

Review to Formulate a Roadmap and Draft National Masterplan for a Sustainable Land Transportation System for Brunei Darussalam

Volume 5

Executive Summary

2014

Notice

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Acknowledgement



Acknowledgement

The consultant team (*"Consultants"*) led by SQW China Limited in association with Atkins was commissioned by the Centre for Strategic and Policy Studies **(CSPS)** to prepare *"A Review for the Purpose of Formulating a Roadmap and Draft National Masterplan for a Sustainable Land Transportation System for Brunei"* (*"Review"*) with the support from His Majesty's Government of Brunei, corporate bodies, professional organizations and other relevant stakeholders.

The aim of the Review is to propose an integrated, high quality, rapid, efficient and safe transport service network that can ensure sustainable, equitable and uncongested mobility and connectivity in liveable cities to support Wawasan 2035 goals. The Review serves as the basis for policy making and in particular, the Government's preparations towards a comprehensive National Land Transport Master Plan (*"Masterplan"*) and White Paper for the country up to 2035 and beyond. The task covers three main clusters:

- **Cluster 1 – Issue and Challenges:** Focusing on the current baseline situation of Brunei's land transportation system.
- **Cluster 2 – Land Transport Strategy:** Identifying the most appropriate land transportation strategies for the future vision.
- **Cluster 3 – Implementation Plan:** Providing full recommendations on the steps, procedures, policies, funding and physical infrastructures that are required in implementing the identified land transport strategies.

The Consultants wish to thank the many individuals and organizations who made submissions and participated in consultations and meetings in completing this Masterplan. The comments and suggestions made in submissions and meetings have been valuable for the consultants' deliberations while preparing this Masterplan.



Executive Summary



1. Executive Summary

1.1 Background

Brunei Darussalam has launched Wawasan 2035 to provide an ambitious and comprehensive vision for its future growth and development. In addition to continuing the Country's success in utilising the wealth arising from oil and gas exploration, Brunei aims at becoming one of the most advanced nations in the world with a high quality of life, social cohesion and equity, maintenance of strong local Islamic culture and values, and, crucially, the progressive diversification of the economy towards new sectors such as logistics, financial services and sustainable tourism.

Investment in land transport infrastructure and services has been an important enabler in realising existing life quality and yet the sector remains crucial for Brunei's future economic and social development. At the same time, the Country faces a number of significant challenges such as car dependency, congestion, journey time delay and pollution. Also, concerns over road safety are becoming increasingly evident and imminent for public debate. Without action, these problems will result in increasingly negative consequences: raising costs for individuals, communities and investors, damaging future economic growth, undermining social inclusion and reducing quality of life for Bruneians as well as those who visit and do business in the Country.

This is a critical stage in Brunei's development and a comprehensive review to formulate a roadmap and draft national master plan for a sustainable land transportation system up to 2035 and beyond is in order. A robust Land Transport Master Plan **(LTMP)**, White Paper and related Roadmap that identifies existing and future issues and challenges, determines an appropriate strategy, and set out specific proposals for programme planning, funding and implementation, will provide the necessary mechanism to enable the Country to achieve its vision.



1.2 Project Aims

The aim of the LTMP is to set out a strategic framework and actionable proposals for the development of an integrated, high quality, efficient and safe transport network for Brunei Darussalam which will ensure sustainable, equitable and efficient connectivity and mobility in support of Wawasan 2035.

The Centre for Policy Studies **(CSPS)** was provided the opportunity to take the LTMP forward and appointed SQW China Limited in association with Atkins to provide technical research and advice towards this end, working closely with Government Ministries and stakeholders as necessary.

In line with the stated objectives and work scope, the process of developing the LTMP included:

- analysis of existing and future travel conditions and consideration of a wide range of infrastructure and non-infrastructure options currently available and available in the future;
- active engagement of key public agencies and stakeholders;
- benchmarking of current policies and practices against international and regional best practice;
- development of a comprehensive, multi-modal land transportation strategy for the whole of Brunei Darussalam;
- a detailed, feasible and practicable implementation plan setting out the practical, financial and institutional proposals for delivery; and
- robust technical documentation supported by strong research providing justification for the proposals put forward.

The planning exercise to develop the LTMP has offered a response not just to current problems, but also for the development of a long-term policy agenda, to 2035 and beyond. Over this timescale, transport technologies, policies and processes can be expected to change substantially. The LTMP anticipates such changes, identifying those which are applicable and relevant to Brunei, and develops ambitious, comprehensive and practical proposals for change over this period.



1.3 Project Work Scope

The LTMP has been developed through three clusters of activities:

- Cluster 1: A study of the issues and challenges facing existing land transport capacity in Brunei and an analysis of future requirements up to 2035 and beyond. This cluster provides an overview of existing land transport capacity, identifies key sociological factors driving consideration of new public transport options, reviews national development policies and their implication for land transportation and quantifies the land transport impacts of future land use and planning and economic scenarios;
- Cluster 2: Development of a range of appropriate land transport interventions and selection of a preferred strategy based on a comparison of social and economic costs and benefits. This cluster tests the potential of the 'existing' transport system to accommodate future transport demands under a Business as Usual (**BAU**) scenario, investigates the potential and feasibility of different transportation systems and undertakes cost-benefit and multi-criteria analyses of four separate alternative packages to help identify a preferred strategy over the short and long term; and
- Cluster 3: Development of a comprehensive implementation roadmap for the preferred strategy. This cluster recommends the physical infrastructure, necessary steps, procedures, policy and governance requirements required to implement the preferred strategy. It includes estimates of costs and expenditure, a short, medium and long term programme for implementation and a summary of proposals under each of the LTMP policies. Demonstration of how the LTMP will deliver the strategic goals and objectives is presented in terms of how key performance indicator targets will be met.

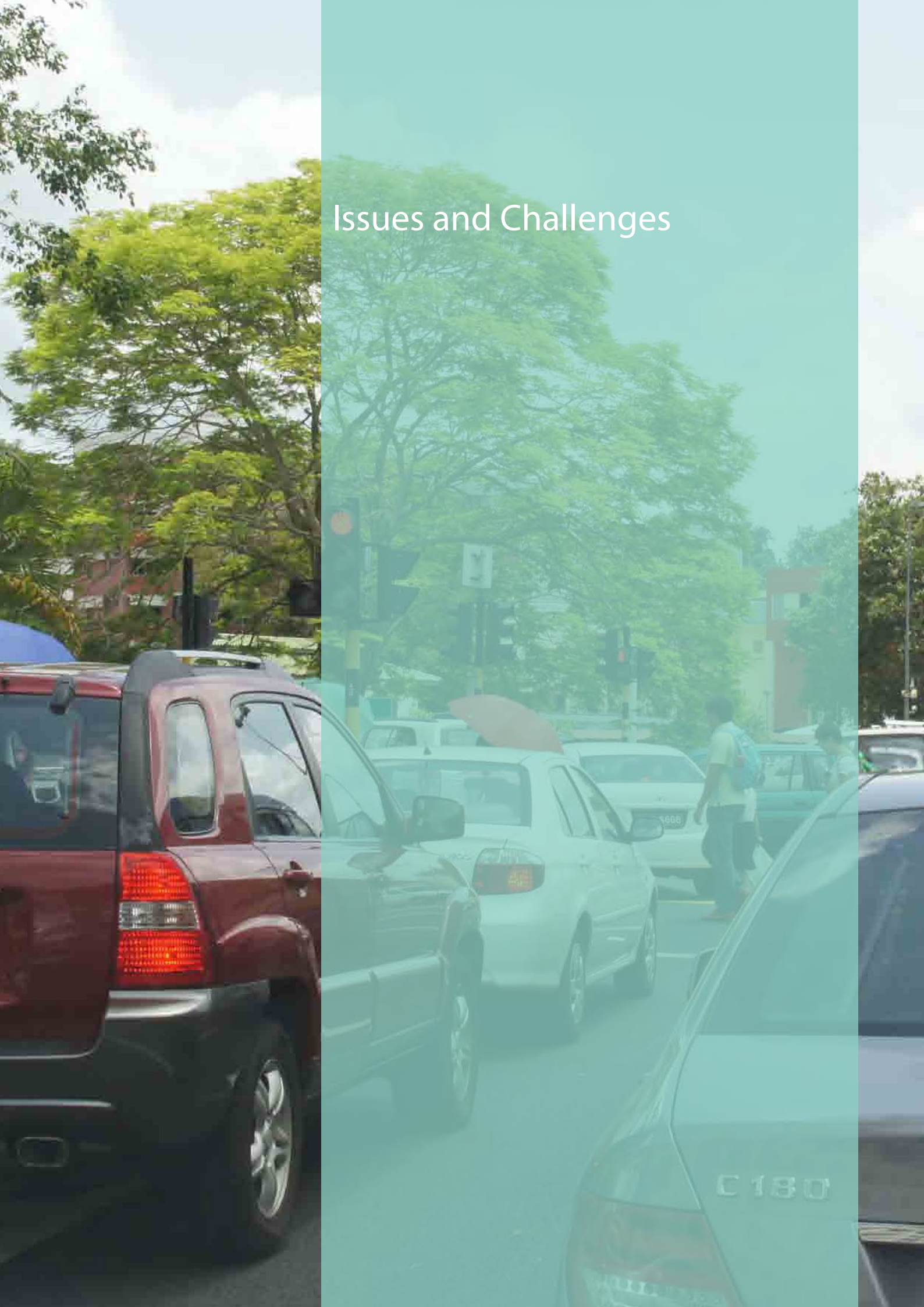


1.4 This Executive Summary

This Executive Summary relates to the LTMP Final Report which consolidates the 3 Cluster work scope into a single document that is structured as follows:

- Chapter 1 (this Chapter) provides a Background to the LTMP;
- Chapter 2 presents the Cluster 1 results in the form of transport capacity, demand, transport survey findings, and issues identified and challenges raised;
- Chapter 3 presents the LTMP policy framework and issues against key themes;
- Chapter 4 presents the Cluster 2 findings, including national land transport strategies, transport options, their appraisal and selection of a preferred option;
- Chapter 5 summarises the White Paper which lies out a number of overarching policies and desired outcomes for the land transport sector;
- Chapter 6 provides the Cluster 3 Implementation Plan in terms of specified inputs, outputs and outcomes, including funding requirement, programme elements, governance and policy support, and Key Performance Indicators (KPIs); and
- Chapter 7 summarises the Road Map for Land Transportation.

Issues and Challenges





2. Issues and Challenges

2.1 Overview

The Cluster 1 Issues and Challenges Report:

- sets out a baseline for current transport capacity (networks and services) in Brunei, the results of an extensive survey programme and development of a base year national transport model;
- defines examples of international good practice in integrated transport and transferable lessons for Brunei;
- makes a structured assessment of the current performance of the transport system; and
- introduces a conceptual policy framework around a set of desired future outcomes, a long-term mission, a set of strategic goals and more specific transport objectives, linked to wider Government priorities and proposals for monitoring.

The Cluster 1 report provides the *"problem statement"* which then forms for the basis for policy development and the formulation of more detailed strategies and proposals of infrastructure and non-infrastructure measures to deal with current bottlenecks, support medium-growth and provide for the long-term sustainable development of the Country.


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Figure 1 – Existing National Transport Network

Source: Consultant's Presentation

2.2 Existing Land Transport System

Brunei's existing land transport system network is shown in Figure 1 and consists of:

- an extensive national highway network;
- associated facilities such as fuel stations, rest stops and land border crossings;
- a waterway network which is important at a number of key localities;
- an urban and inter-district public transport bus network, based on franchised and commercial services, and associated stops and interchanges;
- port and airport facilities which serve as *"international gateways"* to the Country; and
- local networks, and a wider *"public realm"* for pedestrians and cyclists.

Responsibility for developing and managing these networks and facilities rests with a number of public and private sector organisations. In particular, the Ministry of Communications has responsibility for overall national transport policy, planning and regulation of land transport modes and overview of the maritime and aviation sectors. The Ministry of Development is responsible for construction, maintenance and management of national road infrastructure whilst the private sectors plays a key role in providing public transport and freight haulage services either under franchise or on fully commercial lines.

Roads

The transport system is dominated by the highway network, with 3,029km of road across Brunei. The network is formed around the coastal highway backbone which runs from the south-west of the country to the north-east linking the towns from Kuala Belait, Sungai Liang, Tutong, and Jerudong to Muara Port. From this, key links run throughout Brunei Muara to connect into the Bandar Seri Begawan. Key routes also spur off the main corridor to serve the more rural areas of Labi in Belait, Lamunin in Tutong, and Bangar in Temburong.



Figure 2 – National Road Network Hierarchy

Source: Survey Department with Consultant's Presentation

The segregation of Brunei into two constituent parts means there is no direct road connection between Brunei Muara and Temburong. Road connections between the two exist, but only via the Malaysian District of Limbang. This severance in the transport network between the two areas of the country has bolstered a deep imbalance in the development of Temburong compared to the other three districts.

The coastal highway backbone throughout Brunei forms a section of the Pan-Borneo transport network, which links Brunei via land to Malaysia and Indonesia. Brunei borders directly with Malaysia and there are currently four road border crossings from Malaysia into Brunei:

- from the north west of Belait into Malaysian Sarawak towards Miri;
- from the south west of Brunei Muara into Limbang;
- from the west of Temburong into Limbang; and
- from the north-east of Temburong into Malaysia towards Sabah.

Figure 2 shows the current road network hierarchy in terms of:

- primary roads, with a design speed of up to 120kph and generally dual carriageway;
- secondary roads, with a design speed of 80-100kph for dual carriageways and 60-80kph for single carriageways; and
- distributor and local access roads – with a design speed of 40-80kph, and which is single carriageway.

There are around 148,000 registered motor vehicles with the vast majority being private cars and Brunei, as a whole, exhibiting extremely high levels of car ownership, use and dependency compared internationally.


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Waterways

There are approximately 290 km of navigable waterways in Brunei with 273 licensed boats. However current use of the network is largely limited to the proximity of the water village, Kampong Ayer across the Sungai Brunei from Bandar Seri Begawan. Currently speedboats operate for long periods of the day transferring passengers and low volumes of goods from the capital across to the water village. Further use of water transport takes place in the more remote villages deep in the rural interior areas of Brunei where connections by road are of low quality or non-existent.

Owing to the absence of direct road connections noted above, direct journeys between Brunei-Muara and Temburong are via waterway. The water network in this context highlights its importance to function, trade and territorial integrity of Brunei.

The main ferry terminal for Brunei is located at Muara on the shores of Brunei Bay. The terminal handles frequent return RoRo services four times a day to Labuan, and a reduced service frequency to Menumbok in Lawas, Sarawak for people and vehicles heading to Kota Kinabalu, Sabah.

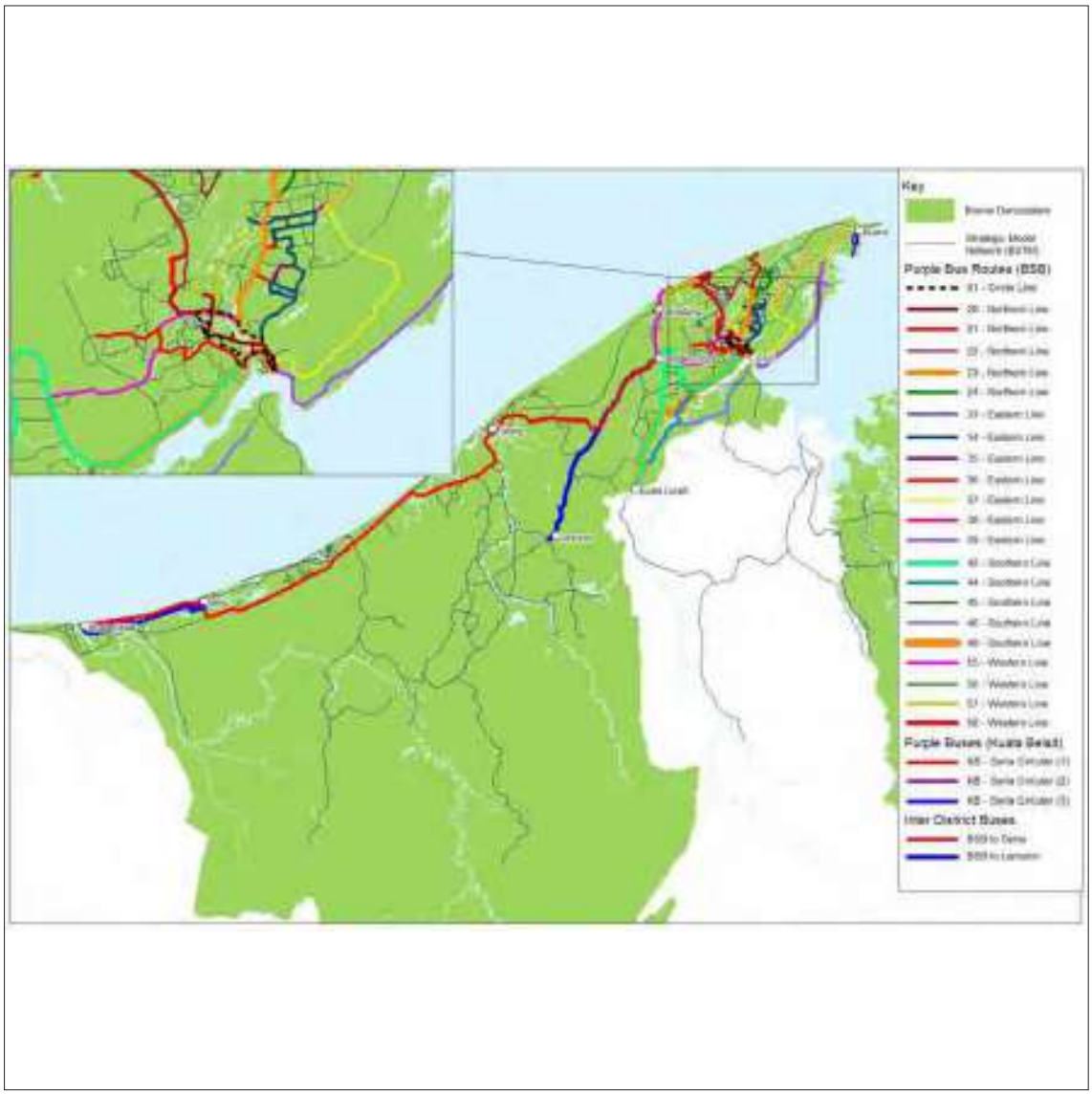


Figure 3 – National Public Transport (Bus) Network

Source: Ministry of Communications with Consultant's Presentation

Public Transport

Buses constitute the sole means of land public transport in Brunei – other than taxis, which are generally in short supply. There is no rail network.

The main provision of buses is shown in Figure 3. Formerly the *"Purple Bus"* system, and now colour-coded by line, the network comprises a number of franchised operations covering the whole of Brunei-Muara together with local operations in Kuala Belait and Seria. In addition to this there are inter-district bus services linking BSB with Kuala Belait, Seria, and Lamunin. There are no bus services to Brunei's substantial (though thinly populated) hinterland, nor are there any buses in Temburong.

Brunei-Muara is covered by 21 bus services grouped into five lines and operated by 105 vehicles. A further three bus routes operate in Belait. These 24 routes are operated through franchises which generally commenced in January 2004 and formally expired in December 2010. They have effectively been extended since then pending renewal.

Services are currently scheduled run every 40 minutes, seven days a week, from around 06:30 to 19:30 only. Fares are B$ 1.00 per trip, regardless of length.

Buses date from the commencement of the first franchise in 1993 and are now substantially dated.

Inter-district services are provided on a commercial basis by individuals who have permits to operate these services.

Multiple operators run on the main route from BSB to Seria. A fixed (but little advertised) timetable is operated and operators rotate across time slots. Buses are of varying size and ages. International bus routes are provided on a commercial basis and link Brunei with towns and cities in Malaysia, for example Kuching, Miri and Kota Kinabalu. A route also links through to Pontianak, Indonesia, in the far south-west of Borneo.

Infrastructure for buses in Brunei comprises bus terminals in BSB, Kuala Belait and Seria, and bus lay-bys, stops and shelters throughout the Country. There are a small number of local bus terminals, but these generally comprise only an area of hard standing for buses. A new bus terminal is proposed at Rimba on the outskirts of BSB to serve intra-district and other long distance services. Buses and bus franchises are licensed and monitored by the Motor Vehicle Licensing Authority, part of the Land Transport Department. The MTLA's


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current capacity and resources to plan public transport comprehensively and in line with international best practice are highly constrained.

Taxis

Taxis play a minor role in public transportation in Brunei. There are currently about 45 privately owned taxis in the Sultanate, which operate mostly within BSB, as well as nearly 20 more that serve the airport specifically. This level of fleet is significantly below international comparators.

Taxis provide a non-metered service that satisfies the relatively low demand for premium door to door transport services, but fall short in terms of overall service information, customer protection and integration with the wider public transport network.

Walking and Cycling

A limited number of cycling routes and infrastructure exist across Brunei including some cycle lanes around the cluster of the Government Administrative District. There is, however, a more extensive cycle network on the flat terrain around the Shell Town district between Kuala Belait and primarily toward Seria.

In many places the cycle routes are not continuous, and indeed the same observation has been made for many of the country's footways, which are often absent, of poor quality or not universally designed. Partly as a result of this, mode share for walking and cycling modes is extremely low and the lack of network infrastructure further reduces accessibility to public transport.


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2.3 Existing Demand and Attitudes

Transport Surveys

A key component of the Cluster 1 Report was a review of existing travel across Brunei. Understanding who is travelling, how they are making their trips and the full context behind why we see these behaviours is a vital element of appreciating baseline conditions.

A wealth of general land use and socio-demographic data was made available to the project from a range of existing sources, including the Land Use Master Plan and preliminary findings from the 2011 Census. An extensive primary survey exercise, innovative in Brunei for its scope and scale, was also undertaken in relation to this system to supplement existing data sources and evidence. This has allowed a more detailed insight into current travel demand, user behaviour and social attitudes to be drawn up. Evidence has been gathered, through a programme of traffic counts, roadside interviews, on-bus interviews, waterside interviews, bus user attitude surveys, and an extensive survey of adult and youth attitudes towards transport. Additional detailed reviews of two particular areas of challenge - Brunei's public transport system and travel to school – were also carried out. In combination, these activities provide the most extensive snapshot of land transport in Brunei ever undertaken. The survey exercise comprised:

- 5,892 Roadside Interviews (**RSI**);
- 518 face-to-face Bus On-Board;
- 250 face-to-face Waterside Interviews;
- 61 buses across 11 routes for Bus boarding and alighting counts;
- 395 buses with 5,828 passenger trips during bus terminal surveys;
- 101 bus passenger interviews;
- 12 roads for Classified Link Flow Count Surveys;
- 13 junctions for Turning Movement Count Surveys; and
- 2,212 respondents completing Transport Attitude Surveys.

In total, there were 8,872 participants either interviewed or completing the questionnaires and some 617,793 vehicles were counted during the surveys.

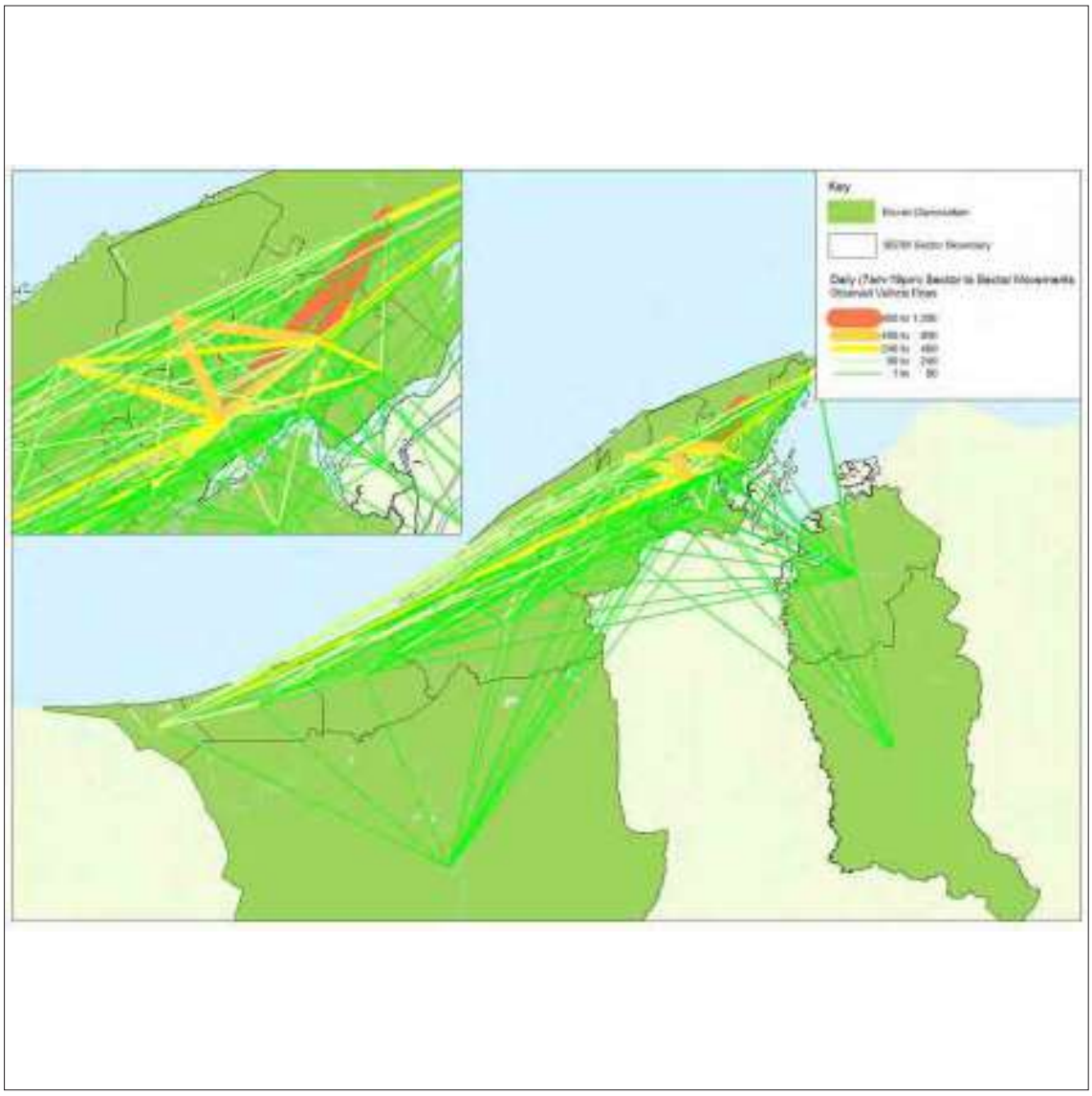


Figure 4 – Observed Daily Sector to Sector Movements at RSI Locations

Source: Primary RSI data collection, Consultant's Presentation

Existing Demand

Trip making across Brunei is around 800,000 person trips per day (from 7am to 7pm), accounting for vehicle occupancy, the vast majority of which are by car.

To highlight the key corridors of demand, origin and destination data from the surveys referred to above was aggregated to 20 key sectors across Brunei Darussalam. This aggregation helps to show key movement patterns and pressures on the existing transport network as shown in Figure 4, showing pressures from the north east sectors of Brunei into BSB, as well as pressure along the key north-east to south-west corridor which forms the backbone of the transport network. There are also a range of trips heading into BSB from the west contributing towards network pressures on the western side of the city.

Counts undertaken in parallel with the roadside interviews highlighted the significant numbers of cars on Brunei's network. For each of the 12 sites, the HGV flows were limited, and at no site did HGV's make up more than 5% of the total flow. A limited number of buses and taxis were recorded – buses making up 0.7% of all vehicles recorded. Over 300,000 vehicles were recorded in total at the RSI counts, and of these, only 151 were taxis. These statistics further indicate high car dependency.

Our Transport Attitude Survey also confirms that car dependency is high across the surveyed population, with just 3% of survey respondents saying that they took a bus within that last week. A greater proportion of those who used regular buses had no car available at home at 20% compared with 8% of all those surveyed.

Whilst traffic volumes are generally within the available capacity provided on the network, at the three peak periods indicated above, there is considerable additional pressure, resulting in observed queuing at key junctions and along strategic routes. By international comparisons, delays are moderate, but with increasing levels of travel on the network the situation is likely to worsen, resulting in more pinch points, greater delay, as well as peak-spreading which lengthens the time that delay is observed.


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Public Attitudes to the Private Car and Public Transport

Car dependency is a key theme which emerges under Cluster 1 based on both the traffic and attitudinal survey evidence. An extraordinary 80% of Brunei's residents state that they use their car *"all the time"*, and a further 14% do so *"often."* Despite this, as shown in Table 1, not all car drivers or passengers are satisfied with their current journeys, with only 55% satisfied with the journey time, 61% with the ease of parking, and 47% with the cost of owning and maintaining a vehicle.

Table 1 – Satisfaction of Private Vehicle Users

	Journey Time	Parking	Cost
Satisfied	55%	61%	47%
Neutral	24%	24%	34%
Dissatisfied	21%	15%	19%

Source: Attitude survey data collection, Consultant's Presentation

Of those that are dissatisfied with the current journey times, only 54% have actually chosen not to make a trip, whilst 79% have retimed their trip but only 14% have switched mode. There is, therefore, an inferred demand response to congestion yet there remains a dependency on car over other modes for the actual journey.

For parking where a reserved space is not available, 83% of those surveyed used a free public car park, and a further 8% parked for free either on the street or illegally. Only 9% of drivers said they used a paid parking location, indicating that parking policy currently does little to influence travel behaviour. It is not unsurprising that few dissatisfied responses were evident in the survey. However, those surveyed seemed least satisfied with the cost of owning and maintaining a vehicle.

Only 47% were satisfied and those with a monthly household income of less than B$ 3,000 were more likely to be unsatisfied with current private transport costs. Over 32% of all people said that increasing car cost would mean that they would not make a trip, with this figure increasing to 40% for those who were already dissatisfied with the cost of travel. If petrol prices increased, approximately 70% of all those surveyed would look to share a journey, and 50% would look to shift to another mode of transport.

Within the survey of young people, levels of dependency are very similar. A total of 90% of respondents said they used a car regularly, with similar levels of dissatisfaction in car journey time (18%), parking (22%) and cost (21%). Whilst there are again stated intentions to use


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public transport more, it is clear that car dependency behaviours are being inherited by the younger generation.

Considering public transport, capacity is generally adequate relative to current demand, at around 8,000 passengers a day. However, 88% of adults and 72% of youths have never used public transport and have negative perceptions of the service offered. Current public transport users are predominantly low income expatriate workers. The results, summarised in Table 2, show that these existing users are more satisfied with the current service than dissatisfied; however, concerns exist in a number of areas, with only 40% are satisfied with reliability, 28% with frequency, and many wishing to see services, which currently cease around 1930 in the evening, continue later into the night.

Table 2 – Satisfaction of Public Transport Users

	Journey Time	Convenience	Frequency	Reliability	Information	Cost
Satisfied	45%	45%	28%	40%	40%	60%
Neither	20%	30%	28%	20%	25%	30%
Dissatisfied	35%	25%	44%	40%	35%	10%

Source: Attitude survey data collection, Consultant's Presentation.


BUS STOP

Overall, it is clear to see that those already using the bus are satisfied with the service, but potentially because they have little other alternative or knowledge of what public transport looks like elsewhere in the region. Those that don't use public transport perceive a safety issue, but more worryingly this perception appears more often than not to have been made without the experience of ever using the services. Like public transport, walking and cycling are minority modes compared to the private car. Some 82% of Adults and 63% of Youths do not have access to a cycle, compared to almost universal access to a car. The vast majority of respondents, 80% for walking and 82% for cycling, never or rarely use non-motorised transport. By comparison, only 13% take a walk and 4% take a cycle trip on a daily basis, levels which are insufficient to reduce the risk of future health difficulties such as high blood pressure, obesity, cardiovascular disease and diabetes.

Despite these issues, transport does not rank highly in the perceived importance to quality of life in Brunei. Factors such as employment, education and housing are higher in peoples' priorities. Transport does, however, generate the most dissatisfaction for Bruneians in terms of level and quality of service. There are indications that this dissatisfaction will increase as problems such as congestion, journey time delay and accessibility for those without a car worsen in the future and impact on individuals' quality of life.

Our surveys provide some evidence that people are prepared to consider changes to their current travel behaviour. Over 80%, for example, support in principle measures to encourage more buses, walking and cycling for travel to school. When asked how Government spending in transport should be directed, 24% of respondents in our survey suggest new modes of high-quality public transport. A further 20% suggest improving the existing (bus-based) public transport system.


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Looking ahead, as shown in Table 3, 24% of respondents suggest the government should invest on new modes of high-quality public transport. 20% suggested improving the existing (bus-based) public transport system.

Only 13% suggested building more roads, signifying a potential shift in social attitudes in Brunei which the LTMP should seek to exploit and carry forward.

Table 3 – Top 10 Categories of Transport Survey Responses for Government Transport Priorities

Category	% Adult Responses	% Youth Responses	% Total Responses
New Mode of Transport (MRT, LRT, Monorail, Alternative Mode)	24%	26%	24%
Improve Existing Mode of Public Transport (e.g. Taxi, Bus, Purple Bus)	17%	29%	20%
Road Network Extension (Build new roads, more lane etc)	14%	11%	13%
Improve Road Safety	5%	2%	4%
Reduce Congestion	4%	3%	3%
Improve Facilities for Walking / Cycling	3%	5%	3%
Better manage School Traffic	3%	3%	3%
Introduce Intelligent technology (journey Time, new technology etc.)	3%	2%	3%
Better Road Management (Car Pool, Bus Land, Trunk Lane etc)	3%	3%	3%
Integrate Transport Planning and Town Planning	3%	2%	3%

Source: Attitude survey data collection, Consultant's Presentation

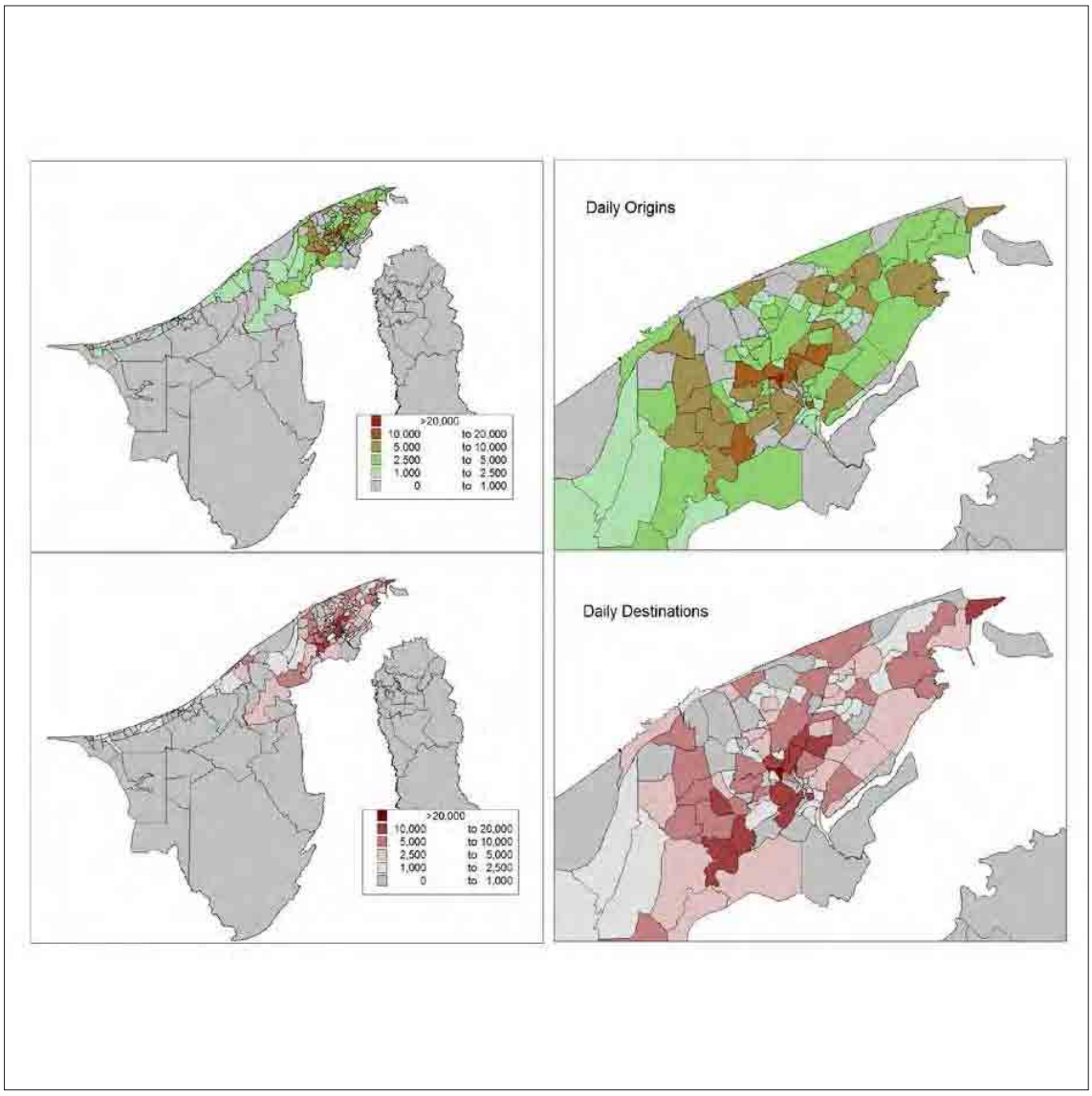


Figure 5 – 2012 Daily Trip Origins and Destinations (All Modes – Persons)

Source: Consultant Presentation

2.4 The Brunei Strategic Transport Model and Base Year Conditions

The following positive features of Brunei's current baseline were identified from the transport surveys referred to above and other Cluster 1 analysis:

- comprehensive national road connectivity providing a high degree of mobility by private cars and goods vehicles. User needs are largely met;
- reasonably good asset condition and maintenance;
- low level of fares and good geographical coverage of bus routes;
- low level of crime and accidents on public transport;
- road safety program showing clear aims, targets, initiatives to improve road safety, with fatalities falling through specific Government initiatives; and
- environmental sustainability promoted to meet Millennium Development Goals, for example the Heart of Borneo Initiative.

Against these, the high level of car dependency, moderate but worsening traffic congestion and impact of increasing traffic volumes on town centres and communities are areas of concern. In addition, the public transport system provides a barely-adequate level and quality of infrastructure and service for existing users, but does little to promote modal shift and a more sustainable range of travel behaviours.

The BSTM Base Year Model **(BSTM)** provides a detailed account of existing traffic conditions in different time periods. About 301,500 vehicles were counted at the roadside interview **(RSI)** sites across the modelled day (7am to 7pm). Using this and other count data, it is estimated that these trips account for 63% of all journeys on the Brunei highway network.


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Therefore, and as noted, real trip making in this time period is closer to 800,000 person trips per day (from 7am to 7pm), accounting for vehicle occupancy.

From the Base Year Model, 80,866 travellers spend on average 27.2 minutes travelling with an average travelling distance of 18.3 kilometres. The average speed is around 40km per hour. Each traveller on average uses B$ 2.20 worth of fuel, of which only B$ 0.57 is the out of pocket cost borne by drivers, while B$1.63 is borne by the Government in terms of fuel subsidy.

The total transportation cost per trip per traveller is about B$ 7.96, which includes time cost, vehicle operating cost and emission cost.

In future, travel conditions are forecast to worsen considerably if Brunei does not adopt new transport policies, investment practices and management of travel demand. This is discussed further below.



Policy Framework and Baseline against Key Themes


BRT
快速公交专用道
BRT快速公交专用道

3. Policy Framework and Baseline against Key Themes

3.1 Vision, Policy Framework, Themes and Strategies

In order to address the current issues summarised above and to set a basis for future policy development and application, the following high-level mission was identified in line with the study objectives and challenges:

> *"An integrated, safe multi-modal land transport system which offers choice for all and supports the sustained and sustainable economic development of Brunei Darussalam."*

The basic premise behind this mission is the need to support national economic, social and cultural development in line with Wawasan 2035, but to achieve this across a range of transport modes and with limitation and mitigation of negative impacts on society and the natural and built environment.

It is therefore important that:

- national transport infrastructure networks and services are appropriately planned across modes in terms of capacity and quality, are strongly integrated in physical and operational terms, and maintained in a good state of repair;
- these networks reflect, and enable, sustainable economic development and land use, including multi-modal access to identified growth areas;



- that a priority is placed on encouraging greater take-up of sustainable travel modes and the more efficient use of finite road space;
- the supply of infrastructure is balanced with the management of demand for its use so that the benefits of capital investment are *"locked in"* and maintained over time;
- investment decisions on transport infrastructure and services include consideration of all impacts, especially those which relate to social inclusion, community development and protection of environmental assets; and
- through the above principles, the historic correlation between economic growth, vehicle ownership and use and road traffic is progressively weakened and, if possible, reversed.

Beneath this mission, a policy framework has been developed (Figure 6) which includes:

- 5 strategic goals;
- 20 operational objectives; and
- 7 policy themes:

1. supporting economic growth through essential infrastructure;
2. promoting public transport;
3. tackling congestion and car dependency;
4. promoting safety, security and health;
5. safeguarding the environment and conserving energy;
6. effective regional and international connections; and
7. strengthening planning and delivery.

These 7 policy themes are important to inform the baseline analysis, but also provide the basis for the development of specific national transport policies and the foundation for the LTMP itself in the form of a White Paper, the latter of which is discussed further below.

Against the 7 policy themes, 4 broad Strategies and 14 Strategy Components have been defined, as shown in further details in Table 4.

The 4 Strategies are:

1. Reducing Car Dependency, led by the Ministry of Communications, covering promotion and improvement to existing bus,


Perlepasan
Departures
Ketibaan
Arrivals
Car Park
P1
Car Park
Premium
030
P1
440
BERLEPAS
DEPARTURE
PEMBERITAHUAN
P1
P2
NOTICE
P1
P2

taxi and water transport modes, development of new forms of mass transit (based on Bus Rapid Transit), improvements to school buses and promotion of walking and cycling;

2. Keeping Traffic Moving, led by Ministry of Development, covering road capacity enhancement, traffic and parking management and new forms of Intelligent Transport System. Improved regional connections with East Malaysia and the wider East Asia Growth Area are also covered under this Strategy;
3. Achieving Social Sustainability, involving various Government agencies, including the Energy Department, covering new vehicle technology and achieving more sustainable travel to school; and
4. Strengthening Governance, led by Ministry of Communications and involving the creation of a new executive agency, Transport for Brunei Authority, as well as wider changes to multi-agency working, transport capacity and skills, processes and systems and sharing best practice.

These Strategies, and their associated themes and Strategy Components, form the heart of our proposals under the LTMP and are expanded on further in subsequent sections.

It should be noted that Table 4 lists a number of existing of new Government agencies, or multi-agency working arrangements, to take the Strategies forward. These include the creation of a new multi-modal integrated transport authority, Transport for Brunei Authority, which is one of the principal proposals emerging from the LTMP. Once Transport for Brunei Authority is created, the roles and responsibilities of specific current Ministries and their associated departments will need to be reviewed and, if appropriate, reformed.
Key points around the current baseline situation, described by policy theme, are set out below.

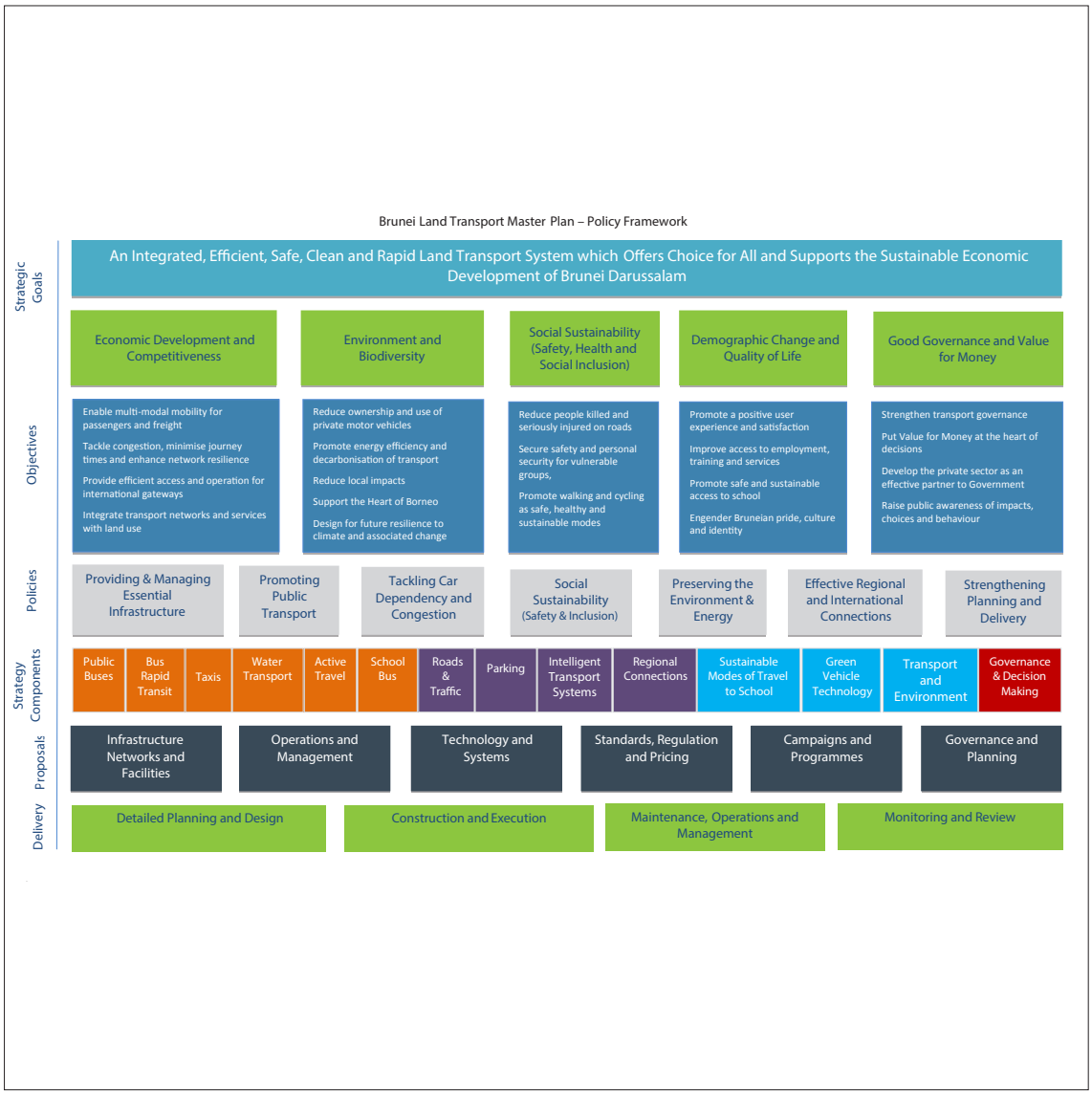


Figure 6 – Brunei Land Transport Master Plan – Policy Framework

Supporting Economic Development through Transport Infrastructure

Brunei has invested significantly in new transport infrastructure in recent years, especially the development of a strategic highway network and progressive upgrading of rural roads. The capacity of the network will increase further through measures set out in the current National Development Plan **(RKN)**. However, additional measures must be considered, including the construction of a new fixed crossing between Brunei-Muara and Temburong and a potential new Inter-State Highway as a key inland transit and development corridor.

Regardless of increases in highway capacity, population growth, economic diversification and land use development is expected to drive a further increase in demand for private travel and road-based freight. In the absence of an effective public transport alternative, this will exacerbate currently moderate levels of congestion and journey time delay. The current lack of a national road network designation, classification and hierarchy, intelligent traffic management, highway-related development control and a reactive approach to road maintenance raise issues of efficient traffic flow, community severance, journey delays and loss of productive time for users.



Table 4 – LTMP Strategic Goals and Objectives

Strategic Goal	Objective
Strategic Goal 1 – Support Brunei's economic development, international competitiveness across key growth sectors and planned spatial changes in economic activity	Objective 1.1 - Enable greater multi-modal mobility for passengers and freight especially by the development of sustainable modes, the deployment of new technology and provision of information on day-to-day travel choices
	Objective 1.2 - Tackle congestion, minimise journey times and enhance transport network resilience through investing in appropriate infrastructure capacity and management of demand
	Objective 1.3 - Provide efficient access and operation for international gateways for passengers and freight, including ports, jetties, airports and land border crossings
	Objective 1.4 - Ensure transport networks and services integrate between modes and with land use plans at the national, district and local level, especially for areas of commercial and industrial development, business activity, new housing and community services
Strategic Goal 2 – Minimise the transport sector's impact on the environment and in particular preserve Brunei's biodiversity, reduce energy use and minimise greenhouse gas emissions	Objective 2.1 – Reduce, and where feasible reverse, growth in the ownership and use of private motor vehicles, especially in BSB, Kuala Belait-Seria and other urban centres
	Objective 2.2 – Promote energy efficiency and the progressive decarbonisation of the vehicle fleet and fuel cycle
	Objective 2.3 – Reduce the local environmental impacts of the transport sector, especially on emissions, biodiversity, visual pollution and severance
	Objective 2.4 – Complement and support the Heart of Borneo in the interests of ecological conservation and sustainable tourism
	Objective 2.5 – Design and adapt transport infrastructure and services for future resilience to climate and associated environmental change
Strategic Goal 3 – Social Sustainability -Support safety, health and social inclusion	Objective 3.1 – Reduce in absolute and proportionate terms the number, and associated costs, of people killed and seriously injured on Brunei's highways
	Objective 3.2 – Secure and maintain a high level of perceived and actual safety and personal security for vulnerable groups, including public transport users, pedestrians and cyclists
	Objective 3.3 – Promote walking and cycling as safe, healthy and environmentally sustainable transport modes in their own right and as enablers of an attractive and functional public realm
Strategic Goal 4 – Support demographic change, liveability and quality of life for all, including access to employment, training and other opportunities	Objective 4.1 – Promote an inclusive, informed and positive user experience, and increased levels of confidence and satisfaction within and between transport modes and between regional, national and local networks
	Objective 4.2 - Improve accessibility to employment, training and services, especially for those on low incomes, without access to a car and communities in rural areas
	Objective 4.3 – Promote and support opportunities for safe and sustainable access to school for the next generation of Bruneians
	Objective 4.4 – Promote the modernisation of the transport system whilst engendering Bruneian pride, culture and identity



Table 4 – LTMP Strategic Goals and Objectives

Strategic Goal	Objective
Enabling Goal 5 – Promote good governance, sound process and value for money in transport planning and delivery	Objective 5.1 – Align transport governance in the interests of strategic leadership, effective delivery and efficient use of resources, and enhance planning capacity within and across all relevant agencies
	Objective 5.2 – Put demonstrable Value for Money principles at the heart of all future transport investment decisions
	Objective 5.3 – Develop the private sector as an effective partner to Government in the planning, delivery and management of the transport system
	Objective 5.4 – Raise public awareness of transport impacts, choices and personal behaviour for future outcomes for Brunei Darussalam

Table 5 – Aligning Strategies with Strategy Components and Implementing Organisations

Strategies	Lead Ministry	Strategy Component	Implementation Organization	Lead Ministry / Department [1]
Reducing Car Dependency	Ministry of Communication	Bus Rapid Transit (BRT)	Bus Rapid Transit Project Group	Ministry of Communication
		Enhancing the Bus System	Department of Bus	Land Transport Department
		Improving Taxis	Department of Taxi	Land Transport Department
		Water Transport	Department of Water Transport	Marine Department
		Active Transport (Walking & Cycling)	Active Travel Working Group	Land Transport Department
		National School Bus System	School Bus Working Group	Ministry of Education/ Land Transport Department
Keep Traffic Moving	Ministry of Development	Managing Roads and Traffic	Public Works Department (JKR)	Public Works Department
		Intelligent Transport System	Brunei Transport Management and Coordination Centre	Public Works Department
		Managing Parking	Department of Parking	Land Transport Department
		Regional Connections	Various	Various



Table 5 – Aligning Strategies with Strategy Components and Implementing Organisations

Strategies	Lead Ministry	Strategy Component	Implementation Organization	Lead Ministry / Department [1]
Achieving Sustainable Society	Various Ministries	Green Vehicle Technology	TfBA Green Vehicle Technology Unit	Land Transport Department
		Transport and Environment		Department of Environment, Parks, and Recreation
				Energy Department
		Sustainable Modes of Travel to School	Sustainable Modes of Travel to School Working Group	Land Transport Department
Strengthening Governance	Ministry of Communication	Strengthening Governance	Transport for Brunei Authority (TfBA)	Ministry of Communication

1 – Lead Ministry/Department to be reviewed/re-allocated following the creation of Transport for Brunei Authority.

Promoting Public Transport

Whilst the existing bus network has a wide coverage, there are a number of gaps, notably with the majority of routes operating into Central BSB, despite evidence of strong east-west demand recorded by our surveys. The network, whilst securing satisfaction from existing users in many respects, falls below benchmarks and standards seen elsewhere and, with patronage having fallen by almost a quarter between 2005 and 2011, there is an urgent need for improvement. Weaknesses lie with bus information, service frequency, hours of operation and the age, quality and state of repair of the vehicles, as well as a franchising arrangement which does little to incentivise operator innovation and enhancement or provide public subsidy for socially necessary services. The bus is currently unable to provide an attractive alternative to attract people out of their cars.


Pemeriksaan
Kenderaan Persendirian
Private Vehicle Inspection
Lorong / Lane
3
Lorong / Lane
4
Pemeriksaan
Kenderaan Persendirian
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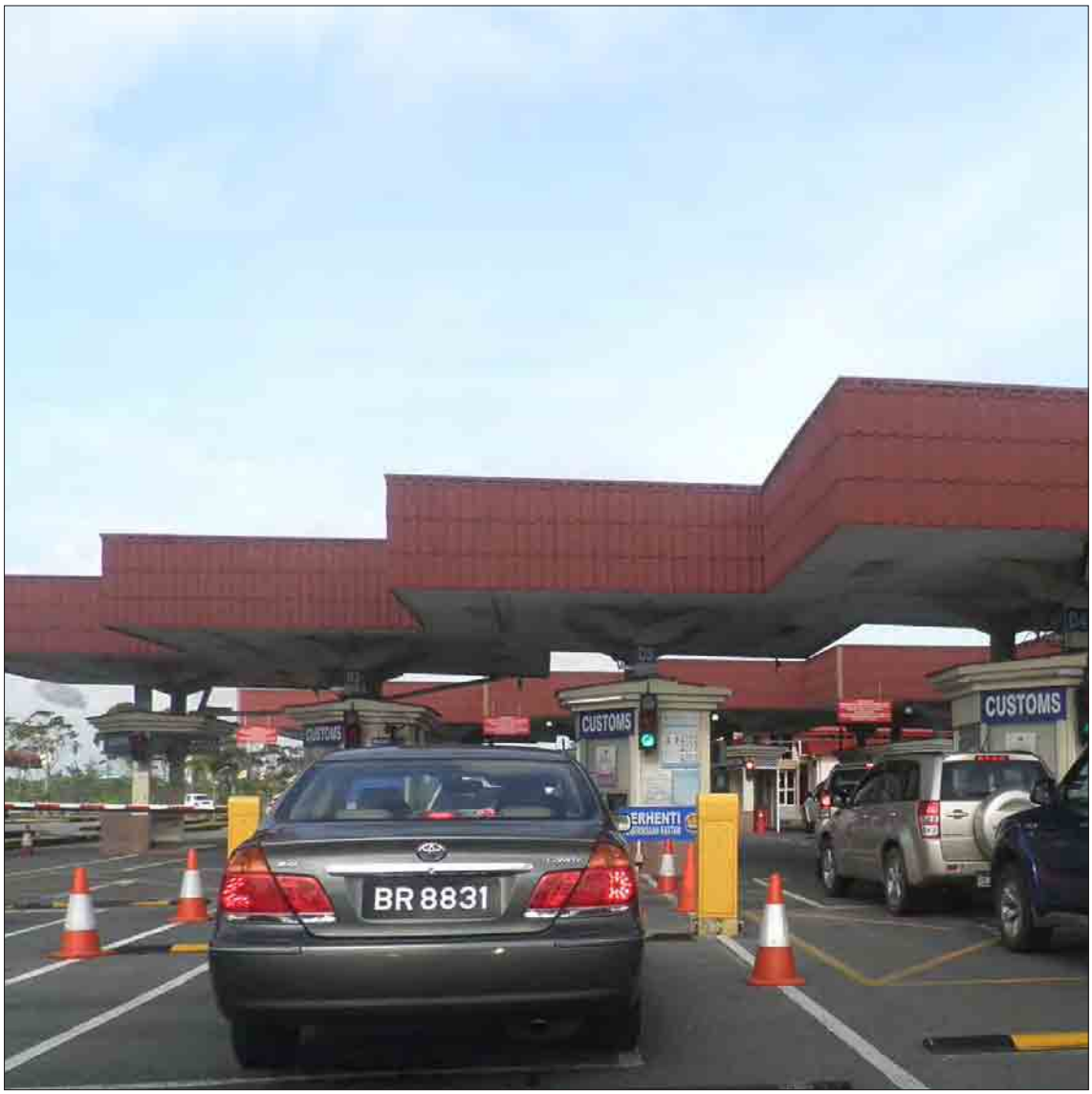
Tackling Congestion and Car Dependency

Brunei is one of the most auto-dependent countries in the World. The low cost of running a car, driven by a Government policy of subsidising fuel, continues to ensure the car is the preferred option for almost all trips. This trend is being inherited by the next generation with nearly 90% of youths recording they use a car *"regularly,"* the school run being dominated by the car and there being a reluctance from parents and their children to consider alternatives. Attitudes and behaviour are reinforced by lack of traffic and parking enforcement, limited investment in walking and cycling initiatives and negative preconceptions of the safety and security of public transport and school buses.

Promoting Safety, Security and Health

The number of casualties from road accidents in Brunei is increasing. In contrast, the number and rate of fatalities is declining relative to other countries in Asia. The Decade of Action on Road Safety aims to continue this trend through a range of initiatives in road engineering, driver education, enforcement and emergency response. The newly-introduced Demerits Points System, combined with the Tell A Friend Road Safety Campaigns aims to encourage safer and more responsible driving behaviour and consideration of all road users.

Aside from the immediate challenge of road safety, and the need to change negative perceptions of personal security on public transport, the long-term health of the Country is a growing challenge. Brunei's residents are increasingly suffering from obesity and other health conditions exacerbated by sedentary lifestyles. High levels of car use and lack of a proactive policy towards encouraging *"active"* modes of transport do little to assist this situation. Social attitudes towards walking and cycling in our surveys are largely negative; 80% of adults and 79% of youths never or rarely walk to their main destination and an equivalent 87% and 73% never or rarely cycle.


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Safeguarding the Environment and Conserving Energy

Brunei has some outstanding environmental assets and to date these have been largely preserved. The development of Brunei's transport network must respect the boundaries of the Heart of Borneo initiative. Furthermore, Brunei must seek to address the challenge of climate change, with current performance generating one of the highest per capita carbon emission rates in the World.

In addition, there is a need to maintain good air quality through slowing the growth in car ownership and strengthening vehicle and fuel standards and regulations. The average car in Brunei is over 6 years, with significantly higher fuel consumption and environmental impacts than newer models. Adoption of hybrid and electric vehicles is in its infancy and the transport sector currently constitutes around half of all national energy consumption.

Effective Regional and International Connections

Brunei's land transport sector cannot be seen in a purely domestic context. The Country is committed to reinforcing its position within the BIMP-EAGA and wider ASEAN regions as a hub for communication, logistics and trade through enhanced gateways and trans-border networks. The current development of the Pandaruan Bridge is an example of progress in this area, but further action is needed to strengthen access to ports and airports, upgrade land border crossing and support wider improvements to Pan-Borneo road and public transport infrastructure and services.


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BRUNEI

Strengthening Planning and Delivery

Our investigations during Cluster 1 have identified issues of weak institutional governance, resourcing, professional skills and capacity, supply chain management and programme delivery. In particular, planning and decision making is fragment across a number of public agencies and stakeholder organisations. Successive RKN programmes have struggled to deliver and there is a clear case to make reforms to progress land transport planning and delivery in a more co-ordinated and coherent manner.

There is no existing over-arching policy framework covering all modes of land transport in Brunei. The LTMP will be a pioneering initiative in this respect.

The document must however reflect and consider a number of existing and approved policy frameworks, including the National Land Use Master Plan, the four District Plans and Wawasan 2035. Furthermore, the LTMP must consider approved schemes listed in the RKN for implementation in due course.

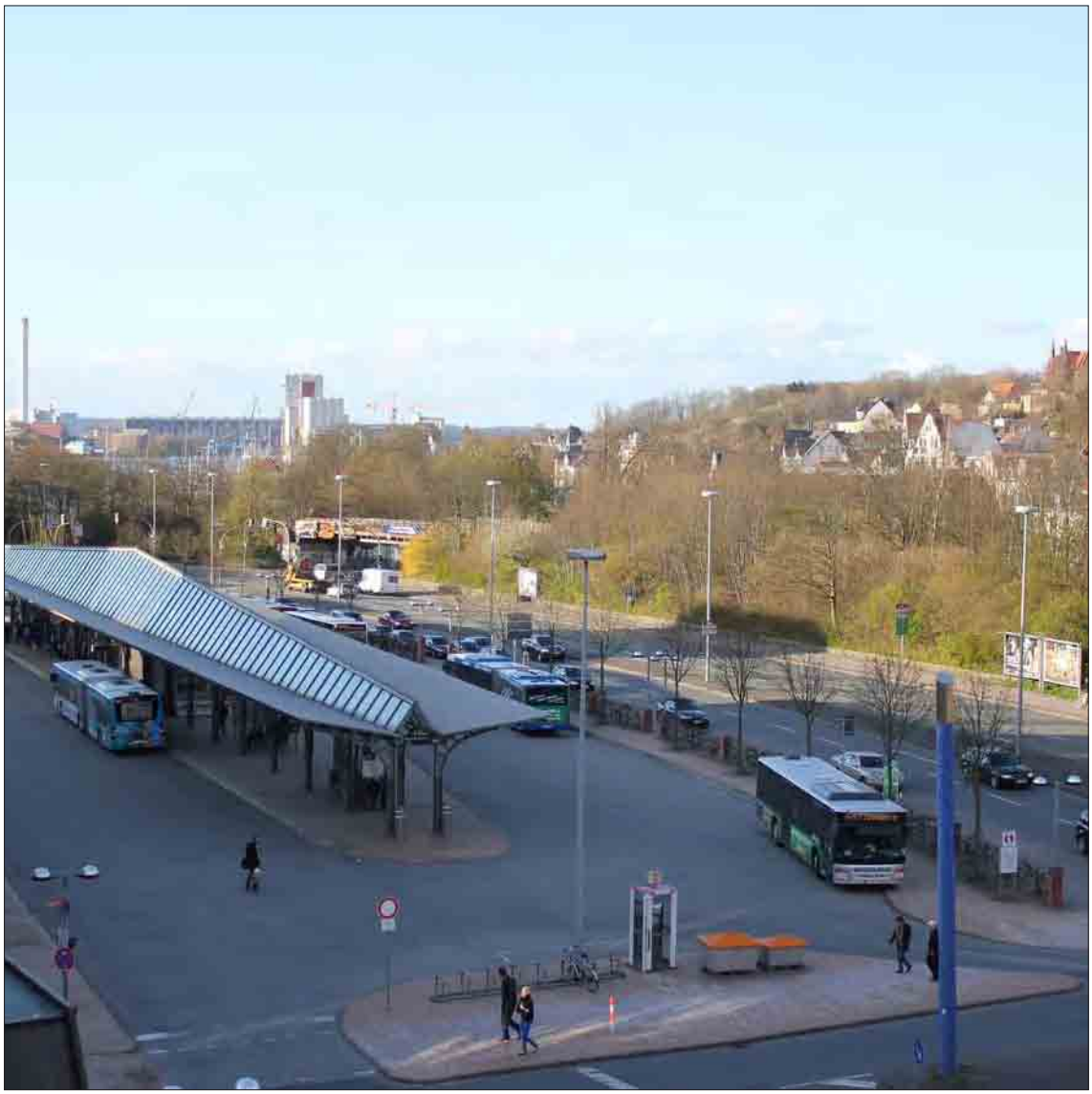
Additional proposals emerging from the LTMP must complement existing commitments. However, it is clear from our analysis that a paradigm shift in policy, planning and feeding into delivery is needed, if a more sophisticated, integrated and multi-modal transport system is to be created, delivering positive economic, social and environmental outcomes for Brunei. This will require changed attitudes, leadership and commitment from Government.



3.2 Assessment of Current Performance

The following areas represent areas where Brunei falls short of current needs, user and stakeholder expectations, and comparable benchmarks, against the key themes identified above:

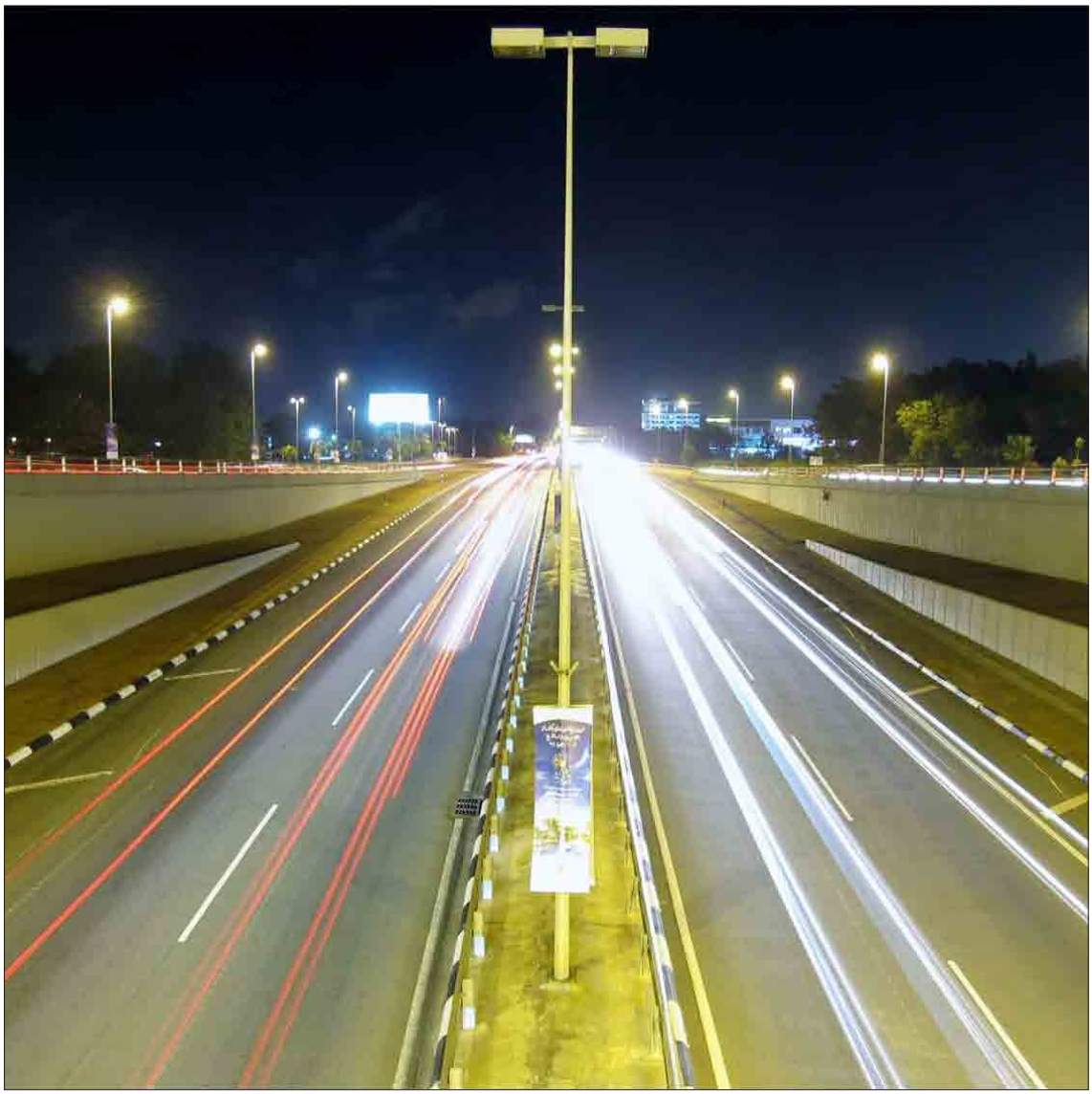
- gaps, or capacity deficits, in the strategic road network in relation to existing urban areas, planned development areas, international gateways and providing access to Temburong;
- limited investment in transport infrastructure such as networks and facilities for non-car modes, pedestrians and cyclists. As a result, very few people walk or cycle on roads. There is only limited intelligent transport system deployment and information on travel choices;
- overall, public transport only carrying a very small proportion of travel movement. In particular, public bus services are of poor quality in terms of service headways, conditions of buses and bus terminals, connectivity to places, overall journey speed;
- poorly regulated environment of public transportation resulting in a significant fleet of private passenger vehicles and unregistered *"private"* taxi operating;
- per-capita private vehicle ownership being amongst the highest in the world due to lack of government policy and limited vehicle restriction measures;
- road traffic having significant local impacts in terms of emissions and noise. Carbon dioxide emission ranked fourth on the world list. Fuel consumption is increasing every year. But little is done to promote energy conservation in the Country;
- concerns over the number of people killed and seriously injured on the road network;
- limited focus on planning, funding and progressing regulations, standards, enforcement and other non-infrastructure measures in the



land transport sector compared to planning for significant investment in capital projects; and

- the political imperative to support Brunei's protected forest resources and promote the Heart of Borneo initiative whilst fostering national economic growth and spatial development;
- the promotion of regional connectivity, trade and economic integration across North Borneo, the East Asia Growth Area (BIMP-EAGA) and wider ASEAN group of nations; and
- systematic weaknesses in transport governance, planning and delivery processes and systems, as well as sector monitoring and reporting, which have led to incomplete or sub-optimal project and programme expenditure and implementation, and a lack of articulation and application towards desired outcomes.

Without action, these challenges are expected to become more acute due to future demographic and economic growth, spatial development and pro-car social attitudes. In particular, there is a need to move national policy from a narrow focus which makes car ownership and use universally accessible, cheap and convenient, to a more sophisticated multi-modal approach which provides a greater range of travel choices, manages car use in line with sustainable development, and seeks to change social attitudes and behaviour.



3.3 Benchmarking Best Practice

We have also benchmarked Brunei with a range of cities and regions across the World. It is clear that in comparison with international exemplars, the Country has lower population and employment densities, higher levels of automobile use and dependency, higher levels of energy intensity and lower levels of public transport quality and take-up. Based on this conclusion, Brunei needs to consider the following:

- integration of land use and transportation, with the need for sustained long-term policies to encourage development through a densification of population and employment within existing urban areas;
- enabling a balanced mix of measures which combines infrastructure and non-infrastructure investment, address the operation as well as the construction of infrastructure, and seek to manage travel demand as well as supply;
- a stronger focus on public transport. Regardless of system, investment is needed in integrated fares and ticketing, information and branding and smart technology, encapsulated within a stronger regulatory framework;
- walking and cycling with dedicated infrastructure and facilities, integrated approaches to the design of the public realm, accessibility planning and sustained social marketing around healthy lifestyles and wellbeing have been shown to be effective in increasing demand and mode share;
- appropriate forms of Travel Demand Management including parking management, social marketing, and site-specific travel plans. There is also a need to consider wider regulations and fiscal incentives around car ownership and use, especially the current subsidy on fuel and conditions on business mileage;

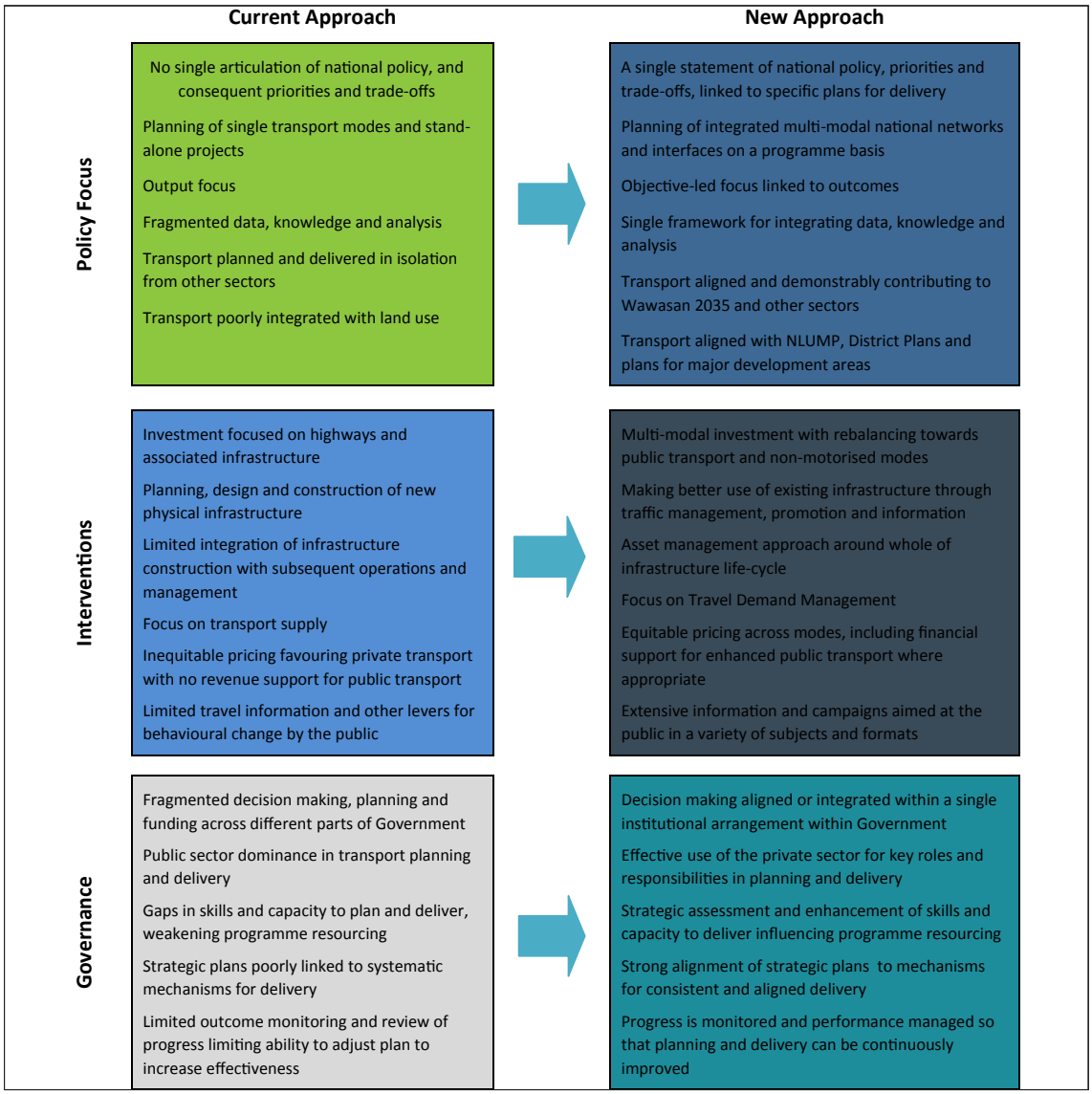
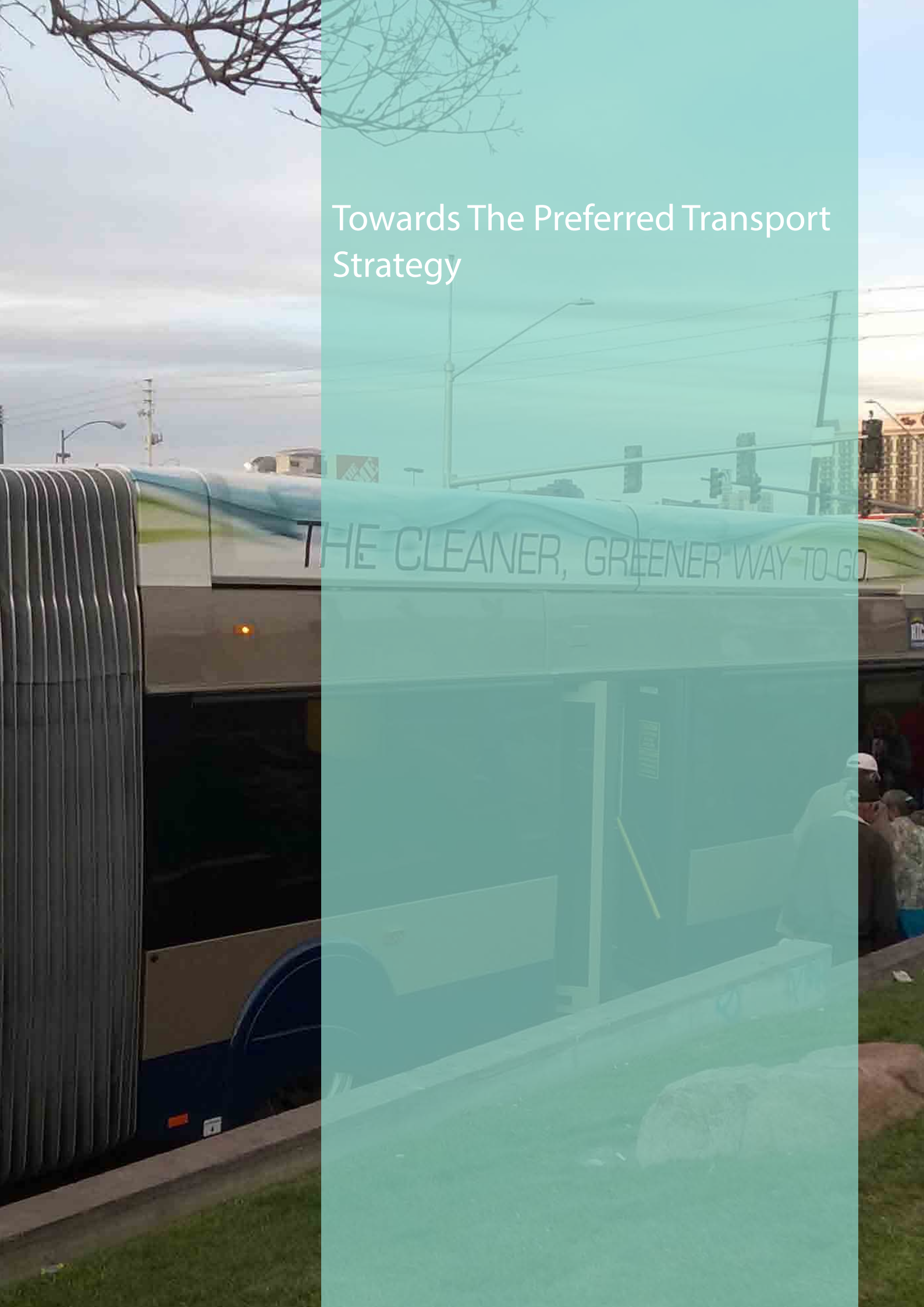


Figure 7 – A New Approach to Transport Planning and Delivery in Brunei

- strong transport governance as an important pre-requisite for success. Many best practice exemplars have created a single planning and delivery body with responsibilities across all modes and networks. Brunei should consider the case for such a single agency, or at least a coordinating structure which combines the functions and responsibilities of the existing Ministries and sector stakeholders; and
- within the adopted governance arrangements, a need to review and enhance technical and professional skills and capacity, processes and systems and supporting resources. Compared with current practice and international practice, resources for these elements in Brunei will need to be increased.

Finally, if a new approach is to be successfully adopted by Brunei, strong political will and leadership is required and policies put in place following the LTMP will need to be maintained for the long-term, consistently applied and effectively communicated to the public so that the rationale for changes is understood, accepted and embedded. Figure 7 defines a new approach to transport planning in Brunei based on these key elements of best practice and which should underpin delivery of the LTMP.

Towards The Preferred Transport Strategy




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ACTION

4. Towards The Preferred Transport Strategy

4.1 Approach

The Cluster 2 Report focuses on identifying the most appropriate land transportation strategies for the future vision of Brunei and the undertaking of various appraisals to select a preferred strategy, in line with the principles set out in the White Paper and policy framework therein.

Cluster 2 considers the potential of the existing transportation system of personal vehicles, buses and taxis and conducts studies on alternative transportation systems to determine four separate transport options which are aligned with economic growth scenarios.

The main differentiators between these strategies are around assumptions made on the capacity and system technology of future public transport, the extent of increase in capacity of the strategic road network to support growth and the level of Travel Demand Management **(TDM)**.


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4.2 Future Population, Employment and Land Use Scenarios

There are often a number of variables involved in forecasting change with degrees of uncertainty as to how economies, policies and external factors may influence the rate of growth, where it happens and to what extent. In discussions with the client stakeholder team, 6 scenarios have been determined to represent a range of future impacts on the transport network, namely:

- 2025 : 2%, 4% and 6% Year on Year Economic Growth; and
- 2035: 2%, 4% and 6% Year on Year Economic Growth.

For each of the forecast scenarios, land use and demographic changes were developed which relate to the economic growth the scenario was projecting and which reflect the land use planning set out in the National Land Use Master Plan, CSPS Land Use Optimisation Study, Brunei Muara District Plan, Tutong District Plan, Belait District Plan, Temburong District Plan and Land Optimization Study. These forecasts were then used to estimate the change in trip making in the future and associated responses in terms of network capacity utilization and network performance.

The growth in the population includes both natural population increase and an increase in the number of migrant workers. It assumes that Brunei Darussalam is successful in attracting foreign direct investment and domestic investment to create significant employment demand. For the 6% scenario, the targeted GDP for Brunei Darussalam will reach B$ 71.5 billion (2010 prices) with a population 867,000 in 2035. The forecasts for 2% and 4% are less, but still significant, at 631,000 and 701,000 implying a substantial increase in vehicle ownership and subsequent trip-making. The estimated population and employment for each scenario is shown in the table below



Table 6 – Estimated Population and Employment for each Scenario

	Population	Employment
2012	402,000	186,000
2025		
2% Scenario	518,000	259,000
4% Scenario	550,000	279,000
6% Scenario	620,000	323,000
2035		
2% Scenario	631,000	338,000
4% Scenario	701,000	380,000
6% Scenario	867,000	479,000

4.3 Future Reference Travel Conditions

The modelling of a number of reference cases ranging between 2025 (2% growth) and 2035 (6% growth) highlights the following issues for the committed transport network under assumed land use planning:

- trip making will increase significantly, particularly for the 6% growth scenarios, which will see a trebling in private vehicle trip growth by 2035;
- forecast industry GFA will be a major source of trip making under all scenarios;
- spatial disparity of trip ends will increase the length of trips made – a 15% increase for 2025 (2%) and a 30% increase for 2035 (6%);
- network congestion and trip making patterns will increase time spent travelling be between 11% (2025, 2%) and 262% (2035, 6%);
- 2025 (2% growth) demand for travel along key corridors will exacerbate existing congestion and require capacity enhancements as well as public


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transport service improvements to maintain existing levels of service; and

- 2035 (6% growth) demand for travel along key corridors will increasingly need to be catered for by forms of mass transit as any extent of practicable road network enhancement will be insufficient to cater for demands under this scenario

Transport costs will increase from 2012 to 2025 and 2035. If the economic growth is 2%, average transport cost will increase from B$ 7.96 to B$ 16.08, i.e. double the existing situation. If the economic growth is 6%, the time cost and vehicle operating cost will increase significantly to B$ 18.97, almost three times as much as the current situation. Along with the population growth, average journey time is expected to increase from 27 minutes in 2012 to 68 minutes in 2035. 71% of trips will take longer than 30 minutes, compare with only 24% today.

Against these future population and employment forecasts, six possible new public transport options were identified for consideration for Brunei, including Personal Rapid Transit **(PRT)**, Bus Rapid Transit **(BRT)** with a variant of trolleybus, Tramways and Light Rail Transit **(LRT)**, Monorail, Metro (or Metro Rapid Transit – MRT) and Heavy Rail, with a variant of High Speed Rail.

A review of these options concludes that of those applicable to an urban context, two could be dismissed on capacity and suitability grounds in Brunei. A PRT system is not likely to be able to carry the levels of capacity required, particularly as the system is primarily to be designed to deal with peak commuter flows. A Metro system is likely to be too large a scale to be required in BSB, as it will involve far too much redundant capacity to be built in to be economically viable; BSB falls short of the population required to make metro a viable option.

Therefore, the options remaining for a future new public transport system are: BRT, LRT and Monorail – the same options discussed by the BSB Development Plan.

All of these systems cater for similar amounts of passengers per hour per direction, so all could be appropriate for the demand profile suggested. The next level of distinction between the three systems is that the BRT and LRT are street running, where the Monorail requires a completely segregated, elevated alignment. Having a completely segregated alignment obviously gives


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BUS
LANE

an advantage in terms of running speed, as there is no interaction with other road users. The other advantage is that the system, being elevated, takes up much less road space on the ground, with only the stilts needing to be accommodated. The disadvantage of the segregated system, however, is that it is much more visually intrusive, as it is elevated on stilts throughout its length, with large elevated structures required for stations. This may be a particular issue in BSB, which is characterised by low-density low-rise development. The other major disadvantage is that the system is much less accessible, with elevated stations needing to be accessed by stairs or lifts. This is particularly a problem for short journeys, where there is a lot of additional journey time and effort required to use the system.

In accordance with the BSB Master Development Plan, therefore, further consideration has been given to an at-grade system along this corridor. This could be a LRT, but a high quality BRT system is also deemed worthy of further consideration as part of a package of schemes within identified transport strategies. It is BRT which has been taken forward to detailed proposals under the LTMP.



4.4 Transport Options

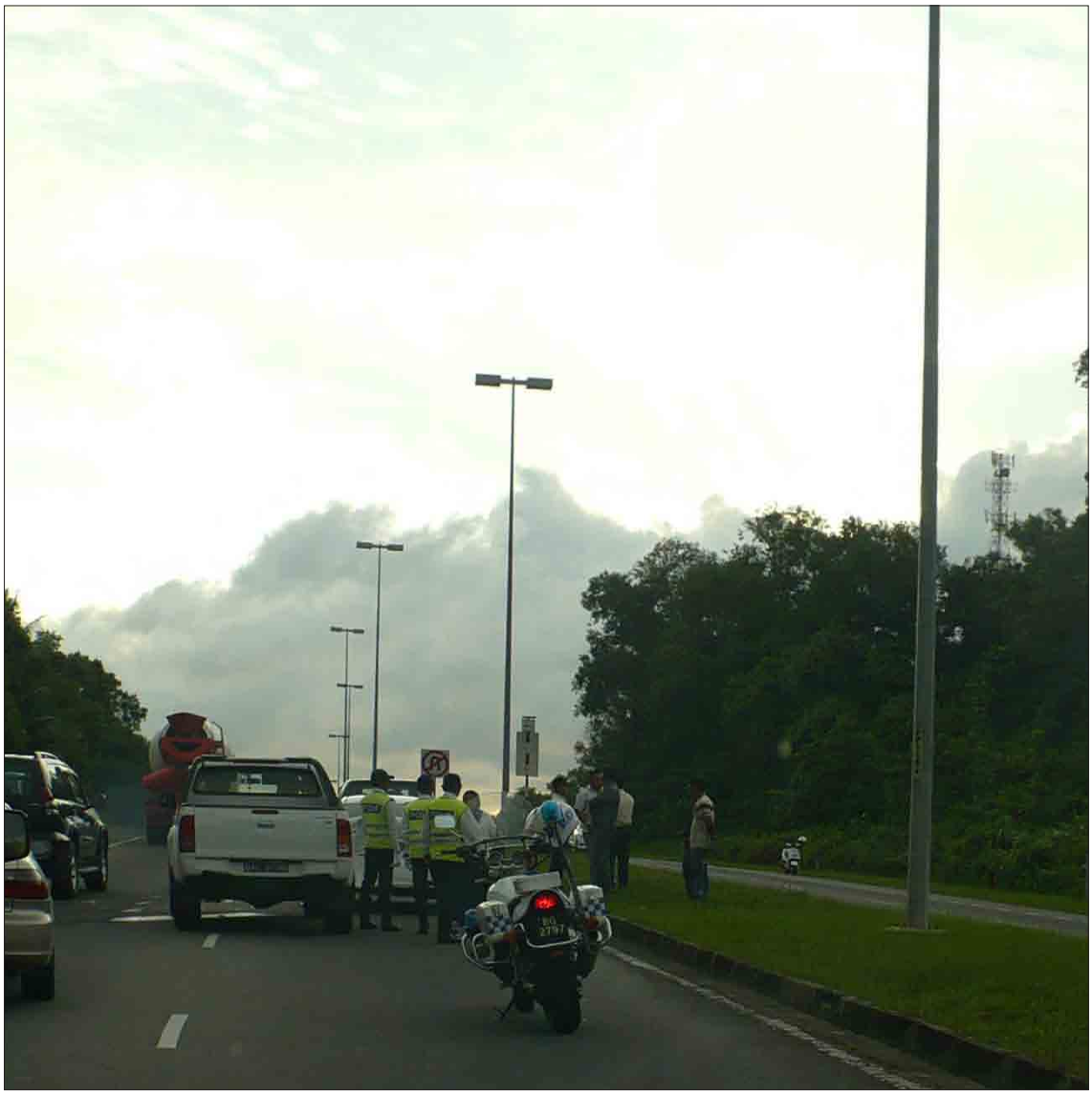
Against the population and employment forecasts set out above, four Transport Options were proposed and are described in detail in the Cluster 2 reporting. These include:

- the Business As Usual **(BAU)** Option assumes that Brunei's economy continues to grow at its recent historical rate of around 2% per annum.;
- a Moderate Option assumes that Brunei's economy accelerates to a rate of 4% per annum, higher than historic rates but short of those set out in Wawasan 2035; and
- a Modern Option and a State Of The Art Option assume that Brunei's economy accelerates to a rate of 6% per annum, the rate required to achieve the overall aims of Wawasan 2035.

The BAU Option is limited to existing transport networks and modes in its requirement to deliver the full range of possible strategy components, and focuses primarily on bus, taxi, water transport improvements as well as selected road network and Park & Ride upgrades. A national school bus system is proposed and as well as the baseline tasks required under intelligent transport systems and green vehicle technology proposals.

The Moderate Option is likely to place greater pressures on existing networks in terms of traffic flows, congestion and associated delay, a greater range and intensity of interventions will be required, for example through the introduction of Bus Rapid Transit **(BRT)**, a more comprehensive approach to promoting sustainable travel to school, investing in walking and cycling networks and stronger forms of Travel Demand Management, such as flexible working hours. This more complex mix of interventions is also likely to require changes in governance, such as the creation of an integrated transport authority responsible for planning and delivery across all modes.

The Modern Option proposed significant new road construction, along with enhanced public transport, for example light rail and investment in a range of measures to maximise network efficiency such as Intelligent Transport Systems. Progressively more restrictive forms of travel demand management **(TDM)**



measures, which actively regulate car use in regulatory or physical terms, are also considered in order to tackle the step-change in travel demand with associated significant increases in traffic, congestion and delay shown in the 6% growth Reference Case.

The State of the Art Option responds to the same transport pressures as the Modern Option, but uses increasingly sophisticated combinations of network upgrades, technology and TDM measures. This includes an inter-district railway line is introduced to supplement the Coastal Highway route with genuine mass public transport on a line that could support freight movement as well. It also includes a reduction of fuel subsidy, new forms of vehicle telemetric, management of car use through a range of fiscal means, assisted by advanced ITS, information and communications systems. The public transport system is assumed to develop to World Class standards in order to provide a strong alternative to car use and promote sufficient mode shift for the Country to operate efficiently and effectively.


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4.5 Option Appraisal

The introduction of new modes and other travel assumptions leads to a significant move away from private vehicle dependency across the day in the strategies appraised. The greatest shift from car, being the State Of The Art Option, sees a considerable reduction in private vehicular traffic compared with the reference case, with mass transit becoming a widely used mode along the four planned corridors. Indeed, the introduction of mass transit presents a step change in modal share for public transport across the state of the art option, where over 28% of all strategic travel demand is forecast to use public transport. The moderate and modern options display a mass transit mode split of 15% and 23% respectively by comparison.

Cost-Benefit Analysis **(CBA)** was carried out for the Strategies. The benefit includes time saving due to congestion reduction and the availability of more direct routes. It also includes the saving in vehicle operating costs when less fuel is consumed with less fuel subsidy and air pollution. The costs include the capital and recurrent costs of the transport options.

The results show the Modern Option is the best value of money followed by State Of The Art Option while Business As Usual Option has the lowest. The Modern Option also has the earliest year of break even, which means the benefit of the proposals outweigh the cost and provide a positive NPV the earliest. The Moderate Option has a positive NPV in 2035 and 2050 with a 10% discount rate. The Moderate Option will break even in 2042 under discount rate of 10%. The Modern Option has a positive NPV and will break even in 2032 with 10% discount rate.

To summarize the overall performance for each of the four transport options, both quantitative and qualitative factors were ranked and an average score of each criterion was obtained according to a multi criteria assessment.
In order to support economic development, the State Of The Art Option performs the best as more improvement measures are proposed such as the Inter-District railway system that enhances regional connectivity. However, from an environmental point of view, the Moderate Option and Modern Option are relatively better than the two other options while BAU Option is the worst. Air pollution follows the pattern


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of reduction in private vehicle strategic trips. Therefore, significant reduction is observed in the Moderate, Modern and State Of The Art Options.

From social sustainability and demographic change & quality of life perspectives, the State Of the Art Option performs the best followed by the Modern Option while the BAU Option is the worst. Investment in walking and cycling networks and facilities are proposed in Moderate Option. These are further enhanced in the Modern and State Of The Art Options.
Beyond BAU, the need to introduce legislation, detailed regulations, procurement and contract management for new public transport modes and various forms of Travel Demand Management is increasingly complex and time-consuming.

Although the Modern and State Of The Art Options can support higher growth and can encourage more people to use public transport, they associate with higher cost. The larger and more complex packages of road, public transport, ITS and TDM measures carry a greater political, programme delivery and outcome risk. In particular, the heavy railway, congestion charges and advanced ITS measures proposed under State Of The Art involve technical expertise which does not currently exist in Brunei, as well as requiring new legislation and potentially encountering public opposition such as the proposal for fuel subsidy reduction.

The BAU Option is the worst among the four transport options in a number of aspects. It supports the lowest economy growth. It performs the worst in environment, social sustainability, demographic change & quality of life, monetary programme costs and benefits.



Table 7 – Multi-Criteria Appraisal Summary

Objective/ Criteria	Indicators	Option			
		BAU	Moderate	Modern	State Of The Art
Support Economic Development	Journey Times	1	3	4	5
	Congestion	2	5	3	4
	Regional Integration	2	3	3	4
	Average	1.7	3.7	3.3	4.3
Environment	Air Emission	1	3	4	5
	Energy	3	5	4	1
	Average	2.0	4.0	4.0	3.0
Social Sustainability	Road Accidents	2	3	3	4
	Walkability & Health	1	3	4	4
	Average	1.5	3.0	3.5	4.0
Demographic Change & Quality of Life	Accessibility	1	3	4	5
	Rural Accessibility	2	3	3	3
	Car Dependency & PT Mode Share	1	3	4	5
	Average	1.3	3.0	3.7	4.3
Monetary Programme Costs and Benefits	Programme Costs	5	4	3	2
	Net Present Value	1	3	5	4
	Benefit Cost Ratio	1	4	5	4
	Fuel Subsidy	1	3	2	5
	Average	2.0	3.5	3.8	3.8


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Table 7 – Multi-Criteria Appraisal Summary

Objective/ Criteria	Indicators	Option			
		BAU	Moderate	Modern	State Of The Art
Assessment of the practical, legal, logistical and organizational challenges	Legal and Regulatory	5	4	3	1
	Governance	1	4	4	4
	Affordability	4	3	2	2
	Delivery Risk	5	4	3	1
	Practicality	5	4	3	1
	Average	4.0	3.8	3.0	1.8
Level of Stakeholder Support	Stakeholder Support	1	5	3	2
	Public Support	3	5	5	2
	Average	2.0	5.0	4.0	2.0

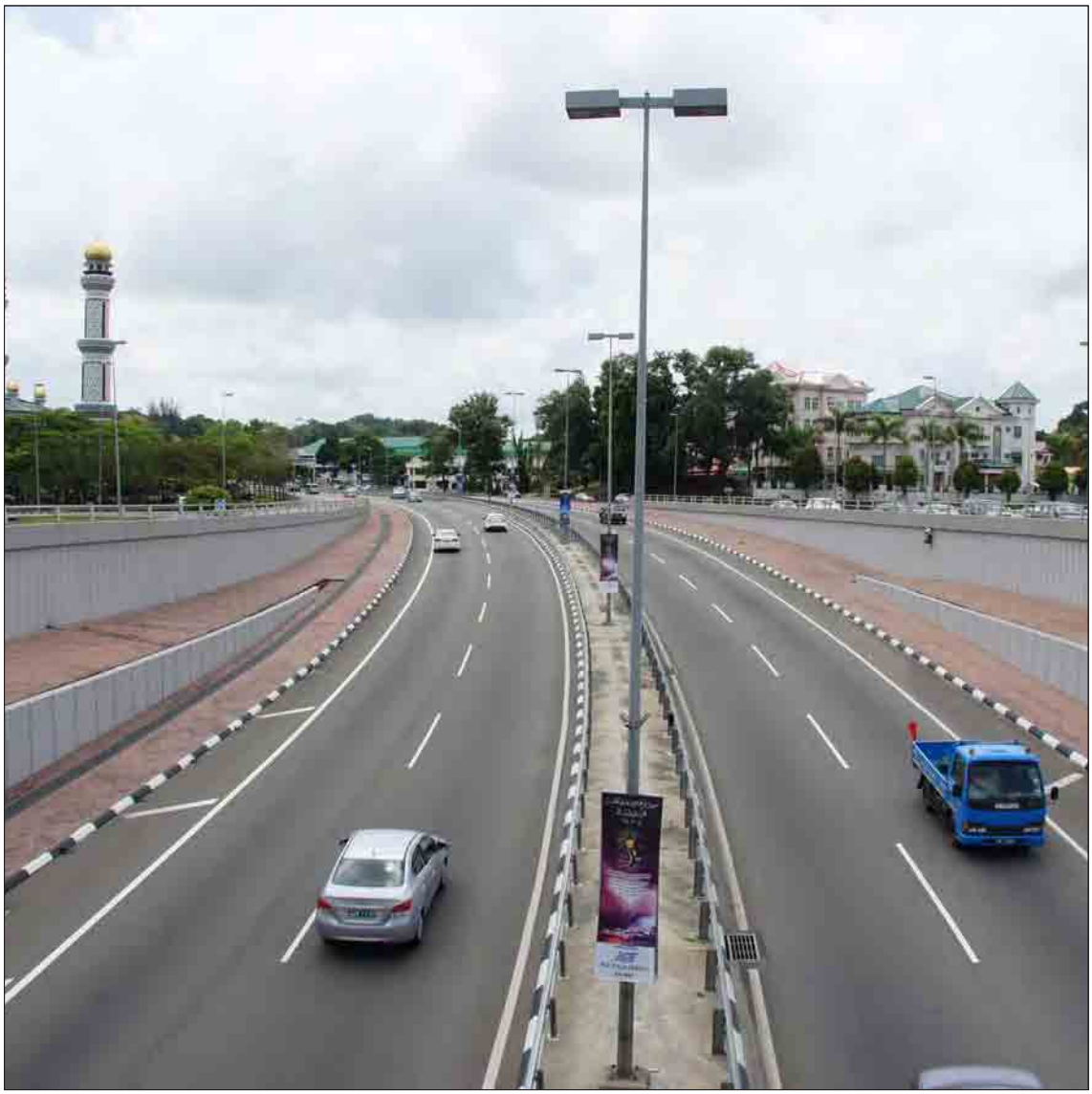
(Note: 5 – Best; 1- Worst) Source: Consultant Presentation

The Moderate Option performs the best from the environmental aspect. It can support the economic development by reducing congestion through encourage people using public transport, walking and cycling. The economic benefits outweigh the costs and it requires a lower capital investment. It also has a lower delivery risk.

As a result, the Moderate Option was chosen as the preferred option for the basis of development of more detailed proposals and the Implementation Plan under Cluster 3. These proposals were supported, in policy terms, through the development of a White Paper as described below.



Land Transport White Paper



5. National Land Transport Policies

5.1 Theme 1 – Supporting Economic Development through Essential Infrastructure (8 Policies)

Issue

Brunei's road infrastructure has improved substantially in recent years. Nevertheless, there remain some connectivity gaps and capacity deficits in the network as well as a need to improve multi-modal facilities. Policies are also required for the operational monitoring, management and maintenance of infrastructure to maximise value for the investment made and focus and sustain benefits to users, communities and the wider economy.

Headline Policy

Transport infrastructure will be constructed, maintained, enhanced, and operated to secure the efficient movement of people and goods across all modes in order to support national economic growth, diversification and spatial development, increased investor confidence and attraction of Foreign Direct Investment.



Sub-Policies

Policy EC1 (National Transport Network)

Support the efficient movement of people through a National Transport Network (NTN) of existing and new routes connecting existing urban areas, new development areas and international gateways. Whilst the emphasis of the NTN is on strategic roads, multi-modal facilities will also be promoted.

Policy EC2 (Targeted Infrastructure Improvements)

Progress the programme of targeted transport infrastructure improvements through future National Development Plans.

Policy EC3 (Targeted Infrastructure Improvements)

Explore alternative planning approaches before additional highway capacity is planned or constructed in addressing congestion and other traffic-related problems. The purpose is to balance the needs of essential road users with mitigation of social and environmental impacts and the combined interests of all user groups.

Policy EC4 (Road Hierarchy)

Promote efficient, safe and reliable travel through a clear road hierarchy. Priority will be given to improved distributor connections so as to segregate local and through traffic, provide connectivity, permeability and legibility, and to smooth traffic flow across the network.



Policy EC5 (Strategic Freight Network)

Support the efficient movement of goods through the designation of a Strategic Freight Network. This Network will improve access to industrial areas and international gateways and ensure diversion of freight vehicles from urban centres, residential areas and other sensitive locations, as well as incorporating supporting facilities for vehicle parking, servicing and navigation.

Policy EC6 (Transport Management Plan)

Develop and apply Transport Management Plans which will include detailed specification of a range of local management, regulatory, operational and enforcement measures for all urban areas and selected strategic routes making up the National Transport Network.

Policy EC7 (Intelligent Transport Systems)

Develop and provide Intelligent Transport Systems for network monitoring, control, information and management with a focus on infrastructure, vehicle and communications technology. The compatibility and interoperability of different systems will be ensured by centralised control facilities and coordinated governance arrangements.

Policy EC8 (Transport Asset Management)

Commit resources to the maintenance, renewal and rehabilitation of existing transport infrastructure through a National Transport Asset Management Plan which will set out how transport infrastructure is managed and maintained in an adequate state of repair.


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5.2 Theme 2 – Promoting Public Transport (6 Policies)

Issue

The coverage, efficiency and quality of public transport in Brunei is currently poor, limiting its attractiveness to current users and also its ability to offer a viable alternative to the private car. Patronage is progressively declining. There is an urgent need for improvements to bus services and infrastructure, as well as the wider regulatory and financial environment. Policies are also needed to improve the quality, level of service and integration of taxis and water transport, as well as a requirement to consider higher capacity transit systems for the Brunei-Muara in the context of urban growth and development.

Headline Policy

Priority is given to developing accessible, integrated, high quality networks for modes which offer an alternative to the private car, in order to sustainably connect urban and development areas, promote modal shift and offer mobility for those without access to a car.

Sub-Policies

Policy PT1 (Urban Buses)

Facilitate urban public buses to provide a frequent, reliable and affordable service for all, with the focus on effective regulatory and franchising arrangements, enhancements to infrastructure, appropriate priority measures and investments in passenger information, branding and service promotion.



Policy PT2 (Inter-District Buses):

Support Inter-District buses in providing a reliable level of public transport between urban areas. Working in partnership with the operators, priority is given to an integrated programme of infrastructure, service and customer-focused enhancements, including between Brunei-Muara and Temburong.

Policy PT3 (Taxis and Other Forms of Demand Responsive Transport):

Taxis and other forms of Demand Responsive Transport serve as a key complementary mode to the mainstream public transport network for tourists, visitors to Brunei, rural communities and those without access to a car. These transportation modes are to be provided with a high level of availability, accessibility, affordability and customer service.

Policy PT4 (Water Transport)

Encourage public transport services by water bus and water taxi in BSB and other areas of Brunei as appropriate, with the focus on maintaining health and safety standards, improving vessel quality, comfort and enhancing landing points to provide interchange with other transport modes for onward connections.

Policy PT5 (Integrated Transport)

Promote effective physical interchange and operational integration between all public transport networks and services with a particular focus of access from adjacent development to the stop, interchange facilities, passenger information, timetables and an integrated ticket and fares system.



Policy PT6 (Rapid Transit)

Give high priority to the development of rapid transit systems with their own Right of Way, high quality interchanges and feeder services in selected corridors where they can be justified by population and employment densities, potential ridership, traffic congestion and the potential to support new development

5.3 Theme 3 – Tackling Congestion and Car Dependency (5 Policies)

Issue

Brunei has one of the highest levels of private vehicle ownership in the World with high use and dependency for all forms of trip making. This is encouraged by current policies, including the long-standing subsidy on fuel which exerts a significant opportunity cost on Government resources. Levels of traffic congestion, whilst not yet acute by international standards, are increasing and becoming problematic at certain locations and certain times of day. There is a need to tackle this situation ahead of forecast future increase in demand through a combination of supply-led, network optimisation and demand management approaches.

Headline Policy

Existing and future levels of traffic congestion, journey time delay and resulting costs for people, communities and businesses shall be mitigated by reducing the need to travel, offering multi-modal travel choices and providing new infrastructure capacity. This includes managing the growth in car ownership and use in parallel with measures to improve alternative transport modes.


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Sub-Policies

Policy CD1 (Travel Demand Management)

Nationally co-ordinated Transport Demand Management (TDM) measures to tackle traffic congestion by reducing private cars on the most congested road during peak periods. Measures include changing mode, changing route, changing time and reduction of trip with the support of proper technology on real time information and providing alternatives.

Policy CD2 (Parking Supply and Management)

Regulate the availability, location, regulation and price of parking in urban areas, together with enforcement against illegal parking. Car parking provision will be differentiated according to the capacity of the surrounding road network, the provision of alternative means of access and the implementation of park and ride facilities.

Policy CD3 (Fiscal Measures)

In order to achieve an optimum use of the transport network, use fiscal initiatives, including keeping the current policy of subsidising automotive fuel under review, to present users with the direct costs of transport which reflect congestion, safety, and pollution and other externalities.


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Policy CD4 (School Travel)

Minimize the impact of the school related traffic by School Travel Plan and national school bus system. Provide proper infrastructure, regulations to avoid pick-up/ drop-off activities outside the schools. Promote safe and healthy travel to school by public transport and non-motorised modes and encourage more efficient use of the car.

Policy CD5 (Workplace Travel)

Prepare and implement guidance for public and private sector employers to develop Site-Specific Travel Plans which reduce the traffic impact of the commuting and business travel of staff and visitors. Such plans will consider staggering working hours, measures to encourage, car sharing, proactive parking management, vehicle business mileage allowances, public transport and other measures.



5.4 Theme 4 – Promoting Social Sustainability (4 Policies)

Issue

The number of people killed and seriously injured on Brunei's roads has fallen over the past decade. Nevertheless, casualties continue to fluctuate year on year, imposing costs on society in terms of human suffering, lost production and network disruption. Policies are needed to improve safety on multiple fronts, promote personal security on public transport, as well as promote longer-term public health through active lifestyles.

Headline Policy

The safety, personal security and long-term health and welfare of all users will be given the highest priority in the development and operation of the transport network.

Sub-Policies

Policy SH1 (Road Safety)

Commit resources to implementing and further augmenting delivery of road safety enhancement measures by driver education, engineering, enforcement and emergency response. Initiatives include accident monitoring, investigation and analysis, road safety audit, Demerits Points System and other measures. In particular, co-ordinated multi-agency actions are taken to reduce the number of people killed and seriously injured towards a long-term aspiration of zero fatalities on Brunei's road network.


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Policy SH2 (Personal Security)

Deploy resources to monitor perceived and actual passenger and staff safety and security issues on all transport networks. Particular focus will be given to the safe operation of public transport, the safety of pedestrians and cyclists, as well as personal security of women, children and other vulnerable groups.

Policy SH3 (Walking & Cycling)

Promote walking and cycling as efficient, safe and healthy modes of travel for short distance trips through infrastructure networks and other supporting facilities. Such networks will be progressed according to design standards for their construction, operation and maintenance with support by appropriate social marketing and promotional activity, as well as multi-agency action towards improved public health through encouragement of active lifestyles.

Policy SH4 (Disabled Accessibility)

Take full account of the needs of the disabled and mobility impaired during planning and design of all transport infrastructure and services. Accordingly, appropriate user groups will be consulted and audit of schemes undertaken prior to implementation.


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5.5 Theme 5 – Safeguarding the Environment and Conserving Energy (6 Policies)

Issue

Brunei has one of the highest rates of per capita carbon emissions in the World, representing a disproportionate contribution to anthropogenic climate change. The transport sector accounts for half of Brunei's energy consumption with nearly 80% consumed by cars alone. Motorised transport also impacts on the natural and built environment in terms of local pollution, noise, reduction in biodiversity and severance. There is a need to limit these impacts and support Government policies for energy conservation, the preservation of Brunei's unique forest resources and watercourses.

Headline Policy

Standards, regulations, processes and systems will be defined and implemented for transport infrastructure and operations across Brunei to minimise the overall impact on the natural and built environment, minimise carbon footprint and maintain local air and noise quality. Positive outcomes will be achieved through a combination of new technology and user behavioural change.



Sub-Policies

Policy EN1 (Environmental Impact Assessment)

Develop an Environmental Impact Assessment for all major transport initiatives before implementation. Evidence will be provided in such assessments of appropriate mitigation measures to protect the local natural and built environment, as well as Bruneians' health and quality of life.

Policy EN2 (Carbon Reduction)

Promote energy efficiency and a reduction in carbon emissions through a Carbon Reduction Blueprint. This will raise public awareness, encourage take up of low carbon travel modes, promote eco-driving practices, support a shift to new fuel technology and ensure the resilience of transport infrastructure and services to the impacts of climate change.

Policy EN3 (Low Emission Vehicles)

Regulate, and progressively tighten, new, imported and existing vehicle emission standards including regular inspection and compliance monitoring as well as changes to fuel standards. Regulations will include heavy polluting vehicles being prohibited to enter certain sensitive areas and emissions labelling for all vehicles with proper consumer information. An appropriate regulatory and fiscal regime will be developed to encourage users to accelerate, over time, their adoption of new technologies.



Policy EN4 (Heart of Borneo)

Fully recognise and support the Heart of Borneo (HoB) initiative working in collaboration with the Governments of Malaysia and Indonesia. Travel needs of rural communities should be served by low environmental impact transportation such as river transport, local service provision will be promoted and there will be a general presumption against extensive construction of new physical transport infrastructure.

Policy EN5 (Built Environment)

Support a high quality public realm in urban areas by development and application of appropriate planning standards, including promoting the concept of liveable neighbourhoods where local trip-making by walking and cycling is encouraged, traffic is appropriately managed and space is given over to communities and people rather than motor vehicles.

Policy EN6 (Fuel Subsidy)

Whilst the policy of providing financial assistance to those on low-incomes in meeting their basic travel needs will be maintained, keep the current universal subsidy on automotive fuel under review to ensure it remains appropriate for this end, balanced with consideration of its opportunity cost, consistency with environmental and sustainability goals, and consideration of options for more targeted support for social inclusion.



5.6 Theme 6 – Effective Regional and International Connections (4 Policies)

Issue

Brunei shares pan-Borneo connections and relations with Malaysia and Indonesia as well as seeking regional economic, social and environmental cooperation through the East ASEAN Growth Area (BIMP-EAGA) and wider ASEAN community. Transport connections have an important role to play in supporting such cooperation and need to be made efficient, attractive and effective as possible to reduce the economic and social costs of travel.

Headline Policy

A priority will be placed on working closely with neighbouring countries to support infrastructure, operational arrangements, policies and regulations which actively promote regional economic and social integration through stronger connectivity across North Borneo and the wider East ASEAN Growth Area (BIMP-EAGA).

Sub-Policies

Policy RC1 (Ports and Airports)

Support targeted programmes of improvement which enhance surface access and customer service for people and goods using existing and planned ports, jetties and airport locations, and assist their efficient onward sea and air connections.


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Policy RC2 (Land Border Crossings)

Invest in improved access to land border crossings and cooperate on initiatives to minimise time and costs on people and business through Customs, Immigration, Quarantine and Security (CIQS) procedures, supporting new regulation, processes and technology as appropriate.

Policy RC3 (Pan-Borneo Highway)

Support the development of the Pan-Borneo Highway to efficient, safe and reliable levels of service, including enhanced connectivity through Temburong and onward connections to East Malaysia.

Policy RC4 (Regional Public Transport)

Support regional public transport services, specifically inter-urban bus and coach connections, across North Borneo working with the Governments of Malaysia and Indonesia and private sector operators in respect of information, boarding and alighting points, rest and recreation areas and attractive fares and ticketing arrangements.



5.7 Theme 7 – Strengthening Planning and Delivery (5 Policies)

Issue

Irrespective of which specific transport policies and programmes are proposed, Brunei Government exhibits systematic weaknesses in its transport and land use governance arrangements, planning processes and systems and skills and capacity to develop and manage a multi-modal transport system. Issues of sector leadership and coordination, effective technical and administrative processes and resourcing must be addressed in practical terms if the LTMP is to be successfully delivered and maximum value for money is to be secured from the required investment.

Headline Policy on Transport Governance

Governance arrangements, processes and systems for integrated land use and transport planning, delivery and monitoring will be strengthened. An executive agency - Transport for Brunei Authority will ensure that resources are efficiently and effectively deployed; planning and delivery of transport infrastructure and services is fully integrated, whilst improvements to multi-agency cooperation and capacity building will also be encouraged.

Sub-Policies

Policy PD1 (Land use - Transport Integration)

Integrate land use development with transportation, including maintaining urban design guidelines and development control procedures to address land use density, mix and structure, road hierarchy and layout, and measures which reduce the need to travel, support public transport and non-motorised modes.



Policy PD2 (Transport Governance)

Strengthen governance arrangements for transport planning and delivery through an executive agency – Transport for Brunei Authority – which will coordinate the detailed planning, construction, operation, maintenance and monitoring of all land transport infrastructure and services in Brunei. To enhance the delivery of wider multi-disciplinary transport policies and measures, coordinated multi-agency cooperation will also be promoted.

Policy PD3 (Institutional Capacity and Skills)

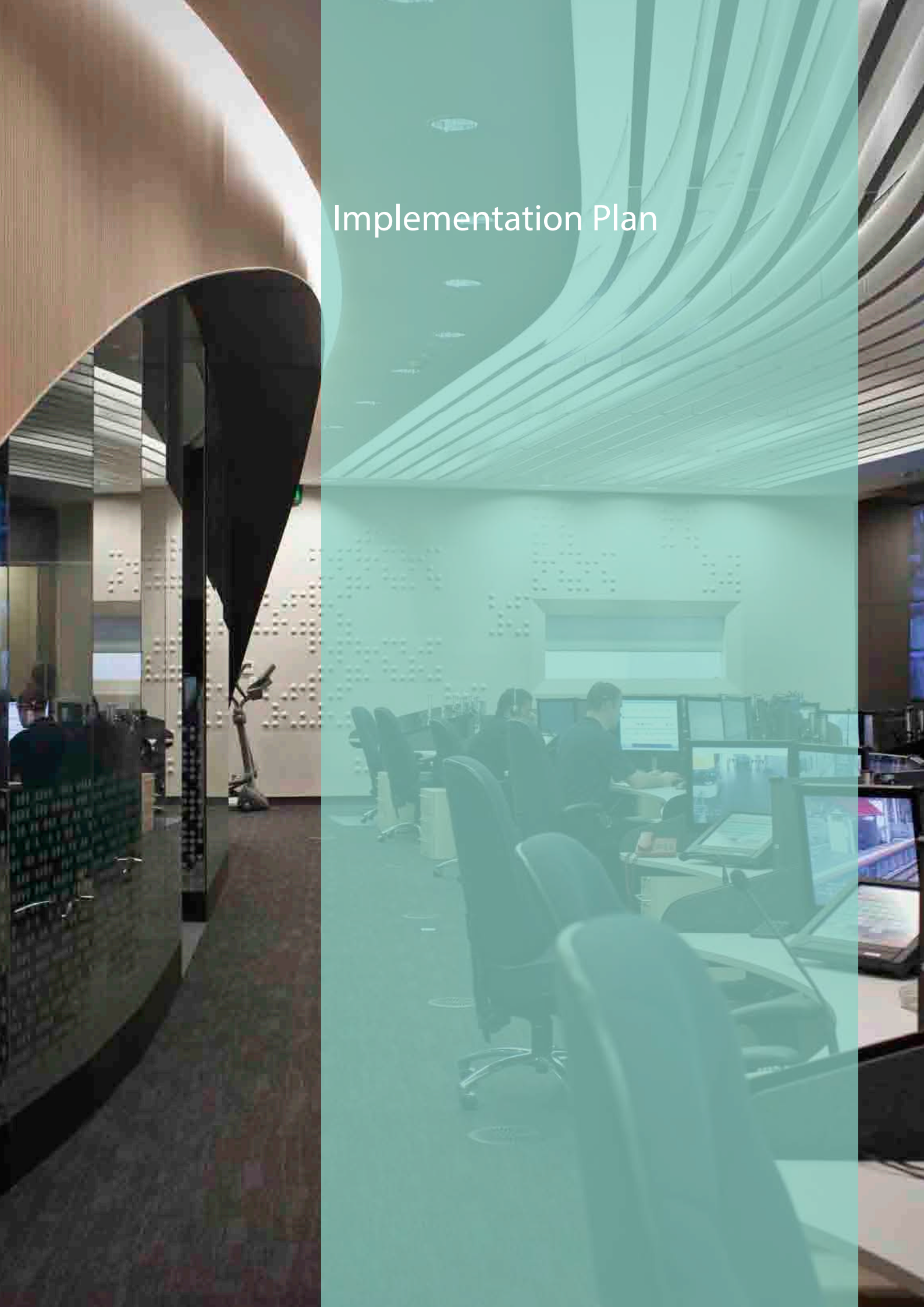
Strengthen the capacity and skills available to the Government in implementing transport initiatives through appropriate staff recruitment, training and professional development, development of enhanced transport planning and delivery processes, appropriate research, and effective funding arrangements. Efforts will also be made to strengthen the private sector supply chain.

Policy PD4 (Transport Data Collection and Monitoring)

A single agency – Centre for National Transport Statistics – will lead a strategic framework and depository for transport data, surveys and statistics. It will also set up common data collection, analytical and storage systems and serve as a knowledge exchange platform for research, technology and good practice.

Policy PD5 (Master Plan Review)

Review the Master Plan regularly, for every 5 years or following major change in government policy, and kept up to date to ensure that it remains effective, relevant and that the desired outcomes are being delivered on the ground.



Implementation Plan



6. Implementation Plan

6.1 Developing Proposals

The Cluster 3 report sets out the preferred strategy, the road map to land transportation, the implementation plan as well as key issues relating to implementation.

Detailed proposals for the LTMP are set out in 14 Strategy Components which cover 128 areas of proposal, aligned with the 7 LTMP policy themes and 37 policies. These proposals include:

- strategic road network designation, capacity and connectivity improvements, asset management and maintenance enhancements;
- improvements to public bus franchising system, physical infrastructure, service quality and customer focus;
- a Bus Rapid Transit system for BSB and associated Public Transport Interchange and Park & Ride;
- expansion, and greater regulation, of the taxi system and associated investment in infrastructure, passenger information and technology;
- greater health and safety regulation of water transport and introduction of new routes connecting new locations in BSB;
- improvement to traffic management, regulation and safety at both the strategic and local level, including selective Travel Demand Management measures;
- enhanced parking infrastructure, facilities, regulation and pricing;
- improved management of the transportation network using Intelligent Transport Systems;
- new active travel (walking and cycling) infrastructure and incentives;



- improved multi-modal access and encouragement of sustainable travel to school and the introduction of a national school bus system;
- implementation of standards, regulations and processes to reduce the impact of transport on the environment, including incentives to encourage take-up of low emission and more fuel-efficient vehicles, and lead to the progressive decarbonisation of the land transport sector;
- improvement of international and cross-border mobility through improved regional connections by private and public transport between Brunei, Sarawak, Sabah and the wider BIMP-EAGA; and
- improved transport governance, particularly the establishment of a new executive agency, Transport for Brunei Authority to take on planning, regulation, construction, operation and management of key strategic transport networks and services, and act as a single steward of the LTMP and its core programmes.

As well as *"national"* programmes and budgets relating to the above interventions, the LTMP proposes a new planning framework of Transport Management Plans which will be prepared at the District level. These Plans will provide a mechanism for planning, designing and funding locally-focused interventions around traffic management, parking management, non-strategic public transport, walking and cycling, road safety and environmental enhancements, ensuring that the strategic goals of the LTMP are delivered at the local level.

The format of presentation is at aggregate level of the programme as a whole. Disaggregate information on each of the key programme elements can be found in the detail of each Strategy Component.


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6.2 Inputs, Outputs and Outcomes

The LTMP will deliver a step change in Brunei's land transport provision consistent with the strategic goals, objectives and policies set out in the White Paper, and as set out in each of 14 Strategy Components. These Strategy Components, aligned with the White Paper are tailored to address both existing issues and challenges and those forecast to emerge in future from economic growth, population and employment increase and associated land use development under a moderate economic growth scenario of 4% per annum. They have been comprehensively reviewed and updated from the LTMP Interim Report and are included as part of the documentation accompanying the LTMP Final Report.

In implementing the LTMP a set of key elements to achieve the overall vision of an integrated, efficient, clean and rapid land transport system for Brunei and the policies underpinning it is defined. In this context, a focus is given to the following:

- inputs – the costs, financial expenditure and other resources which must be invested in key programme areas;
- outputs – the key elements of the roadmap programme itself, in terms of infrastructure, services, regulations, governance improvements and other interventions to be delivered; and
- outcomes – the impacts of the programme in terms of achievement of the desired goals and objectives.

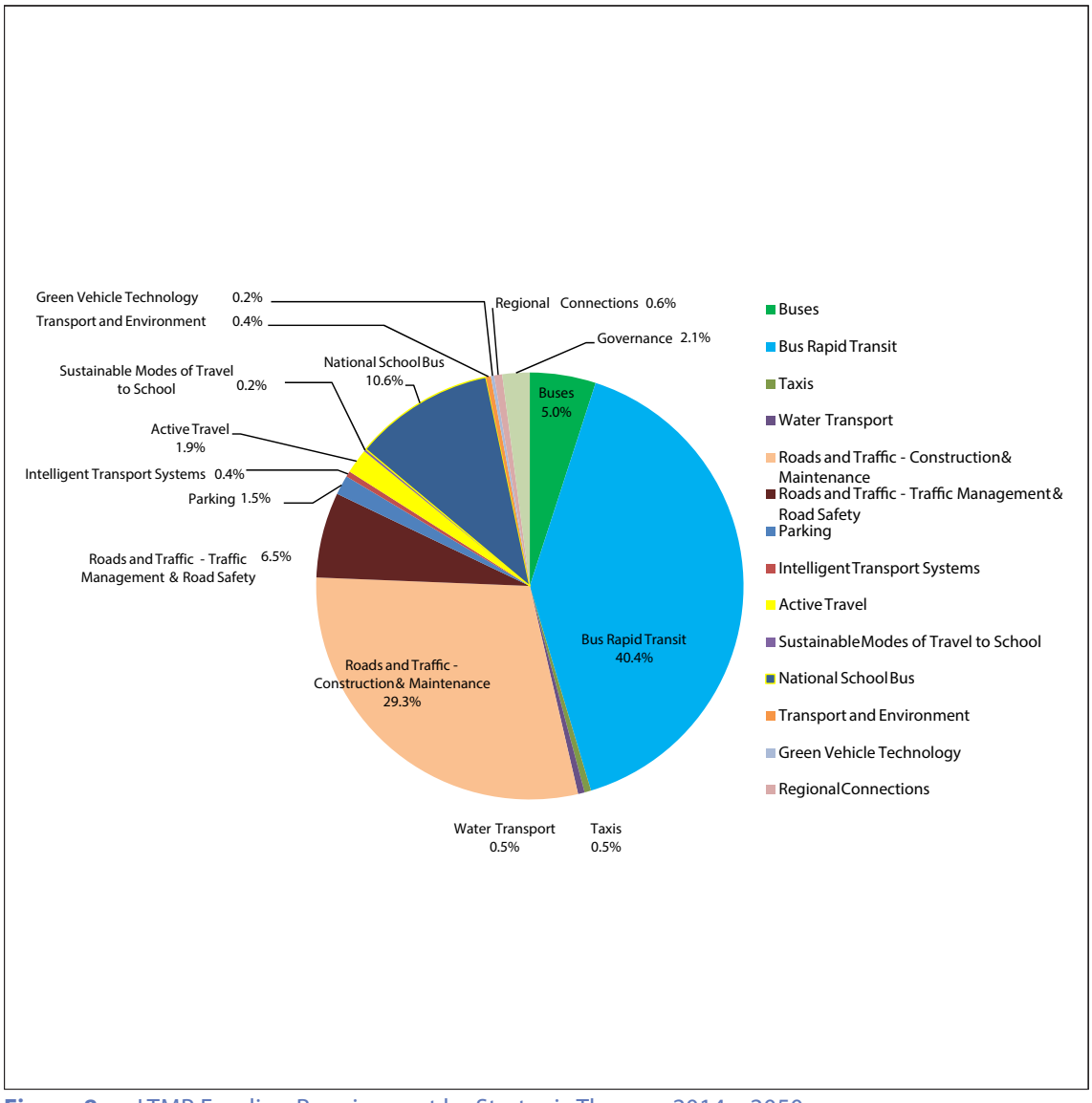


Figure 8 – LTMP Funding Requirement by Strategic Themes, 2014 – 2050

6.3 Inputs

As well as the development of the LTMP policies themselves, and investment in professional staff, processes and systems to take them forward, the principal input to the LTMP is the expenditure of capital and revenue budgets to secure infrastructure, services and other transport interventions.

The total Brunei Land Transport Programme will cost an estimated total of B$ 13.9 billion up to the year 2050. This covers all items to be expended by the Government and other public agencies, and is front-loaded in terms of expenditure, split by time period as follows:

- B$ 10.5 billion from 2014 to 2035; and
- B$ 3.4 billion from 2036 to 2050.

Within the overall total expenditure from 2014 to 2050, it is estimated that:

- B$ 9.1 billion will cover capital investment in (road and public transport) infrastructure and equipment; and
- B$ 4.8 billion will cover operation and maintenance of infrastructure as well as certain interventions (for example, franchising of public buses, school travel plans) which are based on services, campaigns, regulatory and institutional reform.

The combined capital and recurrent costs incurred break down broadly by Strategy Component as shown in Figure 8. The proportion of total funding attributable to each of the Strategy Components indicates that a significant requirement of the LTMP funding resources are for strategic interventions around roads and traffic (construction and maintenance of a number of significant new or upgraded highways) and public transport (mainly around delivery of the BSB Bus Rapid Transit system). These collectively account for approximately 70% of the total funding between them.

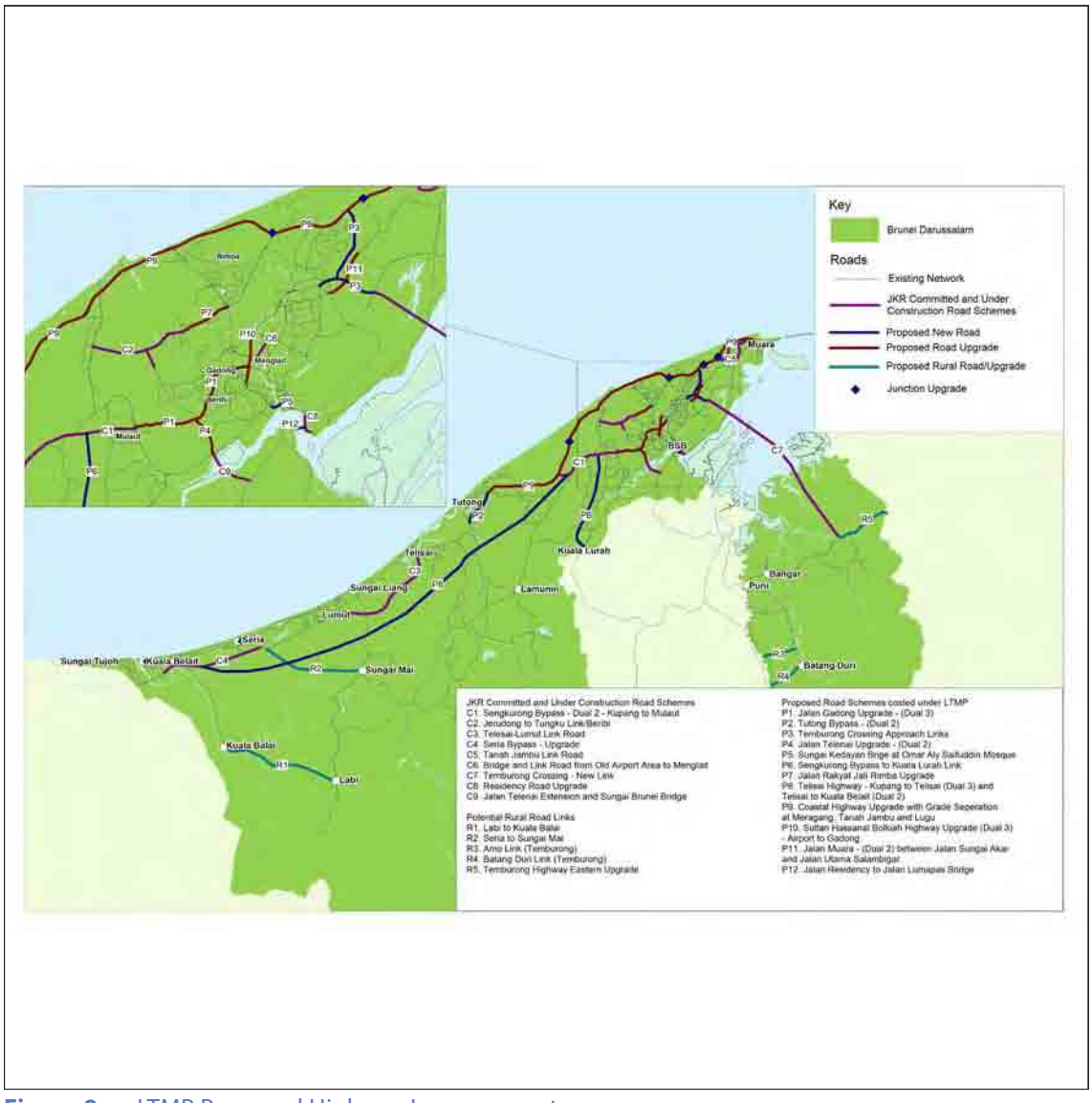


Figure 9 – LTMP Proposed Highway Improvements

6.4 Outputs

The roadmap programme for delivery sets out the key programme elements between 2014 and 2035 using the public funding set out above. Further details are provided under each Strategy Component with the key points set out below.

Roads and Traffic
It is vital to invest in the construction, maintenance, enhancement of highway infrastructure which supports national economic growth, diversification and spatial development, raises investor confidence and attracts Foreign Direct Investment. To this end, a National Road Network **(NRN)** will be designated, a targeted programme of road improvement will be undertaken and improved asset management achieved. A new Functional Road Hierarchy will be put in place, including a Strategic Freight Network.

The programme includes 140km of new roads and 25km of upgraded road in addition to road upgrades related to Bus Rapid Transit (48km).

Investment in traffic management and road safety which supports national economic growth, diversification and spatial development, raises investor confidence and attracts Foreign Direct Investment is also required as part of the Roads and Traffic strategy.

Travel Demand Management policies and measures will be developed and implemented. These include designation of a new BSB Urban Smart Travel Zone **(BUSTZ)**, strengthening of development control procedures and road space re-allocation towards public transport and active travel modes.


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Buses

In order to encourage a modal shift from cars to more sustainable modes of travel and reduce the congestion on the roads it is essential to provide a safe, high quality accessible and sustainable bus transport system.

The desired outcome is to improve the existing bus network and infrastructure through the reduction of the number of bus franchisees (to two or three), expansion of the bus fleet from 105 buses to 275 buses, and improvement to bus frequency and reliability of the bus journey times.

Bus network and infrastructure improvements will need to be paired with the provision of high quality customer services, improved facilities, more readily available information and branding and a transparent and legible fare and ticketing process.

A new Department of Bus is proposed to establish, manage and monitor a new planning, regulatory and operational framework for public bus franchises and their integration with infrastructure, passenger information and customer service improvements.

Separately for an enhanced public network, a National School Bus system will be promoted which, combined with appropriate traffic and parking management measures around schools, will aim to secure a substantial modal shift away from car use for school-related travel.

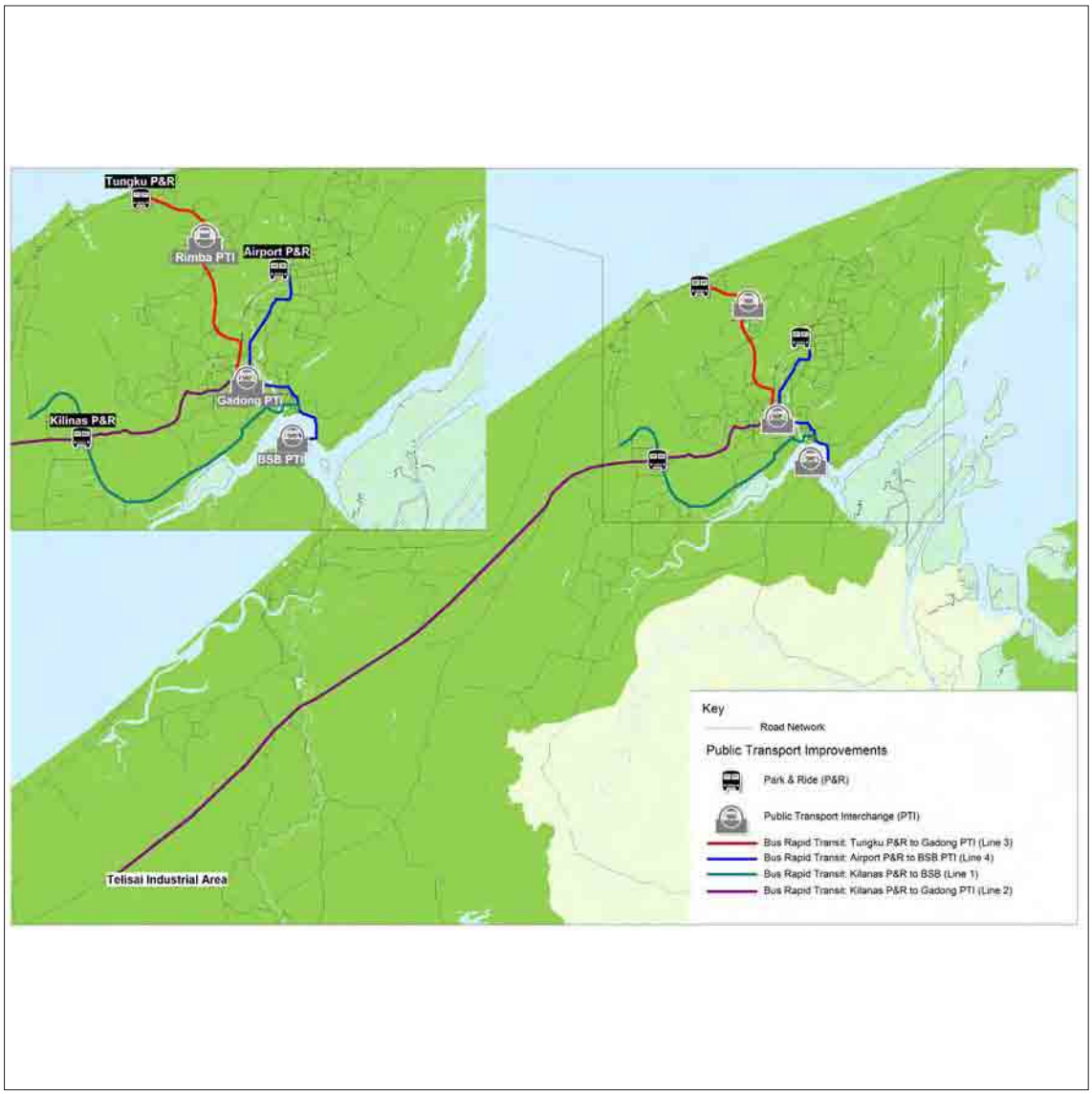


Figure 10 – Proposed Bus Rapid Transit and Park and Ride Network

Bus Rapid Transit

In addition to the improvement of the conventional bus system a need to develop high quality, high capacity transit systems with their own Right of Way in selected corridors was identified in order to serve the key population and employment areas. Bus Rapid transit **(BRT)** has been selected as the optimum higher capacity public transport mode for Brunei. The proposed BRT system, centred on BSB with a link to the proposed Telisai Industrial park, comprises a network of 48km made up of 4 separate lines along radial corridors anchored by Park & Ride facilities. The proposed network will be constructed and progressively increased in capacity between 2017 and 2035:

- BRT Line 1: Sengkurong to BSB via Kilanas and Jalan Tutong (17km);
- BRT Line 2: Kilanas to Gadong via Jalan Gadong (11km) and service extension o Telisai;
- BRT Line 3: Tungku to Gadong (10km); and
- BRT Line 4: Brunei Airport to BSB (10km).

The system as a whole is estimated to carry around 150,000 per day by 2025 and almost 230,000 passengers by 2035, representing a 15% mode share.

In order to support the BRT network there will a strengthening of governance, contracting and funding arrangements and associated enhancements to traffic management, parking, active travel, public realm and TDM within the BRT corridors.


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Taxis

There LTMP proposes an increase in taxi supply and availability, including a new letting franchise system. The number of taxis is proposed to be increased by from about 50 currently to 200 in the short term and 400 plus in the long term. The quality of taxi vehicles will be improved in terms of size, age, facilities for disabled, emissions, branding and vehicle conditions. A centralised booking and dispatch centre and the introduction of a new technology such as fare meters and smart booking applications are also proposed.

Successful delivery of these proposals will be by a new Department of Taxi tasked with the planning, policy and regulation of taxis.

Water Transport

A key proposal for water transport is the introduction of New Marine Safety Code for Water Vessels and new water transport routes and stops within BSB at:

- City Centre to Kiulap and Gadong;
- Brunei International Airport; and
- Kampong Ayer circular route.

There will also be improved docking locations provided at:

- Muara Passenger Terminal;
- New Central BSB passenger terminal;
- New Water transport for the airport;
- Bangor Passenger Terminal; and
- Gadong, Kiulap, RIPAS hospital, Government Administrative District, Kampong Ayer.

These physical measures will also be supported by improved passenger information at terminals, vessels, key destinations, online and other media and a new Department of Water Transport to improve sector coordination. Water transport will also be supported in interior rural areas not accessible by all-weather roads, working with local communities to develop appropriate solutions.



Parking

There is a need to control unconstrained and unregulated provision of parking facilities within Brunei in order to encourage a modal shift from private car to public transport. Parking facilities and infrastructure will be improved through revised standards, new and upgraded off-street public car parks, real time parking guidance systems and consideration of park and ride and freight parking facilities.

Parking planning, regulation and operation will be improved and enforced by a dedicated Department of Parking (part of the proposed Transport for Brunei Authority). The Department of Parking will be responsible for policy, planning, implementation and management of parking areas.

Intelligent Transport Systems

Intelligent Transport Systems **(ITS)** have been identified as a means to facilitate network and transport management across Brunei. The proposals include:

- improving general data collection and monitoring;
- implementing a Network Management and Control System **(NMCS)**;
- promoting real-time information for users and operators;
- establishing a central Brunei Transport Management and Control centre **(BTMCC)**;
- integrating fares, ticketing and payment collection especially for public transport;
- supporting inter-urban and regional travel, including management of the National Road Network; and
- strengthen governance, capacity and skills, in particular around the BTMCC



Active Travel

The LTMP proposes to foster more of an active travel culture in urban centres, communities and neighbourhoods across Brunei through the development of active travel infrastructure, polices and programmes.

Proposals include improved standards, guidelines and regulations combined with a programme of walking and cycling infrastructure, support facilities, way finding and public awareness campaigns and programmes.

Sustainable Modes of Travel to School

A number of proposals have been put forward to encourage greater sustainability for school children and young people, in all forms of travel to, from and between educational institutions. Proposals include:

- a Brunei school Travel Planning Initiative;
- improvements to public transport accessibility for schools;
- education and training of parents, staff and children;
- setting targets, and monitoring and evaluating performance;
- strengthening of multi-agency governance; and
- development control of new upgraded schools.


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National School Bus System

Provision of a safe, reliable, affordable, accessible National School bus System is essential to reduce the traffic impact of school travel on the road network. A school bus expansion programme is proposed with an increase in the number of buses from 465 to 930 and general improvements in the quality of vehicles used. New planning and design guidelines will improve school bus infrastructure along with a new fare and subsidy structure to make school bus travel more affordable.

Green Vehicle Technologies

To maximise the potential benefits of green technologies across all transport modes to support Brunei's environmental strategy there needs to a comprehensive data collection exercise to form the baseline, combined with Green Travel Awareness Campaigns, incentives, regulations and standards to encourage the use of environmentally friendly vehicles.

A Green Vehicle Technology Unit will be required to coordinate and oversee the development and implementation of the strategy, working closely with transport agencies and the automotive industry. This will target a reduction in carbon emissions of 40% compared to a do nothing scenario and local NO_x pollutants will be reduced by more than 30%.


Perusahaan Beribi

Transport and Environment

To maximise the potential benefits of environmental friendly urban design in the land transportation system to Brunei across all modes and minimise the disturbance to the environment by the land transportation system.

Regional Connections

Development and implementation of the LTMP cannot be considered as a purely domestic matter confined within its borders. It is important to develop an efficient, safe and integrated land transport system for Brunei that facilitates cross-border mobility and supports, and is supported by, wider regional and sub-regional dialogue, cooperation and action. Surface access to 'international gateways' and land crossing borders will be improved along with investment in infrastructure and services which will form part of wider sub-regional and regional networks.


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Strengthening Transport Governance

The principal proposal for improving transport governance in Brunei is through the creation of a new standing multi-modal planning and delivery organisation, Transport for Brunei Authority. This will be a new *"Integrated Transport Authority"* for the Country with a statutory remit, functions, powers, dedicated management and resources covering all land transport infrastructure and services, both existing and planned, across the whole of Brunei. There will be general capacity building in key technical areas through the Brunei Transport Skills Initiative and data collection, monitoring and reporting will be taken forward through a new Brunei Centre for Transport Statistics.

The impacts of the LTMP in terms of delivery of strategic goals have been assessed based on a range of quantitative and qualitative evidence for specific Key Performance Indicators **(KPIs)**. These KPIs include a comparison with a reference case that reflects a 'no intervention' scenario under the Brunei Strategic Transport Model **(BSTM)** and provide a basis against which actual progress to 2025 and 2035 can be monitored over time. In some cases, the extent of desired change (e.g. mode share, journey times) can be estimated with some accuracy, based on the BSTM and other methods of forecasting (although based on a fixed 4% growth scenario); in other cases (e.g. users' perception, private sector participation), further surveys will be necessary in order to establish a viable baseline before targets can be set with any confidence.



6.5 Outcomes

The following sections summarise the outcomes – and therefore the benefits – of implementing a programme of capital investment, policies, regulatory and governance reform in line with the proposals above.

Pages below further elaborates on the impacts of the LTMP in terms of delivery of strategic goals, based on a range of quantitative and qualitative evidence for specific Key Performance Indicators, impacts and area of desired outcome. These KPIs include a comparison with a reference case that reflects a 'no intervention' scenario under the Brunei Strategic Transport Model **(BSTM)** and provide a basis against which actual progress to 2025 and 2035 can be monitored over time. In some cases, the extent of desired change (e.g. mode share, journey times) can be estimated with some accuracy, based on the BSTM and other methods of forecasting; in other cases (e.g. user perception, private sector participation), further surveys will be necessary in order to establish a viable baseline before targets can be set.

The wider issue of monitoring and reporting progress and the survey and data collection requirements to support this is addressed more fully below.



Strategic Goal 1 – Economy: Support Brunei's economic development, international competitiveness across key growth sectors and planned spatial changes in economic activity

The LTMP:

- provides a framework for plans for industrial, commercial and residential development to be delivered;
- supports growth of key Brunei economic sectors, including freight, construction and international trade, and provides access to international air, port and land border crossing locations; and
- ensures potential for growth in population and employment in a sustainable manner.

The infrastructure, operational and management, regulatory and institutional measures in the LTMP will:

- provide multi-modal access to town centres, employment areas and new development zones;
- reduce road traffic congestion, with peak hour journey times on the road network cut by over 50%;
- reduce the proportion of journeys by any mode being more than 30 minutes by over 40%;
- increase average speeds and journey time reliability on the National Road Network (**NRN**) and other strategic links for both passenger and freight traffic, with vehicle-kilometres travelled on links in the road network that are operating over of capacity less than around 1% of the total and travellers able to plan and undertake their journeys with information via a range of static and active media;
- raise additional revenue, for example from parking fees and public transport fares, which are potentially available for hypothecation back into projects which improve the transport sector; and

- support the development of Temburong District as an integral part of Brunei, as well as ensuring greater infrastructure and service coordination between Brunei, Sarawak and Sabah.

The LTMP programme represent value for money in the use of Brunei investment resources, with an estimated ratio of monetarised benefits to costs of nearly 1.4 to 1.

Total programme costs of B$ 13.9 billion are outweighed by monetarised benefits of improved travel times, savings in vehicle operating costs, as well as non-monetised savings from reduced accidents, emissions and improved quality of life. In addition, the Government benefit from savings on annual fuel subsidy, reducing opportunity costs and realising funds for alternative forms of investment.

Strategic Goal 2 – Environment: Minimise the transport sector's impact on the environment and in particular preserve Brunei's biodiversity, reduce energy use and minimise greenhouse gas emissions

The LTMP:

- will provide the basis for significant decarbonisation of Brunei's vehicle fleet;
- contributes towards reduced emissions and fuel consumption by cars and freight vehicles;
- encourages a shift from car to public transport, water transport, as well as to walking and cycling; and
- will encourage land-use developments to be designed around public transport as an integral element.

The infrastructure, operational and management, regulatory and institutional measures in the LTMP will:

- increase public transport's share of travel during the peak to over 20%, representing 37,000 trips;
- reduce strategic daily car trips by over 20%;
- treble the number of children using school buses from 9,000 to 27,000
- regulate for Euro V and more advanced emission and fuel consumption standards in the medium term;
- ensure at least 10% of Brunei's vehicle fleet are fully electric, increased further in the longer term;
- reduce transport's CO_2 emissions by 40% and NO_x by 32% compared to do minimum levels;
- ensure the environmental impacts on transport infrastructure and services are fully assessed and mitigated as part of the project development, planning and delivery cycle;
- enhance public realm and quality of the built environment in town centres and residential neighbourhoods;
- protect remote rural areas from unconstrained highway construction and motorisation impacts, achieve mobility by low impact travel modes and support initiatives such as the Heart of Borneo.

Strategic Goal 3 – Social Sustainability: Support safety, health and social inclusion

The LTMP:

- contributes towards a significant reduction in the rate of road casualties by reducing excess speed, improving driving standards and driver behaviour, and facilitating more effective enforcement;
- will improve air quality and reduce transport noise levels across Brunei;
- helps to increase walking and cycling as aids to fitness and better health; and
- will encourage more integrated and sustainable land-use developments in which public transport and active travel are designed as integral elements.

The infrastructure, operational and management, regulatory and institutional measures in the LTMP will:

- contribute towards a fall in the rate of fatal and serious road casualties by 50%;
- contribute to a fall in children killed and seriously injured by 60%;
- increase network safety through driver information systems, improved standards, enforcement and maintenance;
- divert truck movements away from town centres and communities and provide more efficient delivery opportunities for businesses;
- ensure all new transport infrastructure is safe by design and resilient to changing climate and environment;
- support safer, more attractive, liveable and vibrant town and district centres;
- deliver systems to increase personal security for users of public transport networks, public car parks and the wider public realm; and
- improve accessibility for those on low-incomes or without access to a car;
- reduce factors contributing to high levels of obesity, cardiovascular disease, diabetes and other non-communicable diseases;
- improve standards of marine safety and the risk of death and injury from marine accidents.

Strategic Goal 4 – Quality of Life: Support demographic change, liveability and quality of life for all, including access to employment, training and other opportunities

The LTMP:

- provides the basis for further joint and fully integrated planning of transport and land-use;
- will promote increased accessibility in rural areas and for new developments;
- enables new transport services to develop, especially to serve the needs of those without cars for local and long-distance travel; and
- promotes a significant increase in accessibility for residential areas and rural areas by enhancing coverage by public transport and demand responsive services.

The infrastructure, operational and management, regulatory and institutional measures in the LTMP will:

- increase the capacity for making journeys by public transport in urban areas and between Districts across Brunei;
- increase the number of people within walking distance of a public transport stop and regular public transport service;
- ensure that transport service providers focus on keeping their customers informed, understanding and responding to their needs and providing excellent customer service meeting expectations;
- ensure that the congestion, environmental and social costs of the school run are substantially resulting in more independent, healthier and confident children aware of sustainability issues;
- provide truck routes away from residential areas and communities and reduce total truck vehicle km; and
- reduce the costs of passenger services and deliveries of goods and services to more remote areas.

Enabling Goal 5 – Governance: Promote good governance, sound process and value for money in transport planning and delivery

The LTMP:

- provides a new single statement of national transport policy, priorities and trade-offs, linked to specific plans for delivery;
- facilitates the planning of integrated multi-modal national networks and interfaces on a programme basis linked to quantifiable outcomes and milestones;
- will provide a single framework for integrating data, knowledge and analysis;
- will ensure that transport investment is aligned and demonstrably contributes to Wawasan 2035, the NLUMP, District Plans and plans for major development areas; and
- will ensure that plans for technical planning and delivery are supported by appropriate governance, funding and monitoring processes, systems and structures.

The regulatory and institutional measures in the LTMP will:

- lead to the creation of an effective new integrated authority, Transport for Brunei Authority, with powers, resources, leadership and mandate to deliver the LTMP and its associated programmes;
- support strengthened multi-agency working across different parts of Government, and between public and private sectors, towards common goals and agendas;
- ensure that projects and programmes are supported by effective funding arrangements and use of the private sector, as well as delivered on time and on budget through strong project management controls, approvals and gateways;
- identify and progressively fill gaps in key professional and technical skills necessary to plan, deliver, operate and manage a broader and more sophisticated range of transport infrastructure networks, facilities and services;
- ensure that the cost effectiveness and value for money of all transport projects are demonstrated prior to implementation, and that the stated positive outcomes are monitored and demonstrated as achieved in practice;
- demonstrate whether progress against desired outcomes is on track and allow performance management of transport programmes in light of progress made; and
- facilitate greater input from, and therefore ability to meet the needs of, key stakeholders, users and the public.

Table 8 – LTMP Key Performance Indicators and Areas of Outcome

Objective	Strategy Component	Target Key Performance Indicator, Quantified Impact or Area of Outcome			
		2012	2025	2035	Headlines
Strategic Goal 1 – Support Brunei's economic development, international competitiveness across key growth sectors and planned spatial changes in economic activity					
		Planned RKN and Temburong Crossing Improvements	National Road Network and Strategic Freight Network fully designated, designed and operating within defined levels of service	Required NRN and SFN capacity and management enhancements completed to maintain defined level of service	Fully defined, operational and effective National Road Network and Strategic Freight Network
Objective 1.1 - Enable greater multi-modal mobility for passengers and freight	BRT, Buses, Taxis, Water Transport, Roads and Traffic, Active Travel	VBRT None in 2012	BRT headways of 5 mins on key routes	BRT headways of 4 mins on key routes	4 urban BRT corridors - total length of 48 Km - every 4 minutes 3 Park and Ride sites 3 PTIs in Gadong, BSB and Rimba
			3 Park & Ride sites – Kilanas, Tungku and Airport Figure 10 refers	-	
			Gadong PTI Figure 10 refers	-	
		Bus fleet of 105 vehicles	Bus fleet of 275 vehicles	Bus fleet of 275 vehicles	More buses
		Bus headways of 30 mins	Bus headways of 15 mins	Bus headways of 10 mins	More frequent bus services

Table 8 – LTMP Key Performance Indicators and Areas of Outcome

Objective	Strategy Component	Target Key Performance Indicator, Quantified Impact or Area of Outcome			
		2012	2025	2035	Headlines
Objective 1.2 - Tackle congestion, minimise journey times and enhance transport network resilience	Roads and Traffic, Parking, ITS	Limited walking and cycling networks	Walking and cycling networks implemented through Transport Management Plans and planning process	Walking and cycling networks implemented through Transport Management Plans and planning process	Walking and cycling connectivity achieved
		Average AM peak hour journey time by car of 28 minutes	23 minutes (38 mins in Reference Case)	31 minutes (66 mins in Reference Case)	Existing journey times by car largely maintained
		New roads As per committed reference network	58Km of new road by 2018 92Km of new road by 2025	-	140 Km of new road
		Upgraded roads As per committed reference network	6 Km of road upgrades by 2018 8Km of road upgrades by 2025	+11 Km of road upgrades by 2035 Figure 9 refers	25 km of upgraded road
		1% of highway km over capacity in AM Peak	<1% (down from 6% in reference case)	<1% (down from 20% in reference case)	Network management control centre and Brunei Transport Management and Control Centre
					Tackle road congestion

Table 8 – LTMP Key Performance Indicators and Areas of Outcome

Objective	Strategy Component	Target Key Performance Indicator, Quantified Impact or Area of Outcome			
		2012	2025	2035	Headlines
Objective 1.3 - Provide efficient access and operation for international gateways for passengers and freight	Regional connections	-	Journey time targets to Airport, Border Crossings and Muara Port to be set	Journey time targets to Airport, Border Crossings and Muara Port to be set	Telisai Highway. Enhanced CIQS procedures. Port and Airport Surface Access Strategies
Objective 1.4 - Ensure transport networks and services integrate between modes and with land use plans	Roads and traffic, BRT, Buses, School buses	24% of journeys by any mode more than 30 minutes in AM peak hour	20% (down from 31% in reference case)	40% (down from 71% in reference case)	Re-organised bus network to feed BRT corridors

Table 8 – LTMP Key Performance Indicators and Areas of Outcome

Objective	Strategy Component	Target Key Performance Indicator, Quantified Impact or Area of Outcome			
		2012	2025	2035	Headlines
Strategic Goal 2 – Minimise the transport sector's impact on the environment and in particular preserve Brunei's biodiversity, reduce energy use and minimise greenhouse gas emissions					
Objective 2.1 – Reduce, and where feasible reverse, growth in the ownership and use of private motor vehicles	BRT, Buses, Taxis, Water transport, Parking, Active travel, School buses	PT mode share of all strategic journeys around 1%	21% (up from 2% in reference case)	22% (up from 2% in reference case)	One in five trips by PT
		AM Peak Hour trips by BRT	18,000	29,000	BRT provides the backbone to the PT system
		AM Peak Hour trips by Bus <1000	5,000	8,000	Buses as a crucial PT mode
		Strategic daily private car trips = 385,000	500,000 (down from 630,000 in reference case)	750,000 (down from 940,000 in reference case)	Less car dependent
		9,000 students on school buses	27,000 students on school buses	27,000 students on school buses	Treble students using school buses
		School bus fleet of 465 buses	School bus fleet of 930 buses	School bus fleet of 930 buses	Double school bus fleet

Table 8 – LTMP Key Performance Indicators and Areas of Outcome

Objective	Strategy Component	Target Key Performance Indicator, Quantified Impact or Area of Outcome			
		2012	2025	2035	Headlines
Objective 2.2 – Promote energy efficiency and the progressive decarbonisation of the vehicle fleet and fuel cycle	Green Vehicles Technology, Transport and the Environment	39,500 Kg of CO_2 for AM Peak hour	48,000 (down by 31% from reference case)	66,000 (down by 40% from reference case)	Reduced CO_2 emissions
		Negligible proportion of vehicle fleet electric or hybrid	>1% of vehicle fleet electric or hybrid	10% of vehicle fleet fully electric	Electric vehicles and charging infrastructure a standard part of the vehicle mix
Objective 2.3 – Reduce the local environmental impacts of the transport sector	Green vehicles, Transport and Environment, Active travel	Limited emissions standards	Buses, Taxis and all new vehicles meet Euro V standards	Buses, Taxis and all new vehicles meet future Euro standards	Reduced local pollution
		Walking and cycling a negligible mode share	Targets for walking and cycling to be set (i) within Transport Management Plans and (ii) in respect of School Travel Plans	Targets for walking and cycling to be set (i) within Transport Management Plans and (ii) in respect of School Travel Plans	Increased take-up of walking and cycling as a key element of local travel choices
		3,500 Kg of NO_x in AM Peak hour	4,000 Kg (down by 26% from reference case)	6,000 Kg (down by 32% from reference case)	Reduced local pollution



Table 8 – LTMP Key Performance Indicators and Areas of Outcome

Objective	Strategy Component	Target Key Performance Indicator, Quantified Impact or Area of Outcome			
		2012	2025	2035	Headlines
Objective 2.4 – Complement and support the Heart of Borneo in	Transport and the Environment	-	Completion of defined rural road, water transport and other transport infrastructure and services	Completion of defined rural road, water transport and other transport infrastructure and services	Preserve Brunei's natural resources
Objective 2.5 – Design and adapt transport infrastructure and services for future resilience to climate and associated environmental change	Transport and the Environment	39,500 Kg of CO_2 emissions for AM Peak hour	48,000 (down by 31% from reference case)	66,000 (down by 40% from reference case)	Reduced CO_2 emissions


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Table 8 – LTMP Key Performance Indicators and Areas of Outcome

Objective	Strategy Component	Target Key Performance Indicator, Quantified Impact or Area of Outcome			
		2012	2025	2035	Headlines
Strategic Goal 3 – Social Sustainability -Support safety, health and social inclusion					
Objective 3.1 – Reduce in absolute and proportionate terms the number, and associated costs, of people killed and seriously injured in land transportation system	Roads and Traffic	2013 Baseline to be set	50% reduction in KSI	50% reduction in KSI	Safer streets, fewer casualties
		2013 Baseline to be set	60% reduction in Child KSI	60% reduction in Child KSI	Fewer serious accidents
		2013 Baseline to be set	25% reduction in slight casualties	25% reduction in slight casualties	Fewer slight casualties
		DSP system established	No. of penalties under DPS to be set	No. of penalties under DPS to be set	Brunei Road Safety Park
Objective 3.2 – Secure and maintain a high level of perceived and actual safety and personal security for land transportation system	Roads and Traffic, Buses, School Buses, Active Travel	2013 Baseline to be set	User Perception Score to be developed	User Perception Score to be developed	Public transport, active travel and other target modes to be perceived as safe
Objective 3.3 – Promote walking and cycling as safe, healthy and environmentally sustainable transport modes	Active travel	2013 Baseline to be set	Increase in walkability index	Increase in walkability index	Walk and cycle networks for BSB and other areas, work travel plans, cycle parking at transport nodes



Table 8 – LTMP Key Performance Indicators and Areas of Outcome

Objective	Strategy Component	Target Key Performance Indicator, Quantified Impact or Area of Outcome			
		2012	2025	2035	Headlines
Strategic Goal 4 – Support demographic change, liveability and quality of life for all, including access to employment, training and other opportunities					
Objective 4.1 – Promote an inclusive, informed and positive user experience, and increased levels of confidence and satisfaction in land transportation system	BRT, Buses, Water Transport, Roads and Traffic	2013 Baseline to be set	User Satisfaction Index to be developed	User Satisfaction Index to be developed	Higher levels of user satisfaction and focus on customer service
	Taxis	Taxi fleet of 50 vehicles	Increase taxi fleet to 400	Increase taxi fleet to 400+	More taxis
	Roads and Traffic	2013 Baseline to be set	%age of businesses with work travel plans	%age of businesses with work travel plans	Work travel plans
Objective 4.2 - Improve accessibility for those without access to a car and communities in rural areas	Water Transport, Taxis	2013 Baseline to be set	Rural accessibility index to be defined	Rural accessibility index to be defined	Accessibility to rural services and opportunities improved
Objective 4.3 – Promote & support opportunities for safe and sustainable access to school for the next generation of Bruneians	Sustainable Modes of Travel to School	No schools with defined travel plans	70% of schools to have approved and active school travel plans	100% of schools to have approved and active school travel plans	School Travel Plans promoting sustainable modes of travel to school
Objective 4.4 – Promote the modernisation of the transport system whilst engendering Bruneian pride, culture and identity	Transport and the Environment	2013 Baseline to be set	User perception of transport system	User perception of transport system	Increased user perception and satisfaction


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Table 8 – LTMP Key Performance Indicators and Areas of Outcome

Objective	Strategy Component	Target Key Performance Indicator, Quantified Impact or Area of Outcome			
		2012	2025	2035	Headlines
Enabling Goal 5 – Promote good governance, sound process and value for money in transport planning and delivery					
Objective 5.1 – Align transport governance and enhance planning capacity within and across all relevant agencies	Strengthening Governance	-	Transport for Brunei Authority established at full professional headcount of 120 staff	Transport for Brunei Authority organisation kept under review to respond to changing transport challenges	Transport for Brunei Authority established and made fully effective
Objective 5.2 – Put demonstrable Value for Money principles at the heart of all future transport investment decisions	Governance	-	Key projects and programmes to have BCR of greater than 1.0	All key projects and programmes to be delivered on time and on budget	Delivery of the right interventions in an efficient, economic and effective manner
Objective 5.3 – Develop the private sector as an effective partner in the planning, delivery and management of the transport system	Governance	-	Number of private companies in Supply Chain and % which are Bruneian-owned	Number of private companies in Supply Chain and % which are Bruneian-owned	Development and involvement of private sector as a vital delivery partner to Government
Objective 5.4 – Raise public awareness of transport impacts, choices and personal behaviour	Governance	-	User perception of transport system	User perception of transport system	Increased user perception and satisfaction


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6.6 Key Implementation Issues

Overall Approach to Implementation

Transport for Brunei Authority will be responsible for the implementation, monitoring and future update of the LTMP. However, if the Plan is to be successfully implemented, there needs to be a broad understanding and agreement across a range of agencies and stakeholders to the shared vision, objectives and overall strategy which crosses institutional boundaries and set out collective, as well as individual, responsibility for their delivery. Existing and future agencies also need to understand their specific role in the overall delivery chain for LTMP objectives.

The Master Plan will provide a basis for this understanding and agreement, prepared through extensive stakeholder engagement and ultimately endorsed by the Cabinet. When completed, it is recommended that the Master Plan is published jointly by the Ministry of Communications and Ministry of Development, having statutory status and is a collective representation of agreed action by all relevant agencies. Guidance for all agencies on LTMP implementation should be prepared and no Government body should plan or enact proposals which are inconsistent with the LTMP vision and objectives and business cases for individual projects and programmes should be required to demonstrate contribution to LTMP objectives.

Institutional Arrangements – Transport for Brunei Authority

The Ministry of Communications has a vital leadership role in setting, implementing and monitoring the effectiveness of national transport policies. Together with the Ministry of Development, it should provide the initial stewardship of the LTMP and its constituent programmes and budgets. Beneath this umbrella, individual agencies will then have jurisdiction and responsibility for specific proposals set out in the Plan. For example:

- the Land Transport Department will lead on reforms to the planning and regulation of public buses and taxis, as well as the licensing and regulation of the freight sector;


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- JKR will lead on the design, contracting and supervision of major road improvements, traffic management and Intelligent Transport Systems;
- the Energy Department and Climate Change Unit may have an interest in the development of regulations and pilot projects for reducing vehicle fuel consumption and emissions;
- the Town and Country Planning Department will have a key input into the reform of development control procedures, including a move towards more stringent maximum parking standards for new development;
- the Ministry of Education will be the lead authority for development of the National School Bus System; and
- District Offices and Municipalities will have a key role to play in developing and implementing Transport Management Plans focused on local transport infrastructure, policies and regulations.

In the medium term, Transport for Brunei Authority for Brunei will be created as an executive agency with the functions, powers and resources to bring many of these roles into one organisational structure. Its functions will include:

- integrated multi-modal and mode-specific policy development, planning and programming;
- planning and regulation of public transport, including buses, taxis and passenger-based water transport, as well as potential future public transport modes such as BRT;
- planning, design, construction, operation and management of roads and associated infrastructure, facilities and assets;
- vehicle and driver licensing, testing, compliance monitoring and enforcement;
- traffic, parking, and travel demand management;
- road safety planning, regulation and enforcement;
- planning, delivery and management of non-motorised transport;


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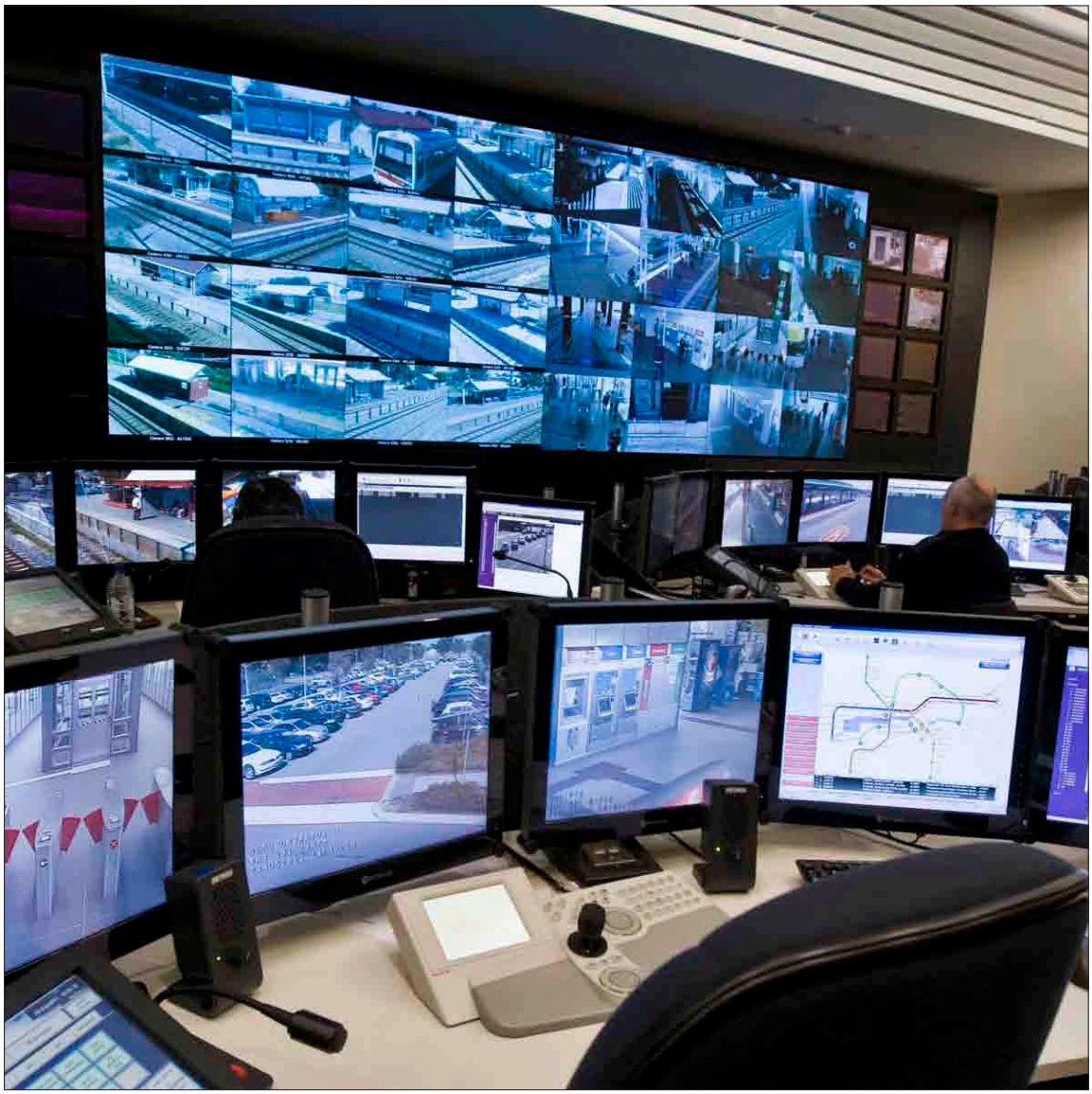
- planning and regulation of freight transport;
- transport interchange, information, communications, promotion and campaigns; and
- co-ordination of transport with land use planning, and development control.

Transport for Brunei Authority should take on functions and resources held by the Land Transport Department (Ministry of Communications) and JKR (Ministry of Development) as well as building new capacity in policy areas and interventions which are currently not, or only weakly, planned and regulated. We suggest the organisation is an independent executive agency rather than a department of a Ministry; however, it should be accountable to the Minister of Communications, but and a range of bodies, including the Ministry of Development and Ministry of Finance, should be represented on its Board. Scrutiny should be provided by a number of independent appointees on the Board as well as an external Transport Advisory Group.

Transport for Brunei Authority will not incorporate functions for civil aviation or international marine regulation, nor the traffic management or enforcement role of the Royal Brunei Police Force. It should, however, will take over stewardship of the Brunei National Road Safety Council, be represented on the National Committee on Health Promotion and other multi-agency groups as appropriate, and work on land use planning and development control with the Town and Country Planning Department of the Ministry of Development.

Key tasks to establish Transport for Brunei Authority include:

- political approval of the TfBA organisation, its functions, powers and constitution;
- establishment of a multi-agency Steering Group to oversee the implementation and transition process;
- drafting, approval and enactment of key legislation by the Cabinet;
- organisational design process, including initial recruitment or transfer of staff, accommodation, and development of corporate systems, processes and support functions;
- establishment of the TfBA Board in a *"shadow"* form to provide a basis for early management decisions;



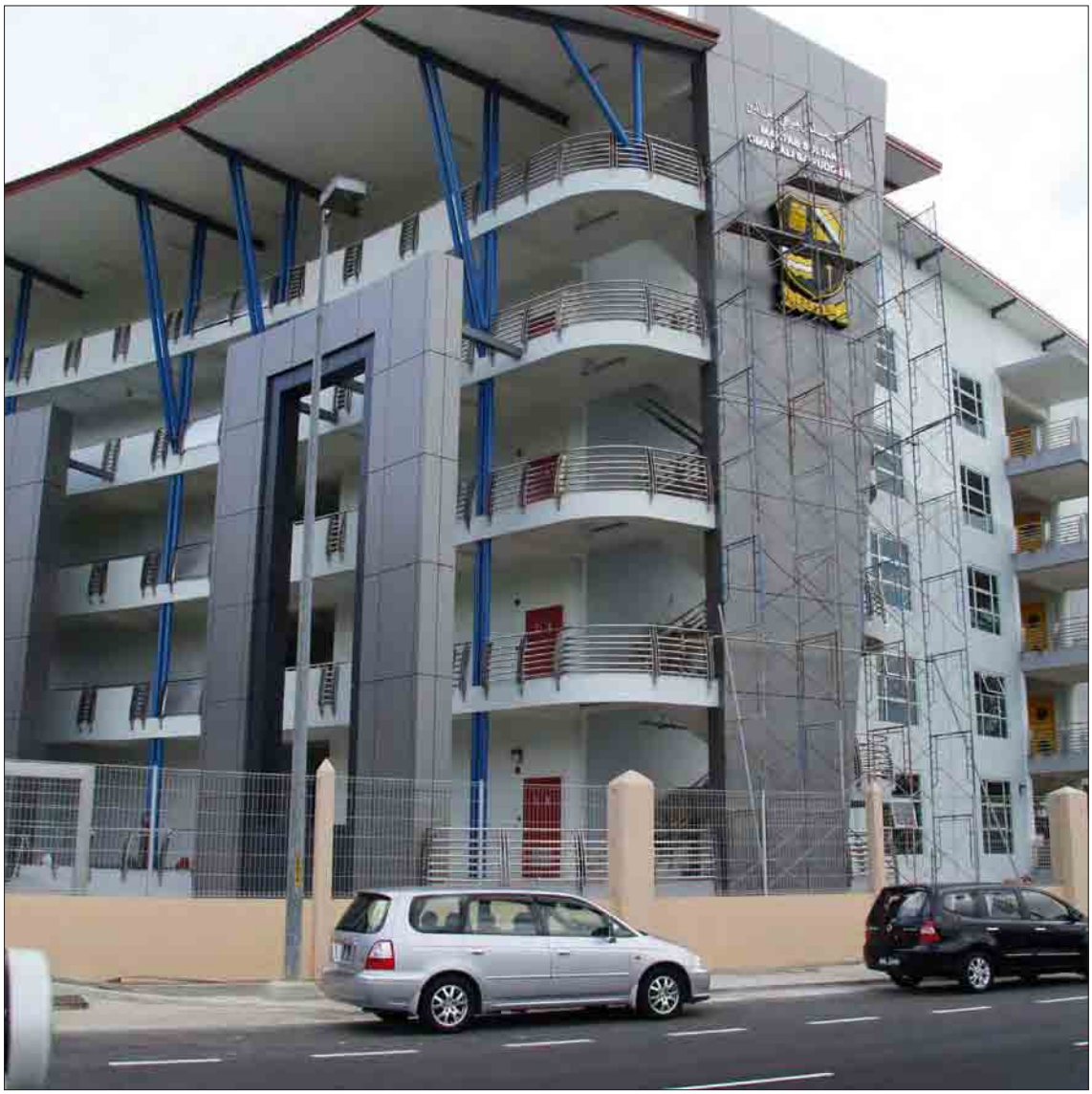
- key appointments, including the Chairman, Board Members, Chief Executive and Management Team;
- commencement of staff transfer and recruitment into an initial organisational structure;
- establishment of working relationships, protocols and practical arrangement between Transport for Brunei Authority and other public agencies;
- arrangements for business planning, outcome monitoring and annual reporting;
- development and appropriate approval of initial plans for expenditure and income; and
- appropriate reform or restructuring of residual functions within predecessor organisations.

Comparisons with transport authorities elsewhere in the World would suggest TfBA should have a staff complement of between 120 to 150 people, including support functions. Such as staff complement represents a considerable increase from the estimated 30 transport planning and engineering professionals within Government, principally Ministries of Communications and Development, at present. This estimate excludes staff within other public agencies or the private sector supply chain, capacity for which must also be developed. For this reason, the LTMP proposes a Brunei Transport Skills Initiative **(BTSI)** to identify and fill the skills gap in the land transport sector and the Strategy Component proposes a range of ways in which to do this.

Institutional Arrangements – The LTMP Steering Group

In the interim, ahead of the creation of Transport for Brunei Authority, a multi-agency LTMP Steering Group should be created to review and direct recommendations before Transport for Brunei Authority is established. The Steering Group should be chaired by Ministry of Communications and comprise representation from the Ministries of Development, Communications, Education, Health, and Finance; District Offices. Other agencies, such as the Royal Brunei Police and Brunei Economic Development Board may also be involved.

The Steering Group should meet regularly, initially on a monthly basis immediately following LTMP approval in order to:.



- define an initial LTMP delivery programme of priority actions, secure and approval funding and initiate early implementation;
- review LTMP activities, progress, funding and outcomes and ensure they are consistent with LTMP objectives;
- consider the major risks to the achievement of strategic goals and advice on the acceptability and management of risks; and
- give guidance and make recommendations as appropriate, for example on governance arrangements and the degree of cooperation achieved with key stakeholders and delivery agencies.

Funding Requirements of the LTMP

The capital and operating costs of the LTMP are substantial. The programme will be funded by a balanced mix of sources. In selecting the optimal means of funding, consideration needs to be given to the balance between capital investment and operating and maintenance costs within overall lifetime costs, the potential efficiencies that may be obtained through involvement of the private sector, and the relative costs of private sector and public sector capital. The latter will include the opportunity cost of spending on transport rather than on other Government projects and programmes.

The Plan also recognises that several measures required to address congestion and Greenhouse Gas emissions are also generators of revenue. This can be used either to finance borrowing for capital works, to support operating and maintenance costs, or for other general purposes. As the LTMP also has a social dimension, consideration must also be given to the financing of subsidies such as fares reductions for residents of rural areas.

The principal sources of funding for capital works are:.

- Government funding, either directly from accumulated reserves, or by borrowing which may be undertaken through the issue of bonds or through loan guarantees for borrowing by Government agencies;
- user fees and charges, including parking charges, public transport fares, vehicle and driver license fees, and secondary sources of income such as letting of


Eastern Line
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retail space and advertising opportunities at Public Transport Interchanges; and

- private sector funding.

The Role of the Private Sector

The skills, capacity and resources of the private sector will be required in several ways to achieve the delivery of a number of the key projects set out in the LTMP. A variety of institutional arrangements are available to tap the capability and capacity of the private sector in the shape of overseas and local contractors, manufacturers and operators to design, build and operate major elements of the Plan components. These contractual arrangements and competitive tendering should ensure that the contractors and service providers have strong incentives to deliver the operational specifications and performance that the Government and its agencies have specified.

Specific models vary by mode, but in many cases take the form of transferring delivery, cost and performance risk to the private sector and giving the contractor, supplier and operator as much freedom as practicable to develop the detailed solutions to deliver a service specification defined by Government.

The Government should undertake detailed preparatory work in order to make an initial selection of projects to be funded using private finance, and seek advice from experienced and proven practitioners in order to develop private finance tender invitations that will attract a high calibre of bidder. The Government should also conduct on-going monitoring of the use of private sector finance in other countries and of initial use of the private sector in transport delivery in Brunei, in order to inform future decisions regarding the scale and role of the private sector in transport delivery.

Professional Capacity and Skills

Progressing the Plan will require a range of skills and competencies, whether these are located within Brunei Government, public agencies or the private sector. These include:.

- transport planning, including policy research and formulation, demand forecasting, feasibility, outline design, appraisal and business case;
- technical, financial and economic regulation;
- detailed engineering design and specification;



- land use planning, development control and transport impact assessment;
- project management, procurement and contract supervision;
- stakeholder consultation and engagement; and
- monitoring and performance management.

These skills will come from existing staff across the Government sector, the university sector, expatriate professionals and from buying in, or seconding, staff from the private sector. There is also a case for greater use of secondments or staff transfers between the different agencies so that the skills base can be used most efficiently and to best effect.

In parallel with reviewing and assessing its own professional capacity, the Government should consider establishing, in partnership with the private sector, Brunei Transport Skills Initiative to assess the needs of the sector, level of current supply and how any shortfall can be made up over time.

Monitoring Progress

It is important that performance against the strategic goals and transport objectives can be determined so that future progress towards achieving the LTMP Mission can be monitored over time. To this end, a set of Key Performance Indicators (KPIs) has been developed as the basis for regular monitoring of performance. A Centre for National Transport Statistics will be established to lead the creation of a strategic framework and depository for transport data, surveys and statistics, set common data collection, analytical and storage systems and processes, and serve as a knowledge exchange platform for research, technology and good practice.

Performance will be measured, mainly through gathering information from surveys and during various stages of the delivery process. Surveys also provide the opportunity to gather opinions on qualitative aspects of travel which can be used for example to improve the attractiveness of public transport or to improve messages on safer driving. In each case it will be necessary to undertake surveys in the next 12-18 months to establish the baseline performance as accurately as possible; this is needed so that changes in performance can be monitored and evaluated from a known starting position.

In the interim, the LTMP Steering



Group should initiate the publication of KPIs regularly in a *"dashboard"* or *"balanced scorecard"* format, which will be reported annually. This will form the basis for Transport for Brunei Authority to adopt and develop over the lifetime of the LTMP. Data collection and survey techniques will include:

- classified traffic count, journey time and speed surveys;
- public transport patronage and boarding and alighting surveys;
- walking and cycling count and user surveys;
- public satisfaction and perception surveys;
- household interview and travel diary surveys;
- asset inventory and condition surveys;
- road accident and casualty recording and analysis;
- vehicle registration and licensing data;
- air quality and noise surveys.

It is recommended that standing arrangements are made for the regular collection of key data sets, for example through an annual National Travel Survey, or establishment of a rolling survey of permanent and temporary traffic count sites at strategic locations. The development of Intelligent Transport Systems may assist data collection and cost effective analysis in due course.

Transport operators should also be required, as part of their franchise agreements, to provide monthly or equivalent periodic data on patronage, passenger origins and destinations and satisfaction with service provision.
In addition, all major transport projects should be subject to a business case setting out, in a quantitative format, key intended outcomes and an appraisal of costs and benefits. These costs and benefits should then be subject to a post-opening impact evaluation, both to confirm the achievement of scheme objectives in practice, but also to inform future scheme appraisal and delivery.



Updating the Plan

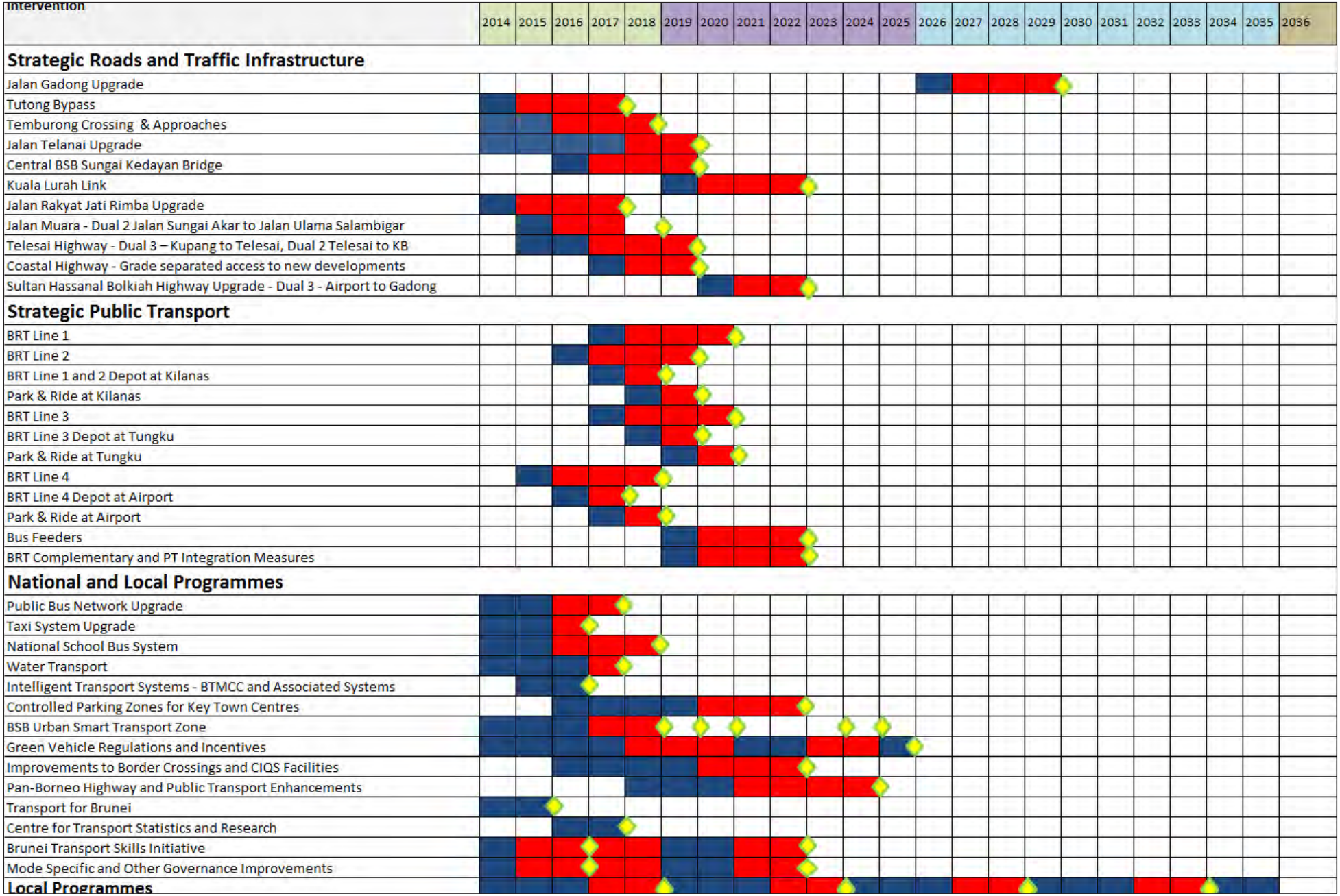
Progress on the implementation of the LTMP and the achievement of its planned outcomes will be kept under review. This progress will be examined by policy theme, type of measure and strategic goal. Records of Plan inputs (expenditure), outputs (programme delivery) and outcomes (performance against KPIs and quantitative targets) should be kept as noted above.

Based on these records, an Annual Report should be published setting out how the Plan is being delivered across Brunei, and the resulting benefits. The Annual Report should be structured under the policy themes set out in this document and be supported by a range of quantitative and qualitative evidence. The enhanced data for national transport networks and modes provided through the proposed new Brunei Centre for National Transport Statistics and Research is expected to improve the quantity and quality of evidence which can be provided over time.

The Plan presents a vision and programme up to 2035. It will be subject to monitoring and evaluation over this period, however, and the policy framework and future investment plans will be adapted in the light of their impacts, and in order to adapt to changing national and international circumstances. Within this context, the Plan should be reviewed every five years; therefore the first Interim Review of the LTMP will be undertaken shortly towards the end of 2018. It will then be subject to subsequent Reviews every five years, with a full Plan Revision to be undertaken around 2025 looking towards the next time horizon of 2050.



Road Map for Land Transport


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Strategic Roads and Traffic Infrastructure
Jalan Gadong Upgrade
Tutong Bypass
Temburong Crossing & Approaches
Jalan Telanai Upgrade
Central BSB Sungai Kedayan Bridge
Kuala Lurah Link
Jalan Rakyat Jati Rimba Upgrade
Jalan Muara - Dual 2 Jalan Sungai Akar to Jalan Ulama Salambigar
Telesai Highway - Dual 3 – Kupang to Telesai, Dual 2 Telesai to KB
Coastal Highway - Grade separated access to new developments
Sultan Hassanal Bolkiah Highway Upgrade - Dual 3 - Airport to Gadong
Strategic Public Transport
BRT Line 1
BRT Line 2
BRT Line 1 and 2 Depot at Kilanas
Park & Ride at Kilanas
BRT Line 3
BRT Line 3 Depot at Tungku
Park & Ride at Tungku
BRT Line 4
BRT Line 4 Depot at Airport
Park & Ride at Airport
Bus Feeders
BRT Complementary and PT Integration Measures
National and Local Programmes
Public Bus Network Upgrade
Taxi System Upgrade
National School Bus System
Water Transport
Intelligent Transport Systems - BTMCC and Associated Systems
Controlled Parking Zones for Key Town Centres
BSB Urban Smart Transport Zone
Green Vehicle Regulations and Incentives
Improvements to Border Crossings and CIQS Facilities
Pan-Borneo Highway and Public Transport Enhancements
Transport for Brunei
Centre for Transport Statistics and Research
Brunei Transport Skills Initiative
Mode Specific and Other Governance Improvements
Local Programmes

7. Road Map for Land Transport

The programme for LTMP delivery is shown in Figure 11 and sets out the key programme elements between 2014 and 2035 using the public funding set out above.

Tables 9 to 11 set out the key actions in the short (to 2018), medium (to 2025) and long (to 2035) time periods.

Further details are provided under each Strategy Component prepared as part of the LTMP suite of documents.

Figure 11 – LTMP Programmes 2014 - 2035

Table 9 – Summary of LTMP Short-Term Programme (to 2018)

Strategic Component/ Programme	Key Actions/Milestones
Roads and Traffic	◆ Designation of National Road Network and Strategic Freight Network and associated levels of service, standards and facilities ◆ Planning and delivery of key road capacity upgrades e.g. Tutong Bypass ◆ Development of Traffic Management Toolkit and Road Hierarchy Guidelines ◆ Review and strengthening of Decade of Action on Road Safety ◆ Introduction of Road Safety Audit and Environmental Impact Assessment
Parking and Demand Management	◆ Development of comprehensive Parking Strategy and Plan ◆ Revision of parking standards for new development ◆ Early strengthening of on-street parking regulations and controls ◆ School and Workplace Travel Plans, with Government Ministries leading by example
School Travel	◆ Commencement of Brunei School Travel Initiative with early targets to establish active and effective School Travel Plans at all Bruneian schools ◆ Initial improvements to National School Bus System ◆ Closer jointing working between Ministries of Communications, Development and Education
Buses, Taxis and Water Transport	◆ Reforms to bus and taxi franchising, funding and procurement arrangements and associated route planning, operational specification and contract monitoring ◆ Strengthened regulation of health and safety and passenger information for water transport ◆ Establishment of Brunei Department of Bus, Taxi and Department of Water Transports as sector planners and regulators, as well as strengthened representation for operators and passengers ◆ Design standards and implementation programmes for improved interchange infrastructure and priority measures
Mass Transit	◆ Bus Showcase Routes on key corridors comprising concerted infrastructure and service enhancements ◆ Feasibility studies, business case and design of Brunei BRT System and associated Park and Ride ◆ Feasibility study for long-distance rail network in Pan-Borneo context

Table 9 – Summary of LTMP Short-Term Programme (to 2018)

Strategic Component/ Programme	Key Actions/Milestones
Active Travel	◆ Identification and treatment of areas and routes for early demonstration ◆ Guidelines and standards for public realm and active travel infrastructure ◆ Establishment of Active Travel Working Group
Green Vehicles	◆ Establishment of Department of Green Vehicle Technology ◆ Review, revision and road map for vehicle and fuel emission and consumption standards with phased reduction over time, commencing with public transport and Government vehicles ◆ Vehicle labelling programme and associated public awareness campaigning ◆ Review of fuel subsidy and roadmap for phased deregulation of fuel prices
Governance and Planning	◆ Initial establishment of Transport for Brunei Authority ◆ Mode-specific governance for key policy areas e.g. buses, water transport, taxis, ITS ◆ Reform of transport programming and budgeting ◆ Launch of Brunei Transport Skills Initiative ◆ Process, system and budgets for Transport Management Plans ◆ Brunei Centre for Transport Statistics

Table 10 – Summary of LTMP Medium-Term Programme (to 2025)

Strategic Component/ Programme	Key Actions/Milestones
Roads and Traffic	◆ Development of Transport Asset Management Plan and associated processes and systems for strategic transport networks and assets ◆ Planning and delivery of key road capacity upgrades e.g. Telisai Highway, Central BSB enhancements ◆ Launch and full capacity development of Network Management and Control System and Brunei Transport Management and Control Centre and associated ITS ◆ Linkage of Brunei Coastal Highway to wider improvements to Pan-Borneo Highway in Sarawak and streamlining of border crossing and CIQS procedures ◆ Successor plans to Decade of Action on Road Safety
Parking and Demand Management	◆ Implementation of Park and Ride strategy for BSB ◆ BSB Urban Smart Transport Zone and associated initiatives ◆ Parking controls in Tutong, Seria, Kuala Belait, Bangor and Telisai ◆ Implementation of agreed changes to fuel subsidy and regulations on vehicle purchase and use
School Travel	◆ Expansion of Brunei School Travel Initiative with all schools having an active School Travel Plan ◆ Expansion of National School Bus System and broader improvements of mainstream public transport, walking and cycle networks to connect with schools ◆ Parking, traffic and demand management measures around schools
Buses, Taxis and Water Transport	◆ Expansion of bus and taxi fleets to reflect increasing demand and mode shift ◆ Introduction of new technology to reduce emissions, provide passenger information and improve quality of service ◆ Introduction of integrated ticketing on a smartcard/electronic basis applicable across all modes ◆ Further design and implementation of improvements to interchange and priority measures, including as feeders to BRT network
Mass Transit	◆ Launch of Brunei BRT System and associated Park and Ride ◆ Feasibility studies into higher capacity systems in line with land use development in key corridors

Table 10 – Summary of LTMP Medium-Term Programme (to 2025)

Strategic Component/ Programme	Key Actions/Milestones
Active Travel	◆ Programmes for walking and cycling infrastructure and facilities on a strategic and local basis ◆ Launch of social marketing and public campaigns ◆ Incorporation of walking and cycling into development control guidelines and procedures
Green Vehicles	◆ Strengthening of vehicle and fuel emission and consumption standards to Euro V and beyond ◆ Working with industry on pilot and field trials of zero emission vehicles, as well as charging infrastructure
Governance and Planning	◆ Capacity building and organisation development of Transport for Brunei Authority ◆ Mainstreaming of Brunei Transport Skills Initiative ◆ Maturity of Transport Management Plans and associated initiatives ◆ Mainstreaming of transport data collection, storage, analysis and reporting

Table 11 – Summary of LTMP Long Term Programme (to 2035)

Strategic Component/ Programme	Key Actions/Milestones
Roads and Traffic	◆ Further planning and delivery of key road capacity upgrades e.g. Jalan Gadong Upgrade ◆ Ongoing enhancement of ITS, including NCMS and BTMCC and increasing focus on in-vehicle systems and vehicle-infrastructure interface
Parking and Demand Management	◆ Long-term intensification of TDM in line with public transport improvements and highway network performance ◆ Further development of BSB Urban Smart Transport Zone and associated initiatives
School Travel	◆ Ongoing enhancement of School Travel Plans and National School Bus System with an increasingly outcome-based and targeted approach ◆ Long-Term relocation and sustainable design of schools in line with land use plans
Buses, Taxis and Water Transport	◆ Enhancement of Demand Responsive Transport and local service provision in rural areas in line with technology development ◆ Further expansion of bus and taxi fleets to reflect increasing demand and mode shift ◆ Technology development to increasing decarbonise the public transport and taxi fleet
Mass Transit	◆ Capacity enhancements to Brunei BRT System and associated Park and Ride ◆ Implementation of higher capacity systems in line with population and employment (e.g. LRT)

Table 11 – Summary of LTMP Long Term Programme (to 2035)

Strategic Component/ Programme	Key Actions/Milestones
Active Travel	◆ Further programmes for walking and cycling infrastructure and facilities ◆ Further social marketing and public campaigns based on technology development
Green Vehicles	◆ Adoption and mainstreaming of decarbonised vehicle technology including full electric, fuel cells and hydrogen
Governance and Planning	◆ Periodic reviews and revisions to transport governance arrangements ◆ Wider reforms linked to ASEAN, BIMP-EAGA and Pan-Borneo integration

Appendix


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8. Appendix

8.1 Glossary

Acronym	Definitions
ASEAN	Association of South East Asian Nations
AHN	ASEAN Highway Network
ANPR	Automatic Number Plate Recognition
ASEAN	Association of South East Asian Nations
BEDB	Brunei Economic Development Board
BIMP-EAGA	Brunei-Indonesia-Malaysia-Philippines East Asia Growth Area
BNRSC	Brunei National Road Safety Council
BRT	Bus Rapid Transit
BSB	Bandar Seri Begawan
BSP	Brunei Shell Petroleum
BTMCC	Brunei Transport Management and Control Centre
BTSI	Brunei Transport Skills Initiative
BUSTZ	BSB Urban Smart Travel Zone
CCTV	Close Circuit Television
CCU	Climate Change Unit
CED	Customs and Excise Department (Ministry of Finance)
CEO	Civil Enforcement Officer
CIQS	Customs, Immigration, Quarantine and Security
CNG	Compressed Natural Gas



Acronym	Definitions
CO_2	Carbon Dioxide
CPZ	Controlled Parking Zone
DARS	(Brunei) Decade of Action on Road Safety
EDPMO	Energy Department (Prime Minister's Office)
GHG	Greenhouse Gases
GoM	Government of Malaysia
GVTU	Green Vehicle Technology Unit
HoB	Heart of Borneo
IT	Information Technology
ITS	Intelligent Transport System
JASTRe	Department of Environment, Parks and Recreation
JKR	Jabatan Kerja Raya (Public Works Department)
LPG	Liquefied Petroleum Gas
LRT	Light Rail Transit
LTD	Land Transport Department
LTMP	(Brunei) Land Transport Master Plan
KKBS	Ministry of Youth, Culture & Sport
MD	Marine Department
MIPR	Ministry of Industry and Primary Resources
MoC	Ministry of Communication
MoD	Ministry of Development
MoDEF	Ministry of Defence
MoE	Ministry of Education
MoF	Ministry of Finance



Acronym	Definitions
MoFAT	Ministry of Foreign Affairs and Trade
MoH	Ministry of Health
MoHA	Ministry of Home Affairs
MoRA	Ministry of Religious Affairs
MRT	Mass Rail Transit
MTLA	Motor Transport Licensing Authority
NLUMP	National Land Use Master Plan
NMCS	Network Management and Control System (and Common Database)
NMT	Non-Motorised Transport
NRN	National Road Network
P&R	Park and Ride
PMO	Prime Minister's Office
PM_{10}	Particulates
PNR	Private Non-Residential (Parking)
PRT	Personal Rapid Transit
PT	Public Transport
PTAL	Public Transport Accessibility Level
PTI	Public Transport Interchange
RKN	(Five Year) National Development Plan
RTI	Real Time Information
RTPI	Real Time Passenger Information
SFN	Strategic Freight Network
SMoTSS	Sustainable Modes of Travel to School Strategy
SMoTSWG	Sustainable Modes of Travel to School Working Group


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Acronym	Definitions
STP	School Travel Plan
TCP	Town and Country Planning Department
TDM	Travel Demand Management
TfBA	Transport for Brunei Authority
UBD	University of Brunei Darussalam
UTC	Urban Traffic Control
UTMC	Urban Traffic and Management Control
VMS	Variable Message Sign

8.2 References

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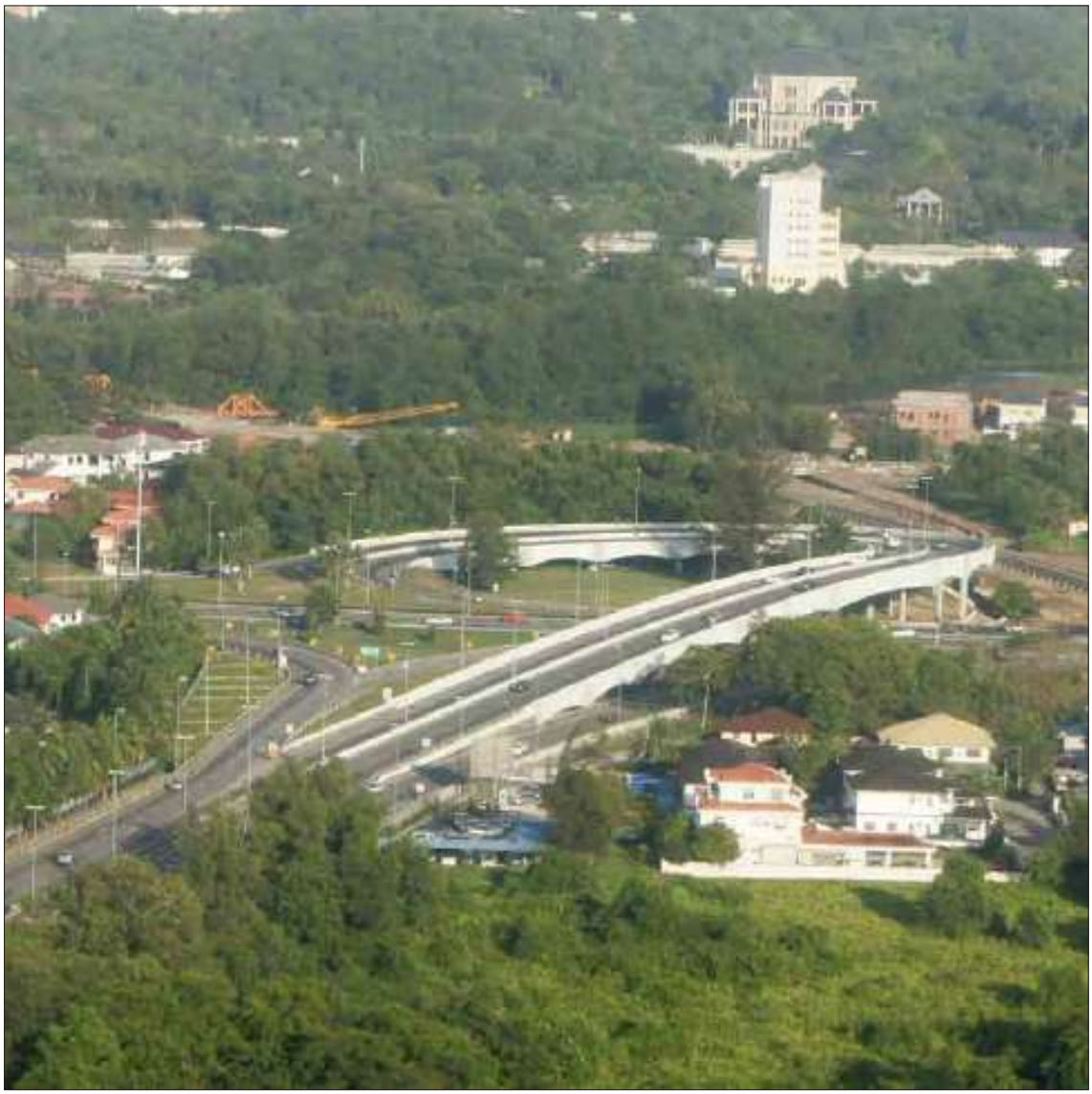
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