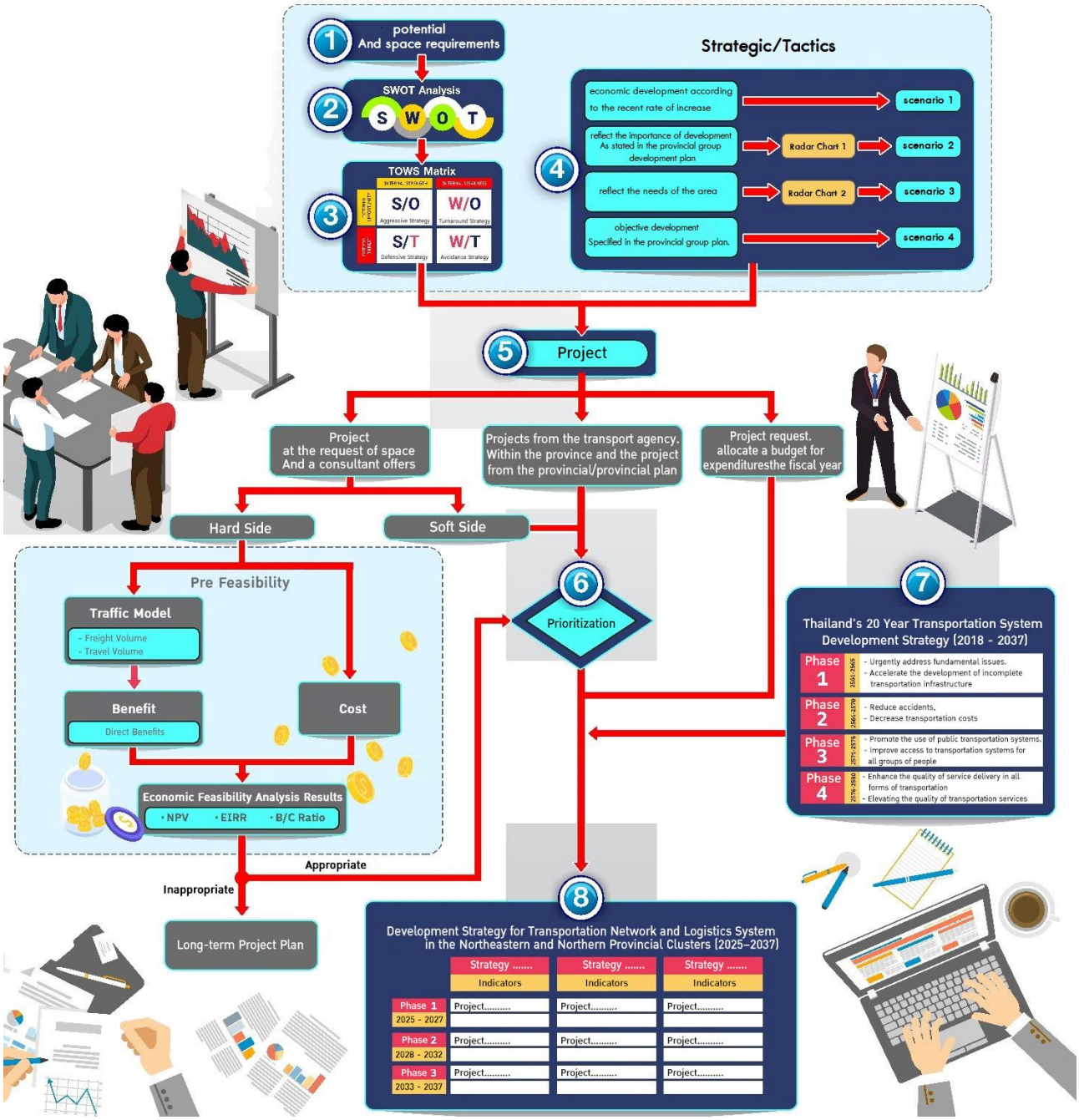
Strategic Framework for Developing Transport Networks and Logistics Systems in Northeastern and Northern Provincial Clusters Linked to GMS Economic Corridors to Promote Economic and Tourism Development in Alignment with the National Strategy.

Chapter 5

Strategic Framework for Developing Transport Networks and Logistics Systems in Northeastern and Northern Provincial Clusters Linked to GMS Economic Corridors to Promote Economic and Tourism Development in Alignment with the National Strategy.

5.1 Development Guidelines for the Formulation of a Strategic Framework for Transport Network and Logistics System Development in Northeastern and Northern Provincial Clusters, Linked to Economic Corridors under the GMS Framework, to Support Economic and Tourism Development in Line with the National Strategy.

The formulation of the strategic framework for the development of transport networks and logistics systems in the Northeastern and Northern provincial clusters, linked to the economic corridors under the GMS framework to support economic and tourism development in line with the National Strategy (2025 - 2037), follows the implementation steps illustrated in **Figure 5.1-1**, as detailed below.



Source: Consultant

Figure 5.1-1 Project Implementation Approach

5.1.1 Review of Foundational Data, Related Development Plans, and Project Implementation Progress in the Target Areas

The consultant reviewed the baseline information relevant to transport planning, including demographic data, socio-economic conditions, agriculture, industry, tourism, trade and investment, transport networks, traffic, and transport volumes. The review also included provincial development plans and operational plans of various government agencies. In addition, the consultant examined reports related to transportation, such as the minutes of meetings of the Provincial Land Traffic System Subcommittee (LTC) and the Joint Public-Private Sector Consultative Committee (JPPCC) on economic issues over the past year, in order to understand the latest developments in transport network expansion and land use in each province within the study area. This information serves as the foundation for the upcoming provincial-level focus group discussions.

5.1.2 Review of Foundational Data, Related Development Plans, and Project Implementation Progress in the Target Areas

Project introduction meetings and focus group discussions were organized in the study areas across all 37 provinces in the Northeastern and Northern regions to gather information on various economic activities, including agriculture (both intra- and inter-provincial), industry, tourism, trade, and investment. The meetings also aimed to identify the needs and obstacles related to different modes of transportation and logistics. Furthermore, insights were gathered on opportunities and challenges from the perspectives of the private sector and relevant government agencies, particularly concerning international cooperation, regulatory frameworks, and future projections.

5.1.3 Evaluation of Regional Potential Using Focus Group Insights and Development of SWOT and TOWS Matrices for Each Province

The analysis of strengths, weaknesses, opportunities, and threats (SWOT) serves as an assessment of the potential and current situation of transportation systems within the study area. This evaluation is based on a review of existing infrastructure, current and projected travel demand, upcoming plans and projects, relevant policies and regulations, as well as existing challenges and constraints. In general, the SWOT analysis is divided into two main components, as follows:

1) Internal Environment: This involves identifying the strengths and weaknesses of existing transport infrastructure and supporting systems, future projects, as well as transport and logistics-related policies and regulations. It is categorized into:

Strength (S): Refers to the positive potential of the transport network that provides benefits or contributes to the success of transport and logistics activities.

Weakness (W): Refers to the negative attributes of the transport network, taking into account shortages, limitations, and inadequacies of infrastructure, as well as existing issues when compared with transportation demand.

2) External Environment: Refers to various situations arising from related external factors. These include factors such as the economy, international cooperation frameworks and agreements, politics, society, and technology. The external environment is categorized into:

Opportunity (O): Refers to external situations that are favorable to transport and logistics activities within the study area.

Threat (T): Refers to external situations that hinder the efficiency of transport and logistics, including obstructive or threatening conditions that result in negative impacts or impose limitations on transport activities and related operations.

5.1.4 Analyze Provincial Strengths to Formulate Strategies and Identify Needs to Develop Projects Aligned with the Strategic Framework.

Each objective must be supported by a corresponding strategy, as strategies are the means to achieve the overall objectives. The formulation of strategies primarily considers the Critical Success Factors (CSFs)-that is, identifying the key factors that influence the success of each objective. Having well-defined strategies provides a clear operational direction toward achieving the objectives and clarifies the missions and roles of the responsible agencies. In developing these strategies, it is necessary to identify the lead agency responsible for implementation, as well as supporting agencies whose mandates are related.

SWOT analysis helps to clearly understand the context of infrastructure and the current situation. However, the strategy formulation process involves integrating the results of the SWOT analysis with the defined objectives using the TOWS Matrix technique, as illustrated in **Figure 5.1-2.** The strategic pairing is structured as follows:

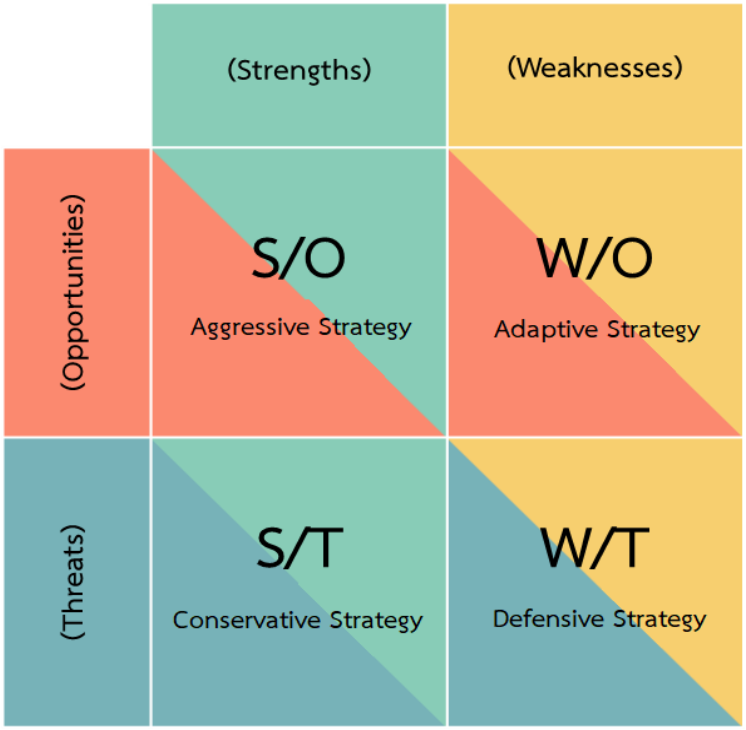


Figure 5.1-2 Strategic Development through TOWS Matrix Analysis

Aggressive Strategy (SO Strategy) is derived from Strengths + Opportunities. This strategy utilizes the strengths of the transport and logistics networks in the study area to maximize the benefits from external opportunities, such as growth in freight transport or emerging demand for new products.

Conservative Strategy (ST Strategy) is derived from Strengths + Threats. It involves using the strengths of the transport and logistics networks in the study area to cope with or mitigate the impacts of external threats, such as cross-border trade regulations or abnormal international situations.

Adaptive (or Corrective) Strategy (WO Strategy) is derived from Weaknesses + Opportunities. This strategy aims to reduce or resolve weaknesses in the transport and logistics network in order to minimize problems and to take advantage of external opportunities.

Defensive Strategy (WT Strategy) is derived from Weaknesses + Threats. It focuses on reducing internal weaknesses, strengthening capabilities, and avoiding external threats in preparation for future opportunities.

5.1.5 Analyze Economic Growth Scenarios and Set Growth Targets

The study and analysis of the potential of the provincial clusters are based on foundational data and provincial cluster development plans, in order to develop development scenarios. These scenarios will guide appropriate, interconnected, and tangible planning for transport infrastructure and logistics system development.

Economic growth data, in the form of gross regional products from various sectors, will be considered alongside the goals and budget allocations of projects included in provincial and cluster development plans. This will support the assessment of growth scenarios for each cluster when transport and logistics networks are developed in accordance with the strategic plan.

5.1.6 Analyze Travel Demand and Network Capacity under the (Draft) Transport and Logistics Action Plan

The consultant will review future travel and freight demand and assess the capacity of the transport network to accommodate such demand. This analysis will be based on model development using assumptions derived from network development initiatives under the integrated policy-to-practice transformation project for regional and national transport and logistics, or from the preparation of the (draft) Transport and Logistics Action Plan. The objective is to understand trends in infrastructure needs or policies that facilitate the distribution of travel and freight transport within the study area.

5.1.7 Strategic Planning, Indicator Development, and Project Identification in Alignment with Thailand's National Transport Development Strategy

To ensure consistency between national and local transport network development, the strategic framework for the development of transport networks and logistics systems in the Northeastern and Northern provincial clusters has been aligned with Thailand's 20-Year Transport Infrastructure Development Strategy (2018-2037). This includes the formulation of strategies, objectives, and indicators that correspond to the goals of the plan in each phase, as illustrated in **Figure 5.1-3.**

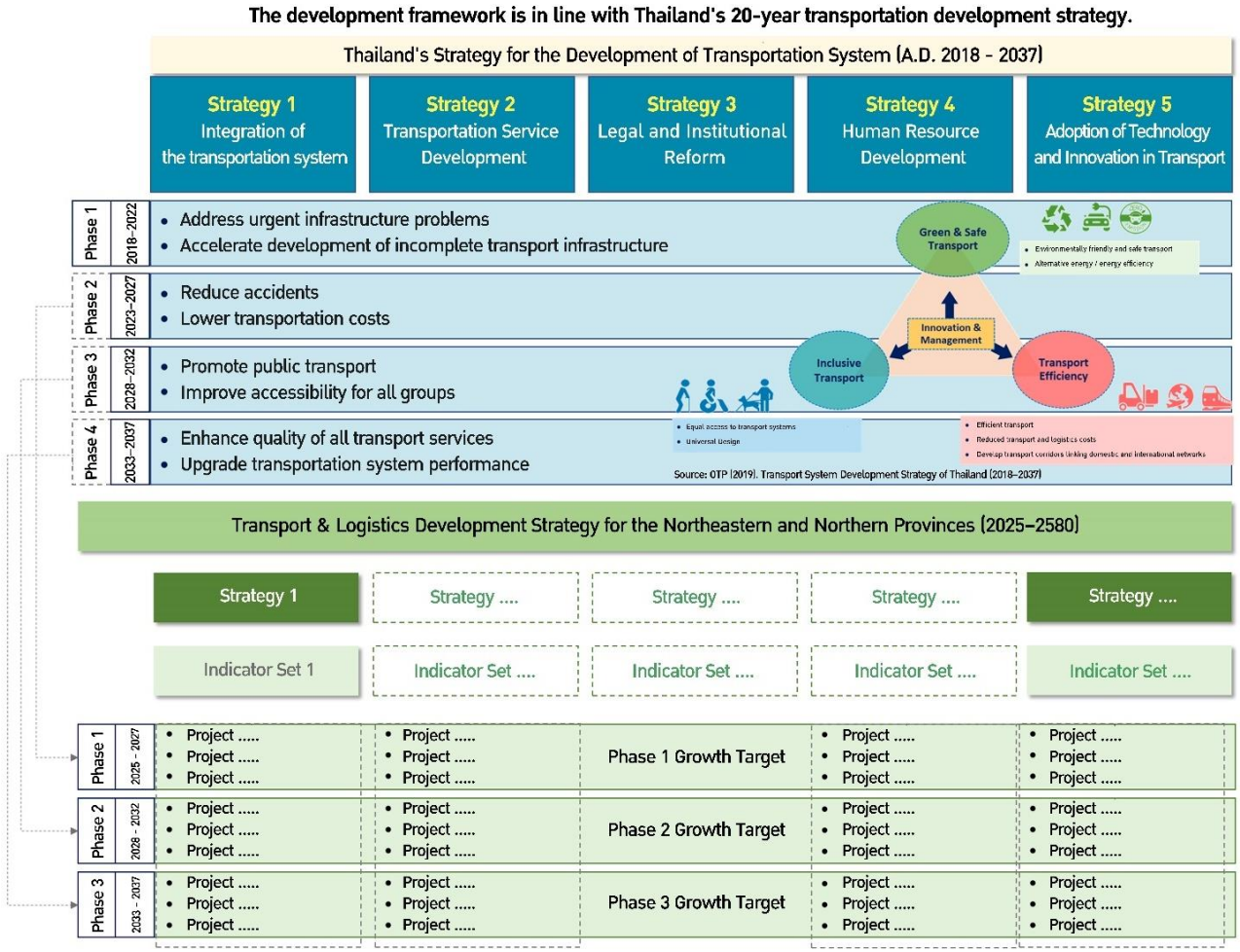


Figure 5.1-3 Development Framework Aligned with Thailand's 20-Year Transport Infrastructure Development Strategy

5.2 Alignment with First-Level, Second-Level and Third-Level Relevant Plans

The formulation of the strategic plan for developing the transport network and logistics system in the Northeastern and Northern provincial clusters, linked to the economic corridors under the GMS framework to support economic and tourism development (2025-2037), has been aligned with the three levels of planning in accordance with the Cabinet Resolution dated December 4, 2017, which include:

First-Level Plan:

20-Year National Strategy (2018 - 2037)

Second-Level Plans:

Master Plans under the National Strategy, National Reform Plans, and the 13th National Economic and Social Development Plan (2023-2027)

Third-Level Plans:

- Thailand's 20-Year Transport System Development Strategy (2018-2037)
- Thailand's 3rd Logistics Development Strategy (2017-2022)
- Transport and Logistics Action Plan Phase 1 (2023-2027)
- Transport and Logistics Action Plan Phase 2 (2028-2037)

5.2.1 Alignment with 20 - Year National Strategy (2018 - 2037)

The strategic plan for the development of transport networks and logistics systems in the Northeastern and Northern provincial clusters, linked to the economic corridors under the GMS framework to support economic and tourism development (2025-2037), is primarily aligned with **the 2nd National Strategy** on Enhancing National Competitiveness, **the 3rd Strategy** on Human Resource Development and Strengthening, **the 4th Strategy** on Creating Opportunities and Social Equality, **the 5th Strategy** on Environmentally Friendly Growth for Quality of Life, **and the 6th Strategy** on Rebalancing and Improving Public Sector Administration.

5.2.2 Consistency with the Master Plans under the National Strategy

The strategic plan for the development of transport networks and logistics systems in the Northeastern and Northern provincial clusters, connected to the economic corridors under the GMS framework to support economic and tourism development (2025-2037), is aligned with the Master Plans under the National Strategy. It is primarily consistent with **Issue (07):** Logistics and Digital Infrastructure, and also aligns with **Issue (05):** Tourism, **Issue (06):** Smart Livable Cities and Areas, **Issue (09):** Special Economic Zones, **Issue (20):** Public Service and Government Efficiency, and **Issue (22):** Legal and Justice System Development.

5.2.3 Alignment with the 13th National Economic and Social Development Plan (2023-2027)

The strategic plan for the development of transport networks and logistics systems in the Northeastern and Northern provincial clusters, linked to the economic corridors under the GMS framework to support economic and tourism development (2025-2037), is consistent with the 13th National Economic and Social Development Plan (2023-2027). Specifically, it aligns with:

Milestone 5: Thailand as a regional gateway for trade, investment, and strategic logistics hub

Milestone 8: Thailand having livable, safe, and sustainable smart cities and areas

Milestone 10: Thailand achieving a circular economy and a low-carbon society

Milestone 13: Thailand possessing a modern, efficient, and citizen-responsive public sector

5.2.4 National Reform Plan (Revised Version)

The strategic framework for the development of transport networks and logistics systems in the Central, Southern, and Eastern provincial clusters, connected to the economic corridors under the GMS framework to support economic and tourism development, is aligned with the revised National Reform Plan in 3 key areas: **economic reform, public administration reform, and legal reform.**

5.2.5 Alignment with Thailand's Transport System Development Strategy (2018 - 2037)

Thailand's 20-Year Transport System Development Strategy (2018-2037) is a third-tier plan prepared by the Ministry of Transport to define the long-term direction for the country's transport system development. The strategy emphasizes three key pillars: (1) Green and Safe Transport, (2) Transport Efficiency, and (3) Inclusive Transport that ensures equitable access. It sets long-term development goals for the nation and promotes the integration of project plans to ensure the successful achievement of these objectives.

The strategic plan for the development of transport networks and logistics systems in the Northeastern and Northern provincial clusters, linked to economic corridors under the GMS framework to support economic and tourism development (2025-2037), is primarily aligned with the following strategic directions:"

- **Strategy 1**: Integrated Transport Systems
- **Strategy 2**: Transport Services
- **Strategy 3**: Regulations and Institution
- **Strategy 4**: Human Resource Development
- **Strategy 5**: Technology and Innovation

5.2.6 Alignment with Action Plan on Thailand Logistics Development 2023 - 2027

The strategic plan for the development of transport networks and logistics systems in the Northeastern and Northern provincial clusters, linked to the economic corridors under the GMS framework to support economic and tourism development (2025-2037), is primarily aligned with Thailand's Logistics Development Action Plan (2023-2027) under the following three development approaches:

- **Development Approach 1:** Development of infrastructure and related facilities
- **Development Approach 3:** Enhancement of customs procedures, import/export processes, and facilitation of cross-border transportation
- **Development Approach 5:** Promotion of research and innovation, human resource development, and logistics performance monitoring

5.2.7 Alignment with Transport Action Plan (2023 - 2027)

The strategic plan for the development of transport networks and logistics systems in the Northeastern and Northern provincial clusters, linked to the economic corridors under the GMS framework to support economic and tourism development (2025-2037), is also in alignment with the Transport Action Plan (2023-2027), particularly the following strategic directions:

- **Strategy 1:** Service Quality Enhancement in Transport and Logistics
- **Strategy 2:** Infrastructure Development to Support National Growth
- **Strategy 3:** Safety and Sustainability Improvement for Safe and Eco-Friendly Mobility
- **Strategy 4:** Smart Governance - Enhancing Efficiency, Transparency, and Modernization of Organizational Systems

5.2.8 Alignment with Action Plan on Transport and Logistics System Development Phase 1 (2023 - 2027) and Phase 2 (2028 - 2037)

The strategic plan for the development of transport networks and logistics systems in the Northeastern and Northern provincial clusters, linked to the economic corridors under the GMS framework to support economic and tourism development (2025-2037), is primarily aligned with the Transport and Logistics System Development Action Plans Phase 1 (2023-2027) and Phase 2 (2028-2037). These action plans serve as national frameworks for infrastructure development in transport and logistics, and include the following components:

1) **Development Approach 1:** Infrastructure development to support the country's sustainable growth
2) **Development Approach 2:** Enhancement of transport service quality to ensure accessibility for all population groups
3) **Development Approach 3:** Improvement of services and management to facilitate trade and supply chain management by increasing the efficiency of the logistics management system
4) **Development Approach 4:** Development and improvement of regulations, laws, governance mechanisms, and international agreements
5) **Development Approach 5:** Development of human resources, service providers, and innovation in the transport and logistics sectors

5.3 SWOT Analysis

SWOT analysis-assessing strengths, weaknesses, opportunities, and threats-is a method used to evaluate the potential and current conditions of the transport system within the study area. This assessment is based on a review of existing infrastructure, current and projected travel demand, upcoming plans and projects, relevant policies and legislation, as well as existing challenges and constraints. In general, the SWOT analysis is divided into two main components as follows:

1) Internal Environment: This involves identifying the strengths and weaknesses of existing transport infrastructure and supporting systems, future development projects, as well as transport and logistics-related policies and regulations. It is categorized into:

Strength (S): Refers to the positive potential of the transport network that provides benefits or contributes to the success of transport and logistics activities. The strengths of each provincial cluster and individual province are analyzed under five key categories as follows:

- **S1: Strategic and Trade Location**

  Assesses proximity and border connections with neighboring countries that facilitate cross-border linkages and trade. This includes infrastructure data such as permanent border checkpoints, temporary border crossings, and border trade facilitation points, along with a review of relevant laws and policies.

- **S2: Transport Network and Infrastructure**

  Considers major international transport corridors, integrated transport and logistics systems within and beyond the region, including connections to neighboring countries, as well as integrated infrastructure development plans.

- **S3: Agricultural and Industrial Production Bases with Market Demand**

  Evaluates production sources with Geographical Indication (GI), which identifies products originating from specific regions with qualities or reputations tied to that origin. Also includes analysis of production areas, output of agricultural and industrial goods, and the availability of surface and groundwater resources.

- **S4: Tourist Attractions with Travel Demand**

  Assesses natural and environmental attractions, tourist arrival volumes and growth rates, cultural diversity, traditions and customs of ethnic groups, agrotourism destinations, as well as 2024 tax incentive policies promoting travel to designated tourism cities.

- **S5: Development of Local Wisdom, Technology, and Innovation**

  Considers research centers, academic institutions, and knowledge dissemination hubs, including cultural and intellectual capital with distinctive local identities and traditional heritage.

Weakness (W): Refers to the negative attributes of the transport network. This includes considerations of deficiencies, limitations, and inadequacies in infrastructure, as well as issues when compared to transportation demand. The weaknesses of each provincial cluster and individual province are analyzed under four key categories as follows:

- **W1: Connectivity and Accessibility of Transport, Logistics, and Public Transit Systems**

  Assesses the availability and quality of existing transport, logistics, and public transportation infrastructure in the area, including the management of public transport systems and supporting facilities.

- **W2: Road Accidents**

  Considers the road traffic fatality rate compared to national safety targets, as defined in the Road Safety Master Plan (2022-2027).

- **W3: Management of Land Use, Tourist Attractions, Resources, and Technological Development**

  Examines the management of knowledge and databases, promotion of tourism sites, and challenges related to human resources.

- **W4: Population, Society, Aging Demographics, Income, and Labor**

  Assesses the proportion of the elderly population (aged 60 and above). According to the United Nations' World Population Ageing report, the number of dependent individuals-children and the elderly-has already surpassed the working-age population. This reflects two demographic conditions: an Aging Society and an Aged Society. The analysis also includes cost of living indices and labor force statistics.

2) External Environment: Refers to various situations arising from relevant external factors. These include economic conditions, international cooperation frameworks and agreements, political, social, and technological factors. The external environment is categorized into:

Opportunity (O): Refers to external situations that are favorable to transport and logistics activities within the study area. The opportunities of each provincial cluster and individual province are analyzed under three key categories as follows:

- **O1: Growth and Development of Tourism**

  Considers the expansion of tourism in the Greater Mekong Subregion (GMS) and within Thailand, including development zones focused on Mekong River lifestyles, as well as a review of related plans and policies.

- **O2: Development in Transport, Trade, and Investment**

  Assesses economic trends in the GMS, expansion of transport networks, and reviews of relevant development plans and investment policies.

- **O3: Promotion of Environmental, Urban Development, and Technological Policies**

  Considers the advancement and implementation of policies related to environmental protection, urban development, and technology.

Threat (T): Refers to external situations that hinder the efficiency of transport and logistics operations. These include obstructive or threatening conditions that cause negative impacts or impose limitations on transport activities and related operations. The threats of each provincial cluster and individual province are analyzed under four key categories as follows:

- **T1: Environmental Issues and Extreme Weather Conditions**

  Considers the impacts of the COVID-19 pandemic, global warming, natural disasters, and pollution-air, soil, and water-as well as plant and animal disease outbreaks.

- **T2: Geopolitical Issues, Economic and Trade Volatility**

  Assesses agricultural product prices, border trade, regional trade and economic competitiveness, as well as trends in energy and electricity supply.

- **T3: Social and Labor Transformations**

  Evaluates societies with a high proportion of elderly individuals (aged 60 and above). According to the United Nations World Population Ageing report, the dependent population-comprising children and the elderly who are unable to work for income-has already surpassed the working-age population. This demographic shift is categorized into two types: Aging Society and Aged Society. This point also includes labor statistics and the health status of the population.

- **T4: Cybersecurity Threats and Inefficient Information Systems**

  Considers cyber threats and the effectiveness of information and data utilization systems.

Summary of the SWOT Analysis Findings in the Study Areas of the Northeastern and Northern Provincial Clusters, with the details as follows:

5.3.1 Upper Northeastern Provincial Cluster 1

1) Strengths of the Upper Northeastern Provincial Cluster 1

The geographical location of Upper Northeastern Provincial Cluster 1 connects to three countries: Laos, Vietnam, and China. The area is equipped with transport, logistics, and connectivity systems that link both within and outside the region. It serves as a center for trade, investment, cross-border commerce, and the Northeastern Economic Corridor (NeEC). Additionally, the cluster offers diverse tourism attractions, particularly in historical, natural, spiritual, religious, and culturally significant sites.

2) Weaknesses of the Upper Northeastern Provincial Cluster 1

The transport and logistics systems lack efficiency and do not comprehensively cover all areas. Infrastructure and facilities are not yet adequate to support the growing needs of the economy, trade, investment, cross-border commerce, and tourism. Furthermore, the area lacks a one-stop service center for trade and investment support.

3) Opportunities of the Upper Northeastern Provincial Cluster 1

Government policies promote development in various areas including transport and logistics, trade and investment, integrated agriculture, tourism, sustainable water management, and the economic expansion of neighboring countries. These trends positively influence trade, investment, and cross-border commerce. Additionally, Free Trade Agreements (FTAs) and the opening of logistics routes to neighboring countries further enhance regional integration.

4) Threats to the Upper Northeastern Provincial Cluster 1

Climate change, natural disasters, and the degradation of natural resources and the environment affect agriculture, the economy, and tourism. Natural disasters pose significant risks to agricultural production. Moreover, the emergence of new diseases in humans, plants, and animals, along with increasing economic competition and trade barriers imposed by neighboring countries, represent major external threats.

5.3.2 Upper Northeastern Provincial Cluster 2

1) Strengths of the Upper Northeastern Provincial Cluster 2

Upper Northeastern Provincial Cluster 2 is supported by two airports serving the Special Economic Development Zones and is connected via the Thai-Lao Friendship Bridge. The area also offers diverse and distinctive tourism resources, including natural attractions, cultural and heritage-based tourism, spiritual and religious tourism, as well as health and wellness tourism.

2) Weaknesses of the Upper Northeastern Provincial Cluster 2

The cluster lacks a rail transport system connecting major cities and key tourist destinations, and lacks efficient and comprehensive inter-city transportation links. In addition, the area lacks dedicated transport services for tourism and experiences seasonally inconsistent tourism activities.

3) Opportunities of the Upper Northeastern Provincial Cluster 2

Government measures support tourism in the Mekong River region and promote "must-visit" cities. There are plans for developing the transport and logistics network within the cluster, linking it to the Eastern Economic Corridor (EEC), neighboring countries, and China. There are also opportunities from government policies that promote high-quality agricultural products.

4) Threats to the Upper Northeastern Provincial Cluster 2

Challenges related to international trade and investment include issues such as smuggled goods, the spread of infectious diseases, and global economic problems. The Russia-Ukraine war has also impacted exports and led to rising oil prices and production costs.

5.3.3 Central Northeastern Provincial Cluster

1) Strengths of the Central Northeastern Provincial Cluster

The Central Northeastern Provincial Cluster is geographically situated along the East-West Economic Corridor (EWEC), and benefits from development projects under the Greater Mekong Subregion (GMS) economic cooperation framework. It is traversed by National Highway No. 2 (Mittraphap Road), which serves as a central route in the northeastern region, connecting to key economic zones within the country and to neighboring countries.

2) Weaknesses of the Central Northeastern Provincial Cluster

Most of the tourism sites in the cluster are not yet standardized or fully developed, and lack integrated linkage among tourism routes across the provinces. Tourism income is largely concentrated in Khon Kaen Province. In addition, the area frequently experiences both flooding and drought, particularly in the Chi River Basin and its tributaries.

3) Opportunities of the Central Northeastern Provincial Cluster

The cluster is benefiting from multiple development initiatives, including railway projects, the expansion of Khon Kaen and Roi Et airports, and regional logistics development policies such as the Dry Port project by the Port Authority of Thailand in Nam Phong District, Khon Kaen. There are also investments in the construction of oil pipeline systems and storage facilities in Ban Phai District. The area is also being promoted as a hub for rail transport, aerospace industry, and space technology. Moreover, the opening of the Laos-China medium-speed railway provides further connectivity and trade opportunities.

4) Threats to the Central Northeastern Provincial Cluster

Global climate change has led to frequent natural disasters such as flooding and drought, which negatively impact agricultural production and affect forest and water resources. Additionally, while international trade cooperation is expanding, the cluster faces challenges from non-tariff trade barriers and environmental impacts associated with cross-border activities.

5.3.4 Lower Northeastern Provincial Cluster 1

1) Strengths of the Lower Northeastern Provincial Cluster 1

Lower Northeastern Cluster 1 serves as a gateway to the Isan region and neighboring countries. It features a well-connected road network linking all regions and borders, including a permanent border checkpoint at Chong Chom (Surin Province) and a border trade point at Chong Sai Taku (Buriram Province). The area boasts diverse tourism attractions and is the source of key headwaters and river basins essential for agriculture and livestock.

2) Weaknesses of the Lower Northeastern Provincial Cluster 1

Some tourist sites and access roads are deteriorated, and there is a lack of public transport services to tourist areas. A digital infrastructure to support economic development has not yet been established. Income distribution remains low, and the region lacks a skilled workforce prepared for high-performance industries and the BCG (Bio-Circular-Green) economy. Public awareness and understanding of BCG industries are also limited.

3) Opportunities of the Lower Northeastern Provincial Cluster 1

Government initiatives such as the Northeastern Economic Corridor (NeEC) policy in Nakhon Ratchasima-linking the Nakhon Chai Burin zone-offer opportunities through major projects including the high-speed rail, the double-track railway (Map Kabao-Chira Junction), and the Bang Pa-In-Nakhon Ratchasima motorway. The growing digital economy also presents potential for development in the region.

4) Threats to the Lower Northeastern Provincial Cluster 1

Permanent border checkpoints face legal and regulatory constraints, limiting development. There is a lack of investment sources for entrepreneurs in BCG industries. Both domestic and international trade competition is increasing, alongside the use of trade protectionist measures. In addition, global climate change is impacting development efforts, while emerging diseases in plants, animals, and humans are causing fluctuations in production capacity.

5.3.5 Lower Northeastern Provincial Cluster 2

1) Strengths of the Lower Northeastern Provincial Cluster 2

This cluster shares borders with two neighboring countries - the Lao People's Democratic Republic (Lao PDR) and the Kingdom of Cambodia - and has strong potential for business and tourism connectivity with these countries. It also has the capability to connect to third countries such as Vietnam. The region possesses abundant water resources and two large dams capable of storing water for power generation and agriculture.

2) Weaknesses of the Lower Northeastern Provincial Cluster 2

Water management and utilization are not aligned with the full potential of the water resources. Both streamflow and rainfall are inadequately managed, and the irrigation systems are insufficient to cover agricultural areas, which mostly depend on natural rainfall. Moreover, environmental degradation has led to droughts and flooding during the rainy season.

3) Opportunities of the Lower Northeastern Provincial Cluster 2

Government policies promoting regional development include projects such as high-speed rail, double-track railways, and logistics systems linking to neighboring countries. A Cabinet resolution has also approved this cluster as Phase 2 of Thailand's bio-industry development zone. The area benefits from convenient transportation by air, rail, and road, and offers hotels and shopping centers capable of accommodating a large number of tourists. Additionally, it is located near world-renowned tourist attractions in neighboring countries, which draw large numbers of international visitors - presenting an opportunity to supply agricultural products for tourism-related demand.

4) Threats to the Lower Northeastern Provincial Cluster 2

The cluster's continuous border with neighboring countries and numerous natural crossings make it difficult to control illegal migrant labor, drug trafficking, and transnational crime. Moreover, the national economy has declined due to the COVID-19 pandemic, leading to reduced purchasing power and a drop in tourist arrivals.

5.3.6 Upper Northern Provincial Cluster 1

1) Strengths of the Upper Northern Provincial Cluster 1

This cluster serves as an economic hub with strong foundations for connectivity with regional groupings such as GMS, BIMSTEC, and ASEAN. It is also a major tourism center in the Greater Mekong Subregion, with a wide variety of renowned tourist attractions at both national and international levels. The region is ideal for long-stay tourism, supported by a climate that is cooler and less humid compared to other regions, especially during the winter season, making it attractive for visitors from other areas.

2) Weaknesses of the Upper Northern Provincial Cluster 1

Although the cluster has a logistics system and tourism connectivity, infrastructure investment remains insufficient to support the growing demand for tourism route expansion - both between major and secondary cities and across borders to neighboring countries. The area also lacks sustainable tourism development, quality tourism management, and effective, integrated public transportation systems.

3) Opportunities of the Upper Northern Provincial Cluster 1

Opportunities arise from policies supporting the development of the Central-Western Economic Corridor (CWEC), high-speed and double-track rail development projects, and growing demand for agrotourism and nature-based tourism. Government initiatives aim to position this cluster as a regional hub for meetings and events (MICE City) and wellness services (Wellness Hub). Economic integration through the ASEAN Economic Community (AEC) and economic growth in neighboring countries also create opportunities for market expansion and increased economic value within the region.

4) Threats to the Upper Northern Provincial Cluster 1

Northern border trade has been affected by political instability in Myanmar, leading to a decline in export value through border checkpoints. Myanmar traders are concerned about the safety of goods and restrictions in online financial transactions, causing delays or reductions in orders from Thailand. In addition, the COVID-19 pandemic has driven countries to depend more on domestic supply chains, which may reduce Thailand's export opportunities in several industrial sectors.

5.3.7 Upper Northern Provincial Cluster 2

1) Strengths of the Upper Northern Provincial Cluster 2

This cluster shares borders with three neighboring countries and contains five customs checkpoints and 19 border crossings across three provinces. Its proximity to GMS countries supports cross-border trade, investment, and tourism. The region also has a logistics system with strong potential for connectivity to major cities in Southeast Asia and the Greater Mekong Subregion (GMS), as well as to neighboring countries.

2) Weaknesses of the Upper Northern Provincial Cluster 2

There is a lack of collaboration and trade networks, both domestically and internationally, which hinders the distribution of goods and services. Additionally, the physical terrain-being largely mountainous-results in higher management and operational costs.

3) Opportunities of the Upper Northern Provincial Cluster 2

Government policies such as the development of special economic zones, positioning the region as a trade gateway to GMS countries and the ASEAN Economic Community (AEC), and investment in rail transport infrastructure (e.g., train station city development, high-speed and dual-track railways) present strong opportunities. These policies support growth in border trade and

regional economic value. Increasing demand for agrotourism and nature-based tourism, as well as trade liberalization and regional integration-especially within GMS and ASEAN-also contribute to expanded trade and investment potential.

4) Threats to the Upper Northern Provincial Cluster 2

The COVID-19 pandemic has caused widespread economic disruption both globally and nationally, directly impacting the Upper Northern Cluster 2 across all sectors. Furthermore, competition from countries like China and Vietnam-key producers in the agricultural and agro-processing sectors-poses challenges in terms of trade competitiveness, particularly in terms of volume and pricing.

5.3.8 Lower Northern Provincial Cluster 1

1) Strengths of the Lower Northern Provincial Cluster 1

The region is well-positioned for trade and service connectivity with various countries and subregional groupings, particularly the Greater Mekong Subregion (GMS). It is linked to Thailand's central economic zone via an extensive transport network, including routes along the North-South Economic Corridor (NSEC), East-West Economic Corridor (EWEC), and China's One Belt One Road (OBOR) initiative. The area also has border and cross-border trade channels with Myanmar and Lao PDR.

2) Weaknesses of the Lower Northern Provincial Cluster 1

Public mass transportation services remain inadequate and do not cover the entire region effectively. Urban expansion has encroached upon fertile agricultural lands. Moreover, the region lacks a centralized center to support trade development and coordinate with partner countries that have strong potential in service and tourism sectors.

3) Opportunities of the Lower Northern Provincial Cluster 1

The development of transport network linkages presents opportunities for expanding markets in trade, agricultural products, tourism, and international education services. Integration into the One Belt One Road and GMS networks positions Lower Northern Cluster 1 as a key gateway for increasing flows of goods and tourists. This also opens up opportunities to expand a variety of service industries.

4) Threats to the Lower Northern Provincial Cluster 1

Free trade policies may negatively impact the region's agricultural and consumer goods sectors and reduce competitiveness in international export markets. While regional trade liberalization and integration initiatives such as the ASEAN Economic Community (AEC) and One Belt One Road facilitate trade, services, and labor mobility among member states, they may also bring adverse economic and social impacts to the region.

5.3.9 Lower Northern Provincial Cluster 2

1) Strengths of the Lower Northern Provincial Cluster 2

This cluster serves as a strategic hub for trade, logistics, and services connecting Northern, Central, Northeastern, and Eastern Thailand. It is linked by major transportation routes across land, water, and rail networks.

2) Weaknesses of the Lower Northern Provincial Cluster 2

Water resource management remains inefficient and ineffective. In addition, much of the area lies within flood-prone river basins, making it highly vulnerable to flooding.

3) Opportunities of the Lower Northern Provincial Cluster 2

The cluster benefits from government policies promoting tourism, energy conservation, and renewable energy. It is also supported by international cooperation frameworks such as the Greater Mekong Subregion (GMS) program and economic integration under the ASEAN Economic Community (AEC).

4) Threats to the Lower Northern Provincial Cluster 2

Trade liberalization under frameworks such as the ASEAN Economic Community (AEC), Free Trade Agreements (FTAs), and others poses competitive challenges. Furthermore, natural disasters, including droughts and floods, significantly affect development efforts in the region.

5.4 Strategic Framework for the Development of Transport Networks and Logistics Systems in the Northeastern and Northern Provincial Clusters Linked to Economic Corridors under the GMS Framework to Support Economic and Tourism Development in Line with the National Strategy

5.4.1 Vision and Missions

The Strategic Plan for the Development of Transport Networks and Logistics Systems in the Northeastern and Northern Provincial Clusters, linked to the economic corridors under the GMS framework to support economic and tourism development (2025-2037), sets forth the following vision: **"Regional Connectivity for Sustainable Development."** This vision aligns with the strategic direction for developing transport networks and logistics systems in the Central, Southern, and Eastern provincial clusters as well.

5.4.2 Development Concepts

The development concept of the Action Plan for Transport Network and Logistics System Development in the Northeastern and Northern Provincial Clusters-linked to the economic corridors under the GMS framework to support economic and tourism development (2025-2037)-is aligned with Thailand's 20-Year Transport System Development Strategy (2018-2037), the Transport and

Logistics Action Plan Phase 1 (2023-2027), and Phase 2 (2028-2037). The plan outlines three development dimensions and follows a three-phase implementation framework: Short term: 2025-2027 Medium term: 2028-2032 and Long term: 2033-2037 The summary is as follows:

1) Connectivity

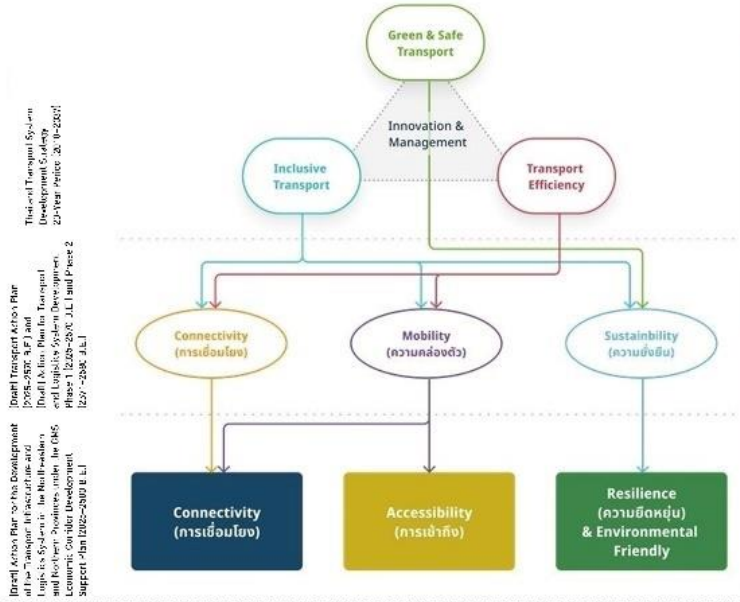
The transport network will function to effectively connect travel and freight movement at the provincial and regional levels. The focus is on reducing traffic congestion along major routes through infrastructure management and travel demand control. Additionally, the efficiency of the logistics system will be enhanced to reduce transportation costs and increase economic value. This also includes improving cross-border transport efficiency and establishing an integrated database system linked with information systems to allow for smooth and uninterrupted data exchange for transport management.

2) Accessibility

The focus is on providing comprehensive transport and logistics services that cover various areas. The transport network and services must be accessible to communities, economic zones, commercial centers, investment areas, and tourist attractions. Public transportation systems should connect journeys efficiently and truly meet user needs. Moreover, strategies and policies will be implemented to ensure reasonable travel costs and to promote accessibility to transport systems for all population groups.

3) Resilience and Environmental Friendliness

Emphasis is placed on maintaining the quality of transport and logistics activities while also enabling adaptation and further development in changing circumstances. The development plan for transport and logistics networks supports a shift toward non-fossil fuel transportation systems and promotes the use of rail and water transport for freight. It also encourages safe, energy-efficient travel and the use of alternative energy. Incorporating technology into travel and transport management helps reduce energy consumption and greenhouse gas emissions. The plan also includes the development of human resources in the transport and logistics sector, as well as strategies to promote environmentally friendly transportation, clean energy technologies, and vehicles, and the development of transport and traffic systems that meet international environmental standards.



Development Dimension	Short Term (2025–2027)	Medium Term (2028–2032)	Long Term (2033–2037)
(Connectivity)	• Improve inter-provincial and regional freight connectivity • Manage traffic demand	• Develop logistics system to add economic value • Develop cross-border transport system	• Develop database infrastructure
Accessibility	• Expand transport networks to comprehensively cover service areas • Regulate vehicle usage in conservation zones	• Improve quality of paratransit services • Promote accessibility for all groups	• Promote access to all modes of transport services
Resilience & Environmental Friendly	• Promote safe transport • Reduce energy consumption & promote alternative energy	• promote a paradigm shift travel to a disused transportation system The engine. • promote a paradigm shift travel and transport goods into the system transport by rail and by water • Personnel development in the sector Transportation and Logistics	• Reduce GHG emissions • Use technologies for mobility management

Indicators

Domestic transportation cost per total product cost (%)
Share of rail transport by volume (%)
Change rate of GHG emissions per ton-kilometer of freight transport (%)
Road traffic fatality rate (per 100,000 population)
Share of clean energy usage in transport sector (%)
Rate of change in trade volume/value at major border checkpoints (%)
Rate of change in GPP from the service sector (%)
Rate of change in tourism income into the provinces (%)
Proportion of users of intercity public transport (%)
Proportion of users of urban public transport (BMA and major municipalities) (%)

Source

Study on Developing a Model for Transportation Network Development in the Northeastern and Nothern Provincial Clusters, Linked with Economic Corridor Areas under the GMS Framework to Support Economic and Tourism Development, Bangkok

Source: Consultant's Analysis

Figure 5.4-1 Alignment with the Development Approaches of the 20-Year Thai Transport System Development Strategy (2018-2037), the Draft Transport Action Plan (2023-2027), the Transport and Logistics System Action Plan Phase 1 (2023-2027), and the Transport and Logistics System Action Plan Phase 2 (2028-2037)

5.4.3 Goals

The goals of the Action Plan for the Development of the Transport Network and Logistics System in the Northeastern and Northern Provincial Clusters, linked to the economic corridor under the GMS framework to support economic and tourism development (2025-2037), are designed to align with and reflect the vision and strategic issues. These goals also address key challenges, foster development, and consider the stakeholders and the nature of the benefits derived from the development of the transport network and logistics system.

The action plan outlines goals over three timeframes: short-term, medium-term, and long-term. These goals are aligned with the key development areas of the 20-Year Thai Transport System Development Strategy (2018-2037), as shown in **Table 5.4-1**

Table 5.4-1 Development Goals for Phase 1, Phase 2, and Phase 3

Period	Objectives of Thailand's 20-Year National Transport Development Strategy (2018–2037)	Action Plan for the Development of Transportation and Logistics Networks in the Upper Northeastern and Northern Provinces Connected to Economic Corridors under the GMS Framework to Support Economic and Tourism Development (2025–2037)	
		Development Dimensions (CARE)	Development Goals
Short Term (2025–2027)	• Resolve urgent basic infrastructure problems • Accelerate infrastructure development in underdeveloped transport areas • Reduce accidents • Lower transportation costs	Connectivity	• Connect road and freight transport routes between provinces and regions • Manage travel demand to reduce traffic congestion
		Accessibility	• Develop transport infrastructure to comprehensively cover all service areas • Control travel costs to make basic travel affordable
		Resilience and Environmental Friendly	• Promote safe and secure travel and transportation • Reduce energy consumption and encourage alternative energy use • Develop clean and efficient transport technologies
Medium Term (2028–2031)	• Promote the use of public transport systems • Develop inclusive access to transport systems for all groups	Connectivity	• Develop logistics systems to increase economic value • Develop cross-border transportation systems
		Accessibility	• Improve the quality of secondary public transport services • Promote access to public transport for all population groups
		Resilience and Environmental Friendly	• Promote modal shift to non-motorized and low-emission transport • Promote resilient and sustainable infrastructure development that can withstand flooding and landslides • Promote the use of environmentally friendly construction standards and practices • Develop manpower in the transport and logistics sectors
Long Term (2032–2037)	• Promote the quality of services in all modes of transport • Upgrade the quality of service in the transport system	Connectivity	• Develop integrated data systems
		Accessibility	• Promote universal access to all transport modes
		Resilience and Environmental Friendly	• Reduce greenhouse gas emissions • Apply smart technologies to transport and logistics management

Source: Consultant

5.4.4 Indicators

The Action Plan for the Development of the Transport Network and Logistics System in the Northeastern and Northern Provincial Clusters, linking with the GMS Economic Corridor to support economic and tourism development (2025-2037), adopts the SMART principle: Specific, Measurable, Agreed Upon, Realistic, and Time Bound. The indicators are designed based on alignment with the Transport and Logistics Action Plan Phase 1 (2023-2027), Phase 2 (2028-2037), and the draft Action Plan for the Development of the Transport Network and Logistics System in the Central, Southern, and Eastern Provincial Clusters linking with the GMS Economic Corridor to support economic and tourism development (2023-2037), including other related Level-3 plans. The key indicators of the Action Plan for the Development of the Transport Network and Logistics System in the Northeastern and Northern Provincial Clusters linking with the GMS Economic Corridor to support economic and tourism development (2025-2037) are shown in **Table 5.4-2**

Table 5.4-2 Main Indicators of the Action Plan with GMS Economic Corridor

No.	Main KPI	National Targets		
		2027	2033	2537
1	Cost of transportation per gross domestic product (GDP) (percentage)	6.5	5.9	5.4
2	Proportion of rail transport to total freight transport volume (percentage)	2.5	2.9	3.6
3	Rate of change in greenhouse gas emissions from the transportation sector (percentage decrease)	Not less than 1.5	Not less than 2.0	Not less than 2.0
4	Rate of fatalities from transportation accidents (per 100,000 persons)	12	8	5
5	Energy consumption of the transportation sector reduced from BAU (percentage decrease)	Not more than 0.60	Not more than 0.56	Not more than 0.52
6	Rate of change in volume/value of trade at major trade gateways and key border checkpoints (percentage)	Differed by clusters	Differed by clusters	Differed by clusters
7	Rate of change in Gross Provincial Product (GPP) for the service sector (percentage)	Differed by clusters	Differed by clusters	Differed by clusters
8	Rate of change in provincial revenue from tourism (percentage)	Differed by clusters	Differed by clusters	Differed by clusters
9	Proportion of intercity public transportation usage (percentage)	48	49	50
10	Proportion of urban public transportation usage (percentage) (Bangkok Metropolitan Area and main cities in the regions)	7.5	15	15

Source: Action Plan for Transport and Logistics System Phase 1 (2023 - 2027) and Action Plan for Transport and Logistics System Phase 2 (2028 - 2037), and (Draft) Action Plan for the Development of Transport Networks and Logistics Systems in the Central, Southern, and Eastern Provincial Groups, linked to the Economic Corridors under the GMS Framework to support Economic and Tourism Development (2023 - 2037).

5.4.5 Development Approaches

The Action Plan for the Development of the Transport Network and Logistics System in the Northeastern and Northern Provincial Clusters, linking with the GMS Economic Corridor to support economic and tourism development (2025 - 2037), defines development approaches that align with the development guidelines outlined in the Transport and Logistics Action Plan Phase 1 (2023-2027), Phase 2 (2028 - 2037), and the draft Action Plan for the Development of the Transport Network and Logistics System in the Central, Southern, and Eastern Provincial Clusters, linking with the GMS Economic Corridor to support economic and tourism development (2023 - 2037). The development approaches consist of five main strategies as follows:

Development Approach 1 Development and Integration of the Transport Network

Development Approach 2 Enhancement of Public Transport Services

Development Approach 3 Facilitation of Goods Transportation and Logistics Services

Development Approach 4 Improvement of Laws, Regulations, Rules, and Requirements, including their implementation to align with the current competitive environment

Development Approach 5 Capacity Building in Human Resources and Innovation

Principles and Rationale, Alignment, and Strategies under the Various Development Approaches are Detailed as Follows.

Development Approach	Strategy	Indicator
Development Approach 1 Development and Integration of the Transport Network	**Strategy 1.1**: Develop the transport infrastructure network to support connectivity to major routes.	- Transport cost per gross domestic product *(percentage)* - Proportion of energy consumption in the transport sector *(percentage)* - Reduction in greenhouse gas emissions from the transport sector compared to the business-as-usual scenario *(percentage reduction)* - Proportion of rail freight transport to total freight transport volume *(percentage)*
	Strategy 1.2: Improve and enhance safety to increase the efficiency of the transport infrastructure network.	- Fatality rate from transport-related accidents *(persons per 100,000 population)*
	Strategy 1.3: Develop access networks to support tourism, trade, investment, and improve the quality of life for the public.	- Growth rate of Gross Provincial Product (GPP) in the service sector *(percentage)* - Growth rate of revenue from inbound tourists to the province *(percentage)*
Development Approach 2 Enhancement of Public Transport Services	**Strategy 2.1:** Enhance the efficiency of public transport services	- Fatality rate from transport-related accidents per 100,000 population *(persons per 100,000 population)*

Development Approach	Strategy	Indicator
		- Percentage of intercity public transport users *(percentage)* - Percentage of urban public transport users *(percentage)*
	Strategy 2.2: Set appropriate fare rates for public transport systems	- Percentage of intercity public transport users *(percentage)* - Percentage of urban public transport users *(percentage)*
	Strategy 2.3: Develop areas surrounding public transport stations	- Growth rate of GPP in the service sector *(percentage)* - Percentage of intercity public transport users *(percentage)* - Percentage of urban public transport users *(percentage)*
Development Approach 3 Facilitation of Goods Transportation and Logistics Services	**Strategy 3.1**: Develop and enhance the capacity of land freight transport facilities	- Proportion of rail freight transport to total freight transport *(percentage)* - Growth rate of GPP in the service sector *(percentage)*
	Strategy 3.2: Develop and enhance the capacity of cross-border freight transport facilities	- Growth rate of cross-border trade value at major trade gateways and key border checkpoints *(percentage)*
	Strategy 3.3: Develop and enhance the capacity of waterway freight transport facilities	- Final energy intensity of the transport sector reduced from the business-as-usual case *(percentage reduction)*
Development Approach 4 Improvement of Laws, Regulations, Rules, and Requirements, including their implementation to align with the current competitive environment	**Strategy 4.1**: Amendment of laws, regulations, rules, and requirements related to transportation	- Proportion of laws and regulations revised to align with current transport conditions
	Strategy 4.2: Implementation of transportation-related laws, regulations, rules, and requirements to ensure effectiveness	- Number of enacted laws, announcements, regulations, and their effective enforcement - Number of projects successfully attracting private sector participation or investment
	Strategy 4.3: Revision of land use regulations	- Number of newly enacted city plans aligned with transportation and logistics needs, implemented within the specified timeframe
Development Approach 5 Capacity Building in Human Resources and Innovation	**Strategy 5.1**: Development and training of human resources in the field of transportation	- Number of personnel who have completed training and passed the assessment criteria
	Strategy 5.2: Adoption of technology and innovation for the development of the transportation system	- Number of technologies and innovations adopted to improve the efficiency of travel and transportation

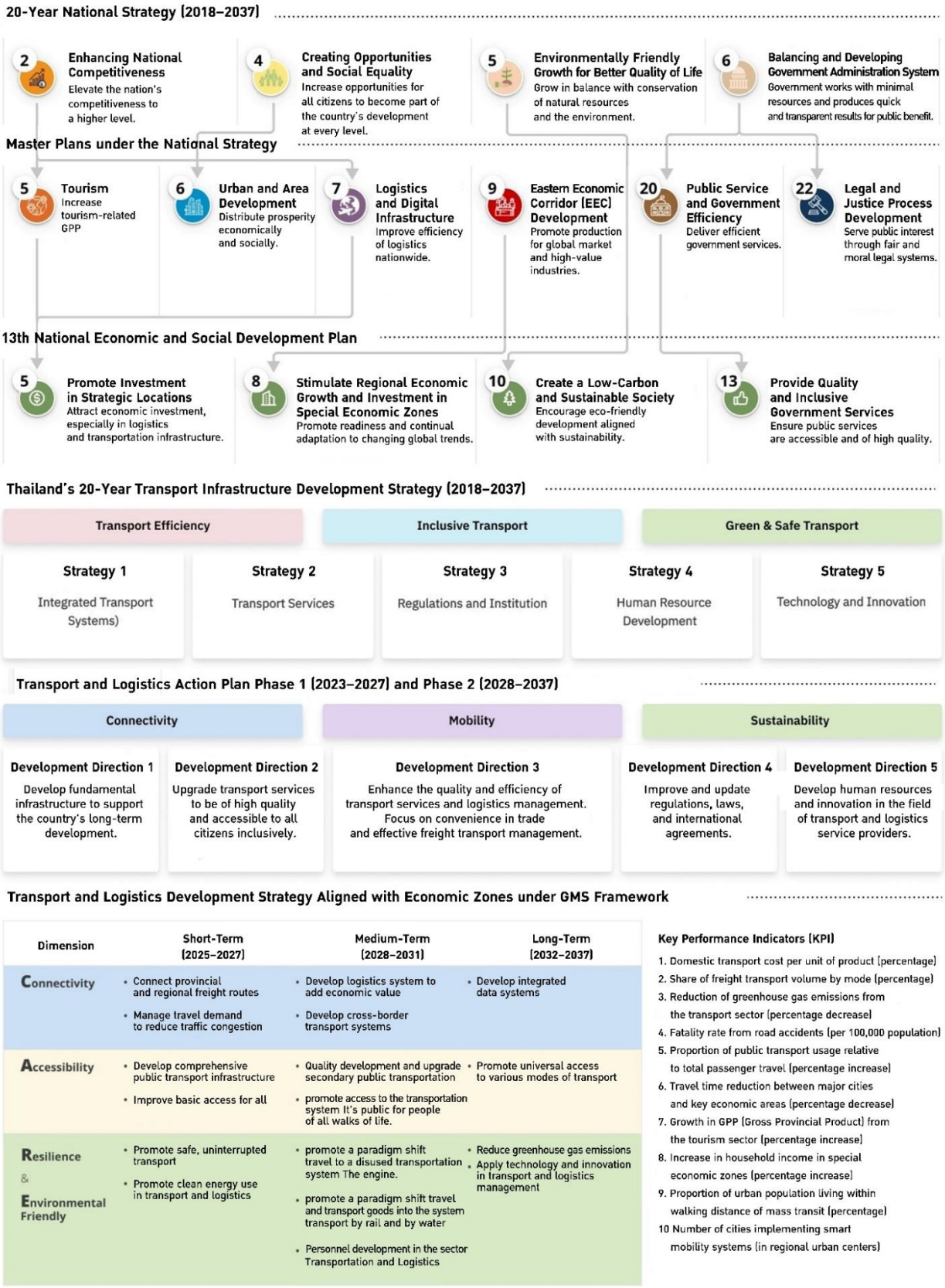


Figure 5.4-2 Action Plan for the Development of Transport Network and Logistics System in the Northeastern and Northern Provincial Clusters, Connecting with the Economic Corridor under the GMS Framework to Support Economic and Tourism Development (2025 - 2037)

Chapter 6

Planning, Investment Planning, and Prioritizing the Development of Transportation and Logistics Networks.

Chapter 6

Planning, Investment Planning, and Prioritizing the Development of Transportation and Logistics Networks.

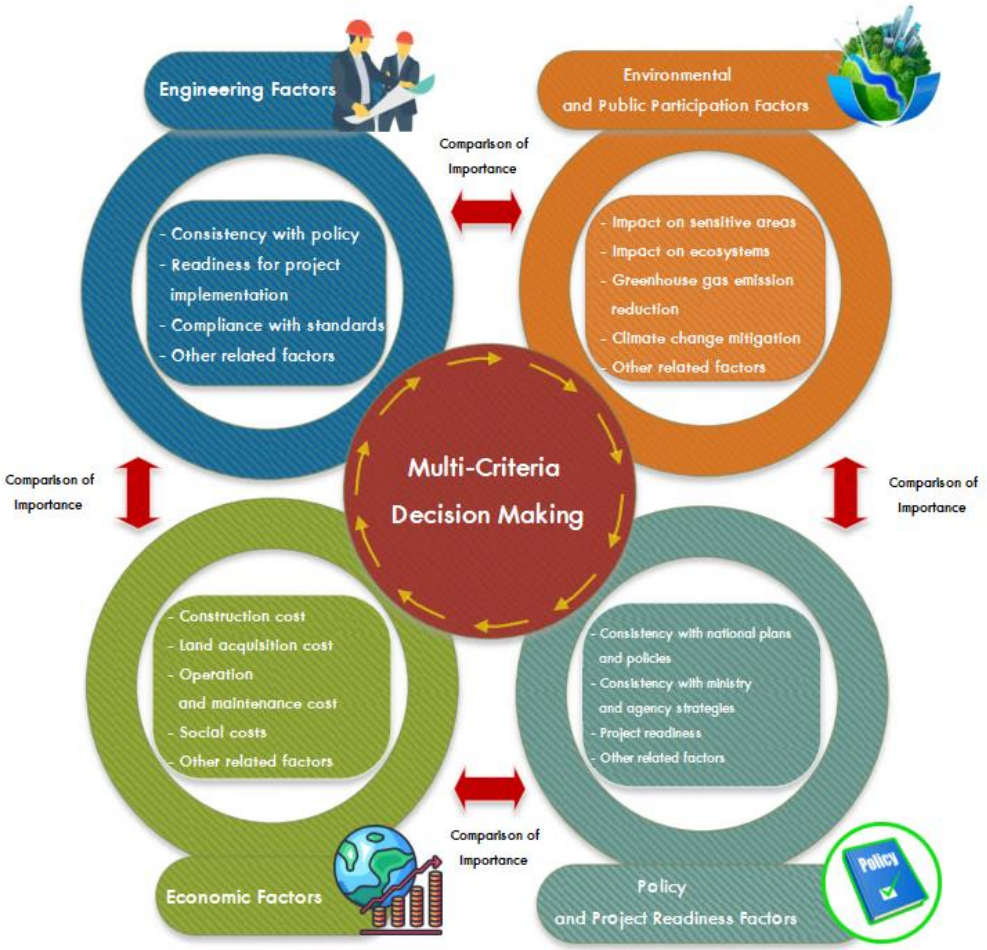
6 Planning, Investment Planning, and Prioritizing the Development of Transportation and Logistics Networks.

6.1 Feasibility Study and Project Prioritization

The prioritization of transportation infrastructure and logistics system development in each transport mode within the Northeastern and Northern regions aims to provide insight into project prioritization. This is intended for formulating the Action Plan on Transport Network and Logistics System Development within Northeastern and Northern Provincial Clusters connecting with GMS Economic Corridor to support Economic and Tourism Development (2023-2037). The Multi-Objective Evaluation method, as explained by Hwang and Yoon (1981), describes Multi-Attribute Decision Making (MADM) as an assessment of project importance based on quantitative suitability scores, which are the sum of importance weights. This method is widely used for prioritizing projects effectively, facilitating the selection of the most suitable and optimal alternatives.

6.1.1 Prioritization Guidelines

Analyzing and prioritizing the importance of options or projects typically involves quantitative analysis, where the prioritization is based on scores associated with factors and the weighting of factors related to the value of the project study area. Assessing the suitability of options falls within the realm of project prioritization problems commonly addressed. One prevalent method is to analyze suitability in the form of composite scores, where the score is obtained by the sum of scores derived from the multiplication of relevant factor values and factor weights. The structure of the analysis for prioritizing factors generally follows a two-tier hierarchy structure, as illustrated in **Figure 6.1-1**



Source: The Consultants

Figure 6.1-1 The structure for analyzing and prioritizing factors.

6.1.2 Suitability Score Analysis

From the review of the project evaluation criteria used for prioritization by the Ministry of Transport, the Office of Transport and Traffic Policy and Planning (OTP), and the Office of the National Economic and Social Development Council (NESDC), including the review of the study project on developing a transport network model in the central and southern provinces connected to economic corridors under the GMS framework to support economic and tourism development in Bangkok,

As a guideline for selecting factor groups, the consultant adopted the approach for determining factor groups and factor scores from the study project on developing a transport network model in the central and southern provinces connected to economic corridors under the GMS framework to support economic and tourism development in Bangkok, by reviewing past related study projects concerning factors used for project prioritization analysis, including the weights of primary and secondary factors applied, as shown in **Table 6.1-1**

Table 6.1-1 Review of the Selection of Primary and Secondary Factors in Past Studies

Study	Weight of Primary Factors	Weight of Secondary Factors
1. Project on Project Evaluation Study for Planning of the Ministry of Transport, 1998	1. Policy Consistency = 14 points	1. Long-term Policies and Plans = 7 points 2. Short-term Policies and Plans = 7 points
	2. Economic and Financial Suitability = 26 points	1. Economic Return = 7 points 2. Financial Return = 7 points 3. Impact on Current Account Balance = 4 points 4. Debt Creation = 4 points 5. Budget Commitment = 4 points
	3. Transport and Communication Suitability = 32 points	1. Promotion of Competition and Private Sector Participation = 5 points 2. Interconnection between Modes and Systems = 5 points 3. Connectivity of Transport/Communication Networks with Neighboring Countries = 4 points 4. Service Rate Determination = 4 points 5. Service Safety, Quality, and Reliability = 5 points 6. Mass Transport / Broadly Beneficial Services = 5 points 7. Social Services and Opportunity Distribution = 4 points
	4. Management Suitability = 16 points	1. Agency Capacity and Mission = 4 points 2. Risk Management = 4 points 3. Planning, Monitoring, and Evaluation = 4 points 4. Organizational, Human Resource, and R&D Development Plans = 4 points
	5. Environmental Impact Suitability = 8 points	
	6. National Security Importance = 4 points	

Source: the Consultant (2023)

Table 6.1-1 Review of the Selection of Primary and Secondary Factors in Past Studies (continued)

Study	Weight of Primary Factors	Weight of Secondary Factors
2. Project on Feasibility Analysis and Investment Prioritization System for Transport Projects in Line with Strategic Goals, 2008, Ministry of Transport	**1.** Strategic Consistency	
	2. Financial Internal Rate of Return (FIRR)	
	3. Economic Internal Rate of Return (EIRR)	
	4. Macroeconomic Impact	
	5. Impact on the Overall Transport System	
	6. Outcome Efficiency	
3. Project on Master Plan for Transport and Traffic System Development (2011-2020), Office of Transport and Traffic Policy and Planning, Ministry of Transport	**1.** Policy Consistency (14%)	1. Economic Internal Rate of Return (EIRR) (8%) 2. Financial Internal Rate of Return (FIRR) (8%) 3. Impact on Current Account Balance (3%) 4. Debt Creation (3%) 5. Budget Commitment (3%)
	2. Economic and Financial Suitability (25%)	1. Promotion of Competition and Private Sector Participation (4%) 2. Connectivity to Support System Development (8%) 3. Service Safety, Quality, and Reliability (8%) 4. Mass Transport / Broadly Beneficial Services (8%) 5. Social Services and Opportunity Distribution (5%)
	3. Transport Suitability (33%)	1. Promotion of Competition and Private Sector Participation (4%) 2. Connectivity to Support System Development (8%) 3. Service Safety, Quality, and Reliability (8%) 4. Mass Transport / Broadly Beneficial Services (8%) 5. Social Services and Opportunity Distribution (5%)
	4. Environmental Impact Suitability (8%)	
	5. Management Suitability (16%)	1. Agency Capacity and Mission (8%) 2. Risk Management (8%)
	6. National Security Importance (4%)	

Source: the Consultant (2023)

6.1.3 Factor Groups and Factor Weights Used in the Study

Based on the reviews, the guidelines for assessing factor values and scores from the study project for the preparation of a master plan for transportation and traffic system development by the Office of Transport and Traffic Policy and Planning, Ministry of Transport, for the years 2011 - 2020 were selected. There were adjustments made to the sub-factors under the policy alignment factor and the assessment criteria for environmental impact factors to comply with the current project study. Details are shown in **Table 6.1-2**

Table 6.1-2 Details and consideration of the importance of main factors and sub-factors used in the study.

Main factors	Sub-factors	%
1. Policy alignment (14%)	1.1 National Strategic Plans Alignment	5
	1.2 Subordinate Plans under National Strategies Alignment	5
	1.3 the National Economic and Social Development Plan Version 13 Alignment	4
2. Economic and financial suitability (25%)	2.1 Economic Internal Rate of Return (EIRR)	9
	2.2 Financial Internal Rate of Return (FIRR)	9
	2.3 Impact on Balance of Payments	4
	2.4 Budgetary Commitment	3
3. Suitability in transportation and communication (33%)	3.1 Promotion of Competition and Private Sector Role Enhancement	4
	3.2 Integration of Transport Networks with Neighboring Countries and Regions	8
	3.3 Safety, Quality, and Reliability of Services	8
	3.4 Large-scale Transport and Widely Beneficial Service Provision	8
	3.5 Service Provision for Social Welfare and Opportunity Distribution	5
4. Environmental impact suitability (8%)		8
5. Management and administration suitability (16%)	5.1 Agency Potential and Mission	8
	5.2 Service User Volume-Related Risks	8
6. National security importance (4%)		4

6.2 Pre-Feasibility Study

The Pre-Feasibility Study aims to provide supporting information for decision-making by relevant agencies in implementing the proposed additional infrastructure developments presented under the Action Plan for the Development of Transport and Logistics Networks in the Northeastern and Northern Provinces connected to economic corridors under the GMS framework to support economic and tourism development (2023-2037). The criteria for selecting projects for the Pre-Feasibility Study are as follows:

1) The project must be an infrastructure-type project.

2) The project has not yet been allocated a budget.

3) The project is an additional proposed project with no existing supporting study, and a study result is required to support further decision-making.

However, for design study-type projects, a preliminary construction cost estimate will be conducted solely for use in suitability analysis. The investment amount appearing in the Action Plan refers only to the cost of the study.

The Pre-Feasibility Study will use the result of the economic analysis as the evaluation criterion, by comparing between the "With-Project" and "Without-Project" scenarios using Cost-Benefit Analysis. The economic benefits considered in this study include:

1) Time Saving

2) Vehicle Operating Cost Saving

3) Greenhouse Gas and Pollution Reduction

4) Accident Cost Saving

The results of the economic suitability analysis suggest additional recommendations in the action plan as shown in **Table 6.2-1**

Table 6.2-1 Economic Conversion Factors

Item	Economic Conversion Factors
Land Cost	1.00
Compensation for Buildings and Structures	0.92
Detailed Design Cost	0.92
Construction Supervision Cost	0.92
Construction Cost	0.88
Operation and Maintenance Cost	0.92

Source: Sadig Ahmed; Shadow Prices for Economics Appraisal of Project : An Application to Thailand, World Bank Staff Working Paper, Number 609, Year 1983

6.2.1 Economic Indicators

Economic feasibility analysis is conducted by comparing the costs and benefits of the project to evaluate key economic indicators, which are presented in terms of Net Present Value (NPV), Economic Internal Rate of Return (EIRR), and Benefit-Cost Ratio (B/C)

1) Net Present Value: NPV

Net Present Value (NPV) is calculated by comparing the difference between the expected economic benefits and the economic investment value over the project's life cycle using a discount rate to convert them into present value.

If the NPV is positive or greater than zero, it indicates that the project is economically viable, meaning that the total benefits exceed the total costs throughout the project life. The level of viability depends on the magnitude of the NPV-the higher the NPV, the more viable the project is; the lower the NPV, the less viable it is. Conversely, if the NPV is negative, it indicates that the project is not economically viable.

2) Economic Internal Rate of Return: EIRR

The Economic Internal Rate of Return (EIRR) refers to the opportunity cost of investment or the discount rate at which the present value of benefits equals the present value of costs, or the NPV is equal to zero.

EIRR shows the return on investment of the project and can be used to compare which project yields a higher return. For example, if the opportunity cost of capital used in the study is 12% per year, which is a rate previously studied by the World Bank and the Office of the National Economic and Social Development Council (NESDC), then a project with an EIRR greater than 12% per year is considered economically viable.

3) Benefit - Cost Ratio: B/C

The Benefit-Cost Ratio is an economic index indicating the ratio of the present value of benefits to the present value of project investment costs, using a discount rate to convert to present value.

If the B/C Ratio is greater than one, it indicates that the project is cost-effective and yields worthwhile investment benefits.

However, the Pre-Feasibility Study of the projects under the Action Plan can group the projects for comparison between the “with-project” and “without-project” scenarios into 7 groups, as follows:

1) Main Road Widening Construction Project

The results of the economic feasibility analysis for the main road lane expansion projects proposed for inclusion in the Action Plan are shown in **Table 6.2-2**

Table 6.2-2 Results of the Economic Feasibility Assessment for Main Road Lane Expansion Projects Proposed for Inclusion in the Action Plan

Seq.	Proposed Project	Province	Operation Year (B.E.)	Net Present Value (NPV Million THB)	Economic Internal Rate of Return (EIRR %)	Benefit/Cost Ratio (B/C Ratio)
Upper Northeastern Provincial Group 1						
1	Widening 2 to 4 Lanes, Highway No. 21, Loei - Lom Kao Section, Rong Chik Sub-district - Santom Sub-district	Loei	2028	221.58	13.23	1.11
2	Widening 2 to 4 Lanes, Highway No. 21, Lom Kao - Loei Section, Nasa Sub-district - Nam Phung Village	Loei	2031	371.09	15.57	1.35
3	Widening 2 to 4 Lanes, Highway No. 21, Lom Kao - Loei Section, Santom Sub-district - Siao Sub-district	Loei	2031	330.34	15.23	1.31
4	Widening 2 to 4 Lanes, Highway No. 21, Lom Kao - Loei Section, Phon Sung Village - Rong Chik Sub-district	Loei	2031	424.85	15.89	1.38
5	Widening 2 to 4 Lanes, Highway No. 2013, Bo Pho - Khok Ngam	Loei	2026	425.9	17.52	1.48
6	Survey and Design Project for Highway Efficiency Improvement, Highway No. 2016, Wang Saphung - Tat Kloi Section	Loei	2026	1,584.44	20.54	1.76
7	Survey and Design Project for Highway Efficiency Improvement, Highway No. 2420, Si Bun Rueang - Na Klang Section	Nong Bua Lamphu	2026	411.38	18.11	1.54
8	Survey and Design Project for Highway Efficiency Improvement, Widening 2 to 4 Lanes, Highway No. 2146, Nong Bua Lamphu - Ubol Ratana Dam Section	Nong Bua Lamphu	2027	1,112.97	20.14	1.79
9	Road Standard Improvement Project, Highway No. 2020, Tha Bo District - Ban Wan	Nong Khai	2026	147.38	20.57	1.77
10	Road Standard Improvement to Class 1 and Widening to 4 Lanes, Highway No. 211, Si Chiang Mai District - Sangkhom District	Nong Khai	2027	602.26	18.5	1.62
11	Road Standard Improvement to Class 1 and Widening to 4 Lanes, Highway No. 211, Sangkhom District - Huai Chiang Da	Nong Khai	2027	761.47	20.34	1.82

Seq.	Proposed Project	Province	Operation Year (B.E.)	Net Present Value (NPV Million THB)	Economic Internal Rate of Return (EIRR %)	Benefit/Cost Ratio (B/C Ratio)
12	Improvement to Class 1 Road Standard, Highway No. 2022, Phen District - Ban Tung District	Udon Thani	2028	404.29	17.85	1.6
13	Road Standard Improvement to Class 1, Highway No. 2348, Ban Phue District - Nam Som District	Udon Thani	2037	251.98	18.56	1.63
14	Lane Expansion Project, Highway No. 2410, Ban Lao - Don Kloi	Udon Thani	2036	70.09	15.13	1.28
15	Lane Expansion Project, Udon Thani Outer Ring Road South Side, Highway No. 216	Udon Thani	2027	199.81	19.21	1.7
16	Lane Expansion Project, Highway No. 2, Nam Khong - Udon Thani Section, Chai Phon Village - Kling Kham Village	Udon Thani	2034	265.59	29.14	2.82
17	Lane Expansion Project, Highway No. 2023, Nam Khon - Wang Sam Mo District	Udon Thani	2027	1,307.32	18.67	1.64
18	Highway Classification Management Project, Highway No. 2, Khao Suan Kwang District - Non Sa-at District	Udon Thani	2036	266.58	16.72	1.44
19	Highway No. 2022 Survey and Design Project, Sara Khrai District - Ban Dung District, Udon Thani Province	Udon Thani	2028	1,307.55	19.38	1.78
20	Survey and Design Project for Highway Efficiency Improvement, Widening 2 to 4 Lanes, Highway No. 227, Lam Phan Chat - Ban Pha Suk Section	Udon Thani	2035	571.77	22.89	2.09
21	International Connectivity Project, Highway No. 212, Tha Dok Kham Village - Bung Khla District	Bueng Kan	2028	659.65	20.68	1.93
22	Lane Expansion Project, Highway No. 2026, Nong Hing - Lao Luang	Bueng Kan	2033	759.43	18.79	1.83
23	Lane Expansion Project, Highway No. 212, Huai Kan Lueang - Dong Bang	Bueng Kan	2028	976.39	20.23	1.88
Upper Northeastern Provincial Group 2						
24	Lane Expansion Project, Highway No. 223, Na Kae District - Ban Tong	Nakhon Phanom	2028	356.77	17.59	1.57
25	Widening to 6 Lanes Project, Highway No. 2276 (Nong Hi - Pla Pak)	Nakhon Phanom	2036	131.5	18.01	1.57

Seq.	Proposed Project	Province	Operation Year (B.E.)	Net Present Value (NPV Million THB)	Economic Internal Rate of Return (EIRR %)	Benefit/Cost Ratio (B/C Ratio)
26	Survey and Design Project for Highway Efficiency Improvement, Highway No. 2033, Na Kae - Nong Yat Section	Nakhon Phanom	2026	745.99	19.71	1.69
27	Lane Expansion Project, Highway No. 2034, Mukdahan - Nong Phue Section, Mukdahan - Bung Khiao	Mukdahan	2036	66.79	15.52	1.32
28	Widening to 6 Lanes Project, Highway No. 212 (Nikhom Kham Soi - Mukdahan)	Mukdahan	2035	303	17.93	1.56
29	Widening to 6 Lanes Project, Highway No. 212 (Mukdahan - That Phanom)	Mukdahan	2035	625.9	18.41	1.61
30	Road No. MH.3019, Intersection H. 212 - Ban Bang Sai Yai (Section 2), Mueang District, Mukdahan Province	Mukdahan	2033	73.28	13.92	1.21
31	Lane Expansion Project, Highway No. 222, Phang Khon District - Ban Pho Thong	Sakon Nakhon	2035	156.98	17.24	1.49
32	Lane Expansion Project, Highway No. 227, Ban Pha Suk - Waritchaphum - Phang Khon	Sakon Nakhon	2027	741.38	19.37	1.71
33	Highway Restoration and Standard Improvement Project, Highway No. 2096, Nong Ka - Kham Ta Kla	Sakon Nakhon	2036	302.08	16.89	1.46
34	Road Standard Improvement to Class 1 and Urban Area Expansion, Highway No. 2342, Sawang Daen Din District - Song Dao District	Sakon Nakhon	2036	98.21	16.31	1.4
35	Road Standard Improvement to Class 1 and Urban Area Expansion, Highway No. 2218, Waritchaphum District - Phu Phan District	Sakon Nakhon	2036	419.51	18.52	1.62
Central Northeastern Provincial Group						
36	Road Standard Improvement to Class 1 Project, Highway No. 2133, Si Bun Rueang - Phu Wiang Section, Ban Khok - Phu Wiang	Khon Kaen	2033	80.13	14.22	1.24
37	Lane Expansion Project, Highway No. 2039, Nam Phong District - Kranuan District	Khon Kaen	2028	789.84	18.23	1.64
38	Lane Expansion Project, Highway No. 2109, Ban Kham Kaen Khun - Ubol Ratana Dam	Khon Kaen	2028	391.57	18.08	1.63

Seq.	Proposed Project	Province	Operation Year (B.E.)	Net Present Value (NPV Million THB)	Economic Internal Rate of Return (EIRR %)	Benefit/Cost Ratio (B/C Ratio)
39	Lane Expansion Project, Highway No. 12, Huai Cham Manao - Rong Seng	Khon Kaen	2033	497.55	17.73	1.68
40	Lane Expansion Project, Highway No. 201, Non Han - Pha Nok Khao	Khon Kaen	2028	1,841.00	18.93	1.72
41	Lane Expansion Project, Highway No. 2062, Khon Kaen - Mancha Khiri District	Khon Kaen	2028	955.84	18.39	1.66
42	Improvement to Class 1 Road Standard, Highway No. 2187, Nong Ruea District - Phu Khiao District	Khon Kaen	2033	189.42	14.98	1.33
43	Highway No. 228 Survey and Design Project, Chum Phae - Nong Bua Lamphu Section, Chum Phae - Huai Sai Nang, Khon Kaen Province	Khon Kaen	2028	704.57	17.89	1.6
44	Lane Expansion Project, Highway No. 2367, Maha Sarakham - Kamala Sai District	Maha Sarakham	2036	356.76	19.15	1.69
45	Road Standard Improvement to Class 1, Highway No. 2381, Na Chueak - Pho Thong	Maha Sarakham	2036	64.16	14.74	1.25
46	Lane Expansion Project, Highway No. 2040, Wapi Pathum District - Phayakkhaphum Phisai District	Maha Sarakham	2028	103.19	14.01	1.19
47	Road Standard Improvement to Class 1 and Widening to 4 Lanes, Highway No. 2322, Kosum Phisai District - Kut Rang	Maha Sarakham	2033	147.55	16	1.37
48	Lane Expansion Project, Highway No. 2322, Kosum Phisai District - Chiang Yen	Maha Sarakham	2036	90.96	15.49	1.32
49	Road Standard Improvement to Class 1 and Widening to 4 Lanes, Highway No. 2063, Borabue District - Wapi Pathum District	Maha Sarakham	2036	182.79	16.73	1.44
50	Widening to 6 Lanes Project, Highway No. 23 (Ban Phai - Maha Sarakham)	Maha Sarakham	2034	599.2	16.62	1.43
51	Widening to 6 Lanes Project, Highway No. 23 (Maha Sarakham - Roi Et)	Maha Sarakham	2034	365.31	16.7	1.44
52	Survey and Design Project for Highway Efficiency Improvement, Widening 2 to 4 Lanes, Highway No. 219, Borabue - Yang Si Surat Section	Maha Sarakham	2026	635.15	19.08	1.63
53	Lane Expansion Project, Highway No. 2046, Phon Thong District - Kuchinarai	Roi Et	2028	147.93	14.46	1.24

Seq.	Proposed Project	Province	Operation Year (B.E.)	Net Present Value (NPV Million THB)	Economic Internal Rate of Return (EIRR %)	Benefit/Cost Ratio (B/C Ratio)
	District Section, Phon Thong District - Intersection H. 12 (Kuchinarai)					
54	Lane Expansion Project, Highway No. 202, Suwannaphum District - Yasothon Section 2	Roi Et	2035	132.88	15.57	1.33
55	Highway Restoration and Improvement Project, Highway No. 2387, Intersection H. 23 - Intersection H. 2045	Roi Et	2036	29.67	14.32	1.21
56	Road Standard Improvement to Class 1 and Widening to 4 Lanes, Highway No. 214, Kaset Wisai District - Tha Tum District	Roi Et	2035	129.19	15.87	1.36
57	Widening to 6 Lanes Project, Highway No. 2044 (Roi Et - Phon Thong) Phase 1	Roi Et	2027	557.13	18.79	1.65
58	Widening to 6 Lanes Project, Highway No. 2116 (Phon Thong - Loeng Nok Tha)	Roi Et	2036	295.83	18.81	1.65
59	Widening to 6 Lanes Project, Highway No. 2046 (Phon Thong - Kuchinarai)	Roi Et	2036	346.4	19.47	1.72
60	Widening to 6 Lanes Project, Highway No. 2044 (Roi Et - Phon Thong) Phase 2	Roi Et	2036	223.77	18.18	1.59
61	Widening 2 to 4 Lanes Project, Highway No. 2041, Si Yaek Somdet - Dong Laem ntersection	Kalasin	2028	212.34	17.62	1.57
62	Highway Restoration and Standard Improvement to Class 1 Project, Highway No. 2009, Intersection H. 2110 (Huai Mek District) - Huai Yang Dong Village	Kalasin	2033	254.95	16.71	1.55
63	Widening 2 to 4 Lanes Project, Highway No. 227, Kalasin - Dong Laem Intersection	Kalasin	2033	463.5	17.3	1.63
64	Road Standard Improvement to Class 1 and Widening to 4 Lanes, Highway No. 2289, Ban Phon (Kham Muang District) - Sam Chai District - Wang Sam Mo District	Kalasin	2033	109.46	15.44	1.34
65	Lane Expansion Project, Highway No. 227, Dong Laem - Wang Sam Mo	Kalasin	2033	576.94	17.47	1.65
Lower Northeastern Provincial Group 1						
66	Lane Expansion Project, Highway No. 2077, Nong Khu Village - Sangkha District	Surin	2032	122.36	16.24	1.45
67	Lane Expansion Project, Highway No. 226, Ban Phama - Si Khoraphum District	Surin	2028	188.68	15.72	1.37

Seq.	Proposed Project	Province	Operation Year (B.E.)	Net Present Value (NPV Million THB)	Economic Internal Rate of Return (EIRR %)	Benefit/Cost Ratio (B/C Ratio)
68	Highway Classification Management Project, Highway No. 24, Sangkha District - Khu Khan District	Surin	2033	399.07	15.43	1.38
69	Lane Expansion Project, Highway No. 2076, Tha Tum District - Uthumphon Phisai District Section, Tha Tum District - Rattanaburi District	Surin	2033	46.39	14.25	1.24
70	Lane Expansion Project, Highway No. 2076, Tha Tum District - Uthumphon Phisai District Section, Rattanaburi District - Pho Si Suwan District	Surin	2033	199.21	15.63	1.41
71	Lane Expansion Project, Highway No. 215, Suwannaphum District - Tha Tum District Section, Thung Kula - Tha Tum District	Surin	2033	128.71	16.13	1.47
72	Lane Expansion Project, Highway No. 224, Lahan Sai District - Ban Kruat District	Buriram	2033	84.46	15.55	1.4
73	Lane Expansion Project, Highway No. 2166, Nong Ki District - Nong Hong District	Buriram	2033	80.49	14.81	1.31
74	Lane Expansion Project, Highway No. 2037, Nang Rong - Chum Phuang Section, Bua Ta Rung Village - Lam Plai Mat District (intermittently)	Buriram	2033	83.04	15.2	1.36
75	Lane Expansion Project, Highway No. 2455, Buriram - Salaeng Thon	Buriram	2028	90.31	13.6	1.15
76	Lane Expansion Project, Highway No. 348, Chong Takhian - Noi Sakae Kuan	Buriram	2033	386.26	18.91	1.85
77	Lane Expansion Project, Highway No. 2445, Prakhon Chai District - Ban Kruat District	Buriram	2033	162.69	16.72	1.55
78	Lane Expansion Project, Highway No. 2226, Nong Khaman - Satuek	Buriram	2028	24.24	12.56	1.05
79	Road Standard Improvement to Class 1 and Lane Expansion, Highway No. 2117, Takhian - Khao Phanom Rung	Buriram	2033	85.95	15.6	1.41
80	Lane Expansion Project, Highway No. 224, Soeng Sang - Prakham	Buriram	2033	201.16	15.06	1.34
81	Lane Expansion Project, Highway No. 2445, Khao Kradong - Prakhon Chai	Buriram	2033	31.06	19.63	1.81
82	Highway Classification Management Project, Highway No. 24, Cho Ho	Buriram	2033	711.8	19.84	1.99

Seq.	Proposed Project	Province	Operation Year (B.E.)	Net Present Value (NPV Million THB)	Economic Internal Rate of Return (EIRR %)	Benefit/Cost Ratio (B/C Ratio)
	Intersection - Nang Rong District Section, Nong Ki District - Nang Rong District					
83	Highway Classification Management Project, Highway No. 24, Nang Rong District - Prakhon Chai District	Buriram	2033	236.99	15.8	1.43
84	Highway Classification Management Project, Highway No. 24, Prakhon Chai District - Prasat District	Buriram	2033	712.85	19.31	1.91
85	Lane Expansion Project, Highway No. 2081, Phutthaisong District - Tha Tum District Section, Phutthaisong District - Sa Khut	Buriram	2033	116.17	16.01	1.46
86	Lane Expansion Project, Highway No. 12, Huai Chamanao - Rong Seng	Chaiyaphum	2033	699.98	19.67	1.96
87	Lane Expansion Project, Highway No. 205, Bamnet Narong District - Chatturat District Section, Kham Ping Village - Nong Bua Khok	Chaiyaphum	2028	228.13	14.85	1.27
88	Road Standard Improvement to Class 1, Highway No. 2389, Kaeng Khro District - Sarapang	Chaiyaphum	2033	198.8	15.11	1.35
89	Widening to 4 Lanes Project Phase 2, Highway No. 225, Nakhon Sawan - Chaiyaphum Section, Ban Tha Pong - Wang Takhe	Chaiyaphum	2033	407.26	19.39	1.92
90	Road Standard Improvement to Class 1 and Urban Area Expansion, Highway No. 2054, Lat Yai - Chong Sam Mo (Ratchani Kon Road)	Chaiyaphum	2028	268.24	14.75	1.27
91	Road Standard Improvement to Class 1, Highway No. 2187, Nong Ruea District - Phu Khiao District	Chaiyaphum	2033	410.71	17.94	1.71
92	Road Standard Improvement to Class 1, Highway No. 2159, Chaiyaphum - Khon San District Section, Chaiyaphum - Nong Bua Daeng District	Chaiyaphum	2028	39.95	19.83	1.83
93	Road Standard Improvement to Class 1 and Urban Area Expansion, Highway No. 2159, Chaiyaphum - Khon San District Section, Nong Bua Daeng District - Kaset Sombun District	Chaiyaphum	2033	358.2	17.53	1.66

Seq.	Proposed Project	Province	Operation Year (B.E.)	Net Present Value (NPV Million THB)	Economic Internal Rate of Return (EIRR %)	Benefit/Cost Ratio (B/C Ratio)
94	Road Standard Improvement to Class 1 and Lane Expansion, Highway No. 2159, Chaiyaphum - Khon San District Section, Kaset Sombun District - Khon San District	Chaiyaphum	2033	699.98	19.67	1.96
95	Road Standard Improvement to Class 1 and Urban Area Expansion, Highway No. 2037, Phu Khiao District - Kaset Sombun District	Chaiyaphum	2028	224.55	15.12	1.3
96	Improvement and Shoulder Widening Project on Highway No. 201, Si Yaek Rong Tom - Chong Sam Mo Section (Km. 126+617 to Km. 162+051)	Chaiyaphum	2033	269.76	16.95	1.58
97	Highway Restoration and Efficiency Improvement Project, Highway No. 201, Sikhiu Interchange - Hin Long	Nakhon Ratchasima	2028	254.63	15.52	1.35
98	Lane Expansion Project, Highway No. 204, Nakhon Ratchasima Bypass	Nakhon Ratchasima	2028	281.14	15.32	1.32
99	Lane Expansion Project, Highway No. 2073, Nang Rong - Chum Phuang Section, Nong Don Noi - Chum Phuang	Nakhon Ratchasima	2033	390.25	17	1.59
100	Road Standard Improvement to Class 1 and Widening to 4 Lanes, Highway No. 2246, Bo Takhong - Tako Section, Khok Sara Kham - Tako	Nakhon Ratchasima	2033	827.82	19.76	1.98
101	Highway Classification Management Project, Highway No. 24, Sikhiu Interchange - Pak Thong Chai Intersection	Nakhon Ratchasima	2038	209.33	15.93	1.45
102	Highway Classification Management Project, Highway No. 24, Cho Ho Intersection - Nang Rong District Section, Cho Ho Intersection - Nong Ki District	Nakhon Ratchasima	2028	705.71	17.17	1.52
103	Road Standard Improvement to Class 1 and Widening to 4 Lanes, Highway No. 2421, Chok Chai District - Pak Thong Chai District	Nakhon Ratchasima	2033	274.7	17.03	1.59
104	Lane Expansion Project, Highway No. 2256, Chai Badan District - Dan Khun Thot District	Nakhon Ratchasima	2028	1,073.75	17.41	1.55

Seq.	Proposed Project	Province	Operation Year (B.E.)	Net Present Value (NPV Million THB)	Economic Internal Rate of Return (EIRR %)	Benefit/Cost Ratio (B/C Ratio)
105	Highway Classification Management Project, Highway No. 2, Nakhon Ratchasima - Phimai District	Nakhon Ratchasima	2033	272.62	17.43	1.64
106	Highway Classification Management Project, Highway No. 2, Phimai District - Sida District	Nakhon Ratchasima	2033	403.07	19.01	1.87
107	Highway Classification Management Project, Highway No. 2, Sida District - Phon District	Nakhon Ratchasima	2033	357.08	16.82	1.56
108	Highway Classification Management Project, Highway No. 304, Nakhon Ratchasima - Pak Thong Chai District	Nakhon Ratchasima	2033	218.3	16.47	1.52
109	Project under the Highway No. 2 Development Master Plan, Nakhon Ratchasima - Talat Section	Nakhon Ratchasima	2033	285.22	16.65	1.54
110	Project under the Highway No. 304 Development Master Plan, Wang Nam Khiao - Pho Klang Section	Nakhon Ratchasima	2033	797.57	18.23	1.75
111	Road No. NM.4008, Intersection H. 201 - H. 205, Dan Khun Thot, Phra Thong Kham Districts, Nakhon Ratchasima Province	Nakhon Ratchasima	2033	189.28	17.42	1.64
Lower Northeastern Provincial Group 2						
112	Lane Expansion Project, Highway No. 2134, Trakarn Phuet Phon District - Don Yai Sub-district	Ubon Ratchathani	2028	624.4	17.17	1.51
113	Highway Classification Management Project, Highway No. 2135, Si Mueang Mai District (Don Yai) - Pha Taem (Nam Thaeng)	Ubon Ratchathani	2028	356.44	15.87	1.4
114	Lane Expansion Project, Highway No. 231, Ubon Ratchathani Outer Ring Road East Side, including the Mun River Crossing Bridge	Ubon Ratchathani	2028	693.86	16.57	1.46
115	Lane Expansion Project, Highway No. 2171, Tha Pho Si Village - Nam Yuen District	Ubon Ratchathani	2028	742.56	18.28	1.65
116	Road Standard Improvement to Class 1, Highway No. 2383, Muang Sam Sip District - Ban Du Noi Section, Muang Sam Sip District - Ban Lao Bak	Ubon Ratchathani	2028	197.94	16.52	1.45

Seq.	Proposed Project	Province	Operation Year (B.E.)	Net Present Value (NPV Million THB)	Economic Internal Rate of Return (EIRR %)	Benefit/Cost Ratio (B/C Ratio)
117	Road Standard Improvement to Class 1, Highway No. 2112, Kham Khuean Kaew - Pak Saeng - Nam Thaeng Section	Ubon Ratchathani	2028	1,603.37	18.09	1.63
118	Road Standard Improvement to Class 1, Highway No. 2112, Nam Thaeng - Khong Chiam Section	Ubon Ratchathani	2028	690.35	17.88	1.6
119	Road Standard Improvement to Class 1, Highway No. 2222, Khong Chiam - Phibun Mangsahan	Ubon Ratchathani	2028	668.51	18.39	1.66
120	Lane Expansion Project, Highway No. 2182, Det Udom District - Buntharik District	Ubon Ratchathani	2033	636.06	17.21	1.61
121	Road Standard Improvement to Class 1 and Lane Expansion, Highway No. 2396, Buntharik District - Sirindhorn District	Ubon Ratchathani	2033	636.06	17.21	1.61
122	Highway Classification Management Project, Highway No. 24, Khu Khan District - Det Udom District Section, Na Krasaeng - Det Udom	Ubon Ratchathani	2033	292.37	17.78	1.69
123	Road Standard Improvement to Class 1 and Lane Expansion, Highway No. 2134, Don Yai - Khong Chiam District	Ubon Ratchathani	2028	593.34	18.77	1.7
124	Road Standard Improvement to Class 1 and Lane Expansion, Highway No. 2232, Nong Phue - Na Hai	Ubon Ratchathani	2033	293.5	16.43	1.51
125	Road Standard Improvement to Class 1 and Lane Expansion, Highway No. 2134, Phana District - Trakarn Phuet Phon District	Ubon Ratchathani	2028	411.55	18.54	1.68
126	Highway No. 2112 Survey and Design Project, Kham Khuean Kaew - Pak Saeng Section, Sai Noi Village - Don Nang Nil Village, Ubon Ratchathani Province	Ubon Ratchathani	2033	1,328.24	18.73	1.83
127	Lane Expansion Project, Highway No. 2083, Sadao - Kham Khuean Kaew	Yasothon	2033	557.06	19.02	1.87
128	Lane Expansion Project, Highway No. 2083, Rasi Salai - Sadao	Yasothon	2033	425.81	19.5	1.94

Seq.	Proposed Project	Province	Operation Year (B.E.)	Net Present Value (NPV Million THB)	Economic Internal Rate of Return (EIRR %)	Benefit/Cost Ratio (B/C Ratio)
129	International Connectivity Project, Highway No. 2169, Kut Chum District - Loeng Nok Tha District	Yasothon	2033	587.75	19.12	1.88
130	Widening to 6 Lanes Project, Highway No. 212 (Loeng Nok Tha - Nikhom Kham Soi)	Yasothon	2038	575.07	23.06	2.51
131	Road Standard Improvement to Class 1 and Lane Expansion, Highway No. 2134, Phana District - Trakarn Phuet Phon District	Amnat Charoen	2033	135.88	15.62	1.41
132	Road Standard Improvement to Class 1 and Lane Expansion, Highway No. 2134, Lue Amnat District - Phana District	Amnat Charoen	2033	154.3	15.49	1.39
133	Lane Expansion Project, Highway No. 221, Sisaket - Phu Ngoen	Sisaket	2028	137.09	14.55	1.25
134	Lane Expansion Project, Highway No. 2083, Uthumphon Phisai District - Kham Khuean Kaew District Section, Bua Hung Village - Rasi Salai District, including the Mun River Crossing Bridge	Sisaket	2028	577.65	19.15	1.75
135	Lane Expansion Project, Highway No. 220, Khu Khan District - Intersection H. 24 (Kantharalak Intersection)	Sisaket	2028	124.5	17.11	1.52
136	Lane Expansion Project, Highway No. 2083, Rasi Salai District - Sadao	Sisaket	2033	83.69	14.58	1.28
137	Lane Expansion Project, Highway No. 221, Phu Ngoen - Kan Chang Intersection	Sisaket	2033	119.68	15.84	1.43
138	Highway Classification Management Project, Highway No. 24, Sangkha District - Khu Khan District	Sisaket	2033	724.94	17.84	1.7
139	Highway Classification Management Project, Highway No. 24, Khu Khan District - Det Udom District Section, Khu Khan - Hua Chang	Sisaket	2033	289.81	17.07	1.59
140	Lane Expansion Project, Highway No. 2076, Tha Tum District - Uthumphon Phisai District Section, Rattanaburi District - Pho Si Suwan District	Sisaket	2033	214.02	15.87	1.44
141	Lane Expansion Project, Highway No. 2076, Tha Tum District - Uthumphon	Sisaket	2033	63.29	14.49	1.27

Seq.	Proposed Project	Province	Operation Year (B.E.)	Net Present Value (NPV Million THB)	Economic Internal Rate of Return (EIRR %)	Benefit/Cost Ratio (B/C Ratio)
	Phisai District Section, Pho Si Suwan District - Uthumphon Phisai District					
142	Highway No. 2201 Survey and Design Project, Khu Khan - Chong Sa Nga Section, Na Charoen Intersection - Sa-nga Intersection Section 1, Sisaket Province	Sisaket	2033	224.82	15.48	1.39
Upper Northern Provincial Group 1						
143	Road Standard Improvement to Class 1, Highway No. 1095, Nong Khong Village - Mae Na Sub-district Section	Mae Hong Son	2036	276.93	17.3	1.5
144	Highway Efficiency Improvement and Hazard Point Rectification Project, Highway No. 1, Samakkhi - Mae Ka Section, Intersection H. 11 - Intersection H. 103 (Km. 706+000 to Km. 73+000)	Lampang	2038	435.65	17.12	1.52
145	Highway No. 120 Construction Project, Phayao - Mae Kha Chan Section, Mae Na Ruea - Wang Nuea	Lampang	2035	633.52	20.79	1.86
146	Highway No. 1035 Construction Project, Lampang - Wang Nuea Section, Sop Luem Village - Wang Nuea	Lampang	2036	97.95	16.29	1.4
147	Highway No. 1035 Construction Project, Lampang - Wang Nuea Section, Mae Suk Village - Sop Luem Village	Lampang	2036	97.34	18.04	1.57
148	Highway No. 1035 Construction Project, Lampang - Wang Nuea Section, Sampao Thong - Suan Dok Kham Village	Lampang	2036	28.21	13.87	1.17
149	Highway No. 103 Construction Project, Rong Kwang District - Ngao District Section, Wang Din Village - Mae Tip Luang Village	Lampang	2028	439.65	15.07	1.3
150	Highway No. 1034 Construction Project, Koh Kha - Hang Chat Section	Lampang	2036	96.09	16.91	1.46
151	Highway No. 11 Construction Project, Den Chai District - Lampang Section, Mae Khaem Intersection - Ban Mai	Lampang	2034	51.57	14.69	1.24
152	Rural Highway No. LP.2031 Construction Project, Doi Khun Tan Tourist Route	Lamphun	2034	117.13	15.74	1.34

Seq.	Proposed Project	Province	Operation Year (B.E.)	Net Present Value (NPV Million THB)	Economic Internal Rate of Return (EIRR %)	Benefit/Cost Ratio (B/C Ratio)
153	Highway No. 1136 Construction Project, Intersection H. 11 - Intersection H. 106 (Muang Nga)	Lamphun	2026	4.08	20.73	1.78
154	Highway No. 11 Construction Project, Lampang - Chiang Mai Section, Khun Tan - Doi Ti Intersection	Lamphun	2034	224.68	17.33	1.5
155	Highway No. 106 Construction Project, Thoen District - Li District Section, Si Bun Rueang Village - Ban Hong Sub-district	Lamphun	2035	89	15.51	1.32
156	Highway No. 106 Construction Project, Don Chai - U Mong Section, Mae Tuean - Sri Wichai	Lamphun	2036	164.72	19.56	1.73
157	Rural Highway No. CM.4051 Efficiency Improvement and Hazard Point Rectification Project, Intersection H. 1096 (Km. 14+200) - Ban Mae Khi	Chiang Mai	2034	66.21	16.07	1.38
158	Chiang Mai Airport Access Improvement Project to Solve Traffic Congestion	Chiang Mai	2034	8.17	20.16	1.8
159	Highway No. 107 Construction Project, Chiang Mai - Chiang Rai Section, Ban Den - Ban Mae Chi	Chiang Mai	2038	93.39	18.16	1.59
160	Highway No. 107 Construction Project, Chiang Mai - Mae Chan District Section, Fang District - Mae Ai District	Chiang Mai	2028	217.55	15.54	1.35
161	Highway No. 107 Construction Project, Chiang Mai - Chiang Rai Section, Mae Ai District - Huai Sala Village	Chiang Mai	2038	194.6	17.05	1.47
162	Highway No. 107 Construction Project, Chiang Mai - Chiang Rai Section, Ban Thung Kala - Ban Huai Sai	Chiang Mai	2038	79.78	15.95	1.36
163	Highway No. 1 Construction Project...	Chiang Rai	2034	48.06	13.56	1.15
164	Highway No. 1 Construction Project, Mae Chan - Mae Sai Section, Pa Rai - Chiang Saen Intersection	Chiang Rai	2038	68.61	16.59	1.43
165	Highway No. 1020 Construction Project, Chiang Rai - Thoeng Section, Khun Mae Muet - Ban Mae Mon	Chiang Rai	2038	73.18	15.65	1.34
166	Highway No. 1020 Construction Project, Chiang Rai - Thoeng Section, Intersection H. 1 - Khun Mae Muet	Chiang Rai	2038	64.91	15.11	1.3

Seq.	Proposed Project	Province	Operation Year (B.E.)	Net Present Value (NPV Million THB)	Economic Internal Rate of Return (EIRR %)	Benefit/Cost Ratio (B/C Ratio)
167	Highway No. 1020 Construction Project, Chiang Rai - Thoeng Section, Ban Pong Daeng - Ban Mae Mon	Chiang Rai	2038	59.86	14.86	1.27
168	Rural Highway No. ChR.3051 Construction Project, Mae Chan District - Waeng Kaew Village Section	Chiang Rai	2034	162.77	15.62	1.34
169	Highway No. 1202 Construction Project, Phayao - Chiang Rai Section, Pa Phao Intersection - Thoeng District	Phayao	2038	115.82	16.32	1.4
170	Highway No. 1021 Construction Project, Phayao - Chiang Kham Section, Intersection H. 1 - Ban Chom Phu	Phayao	2033	215.14	16.63	1.43
171	Highway No. 1021 Construction Project, Phayao - Chiang Kham Section, Ban Chom Phu - Chiang Kham District	Phayao	2033	267.36	16.99	1.47
172	Highway No. 1091 Construction Project, Nan - Chiang Muan Section, Pa Sang Village - Chiang Muan District	Phayao	2033	138.86	15.93	1.36
173	Highway No. 1091 Construction Project, Nan - Chiang Muan Section, Ban Dong - Ban Pha Chang	Phayao	2033	139.75	15.68	1.34
174	Highway No. 1091 Construction Project, Nan - Chiang Muan Section, Huai San - Ban Dong	Phayao	2033	187.94	17.51	1.51
175	Highway No. 1193 Construction Project, Chiang Kham - Thoeng Section	Phayao	2028	132.88	16.48	1.42
Upper Northern Provincial Group 2						
176	Highway No. 1023 Construction Project, Mae Charim District - Ban San Charoen	Nan	2033	129.58	17.91	1.57
177	Highway No. 1124 Construction Project, Wiang Sa District - Sa District	Nan	2033	119.29	15.48	1.32
178	Highway No. 101 Construction Project, Pha Maen - Huai Kaeng Village Section	Nan	2035	137.95	16.09	1.38
179	Highway No. 1024 Construction Project, Nan - Mae Charim District Section, Intersection H. 1168 - Mae Charim District	Nan	2033	133.56	15.35	1.31
180	Highway No. 1024 Construction Project, Nan - Mae Charim District Section, Ban Pha Maen - Intersection H. 1168	Nan	2033	130.41	15.42	1.32

Seq.	Proposed Project	Province	Operation Year (B.E.)	Net Present Value (NPV Million THB)	Economic Internal Rate of Return (EIRR %)	Benefit/Cost Ratio (B/C Ratio)
181	Highway No. 1026 Construction Project, Nan - Wiang Sa District	Nan	2033	156.41	15.65	1.34
182	Highway No. 101 Construction Project, Den Chai - Nan Section, Ban Huai Kaeng - Nam Li	Nan	2034	41.22	13.91	1.18
183	Highway No. 1023 Construction Project, Mae Charim District - Ban San Charoen	Nan	2033	129.58	17.91	1.57
184	Highway No. 1023 Construction Project, Na Noi District - Mae Charim District	Nan	2033	126.96	15.93	1.37
185	Highway No. 117 Construction Project, Nakhon Sawan - Phitsanulok Section, Wang Thong - Khlong Khun	Phichit	2033	253.95	15.11	1.3
186	Highway No. 11 Construction Project, In Buri - Chiang Mai Section, Bang Mun Nak - Hua Dong	Phichit	2033	338.97	17.65	1.54
187	Highway No. 113 Construction Project, Tab Mo - Chon Daen Section, Ban Klang - Chon Daen	Phichit	2033	128.84	16.39	1.4
188	Highway No. 113 Construction Project, Phichit - Tab Mo Section	Phichit	2028	262.29	15.68	1.35
189	Highway No. 113 Construction Project, Tab Mo - Chon Daen Section, Tab Mo - Ban Klang	Phichit	2033	100.95	16.14	1.37
190	Highway No. 1381 Construction Project, Intersection H. 111 - Intersection H. 117 (Taphan Hin)	Phichit	2034	127.27	15.01	1.28
191	Highway No. 115 Construction Project, Kamphaeng Phet - Nakhon Sawan Section, Ban Bueng - Bang Krathum	Phichit	2033	109.13	14.86	1.27
192	Highway No. 1293 Construction Project, Ban Kaeng - Bang Krathum	Phichit	2033	71.93	15.66	1.34
193	Highway No. 113 Construction Project, Phichit - Tab Mo Section	Phichit	2028	262.29	15.68	1.35
194	Highway No. 1182 Construction Project, Pho Prathap Chang - Wachira Barami Section	Phichit	2033	141.27	15.39	1.32
195	Highway No. 1149 Construction Project, Intersection H. 113 - Ban Wang Chik	Phichit	2033	75.14	15.11	1.29
196	Highway No. 1059 Construction Project, Phichit - Thap Khlo	Phichit	2033	114.71	14.99	1.28

Seq.	Proposed Project	Province	Operation Year (B.E.)	Net Present Value (NPV Million THB)	Economic Internal Rate of Return (EIRR %)	Benefit/Cost Ratio (B/C Ratio)
197	Highway No. 117 Construction Project, Nakhon Sawan - Phitsanulok Section, Khlong Khun - Ban Mai Rattanakhiri	Phichit	2028	512.63	16.48	1.42
198	Highway No. 117 Construction Project, Nakhon Sawan - Phitsanulok Section, Ban Mai Rattanakhiri - Wang Thong	Phichit	2033	288.66	15.42	1.32
199	Highway No. 113 Construction Project, Phichit - Tab Mo Section	Phichit	2028	262.29	15.68	1.35
200	Highway No. 115 Construction Project, Kamphaeng Phet - Nakhon Sawan Section, Khlong Khun - Ban Mai Rattanakhiri	Phichit	2028	235.03	15.99	1.37
201	Highway No. 1131 Construction Project, Intersection H. 111 - Ban Bang Khwang	Phichit	2033	65.62	14.92	1.27
202	Highway No. 1021 Construction Project, Phayao - Chiang Kham Section, Intersection H. 1 - Ban Chom Phu	Phayao	2033	215.14	16.63	1.43
203	Highway No. 1091 Construction Project, Nan - Chiang Muan Section, Ban Dong - Ban Pha Chang	Phayao	2033	139.75	15.68	1.34
204	Highway No. 11 Construction Project, In Buri - Chiang Mai Section, Hua Dong - Bang Khai	Phitsanulok	2033	290.07	16.88	1.45
205	Highway No. 1131 Construction Project, Intersection H. 117 - Ban Hua Dong	Phitsanulok	2033	136.21	15.82	1.35
206	Highway No. 11 Construction Project, In Buri - Chiang Mai Section, Bang Khai - Ban Wang Chompu	Phitsanulok	2033	135.53	16.62	1.43
207	Highway No. 117 Construction Project, Nakhon Sawan - Phitsanulok Section, Ban Mai Rattanakhiri - Wang Thong	Phitsanulok	2033	288.66	15.42	1.32
208	Highway No. 117 Construction Project, Nakhon Sawan - Phitsanulok Section, Wang Thong - Khlong Khun	Phitsanulok	2033	253.95	15.11	1.3
209	Highway No. 117 Construction Project, Nakhon Sawan - Phitsanulok Section, Khlong Khun - Ban Mai Rattanakhiri	Phitsanulok	2028	512.63	16.48	1.42
Lower Northern Provincial Group 1						
210	Highway No. 1149 Construction Project, Intersection H. 113 - Ban Wang Chik	Phitsanulok	2033	75.14	15.11	1.29

Seq.	Proposed Project	Province	Operation Year (B.E.)	Net Present Value (NPV Million THB)	Economic Internal Rate of Return (EIRR %)	Benefit/Cost Ratio (B/C Ratio)
211	Highway No. 1175 Construction Project, Phitsanulok - Phichit Section	Phitsanulok	2033	100.27	15.11	1.29
212	Highway No. 1293 Construction Project, Ban Kaeng - Bang Krathum	Phitsanulok	2033	71.93	15.66	1.34
213	Highway No. 12 Construction Project, Mae Sot - Mukdahan Section, Wang Thong - Kaeng Sopha	Phitsanulok	2035	496.88	17.56	1.54
214	Highway No. 1293 Construction Project, Ban Kaeng - Bang Krathum	Phitsanulok	2033	71.93	15.66	1.34
215	Highway No. 1063 Construction Project, Pho Prathap Chang - Wachira Barami Section	Phitsanulok	2033	141.27	15.39	1.32
216	Highway No. 111 Construction Project, Around Phitsanulok City	Phitsanulok	2028	134.13	15.75	1.35
217	Highway No. 12 Construction Project, Mae Sot - Mukdahan Section, Kaeng Sopha - Khao Kho	Phitsanulok	2035	393.18	17.06	1.49
218	Highway No. 12 Construction Project, Mae Sot - Mukdahan Section, Phitsanulok - Wang Thong	Phitsanulok	2028	191.07	14.93	1.27
219	Highway No. 12 Construction Project, Mae Sot - Mukdahan Section, Khao Kho - Ban Na Ngam	Phetchabun	2035	363.34	16.89	1.48
220	Highway No. 113 Construction Project, Tab Mo - Chon Daen Section, Ban Klang - Chon Daen	Phetchabun	2033	128.84	16.39	1.4
221	Highway No. 113 Construction Project, Tab Mo - Chon Daen Section, Tab Mo - Ban Klang	Phetchabun	2033	100.95	16.14	1.37
222	Highway No. 115 Construction Project, Kamphaeng Phet - Nakhon Sawan Section, Ban Bueng - Bang Krathum	Phetchabun	2033	109.13	14.86	1.27
223	Highway No. 12 Construction Project, Mae Sot - Mukdahan Section, Khao Kho - Ban Na Ngam	Phetchabun	2035	363.34	16.89	1.48
224	Highway No. 21 Construction Project, Phai Khwang - Nong Phai Section	Phetchabun	2028	599.49	17.57	1.54
225	Highway No. 2256 Construction Project, Chai Badan - Dan Khun Thot Section	Phetchabun	2028	1,073.75	17.41	1.55

Seq.	Proposed Project	Province	Operation Year (B.E.)	Net Present Value (NPV Million THB)	Economic Internal Rate of Return (EIRR %)	Benefit/Cost Ratio (B/C Ratio)
226	Highway No. 21 Construction Project, Phai Khwang - Nong Phai Section	Phetchabun	2028	599.49	17.57	1.54
227	Highway No. 12 Construction Project, Mae Sot - Mukdahan Section, Lom Sak - Lom Kao	Phetchabun	2035	487.64	17.45	1.53
228	Highway No. 203 Construction Project, Lom Sak - Khao Kho Section	Phetchabun	2035	1,059.20	18.25	1.63
229	Highway No. 21 Construction Project, Nong Phai - Si Thep Section	Phetchabun	2033	497.58	16.92	1.49
230	Highway No. 21 Construction Project, Si Thep - Mueang Khon Kaen Section	Phetchabun	2033	572.33	17.37	1.55
231	Highway No. 21 Construction Project, Nong Phai - Si Thep Section	Phetchabun	2033	497.58	16.92	1.49
232	Highway No. 21 Construction Project, Si Thep - Mueang Khon Kaen Section	Phetchabun	2033	572.33	17.37	1.55
233	Highway No. 21 Construction Project, Si Thep - Mueang Khon Kaen Section	Phetchabun	2033	572.33	17.37	1.55
234	Highway No. 21 Construction Project, Si Thep - Mueang Khon Kaen Section	Phetchabun	2033	572.33	17.37	1.55
235	Highway No. 21 Construction Project, Si Thep - Mueang Khon Kaen Section	Phetchabun	2033	572.33	17.37	1.55
Lower Northern Provincial Group 2						
236	Construction Project of Highway No. 101, Kamphaeng Phet - Sukhothai Section, to be 4 lanes throughout	Kamphaeng Phet	2035	155.02	21.04	1.89
237	Construction Project of Highway No. 115, Kamphaeng Phet - Si Yaek Pluag Sung Section, to be 4 lanes throughout	Kamphaeng Phet	2035	149.44	18.82	1.65
238	Improvement/Construction Project of Highway No. 112 (Kamphaeng Phet Bypass), to be 4 lanes throughout	Kamphaeng Phet	2035	143.74	17.72	1.54
239	Construction Project of Highway No. 101, Mueang - Nong Pling Section	Kamphaeng Phet	2035	23.18	15.86	1.35
240	Construction Project of Highway No. 115, Kamphaeng Phet - Phichit Section, Ban Thung Ruam Thong - Bueng Bua Segment	Kamphaeng Phet	2035	31.51	14.61	1.24
241	Construction Project of Highway No. 1112, Salokbat - Wang Pla Ao Section, Bo Tham - Ban Pang Makha Segment	Kamphaeng Phet	2028	22.76	12.76	1.07

Seq.	Proposed Project	Province	Operation Year (B.E.)	Net Present Value (NPV Million THB)	Economic Internal Rate of Return (EIRR %)	Benefit/Cost Ratio (B/C Ratio)
242	Construction Project of Highway No. 1115, Sak Lek - Noi Sum Khilek Section (Km. 0+000 - 11+761)	Phichit	2036	50.90	15.58	1.33
243	Construction Project of Highway No. 111 (Phichit Bypass)	Phichit	2035	98.30	16.35	1.40
244	Construction Project of Highway No. 117, Khlong Phalang Tai - Nong Na Section (Km. 38+628 - 101+550)	Phichit	2032	741.58	15.95	1.36
245	Construction Project of Highway No. 115, Kamphaeng Phet - Sak Lek Section, Khlong Non - Noen Samo Segment (Km. 90+750 - 92+300)	Phichit	2035	26.98	23.44	2.16
246	Infrastructure Development Project to Upgrade Road Standard, Entrance to Phichit Railway Station	Phichit	2036	5.30	16.64	1.43
247	Construction Project of Highway No. 115, Kamphaeng Phet - Sak Lek Section, Noen Samo - Si Yaek Sak Lek Segment (Km. 95+950 - 106+950)	Phichit	2035	60.78	16.12	1.38
248	Construction Project of Highway No. 1070, Taphan Hin - Dong Suea Lueang Section (Km. 0+000 - 33+451)	Phichit	2031	264.08	15.71	1.34
249	Construction Project of Highway No. 113, Dong Khui - Taphan Hin Section (Km. 54+253 - 77+500)	Phichit	2035	96.47	15.05	1.28
250	Construction Project of Highway No. 1068, Khlong Krachen - Phai Tha Pho Section (Km. 0+000 - 25+178)	Phichit	2036	210.95	18.55	1.63
251	Construction Project of Rural Highway No. PhJ.4014, Intersection H. 1068 (Km. 8+100) - Ban Bueng Sifai	Phichit	2034	104.48	21.30	1.92
252	Construction Project of Highway No. 11, Khao Sai - Thap Khlo Section	Phichit	2034	119.30	19.44	1.72
253	Construction Project of Highway No. 1067, Bang Mun Nak District - Ban Pho Thale Section	Phichit	2036	147.29	22.92	2.10
254	Road Standard Improvement Project (Class 1) Highway No. 3329, Takhli - Nong Luang Section	Nakhon Sawan	2037	323.96	16.73	1.44
255	Highway Performance and Hazardous Point Improvement Project Highway	Nakhon Sawan	2038	1,317.34	18.37	1.66

Seq.	Proposed Project	Province	Operation Year (B.E.)	Net Present Value (NPV Million THB)	Economic Internal Rate of Return (EIRR %)	Benefit/Cost Ratio (B/C Ratio)
	No. 117, Nakhon Sawan - Phitsanulok Section					
256	Highway Performance Improvement Project Highway No. 3265 and Hazardous Point, Yaek Khok Mo - Tha Sung Section	Uthai Thani	2036	30.52	14.20	1.20
257	Construction Project of Highway No. 3456, Khlong Kradi - Bung Krathue Section (Km. 0+000 - 67+334)	Uthai Thani	2032	645.58	18.92	1.67
258	Construction Project of Highway No. 3282, Ban Rai - Yaek Nikhom Thap Salao Section (Km. 0+000 - 53+639)	Uthai Thani	2037	367.97	17.57	1.53
259	Construction Project of Highway No. 3221, Uthai Thani - Thap Than District Section	Uthai Thani	2036	32.31	14.32	1.21
260	Construction Project of Highway No. 333, Ban Rai District - Nong Chang District Section, Mueang Karung Sub-district - Nong Saruang Sub-district	Uthai Thani	2028	342.05	15.42	1.33
261	Construction Project of Highway No. 333, Ban Rai District - Nong Chang District Section, Ban Rai - Mueang Karung Segment	Uthai Thani	2035	244.92	17.69	1.54

Source: Consultant (B.E. 2567 / A.D. 2024)

Note: Feasibility Study Project Type The initial project value is currently under study (preliminary estimate data).

2) New Route Construction Project

The economic feasibility analysis results for the **new road construction projects** additionally proposed in the Action Plan are shown in **Table 6.2-3**

Table 6.2-3 Results of the Economic Feasibility Assessment for New Route and Bypass Construction Projects

Seq.	Proposed Project	Province	Operation Year (B.E.)	Net Present Value (NPV Million THB)	Economic Internal Rate of Return (EIRR %)	Benefit/Cost Ratio (B/C Ratio)
Upper Northeastern Provincial Group 1						
1	Construction Project of Road Line C1, Loei City Comprehensive Plan	Loei	2034	55.89	21.6	1.95
2	Construction Project of Road Line C3, Loei City Comprehensive Plan	Loei	2034	27.99	20.43	1.82

Seq.	Proposed Project	Province	Operation Year (B.E.)	Net Present Value (NPV Million THB)	Economic Internal Rate of Return (EIRR %)	Benefit/Cost Ratio (B/C Ratio)
3	Si Bun Rueang Bypass, Highway No. 228	Nong Bua Lamphu	2037	262.27	17.79	1.81
4	New Road Construction Project, Udon Thani - Bueng Kan	Udon Thani	2029	2,402.21	21.83	1.98
5	Road Line C7, Udon Thani City Comprehensive Plan	Udon Thani	2034	159.35	23.46	2.16
6	New Road Construction Project, Udon Thani - Bueng Kan	Bueng Kan	2029	2,402.21	21.83	1.98
Upper Northeastern Provincial Group 2						
7	New 4-Lane Road Construction Project, Intersection H. 2276 - R.H. NPK.4038 to H. 2276 (East Pak Pla Bypass)	Nakhon Phanom	2036	70.1	22.04	2
8	That Phanom District Bypass	Nakhon Phanom	2038	107.7	19.12	1.88
9	New 4-Lane Road Construction Project, Intersection H. 12 (Ban Kut Ngong) to H. 238 (Mukdahan Bypass)	Mukdahan	2034	142.25	23.45	2.16
10	New 4-Lane Road Construction Project, Intersection H. 212 (Ban Din Muai) to H. 238 (Mukdahan Bypass)	Mukdahan	2035	83.45	15.47	1.32
11	New 4-Lane Road Project, Sakon Nakhon Bypass (East)	Sakon Nakhon	2034	606.04	18.02	1.78
12	Sakon Nakhon City Bypass, North Section	Sakon Nakhon	2033	85.1	15.46	1.39
13	Sawang Daen Din District Bypass, North Section	Sakon Nakhon	2042	145.02	18.83	1.94
Central Northeastern Provincial Group						
14	Road Line C3, Khon Kaen City Comprehensive Plan	Khon Kaen	2034	31.67	15.76	1.35
15	Road Line KhK.1011, Intersection H. 2 - Ban Phra Yuen, Mueang/Phra Yuen District	Khon Kaen	2026	15.91	20.11	1.72
16	New 4-Lane Road Construction Project, Intersection H. 23 (Ban Don Bom) to H. 2040 (Waeng Nang)	Maha Sarakham	2034	208.91	23.74	2.19
17	Maha Sarakham City Bypass	Maha Sarakham	2033	79.26	14.55	1.28

Seq.	Proposed Project	Province	Operation Year (B.E.)	Net Present Value (NPV Million THB)	Economic Internal Rate of Return (EIRR %)	Benefit/Cost Ratio (B/C Ratio)
18	New 4-Lane Road Construction Project, Intersection H. 23 (Um Mao Municipality) to H. 214 (Changhan)	Roi Et	2035	130.71	17.01	1.47
Lower Northeastern Provincial Group 1						
19	New 2-Lane Road Project, H. 2298, Sa Makha - Khon Buri District (to H. 224)	Nakhon Ratchasima	2033	86.89	15.46	1.39
20	Motorway No. 6, Bang Pa-in - Nakhon Ratchasima Section	Nakhon Ratchasima	2028	1,746.06	18.91	1.72
21	Dan Khun Thot District Bypass	Nakhon Ratchasima	2033	904.27	17.13	1.6
Lower Northeastern Provincial Group 2						
22	New Road Project, H. 202, Khemarat - Na Tan (Thai-Lao Friendship Bridge No. 6)	Ubon Ratchathani	2033	698.67	14.63	1.29
23	New 4-Lane Road Project, Det Udom District - Don Chik	Ubon Ratchathani	2033	547.76	16.89	1.57
24	New 4-6 Lane Road Construction Project, Intersection H. 212 (Kut Hae) to H. 212 (Khok Samran)	Yasothon	2038	351.97	17.38	1.64
25	New 4-Lane Road Project, Senangkhanikhom - Chanuman - Khemarat (New H. 202 - Khong Bridge 6)	Amnat Charoen	2033	753.97	14.83	1.31
26	Amnat Charoen City Bypass	Amnat Charoen	2033	472.89	13.67	1.19
27	Road Lines C2 and B4, Amnat Charoen City Comprehensive Plan	Amnat Charoen	2034	123.43	19.08	1.68
28	Road Line C1 (Section H. 202 - H. 212), Amnat Charoen City Comprehensive Plan	Amnat Charoen	2034	130.36	18.06	1.58
29	Si Sa Ket City Bypass	Si Sa Ket	2037	321.49	14.43	1.28
Upper Northern Provincial Group 1						
30	New Road Construction Project connecting H. 108 (Mueang Mae Hong Son) - to H. 1096 (Samoeng District)	Mae Hong Son	2038	1,560.84	19.42	1.78
31	Chom Thong Bypass	Lamphun	2034	89.79	15.45	1.32
32	Road Line Ng2, Lamphun City Comprehensive Plan	Lamphun	2034	76.26	19	1.67
33	New Road Construction Project connecting H. 108 (Mueang Mae Hong Son) - to H. 1096 (Samoeng District)	Chiang Mai	2038	1,252.70	19.46	1.79
34	Ton Pao Bypass Development Project, Part 1	Chiang Mai	2036	443.67	19.46	1.72

Seq.	Proposed Project	Province	Operation Year (B.E.)	Net Present Value (NPV Million THB)	Economic Internal Rate of Return (EIRR %)	Benefit/Cost Ratio (B/C Ratio)
Upper Northern Provincial Group 2						
35	Phayao Outer Ring Road connecting H. 1202 with H. 120	Phayao	2038	171.89	17.32	1.54
36	Chun Bypass	Phayao	2038	164.38	17.28	1.5
37	Road Line C1, Phayao City Comprehensive Plan	Phayao	2034	47.2	18.53	1.62
38	New Road Construction Project, Chiang Rai - Thai-Lao Friendship Bridge No. 4	Chiang Rai	2038	383.98	16.06	1.4
Lower Northern Provincial Group 1						
39	New Road Construction Project, Sukhothai - Si Nakhon - Ban Dara Railway Station	Sukhothai	2036	618.28	15.92	1.39
40	Nakhon Thai Bypass (North)	Phitsanulok	2036	123.31	20.17	1.95
41	Grade Separated Intersection Project at Highway No. 21 and Highway No. 225 (Yaek Rahun)	Phetchabun	2038	17.56	13.35	1.12
Lower Northern Provincial Group 2						
42	Nakhon Sawan Bypass under the Bypass Development Plan to resolve urban traffic issues in the region	Nakhon Sawan	2031	2,292.90	17.39	1.55

Source: Consultant (B.E. 2567 / A.D. 2024)

Note: Feasibility study projects are currently undergoing initial project value estimation (preliminary estimated data).

3) Grade-Separated Intersection Bridge and Tunnel Construction Project

Economic feasibility analysis results for the Grade Separated Intersections, Bridges, and Tunnel projects additionally proposed in the Action Plan, as shown in **Table 6.2-4**

Table 6.2-4 Results of the Economic Feasibility Assessment for Grade Separated Intersections, Bridges, and Tunnel projects

Seq.	Proposed Project	Province	Operation Year (B.E.)	Net Present Value (NPV Million THB)	Economic Internal Rate of Return (EIRR %)	Benefit/Cost Ratio (B/C Ratio)
Upper Northeastern Provincial Group 1						
1	Survey and Design Project for Grade Separated Intersection at Nong Song Hong Intersection, Nong Khai (H. 2 intersection with H. 211 and Municipal Road)	Nong Khai	2034	151.06	18.78	1.65
Upper Northeastern Provincial Group 2						
2	Study and Design Project for Hazardous Spot Remediation at U-turn on H. 212, Tha Khwai - Klang Noi section	Nakhon Phanom	2035	160.37	18.1	1.58

Seq.	Proposed Project	Province	Operation Year (B.E.)	Net Present Value (NPV Million THB)	Economic Internal Rate of Return (EIRR %)	Benefit/Cost Ratio (B/C Ratio)
3	Grade Separated Intersection Project at H. 22 intersection with H. 241 and H. 2347, Ban That Na Waeng Intersection	Sakon Nakhon	2034	80.53	15.77	1.35
Central Northeastern Provincial Group						
4	Survey and Design Project for Grade Separated Intersection at Non Tun Intersection, Khon Kaen (H. 230 intersection with H. 2424)	Khon Kaen	2033	158.71	16.53	1.52
Lower Northeastern Provincial Group 1						
5	Survey and Design Project for Grade Separated Intersection at Prasat Intersection, Surin (H. 24 intersection with H. 214)	Surin	2032	153.47	16.44	1.48
6	Survey and Design Project for Grade Separated Intersection at Rong Tom Intersection, Chaiyaphum (H. 202 intersection with H. 201)	Chaiyaphum	2032	125.82	15.71	1.39
7	Grade Separated Intersection Project, H. 2 entrance to Kut Chik Railway Station	Nakhon Ratchasima	2033	46.5	13.61	1.17
8	Grade Separated U-turn Overpass Project, H. 2, Km. 88-89, Khlong Phai Sub-district	Nakhon Ratchasima	2031	68.04	15.61	1.35
9	1-Direction Overpass Bridge Project, H. 2, entrance to Sikhiu District Interchange	Nakhon Ratchasima	2028	67.88	13.36	1.13
10	Construction Project for U-turn Overpass Bridge on H. 2, Km. 53+000, Pak Chong District (U-turn direction to Nakhon Ratchasima)	Nakhon Ratchasima	2033	143.4	18.48	1.79
11	Construction Project for U-turn Overpass Bridge on H. 2, Km. 40+300, Pak Chong District (U-turn direction to Bangkok)	Nakhon Ratchasima	2033	25.64	13.34	1.14
12	Survey and Design Project for Grade Separated Intersection at Wat Phanom Wan Intersection, Nakhon Ratchasima (H. 2 intersection with Rural Highway NM.1049)	Nakhon Ratchasima	2033	116.79	15.44	1.39
Lower Northeastern Provincial Group 2						
13	Grade Separated Intersection Project at H. 231 intersection with H. 2050 (Non Hong Thong Intersection)	Ubon Ratchathani	2028	281.75	16.7	1.46

Seq.	Proposed Project	Province	Operation Year (B.E.)	Net Present Value (NPV Million THB)	Economic Internal Rate of Return (EIRR %)	Benefit/Cost Ratio (B/C Ratio)
14	Construction Project for Thai-Lao Friendship Bridge No. 6, Ubon Ratchathani - Salavan	Ubon Ratchathani	2033	392.86	13.4	1.15
15	Survey and Design Project for Grade Separated Intersection at Nong Ta Phon Intersection, Ubon Ratchathani (H. 231 intersection with H. 2178)	Ubon Ratchathani	2032	42.87	13.34	1.13
16	Overpass Bridge Project over Railway, H. 226, Nong Kut Railway Crossing, Km. 246+500	Si Sa Ket	2033	173.81	19.63	1.96
Upper Northern Provincial Group 1						
17	Improvement Project for U-turn to accommodate large vehicles at the U-turn on Highway No. 1 (in front of Big C Lampang)	Lampang	2034	89.76	18.72	1.64
18	Grade Separated Intersection Project at H. 1, Km. 691+250 (Koh Kha Intersection)	Lampang	2034	102.57	16.73	1.44
19	Improvement Project for U-turns and facilities on H. 116 to accommodate large vehicles	Lamphun	2035	114.46	21.3	1.92
20	Grade Separated Intersection Project at H. 11 intersection with H. 114 (Doi Ti Intersection)	Lamphun	2035	26.04	13.28	1.12
21	Grade Separated Intersection Project at H. 121 intersection with H. 1001 (Likhit Chiwan Intersection)	Chiang Mai	2037	59.97	14.76	1.27
22	Grade Separated Intersection Project at H. 121 intersection with H. 1367 (San Khayom Intersection)	Chiang Mai	2036	52.62	14.52	1.24
23	Grade Separated Intersection Project at H. 121 intersection with H. 1006 (Ton Pao Phatthana Intersection)	Chiang Mai	2028	313.26	16.96	1.5
24	Grade Separated Intersection Project at H. 121 intersection with H. 11 (Superhighway Intersection)	Chiang Mai	2028	282.47	16.21	1.42
25	Grade Separated Intersection Project at H. 121 intersection with H. 106 (Kong Sai Intersection)	Chiang Mai	2028	127.98	15.07	1.3

Seq.	Proposed Project	Province	Operation Year (B.E.)	Net Present Value (NPV Million THB)	Economic Internal Rate of Return (EIRR %)	Benefit/Cost Ratio (B/C Ratio)
26	Grade Separated Intersection Project at H. 121 intersection with H. 108 (Samoeng Intersection)	Chiang Mai	2028	418.49	16.71	1.47
27	Construction Project for Grade Separated Intersection at H. 121 intersection with H. 1317 (San Klang Intersection)	Chiang Mai	2027	177.25	16.3	1.43
28	San Pa Tong Grade Separated Intersection (Tunnel) Project	Chiang Mai	2028	822.64	18.58	1.68
Upper Northern Provincial Group 2						
29	Improvement Project for Mae Tam Intersection, H. 1 intersection with H. 1193	Phayao	2037	97.53	16.44	1.48
30	Improvement Project for Hazardous Spots on the Tourist Route Network	Chiang Rai	2028	8.46	14.3	1.19
Lower Northern Provincial Group 1						
31	Intersection Improvement Project at H. 117 and H. 102 (Lotuss Uttaradit Intersection) to reduce accidents	Uttaradit	2035	103.39	17.3	1.5
Lower Northern Provincial Group 2						
32	Repair Project for Bridge over Chao Phraya River on H. 1 (Dechatiwong Bridge)	Nakhon Sawan	2034	55.69	17.11	1.48
33	U-turn Overpass Bridge Project on H. 1 near Ban Yang Tan	Nakhon Sawan	2034	31.24	14.15	1.19
34	Railway Crossing Project, Section H. 1 detour - Hua Wai Station	Nakhon Sawan	2034	58.9	16.54	1.42

Source: Consultant (B.E. 2567 / A.D. 2024)

Note: Feasibility study projects are currently undergoing initial project value estimation (preliminary estimated data).

4) Cargo Transport Station and Container Yard (CY) Development Project

Economic feasibility analysis results for the Logistics Terminal and Container Yard (CY) Development projects additionally proposed in the Action Plan, as shown in Table 6.2-5.

Table 6.2-5 Economic feasibility evaluation results for the Logistics Terminal and Container Yard (CY) development projects.

Seq.	Proposed Project	Province	Operation Year (B.E.)	Net Present Value (NPV Million THB)	Economic Internal Rate of Return (EIRR %)	Benefit/Cost Ratio (B/C Ratio)
Upper Northern Provincial Group 1						
1	Project for Improvement, Promotion, and Development of Border Trade and Cross-Border Transport to promote product export for Lamphun Province	Lamphun	2029	15.8	19.49	1.69
Upper Northern Provincial Group 2						
2	Project for Improvement of Cargo Holding Area at the Border Checkpoint	Chiang Rai	2028	26.6	18.8	1.62
Lower Northern Provincial Group 2						
3	Project for Promotion of Domestic Freight Transport to reduce logistics costs	Kamphaeng Phet	2029	15.8	19.49	1.69
4	Project for Development of a Regional Freight Terminal to enhance road freight transport efficiency, Nakhon Sawan Province	Nakhon Sawan	2028	17.9	16.66	1.42
5	Construction Project for a Distribution Center (Hub), Uthai Thani Province	Uthai Thani	2029	15.98	16.66	1.42

Source: Consultant (B.E. 2567 / A.D. 2024)

Note: Feasibility study projects are currently undergoing initial project value estimation (preliminary estimated data).

5) Public Transport System Development Project

Economic feasibility analysis results for the Public Transport System Development projects additionally proposed in the Action Plan, as shown in **Table 6.2-6**

Table 6.2-6 Results of the Economic Feasibility Assessment for Public Transport System Development projects

Seq.	Proposed Project	Province	Operation Year (B.E.)	Net Present Value (NPV Million THB)	Economic Internal Rate of Return (EIRR %)	Benefit/Cost Ratio (B/C Ratio)
Upper Northeastern Provincial Group 1						
1	Project for providing 2nd-Class Air-Conditioned Seating Buses for Persons with Disabilities on 3 main routes, Bangkok - Nong Khai Line	Nong Khai	2026	6.35	18.48	1.59
Lower Northeastern Provincial Group 2						
2	Project for providing 2nd-Class Air-Conditioned Seating Buses for Persons with Disabilities on 3 main routes, Bangkok - Ubon Ratchathani Line	Ubon Ratchathani	2029	5.49	14.45	1.23
Upper Northern Provincial Group 2						
3	City Bus Project connecting Mae Fah Luang Airport, Chiang Rai - Mueang Phayao District, to support inter-city tourism	Phayao	2028	35.91	17.43	1.49
Lower Northern Provincial Group 2						
4	Project for Development of Bicycle Routes along Highway No. 333 and Highway No. 3438 to support tourism	Uthai Thani	2035	208.10	15.73	1.35

Source: Consultant (B.E. 2567 / A.D. 2024)

Note: Feasibility study projects are currently undergoing initial project value estimation (preliminary estimated data).

6) Urban Development Project with Transport Infrastructure System (TOD)

Economic feasibility analysis results for the Town Development and Transport Infrastructure System (TOD) projects additionally proposed in the Action Plan, as shown in **Table 6.2-7**

Table 6.2-7 Results of the Economic Feasibility Assessment for Town Development and Transport Infrastructure System (TOD) projects

Seq.	Proposed Project	Province	Operation Year (B.E.)	Net Present Value (NPV Million THB)	Economic Internal Rate of Return (EIRR %)	Benefit/Cost Ratio (B/C Ratio)
Upper Northern Provincial Group 2						
1	Project for Developing the Area along the Mekong River as a Natural Tourist Attraction to promote tourism	Chiang Rai	2028	26.60	18.80	1.62
Upper Northern Provincial Group 2						
2	Feasibility Study Project for the Construction of a Rest Area on Highway No. 12	Tak	2028	174.56	18.64%	1.71
Lower Northern Provincial Group 2						
3	Project for Developing the Area around Phichit Railway Station	Phichit	2029	7.26	15.57%	1.31

Source: Consultant (B.E. 2567 / A.D. 2024)

Note: Feasibility study projects are currently undergoing initial project value estimation (preliminary estimated data).

7) Operational Capacity Enhancement Project (Soft Side)

Economic feasibility analysis results for the Operational Capacity Development (Soft Side) projects additionally proposed in the Action Plan, as shown in **Table 6.2-8**

Table 6.2-8 Results of the Economic Feasibility Assessment for Operational Capacity Development (Soft Side) projects

Seq.	Proposed Project	Province	Operation Year (B.E.)	Net Present Value (NPV Million THB)	Economic Internal Rate of Return (EIRR %)	Benefit/Cost Ratio (B/C Ratio)
Upper Northeastern Provincial Group 1						
1	Project for Integrated Inspection to Prevent Smuggling of Aquatic Animals and Aquatic Products (Import/Export)	Nong Khai	2029	8.72	17.55	1.56
Lower Northeastern Provincial Group 1						
2	Project for Study and Improvement of Train Schedules and Routes to enhance inter-regional connection efficiency	Surin	2028	9.92	18.33	1.6
Upper Northern Provincial Group 1						
3	Project for Study of Application Development to Support Public Transport Service Usage, Chiang Mai Province	Chiang Mai	2028	14.27	20.93	1.86
Upper Northern Provincial Group 2						
4	Project for Multi-Modal Transport Study to research the transfer of both people and goods	Phayao	2029	12.12	20.52	1.82
5	Project for Opening Pha Dai Border Checkpoint to support tourism	Chiang Rai	2028	28.29	19.17	1.68
Lower Northern Provincial Group 2						
6	Project for Study of Installing Directional Signs to Connect Tourist Attractions, Uthai Thani Province	Uthai Thani	2029	23.93	28.19	2.62

Source: Consultant (B.E. 2567 / A.D. 2024)

Note: Feasibility study projects are currently undergoing initial project value estimation (preliminary estimated data).

6.3 Preparation of Environmental Information Reports (Environmental Checklists)

6.3.1 Preparation of Environmental Information Reports (Environmental Checklists) Including Key Issues, Mitigation and Prevention Measures, and Environmental Quality Monitoring Measures

The consultant has reviewed relevant laws, regulations, and Cabinet resolutions concerning the promotion and maintenance of environmental quality and the conservation of natural resources. This review serves as a basis for assessing the prioritization of transportation network development and for preparing environmental information reports for significant and feasible projects (Pre-Feasibility Study) selected from the programs outlined in the work plan, in accordance with the Terms of Reference (TOR), Clause 4.1.2.

(1) Objectives

The objectives and scope of the study for the preparation of environmental information reports (Environmental Checklists) for the selected projects are summarized as follows:

1.1) To review relevant laws, regulations, and requirements related to environmental studies, including the verification of environmental data items and constraints.

1.2) To study current environmental resource data and identify areas at risk of being affected by project development, as well as to assess and classify the level of significance of environmental impacts.

1.3) To assess significant environmental impacts using a checklist format, and to provide recommendations for mitigation and prevention measures, as well as environmental quality monitoring measures.

6.3.2 Review of Relevant Legislation

The National Environment Quality Promotion and Preservation Act B.E. 2535, the National Environment Quality Promotion and Preservation Act (No. 2) B.E. 2561, and related laws enacted under these Acts aim to encourage public and private sector participation in promoting and preserving environmental quality. The Ministerial announcements issued under Section 48, which are relevant to transportation project development, include the following:

- Ministerial Announcement of the Ministry of Natural Resources and Environment on the Designation of Projects, Activities, or Operations Requiring an Environmental Impact Assessment (EIA) Report, including the criteria, methods, and conditions for preparing the EIA report, published in Volume 141, Special Section 4 Ng, Government Gazette, dated January 5, 2024. Projects related to transportation that require the preparation of an EIA report are listed in **Table 6.3-1**

Table 6.3-1 Types and Sizes of Transportation Projects Requiring Preparation Environmental Impact Assessment Report, Volume 141, Special Section 4 Ng, Government Gazette, January 5, 2024

No.	Types of Projects, Activities, or Operations	Size
2	**Airports or Temporary Takeoff and Landing Sites for Aircraft on Water, as Defined by the Air Navigation Act**	All sizes
19	**Expressway Systems as Defined by the Expressway Act or Projects with Characteristics Similar to Expressways**	All sizes
20	**Highways or roads, as defined under the Highway Act, that pass through the following areas:** 20.1 Wildlife Sanctuaries and Non-Hunting Areas as Defined by the Wildlife Preservation and Protection Act 20.2 National Park Areas as Defined by the National Park Act 20.3 Areas Designated by Cabinet Resolution as Watershed Classification Level 2 Zones 20.4 Mangrove Forest Areas within National Reserved Forests 20.5 Coastal Areas Within 50 Meters from the Natural High Tide Line 20.6 Areas Located Within or Near Internationally Important Wetlands or World Heritage Sites Listed Under International Conventions, Within a Distance of 2 Kilometers 20.7 Areas Located Near Ancient Monuments, Archaeological Sites, Historical Sites, or Historical Parks as Defined by the Act on Ancient Monuments, Antiques, Art Objects, and National Museums, Within a Distance of 1 Kilometer- Except for Urban Planning Roads as Specified by the Town Planning Act.	All sizes
21	**Rail-Based Mass Transit System**	All sizes
22	**Port**	Supporting vessels with a gross tonnage of 500 tons or more, or having a quay length of at least 100 meters but less than 300 meters, or possessing a total berth area of at least 1,000 square meters but less than 10,000 square meters.
23	**Cruise and Recreational Marinas**	Capable of accommodating 50 or more vessels, or having a total berth area of 1,000 square meters or more.
26	**Air Transportation System** Specifically for the construction or expansion of airports or temporary aircraft takeoff and landing sites, as defined under the Air Navigation Act.	Having a runway length of at least 1,100 meters but less than 3,000 meters.

No.	Types of Projects, Activities, or Operations	Size
33	Projects, activities, or operations of all types located within areas designated by Cabinet resolution as Watershed Classification Level 1, except for 33.1 Community development projects, activities, or operations and land allocation approved by the Cabinet. 33.2 Projects, activities, or operations within Community Forest Areas as defined by the Community Forest Act. 33.3 Projects, activities, or operations of government agencies that were utilizing the area prior to the effective date of this announcement, conducted according to the original objectives without any expansion of the area beyond the original scope.	All sizes

- Ministerial Announcement of the Ministry of Natural Resources and Environment on the Designation of Projects, Activities, or Operations That May Severely Impact Natural Resources, Environmental Quality, Public Health, Hygiene, and Quality of Life in Communities, Requiring the Preparation of Environmental Impact Assessment (EIA) Reports, Including the Criteria, Methods, and Conditions for Preparing Such Reports, B.E. 2566 (2023), Volume 141, Special Edition 4 Ng, Government Gazette, January 5, 2024. The types of transportation projects required to prepare Environmental Impact Assessment reports are presented in **Table 6.3-2**

Table 6.3-2 Types and Sizes of Transportation Projects Required to Prepare Environmental Impact Assessment Reports, B.E. 2566 (2023), Volume 141, Special Edition 4 Ng, Government Gazette, January 5, 2024

No.	Types of Projects, Activities, or Operations	Size
1	**Land reclamation in the sea or Songkhla Lake outside the original coastal boundary, except for reclamation intended for beach restoration.**	Having a size of 300 rai or more.
8	**Air Transportation System** Specifically for the construction or expansion of airports or temporary aircraft takeoff and landing sites, as defined under the Air Navigation Act.	Having a runway length of at least 3,000 meters.
9	**Port** Except for projects, activities, or operations related to national security under the National Security Council Act, approved by the Cabinet.	1) Having a quay length of 300 meters or more, or a total berth area of 10,000 square meters or more, except for piers used by local residents for daily activities and tourism purposes. 2) Having dredging volume of 100,000 cubic meters or more.

- **Additional Cabinet Resolution on Conservation Forests (dated September 13, 1994)** It has been stipulated that road construction or expansion projects, as well as projects constructing new embankments beyond existing ones passing through additional conservation forest areas, are required to prepare an Initial Environmental Examination (IEE) report. For all other projects that do not fall under the types and sizes requiring Environmental Impact Assessment (EIA) reports or Initial Environmental Examination (IEE) reports, an environmental data checklist shall be prepared, including measures for prevention and mitigation of environmental impacts, as well as measures for monitoring and controlling environmental quality.

- **Ministerial Announcement of the Ministry of Natural Resources and Environment Regarding the Designation of Areas and Environmental Protection Measures.** For areas that serve as watershed sources or possess unique natural ecosystems distinct from general areas, or for areas with natural ecosystems that are susceptible to degradation or adverse impacts from human activities, or areas of significant natural or cultural value that merit conservation and have not yet been officially designated as protected zones, land use in such areas shall be regulated in order to preserve the natural state or prevent disturbance to the ecosystem or the environmental and cultural values. All actions or activities that may pose a threat or cause ecological disruption or degradation to the environmental or cultural value of the area are prohibited. Furthermore, types and scales of projects or activities—whether undertaken by government agencies, state enterprises, or private entities—that are to be constructed or operated within such areas must be subject to the requirement of submitting an environmental impact assessment (EIA) report. Guidelines, procedures, regulations, and approaches for preparing both the initial environmental examination (IEE) and the full environmental impact assessment (EIA) must also be established. Currently, the declaration of protected environmental zones and related protective measures covers project areas in the provinces of Chiang Mai, Lamphun, and Tak, which can be summarized as follows:

  - The Ministerial Regulation issued in 2022 designates the areas of Wat Ket Subdistrict and Nong Hoi Subdistrict in Mueang Chiang Mai District; Nong Phueng Subdistrict, Yang Noeng Subdistrict, and Saraphi Subdistrict in Saraphi District, Chiang Mai Province; and Umong Subdistrict in Mueang Lamphun District, Lamphun Province, as Environmental Protection Zones.
  - The Ministerial Regulation issued in 2022 designates the areas of Phra That Pha Daeng Subdistrict, Mae Tao Subdistrict, and Mae Ku Subdistrict in Mae Sot District, Tak Province, as Environmental Protection Zones.

- **Regulation of the Office of the Prime Minister on the Implementation of the Convention Concerning the Protection of the World Cultural and Natural Heritage, B.E. 2559 (2016), published in the Government Gazette, Volume 133, Special Part 8 Ng, dated 12 January 2016.** As Thailand is a State Party to the Convention Concerning the Protection of the World Cultural and Natural Heritage (1972), it is obligated to comply with the implementation guidelines under the Convention. In order to establish a mechanism for formulating policies and implementing actions in line with the Convention, the Prime Minister issued the Regulation of the Office of the Prime Minister establishing the National Committee on the World Heritage Convention. This Committee is responsible for, among other duties, proposing policies on the protection, prevention, and conservation of World Heritage in accordance with the Convention to the Cabinet for approval. Once approved by the Cabinet, relevant government agencies are to be notified and instructed to implement such policies. The Committee is also tasked with formulating plans, measures, and mechanisms for the protection, prevention, and conservation of cultural heritage, natural heritage, and mixed heritage located within the country; making recommendations to the Cabinet for approval on the nomination of cultural, natural, and mixed heritage sites in Thailand for inscription on the World Heritage List; coordinating and monitoring the implementation of policies, plans, measures, and mechanisms by government agencies; promoting cooperation among relevant government and private sector entities; and appointing sub-committees or working groups as deemed appropriate.

1) Inscribed World Heritage Sites

Thailand has a total of eight inscribed World Heritage Sites, consisting of five cultural heritage sites and three natural heritage sites. The cultural heritage sites include the Historic City of Ayutthaya; the Historic Town of Sukhothai and Associated Historic Towns (Old Sukhothai); the Ban Chiang Archaeological Site; the Ancient Town of Si Thep; and Phu Phra Bat Historical Park. The natural World Heritage Sites include the Thung Yai-Huai Kha Khaeng Wildlife Sanctuaries (Huai Kha Khaeng), the Dong Phayayen-Khao Yai Forest Complex (Khao Yai), and the Kaeng Krachan Forest Complex. Among these, six World Heritage Sites are located within the project study area, including:

1.1 Thung Yai-Huai Kha Khaeng Wildlife Sanctuaries (Huai Kha Khaeng)

1.2 Dong Phayayen-Khao Yai Forest Complex (Khao Yai)

1.3 Historic Town of Sukhothai and Associated Historic Towns (Old Sukhothai)

1.4 Ban Chiang Archaeological Site (Ban Chiang)

1.5 Ancient Town of Si Thep

1.6 Phu Phra Bat Historical Park

2) Heritage Sites Listed on the World Heritage Centre's Tentative List (Tentative List)

2.1 Phra That Phanom, a Group of Historical Structures and Related Landscapes

2.2 The Group of Prasat Phanom Rung, Prasat Mueang Tam, and Prasat Plai Bat

2.3 Various Memorial Sites and the Cultural Landscape of Chiang Mai, the Lanna Kingdom's Capital

3) Registered Heritage Sites in Thailand's National List

3.1 Phetchabun Mountain Forest Complex Located in Phetchabun and Loei Provinces, this site is registered on Thailand's National List as a natural heritage site. (Natural site)

3.2 The Chiang Saen Ancient City and Suwannakhomkham Archaeological Site has been registered as a World Heritage Site at the international level, particularly in Thailand and the Lao PDR. Sites Registered on Thailand's National List as Cultural Heritage Sites (Cultural site)

3.3 Archaeological and Cultural Sites in Nan Province. Cultural Heritage Sites Registered on Thailand's National List (Cultural site)

- **The Act on Ancient Monuments, Antiques, Objects of Art, and National Museums, B.E. 2504 (1961)** The Act on Ancient Monuments, Antiques, Objects of Art, and National Museums (No. 2), B.E. 2535 (1992) amended the original 1961 legislation. The Act stipulates the responsibilities of individuals possessing ancient monuments, whether or not such sites have been officially registered. In the process of registration, the Act requires a formal declaration and outlines the duties and obligations associated with the designation. The registration of ancient monuments is regarded as a fundamental mechanism for protection, preservation, and regulatory control. However, if it is determined that a particular ancient monument no longer requires such control, its registration may be revoked. Furthermore, once a monument has been registered, the boundaries of the protected area may be adjusted—either expanded or reduced—as necessary.

For ancient monuments and objects of art, the Act also requires official registration and stipulates the associated responsibilities. Ancient monuments and objects of art that are state property and under the supervision of the Fine Arts Department must be preserved in national museums. As for the information regarding the location and classification of ancient monuments within the provinces covered by the project, coordination is currently underway with the Cultural Heritage Information Technology Center, Fine Arts Department, to obtain the necessary data.

- **Wetlands** According to the Ramsar Convention (Ramsar Convention) wetlands are defined as areas of marsh, fen, peatland, or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish, or salt, including areas of marine water the depth of which at low tide does not exceed six meters. Thailand is a contracting party to the Ramsar Convention. At present, internationally important wetlands (Ramsar Sites) located within the project area include:

(1) Nong Bong Khai Non-Hunting Area Wetland, Chiang Rai Province

(2) Bueng Khong Long Non-Hunting Area Wetland, Bueng Kan Province

(3) Kut Ting Wetland, Bueng Kan Province

(4) Lower Songkhram River Wetland, Nakhon Phanom Province

A total of 15 international wetlands, 69 internationally important wetlands, and 47 nationally important wetlands have been identified. Within the project study area, there are 4 international wetlands, 17 internationally important wetlands, and 21 nationally important wetlands. The distribution of international, internationally important, and nationally important wetlands is presented in conjunction with conservation areas within the project study area.

Furthermore, the Cabinet Resolutions dated 3 November 2009 and 12 May 2015 stipulated conservation measures for wetlands, identifying the responsible and supporting agencies for implementing these measures.

Measure No. 10 specifically requires that project proponents prepare an Environmental Impact Assessment (EIA) report for projects or activities likely to have environmental impacts, in accordance with the notification issued under Section 46 of the Enhancement and Conservation of National Environmental Quality Act.

- **National Park** According to the 2023 database of the Office of National Parks, Department of National Parks, Wildlife and Plant Conservation, and in accordance with the National Park Act B.E. 2562 (2019), Volume 136, Part 71 Kor, dated 29 July 2019, there are a total of 156 national parks in Thailand. Out of these, 133 national parks have been officially declared in the Royal Gazette, while 23 are pending official declaration.

- **Watershed Quality Classification** is the categorization of land based on its environmental potential to support land use planning aimed at conserving natural resources and the environment. Watershed areas are classified into five quality levels as follows:

Class 1A - *Protected forest in headwater areas*: These are critical upstream areas with intact forest cover and steep slopes, requiring strict conservation and minimal to no human use.

Class 1B - *Areas with similar physical characteristics to Class 1A that have already been utilized*: These areas may have been converted for certain uses but still require strong conservation measures due to their ecological sensitivity.

Class 2 - *Downstream from Class 1A with gentler slopes*: These areas are suitable for economic forest plantations while still playing a role in watershed protection.

Class 3 - Further downstream from Class 2 with moderate slopes: These areas support mixed land uses such as economic forests, fruit trees, perennial crops, grasslands, and conservation-oriented agriculture.

Class 4 - *Foot-hill areas with low slopes*: Suitable for farming and horticulture, but require appropriate soil and water conservation measures.

Class 5 - *Lowland plains*: Appropriate for paddy fields, water-loving crops, communities, and other development activities.

According to the Royal Decree on Watershed Delineation B.E. 2564 (2021), published in the Royal Gazette, Volume 138, Part 12 Kor, dated 11 February 2021, Thailand has identified a total of 22 major watersheds

6.3.3 Preparation of Environmental Information Reports (Environmental Checklists) This includes the compilation of essential environmental information along with proposed mitigation and preventive measures for potential environmental impacts, as well as environmental quality monitoring measures.

1) Environmental Data Checklist Review (Environmental Checklists)

Environmental Data Checklist Review (Environmental Checklists) The review was conducted by applying the Action Plan for the Development of the Transportation Network and Logistics System in the clusters of provinces in the Northeastern and Northern regions, linked with the economic corridor areas under the Greater Mekong Subregion (GMS) framework, to support economic development and tourism.

The review was carried out according to the checklist and environmental constraints for long-term project development. The results of the review are presented in **Appendix G.**

2) Selection of Key Projects for Preparing Environmental Data Checklists (Environmental Checklists Report)

In selecting key projects based on the results of the environmental data checklist review, the following selection criteria were applied:

2.1) The project is an infrastructure-type project.

2.2) The project emphasizes connectivity between provinces within the same provincial cluster.

2.3) The project is a key project and included in the short-term plan (2025-2027) as a priority.

2.4) The project has not previously undergone any environmental impact study.

3) Preparation of Environmental Information Report (Environmental Checklists)

In preparing the Environmental Information Report (Environmental Checklists), the process must be aligned with the guidelines of the Office of Natural Resources and Environmental Policy and Planning (ONEP), issued in December 2012. The study focuses on nine selected projects listed in Table 6.3-1, for which Environmental Checklists Reports will be prepared as follows:

(1) Objectives for the Preparation of the Environmental Information Report (Environmental Checklists)

1.1) To review laws, regulations, and relevant provisions related to environmental studies, including the examination of environmental checklists and constraints.

1.2) To study current environmental resource data and identify areas at risk of being impacted by project development, as well as to prioritize the significance of potential environmental impacts. (Level of Significance)

1.3) To assess significant environmental impacts in the form of a checklist in order to propose or recommend appropriate mitigation measures, as well as measures for monitoring and evaluating environmental quality.

(2) Methodological Steps for the Preparation of the Environmental Information Report (Environmental Checklists)

There are five main steps in the preparation of the Environmental Checklists.

2.1) Part 1: Data Collection and Presentation of General Information It includes the project name, project objectives, project location in terms of physical, geographical, and physiographic characteristics; data and maps showing conservation areas, watershed areas, national parks, wildlife sanctuaries, reserved forests, and other relevant areas (if any). It also covers information on important historical and archaeological sites, as well as key natural resource areas, among others.

2.2) Part 2: Environmental Information Checklist: The initial assessment of environmental impact issues is conducted using the Checklist method, which is a technique for identifying significant impacts. The consultants study environmental information across four categories covering environmental factors and values: physical environmental resources, biological environmental resources, human use values, and quality of life values. This assessment focuses on environmental resources relevant to the project development.

2.3) Part 3: Prioritization of Environmental Impact Significance (Level of Significance): The significance of each project will be prioritized for both the construction and operational phases, based on the four categories of factors outlined in Part 2.

2.4) Part 4: Summary of Significant Environmental Impacts, Mitigation Measures, and Monitoring Measures: The consultants will summarize environmental issues with moderate or higher significant impacts and develop corresponding mitigation and monitoring measures for both the construction and operational phases. Additionally, they will consider possible measures to enhance environmental quality for resources positively affected, aiming to promote more sustainable project development.

2.5) Part 5: Summary of Findings: The benefits and drawbacks of implementing the project, along with mitigation measures for unavoidable negative impacts, as well as plans for monitoring and tracking significant environmental impacts, will be presented. In all cases, if the project or activity is found to cause continuous destruction or loss of protected forest areas without the possibility of effective mitigation or restoration, such projects should be avoided. Consequently, recommendations regarding the project's implementation should be submitted to the Office of Transport and Traffic Policy and Planning for further consideration.

Table 6.3-3 List of Projects Selected for Environmental Checklist Preparation

Provincial Cluster	Project Name	Province	Agency	Fiscal Year Start - End	Budget (MTHB)
Upper Northeastern Provincial Cluster 1	Project for Upgrading to Highway Standard Class 1 and Expanding to 4 Lanes on Highway No. 211, Sangkhom District - Huai Chiang Da, Nong Khai Province	Nong Khai	Department of Highways	2568 - 2569	908.96
Upper Northeastern Provincial Cluster 2	Project for Adding Traffic Lanes on Highway No. 227, Ban Phasuk - Waritchaphum - Phang Khon	Sakon Nakhon	Department of Highways	2568 - 2569	1,013.84
Central Northeastern Provincial Cluster	Project for the Construction of Highway Khon Kaen 1011, Intersection with Highway No. 2 - Ban Phra Yuen, Mueang District, Khon Kaen Province	Khon Kaen	Department of Rural Roads	2568	20.01
Lower Northeastern Provincial Cluster 1	Highway Hierarchy Management Project for Highway No. 24, Chok Chai Intersection - Nang Rong District (Section: Chok Chai Intersection - Nong Ki District)	Nakhon Ratchasima	Department of Highways	2568 - 2570	1,398.40
Lower Northeastern Provincial Cluster 2	Grade-Separated Interchange Project at the Intersection of Highway No. 231 and Highway No. 2050 (Non Hong Thong Intersection)	Ubon Ratchathani	Department of Highways	2568 - 2570	650.00
Upper Northern Provincial Cluster 1	Feasibility Study Project for Public Transportation System Linking 3 Airports (Chiang Mai - Mae Fah Luang - Lampang)	Lampang	Department of Land Transport (DLT)	2570	20.00
Upper Northern Provincial Cluster 2	Project for the Construction of Urban Planning Road C1, Phayao Comprehensive Town Plan, Phayao Province	Phayao	Department of Rural Roads	2575 - 2576	162.82
Lower Northern Provincial Cluster 1	Project for Upgrading to Highway Standard Class 1 on Highway No. 117, Uttaradit - Phu Du (Section: Nam Pat District - Song Hong Subdistrict)	Uttaradit	Department of Highways	2568 - 2570	650.00
Lower Northern Provincial Cluster 2	Project for Upgrading to Highway Standard Class 1 on Highway No. 1112, Salokbat - Wang Pla Ao Section (Bo Tham - Ban Pang Maka Section)	Kamphaeng Phet	Department of Highways	2568 - 2570	382.50

6.4 Action Plan on the Development of Transport Network and Logistics System in the Northeastern and Northern Provincial Clusters, Linking with Economic Corridor Areas under the GMS Framework and Other Relevant International Cooperation Frameworks.

6.4.1 Review of Compliance of the Action Plan with Three-Level Plans

In formulating the Action Plan on the Development of Transport Network and Logistics System in the Northeastern and Northern Provincial Clusters, linking with the GMS Economic Corridor to support economic and tourism development (2025-2037), consideration has been given to the alignment with three levels of plans, as follows:

Level 1 Plans: The 20-Year National Strategy (2018 - 2037)

Level 2 Plans: The Master Plans under the National Strategy, the National Reform Plans, and the 13th National Economic and Social Development Plan (2023 - 2027)

Level 3 Plans: The 20-Year Transport System Development Strategy of Thailand (2018 - 2037), the 3rd National Logistics Development Strategy (2017 - 2021), and the (Draft) Action Plan on Transport and Logistics, Phase 1 (2023 - 2027) and Phase 2 (2028 - 2037)

In addition, the consistency with the United Nations Sustainable Development Goals (SDGs) and Thailand's Bio-Circular-Green (BCG) Economy Strategy, in relation to transport and logistics systems, has also been taken into account. The alignment of the Action Plan with the three levels of plans is illustrated in **Figure 6.4-1**, with the key points summarized as follows.

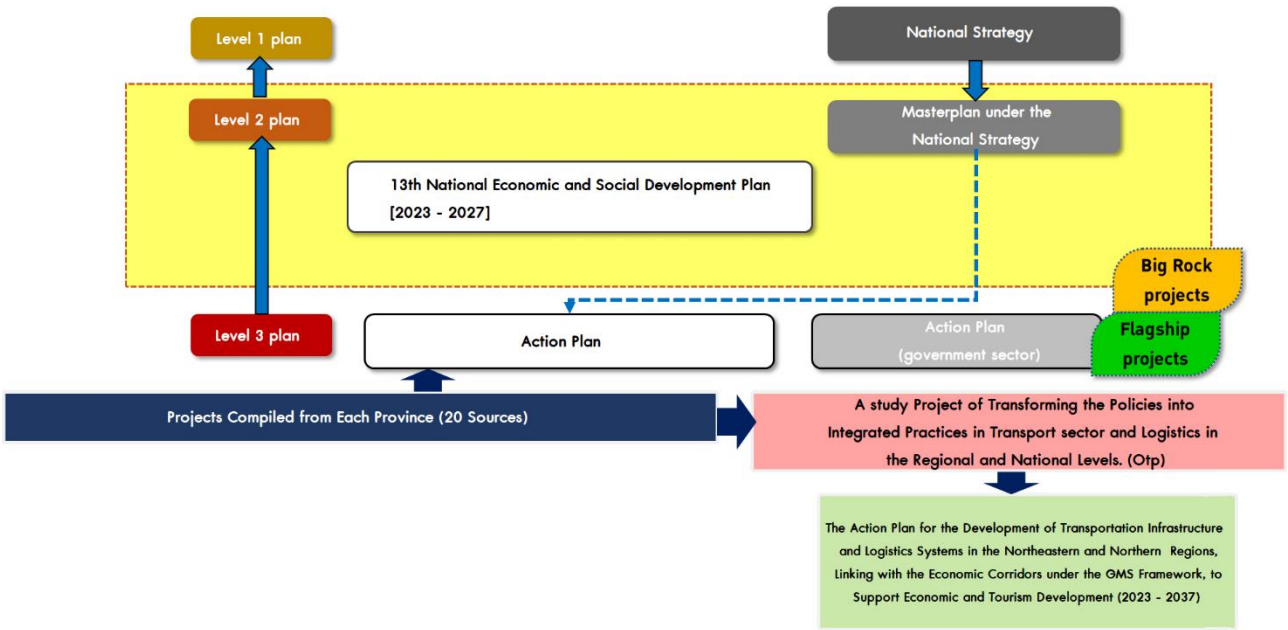


Figure 6.4-1 Alignment of the action plan with related three-level plans and guidelines for preparing action plans

6.4.2 Formulation of the Action Plan on Transport Network and Logistics System Development within Northeastern and Northern Provincial Clusters connecting with GMS Economic Corridor to support Economic and Tourism Development (2023 - 2037)

In formulating the Action Plan, the consultant incorporated programs/projects in line with the development approaches, strategies, and relevant indicators. The prioritization of projects was considered based on the project prioritization criteria, the results of the preliminary feasibility study (Pre-Feasibility Study), and the outcomes of the environmental impact assessment in accordance with the Environmental Checklists.

The Action Plan consists of a total of 827 programs/projects, comprising 455 projects in the Northeastern region and 372 projects in the Northern region, over a 13-year period (2025-2037), as shown in **Table 6.4-1** to **Table 6.4-2.**

Table 6.4-1 Summary of the Number of Projects and Investment Value of the Northeastern Provincial Cluster

Development Guidelines	Quantity (projects)	Investment amount (million baht)
Development Guideline 1: Development and Integration of Transportation Infrastructure	**249**	**180,017.82**
Strategy 1.1: Develop transportation infrastructure to support connectivity to major routes	27	8,459.67
Strategy 1.2: Develop and enhance safety measures to improve the efficiency of transportation infrastructure	140	137,967.92
Strategy 1.3: Develop connecting infrastructure to promote tourism, trade, investment, and quality of life	82	33,590.22
Development Guideline 2: Enhancement of Public Transportation System Services	**106**	**2,552.00**
Strategy 2.1: Enhance the efficiency of public transportation services	84	1,997.00
Strategy 2.2: Establish appropriate fare rates for public transportation systems	-	-
Strategy 2.3: Develop areas around public transportation stations	22	555.00
Development Guideline 3: Facilitation of Cargo Transportation and Logistics Services	**17**	**551.00**
Strategy 3.1: Develop and enhance road and rail cargo transportation facilities	17	551.00
Strategy 3. Develop and enhance facilities for cross-border cargo transportation	-	-
Strategy 3.3: Develop and enhance facilities for waterway cargo transportation	-	-
Development Guideline 4: Improvement of Laws, Regulations, and Standards to align with current competitive conditions	**13**	**20.00**
Strategy 4.1: Amend laws, regulations, and standards related to transportation	3	-
Strategy 4.2: Implement laws, regulations, and standards related to transportation effectively	10	20.00
Strategy 4.3: Revise land use regulations	-	-
Development Guideline 5: Enhancement of Human Resource and Innovation	**66**	**1,205.00**
Strategy 5.1: Human resource management and development in transportation system	21	105.00
Strategy 5.2: Utilization of technology and innovation in transportation system development	45	1,100.00
Grand Total (Development Guideline 1 - 5)	**451**	**184,345.82**

Source: Consultant

Table 6.4-2 Summary of the Number of Projects and Investment Value of the Northern Provincial Cluster

Development Guidelines	Quantity (projects)	Investment amount (million baht)
Development Guideline 1: Development and Integration of Transportation Infrastructure	**220**	**153,384.31**
Strategy 1.1: Develop transportation infrastructure to support connectivity to major routes	4	406.50
Strategy 1.2: Develop and enhance safety measures to improve the efficiency of transportation infrastructure	162	114,498.15
Strategy 1.3: Develop connecting infrastructure to promote tourism, trade, investment, and quality of life	54	38,479.66
Development Guideline 2: Enhancement of Public Transportation System Services	**56**	**1,603.29**
Strategy 2.1: Enhance the efficiency of public transportation services	54	1,543.29
Strategy 2.2: Establish appropriate fare rates for public transportation systems	-	-
Strategy 2.3: Develop areas around public transportation stations	2	60.00
Development Guideline 3: Facilitation of Cargo Transportation and Logistics Services	**25**	**1,477.39**
Strategy 3.1: Develop and enhance road and rail cargo transportation facilities	16	992.01
Strategy 3. Develop and enhance facilities for cross-border cargo transportation	9	485.38
Strategy 3.3: Develop and enhance facilities for waterway cargo transportation	-	-
Development Guideline 4: Improvement of Laws, Regulations, and Standards to align with current competitive conditions	**8**	**53.00**
Strategy 4.1: Amend laws, regulations, and standards related to transportation	1	-
Strategy 4.2: Implement laws, regulations, and standards related to transportation effectively	7	53.00
Strategy 4.3: Revise land use regulations	-	-
Development Guideline 5: Enhancement of Human Resource and Innovation	61	1,048.00
Strategy 5.1: Human resource management and development in transportation system	22	98.00
Strategy 5.2: Utilization of technology and innovation in transportation system development	39	950.00
Grand Total (Development Guideline 1 - 5)	**370**	**157,565.99**

Source: Consultant

The Action Plan for the Development of the Transportation Network and Logistics System in the Northeastern and Northern Provincial Clusters Linked to the GMS (Greater Mekong Subregion) Economic Corridors (B.E. 2568 - 2580 [A.D. 2025 - 2037]) has key (Flagship) plans/projects summarized in **Table 6.4-3**

Table 6.4-3 Summary of the Number of Projects and Investment Value of the Northern Provincial Cluster

No.	Key Plan/Project	Year of Implementation	Responsible Agency
Development Approach 1: Development and Integration of the Transportation Network			
1	Si Bun Rueang Bypass Road Project, Highway No. 228	2573 - 2575	Department of Highways
2	Mueang Nong Bua Lamphu District Bypass Road	2580	Department of Highways
3	Feasibility Study Project for a New Rail Line, Nong Bua Lamphu - Loei Section	2576 - 2577	State Railway of Thailand
4	Construction Project for a New 4-Lane Road (New Alignment Detour), H. 2276 intersection with Rural H. NP.4038, connecting to H. 2276 (Pak Pla East Bypass)	2572	Department of Highways
5	Mueang Sakon Nakhon District Northern Bypass Road	2576 - 2578	Department of Highways
6	Mueang Maha Sarakham District Bypass Road	2571 - 2573	Department of Highways
7	Survey and Design Project for Wapi Pathum District Bypass Road	2572	Department of Highways
8	Kalasin Northern Bypass Road Project	2575	Department of Highways
9	Somdet District Bypass Road	2581	Department of Highways
10	Survey and Design Project for Grade Separated Intersection at Rong Tom Intersection, Chaiyaphum (H. 202 intersection with H. 201)	2571 - 2574	Department of Highways
11	Survey and Design Project for Buriram Eastern Bypass Road	2575	Department of Highways
12	Survey and Design Project for Prakhon Chai Western Bypass Road	2575	Department of Highways
13	Survey and Design Project for Prakham District Bypass Road	2575	Department of Highways
14	Project to Study Traffic Solution Guidelines at Chong Mek Permanent Border Crossing	2570	Department of Land Transport
15	Mueang Amnat Charoen District Bypass Road	2570 - 2575	Department of Highways
16	New 4-Lane Road Alignment Project, Det Udom - Don Chik Section	2571 - 2575	Department of Highways
17	International Connection Project, Highway No. 2169, Kut Chum - Loeng Nok Tha Districts	2571 - 2575	Department of Highways
18	Mueang Si Sa Ket District Bypass Road	2574 - 2579	Department of Highways
19	Study and Design Project for Phibun Mangsahan Bypass Road (H. 217 - H. 2222)	2581	Department of Highways
20	Study Project for Construction of Bicycle and Pedestrian Paths in Chiang Mai Urban Area for safety	2570	Chiang Mai Provincial Office
21	Study Project for Enhancing International Flight Route Efficiency at Chiang Mai International Airport	2570	Airports of Thailand Public Company Limited
22	Feasibility Study Project for Highway Development and Improvement for Safety at U-Turn Areas	2571	Department of Highways
23	Study Project for Tunnel Construction at Huai Nam Dang to support tourism	2571	Department of Highways
24	Study Project for Tunnel Construction at Kiu Lom to support tourism	2571	Department of Highways
25	Study Project for Tunnel Construction at Luk Khao Lam to support tourism	2571	Department of Highways
26	Feasibility Study Project for Development of East-West Highway Network to connect tourist attractions and neighboring provinces	2571	Department of Highways
27	Project for Development of Agricultural Freight Transport Route to accommodate trucks, Pai District - Lamphun Province route	2581 - 2582	Department of Highways
28	Project for Study and Development of the Area along the Mekong River as a Natural Tourist Attraction to promote tourism	2570	Chiang Rai Provincial Office
29	Feasibility Study Project for Development of Road Network to Connect Tourist Attractions, Phrae Province	2571	Department of Highways
30	Feasibility Study Project for Public Bus Route, Nan - Luang Prabang Line, to connect neighboring countries	2571	Department of Land Transport
31	Feasibility Study Project for Connecting Route between Phayao Station Container Yard and Phayao Railway Station (Den Chai - Chiang Rai - Chiang Khong Double-Track Rail Project) to the main highway	2571	Department of Highways

No.	Key Plan/Project	Year of Implementation	Responsible Agency
32	Feasibility Study Project for Connecting Route for the Tunnel of the Den Chai - Chiang Rai - Chiang Khong Double-Track Rail Project to the main highway, to promote tourism	2571	Department of Highways
33	Feasibility Study Project for Development of Tourism Route Connecting 4 World Heritage Sites (Ayutthaya - Si Thep - Luang Prabang - Sukhothai)	2571	Department of Highways
34	Nakhon Thai Bypass Road (Northern Section)* Project	2575 - 2578	Department of Highways
35	Feasibility Study Project for Development of an Underpass Tunnel on the East-West Route, Phetchabun Province, to reduce travel time	2571	Department of Highways
36	Construction Project for a New Alignment Road, Sukhothai - Si Nakhon - Ban Dara Railway Station Line	2573 - 2575	Department of Highways
37	Project for Infrastructure Development to Upgrade Road Standard for Phichit Railway Station Entrance	2577 - 2578	Department of Highways
38	Uthai Thani Bypass Road Project (under the study for developing bypass plans to solve traffic problems in regional urban areas)	2580	Department of Highways
Development Approach 2: Upgrading Public Transport Services			
39	Study Project for Developing Inter-Provincial Public Transport System and Connecting to High-Speed Rail Stations to support tourism, Udon Thani Province	2570 - 2571	Department of Land Transport
40	Study Project for Guidelines to Increase Efficiency of Public Buses Connecting to Airport, Double-Track Rail Station, High-Speed Rail Station, and Udon Thani Urban Area	2571 - 2572	Department of Land Transport
41	Study Project for Guidelines to Promote Water Transport and Merchant Marine on the Mekong River (Nong Khai, Bueng Kan, Loei, Nakhon Phanom, and Mukdahan Provinces)	2572 - 2574	Marine Department
42	Feasibility Study and Design Project for Water Tourism Route Development, "Lanna - Khong" area, Nong Khai Province	2572 - 2574	Marine Department
43	Feasibility Study Project for a New Rail Line, Nong Khai - Bueng Kan - Nakhon Phanom Section	2580	State Railway of Thailand
44	Feasibility Study Project for the Nong Khai - Loei Double-Track Rail Line	2580	State Railway of Thailand
45	Study Project for Developing Inter-Provincial Public Transport System and Connecting to High-Speed Rail Stations to support tourism, Nong Khai Province	2576 - 2577	Department of Land Transport
46	Study Project for Guidelines to Increase Efficiency of Public Buses Connecting to Double-Track Rail Station, High-Speed Rail Station, and Nong Khai Urban Area	2576 - 2577	Department of Land Transport
47	Feasibility Study Project for a New Rail Line, Udon Thani - Nong Bua Lamphu Section	2580	State Railway of Thailand
48	Study Project for Guidelines to Increase Efficiency of Public Buses Connecting to Airport, Double-Track Rail Station, and Nakhon Phanom Urban Area	2570 - 2571	Department of Land Transport
49	Study Project for Guidelines to Increase Efficiency of Public Buses Connecting to Double-Track Rail Station and Mukdahan Urban Area	2570 - 2571	Department of Land Transport
50	Study Project for Guidelines to Increase Efficiency of Public Buses Connecting to Airport and Sakon Nakhon Urban Area	2571 - 2572	Department of Land Transport
51	Feasibility Study Project for Suburban Rail Line Development, Muang Phon - Ban Phai - Khon Kaen - Khao Suan Kwang Section	2570	State Railway of Thailand
52	Study Project for Developing Inter-Provincial Public Transport System and Connecting to High-Speed Rail Stations to support tourism, Khon Kaen Province	2570	Department of Land Transport
53	Study Project for Guidelines to Increase Efficiency of Public Buses Connecting to Airport, Double-Track Rail Station, High-Speed Rail Station, and Khon Kaen Urban Area	2570	Department of Land Transport

No.	Key Plan/Project	Year of Implementation	Responsible Agency
54	Study Project for Guidelines to Increase Efficiency of Public Buses Connecting to Airport, Double-Track Rail Station, and Maha Sarakham Urban Area	2570 - 2571	Department of Land Transport
55	Study Project for Guidelines to Increase Efficiency of Public Buses Connecting to Airport, Double-Track Rail Station, and Roi Et Urban Area	2571 - 2572	Department of Land Transport
56	Feasibility Study Project for Freight Transport (Potash Ore) Connecting to Rail System	2569 - 2570	SRT/Private Sector
57	Study Project for Developing Inter-Provincial Public Transport System and Connecting to High-Speed Rail Stations to support tourism, Nakhon Ratchasima Province	2570	Department of Land Transport
58	Study Project for Guidelines to Increase Efficiency of Public Buses Connecting to Airport, Double-Track Rail Station, and Buriram Urban Area	2570	Department of Land Transport
59	Study Project for Guidelines to Increase Efficiency of Public Buses Connecting to Double-Track Rail Station and Surin Urban Area	2570	Department of Land Transport
60	Project for Review and Feasibility Study of Air Travel Volume to support Surin Airport Development	2570	Department of Airports
61	Project for Study to Increase Efficiency of Routes and Public Transport System to support the UNESCO Ring Road Tourism Route, Nakhon Ratchasima Province	2571 - 2572	Department of Land Transport/Department of Rural Roads/Provincial Office
62	Study Project for Guidelines to Increase Efficiency of Public Buses Connecting to Double-Track Rail Station, High-Speed Rail Station, and Nakhon Ratchasima Urban Area	2571 - 2572	Department of Land Transport
63	Feasibility and Value Study Project for a New Rail Line, Chaturat - Chaiyaphum - Nong Bua Lamphu Section	2576 - 2577	Department of Rail Transport/State Railway of Thailand
64	Study Project for Guidelines to Increase Efficiency of Public Buses Connecting to Airport, Double-Track Rail Station, and Ubon Ratchathani Urban Area	2570	Department of Land Transport
65	Feasibility and Value Study Project for a New Rail Line, Mukdahan - Amnat Charoen - Ubon Ratchathani Section	2576 - 2577	State Railway of Thailand
66	Project to Support Public Transport System Operation for the World Horticultural Exposition, Nakhon Ratchasima 2026 (B.E. 2572)	2570	DLT (Nakhon Ratchasima Provincial Transport Office)
67	Project to Develop a Central Data Center System for Public Transport to support the World Horticultural Exposition, Nakhon Ratchasima 2026 (B.E. 2572)	2570	DLT (Nakhon Ratchasima Provincial Transport Office)
68	Public Transport System Development Plan to Connect 7 Tourist Attractions	2570	Department of Land Transport
69	Feasibility Study Project for Developing Public Transport System to Cover Chiang Mai Area	2570	Department of Land Transport
70	Feasibility Study Project for Clean Energy and Environmentally Friendly Public Transport System, Chiang Mai Province	2570	Department of Land Transport
71	Feasibility Study Project for Public Transport System Connecting 3 Airports (Chiang Mai - Mae Fah Luang - Lampang)	2570	Department of Land Transport
72	Feasibility Study Project for Developing Inter-Provincial Public Transport System in the Northern Region	2571	Department of Land Transport
73	Feasibility Study for Connecting Rail Network between Provinces in the North to promote economy and tourism	2571	Department of Rail Transport
74	Feasibility Study Project for Rail Line Construction Connecting Chiang Mai - Khun Yuam to promote tourism	2571	Department of Rail Transport

No.	Key Plan/Project	Year of Implementation	Responsible Agency
75	Feasibility Study Project for Developing Lampang Public Transport System to support travel and the aging society	2571	Department of Land Transport
76	Feasibility Study Project for Developing Environmentally and Community Friendly Public Transport Energy System	2571	Department of Land Transport
77	Study Project for Developing Electric Vehicle (EV) Public Transport System, Lamphun Province	2571	Department of Land Transport
78	Feasibility Study Project for Increasing Efficiency of Chiang Rai Public Transport System to support tourism	2570	Department of Land Transport
79	Consultancy Fee for Feasibility of Constructing 1 Phayao Airport, Phayao Province	2568	Department of Airports
80	Feasibility Study Project for Public Bus Route, Nan - Phrae - Phayao - Chiang Rai Line	2571	Department of Land Transport
81	Feasibility Study Project for Double-Track Rail Construction, Phrae - Nan Line	2571	Department of Rail Transport
82	Feasibility Study Project for Connecting Network of Public Transport System between Districts and Neighboring Provinces	2571	Department of Land Transport
83	Multi-Modal Transport Study Project to research the transfer of both people and goods	2571	Department of Land Transport
84	City Bus Project connecting Mae Fah Luang Airport, Chiang Rai - Mueang Phayao District, to support inter-city tourism	2571	Department of Land Transport
85	Study Project for Developing Rail System to Connect Chiang Mai - Phayao Provinces	2571	Department of Rail Transport
86	Feasibility Study Project for Public Bus Route to Cover Phayao Area	2571	Department of Land Transport
87	Feasibility Study Project for Increasing Efficiency of Public Transport System, Phrae - Chiang Rai Route	2571	Department of Land Transport
88	Feasibility Study Project for Increasing Efficiency of Public Transport System, Den Chai District	2571	Department of Land Transport
89	Feasibility Study Project for Public Bus Route to Support Tourism	2571	Department of Land Transport
90	Study Project for Guidelines to Promote Water Transport and Merchant Marine on the Mekong River to support "Lanna - Khong" water tourism, Chiang Rai and Nan Provinces	2572 - 2574	Marine Department
91	Feasibility Study Project for Developing the Lower Northern Travel Hub, Phitsanulok Province	2571	Department of Land Transport
92	Feasibility Study Project for Developing Public Transport Service Routes, Phitsanulok Province	2571	Department of Land Transport
93	Review Study of the Feasibility Project for the Pak Nam Pho - Mae Sot Double-Track Rail	2571	Department of Rail Transport
94	Feasibility Study Project for Public Transport System Covering Phetchabun Area	2571	Department of Land Transport
95	Review of the Feasibility Study Project for the Lom Narai - Phetchabun - Lom Kao Rail Line Construction	2571	State Railway of Thailand
96	Feasibility Study Project for Sukhothai Rail Line Development Connecting Tourist Attractions	2571	Department of Rail Transport
97	Feasibility Study Project for Electric Public Transport Service Routes around Mueang Uttaradit	2571	Department of Land Transport
98	Feasibility Study Project for Developing Inter-Provincial Public Transport System in Kamphaeng Phet	2571	Department of Land Transport

No.	Key Plan/Project	Year of Implementation	Responsible Agency
99	Feasibility Study Project for Developing Public Transport System Connecting Kamphaeng Phet and Nakhon Sawan Railway Station	2571	Department of Land Transport
100	Feasibility Study Project for Developing Public Transport System Connecting Kamphaeng Phet and Phitsanulok Airport	2571	Department of Land Transport
101	Study Project for Connecting Rail Transport System, Kamphaeng Phet Province	2571	Department of Land Transport
102	Feasibility Study Project for Developing Urban Public Transport System, Phichit Province	2571	Department of Land Transport
103	Feasibility Study Project for Developing Public Transport System, Taphan Hin - Mueang Phichit Route	2571	Department of Land Transport
104	Feasibility Study Project for Developing Inter-Provincial Public Transport System in Phichit	2571	Department of Land Transport
105	Study Project for Guidelines to Promote Water Transport and Merchant Marine on the Ping - Nan - Yom Rivers in the Lower Northern Provincial Group 2 (Nakhon Sawan, Kamphaeng Phet, Phichit, Uthai Thani) to revitalize transport and water tourism routes	2571 - 2575	Marine Department
106	Project to Study and Develop the Area around Phichit Railway Station	2571	Department of Public Works and Town & Country Planning
Development Approach 3: Facilitating Freight Transport and Logistics Services			
107	Study and Design Project for a Logistics Hub as a transport, communication, and distribution center, Loei Province	2570 - 2571	Department of Land Transport
108	CY (Container Yard) Construction Project at Natha Station (PPP)	2572	State Railway of Thailand
109	CY Construction Project at Nong Takhai Station (PPP)	2572	State Railway of Thailand
110	CY Construction Project at Udon Thani Station (PPP)	2572	State Railway of Thailand
111	Feasibility Study Project for Construction of a Truck Rest Area, Highway No. 213 (Kalasin - Sakon Nakhon)	2576 - 2577	Department of Highways
112	Feasibility Study Project for Developing a Rail Freight Transport, Communication, and Distribution Hub for the Northeastern Region, Roi Et Province	2570 - 2571	Department of Land Transport
113	Feasibility Study Project for Construction of a Truck Rest Area, Highway No. 12 (Kalasin - Mukdahan)	2568 - 2569	Department of Highways
114	CY Construction Project at Thapra Station (PPP)	2570	State Railway of Thailand
115	CY Construction Project at Non Phayom Station (PPP)	2572	State Railway of Thailand
116	Feasibility Study Project for Construction of a Truck Rest Area, Highway No. 24 near Prasat District, Surin Province	2571 - 2572	Department of Highways
117	CY Construction Project at Bua Yai Junction Station (PPP)	2572	State Railway of Thailand
118	CY Construction Project at Kut Chik Station (PPP)	2572	State Railway of Thailand
119	Project for Study and Development of Secondary Road Network, Loeng Nok Tha - Thai Charoen - Pa Tio Districts, to support agricultural produce and product transport	2571 - 2572	Department of Rural Roads
120	Feasibility Study Project for Developing Highway Network to Support 4,000 Rai Industrial Estate Area in Si Bua Ban Sub-district (near Lamphun Provincial Government Center)	2571	Department of Highways
121	Feasibility Study Project for a Rest Area, Mae Hong Son Province, to support tourism	2571	Department of Highways
122	Feasibility Study Project for a Distribution Center (Hub), Lamphun Province	2571	Department of Land Transport
123	Project for Study, Improvement, Promotion, and Development of Border Trade and Cross-Border Transport to promote product export for Lamphun Province	2571	Lamphun Provincial Office

No.	Key Plan/Project	Year of Implementation	Responsible Agency
124	Feasibility Study, Survey, Design, and Environmental Impact Study Project for Developing Pha Dai Tourist Pier, Chiang Rai Province	2570	Marine Department
125	Project for Study and Improvement of Cargo Holding Area at the Border Checkpoint	2570	Customs Department
126	Feasibility Study Project for Determining the Location of Container Yard (CY) to cover connections to neighboring countries	2571	Department of Rail Transport
127	Feasibility Study Project for Truck Rest Area and Facilities	2571	Department of Highways
128	Development Project for Ban Huak Border Checkpoint	2575 - 2576	Customs Department
129	Feasibility Study Project for Construction of a Rest Area on Highway No. 12	2568 - 2570	Department of Highways
130	Feasibility Study Project for Construction of a Rest Area on Highway No. 105	2571	Department of Highways
131	Feasibility Study Project for Construction of a Rest Area, Nong Phai District	2571	Department of Highways
132	Feasibility Study Project for Construction of Additional CY Access-Exit	2571	Department of Rail Transport
133	CY Construction Project at Sila At Station (PPP)	2574	State Railway of Thailand
134	Project for Construction of Freight Vehicle Parking Area at Mae Sot Border Checkpoint to solve the problem of freight vehicles parking on the bridge*	2575 - 2576	Customs Department
135	Feasibility Study Project for Connecting Route to Ban Na Kra Saeng Border Checkpoint for travel and freight transport	2571	Department of Highways
136	Study Project for Development of a Regional Freight Terminal to enhance road freight transport efficiency, Nakhon Sawan Province	2570	Department of Land Transport
137	Feasibility Study Project for Creating a Linkage between Rail System and Road Network to promote freight transport and tourism	2570	Department of Highways
138	Study Project for Improving Facilities at Rest Areas for user convenience and safety	2570	Department of Highways
139	Feasibility Study Project for Construction of a Container Yard (CY), Kamphaeng Phet Province	2571	Department of Rail Transport
140	Study Project for Promoting Domestic Freight Transport to reduce logistics costs	2571	Ministry of Commerce
141	Study Project for Construction of a Distribution Center (Hub), Uthai Thani Province	2571	Department of Land Transport
Development Approach 4: Improvement of Laws, Regulations, Rules, and Requirements, Including Implementation to Align with Current Competition			
142	Study Project for Improving Cross-Border Procedures at Border Checkpoints to promote tourism	2569 - 2570	Customs Department
143	Project for Developing a Digital Logistics & Transport Regulations Platform	2568 - 2569	Department of Land Transport
Development Approach 5: Building Personnel and Innovation Capacity			
144	Project for Developing Capacity of Government Agency Personnel and Private Sector Operators in public transport system planning and management	2569 - 2570	Department of Land Transport

Source: Consultant

6.4.3 Guidelines for Monitoring and Evaluating the Progress of the Projects

To ensure that monitoring and evaluating the progress of the project aligns with the OTP's format and principles, the details of the approach to assess the progress and monitoring of the projects can be shown as follows:

1) Review of Progress Evaluation for Plans/Projects of the Office of Transport and Traffic Policy and Planning
2) Proposal for a Progress Evaluation and Outcome Monitoring Model for Plans/Projects

6.5 Policy recommendations to enhance economic value, trade, investment, tourism, and logistics systems.

After the preparation of the Action Plan for the Development of Transport and Logistics Networks in the Upper Northeastern and Northern Provincial Clusters connected to the economic corridor areas under the GMS framework to support economic and tourism development (2025-2037), which consists of 5 development directions and 14 strategies covering network development, enhancement of public transport services, logistics systems, legal improvements, and capacity building for personnel and innovation, it can create connectivity, accessibility, and improve the efficiency of future travel and transport.

This is to promote opportunities for increasing "value added" in the economy, trade, investment, tourism, and logistics systems resulting from the development of transport and logistics networks, which means generating greater benefits and returns beyond basic operations, and focusing on sustainable transportation. The consultant has therefore prepared policy recommendations to promote value creation opportunities, focusing on management, regulatory mechanisms, innovation development that emphasizes adaptability to rapidly changing contexts, and cooperation among all sectors. The 4 recommendations are as follows:

- Recommendation 1: Promotion of public transport systems and travel connectivity
- Recommendation 2: Development of the rail system to reduce travel and freight transport costs in Thailand
- Recommendation 3: Road traffic accident mitigation
- Recommendation 4: Linkage and promotion of tourist attractions

6.5.1 Utilization of Public Transport Systems and Travel Connectivity

Thailand's public transport system is still unable to effectively compete with private car usage due to its lack of service coverage and inability to provide seamless connections between primary and secondary transport systems at the national, interregional, provincial, and urban levels. In addition, it faces issues related to reliability, including service quality, frequency, punctuality, and insufficient facilities. Moreover, fares for certain types of public transport are inconsistent with travel

distance and service quality. As a result, people still primarily choose to use personal cars and motorcycles, leading to problems such as traffic congestion, accidents, excessive fuel consumption, and air pollution that affects public health.

Policy recommendations to promote public transport systems and travel connectivity will focus on implementation within urban areas and connectivity between major transport nodes, with the following details

1. Management

Accelerate the development of public transport networks covering both major and secondary cities, implement feeder systems connecting communities to major stations, improve service quality (timetables, frequency, punctuality), develop a unified ticketing system (One Card), implement TDM measures to reduce private car use, and establish a public transport fund.

Policy Recommendation

Develop a Regional Integrated Public Transport Master Plan linking rail, bus, and local transport systems, along with supporting measures for public transport use and private vehicle restrictions.

2. Regulatory Mechanism

Promote cooperation among central government, local authorities, and the public, establish safety and quality service standards, develop a monitoring and evaluation system, and create channels for public feedback.

Policy Recommendation

Establish a Regional Transport Authority (RTA) in each region to oversee, regulate, and integrate public transport systems in collaboration with local authorities and the private sector.

3. Regulatory Reform

Amend vehicle operation regulations and licensing, promote free competition, introduce price incentives (fare reductions, privileges for vulnerable groups, tax benefits), control private car use (road pricing, parking), and revise laws related to subsidies and fare caps.

Policy Recommendation

Reform land transport laws by integrating “Car Restraint + Public Transport Incentive” measures (relax licensing barriers, restructure fare systems, and use tax policies to support mass transit systems).

4. Innovation Development

Develop travel planning apps, use IoT and real-time tracking, support electric buses (EVs), establish innovation incubators with the private sector and academic institutions, and pilot projects.

Policy Recommendation

Promote a Smart & Green Mobility Platform integrating route info, timetables, ticket booking, and real-time tracking, while accelerating the transition to EV/Zero Emission public transport fleets.

5. Infrastructure Improvement

Accelerate the development of urban and rural mass transit routes, improve stations, stops, and facilities, increase walking and cycling paths (NMT), develop TOD areas around major stations, build transfer centers, and implement pilot projects in tourism/economic zones.

Policy Recommendation

Develop Integrated Transport Hubs in major cities and TOD (Transit Oriented Development) infrastructure that supports seamless and sustainable travel.

6.5.2 Development of the Rail System to Reduce Travel and Freight Transport Costs in Thailand

Travel and freight transportation between cities by rail in Thailand is still not widely adopted due to an underdeveloped rail network. Currently, 29 provinces still lack rail transport systems. Moreover, connections between major cities, secondary cities, and rural areas are insufficient, resulting in continued dependence on private cars and buses, which incur higher costs and contribute to traffic congestion, accidents, and pollution. The existing rail system also suffers from low speed and frequency, outdated station and carriage facilities, and insufficient maintenance, making rail not yet a primary travel option between cities.

In terms of freight transport, the rail system still lacks connectivity with industrial zones and faces issues such as delays, a shortage of vehicles and containers. As a result, operators rely on more expensive road transport, leading to high logistics costs and reduced national competitiveness. Additionally, cross-border connectivity for international trade still encounters complex and slow customs procedures, as well as road infrastructure damage and accidents from heavy truck usage.

Furthermore, the development of the rail system has progressed slower than planned. Based on future trend analysis, even if rail infrastructure is developed according to targets, it still may not attract sufficient modal shift from road to rail. Therefore, the government should urgently implement measures to enhance the reliability of the rail system and establish it as the primary mode for both passenger travel and freight transportation.

Policy recommendations for the development of the rail system to reduce travel and freight transport costs in Thailand will focus on the implementation of the R-map and MR-Map master plans and the connection of key transport nodes (Transport Node), with details as follows.

1. Management

Accelerate development in accordance with the R-map and MR-Map, expand double-track/high-speed rail network, apply the Hub and Spoke model in logistics, improve service quality and train operation management, establish a Rail Transport Dashboard, connect rail systems with buses and boats, support One Stop Service at border checkpoints and container service centers.

Policy Recommendation

Formulate a Railway Backbone Master Plan integrating passenger travel and freight transport, along with supporting ICD centers and One Stop Service systems to enhance logistics efficiency.

2. Regulatory Mechanism

Set service standards (cleanliness - safety - punctuality), plan long-term maintenance, regulate accessible fare pricing, support PPP and encourage more private sector involvement, implement a Single Form to reduce redundant procedures.

Policy Recommendation

Establish a Railway Regulatory Authority to regulate quality standards, safety, and fare pricing, as well as promote PPP in rail system investment.

3. Regulatory Reform

Amend laws to incentivize investment (tax, privileges), promote free competition, protect investors, designate areas around stations as special economic zones, enact laws to promote rail travel (fare reductions, special privileges, tax), improve safety regulations, promote rail freight (subsidies, tax incentives, low fees), set time/compensation standards, and improve customs procedures to One Stop Service.

Policy Recommendation

Reform the Rail Transport Act to cover investment, safety, passenger benefits, and cross-border logistics in order to build confidence and enhance competitiveness.

4. Innovation Development

Develop digital systems (online booking, e-ticket, AI scheduling, tracking), apply IoT to railways and trains, promote electric and hydrogen trains, establish innovation incubation centers with pilot projects.

Policy Recommendation

Promote the Smart & Green Railway Program integrating Big Data, IoT, AI, and clean energy to reduce costs, enhance safety, and reduce pollution.

5. Infrastructure Improvement

Accelerate development of double-track and high-speed rail, improve stations and facilities, create feeder systems, develop low-cost containers, and improve tracks to support timely freight transport.

Policy Recommendation

Advance high-speed and double-track railway projects to connect regions, and establish logistics hubs around major stations with feeder systems covering both urban and rural areas.

6.5.3 Road Traffic Accident Problem Solving

The World Health Organization reported that Thailand has one of the highest road traffic fatality rates in the world. In 2021, Thailand had a traffic fatality rate of 25.4 deaths per 100,000 population (approximately 16,000-18,000 deaths per year). Most road traffic fatalities involved motorcycle users and working-age individuals. The main causes of accidents include speeding, drunk driving, and failure to comply with traffic laws. Additionally, some of the issues stem from infrastructure

deficiencies, such as damaged roads, accident-prone spots, and lack of safety equipment. Road traffic accidents result in direct and indirect economic losses of more than one trillion baht and affect the health and quality of life of the population.

These problems are structural at the macro level, due to the need to rely on road transportation as the primary mode of travel. Other contributing factors include weak law enforcement, reliance on personal vehicles (cars and motorcycles), lack of efficient public transportation systems, and insufficient coverage of other transport modes such as rail. There are also issues concerning safety standards.

Policy recommendations for solving road traffic accident problems will be implemented on highway areas and urban roads, with details as follows.

1. Management

Accelerate the implementation of the Road Safety Master Plan at all levels, establish a central hub for collecting and analyzing accident data, integrate data from multiple agencies (Transport - Public Health - Police - Local Authorities), establish a continuous monitoring and evaluation system, and cultivate a disciplined driving culture.

Policy Recommendation

Establish a National Road Safety Data Center to collect, analyze, and disseminate integrated accident data, and set short-, medium-, and long-term accident reduction targets.

2. Regulatory Mechanism

Enhance the roles of the National Road Safety Policy Committee (NRSPC) and the Road Safety Directing Center (RSDC), integrate law enforcement between police - transport - local agencies, inspect the quality of freight/public transport service providers, allocate budget support, and open participation to civil society.

Policy Recommendation

Establish a Road Safety Regulatory Authority to oversee and enforce safety measures with a mechanism for public monitoring.

3. Regulatory Improvement

Amend the Land Traffic Act B.E. 2522, the Motor Vehicle Accident Victim Protection Act B.E. 2535, and related laws to impose harsher penalties on repeat offenders (drunk driving, speeding), mandate installation of safety equipment in new cars (ABS, airbags, collision warning systems), use technology to detect speeding and drunk driving, and implement tax incentive measures for high-safety-standard vehicles.

Policy Recommendation

Reform traffic and vehicle laws with a focus on a “Zero Tolerance Policy” for drunk driving/speeding, and use tax and benefit measures to promote the use of safe vehicles.

4. Innovation Development

Use IoT and GPS to monitor driving behavior and engine conditions in real time, use AI + Big Data to predict risks, develop early warning systems, and create safety applications (Safe Route, Rest Stops, Emergency Alert).

Policy Recommendation

Promote the Smart Road Safety Innovation Program integrating IoT - AI - Big Data to provide warnings and prevent accidents before they occur.

5. Infrastructure Improvement

Upgrade road standards (widen shoulders, safe U-turn points, truck escape ramps, lighting at risk areas), install barriers and signals at road-rail crossings, use self-healing materials for road maintenance, implement pilot projects to reduce accidents in risk areas, and promote V2X (Vehicle-to-Everything) technology.

Policy Recommendation

Implement the Safe Infrastructure & Smart Mobility Program combining road and risk area improvements with V2X technology to raise safety standards.

6.5.4 Connecting and Promoting Tourist Attractions

Thailand's tourism industry is growing, with an increasing trend of tourists seeking in-depth experiences and healthy elderly tourists. However, there are still limitations in accessibility and transportation connectivity, especially in secondary cities and rural tourist destinations that lack infrastructure and seamless public transportation systems. In addition, the inconsistency between routes and schedules of trains, vans, and buses causes delays and high travel costs. Meanwhile, reliance on private vehicles results in traffic congestion in tourist areas, and the lack of clear travel information, especially for international tourists, remains a major obstacle to sustainable tourism and the distribution of income to local communities.

Policy recommendations for connecting and promoting tourism will focus on implementation areas along the Main Tourism Corridor of all modes of the transportation network, with the following details.

1. Management

Accelerate the development of public transportation networks to tourist destinations, implement feeder systems from airports - railway stations - main bus terminals, control the use of private vehicles in tourist areas, promote PPP to attract investment, use regional university networks as think tanks, and distribute investment to secondary cities.

Policy Recommendation

Establish a Tourism Mobility Master Plan covering primary and secondary cities, linking public transport systems - NMT (bicycle/walking), and promoting PPP + regional universities as knowledge supporters.

2. Regulatory Mechanism

Establish a joint committee (Transport - Tourism - Local Authorities), develop a service quality evaluation system from tourist data, integrate transport and tourism data on a central platform.

Policy Recommendation

Establish a Provincial Tourism Transport Committee (PTTC) to monitor and set directions for tourism transport system development, as well as define quality indicators and shared data platforms.

3. Regulatory Improvement

Amend investment promotion - PPP laws to support mass transit projects in tourist areas, revise regulations for transport operation licenses, set service standards (safety - cleanliness - punctuality), enforce clean energy vehicles in tourist areas.

Policy Recommendation

Amend the Public Transport & Tourism Act to support:

- Tax privileges/subsidies for PPP
- Tourism transport service standards
- Mandatory use of EV Bus / Green Mobility in tourist zones

4. Innovation Development

Develop applications providing information - routes - fares, use IoT and GPS in buses for real-time tracking, use Big Data + AI to analyze tourist behavior for transport system design.

Policy Recommendation

Establish a Smart Tourism Transport Platform integrating travel planning functions, real-time info, digital guides, and using AI analysis to enhance tourism mobility.

5. Infrastructure Improvement

Develop roads - connection points - multilingual signs, accelerate double-track/high-speed rail links to tourist sites, develop Transport Hubs, promote pilot projects in key tourist provinces (Chiang Mai, Nakhon Ratchasima, Loei).

Policy Recommendation

Advance the Tourism Connectivity Infrastructure Program, such as developing Transport Hubs, improving roads to tourist sites, and developing TOD around railway stations - airports.

6.6 Information Database System

This was has been prepared to summarize the approach to designing and developing a transportation information database system, which serves as a vital component for strategic planning at both regional and national levels. The focus is particularly on the northeastern and northern regions of Thailand, which play a crucial role in linking with the economic corridors under the Greater Mekong Subregion (GMS) cooperation framework.

The primary objective of the project is to develop an accurate, interconnected, and practically applicable database system that can be used at the policy level to support infrastructure planning, investment, transportation, logistics, and tourism in targeted areas. The designed system integrates and manages data from multiple dimensions, including demographics, economic indicators, transportation routes—road, rail, air, and water—as well as quantitative forecasts for future development.

The data visualization of the study for developing the transportation network model is presented as a Dashboard using the Power BI program.

The program's visualization of the aforementioned project clarifies the data, allowing for rapid and efficient data analysis from various sources, such as Excel Files, Microsoft Access Database, SQL Server, Oracle, etc. Users do not require technical knowledge because the program can display results in various forms, including tables, summarized visualizations, and various graph types, which can be linked and managed through the Dashboard, as shown in **Figure 6.6-1**

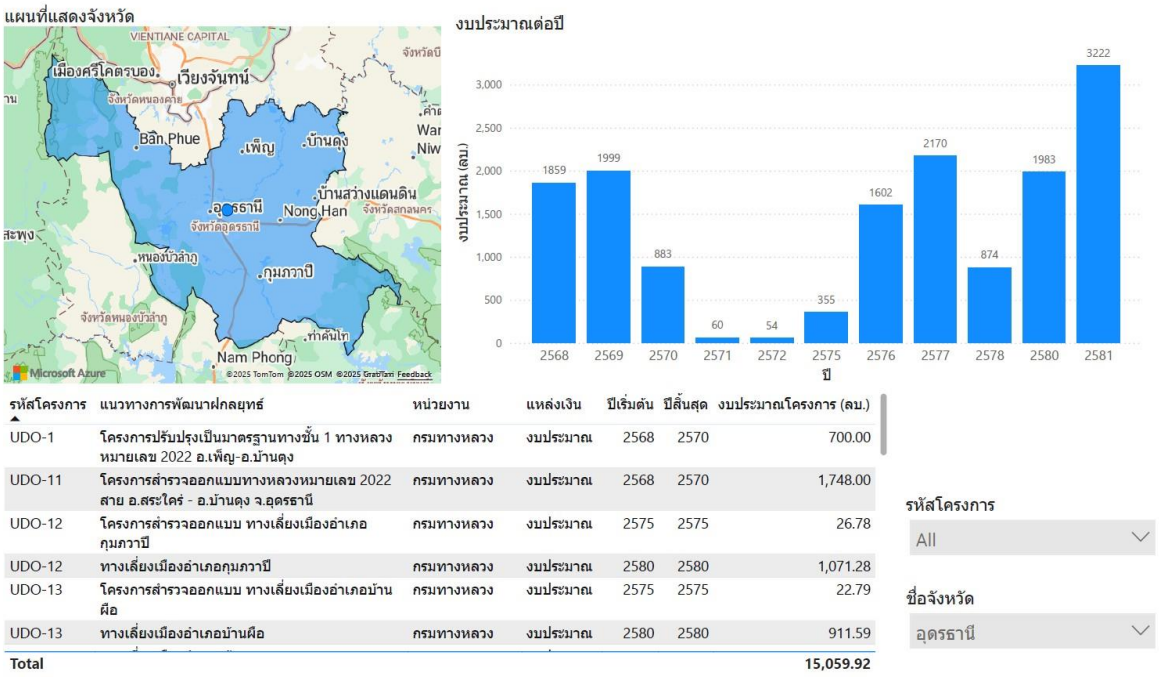


Figure 6.6-1 Data visualization of the projects under the development plan, along with their budget, separated by province, using Power BI, specifically for Udon Thani Province.

Developing a transportation information database provides the following benefits for development and management:

1. Serves as a central database for planning and establishing transportation strategies at the national, regional, and provincial levels.
2. Supports strategic decision-making by systematically linking infrastructure and transportation system data.
3. Increases efficiency in analyzing and forecasting travel demand and ensuring infrastructure development aligns with local needs.
4. Aids in the consideration and determination of transportation investment projects to achieve maximum benefits for the economy and society.
5. Supports the linkage of data from multiple sources such as roads, airports, ports, and railways, enabling joint analysis and utilization.
6. Facilitates relevant agencies and stakeholders in accessing accurate, up-to-date data for rapid decision-making.
7. Helps identify opportunities for developing new infrastructure or improving existing structures to suit future demands.

Chapter 7

Public Relations and Public Participation

Chapter 7

Public Relations and Public Participation

7. Public Relations and Public Participation

7.1 Public Relations Plan and Implementation of Public Participation Activities

For the project's public relations and public participation activities, the consultant shall develop a Public Relations Plan and a Public Participation Implementation Plan. These plans will be aligned with the overall project study and implementation schedule. The proposed approach for these activities is as follows:

1) Project Area

The project area will cover the study areas of the project, including provinces in the Northeastern and Northern regions of Thailand.

2) Format and Timing of Meetings/Seminars

The format and timing of meetings or seminars shall include appropriate content for presenting project information that aligns with the study process and the schedule for report submission.

3) Target Groups

The target audiences include relevant provincial government agencies, private sector representatives, business operators, and stakeholders in commerce and industry within the project area.

4) Public Relations and Public Participation Plan

The consultant shall submit the Public Relations Plan and the Public Participation Implementation Plan to the Office of Transport and Traffic Policy and Planning (OTP) for approval prior to commencing related activities. The consultant will organize meetings, trainings, seminars, and public relations activities to introduce the project and gather feedback from government agencies, private sector entities, and the general public. The activities will be conducted in accordance with the public participation and stakeholder engagement plan.

7.2 Results of the Seminar for Project Introduction and Stakeholder Feedback

1) Objectives of the Seminar for Project Introduction

(1) To introduce the project and present key information, including the project overview, scope of study, development framework, study implementation plan, and project timeline.

(2) To gather opinions and suggestions to support the implementation process and refine the project development approach, ensuring alignment with local needs, area potential, and systematic project development.

2) Summary of Comments and Suggestions from the Project Introduction Seminar

The project introduction seminar covered 9 target areas. The key comments and suggestions can be summarized as follows:

No.	Date/Time	Target Area	Number of Participants	Summary of Comments and Suggestions
1	Tuesday, September 19, 2023 08:30 AM – 3:00 PM Majorel Meeting Room, The Princess Hotel, Udon Thani City, Udon Thani Province	The Upper Northeastern Provincial Cluster 1 consists of Udon Thani, Bueng Kan, Loei, Nong Khai, and Nong Bua Lamphu provinces.	69 people	- Nong Bua Lamphu and Loei provinces have stone quarry sites where overweight trucks frequently pass. It is recommended to plan for weigh stations and weight control checkpoints to mitigate road subsidence impacts. - It is requested that Highway No. 211 be extended to Tha Li District, Loei Province, due to the presence of a customs checkpoint facilitating border trade in Tha Li. - Nong Bua Lamphu Province has a limited budget, with over 70% allocated for road repairs. Therefore, related agencies are urged to take responsibility for maintenance, allowing the province to allocate more funds to address other issues such as increasing citizen income, promoting occupations, and reducing inequality. - Highway No. 211, known as the Romantic Road along the Mekong River connecting Nong Khai, Loei, and Chiang Khan provinces, experiences heavy traffic. However, there is no development plan to expand the road, which currently has an 8-meter-wide carriageway that is insufficient. An urgent plan for road expansion is requested. - According to the presented plan, the Container Yard at Udon Thani Industrial Estate has already been completed over 70%. - Project priorities should be established, and it is requested that the project align with the new master plan of Udon Thani Province, which is currently under development. - This project requires Environmental Impact Assessment (EIA) and Social Impact Assessment (SIA) to develop risk management and mitigation plans for potential issues.
2	Monday, September 18, 2023 08:30 AM – 3:00 PM Phu Sakon Grand Meeting Room, Sakon Grand Palace Hotel, Mueang Sakon Nakhon	The Upper Northeastern Provincial Cluster 2 consists of Sakon Nakhon, Nakhon Phanom, and Mukdahan provinces.	82 people	- It is proposed that transportation routes along the border areas, particularly those adjacent to the Mekong River, be developed. - It is proposed that Sakon Nakhon Airport be designated as a Sister Airport under a Sister Airport Agreement (SAA), and be upgraded to an International and Customs Airport. - It is requested that the construction of the East–West Economic Corridor (EWEC) along the East–West Economic Belt be expedited to ensure its full completion.

No.	Date/Time	Target Area	Number of Participants	Summary of Comments and Suggestions
	District, Sakon Nakhon Province			- Agricultural development should be promoted, as Mukdahan Province is known for its volcanic durians grown in Dong Luang District, including Ban Nong Chomphu, Ban Nong Sung, Ban Don Tan, and Ban Phu Pha Hom. - A historical and cultural tourism route is proposed, as Sakon Nakhon Province is home to tourist attractions over 1,000 years old, such as Phra That Phu Phet. However, there is a lack of concrete tourism promotion and the sites remain difficult to access. - It is recommended that support be provided to encourage tourists to stay overnight in Sakon Nakhon Province, as the province offers a diverse range of tourism attractions. - It is recommended that security measures along the Mekong River border area be eased. Instead of relying solely on military surveillance, it is proposed that an electronic monitoring system such as long-range surveillance cameras be implemented.
3	Wednesday, September 20, 2023 08:30 AM – 3:00 PM Borirak 2 Meeting Room, VIVICH Hotel, Mueang Khon Kaen District, Khon Kaen Province	The Central Northeastern Provincial Cluster consists of Khon Kaen, Kalasin, Maha Sarakham, and Roi Et provinces.	75 people	- Detailed information on the East–West Economic Corridor (EWEC) route is requested, as it connects Khon Kaen Province to Yang Talat District in Kalasin Province, which is expected to become a future hub for Champion Products. - It is proposed to develop infrastructure to expand opportunities for local residents. - Product processing should be adjusted to produce smaller-sized goods to increase product value and reduce transportation costs. - Tourism development should focus on community culture, beliefs, and faith to increase tourist numbers. - Tourism site owners are encouraged to enhance the potential of their attractions by providing historical information, developing personnel language skills, improving restoration efforts, and ensuring convenience and cleanliness. - Integration of plans across different areas should avoid overlap in responsibilities and budgets among projects. Prioritization of projects is necessary to determine which should be implemented first.

No.	Date/Time	Target Area	Number of Participants	Summary of Comments and Suggestions
4	Thursday, September 21, 2023 08:30 AM – 3:00 PM Nok Yoong 3 Meeting Room, Center Point Terminal 21 Korat Hotel, Mueang Nakhon Ratchasima District, Nakhon Ratchasima Province	The Lower Northeastern Provincial Cluster 1 consists of Nakhon Ratchasima, Chaiyaphum, Buriram, and Surin provinces.	87 people	- It is proposed that refrigerated cargo transportation should be carried out via rail, with goods delivered directly to the final destination to avoid the need for transshipment or handling during transit. - It is requested to urge other relevant agencies to clarify and reach conclusive decisions on projects under study, such as the location of the Container Yard (CY) in Nakhon Ratchasima Province. - It is requested to develop the Chong Chom checkpoint to enhance trade, utility, and convenience in order to increase user volume. - Policy-driven investment is needed to develop the UNESCO Ring Road (UNESCO Triple Heritage City). Although the roads already exist, they lack distinctive identity, necessitating further development in this area. - Passenger transport terminals serve as central hubs for gathering and distributing passengers. It is requested to conduct a study on the connectivity between bus terminals, railway stations, and airports. - Tourism routes should be designed to offer diverse options, divided into two categories: sightseeing tours and overnight stays.
5	Friday, September 22, 2023 08:30 AM – 3:00 PM Pathumwan 5 Meeting Room, Sunyi Grand and Convention Center Hotel, Mueang Ubon Ratchathani District, Ubon Ratchathani Province	The Lower Northeastern Provincial Cluster 2 consists of Ubon Ratchathani, Yasothon, Sisaket, and Amnat Charoen provinces.	91 people	- It is proposed to establish sufficient electric vehicle (EV) charging stations to accommodate the increasing demand in the future. - It is proposed to conduct negotiations to permit Thai-registered vehicles to operate in other countries, aiming to promote economic development and tourism. - Ubon Ratchathani Province currently lacks a motorway. It is proposed to construct a motorway connecting the Eastern region to the Northeastern region. - Freight transportation between Thailand and neighboring countries still faces obstacles due to designated cargo transfer points. It is recommended to extend the cargo transportation distance to facilitate smoother trade.

No.	Date/Time	Target Area	Number of Participants	Summary of Comments and Suggestions
				- The transportation of agricultural products still relies on intermediaries, making it difficult for producers to export directly to destination countries. It is recommended to establish a centralized hub in each province for the aggregation and distribution of agricultural products. - It was proposed that the development of the 6th Thai–Lao Friendship Bridge be expedited. Additionally, if the 6th Thai–Lao Friendship Bridge is constructed, it is necessary to assess the potential impacts on the existing Chong Mek border checkpoint, as a new border crossing point will be established. - It was suggested that the industrial factory data be updated, as the number of factories has decreased. - It was recommended that the development of the sports industry in each province be promoted in order to attract public interest and further stimulate the economy. - Were there any challenges or obstacles encountered during the preliminary data collection, such as areas potentially affected by environmental concerns, cultural heritage, or historical sites?
6	Monday, September 25, 2023, from 08:30 A.M. - 03:00 P.M., at Chiang Rung Meeting Room, Wiang Inn Hotel, Mueang Chiang Rai District, Chiang Rai Province.	The Upper Northern Region Cluster 2 comprises Chiang Rai, Nan, Phayao, and Phrae provinces.	89 people	- It is recommended to enhance the road network connecting to the Den Chai–Chiang Khong railway line by ensuring adequate and appropriate connections to the planned railway stations in Chiang Rai, Phayao, and Phrae provinces. - Regarding the three northern border checkpoints the ones bordering Myanmar, along the Mekong River, and bordering the Lao PDR appropriate strategies should be developed to ensure these key checkpoints are effectively connected with all 17 provinces in the region, and integrated into the national trade and logistics hub. - Mae Fah Luang Chiang Rai International Airport should be further developed, including the establishment of an aircraft maintenance center and the construction of taxiways capable of supporting international air cargo transport.

No.	Date/Time	Target Area	Number of Participants	Summary of Comments and Suggestions
				- The Chiang Saen Customs checkpoint handles a very high volume of cargo transportation, resulting in substantial tax revenue. However, cargo transportation is not yet fully optimized due to incomplete protocols, including regulations and border crossing procedures. - It is recommended to provide information regarding access to transportation and export channels for agricultural products, as farmers currently lack sufficient knowledge about export processes. - It is recommended to modernize tourism development by providing information on city entry procedures, regulations for vehicle usage in Thailand, immigration inspection methods, and currency exchange.
7	Tuesday, September 26, 2023 08:30 AM – 3:00 PM Imperial Ballroom, 2nd Floor The Empress Hotel, Mueang District, Chiang Mai Province	The Upper Northern Region 1 consists of Chiang Mai, Mae Hong Son, Lampang, and Lamphun provinces.	85 people	- It is recommended to conduct further surveys and design studies for a high-speed rail connection between Chiang Mai and Chiang Rai. Additionally, progress updates on the Chiang Mai–Chiang Rai motorway should be requested, as the feasibility study has been ongoing for over 10 years without significant advancement. This route is highly demanded by the public. - Since Pai District's tourism sector ranks third highest in revenue in Northern Thailand, it is recommended to expand Pai Airport in Mae Hong Son Province to accommodate aircraft with at least 70 seats. Currently, the airport can only support aircraft with 12 seats, and no airlines in Thailand operate planes with such a small capacity. - It is recommended to conduct a feasibility study on constructing tunnels connecting Mae Hong Son–Chiang Mai and Pai–Mae Hong Son routes, passing through three mountains: Huai Nam Dang, Doi Kiew Lom, and Khao Laam. If feasible, this project would reduce travel time between Chiang Mai and Mae Hong Son to just 3 hours. - The presentation did not cover the industrial sector of Lamphun Province, which is currently undergoing transformation into BCG (Bio-Circular-Green) industries and green industries at Mae Mo GPP.

No.	Date/Time	Target Area	Number of Participants	Summary of Comments and Suggestions
				- Lamphun Province produces agricultural products such as fresh longan, dried longan with peel, and golden longan, which are exported to Europe, thereby adding value to the agricultural sector. - A major obstacle to tourism is that direct international flights are not allowed to land at Chiang Mai Airport after midnight.
8	Wednesday, September 27, 2023 08:30 AM – 3:00 PM Convention Room 1 Topland Hotel, Mueang District, Phitsanulok Province	The Lower Northern Region 1 consists of Phitsanulok, Tak, Phetchabun, Sukhothai, and Uttaradit provinces.	99 people	- There is a need for traffic management specifically for freight trucks. - Highway No. 1246 and Highway No. 117 serve as strategic routes connecting to the Phu Du border checkpoint in Uttaradit Province. If both roads are upgraded to four lanes, they will significantly enhance transportation efficiency. - As Thai society transitions into an aging society, it is essential to consider infrastructure development that accommodates people of all age groups. - A proposed location for a container yard (CY) is in the Phajuk Subdistrict Municipality, Uttaradit Province. The area spans over 2,000 rai, with partial development already in place, and has access to the border. It is recommended that logistics development be considered at this site. - Phitsanulok Province produces the largest quantity of mangoes in the country, yet there is still no processing plant to support value-added production. - Phitsanulok has only 442 factories, with no large-scale industrial plants like those in neighboring provinces. This raises questions about whether urban zoning regulations are a contributing factor. - Is it possible to request the establishment of a factory in the Logistics Hub area of Phitsanulok Province, which is currently undergoing a feasibility study? - After Si Thep Historical Park in Phetchabun Province was designated a World Heritage Site, the number of tourists has significantly increased. However, there is still no tourism support

No.	Date/Time	Target Area	Number of Participants	Summary of Comments and Suggestions
				plan in place, such as restrooms, parking, accommodations, or retail areas. It is recommended to establish rest areas to accommodate visitors. - It is also proposed to construct alternative travel routes to support tourism to Si Thep Historical Park during the rainy season.
9	Thursday, September 28, 2023 08:30 AM – 3:00 PM Sapphire Room, Bonito Chinos Hotel Mueang District, Nakhon Sawan Province	The Lower Northern Region 2 consists of Nakhon Sawan, Kamphaeng Phet, Phichit, and Uthai Thani provinces.	86 people	- According to current plans for major transportation infrastructure, the routes pass only through the eastern part of Kamphaeng Phet Province. It is recommended that future transportation routes also pass through the western part to improve convenience and modernity. - It is requested that Highway No. 1112, a key route frequently used by farmers for transporting agricultural products, be improved and upgraded. - If an expressway or motorway is to be constructed, there is concern that it may negatively impact local communities, particularly farmers. Therefore, it is important to consider whether the project includes plans for underpasses or tunnels to facilitate agricultural transportation. - An inquiry is raised regarding the feasibility of constructing Highway No. 1117, connecting Khlong Mae Lai to Umphang. - There is an overlap between the MR1 route and the eastern ring road in Nakhon Sawan Province. It is proposed to consolidate the two routes, and if possible, relocate the MR1 route to the western side of the province. - The provinces in Lower Northern Region 2 are often perceived merely as transit areas. Therefore, efforts should be made to enhance their attractiveness and economic significance.

7.3 Results of Focus Group Discussions in the Study Area to Gather Information, Opinions, and Recommendations from Relevant Development Stakeholders

1) Objectives of the Focus Group Discussion (Focus Group)

(1) To study the key types of agricultural and industrial products in the province, including production volumes and periods, transportation modes and costs, and the destinations of goods transported.

(2) To study trade and investment activities, as well as travel patterns related to the conduct of such activities.

(3) To study the number of tourists, their destinations, and their travel behavior, including accommodation choices and spending patterns.

(4) To study the roles of government and private sector agencies in the province's transportation and logistics operations.

(5) To study the problems, obstacles, and economic development opportunities of the province arising from activities in items (1) to (3), including other recommendations.

2) Summary of Key Comments and Recommendations from the Focus Group Discussions (Focus Group)

The focus group discussions covered 37 target areas. The key comments and recommendations can be summarized as follows:

No.	Date / Time / Location	Target Area	Number of Participants	Summary of Comments and Suggestions
1	Monday, March 11, 2024 08:30 AM – 3:00 PM Sirinthara 1 Meeting Room The One Hotel, Mueang District, Bueng Kan Province	Bueng Kan Province	40	- Bueng Kan Province has important tourist attractions, but the transportation routes are narrow and inconvenient for access. - It is proposed that the Bueng Kan – Chong Chom road be developed within a 10-20 year framework to connect the northern and southern Isan regions. - The acceleration of the Bueng Kan Airport project is recommended to attract more tourists to the province. - It is proposed to establish a Container Yard promptly and to implement technology in transportation management, especially for agricultural products that require speed and technological support. - Airfare is high due to limited airlines and flights at Loei Airport, which is small and restricted; expansion and upgrades to international standards are needed. - Due to difficulties expanding the road to 4 lanes through protected areas, Loei Province plans to construct a two-lane elevated road connecting with the skyway, focusing on the route from Mueang Loei District to Phu Ruea District. - It is proposed to widen the road from two lanes to four lanes along the Sri Bun Rueang – Chum Phae route, approximately 50 kilometers. - For the Khon Kaen – Ubon Rat – Non Sawang route, it is proposed to widen the road from two lanes to four lanes, covering about 120 kilometers. - Projects related to public transportation systems should be promoted and expedited promptly. - The transportation system currently lacks a railway network; its development would greatly enhance transportation efficiency.
2	Tuesday, March 12, 2024 08:30 AM – 3:00 PM Leelawadee Meeting Room Pannalan Boutique Resort Hotel, Mueang District, Nong Khai Province	Nong Khai Province	40	
3	Wednesday, March 13, 2024 08:30 AM – 3:00 PM Chamchuri Meeting Room Loei Palace Hotel, Mueang District, Loei Province	Loei Province	46	
4	Thursday, March 14, 2024 08:30 AM – 3:00 PM Chuan Phit Meeting Room Natthapong Grand Hotel, Mueang District, Nong Bua Lamphu Province	Nong Bua Lamphu Province	43	

No.	Date / Time / Location	Target Area	Number of Participants	Summary of Comments and Suggestions
5	Friday, March 15, 2024, 08:30 AM – 3:00 PM Crystal Top Meeting Room, 6th Floor Prachaktra Design Hotel, Mueang District, Udon Thani Province	Udon Thani Province	43	
6	Monday, March 18, 2024, 08:30 AM – 3:00 PM Prempreeda Meeting Room The Majestic Hotel, Mueang District, Sakon Nakhon Province	Sakon Nakhon Province	38	- It is proposed to increase the number of flights, as currently there are only morning and evening flights. Increasing flight frequency may lead to a rise in tourist arrivals. - There is a need for a double-track railway and infrastructure improvements to support tourism and transportation. - It is proposed to establish a Container Yard (CY) in Nakhon Phanom Province. - Roads connecting to Mukdahan Province should be improved, as current conditions adversely affect freight transportation. - Electric vehicle (EV) public transportation connecting provinces should be implemented to enhance convenience, safety, and support the development of Smart Cities.
7	Tuesday, March 19, 2024 08:30 AM – 3:00 PM River Heritage Meeting Room The River Hotel, Mueang District, Nakhon Phanom Province	Nakhon Phanom Province	44	
8	Wednesday, March 20, 2024 08:30 AM – 3:00 PM Morakot Meeting Room Ploy Palace Hotel, Mueang District, Mukdahan Province	Mukdahan Province	43	

No.	Date / Time / Location	Target Area	Number of Participants	Summary of Comments and Suggestions
9	Thursday, March 21, 2024 08:30 AM – 3:00 PM Benjaporn Meeting Room Rim Pao Hotel, Mueang District, Kalasin Province	Kalasin Province	48	- Truck parking and resting areas should be located at appropriate sites; currently, trucks park before ascending mountainous areas. - The route in Phon Thong District is mountainous, causing difficult travel conditions and longer transportation times. - It is proposed to develop a network to connect with MR2.
10	Friday, March 22, 2024 08:30 AM – 3:00 PM Meeting Room S2 S. Tawan Hotel, Mueang District, Maha Sarakham Province	Maha Sarakham Province	36	- Highway 219 has several bottleneck sections, and Highway 2240 near the Government Complex, currently a four-lane road without a median, frequently experiences accidents. Improvement and safety measures on these roads are necessary. - Development of a public transportation network system is proposed. - Khon Kaen Province still faces connectivity issues with neighboring provinces on several routes such as Borabue and Nong Ruea, as well as bottlenecks on routes including Ban Thum - Manchakhiri and Nam Phong - Kranuan. - It is suggested to address the issue of overloaded trucks by improving road structures to enhance durability and increasing inspection checkpoints on secondary roads.
11	Monday, April 1, 2024, 08:30 AM – 03:00 PM Venue: Hoop Taem Meeting Room, Le Cassia Hotel, Mueang District, Khon Kaen Province	Khon Kaen Province	41	
12	Tuesday, April 2, 2024, 08:30 AM – 03:00 PM Paithoon Meeting Room, Phetcharat Garden Hotel, Mueang District, Roi Et Province	Roi Et Province	40	

No.	Date / Time / Location	Target Area	Number of Participants	Summary of Comments and Suggestions
13	Wednesday, April 3, 2024, 08:30 AM – 03:00 PM Amornwadee 2 Meeting Room, The Green Park Grand Hotel, Mueang District, Yasothon Province	Yasothon Province	39	- The change in the types of passenger vehicles has caused operators to experience unprofitability. Issues related to regulations have led to conflicts among different types of vehicle operators. - For the freight transport route in Loeng Nok Tha District, it is requested to widen the shoulders and increase lighting due to frequent accidents. - It is proposed to develop tourist attractions to increase their recognition, such as Phra That Anon, the only one of its kind in the world. Additionally, routes should be added to connect with tourist sites in neighboring provinces, for example, Phra That Phanom in Nakhon Phanom Province and Phra That Anon in Yasothon Province. - Transportation faces issues with the route segment in Nakhon Ratchasima Province, which acts as a bottleneck, especially during festival periods. It is requested that additional routes be developed to facilitate easier travel to the Northeastern region. - The area around the customs checkpoint is congested due to its limited space. Issues related to land ownership management prevent expansion, resulting in overcrowding at the checkpoint. - It is proposed to revise the public transportation system in the area to enhance convenience and efficiency for users. - There is a demand for the establishment of Sisaket Airport. - It is proposed to promote the development of an outer ring road within Sisaket Province, as well as to improve the route to Chong Sangam border checkpoint to enhance convenience, thereby benefiting the local economy.
14	Thursday, April 4, 2024, 08:30 a.m. - 03:00 p.m. Nai Lert Meeting Room, Lertwijit Hotel, Mueang Amnat Charoen District, Amnat Charoen Province	Amnat Charoen Province	42	
15	Friday, April 5, 2024, Time: 08:30 AM – 03:00 PM Venue: Meeting Room 1, Nathasiri Residence Hotel, Mueang District, Ubon Ratchathani Province	Ubon Ratchathani Province	48	
16	Monday, April 22, 2024, 08:30 AM – 3:00 PM Picasso Meeting Room, 3rd Floor Gallery Design Hotel Mueang Si Sa Ket District, Si Sa Ket Province	Si Sa Ket Province	38	

No.	Date / Time / Location	Target Area	Number of Participants	Summary of Comments and Suggestions
17	Tuesday, April 23, 2024, 08:30 AM – 03:00 PM Aemorn Grand A Meeting Room, Suan Pa Resort Hotel, Mueang District, Surin Province	Surin Province	40	- There should be secondary roads providing access to the inner agricultural areas to facilitate the transportation of produce. Additionally, the presence of roads can accommodate irrigation canals, benefiting farmers both in terms of water supply for agriculture and transportation infrastructure. - If a permanent checkpoint is established in Kab Choeng District, it is proposed to include a cold storage facility to support the distribution of goods to neighboring countries, which would enhance the capacity of Surin Province. - It is recommended to promote connection points and public transportation systems for travel between tourist attractions, such as Khao Kradong, Phanom Rung, and Muang Tam Castle. - Agricultural product transportation via rail is still inconvenient, as exports to certain countries, such as China, are not yet possible. This limitation affects the overall efficiency of transportation. - There is currently no public transportation system connecting to tourist attractions. It is anticipated that within the next five years, Nakhon Ratchasima Province will be able to develop its tourist sites and modernize its public transportation services.
18	Wednesday, April 24, 2024, 08:30 AM – 3:00 PM Buritel Hall Conference Room, Buritel Hotel, Mueang District, Buriram Province	Buriram Province	38	
19	Thursday, April 25, 2024, 08:30 AM – 3:00 PM Taweesin Meeting Room, 5th Floor, Korat Hotel, Mueang District, Nakhon Ratchasima Province	Nakhon Ratchasima Province	46	
20	Friday, April 26, 2024, 08:30 AM – 3:00 PM Chamchuri Meeting Room, Siam River Resort Hotel, Mueang District, Chaiyaphum Province	Chaiyaphum Province	43	- The motorways passing through Chaiyaphum Province, including M4, M5, and M6, currently serve only as transit routes. It is proposed to introduce branch routes, such as M4-1, M5-1, and M6-1, to provide easier access for the public into Chaiyaphum Province.

No.	Date / Time / Location	Target Area	Number of Participants	Summary of Comments and Suggestions
21	Monday, 13 May 2024, from 08:30 a.m. to 03:00 p.m., Dok Siew Meeting Room, Nan Truengjai Hotel, Mueang Nan District, Nan Province	Nan Province	39	- It is requested to study and promote the extension of the double-track railway from Den Chai - Phayao - Chiang Rai to also reach Nan Province, since people who wish to travel to Phayao or Chiang Rai are currently unable to do so. - Highway No. 1091 (Nan - Phayao) and Highway No. 1148 (Nan - Chiang Rai) have problems with narrow lanes, steep slopes, and short side distances. It is proposed that these routes be considered for improvement. - There is a need to expand the route from Den Chai District into Phrae City, or the route before reaching the entrance to Phra That Cho Hae, as it is a main route that is currently narrow. - For rail connectivity, it is proposed to establish connections between Chiang Mai - Phayao and Chiang Rai - Phayao, and further extend the routes to international destinations such as Luang Prabang and Vietnam. - The route from Chiang Khong to the border of China has no railway connection, resulting in higher costs due to the need for cargo transfers. If the route is developed, it will help reduce transportation costs. - It is requested to develop a motorway between Chiang Rai and Chiang Mai to reduce travel time, while also enhancing economic connectivity and export linkage between these two major provinces. - There is still no facilitation provided for tourists in various processes, such as obtaining a temporary driving license or accessing public health services, all in one place. Although efforts have been made to push for a One Stop Service, there has yet to be any concrete implementation. - Secondary routes, tourist routes, and agricultural transport routes, such as mountain roads, are quite narrow, lack signage, and pose a risk of accidents. It is recommended to construct tunnels, underpasses, or overpasses at main roads.
22	Tuesday, 14 May 2024, from 08:30 a.m. to 03:00 p.m., Nakara Pavilion Meeting Room, Phrae Nakara Hotel, Mueang Phrae District, Phrae Province	Phrae Province	38	
23	Wednesday, 15 May 2024, from 08:30 a.m. to 03:00 p.m., Waterside Meeting Room, M2 Waterside Hotel, Mueang Phayao District, Phayao Province	Phayao Province	38	
24	Thursday, 16 May 2024, from 08:30 a.m. to 03:00 p.m., Vista Ballroom 1, Grand Vista Hotel, Mueang Chiang Rai District, Chiang Rai Province	Chiang Rai Province	42	

No.	Date / Time / Location	Target Area	Number of Participants	Summary of Comments and Suggestions
25	Monday, 20 May 2024, from 08:30 a.m. to 03:00 p.m., Kasalong Meeting Room, Wiang Lakorn Hotel, Mueang Lampang District, Lampang Province	Lampang Province	37	- Lampang Airport should be developed to accommodate more flights. - Regarding transportation, although the distance is short, the roads are quite sloped, resulting in longer travel times. - It is requested to promote the establishment of a Container Yard (CY). - It is proposed to expand Mae Hong Son Airport to accommodate more flights and larger aircraft. - Mae Hong Son Province still does not have any four-lane roads; it is proposed that development be carried out. - It is proposed to expand Pai Airport, as Pai District receives no fewer than 1,500,000 tourists per year, the majority of whom are foreigners. - It is proposed to construct three tunnels: in the Huai Nam Dang area, the Kio Lom area, and the Luk Khao Lam area. - It is proposed to design the Doi Ti intersection bridge (southbound: Lampang - Lamphun - Chiang Mai) as an underpass, while the northbound direction (Chiang Mai - Lamphun - Lampang) should be a six-lane road, which would help improve travel efficiency., a road connection to Mae Hong Son Province is requested via Doi Pui Luang, exiting at Huai Pu Ling in Mae Hong Son.
26	Tuesday, 21 May 2024, from 08:30 a.m. to 03:00 p.m., Tharatip Meeting Room, The Imperial Mae Hong Son Resort, Mueang Mae Hong Son District, Mae Hong Son Province	Mae Hong Son Province	44	
27	Thursday, 23 May 2024, from 08:30 a.m. to 03:00 p.m., Grand Pa 1 Meeting Room, Grand Pa and Resort Hotel, Mueang Lamphun District, Lamphun Province	Lamphun Province	38	
28	Friday, 24 May 2024, from 08:30 a.m. to 03:00 p.m., Nok Yoong Meeting Room, The Empress Hotel, Mueang Chiang Mai District, Chiang Mai Province	Chiang Mai Province	53	

No.	Date / Time / Location	Target Area	Number of Participants	Summary of Comments and Suggestions
29	Tuesday, 4 June 2024, from 08:30 a.m. to 03:00 p.m., Pailin Meeting Room, Nawarat Heritage Hotel, Mueang Kamphaeng Phet District, Kamphaeng Phet Province	Kamphaeng Phet Province	41	- It is proposed to expand Phahonyothin Road between Nakhon Sawan Province and Kamphaeng Phet Province to six lanes. - It is requested to expand the roads to four lanes along Highway No. 101 (Kamphaeng Phet - Sukhothai), Highway No. 115 (Kamphaeng Phet - Phichit), and the road between Kamphaeng Phet and Tak. - Want a train connection between Nakhon Sawan and Chaiyaphum provinces. - Phichit Province lacks a public transportation system, and there is no connection from the railway station to accommodations or hotels. Due to the inconvenient location of the railway station, many establishments or accommodations must coordinate local rickshaws to pick up and drop off tourists to facilitate transportation. - Rest areas lack basic facilities and are unsafe for users. If comprehensive facilities are provided, it would encourage more tourists to use the services. - Currently, the Takhli – Lopburi – Phetchabun - Tha Tako route handles approximately 70,000 tons of sugarcane transport per day, but the road is narrow. It is proposed to expand the road shoulder for safety. Transportation routes to tourist attractions are inconvenient, lacking directional signs, tourist site symbols, and street lighting.
30	Wednesday, 5 June 2024, from 08:30 a.m. to 03:00 p.m., Worapong Meeting Room, Mee Porn Sawan Grand Hotel and Resort, Mueang Phichit District, Phichit Province	Phichit Province	36	
31	Thursday, 6 June 2024, from 08:30 a.m. to 03:00 p.m., Grand Ballroom, 42C The Chic Hotel, Mueang Nakhon Sawan District, Nakhon Sawan Province	Nakhon Sawan Province	40	
32	Friday, 7 June 2024, from 08:30 a.m. to 03:00 p.m., Thara Hill Meeting Room, Uthai Thara Hill Hotel, Mueang Uthai Thani District, Uthai Thani Province	Uthai Thani Province	36	

No.	Date / Time / Location	Target Area	Number of Participants	Summary of Comments and Suggestions
33	Monday, 10 June 2024, from 08:30 a.m. to 03:00 p.m., Chan Pha Meeting Room, Tak Andaman Resort, Mueang Tak District, Tak Province	Tak Province	35	- It is requested to widen the route from Mueang Tak District to Umphang District beyond its current width. - The Sukhothai–Thoen route currently requires passing through Sawankhalok–Thung Saliam–Thoen, which adds up to 80 kilometers when traveling to Tak Province. It is requested that the route be improved for greater convenience. - Container Yard in Uttaradit Province has limitations because there is a government center. If a large container truck enters the area, the turning circle will not be possible. It may be necessary to consider the route or cut additional roads to develop the entrance and exit of the Container Yard to be better. - It is requested to expand the Tron–Tha Uan route from 2 lanes to 4 lanes, as frequent accidents occur near the Tron Agricultural Cooperative area. - There are two main transport routes, both facing issues: Route 1, near Ahee Village before reaching the Tha Li checkpoint, is quite narrow; Route 2, leading to the Thung Chang customs checkpoint and out to the Huai Kon checkpoint, is very steep. - High-speed rail and double-track railway are requested. - A railway route is proposed from Chaibadan, running along the mountains to Lom Kao, which is a scenic route with beautiful views. - The Khon Kaen–Phitsanulok route has 4 lanes, except for the section through Nam Nao National Park, which remains only 2 lanes. It is proposed to develop it into 4 lanes or construct an elevated road (tollway) around the mountains, similar to what is done in Taiwan, due to regular freight transport on this route.
34	Tuesday, 11 June 2024, from 08:30 a.m. to 03:00 p.m., Fuang Fa Meeting Room, Sukhothai Treasure Resort and Spa, Mueang Sukhothai District, Sukhothai Province	Sukhothai Province	39	
35	Wednesday, 12 June 2024, from 08:30 a.m. to 03:00 p.m., M1L Meeting Room, Aarya Hotel, Mueang Uttaradit District, Uttaradit Province	Uttaradit Province	39	
36	Thursday, 13 June 2024, from 08:30 a.m. to 03:00 p.m., Uthai Thani Meeting Room, Topland Hotel, Mueang Phitsanulok District, Phitsanulok Province	Phitsanulok Province	39	
37	Friday, 14 June 2024, from 08:30 a.m. to 03:00 p.m., Leevith Grand Ballroom, Leevith Resort, Mueang Phetchabun District, Phetchabun Province	Phetchabun Province	35	

7.4 Public Hearing and Exchange of Opinions Seminar

1) Objectives of the Seminar

(1) To present the progress of the study, including the Draft Action Plan for the Development of Transportation Network and Logistics System in the Northeastern and Northern Provinces, linked with the economic corridor areas under the GMS framework, to support economic and tourism development (2023 - 2037).

(2) To collect information on local conditions, problems, obstacles, and development needs, as well as other relevant issues.

(3) To exchange information, receive feedback and suggestions on the progress of the study, and gather development needs, problems, obstacles, and potential of the areas, along with additional considerations, to inform and refine project development strategies to align with local needs and capabilities, and ensure systematic project planning.

2) Summary of Comments and Suggestions from the Seminar

The seminar covered 9 target areas. The key comments and suggestions can be summarized as follows:

No.	Date / Time	Target Area	Number of Participants	Summary of Comments and Suggestions
1	Monday, 6 January 2025, from 08:30 a.m. to 03:00 p.m., Nakara 1 Meeting Room, Royal Nakara Hotel and Convention Center Nong Khai, Mueang Nong Khai District, Nong Khai Province	Upper Northeastern Provincial Cluster 1 comprises Udon Thani, Bueng Kan, Loei, Nong Khai, and Nong Bua Lamphu Provinces.	113 people	- It is requested to consider the route into Suwannakuha District, Nong Bua Lamphu Province, to promote access to tourist attractions in the district. - It is proposed to develop the road between Phu Kradueng District, Loei Province, and Chum Phae District, Khon Kaen Province, into a 4-lane road. - It is proposed to improve the Thali–Sangkhom road (Romantic Route) to meet standards. - If there is railway development, will the government plan to change the train services for international transport? - It is proposed to have a railway along the Mekong River from Nong Khai Province to Loei Province. - It is proposed to have an airport in Nong Khai Province. - Public transportation in Nong Khai Province is still of low quality, and pricing is not standardized. It is proposed that the government invest or co-invest with the private sector to develop the public transport system. - There should be guidelines to help promote smaller provinces to increase their potential. - The transport of rubber blocks into factories may cause latex to drip on the road, leading to accidents. It is proposed to study and find solutions.
2	Tuesday, 7 January 2025, from 08:30 a.m. to 03:00 p.m., Yung Thong Meeting Room, Fortune Riverview Hotel, Mueang Nakhon Phanom District, Nakhon Phanom Province	Upper Northeastern Provincial Cluster 2 comprises Sakon Nakhon, Nakhon Phanom, and Mukdahan Provinces.	90 people	- It is proposed to build roads to promote tourism around Nong Han Lake, Sakon Nakhon Province. - It is proposed to study a bypass route for Sakon Nakhon City. - It is proposed to study a bypass route in Phang Khon District, Sakon Nakhon Province. - It is proposed to improve Highway No. 203 between Somdet District, Kalasin Province, and Sakon Nakhon Province, as the route passes through mountainous areas with steep slopes, which most trucks cannot climb. - It is proposed to have glowing traffic lanes that are clearly visible at night to reduce accidents. - It is proposed to study light rail transit within the city because urban traffic is congested and unsafe. - It is proposed to develop public transportation systems connected to the airport. - It is proposed to promote provinces along the Mekong River to have more joint activities with neighboring countries to enhance tourism. - It is proposed to install CCTV cameras along the Mekong River for tourist safety. - It is proposed to extend border crossing hours to facilitate smoother freight transport.

No.	Date / Time	Target Area	Number of Participants	Summary of Comments and Suggestions
3	Wednesday, 8 January 2025, from 08:30 a.m. to 03:00 p.m., Dok Ked Meeting Room, Rim Pao Hotel, Mueang Kalasin District, Kalasin Province	Central Northeastern Provincial Cluster comprises Khon Kaen, Kalasin, Maha Sarakham, and Roi Et Provinces.	118 people	- It is proposed to improve the roads from the upper central region to the lower northern region to meet standards. - It is proposed to improve secondary roads to meet standards. - It is requested to expedite the development of the Bueng Kan–Surin road, as it creates investment opportunities for the central northeastern provinces. - It is proposed to develop roads in Kalasin Province into 4-lane roads. - It is requested to accelerate the development of routes in Wapi Pathum District, which are planned for development between 2038 and 2047 (B.E. 2581 - 2590). - Request for information on the construction timeline of Highway No. 23 from Ban Phai to Ubon Ratchathani. - It is proposed to develop Sarasin Airport to accommodate users from Kalasin and Maha Sarakham provinces. - There should be clearly visible bus stops on main roads.
4	Friday, 10 January 2025, from 08:30 a.m. to 03:00 p.m., Nong Hong Meeting Room, Thepnokorn Hotel, Mueang Buriram District, Buriram Province	Lower Northeastern Provincial Cluster 1 comprises Nakhon Ratchasima, Chaiyaphum, Buriram, and Surin Provinces.	112 people	- Improve the road surface and widen the lanes from 2 lanes to 4 lanes in the Non Din Daeng - Lahan Sai section, Buriram Province. - In each area, there are shortcut routes; it is proposed to install permanent information signs to reduce traffic congestion on main routes and during festivals. - Problems on Highway No. 348 Buriram - Sa Kaeo, in the Khao Chong Tako section, include damaged road surfaces, traffic congestion, and some sections having only 2 lanes; it is proposed to develop this into 4 lanes. - Request to develop a rest area along Highway No. 24 near Tabao Subdistrict, Prasat District, Surin Province, covering 6 rai of land. - It is proposed to have Surin Airport to accommodate tourists and people from neighboring countries. - It is proposed to develop the passenger bus terminal, as it was constructed a long time ago and is limited in size, but the city has since expanded; consideration is requested on whether to keep the terminal in its current location or move to a new site.

No.	Date / Time	Target Area	Number of Participants	Summary of Comments and Suggestions
5	Thursday, 9 January 2025, from 08:30 a.m. to 03:00 p.m., Sri Lamduan 1 Meeting Room, Sri Lamduan Hotel, Mueang Sisaket District, Sisaket Province	Lower Northeastern Provincial Cluster 2 comprises Ubon Ratchathani, Yasothon, Sisaket, and Amnat Charoen Provinces.	121 people	- Request to improve secondary roads in the border area between Yasothon Province and neighboring provinces to meet standards, in order to enhance capacity and support tourism. - It is proposed to develop the entrance road to Ubon Ratchathani International Airport from the north (Highway No. 2050), which can connect from Trakan Phuet Phon and Khemarat districts. - It is proposed to study a new cut of Highway No. 24 connecting to Highway No. 217, which is a main freight route, to support the Ubon Ratchathani industrial estate (located on Highway No. 24 Chok Chai - Det Udom). - Request to expedite the construction of the 6th Thai–Lao Friendship Bridge. - Request to add lanes for agricultural freight (slow vehicles). - It is proposed to build a ring road in Khukhan District, Sisaket Province. - Request to improve Highway No. 2341 Khun Han - Phu Sing to meet standards. - Request to prioritize the route section from Loeng Nok Tha District - Thai Charoen District - Pa Tio District as a short-term plan. - It is proposed to build an elevated road over the intersection on Highway No. 24 to reduce traffic congestion and accidents. - It is proposed to build an airport named “Kasarin Airport” to serve users from Sisaket and Surin provinces. - It is proposed to have a public transportation system to accommodate and serve the growing population and tourists. - It is proposed to promote riverside activities along the Mekong River, such as a 37-kilometer trail run in Chanuman District, Amnat Charoen Province. - Request to develop agricultural tourism sites, as Sisaket has the world-famous volcanic mountain durian.

No.	Date / Time	Target Area	Number of Participants	Summary of Comments and Suggestions
6	Monday, 13 January 2025, from 08:30 a.m. to 03:00 p.m., Benjarong Meeting Room, Phayao Gateway Hotel, Mueang Phayao District, Phayao Province	Upper Northern Provincial Cluster 2 comprises Chiang Rai, Nan, Phayao, and Phrae Provinces.	110 people	- Request to include the Phrae bypass route in the plan. - Request to improve the roads to meet standards and have longer durability. - In cases where projects require entering reserved forests or conservation forests, request to obtain permission to access the area concurrently with or before the budget request for construction, to expedite project implementation. - In cases where highways are expanded to 4 lanes, although travel will be more convenient, please study the potential increase in accidents and whether rest stops for tourism will be affected or changed. - Request strict enforcement of overweight load limits to reduce road damage problems. - The route to Phu Du checkpoint, Uttaradit Province, is narrow. Additional information is that the area for road construction to Phu Du checkpoint overlaps with reserved forest areas and the Sor Por Kor land (Agricultural Land Reform Office); further study is requested. - Propose developing Den Chai railway station into a major junction. - Propose establishing an airport in Phayao Province.
7	Tuesday, 14 January 2025, from 08:30 a.m. to 03:00 p.m., Grand Pa Meeting Room, Grand Pa Hotel and Resort, Mueang Lamphun District, Lamphun Province	Upper Northern Provincial Cluster 1 comprises Chiang Mai, Mae Hong Son, Lampang, and Lamphun Provinces.	117 people	- Request to expedite the construction of Route Ngor 2 from the Lamphun District Junction, bypassing behind Lamphun Hospital, as the Environmental Impact Assessment (EIA) has been completed but construction has not yet started. - Propose constructing three tunnels in Mae Hong Son Province along Highway 1095 at 1) Huai Nam Dang area, 2) Kiu Lom area, and 3) Look Khao Lam area. - Request to accelerate the construction of the double-track railway project. - Propose the development of a high-speed rail route between Chiang Mai and Chiang Rai. - Request to develop Pai Airport's runway to accommodate commercial aircraft landings. - Request a study on further development of unmanned transport systems.

No.	Date / Time	Target Area	Number of Participants	Summary of Comments and Suggestions
8	Wednesday, 15 January 2025, from 08:30 a.m. to 03:00 p.m., Function Room 3, Sukhothai Treasure Resort and Spa, Mueang Sukhothai District, Sukhothai Province	Lower Northern Provincial Cluster 1 comprises Phitsanulok, Tak, Phetchabun, Sukhothai, and Uttaradit Provinces.	115 people	- Propose to improve Highway 105 (Mae Sot - Mae Sariang - Mae Hong Son) to meet standards throughout the route. - Propose to prioritize the improvement of Highway 1090 (Mae Sot - Umphang) because it has many tourist attractions. - Highway 12 has a large volume of trailers and trucks; propose to promote rail transport to reduce costs and increase safety. - Propose to develop the rail system on the Silasart - Phu Du checkpoint route in Uttaradit Province to support connectivity between Thailand, Laos PDR, and Myanmar. - Request development of the area surrounding Uttaradit Railway Station. - Request a feasibility study for the construction of Uttaradit Airport. - Propose to develop Phetchabun Airport to support commercial services. - Infrastructure design should accommodate an aging society. - Infrastructure design should consider future usability, such as adding CCTV cameras and smart rest areas.
9	Thursday, 16 January 2025, from 08:30 a.m. to 03:00 p.m., Worapong Meeting Room, Mee Porn Sawan Grand Hotel and Resort, Mueang Phichit District, Phichit Province	Lower Northern Provincial Cluster 2 comprises Nakhon Sawan, Kamphaeng Phet, Phichit, and Uthai Thani Provinces.	94 people	- Highway 3456 should be upgraded to Standard Level 1 rather than expanded to 4 lanes, as traffic volume is not yet dense enough. - The Phichit bypass project (under study as part of regional urban traffic development plans) should prioritize development on the east side first to support development around Phichit Railway Station. The project should be divided into smaller phases to enable faster implementation. - Propose parallel roads in densely populated community areas to improve local traffic flow and solve issues with long U-turn distances and wrong-way driving. - Request that Highway 3004, from Khao Chira Prawat Camp to Sub Samot, be included in the study plan since the segment between km 68–90 passes through a wildlife sanctuary and requires an Environmental Impact Assessment (EIA). - Infrastructure on routes from Sukhothai, Phitsanulok, and Tak airports should be developed to connect with secondary cities in neighboring provinces to promote travel and tourism. - Propose development of community areas and bicycle lanes in Kamphaeng Phet Province.

7.5 Seminar for Clarification and Dissemination of Study Results

1) Objectives

(1) To present the study results, including the (draft) action plan for the development of transportation network and logistics systems in the Northeastern and Northern provincial clusters, linked with the economic corridor areas under the Greater Mekong Subregion (GMS) framework, to support economic and tourism development (2025 - 2037).

(2) To exchange information, gather opinions, and receive recommendations on the study results as reference for implementation and to improve project development approaches to be consistent with the needs and potential of the areas, and aligned with systematic project development.

2) Summary of Comments and Recommendations from the Seminar on the Clarification and Dissemination of Study Results

The seminar on the clarification and dissemination of the study results, covering nine targeted areas, yielded the following key comments and recommendations:

No.	Date / Time	Target Area	Number of Participants	Summary of Comments and Suggestions
1	Tuesday, 10 June 2025, from 08:30 a.m. to 03:00 p.m., Yamdee Meeting Room, Weladee Hotel, Mueang Udon Thani District, Udon Thani Province	Upper Northeastern Provincial Cluster 1 comprises Udon Thani, Bueng Kan, Loei, Nong Khai, and Nong Bua Lamphu Provinces.	130 people	- It was recommended that modern technology be applied to traffic management systems, such as installing GPS devices in all trucks and transport vehicles. This should be supported by mandatory measures or legal enforcement. Additionally, the installation of smart traffic lights is suggested, as it would help reduce traffic congestion and significantly improve travel efficiency. - It was suggested that the road connecting **Tha Li District** to **Chiang Khan, Pak Chom, and Sangkhom Districts** in Loei Province-which is an original and heavily used route-be prioritized for improvement. This route offers scenic views of the Mekong River and should be considered one of the top priorities for development. - A recommendation was made to prioritize the **Nong Bua Lamphu Bypass Project** for **Na Klang District** at the highest level, as the issue is considered urgent. Currently, **Highway No. 210**, which connects Udon Thani Province to Loei Province, requires all vehicle types to pass through Na Klang District-a large community with no alternative bypass. The road is narrow and has a high incidence of accidents. Therefore, it is strongly recommended that the project be prioritized accordingly. If it is scheduled for implementation in **fiscal year 2580 B.E. (2037 A.D.)**, there is concern it will be too delayed. It is therefore proposed that the project timeline be moved forward to the period of **fiscal years 2575–2576 B.E. (2032-2033 A.D.)**, which would be more appropriate.
2	Monday, 9 June 2025, from 08:30 a.m. to 03:00 p.m., Srisakon B Meeting Room,	Upper Northeastern Provincial Cluster 2 comprises Sakon	78 people	- It is recommended that the Ministry of Transport develop a construction plan for roads along the border areas, such as Chong Bok, Chong Sa Ngam, and roads adjacent to the Mekong River. Additionally, the development of border areas into

No.	Date / Time	Target Area	Number of Participants	Summary of Comments and Suggestions
	The Majestic Sakon Nakhon Hotel, Mueang Sakon Nakhon District, Sakon Nakhon Province	Nakhon, Nakhon Phanom, and Mukdahan Provinces.		special tourist destinations is suggested. This would benefit local farmers by facilitating agricultural trade or promoting agrotourism, as improved access to these areas would enhance economic conditions in the region. - Following participation in the Cabinet meeting held in Nakhon Phanom Province, a resolution was passed to expedite the construction of Mukdahan Airport. The project's feasibility assessment indicated sufficient potential, leading to approval for the preparation of an Environmental Impact Assessment (EIA) report. While awaiting the completion of the airport construction and related procedures, permission to use Savannakhet Airport is to be requested in the interim. This is contingent upon the outcome of negotiations between the Ministry of Foreign Affairs and the Lao PDR authorities. If approval is granted by Lao PDR, use of Savannakhet Airport can proceed.
3	Wednesday, 11 June 2025, from 08:30 a.m. to 03:00 p.m., Ruen Napalai Meeting Room, Rachawadee Resort and Hotel, Mueang Khon Kaen District, Khon Kaen Province	Central Northeastern Provincial Cluster comprises Khon Kaen, Kalasin, Maha Sarakham, and Roi Et Provinces.	113 people	- It is recommended to expand **Highway No. 2116**, specifically the section from Yang Talat to Ban Bo in Khlong Chai District, Kalasin Province, from a 2-lane road to a 4-lane road. This expansion is necessary because this route connects the overall network within the mid-Northeastern provinces, making its development highly essential. - In Khon Kaen Province, the feasibility of constructing an elevated highway to bypass the city should be considered. Any urban planning constraints need to be assessed. The implementation of an elevated road would help reduce the risk of accidents at highway intersections within the urban area.
4	Thursday, 12 June 2025, from 08:30 a.m. to 03:00 p.m., Nok Yoong Meeting Rooms 2-3, 4th Floor, Centerpoint Terminal 21 Korat Hotel, Mueang Nakhon Ratchasima District, Nakhon Ratchasima Province	Lower Northeastern Provincial Cluster 1 comprises Nakhon Ratchasima, Chaiyaphum, Buriram, and Surin Provinces.	100 people	- Traffic congestion during the festival period at the Takhok Pass section has been severe. Therefore, it is urgently requested to accelerate the development of projects in this area. Additionally, Takhok Pass serves as a transportation route between the Northeastern and Eastern regions. Frequent truck accidents occur due to the narrow traffic lanes, resulting in significant loss of life and property, which is a serious concern. It is recommended that the development in this area be expedited without delay.

No.	Date / Time	Target Area	Number of Participants	Summary of Comments and Suggestions
				- It is suggested that a fifth Thai-Lao Friendship Bridge be constructed in Bueng Kan Province, which was not included in the previous study. Furthermore, the project includes plans to establish a public bus checking point to inspect buses traveling between Nakhon Ratchasima Province and Ubon Ratchathani Province. According to the study, the designated checking point is located in Prakhon Chai District, Buriram Province. The Consultant is requested to review the Department of Land Transport's plans further to update and enhance the completeness of the project information.
5	Friday, 13 June 2025, from 08:30 a.m. to 03:00 p.m., Ballroom AB Meeting Room, Laitong Hotel, Mueang Ubon Ratchathani District, Ubon Ratchathani Province	Lower Northeastern Provincial Cluster 2 comprises Ubon Ratchathani, Yasothon, Sisaket, and Amnat Charoen Provinces.	102 people	- The route from Khemarat to Khong Chiam is predominantly used by trucks. It is recommended to increase the number of truck rest stops by utilizing areas under the Department of Highways, providing designated spaces where truck drivers can park and rest safely. - It is suggested to consider the development of **Highway No. 24** along the following sections, which experience heavy traffic: • Khukhan District (Sisaket Province) • Kho Wang District (Yasothon Province) • Kam Kuen Kaew District (Yasothon Province) • Lue Amnat District (Amnat Charoen Province) • Phana District (Amnat Charoen Province) • Trakan Phuet Phon District (Ubon Ratchathani Province) • Wat Pa Saeng (Ubon Ratchathani Province) - Support is given for the use of **Electric Vehicles (EVs)**, including the recommendation to increase the number of EV charging stations, especially at tourist destinations with high EV usage. A strategy should also be developed to address the lack of EV charging stations during nighttime. Regarding **Highway No. 24**, issues have been identified such as deteriorated road surfaces and insufficient lighting at intersections and junctions, increasing the risk of accidents. Additionally, road widening should be considered to alleviate traffic congestion.

No.	Date / Time	Target Area	Number of Participants	Summary of Comments and Suggestions
6	Tuesday, 10 June 2025, from 08:30 a.m. to 03:00 p.m., Imperial Ballroom, The Empress Hotel Chiang Mai, Mueang Chiang Mai District, Chiang Mai Province	Upper Northern Provincial Cluster 1 comprises Chiang Mai, Mae Hong Son, Lampang, and Lamphun Provinces.	96 people	- It is requested that efforts be made to increase the number of airlines operating at **Mae Hong Son Airport**, as currently there is only one airline providing service. - It is recommended that a **central agricultural distribution center** be established in **Lamphun Province**, along with the development of a **provincial bus terminal**, as Lamphun currently lacks such a facility. The use of **electric public buses (EVs)** in the province is also encouraged. - The development of **Pai Airport** is proposed due to the high number of tourists in the area. It is recommended to promote the operation of flights on the **Bangkok–Pai** and **Pai–Mae Hong Son** routes to enhance regional connectivity. - Regarding the planned construction of the **Huai Nam Dang Tunnel** in Mae Hong Son Province, currently scheduled for **fiscal year 2571 B.E. (2028 A.D.)**, it is requested that the implementation be expedited and rescheduled for **fiscal year 2570 B.E. (2027 A.D.)**.
7	Monday, 9 June 2025, from 08:30 a.m. to 03:00 p.m., Heritage Meeting Room, Heritage Chiang Rai Hotel and Convention, Mueang Chiang Rai District, Chiang Rai Province	Upper Northern Provincial Cluster 2 comprises Chiang Rai, Nan, Phayao, and Phrae Provinces.	93 people	- It is recommended to promote the development of a new transportation route to support tourism along the **Nan - Xayaburi - Hongsa - Luang Prabang** corridor. - A proposal is made to construct an **underground tunnel** from **Pua District** to **Huai Kon border checkpoint** in **Nan Province** to facilitate smoother and safer travel. - It is strongly recommended to **accelerate the extension of the railway to Nan Province** to ensure connectivity with the **Pak Lai Bridge** (linking **Nan and Uttaradit Provinces**), thereby enhancing regional transport integration.
8	Wednesday, 11 June 2025, from 08:30 a.m. to 03:00 p.m., Pichitra Grand Ballroom, Mayflower Grand Hotel Phitsanulok, Mueang Phitsanulok District, Phitsanulok Province	Lower Northern Provincial Cluster 1 comprises Phitsanulok, Tak, Phetchabun, Sukhothai, and Uttaradit Provinces.	109 people	- A proposal was made to **upgrade the airport** for use as a **base for royal rainmaking operations** and for **pilot training purposes.** - A clarification was requested regarding whether the **Mae Sot motorway route** overlaps or aligns with the existing **Highway No. 12** alignment as it crosses into **Tak Province.** - A proposed **secondary route to Highway No. 12** (Indochina Intersection – Wang Thong) via **Highways 1246, 1143, and 1237** was suggested. This route would

No.	Date / Time	Target Area	Number of Participants	Summary of Comments and Suggestions
				enhance connectivity between the **Northern and Northeastern regions**, significantly reducing travel time.
9	Thursday, 12 June 2025, from 08:30 a.m. to 03:00 p.m., Platinum Hall Meeting Room, Grand Hill Resort and Spa Hotel, Mueang Nakhon Sawan District, Nakhon Sawan Province	Lower Northern Provincial Cluster 2 comprises Nakhon Sawan, Kamphaeng Phet, Phichit, and Uthai Thani Provinces.	105 people	- It is proposed to develop a **transportation corridor starting from Chong Chom** to **Bueng Kan**, with the potential to connect further to the **South China Sea** and the **Indian Ocean**, which would be strategically beneficial for regional trade and logistics. - It is recommended to include **water transportation systems** in national planning frameworks, in order to improve the efficiency and effectiveness of inland waterway transport. - It is strongly requested to expedite the development of a **railway line connecting Nakhon Sawan - Tak - Mae Sot - Ban Phai**, which would serve as a vital link between the **Central** and **Northeastern** regions of Thailand. - A proposal was made to **increase the number of chartered train services**, with enhanced facilities for tourists, along these routes. This would help to promote regional tourism and improve travel convenience for visitors.

7.6 Interviews with Private Sector Organizations and Business Operators

No.	Agency / Date / Time	Number of Participants	Summary of Comments and Suggestions
1	The Thai National Shippers' Council (TNSC) Tuesday, 15 July 2025, from 02:00 p.m. to 04:00 p.m., Meeting Room 1, Thai National Shippers' Council (TNSC), and via Zoom Cloud Meeting	18 people	- The main issue faced by trucks is that the current legal height regulations do not comply with international standards. According to international standards, **High Cube container trucks** must have a height of **4.6 meters** from the ground, and **Car Carrier trucks** must have a height of **4.8 meters** from the ground. - There is disagreement with allowing trucks to exceed the legally prescribed weight limits. Any violations should be strictly enforced according to the law. However, regarding weight measurement, it is requested that the weight recorded at the port scales be considered as the official weight. If any truck exceeds the weight limit based on this measurement, it should not be permitted to leave the port.
2	The Federation of Thai Industries Thursday, 17 July 2025, from 02:00 p.m. to 04:00 p.m., Meeting Room 1015 TOYOTA, 10th Floor, The Federation of Thai Industries (FTI), and via Zoom Cloud Meeting	15 people	- It is proposed to increase the allowable weight limit for trucks to **28 tons**, with the option to impose additional fees for the extra weight. - There is a request for legislation to regulate container yard businesses, specifically controlling container handling fees and the entry and exit procedures at container yards. - Measures to support or promote the use of **EV trucks** as replacements for diesel trucks are recommended, targeting real benefits for transport operators. Examples include offering **lower electricity charging rates for trucks compared to passenger vehicles**, capping interest rates on truck hire-purchase loans, and providing additional financial support from the government through various mechanisms.

No.	Agency / Date / Time	Number of Participants	Summary of Comments and Suggestions
3	Thai Transport and Logistics Association Thursday, 31 July 2025, from 09:30 a.m. to 12:00 p.m., via Zoom Cloud Meeting	19 people	- **Technology should be fully integrated with legal enforcement**, and serious efforts should be made to promote digitalization. This would help eliminate discretionary judgments and promote a level playing field for business operators. - It is proposed that **all relevant agencies collaborate to implement a genuine One Stop Service system**, whereby a central agency would serve as the single point of contact for business operators and coordinate with other relevant authorities. This would eliminate the need for operators to submit the same request to multiple agencies. - It is requested that the law be amended to **allow prohibited import goods to enter the country solely for transit to a third country.**
4	The Thai Chamber of Commerce Thursday, 31 July 2025, from 01:30 p.m. to 03:30 p.m., via Zoom Cloud Meeting	25 people	- **Previously, vehicles crossing into the Lao PDR were allowed to stay for up to 30 days**, but currently the permitted stay is limited to only 15 days. It is requested that negotiations be held with the Lao PDR to restore the 30-day period. - **Government agencies should adopt technology to implement a functional One Stop Service system**, such as issuing **e-licenses** and enabling **tax payments via QR code**, in order to enhance operational efficiency and convenience.
5	Mitr Phol Sugar Corp., Ltd. (Amnat Charoen) Wednesday, 23 July 2025, from 02:00 p.m. to 04:00 p.m., via Zoom Cloud Meeting	13 people	- **There is currently no establishment of a distribution center in the Northeastern region**, as Chonburi Province is located in close proximity to the seaport. - **At present, there are no legal issues or obstacles concerning business operations and transportation.**

No.	Agency / Date / Time	Number of Participants	Summary of Comments and Suggestions
6	Sunsweet Public Company Limited Friday, 25 July 2025, from 02:00 p.m. to 04:00 p.m., via Zoom Cloud Meeting	16 people	- **The primary issue requiring assistance is the high cost of fuel for transportation**, which significantly affects logistics and delivery expenses. - **A single product may be subject to varying interpretations**, therefore, it is requested that clear and flexible regulations be established. Reliance solely on the discretion of officials should be avoided, in order to prevent missed business opportunities and to facilitate trade operations. This will enable companies to operate more smoothly and derive greater benefits.
7	Murata Electronics (Thailand) Co., Ltd. Wednesday, 30 July 2025, from 10:30 a.m. to 12:00 p.m., via Zoom Cloud Meeting	15 people	- **Due to the large number of customs-related laws and announcements**, it is difficult to stay current with the latest regulations. Therefore, it is proposed that a centralized platform or channel be provided for learning and accessing up-to-date information. - **The ambiguity of certain customs regulations prevents factories from making clear operational decisions**, resulting in unclear practices. The current approach to resolving this issue involves consulting customs officers and making adjustments based on their guidance.
8	P.M.80 Co., Ltd. Wednesday, 6 August 2025, from 10:00 a.m. to 11:30 a.m., via Zoom Cloud Meeting	15 people	- **Both domestic and international transportation are handled through freight forwarders and shipping agents**, who act as intermediaries responsible for managing the transportation process. As a result, the company does not directly encounter or is unaware of any transportation issues and has no concerns related to customs procedures.
9	Eastern Rice Mill Co., Ltd. Wednesday, 13 August 2025, from 10:30 a.m. to 12:00 p.m. Via electronic platform: Zoom Cloud Meeting	13 people	- No legal or regulatory concerns or recommendations have been raised. - It is recommended to establish rest areas for trailers every 100 kilometers. These rest areas do not need to be large facilities; alternatively, in cases where there are three traffic lanes, one lane may be designated to accommodate parking for approximately 5–6 trailers. Such areas should be equipped with basic amenities, such as restrooms and food stalls. In addition, it is recommended to install lighting at certain hazardous curves for improved safety.

No.	Agency / Date / Time	Number of Participants	Summary of Comments and Suggestions
10	Sanguanwong Industry Co., Ltd. Friday, 15 August 2025, from 10:00 a.m. to 11:30 a.m. Via electronic platform: Zoom Cloud Meeting	18 people	- Regulations and laws governing the transportation of goods from the point of origin must take into account the potential impacts at the destination, as certain countries may have laws that differ from those of Thailand. - It is recommended to establish an Inland Container Depot (ICD) at Ban Kradon Station, as the Jirad Station has limited space due to its location within the city, making it inconvenient. Should an ICD be developed at Ban Kradon Station, it must be adequately equipped with customs facilities and shipping agency services.