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Cayman Islands Government – The Ministry of Tourism and Transport

LTCT-PTU2022-001: Assessment of a Public Transport Strategy – Final Report

May 18, 2023

MAKING AN IMPACT THAT MATTERS IN THE CAYMAN ISLANDS

Deloitte.

Deloitte & Touche LLP
Citrus Grove, 106 Goring Avenue
Grand Cayman, KY1-1109
Cayman Islands

Tel: +1 (345) 949-7500
Fax: +1 (345) 949 8258
cayman@deloitte.com
www.deloitte.com/ky

May 18, 2023

The Ministry of Tourism and Transport
The Cayman Islands Government
Government Administration Building
133 Elgin Avenue
George Town
Grand Cayman, KY1-9000
Cayman Islands

Dear Ms. Harris,

Re: Phases 1 to 5: Assessment of a Public Transport Strategy

Please find attached the final report prepared for the Cayman Islands Government – The Ministry of Tourism and Transport ("the Ministry" or "MoTT"), which includes 1) The revised public bus system strategic priority areas and objectives; 2) A current state analysis of the public bus system including an analysis of supply and potential demand; 3) Suggested enhancements to improve the public bus system; 4) Recommendations on a strategy to transition to a national Government-run public bus system; 5) Recommendations on how to transition the current omnibus service to a community-based service that may continue to operate as entrepreneurial but not on primary arterial roads; 6) Restructuring solutions to the pillars within the Public Transport Unit's ("PTU") on how to better manage the public transport sector; and 7) Technical advice on the efficacy and scope of a sustainable public transport system.

We would like to take this opportunity to thank the Ministry as well as all stakeholders for their cooperation and input during the project. Should you have any questions or wish to discuss anything further, please contact me on +1 345-814-2212 or tjackman@deloitte.com.

Sincerely,

Taron Jackman
Partner, Risk Advisory and Consulting
Deloitte & Touche LLP

Cc: Hon. Minister Kenneth Bryan, Chief Officer Stran Bodden

Report Distribution

This report has been prepared and is intended solely for the information and use of the Cayman Islands Government ("CIG") including the members of Cabinet, the Ministry and the Public Transport Board ("PTB"). No responsibility to any other third party is accepted, as the report has not been prepared and is not intended for any other purpose.

The Ministry's Responsibilities

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Contents

1. Introduction

1. Introduction

Background and Scope of Work

In September 2022, Deloitte & Touche LLP ("Deloitte") was engaged by the Ministry to perform an assessment of a public transport strategy specifically as it relates to the public bus system (the "Project"). Deloitte completed the Project between October 2022 and April 2023. This final report includes the results of the key completed activities listed below:

Phase 1: a) To revise the public bus system strategic priority areas and objectives; b) to perform a current state analysis of the public bus system including an analysis of supply and potential demand; and c) to suggest enhancements to improve the public bus system.

Phase 2: To make recommendations on a strategy to transition to a national Government-run public bus system.

Phase 3: To examine how to transition the current omnibus service to a community-based service that may continue to operate as entrepreneurial, however, not on mainstream roadways.

Phase 4:

a) To recommend a restructuring solution to the pillars within the PTU on how to better manage this sector, including:

    1. Public buses;
    2. Tourism related transport such as taxis, tours, watersports, and limousines; and
    3. Offer organisational structure recommendations for a more efficient PTU.

b) To provide a road map to accomplish the right-sized Cayman PTU.

Phase 5: To provide technical advice on the efficacy and scope of a sustainable public transport system.

Deloitte is pleased to provide the Ministry with the following report for Phases 1 – 5[1] of the Project which includes the following areas:

a) The revised public bus system strategic priority areas and objectives;

b) A current state analysis of the public bus system including an analysis of supply and potential demand;

c) Suggested enhancements to improve the public bus system;

d) Implementation options for a public bus system including the strategy to transition to a national Government-run public bus system as well as to transition the current omnibus service to a community-based service;

e) An organisation restructuring solution for the PTU; and

f) Technical advice on the efficacy and scope of a sustainable public transport system.

[1] Deloitte does not assume responsibility for the accuracy of the data collected during Phases 1 - 5 of this Project and sources have been cited throughout this Report.

Phase 1

2. Stakeholder Consultations and Documents Received and Reviewed

2. Stakeholder Consultations and Documents Received and Reviewed

Deloitte carried out interviews, consultations and focus groups with the following stakeholders during Phase 1 of the Project:

	Entity	Representatives	Date
1.	PTU	Durk Banks (Director); Kim Ramoon (Senior Inspector)	Nov-3-2022
2.	Cayman Islands Tourism Association	Troy Leacock (President)	Nov-4-2022
3.	National Energy Policy Committee	Kristen Smith (Senior Policy Advisor (Energy))	Nov-7-2022
4.	Eastern Employers	Marleine Gagnon (Owner, Turtle Nest Inn); Sharlene Brenkus (Wyndham); Denise Brown-Solomon (Morritts)	Nov-21-2022
5.	Department of Vehicle and Equipment Services	Stephen Quinland (Director)	Nov-15-2022
6.	George Town Revitalisation Project	Colin Lumsden (George Town Manager) and team	Dec-8-2022
7.	Caribbean Utilities Company	Sasha Tibbetts (Vice President Customer Service and Technology)	Nov-24-2022
8.	National Roads Authority	Edward Howard (GIS Manager)	Nov-22-2022
9.	Department of Lands and Survey	Uche Obi (Director)	Nov-29-2022
10.	Department of Planning	Richard Mileham (Planning Officer)	Nov-29-2022
11.	Large Employers	Woody Foster (Fosters); Marc Langevin (The Ritz-Carlton); Steven Andre (Kimpton)	Nov-25-2022
12.	Bus Operators	Nigel Mitten; Paula Porter; Wendy Fisher; Doey Kelly; Manley Berry	Dec-2-2022
13.	MoTT	Stran Bodden (Chief Officer)	Nov-23-2022
14.	MoTT	Jonathan Jackson (Deputy Chief Officer)	Dec-5-2022
15.	Ministry of Planning, Agriculture, Housing and Infrastructure	Hon. Jay Ebanks (Minister)	Nov-24-2022
16.	PTB	Rosa Harris (Chairman)	Dec-1-2022
17.	PTB	Edlin Myles (Board Member); Collin Redden (Board Member)	Dec-8-2022
18.	Ministry of Finance	Hon. Chris Saunders (Minister)	Dec-5-2022

2. Stakeholder Consultations and Documents Received and Reviewed (continued)

	Entity	Representatives	Date
19.	DART	Mark Vandevelde (CEO) and team	Dec-5-2022
20.	Rotary Central Cayman Islands Ltd.	Paul Keeble (Member); Colin Fawkes (Member)	Jan-13-2023
21.	The Premier	Hon. Wayne Panton (The Premier); Pilar Bush (Chief of Strategy)	Jan-24-2023
22.	The Opposition	Joseph Hew (Minister of Parliament and Deputy Leader of the Opposition);	Feb-6-2023

2. Stakeholder Consultations and Documents Received and Reviewed (continued)

Deloitte received and analysed the following list of data and information received from stakeholders during Phase 1 of the Project:

	Name of Document or Data	Received From
1.	Bus Statistics	Durk Banks; Kim Ramoon, PTU
2.	Public Transport Vehicle Inspection Sheet	Durk Banks, PTU
3.	List of Technologies used by PTU	Durk Banks, PTU
4.	Civil Service Engagement Survey 2021 - Core Ministry Tourism and Transport	Durk Banks, PTU
5.	NEW BUS ROUTES WITH MAP and FARE TABLE 1ST DEC 15 (1)	Durk Banks, PTU
6.	List of PTB Members October 2022	Durk Banks, PTU
7.	PTB Strategy Presentation (Slide Deck)	Durk Banks, PTU
8.	PTU Organisational Chart (as of October 26, 2022)	Durk Banks, PTU
9.	PTU Sept 2022 Cabinet Billings	Durk Banks, PTU
10.	PTU Staff Monthly Stats Report (Blank)	Durk Banks, PTU
11.	Operators Renewal Application 18A	Durk Banks, PTU
12.	Room Stock Cayman Islands FINAL (as of November 2022)	Rosa Harris, PTB
13.	Value for Money VFM PTB Presentation (October 14, 2013)	Durk Banks, PTU
14.	Policies and Concerns (November 1, 2011)	Durk Banks, PTU
15.	Bar Restaurant Industry Feedback	Durk Banks, PTU
16.	BUS ROUTE EXTEND project 1 (July 1, 2015)	Durk Banks, PTU
17.	Car Free Week Survey	Durk Banks, PTU
18.	Incident Report Form	Durk Banks, PTU
19.	Random Vehicle Inspection Check Sheet	Durk Banks, PTU
20.	Climate Change Risk Assessment Public Survey	Kristen Smith, National Energy Policy Committee (“NEPC”)

2. Stakeholder Consultations and Documents Received and Reviewed (continued)

Deloitte received and analysed the following list of data and information received from stakeholders during Phase 1 of the Project:

	Name of Document or Data	Received From
21.	Car Free Day 2022 Data	Kristen Smith, NEPC
22.	DVL Raw Data of Registered Vehicles	Kristen Smith, NEPC
23.	National Energy Policy Implementation Plan	Kristen Smith, NEPC
24.	GT Shuttle New Route Map and FAQ Questions	Kristen Smith, NEPC
25.	GT Shuttle QR Poster	Kristen Smith, NEPC
26.	GT Shuttle Flyers	Kristen Smith, NEPC
27.	Ministry New Shuttle Spot Audio Recording	Kristen Smith, NEPC
28.	Post Implementation Notes for the GT Shuttle	Kristen Smith, NEPC
29.	Responsible Travel Scheme (for Civil Servants)	Kristen Smith, NEPC
30.	Press Release for Car Free Week	Kristen Smith, NEPC
31.	Car Free Week Invite Letter	Kristen Smith, NEPC
32.	Car Free Week Bus Parking Map	Kristen Smith, NEPC
33.	Car Free Week Car and Ride Flyer	Kristen Smith, NEPC
34.	DG Takes Car Free Week Pledge Announcement	Kristen Smith, NEPC
35.	Car Free Week Survey	Kristen Smith, NEPC
36.	NRA Statistics - 2016 Comprehensive Data Collection Program	Denis Thibeault, National Roads Authority (“NRA”)
37.	NRA Statistics – 2019 ATR Counts	Denis Thibeault, NRA
38.	Grand Harbour Study - Overview (October 19, 2022)	Edward Howard, NRA
39.	Brodhead Road Corridor Study	Edward Howard, NRA
40.	Quick Win Memorandum (October 11, 2022)	Edward Howard, NRA

2. Stakeholder Consultations and Documents Received and Reviewed (continued)

Deloitte received and analysed the following list of data and information received from stakeholders during Phase 1 of the Project:

	Name of Document or Data	Received From
41.	High Level Public Transport Assessment - Independent Tour Operators 2013	Durk Banks, PTU
42.	PRIDE Transportation Presentation	Durk Banks, PTU
43.	PTB Market Assessment Report - Final (Deloitte Study) 2007	Durk Banks, PTU
44.	Tower DOT Mystery Shopping Report 2013	Durk Banks, PTU
45.	Value for Money VFM PTB Presentation 2013	Durk Banks, PTU
46.	DOT Public Transportation Sector Assessment Report 2009	Durk Banks, PTU
47.	DOT Transportation Sector Customer Service Assessment Final Report 2006	Durk Banks, PTU
48.	FBus Depot Architecture Plans for Cover Area	Durk Banks, PTU
49.	PTU Policies and Procedures	Durk Banks, PTU
50.	PTU Disciplinary Matters	Durk Banks, PTU
51.	Draft Legislative Review by Mr. O. Watler	Durk Banks, PTU
52.	Tollbooth Images	Durk Banks, PTU
53.	Government Administration Building Site Map	Durk Banks, PTU
54.	Forensic Unit - Public Transport Drug Testing Handout	Durk Banks, PTU
55.	Lost property Form	Durk Banks, PTU
56.	Obtaining a Public Transport Permit	Durk Banks, PTU
57.	Office Procedures Email	Durk Banks, PTU
58.	Job Description for a PTU Administrative Secretary	Durk Banks, PTU
59.	Job Description for a PTU Executive Officer	Durk Banks, PTU
60.	Job Description for a Public Transport Inspector	Durk Banks, PTU

2. Stakeholder Consultations and Documents Received and Reviewed (continued)

Deloitte received and analysed the following list of data and information received from stakeholders during Phase 1 of the Project:

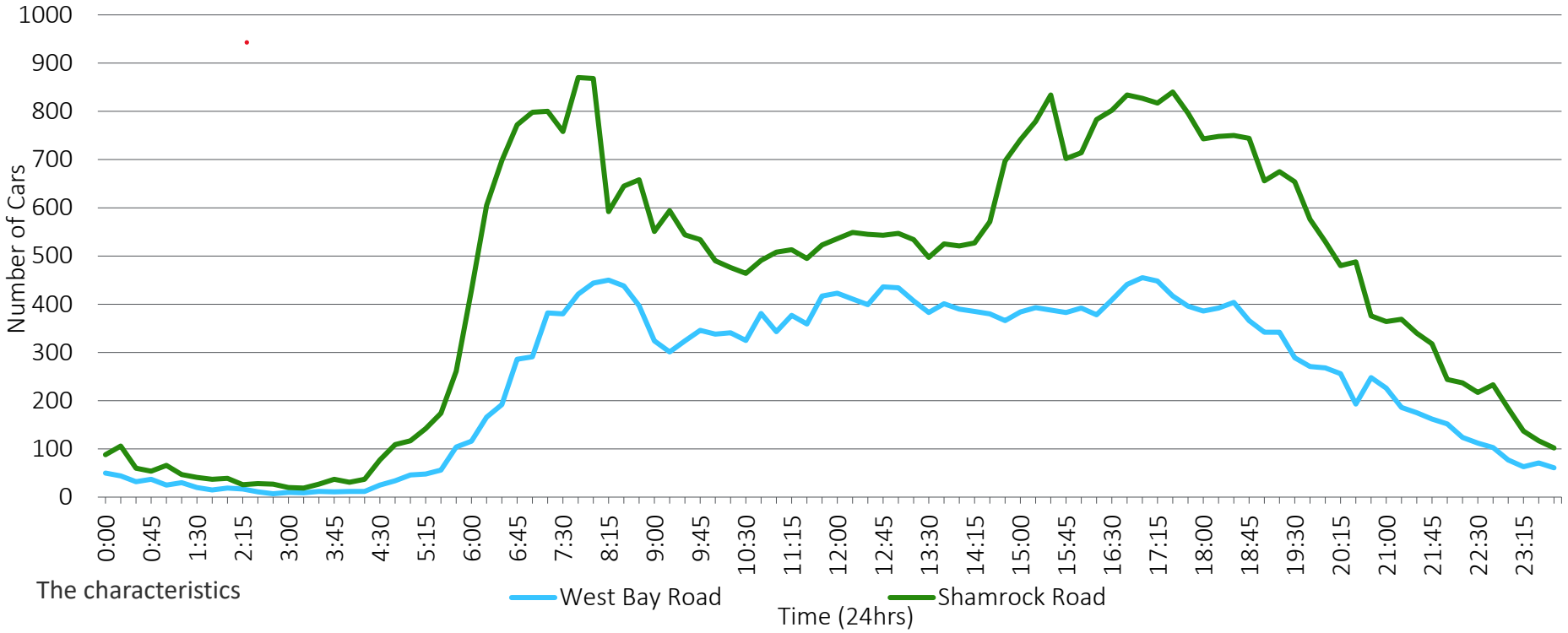
	Name of Document or Data	Received From
61.	Job Description for a PTU Senior Inspector (TAXI)	Durk Banks, PTU
62.	Job Description for a Bus Depot Officer	Durk Banks, PTU
63.	Job Description for a PTU Director	Durk Banks, PTU
64.	Public Bus System Legislation	Durk Banks, PTU
65.	Greenhouse Gas Emissions Data 1990-2020	Gina Ebanks-Petrie, Department of Environment (“DOE”)
66.	Ritz Carlton Employee Transportation Survey	Marc Langevin, Ritz Carlton Hotel
67.	Customer Complaints Received	Durk Banks, PTU

3. Summary of Observations

3. Summary of Observations – Traffic Flow

The following chart is a snapshot of traffic patterns throughout one (1) day on two (2) selected main arterial roads within Grand Cayman. This indicates the comparative volume of traffic flow throughout the day between George Town and the Eastern Districts versus George Town and West Bay. **Data for Easterly Tibbetts Highway was not available,** however the traffic flows heading to West Bay from George Town would also be serviced by the Easterly Tibbetts Highway.

Chart 3.1.1 Traffic Volumes on Main Arterial Roadways
(One (1) day during 2019)



Data Point Location:

Shamrock Road (Selkirk Drive)

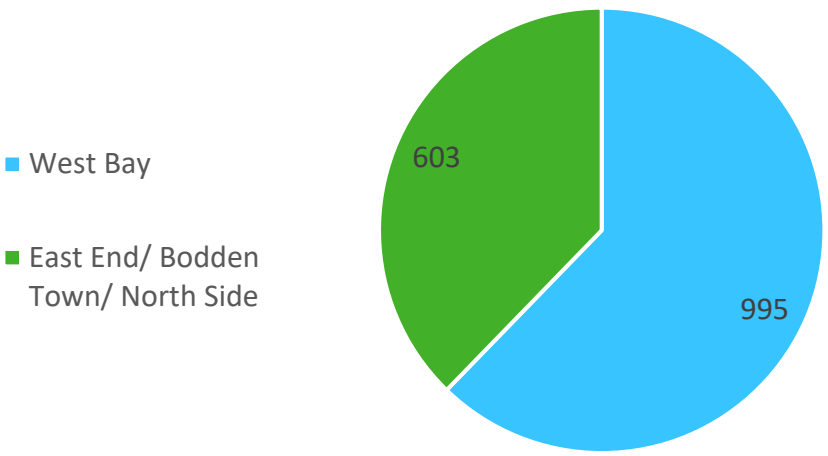
West Bay Road (Bay Town Plaza)

Source: Deloitte analysis with information from the NRA.

3. Summary of Observations – Current Supply

The licensed supply of seats heading to West Bay is **25%** more than the seats heading to Bodden Town, East End and North Side. These seats are provided during the operating hours of **6am to 7pm** during the week.

Chart 3.1.2 Number of Seats
(2022)



The official George Town route 4A (as defined by the PTU, See Appendix A attached) has a capacity of 48 seats in circulation, however, *all* buses departing from the central George Town depot are routed to service different areas within George Town for a higher available capacity.

The increased number of seats available across the West Bay routes is indicative of:

- A faster turnaround time (1 hour to complete compared to 2 hours to complete the Eastern District routes);
- The volume of rental properties concentrated in the West Bay District (21% versus 16% in the Eastern Districts);
- The concentration of employment opportunities throughout the routes in George Town, on West Bay Road and in West Bay; and
- The concentration of hotel rooms in George Town and West Bay Road (76% of total rooms).

Source: Deloitte analysis with public bus statistics from the PTU.

3. Summary of Observations – Potential Demand

Chart 3.2.3 Estimated Population by Status
(2022, Percentage)

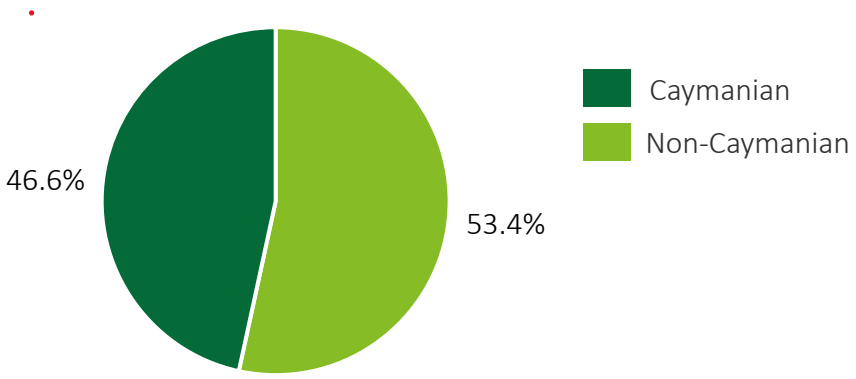
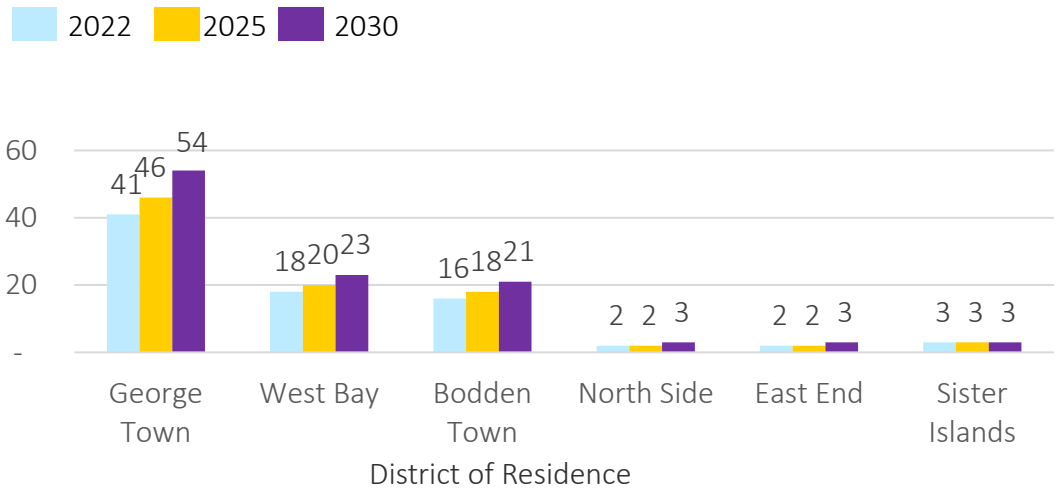


Chart 3.2.4 Current and Projected Population
(2022-2025-2030, thousands of people)



The current bus system is designed to predominantly service George Town and West Bay, however, it does not necessarily service all sub-divisions within each District.

Historically Caymanians have owned cars or used cars owned by their families as soon as they obtain their drivers license.

Typically Non-Caymanians arrive on island without vehicles. They are of working age and in many cases are forced to purchase private vehicles to get around the island due to the lack of available public transport.

Access to capital for vehicles purchases via bank loans or other financing methods are not easily accessible thus they purchase low cost vehicles for cash predominantly. Of 52,266 licensed motor vehicles on the road as of November 4, 2022, there are 4,941 Honda Fits licensed. This is an example of a low cost vehicle. 88% of licensed Honda Fits are older than 10 years of age but were imported onto the island within the last five (5) years. This is indicative of the trend to import low cost vehicles onto the island.

Table 3.2.5 Employed Persons by District of Residence and District of Employment
(2021, percentage)

	District of Employment				
District of Residence	**George Town**	**West Bay**	**Bodden Town**	**North Side**	**East End**
George Town	58%	47%	28%	20%	18%
West Bay	20%	44%	7%	4%	2%
Bodden Town	19%	8%	59%	22%	18%
North Side	2%	1%	3%	49%	11%
East End	1%	0%	3%	5%	51%

Source: Deloitte analysis with information from the 2022 Parliamentary address, the Cayman Islands' 2021 Census of Population and Housing Report and the Cayman Islands Computer Services Department on behalf of the Department of Vehicle and Drivers' Licensing.

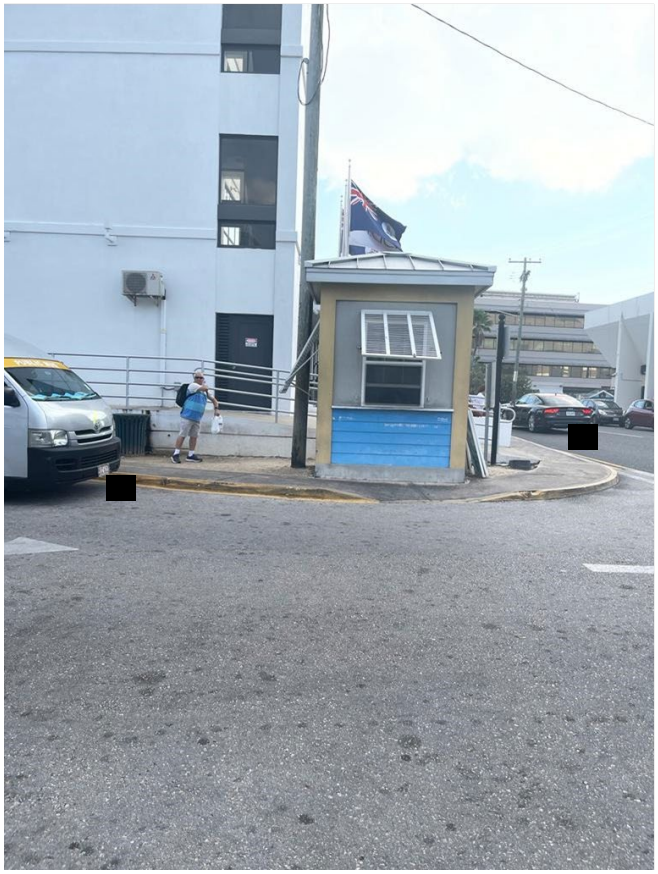
3. Summary of Observations – Potential Demand (Schools)

68% of students attending schools across Grand Cayman are transported via private motor vehicle versus **14%** who are transported via school bus.

Table 3.2.6 Persons Attending School Locally by District of Residence and District of School
(2021, percentage[1])

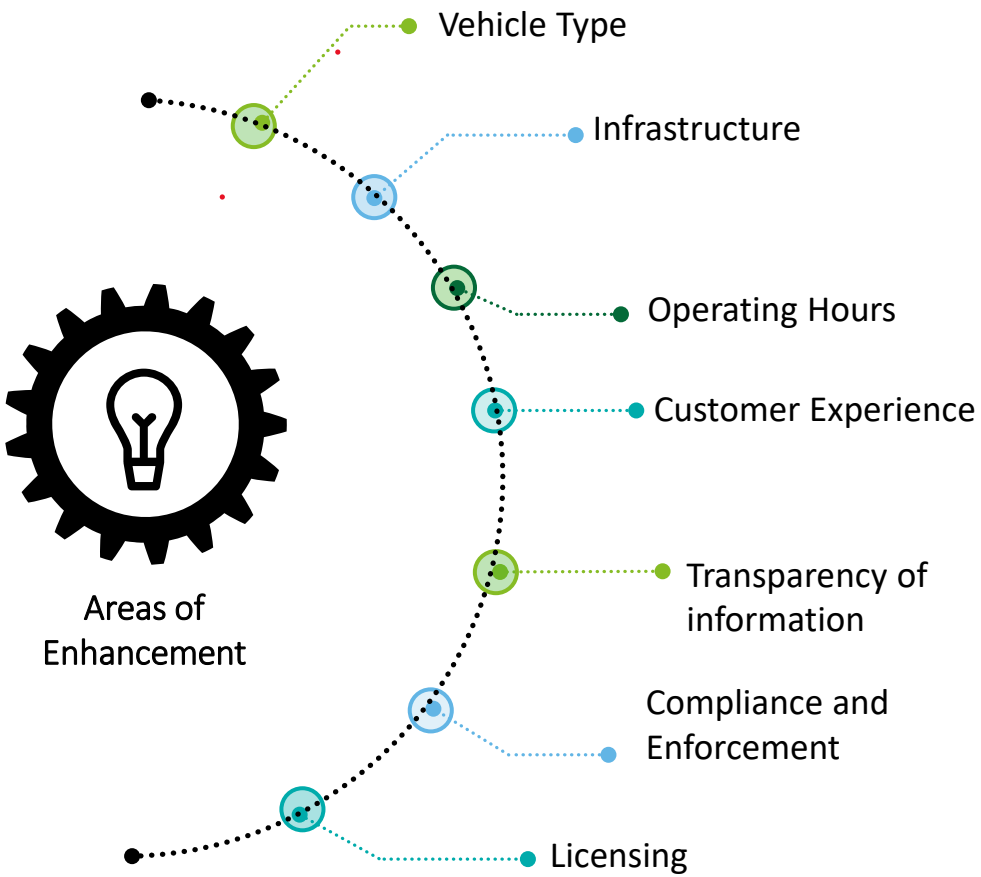
	District of School				
District of Residence	**George Town**	**West Bay**	**Bodden Town**	**North Side**	**East End**
George Town	53.6%	9.8%	14.6%	8.8%	0%
West Bay	18.5%	85.5%	5.4%	0.6%	0%
Bodden Town	24.1%	4.2%	72.5%	61.1%	9.40%
North Side	2.0%	0.4%	5.4%	20.1%	6.20%
East End	1.2%	0%	2.2%	9.4%	84.40%

[1]Where percentages per transportation mode do not sum to 100%, this is due to the sister island data being excluded from this chart.



Source: Deloitte analysis with information from the Cayman Islands' 2021 Census of Population and Housing Report.

3. Summary of Observations – Areas of Enhancement



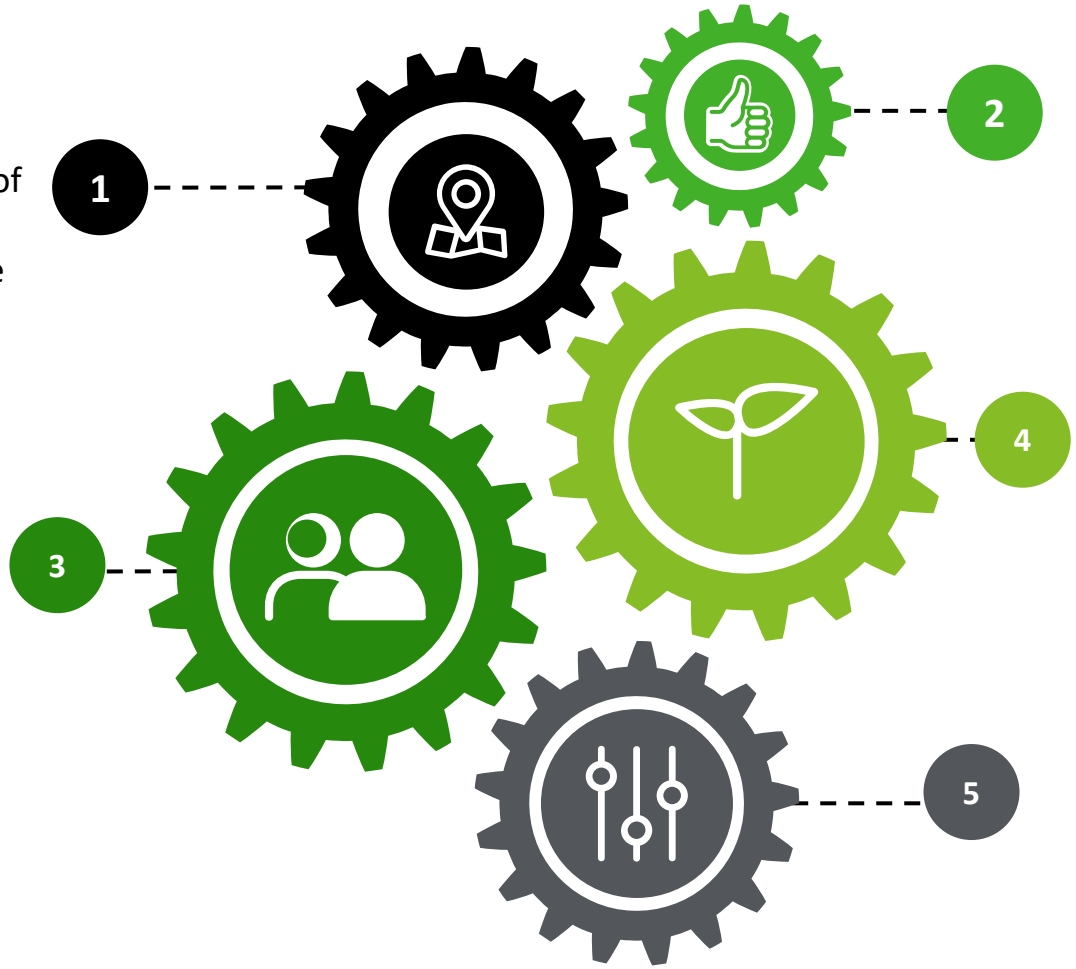
4. Revised Public Bus System Strategic Priority Areas and Objectives

4. Revised Public Bus System Strategic Priority Areas and Objectives

Strategic Priority Areas

Increase Utilisation

To increase the use of public transport by both visitors and the local community.



Improve Customer Experience

To provide quality service to our patrons, improving overall customer satisfaction.

Reduce Emissions

To reduce emissions, fostering sustainability and transitioning to an environmentally friendly fleet.

Enhance Human Resources – Development and Training

To optimise the quality of service through structured talent training and development programmes.

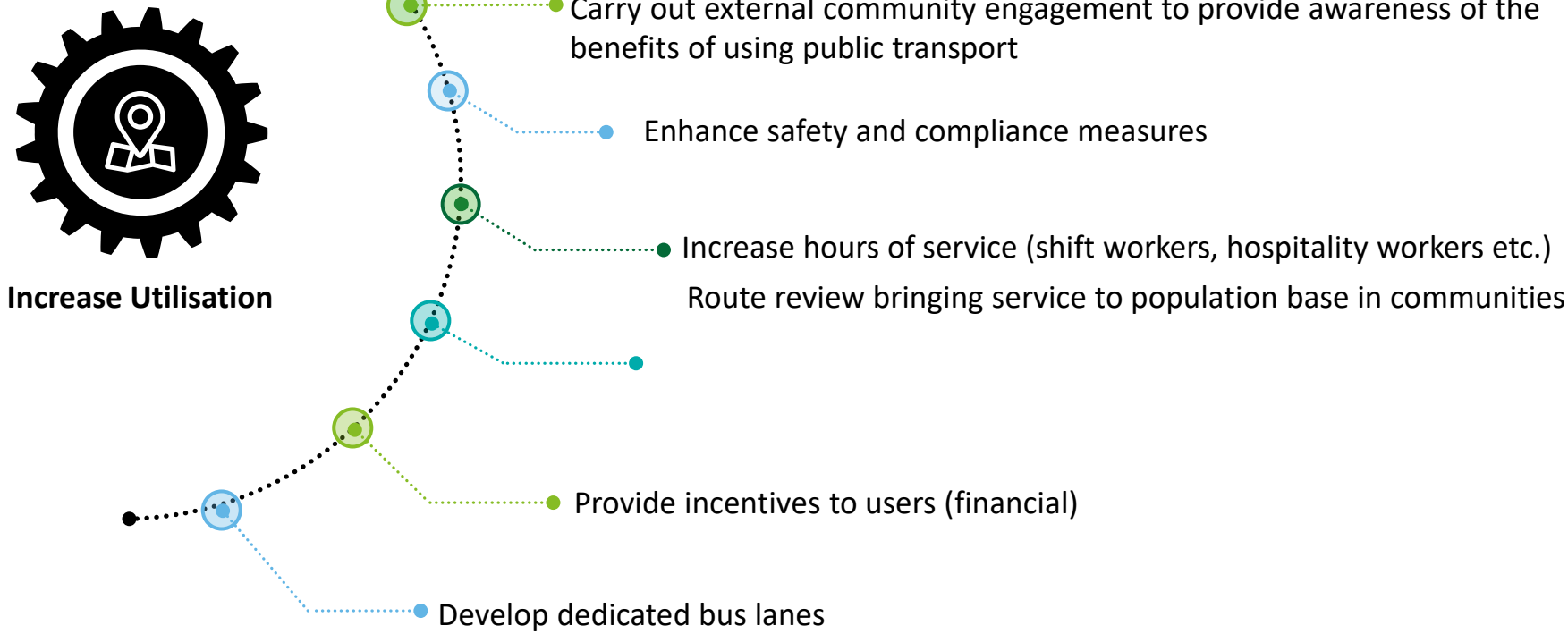
Strengthen Structural and Organisational Efficiencies

To create an efficient organisation that aligns to our strategic goals and objectives.

4. Revised Public Bus System Strategic Priority Areas and Objectives (continued)

Strategic Objectives

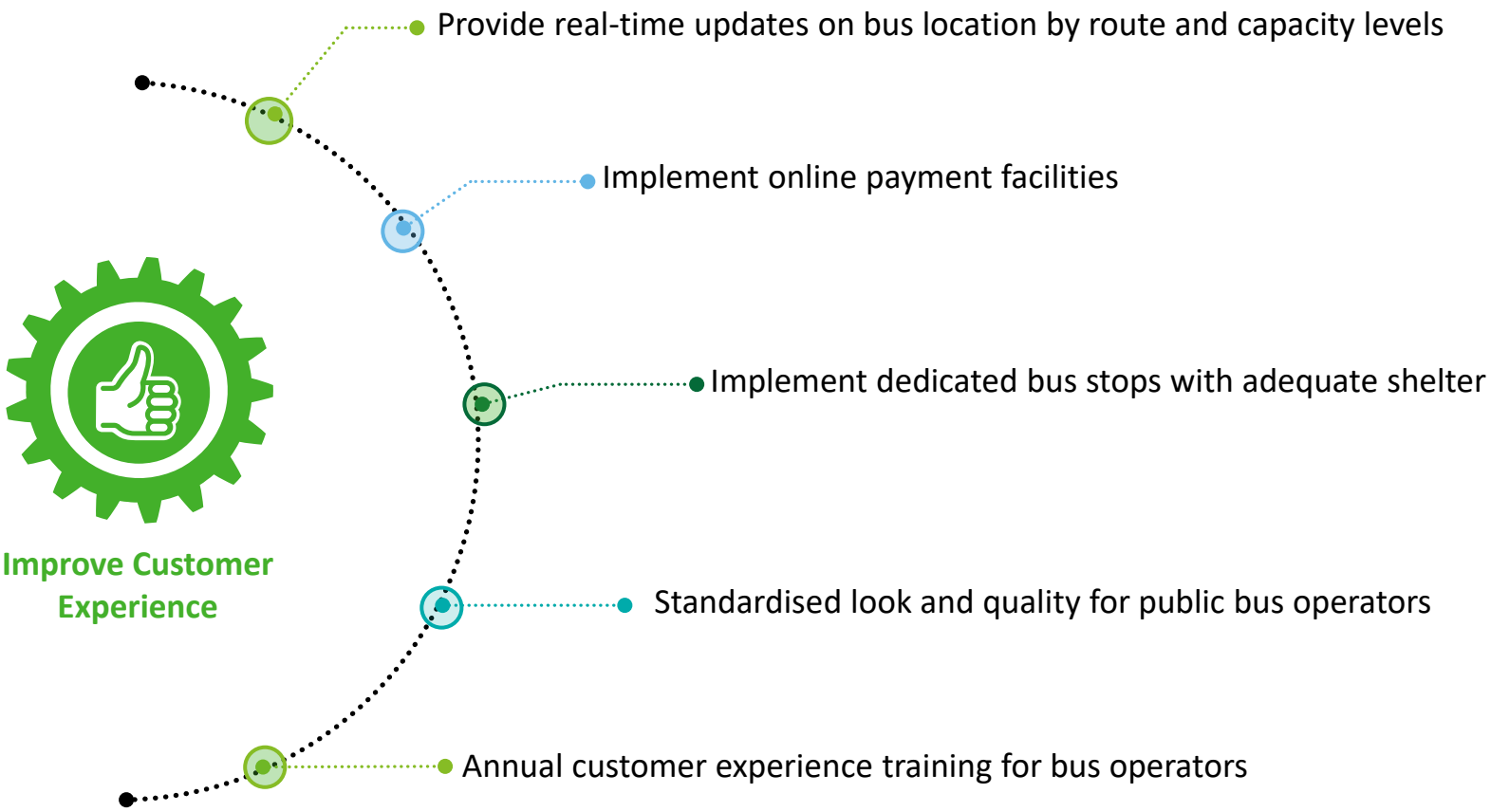
Increase Utilisation: To increase the use of public transport by both visitors and the local community.



4. Revised Public Bus System Strategic Priority Areas and Objectives (continued)

Strategic Objectives

Improve Customer Experience: To provide quality service to our patrons, improving overall customer satisfaction.



4. Revised Public Bus System Strategic Priority Areas and Objectives (continued)

Strategic Objectives

Enhance Human Resources – Development and Training: To optimise the quality of service through structured talent training and development programmes.

Enhance Human Resources – Development and Training

- Implement training and development programme for each employee
- Increase the number of employees to ensure that the quality of service is improved
- Provide management and leadership training to improve communication and operations within teams
- Ensure all new positions are evaluated by the Portfolio of Civil Service (“PoCS”)

4. Revised Public Bus System Strategic Priority Areas and Objectives (continued)

Strategic Objectives

Reduce Emissions: To reduce emissions, fostering sustainability and transitioning to an environmentally friendly fleet.

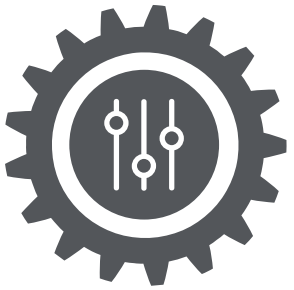
Reduce Emissions

- Plan and develop infrastructure which will allow more facilities to cater to electric vehicles
- Implement a rolling plan to introduce electric and/or hybrid vehicles into the public transport fleet
- Facilitate training on the maintenance and repair of electric and hybrid vehicles and provide incentives to encourage automotive repair entities to supply these services
- Establish legislation and provide incentives to reduce the number of gasoline and diesel fueled cars in use
- Increase public awareness of the benefits of transitioning to low emission vehicles
- Develop a media campaign to inform the public of the introduction of low emission vehicles into the omnibus fleet by the PTU

4. Revised Public Bus System Strategic Priority Areas and Objectives (continued)

Strategic Objectives

Strengthen Structural and Organisational Efficiencies: To create an efficient organisation that aligns to our strategic goals and objectives.



Strengthen structural and organisational efficiencies

- To align the organisational structure to efficiently support the strategic objectives of the PTB
- Develop a culture of shared values through internal engagement workshops
- Consider transitioning the PTU to a Department under the Ministry
- Introduce technology to create efficiencies and change processes
- Introduce legislation to strengthen compliance functionality and enforcement capability

5. Current State Analysis of the Public Bus System

5. Current State Analysis of the Public Bus System

5.1 Summary of Supply

The PTU has 13 predefined routes servicing the Districts of George Town, West Bay, Bodden Town, East End and North Side. All bus routes follow the main thoroughfares in Grand Cayman. The District of Bodden Town is serviced by buses leaving George Town in the direction of the East End and North Side Districts.

Table 5.1.1 High Level Summary of Supply of Approved Operators

District	Route	Route Length (miles)	Route Duration (hours)	No. Buses Servicing Route	No. Seats Servicing Route
West Bay	1	19.6	1	65 (63%)	995
	2	21.4	1		
	3	24.5	1.5		
George Town	4A	4.1	0.5	3 (3%)	48
	4B	Not in operation[1]			
	5A	Not in operation[1]			
	5B	Not in operation[1]			
East End/ Bodden Town	7A	49.2	2	14 (13%)	232
	7B	59.3	2.5		
North Side/ Bodden Town	8A	54.2	2.5	22 (21%)	371
	8B	64.3	2		
	9A	49.2	2		
	9B	Not in operation[1]			
Total Buses				104	

Source: Deloitte analysis with public bus statistics from the PTU.

The West Bay District has the highest number of buses assigned at 65 which contributes to the highest capacity currently provided to customers during the public bus operational hours of 6am to 7pm Monday to Saturday.

The West Bay buses are used by residents of West Bay, individuals whose place of employment is based on West Bay Road, as well as visitors staying along Seven Mile Beach.

Buses leaving the George Town depot to other Districts are routed through parts of George Town and used to supply services throughout the George Town area.

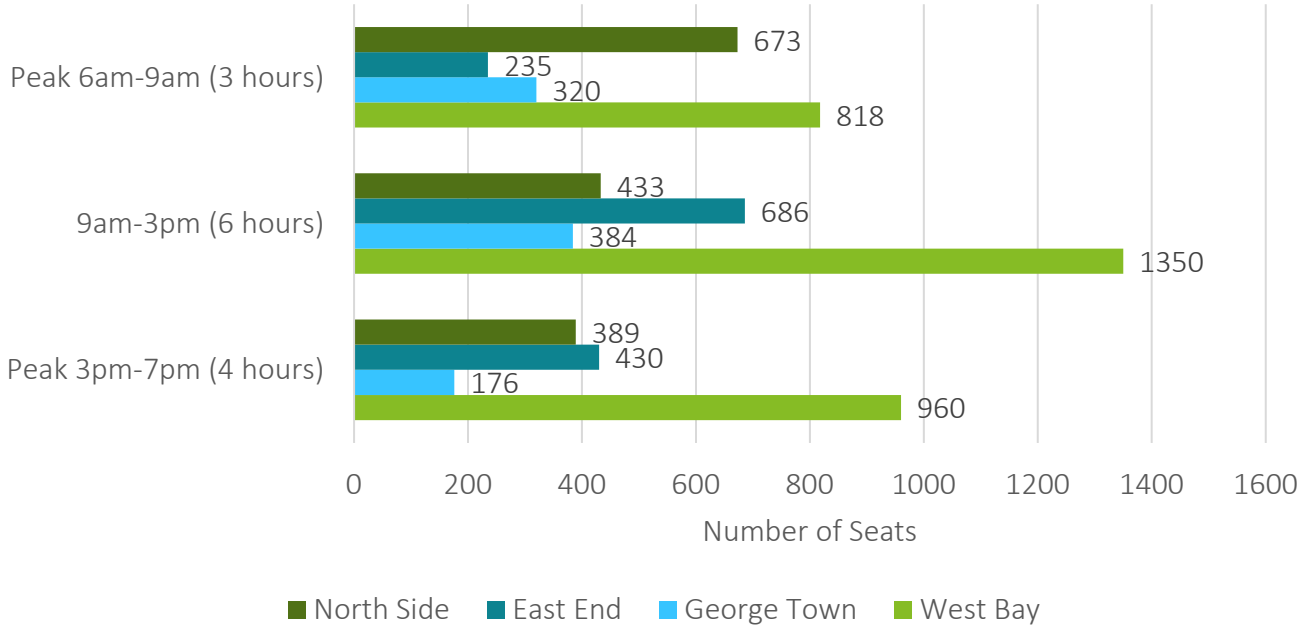
[1] Note that per discussion with the PTU, this bus route is not operational with no corresponding licensed buses servicing this route.

5. Current State Analysis of the Public Bus System (continued)

5.1 Summary of Supply

The current available capacity provided for each District is measured by the number of seats within operational omnibuses that circulate each route throughout a day.

Chart 5.1.2 Available Capacity by District
(Monday December 5, 2022; Number of seats[1])



West Bay omnibuses offer the highest available capacity for users throughout the day.

North Side and George Town omnibuses offer relatively lower capacity from 3pm to 7pm when demand for people to travel home after work is high.

The East End routes offer relatively lower capacity from 6am to 9am when demand for people travelling into town is high.

[1]Note that in some cases buses servicing a particular route may not have dispatched from the George Town depot. In these instances, no data was able to be recorded.

Source: Deloitte analysis with public bus statistics from the PTU.

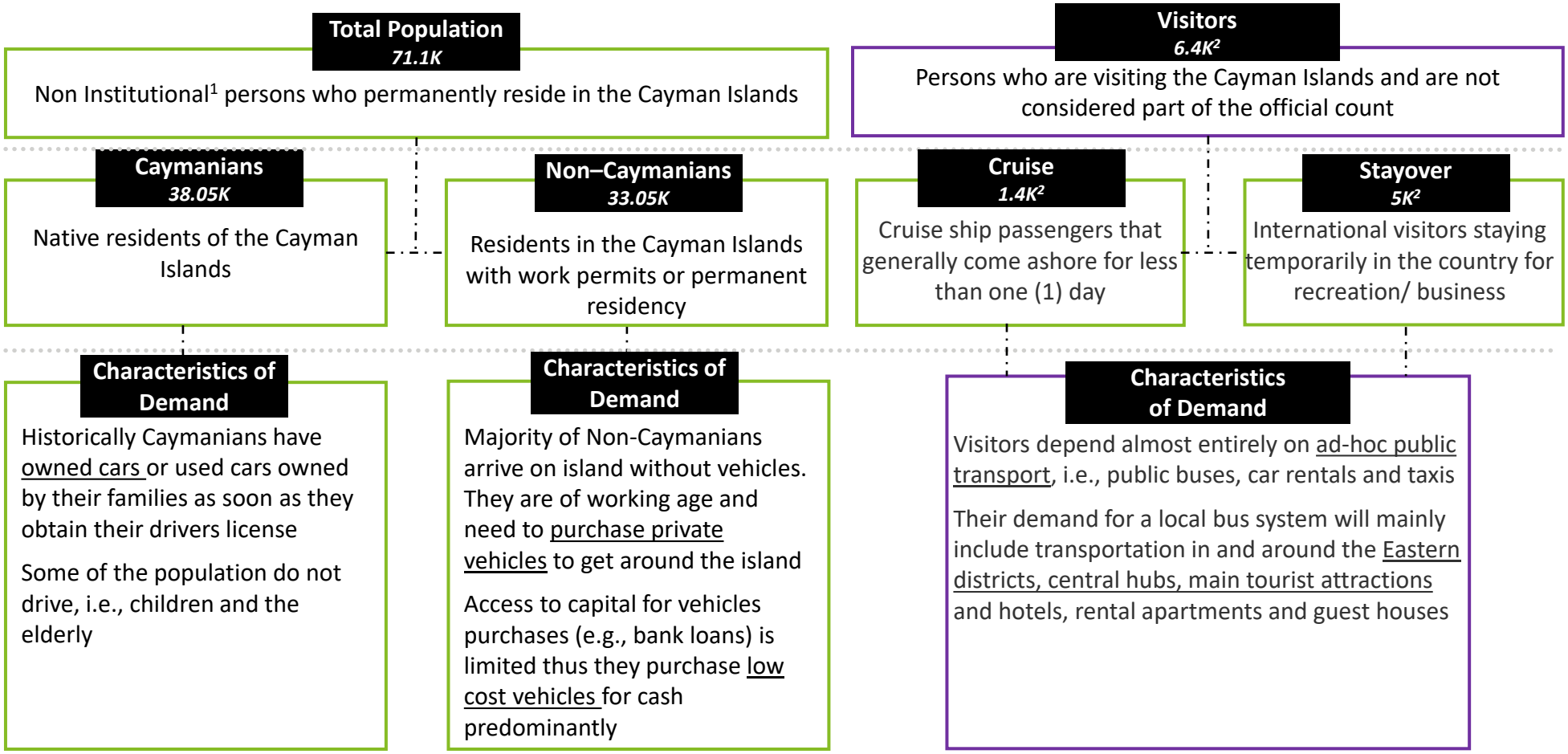
5. Current State Analysis of the Public Bus System (continued)

5.2 Analysis of Potential Demand

There is a demand for an effective public bus system by the total population residing in the Cayman Islands as well as visitors. In considering the demand for public transportation we have conducted an analysis of the resident population of the Cayman Islands and numbers of visitors to the country.

Illustration 5.2.1 Relevant population

(2021; Thousands of people)



[1] Total population excludes institutional persons who live in institutions such as prisons, infirmaries, retirement homes, etc.

[2] Visitors are calculated as the daily average of cruise and stayover air visitors and has been calculated as of 2019, the last pre-pandemic year.

Source: Deloitte analysis with information from the Cayman Islands' 2021 Census of Population and Housing Report and the Cayman Islands Economics and Statistics Office.

5. Current State Analysis of the Public Bus System (continued)

5.2 Analysis of Potential Demand

Potential domestic demand is measured by the spread of the total population residing in Grand Cayman and can be analysed by District below:

Illustration 5.2.2 The Cayman Islands

Population Distribution

At the time of the 2021 census the Cayman Islands had a total population of approximately 71k residents, from which 97% are concentrated in Grand Cayman.

The population mainly resides in George Town, West Bay and Bodden Town representing the main urban centres, as approximately 92% of the total population habits these regions located on the southwestern part of Grand Cayman.

District	Population 2021	%
Grand Cayman	68,848	97%
George Town	34,921	49%
West Bay	15,335	22%
Bodden Town	14,845	21%
North Side	1,902	3%
East End	1,846	2%
Sister Islands	2,256	3%
Cayman Islands	71,105	100%

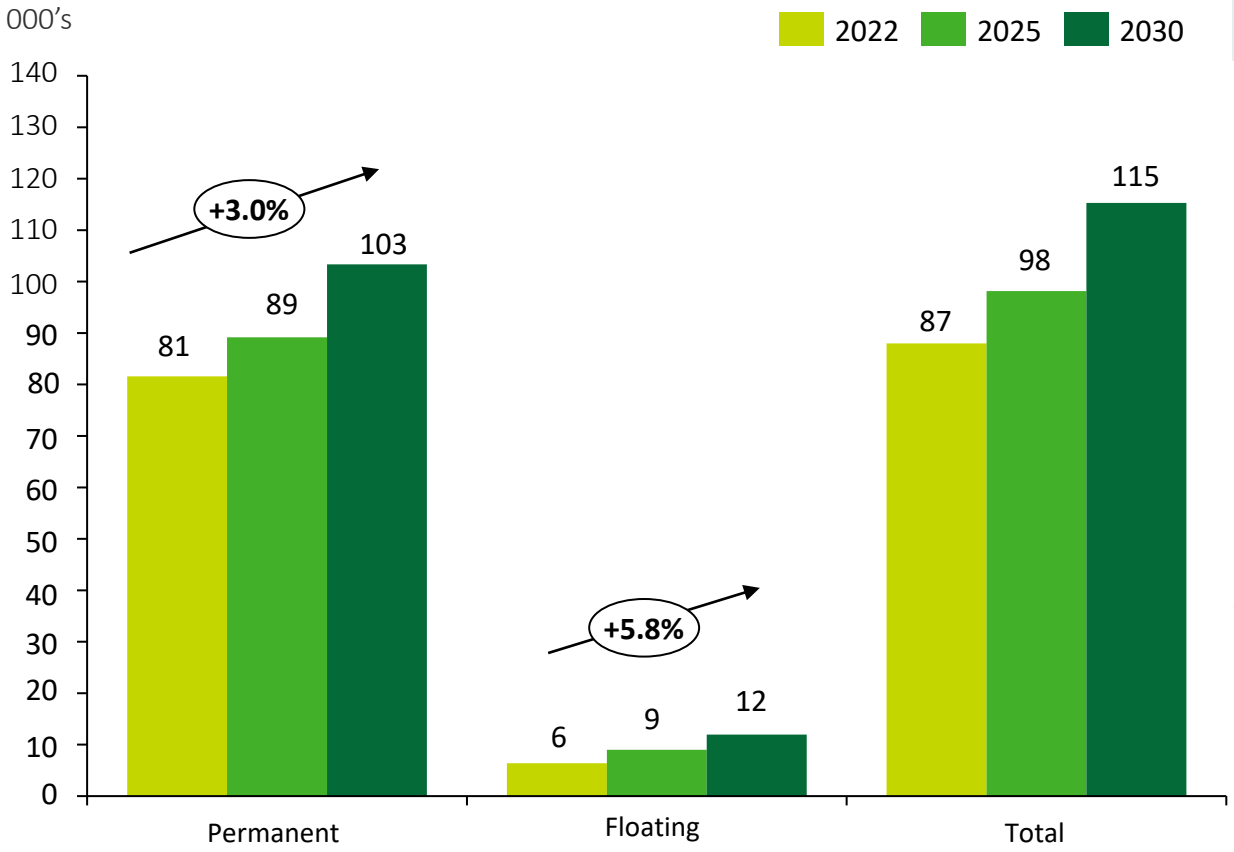
Source: Deloitte analysis with information from Britannica, and the Cayman Islands' 2021 Census of Population and Housing Report.

5. Current State Analysis of the Public Bus System (continued)

5.2 Analysis of Potential Demand

Potential future demand is estimated by forecasting population growth.

Chart 5.2.3 Population Forecast Based on Historic Growth Rates
(2022 - 2025 - 2030; thousands of people)



During the Parliament address in December 2022, Honourable Chris Saunders (Deputy Premier and Minister of Parliament) announced that the total Cayman Islands' population has increased to approximately 81,600 people since the 2021 Census. The majority of this increase in residents is as a result of an increase in work permit holders that have come to the Cayman Islands and are in need of transportation.

Visitors

Since 2013, visitor arrivals have grown an average of 5.8% annually to 2019. The reduced arrivals since 2020 as a result of COVID-19 are expected to be recovered with stayover arrivals during November 2022 reaching 53% of the country's 2019 total arrival numbers. Arrival numbers have been steadily increasing as the Cayman Islands partially reopened its borders in October 2021 and cruise ships have resumed operations.

Permanent population

The evolution of the population's growth rate in the Cayman Islands shows a relatively steady pace over the last 30 years, with an average growth of 3.0%, excluding exceptional shifts during hurricane Ivan and COVID-19.

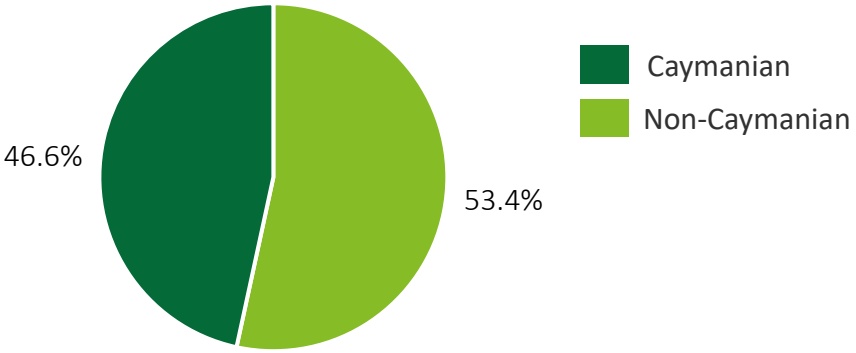
Source: Deloitte analysis with information from the Cayman Islands' 2021 Census of Population and Housing Report and the Cayman Islands Economics and Statistics Office.

5. Current State Analysis of the Public Bus System (continued)

5.2 Analysis of Potential Demand

Potential future domestic demand by District is projected based on the current distribution of the domestic population as well as the distribution of rented households by District.

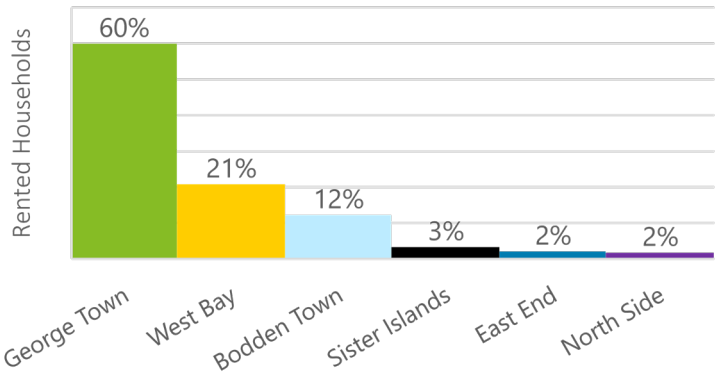
Chart 5.2.4 Estimated Population by Status (2022, Percentage)



Taking into The Cayman Islands' population growth since the 2021 Census can largely be attributed to an influx of international Non-Caymanian residents for an estimated total population by status as at December 2022:

Caymanian	38,047
Non-Caymanian	43,553
Total Population	81,600

Chart 5.2.5 Distribution of Rented Households by District (2021; Percentage)



Non-Caymanians typically rent properties rather than own thus it is assumed that the increased population is distributed according to the percentage of rental households across the Districts per the 2021 Census with majority of rentals in the Districts of George Town, followed by West Bay and Bodden Town.

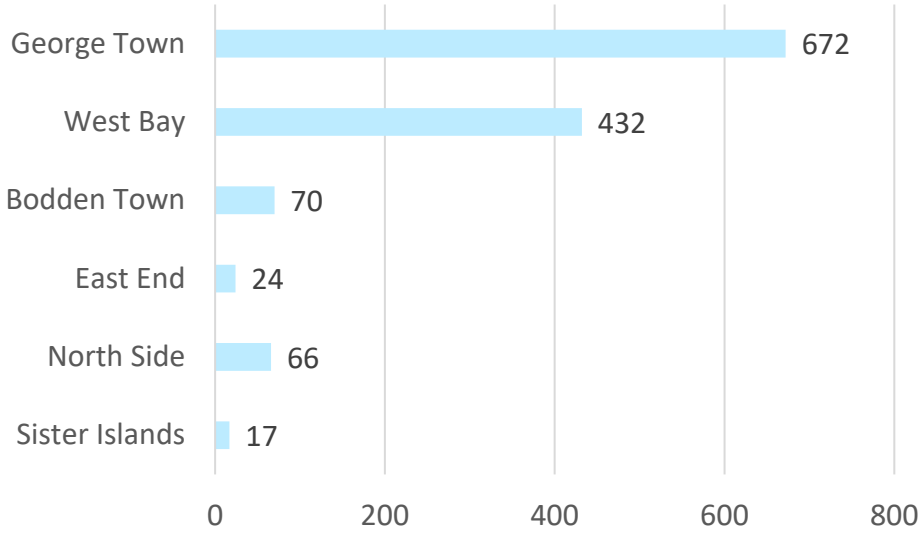
Source: Deloitte analysis with information from the 2022 Parliamentary address and the Cayman Islands' 2021 Census of Population and Housing Report.

5. Current State Analysis of the Public Bus System (continued)

5.2 Analysis of Potential Demand

Potential future domestic demand by District considers approved residential construction permits issued from 2020 through Q2, 2022.

Chart 5.2.6 Approved Residential Construction Permits by District
(Q2 2022; Number of approved units)



Approved residential construction permits for residential apartments/condos, townhouses and other mixed use residential/ commercial buildings reveals that 86% of approved construction units within the next few years is projected to take place in George Town and West Bay.

As new buildings are inhabited by residents predominantly, this contributes to an increased domestic inherent demand for an effective public bus system across these Districts.

Source: Deloitte analysis with information from the Department of Planning Lists of Permits Issued and the Cayman Islands' 2021 Census of Population and Housing Report.

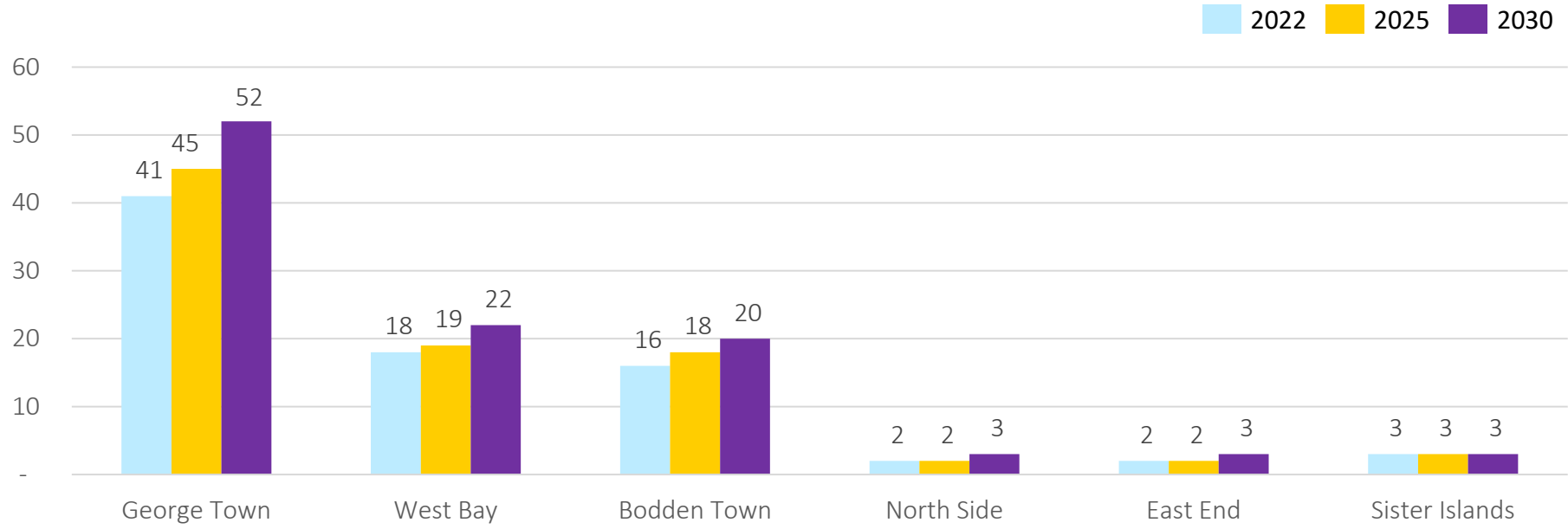
5. Current State Analysis of the Public Bus System (continued)

5.2 Analysis of Potential Demand

Potential future domestic demand by District considers historic population growth rates, as well as the movement of residents between Districts and population growth as a result of residential construction.

Chart 5.2.7 Population Forecast Based on Historic Growth Rates and Residential Development

(2022 - 2025 - 2030; thousands of people[1])



Domestic population growth across Districts considers an average annual growth of 3.0% as well as approved residential construction permits issued from 2020 through Q2, 2022[2]. It is assumed that half of the additional units constructed will be inhabited by existing residents moving from one District to another with the remaining half absorbed by population growth.

The highest future demand for public transport will continue to be from within the George Town and West Bay and Bodden Town Districts.

[1] Note that figures have been rounded.

[2] It has been assumed that one (1) unit approved will house two (2) individuals and that mixed residential/commercial buildings approved consist of an average of two (2) units each.

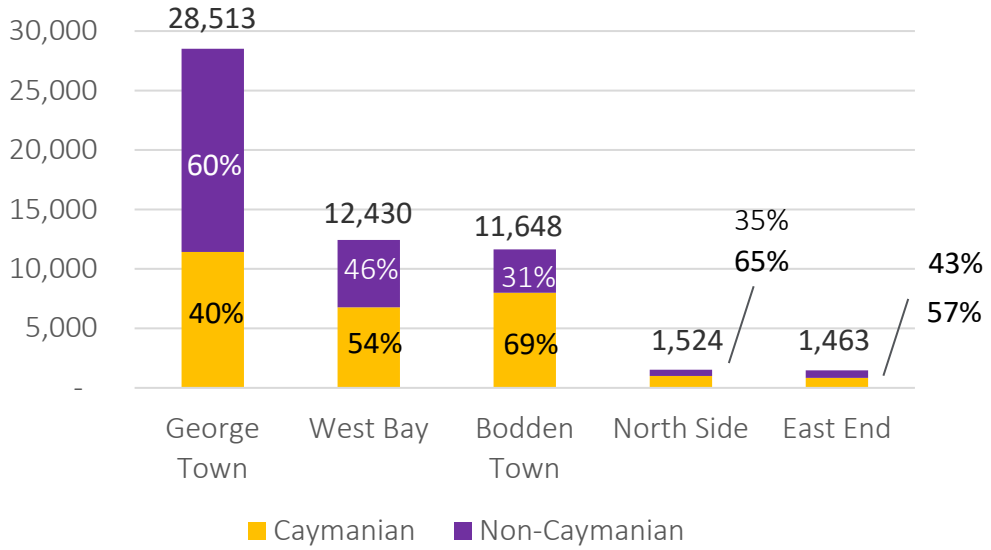
Source: Deloitte analysis with information from the 2022 Parliamentary address and the Cayman Islands' 2021 Census of Population and Housing Report.

5. Current State Analysis of the Public Bus System (continued)

5.2 Analysis of Potential Demand

Potential future domestic demand for public buses is highest amongst the employed population.

Chart 5.2.8 Working Age Population by Status and District
(2021, number of people and percentage)



Working Age refers to all persons 15 years old and above. This population is expected to be part of the labour force and employed populations within the next 5 to 10 years and thus is a good indicator of the projected future employed population across the Districts in demand of public buses to transport them to and from the workplace.

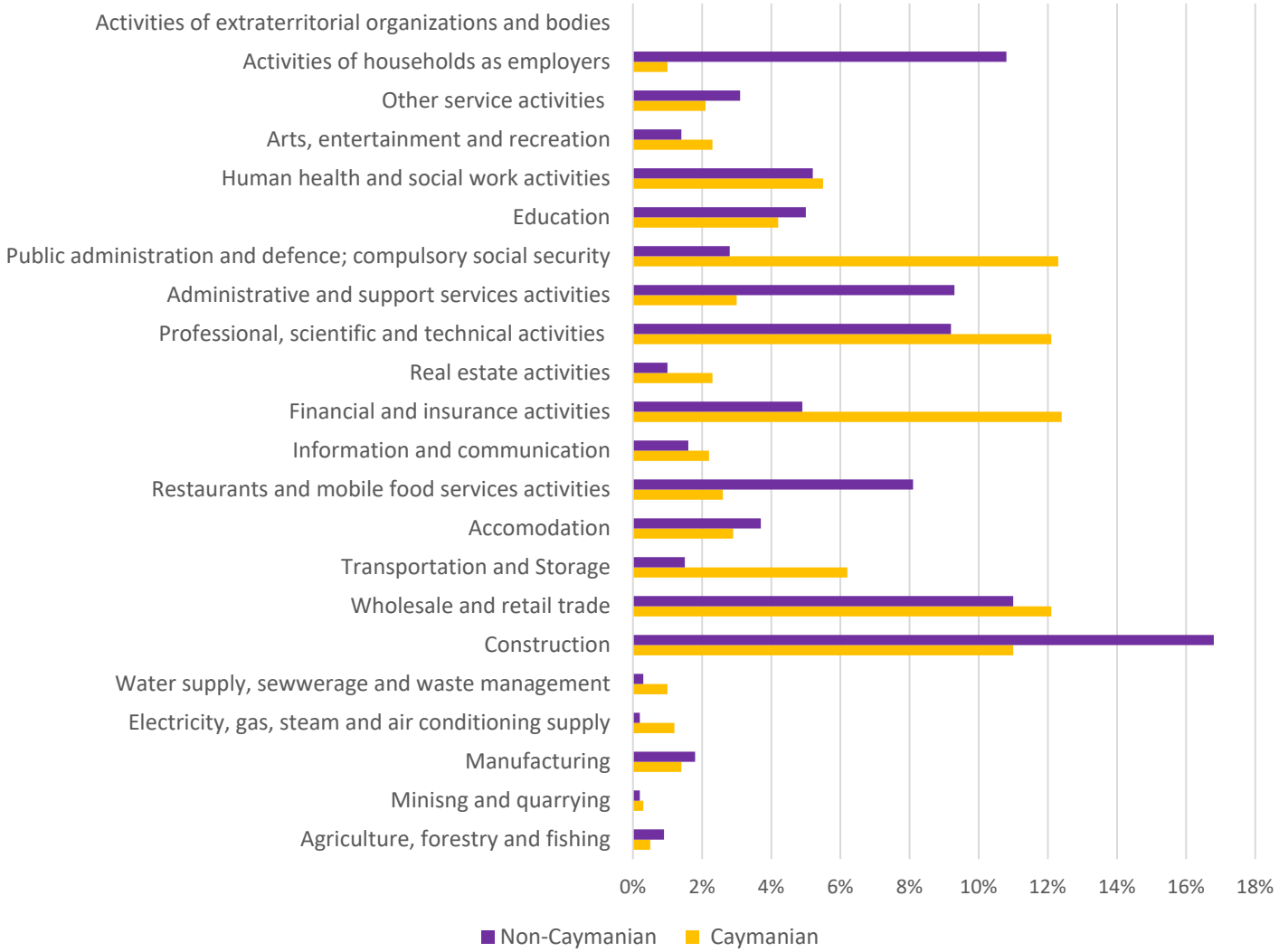
Source: Deloitte analysis with information from the Cayman Islands' 2021 Census of Population and Housing Report.

5. Current State Analysis of the Public Bus System (continued)

5.2 Analysis of Potential Demand

Potential future domestic demand for public buses is assessed by employed persons across industry types.

Chart 5.2.9 Employed Persons[1] by Industry and Status
(2021, percentage of employed persons)



The construction, wholesale and retail trade, activities of households as employers and the restaurants and mobile food service activities industries collectively account for 37.9% of the employed population.

46.7% of the total Non-Caymanian population are employed within these industries. Non-Caymanians having moved to the island who may not own vehicles upon arrival rely on the public bus system for transportation to and from the workplace.

[1]Employed persons refers to a person who is 15 years or older and engaged in some form of economic activity regardless of the type of work.

Source: Deloitte analysis with information from the Cayman Islands' 2021 Census of Population and Housing Report.

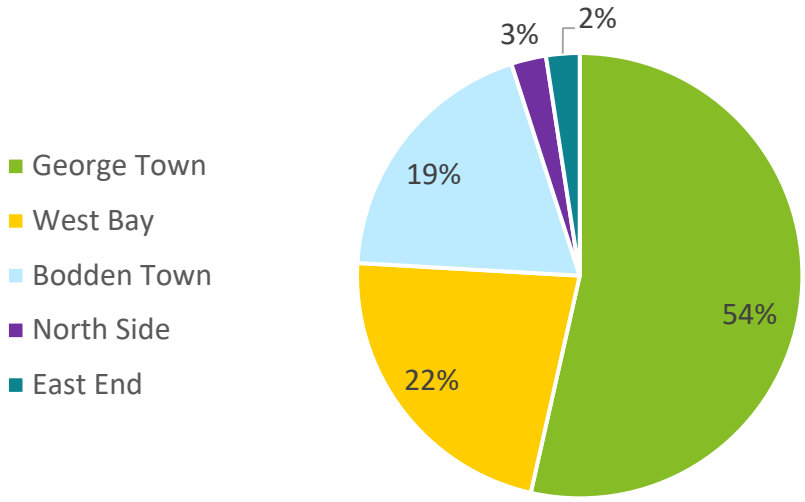
5. Current State Analysis of the Public Bus System (continued)

5.2 Analysis of Potential Demand

Potential future domestic demand for public buses is assessed by employed persons across industry types.

Chart 5.2.10 Number of Employees working in Households by District

(2021, percentage)



54% of household employees travel into George Town to their place of employment with 22% and 19% travelling into West Bay and Bodden Town respectively on a daily basis.

As can be seen on Chart 5.2.9 on page 38, majority of household employees are Non-Caymanians who, when arriving on island would not have owned vehicles and be reliant on public transport.

Source: Deloitte analysis with information from the Cayman Islands' 2021 Census of Population and Housing Report.

5. Current State Analysis of the Public Bus System (continued)

5.2 Analysis of Potential Demand

Potential future domestic demand to transport employed persons across Districts gives an indication of the routes needed to meet the growing needs of the Cayman Islands public.

Table 5.2.11 Employed Persons by District of Residence and District of Employment (2021, percentage)

	District of Employment				
District of Residence	**George Town**	**West Bay**	**Bodden Town**	**North Side**	**East End**
George Town	58%	47%	28%	20%	18%
West Bay	20%	44%	7%	4%	2%
Bodden Town	19%	8%	59%	22%	18%
North Side	2%	1%	3%	49%	11%
East End	1%	0%	3%	5%	51%

31% of the George Town and West Bay workforce travel into town from the Eastern Districts.

While majority of the population who work in George Town live in the same District, 39% of the workforce in George Town travel from either West Bay or Bodden Town daily.

47% of the West Bay workforce (including persons employed along West Bay Road) travel from their place of residence into George Town which contributes to the high demand for public transport between these two (2) Districts.

28% of the Bodden Town workforce travel from George Town daily and 42% of the North Side workforce travel from both the George Town and Bodden Town Districts.

The strong demand for public transport routes to extend to the eastern side of the island is indicated by the fact that 49% of the East End workforce travel daily from the other Districts on the island.

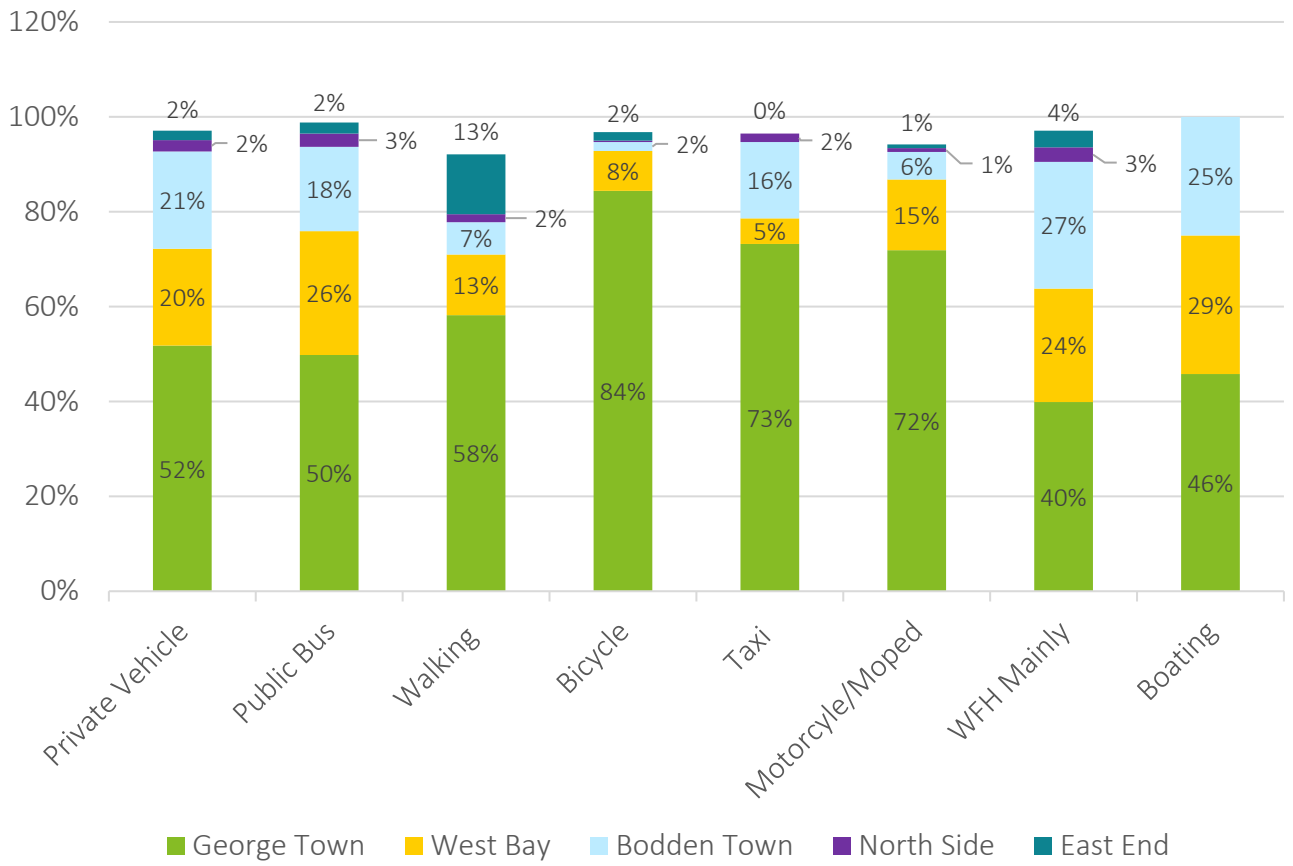
Source: Deloitte analysis with information from the Cayman Islands' 2021 Census of Population and Housing Report.

5. Current State Analysis of the Public Bus System (continued)

5.2 Analysis of Potential Demand

Potential future domestic demand for public buses is highest amongst the employed population.

Chart 5.2.12 Employed Persons by District and Main Mode of Transportation to Work (2021, percentage[1])



[1]Where percentages per transportation mode do not sum to 100%, this is due to the sister islands' data being excluded from this chart.

The public bus system is currently used predominantly by persons employed in George Town and West Bay and less so by those employed in Bodden Town and on the Eastern side of the island.

Noted that there is a relatively high percentage of individuals who work in East End who walk to their place of employment and working from home rates are relatively high across all Districts, potentially due to time efficiencies gained by avoiding traffic.

Taxis are used by residents to get to and from their place of employment particularly in the George Town and Bodden Town Districts. These individuals represent the prime target market for a cost-effective public bus system.

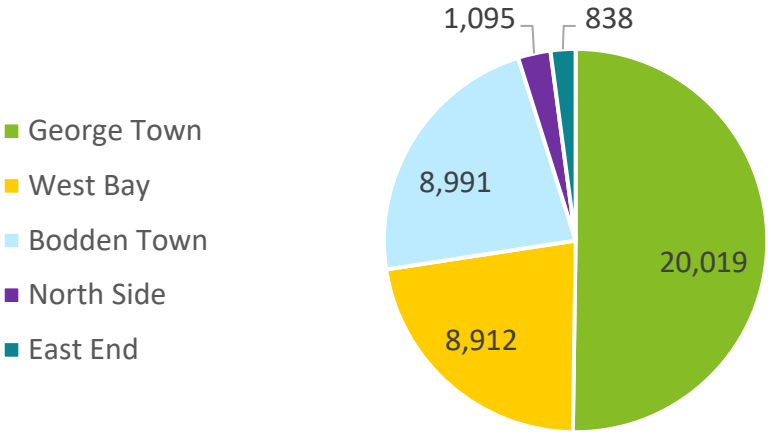
Source: Deloitte analysis with information from the Cayman Islands' 2021 Census of Population and Housing Report.

5. Current State Analysis of the Public Bus System (continued)

5.2 Analysis of Potential Demand

The pull of motor vehicle drivers onto public buses can be an indicator of potential future domestic demand across each Districts.

Chart 5.2.13 Estimate Motor Vehicles per Household
(2021, number of motor vehicles)



Majority of the motor vehicles on island are owned by persons living in George Town who are close to places of employment, grocery stores, restaurants and bars.

Based on the 2021 Census on average there are an estimate 1.4 motor vehicles owned per household.

Total Households	28,639
Total Estimate Motor Vehicles	39,855
Average Motor Vehicles per Household	1.4

[1] A household is defined as either one (1) person living alone or a group of persons living at the same address and with common housekeeping, i.e., sharing at least one (1) meal a day and sharing living arrangements.

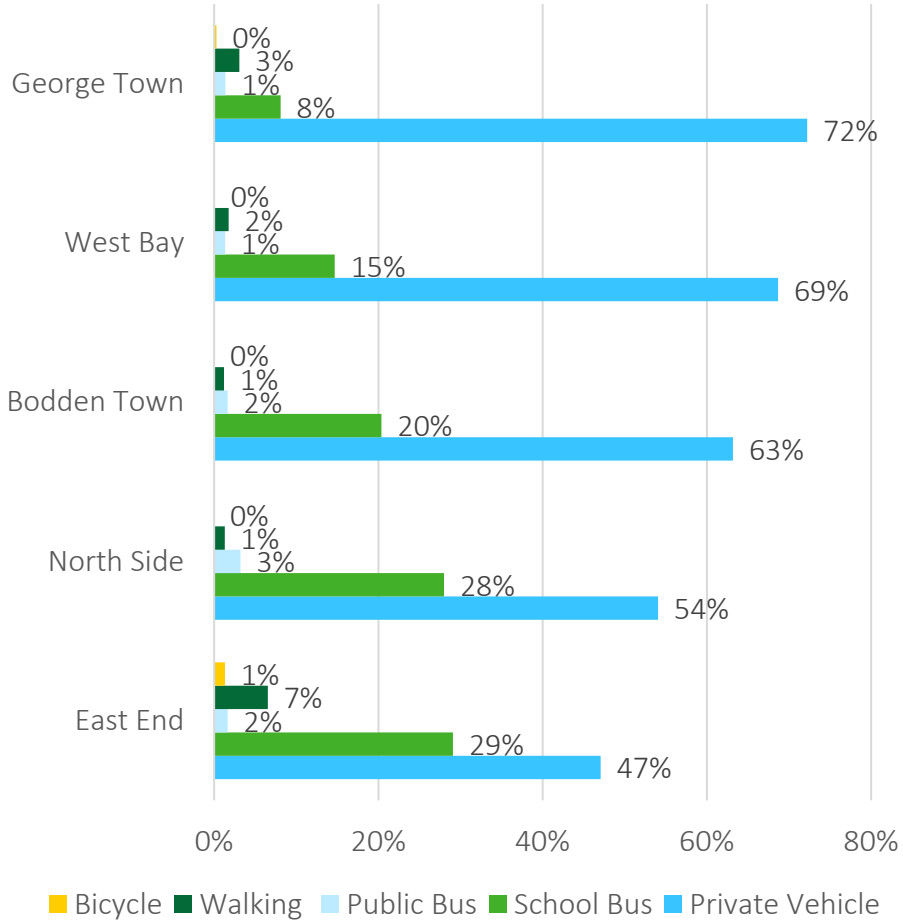
Source: Deloitte analysis with information from the Cayman Islands' 2021 Census of Population and Housing Report.

5. Current State Analysis of the Public Bus System (continued)

5.2 Analysis of Potential Demand

Parents driving their children to public and private schools contributes to increased traffic on the roads. Children needing to be transported to and from schools contribute to the current and potential future domestic demand.

Chart 5.2.14 Main means of Transport to Schools[1] (2021, percentage)



The most prevalent mode of transport used to transport children to schools is by private motor vehicle followed by the school buses.

As the school buses do not provide services to private schools, there is a high current potential demand by parents for public buses to transport their children to and from schools to avoid congestion on main roads during peak hours.

As reported to Deloitte during the stakeholder consultation, there are some parents who feel that the public buses are not reliable and safe enough for students to use on their own which is indicative of the low percentage of persons using public buses to get to schools across all Districts.

[1] Schools include all levels of schooling institutions from day cares/nursery schools to University/College.

Source: Deloitte analysis with information from the Cayman Islands' 2021 Census of Population and Housing Report.

5. Current State Analysis of the Public Bus System (continued)

5.2 Analysis of Potential Demand

Parents driving their children to public and private schools contributes to congestion on the roads during the peak hours in the mornings and afternoons, increasing potential future demand for a public bus system.

Table 5.2.15 Persons Attending School[1] Locally by District of Residence and District of School

(2021, percentage)

	District of School				
District of Residence	**George Town**	**West Bay**	**Bodden Town**	**North Side**	**East End**
George Town	53.6%	9.8%	14.6%	8.8%	0%
West Bay	18.5%	85.5%	5.4%	0.6%	0%
Bodden Town	24.1%	4.2%	72.5%	61.1%	9.40%
North Side	2.0%	0.4%	5.4%	20.1%	6.20%
East End	1.2%	0%	2.2%	9.4%	84.40%

[1] Schools include all levels of schooling institutions from day cares/nursery schools to University/College.

42.6% of persons attending school in George Town travel into the District daily from West Bay and Bodden Town.

In addition, 14.6% of Bodden Town school goers travel in the opposite direction from George Town to Bodden Town daily highlighting the high demand for continuous bus services between George Town and Bodden Town during peak hours.

69.9% of persons who attend school in North Side travel east from George Town and Bodden Town highlighting the high demand for daily buses to extend north during peak hours.

32% of the George Town and West Bay school attendees travel into town from the Eastern Districts.

Source: Deloitte analysis with information from the Cayman Islands' 2021 Census of Population and Housing Report.

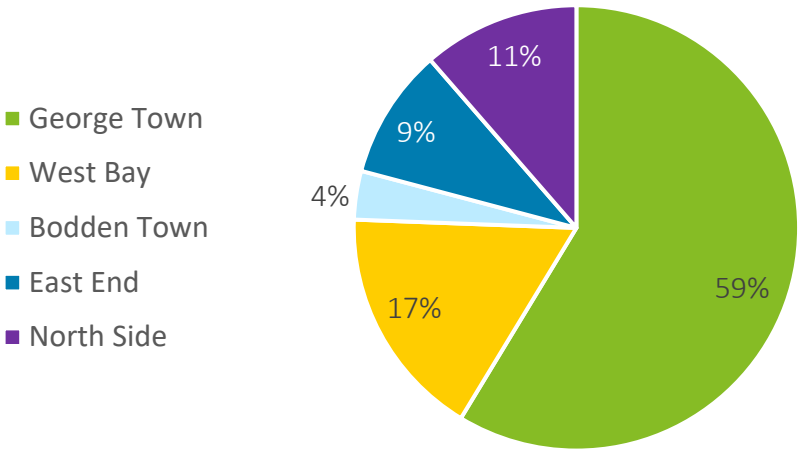
5. Current State Analysis of the Public Bus System (continued)

5.2 Analysis of Potential Demand - Tourism

Potential future demand increases directly with the number of tourists visiting Grand Cayman with the demand for specific routes correlating to the Districts across which most hotels, apartments and guest houses are based.

Chart 5.2.16 Available Capacity of Hotels, Apartments and Guest Houses by District

(2022, percentage)



Available capacity of hotels, apartments and guest houses has been calculated using information from the Department of Tourism which indicates the number of bedrooms and beds across each room type for an average of 1.4 beds per bedroom and an average of 2 people per bed to arrive at current capacity levels.

Most of the capacity for tourists is spread across George Town, West Bay and North Side increasing demand for public transport in these Districts to attract tourists to the island.

The Cayman Islands has experienced a strong recovery of tourism since partially reopening its borders in October 2021. The stayover tourist numbers for November 2022 were the highest during the 2022 calendar year and resulted in a recovery of 53% of 2019's pre-COVID 19 total arrival numbers since January 2022.

Potential future demand for public transport is expected to increase in line with the stayover tourists.

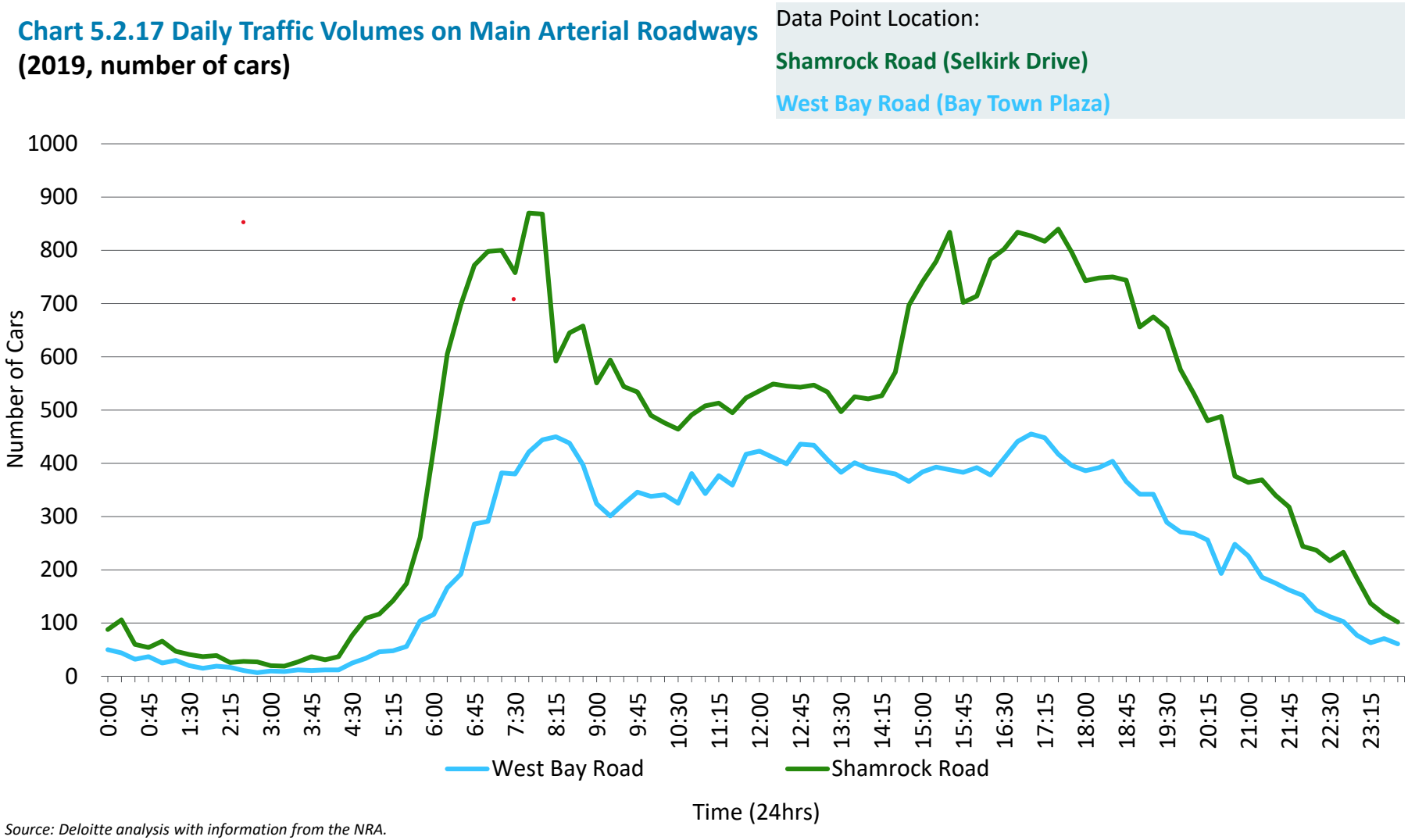
Source: Deloitte analysis with information from the Cayman Islands Department of Tourism Room Stock Report Nov 30, 2022.

5. Current State Analysis of the Public Bus System (continued)

5.2 Analysis of Potential Demand – Traffic Patterns

Daily Automatic Traffic Recorder ("ATR") data was received from the Cayman Islands NRA. Two (2) selected main arterial roadways leading to and from the George Town District were selected and the data for one (1) day during the pre-pandemic 2019 calendar year has been analysed for an indication of normal road traffic volumes. **Data for Easterly Tibbetts Highway was not available,** however the traffic flows heading to West Bay from George Town would also be serviced by the Easterly Tibbetts Highway.

Chart 5.2.17 Daily Traffic Volumes on Main Arterial Roadways (2019, number of cars)



Source: Deloitte analysis with information from the NRA.

6. Enhancements to the Public Bus System

6. Enhancements to the Public Bus System

Suggested Enhancements

There are several enhancements that could be made to the public bus system that if implemented, would improve the passenger experience and encourage higher utilisation. This would facilitate in pulling existing residents out of private motor vehicles onto the public buses and provide visitors with an enhanced island experience. The below enhancements have been compiled through an analysis of the data received, an analysis of public bus systems across other jurisdictions including the Caribbean, as well as the responses received during Deloitte's consultations across stakeholder groups:

Vehicle Type

1. The **size** of the buses should be increased and should include space for personal belongings;
2. Buses could offer free **wifi**;
3. Consistent buses with facilities to accommodate people with **disabilities**, e.g., wheelchair slide access and **designated seating** for the elderly, ill, incapacitated or handicapped;
4. Buses could have **automatic payment** facilities;
5. Buses could allow for **natural light** to allow customers to be productive during trips;
6. Buses could have built in **alert** systems for customers to request the driver to stop at designated bus stops; and
7. Buses with consistent standards of quality should be maintained to appeal to all potential passengers.

Infrastructure

1. Increased number of **official bus stops** providing comfort to customers, shelter, as well as wifi and general information;
2. Implementation of **Bus lanes** which would result in bus trips being faster;
3. More than one (1) **official depot** to improve convenience for customers living in the eastern Districts;
4. Depots should provide **shelter and information** to customers; and
5. Depots, shelters and buses should have **surveillance** cameras, security and be well lit.

Operating Hours

1. Buses should provide **longer operational hours** across all routes to assist travelers throughout the week.

Source: Deloitte analysis with information from the Stakeholder interviews.

6. Enhancements to the Public Bus System (continued)

Suggested Enhancements

Customer Experience

1. Bus operator **behaviour** should display a high level of customer service at all times;
2. Bus operators should consistently allow customers with physical **disabilities** to enter their vehicles;
3. Customers should not be required to pay for **additional** seating needed to store their personal belongings;
4. Customer service employees and information, i.e., bus conductors could be positioned at designated bus stops and depots;
5. Convenient **payment** facilities could be provided online or in advance of using the buses;
6. Bus operators should display consistent levels of **reliability** by arriving at designated bus stops at pre-defined intervals;
7. Consistent **enforcement** could be implemented to ensure that bus operators adhere to PTU laws and routes; and
8. A **hop-on-hop-off** service to transport visitors during the day could be implemented.

Transparency

1. Buses should be equipped with **tracking devices** to allow for live route tracking, arrival times, seat availability, service alerts, etc.;
2. Bus routes and timetables should be **available** to the public, which map routes against prescribed bus stops, depots and travel times; and
3. Publication of consistent **bus fares**.

Source: Deloitte analysis with information from the Stakeholder interviews.

6. Enhancements to the Public Bus System (continued)

Suggested Enhancements

Routes

1. Bus routes specifying designated bus stops should be **predefined** and made available to customers;
2. Bus routes should allow for passengers to be dropped off within **10 minutes** from their doorstep or place of work;
3. Routes should allow for **higher supply** around central hubs during peak demand hours, i.e., George Town/Camana Bay at midday and on weekends; and
4. Existing routes should be planned to allow for sufficient services to **key areas, sub-divisions and residential areas.**

Compliance

1. Technology to be used to enhance the effectiveness of the compliance functions;
2. Compliance could be improved by granting PTU officers the **authority** to issue non-compliance fines, i.e., for licensing, speeding, etc.;
3. Legal **consequences** could be implemented for operators based on serious complaints submitted, e.g., overcharging customers, complex and lengthy routes, etc.

Licensing

1. Omnibus license plates should consistently reflect the correct **vehicle type** based on the license purchased to avoid passenger confusion, i.e., taxi vs omnibus plates; and
2. Faster renewal approvals.

Source: Deloitte analysis with information from the Stakeholder interviews.

Phases 2 – 4

7. Operational Frameworks for a Public Bus System

7. Operational Frameworks for a Public Bus System

Deloitte proposes the following two options to implement a national Government-run public bus service in Grand Cayman:

Option 1: A Government-run public bus system that provides bus services to all districts and communities on Grand Cayman, where all but a few bus routes originate from a single central bus depot. An enhanced community bus service originating from the central depot would also be provided within the community near the central bus depot's location. Other communities that meet several defined factors, such as passenger needs and volumes, may have designated bus loading locations where further limited community routing may originate.

Option 2: A Government-run public bus system that includes a central bus depot and incorporates several strategically placed bus sub-depots within selected communities across Grand Cayman. This proposed option consists of a community transportation hub being the central point for a community bus service, a drop-off and pick-up point for an express bus service to and from a central bus depot, and a park & ride for travellers that want to use the express bus service to the central bus depot but are not interested in using the community bus service (i.e., the public bus service that does not utilise the main arterial roadways).

Critical to the delivery of the identified option for an efficient and sustainable bus service, is a comprehensive and persistent effort by a qualified team of change management professionals given the complexity of the change requirements for the proposed options.

In considering the conversion from the current privately operated bus service to a Government-run service, the CIG would also need to ensure the following elements are in place:

a) Clear and well-defined outcomes

"If a man knows not to which port he sails, no wind is favorable." Seneca

As there is not a documented reason for the change included within the scope for this Project beyond that the change should result in the public bus service being Government-run, it is important that all stakeholders are aligned on what success looks like to help guide the change process. As an example, some of the outcomes of an efficient public bus service can potentially yield the following results:

1. Reduction of traffic congestion during peak travel times on the roadways;
2. Increase the passenger experience including convenience and connectivity;
3. Increased workplace productivity for employees; and
4. Reduce the cost of living for residents on island by the provision of a lower cost transportation option.

It is difficult to determine if a National Government run Public Bus system will deliver any of the outcomes listed above unless it is designed to achieve the stated results, hence having alignment with all stakeholders on the expected outcome of the change is essential.

7. Operational Frameworks for a Public Bus System (continued)

b) A detailed and robust transition plan

A key issue underlying the successful implementation of a public bus service is the efficient transition from the current public bus service to a Government-run bus service. While the existing public transport service may not meet the needs of all passengers, there are still a number of residents and visitors in the Cayman Islands that are dependent on the bus services currently provided.

Any reduction in the service currently provided by the private operators during the transition to a new Government-run public bus framework, has the potential to force current users to find alternative modes of transportation, which in some cases may involve purchasing or using a private vehicle to meet their basic needs. In extreme cases, an extended reduction of the current public bus service could lead to a reduction in workplace productivity and increased cost-of-living pressures, as passengers look to compensate in the absence of low-cost transportation options.

Once the agreed changes to the current public bus system are announced by the CIG, it is reasonable to expect that each private operator would evaluate the impact the announced changes would have on their businesses and respond accordingly. The CIG will therefore have to ensure that the response from the private operators is carefully managed as it is critical for the existing services to be maintained until the Government service is implemented. As a result, a level of intervention may be required by the Government to ensure the desired outcome.

c) Organisational capacity to deliver change

The scope and complexity of the proposed change of the existing privately operated public bus service to a Government-run bus service varies in time, effort and required resources, depending on the approach and the vehicles selected by the CIG to deliver the public bus services in Grand Cayman. In addition to needed changes to the legislative framework governing the public transportation sector, the current organisation structure of the PTU and the proposed organisational structure outlined within this report does not account for those positions within the organisation that would be responsible for driving the required changes throughout. It is ideal to have the existing team members from within the organisation that understands the public transportation sector and knows the stakeholders, involved in the change process to develop a sense of ownership, buy-in and ultimate accountability. Most employees that are the best fit to be involved in the change process are those employees that are fully utilised doing their daily tasks within the PTU as the existing bus services need to continue. The CIG would therefore have to ensure a change programme is included within the transition plan, with the appropriate project management governance in place as needed.

7. Operational Frameworks for a Public Bus System (continued)

d) A comprehensive communication and messaging strategy

A comprehensive communication and messaging strategy is a critical element of the transition plan, given the number of stakeholders and stakeholder groups involved. As it is assumed that the technological capacity of the PTU would be enhanced as part of the wider organisational restructuring, the use of social media and other platforms should be available to assist in the rollout of the communication strategy. An important outcome of the defined strategy is to assist in strengthening the relations with the existing private operators that are still providing the public bus service. In addition, the communications strategy will serve to provide an outreach to those members of the public that are currently using the bus service and those potential future users of the Government run-service.

In addition to the four (4) core elements noted above, the following eight (8) foundational requirements have been identified through feedback received from stakeholders as being essential to the delivery of a public bus service by the CIG.

Critical Success Factors:

1. PTU Restructuring and Enhanced Powers

a) The **full compliment of required PTU staff** will need to be in place to ensure operations and regulatory functions are fully supported from the onset;
b) The PTU needs to undergo **organisational change** to ensure it can **operate and regulate** the public bus system effectively;
c) A specific **scheduling and routing** responsibility to be assigned to a function within the PTU;
d) The PTU needs to have the **authority to enforce** public transport related legislation to ensure appropriate governance and compliance by PTU staff and bus operators; and
e) An **enhanced technology** function will be essential to allow for effective compliance monitoring, transparency of route and schedule information, live tracking of buses and appropriate access to customer service.

2. Cost

Prices set need be **more affordable than owning a private vehicle** and possibly free initially in order to encourage utilisation and inspire changed behaviour.

3. Timing of Operations (24 hours if possible)

Operating times need to be **extended to meet the needs of passengers.**

4. Speed to and from the main George Town Depot

Travel times using the buses **need to be faster than driving motor vehicles** between the Districts and the George Town depot.

5. Accessibility and Connectivity to other destinations

a) The location of District park and ride sub-depots need to be easily accessible; and
b) Bus routes need to ensure **all routes are sufficiently serviced** from the George Town depot and the District park and ride sub-depots.

6. Safety, Security and Timeliness

Bus stops, bus depots and the buses themselves need to be **safe and reliable** to ensure initial uptake.

7. Adequate Space and Comfort for all Passengers

a) The buses need to be **comfortable, safe, clean and quiet** to pull drivers out of their vehicles; and
b) Buses and bus stops need to have a **high level of comfort to entice passengers** out of their private motor vehicles.

8. Operational Framework Option 1

8. Operational Framework Option 1

Option 1: A Central Bus Depot

This proposed approach towards the delivery of a national Government-run public bus service is an approach seen in several smaller countries across the Caribbean region elements of which are currently in place in Grand Cayman. Option 1 involves the use of a single central bus depot where most buses originate from and travel to defined routes within the communities across the island. An enhanced community bus service originating from the central depot would also be provided within the community near the central bus depot's location. Other communities that meet several defined factors, such as passenger needs and volumes, may have designated bus loading locations where further limited community routing may originate.

In selecting this option, it is assumed that the organisational and functional gaps identified within the PTU have been substantially addressed with the key staffing positions within the organisational structure filled (please see section 10 of this report for further details).

The **core drivers** for selecting this approach as an option for the delivery of a national Government-run public bus service are:

a) **Complexity of implementation; and**

b) **The strong potential for a rapid increase in passenger utilisation once fully implemented.**

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8. Operational Framework Option 1 (continued)

a) Complexity of implementation

The complexity of the implementation of this selected approach can range from **Medium** to **High.** Once the foundational issues within the PTU are addressed and is dependent on the Government's appetite for the full bus service to be implemented in a phased approach with the introduction of electrical buses coming in subsequent phases.

With this approach several key elements for success in the delivery of a national bus service that originates from a central depot are already in place within the PTU and functional with the private bus operators, however, further enhancements for better alignment with the travelling public is required.

As previously mentioned, a core element for success is the **redesigned routing**, **scheduling** and **hours of operations**. While further data is needed to better understand passenger travel needs within communities across the Cayman Islands, it is known that current routing for the existing bus service is on the main roadways throughout Grand Cayman with limited enhanced routing within some communities in central George Town and in other communities in West Bay. Other communities within the wider George Town area, Red Bay, Prospect, Savanah, Newlands, Northward, Beach Bay and Bodden Town are not adequately serviced by the current bus routing. The addition of several new routes, or modifications to the existing routes, by the PTU with adequate and transparent scheduling with increased operating hours would complement and enhance the existing routes that are known and used by the current bus travellers on the island. It is advisable for the Government to acquire the services of a routing Subject Matter Expert ("SME") to assist with mapping the new or enhances routes within the relevant communities. As existing routes (some with modifications) will remain, the CIG can use the number of seats currently supplied by the private operators with the addition of the seats needed to service any new routes within the communities, as a benchmark starting point for the number and size of buses needed to deliver the bus service on the designated routes. Additional seats or drivers may be needed to deliver the bus services during the enhanced operational hours; however, it is important for the CIG to monitor and analyse the passenger volumes on the defined routes. Once the routing and scheduling has been defined, the CIG would need to define the preferred approach for the delivery of the service. The elements to be considered here are the type, number and size of the buses needed along with the frequency and length of trips to and from the central depot.

8. Operational Framework Option 1 (continued)

After the completion of the analysis to define the routes, scheduling and hours of service delivery, the CIG would be able to determine the following:

01 **The number of staff needed to operate and maintain the vehicles**

02 **The size and location of an additional site to store, charge and maintain the Government fleet when not in use**

03 **The specifications of the vehicles and the time and cost needed to procure and have them operational**

04 **A communications strategy**

05 **The size and possible locations for the central bus depot**

06 **Any safety and security concerns**

8. Operational Framework Option 1 (continued)

Complexity of implementation (continued)

Other considerations concerning the implementation of Option 1 include:

a) The specifications, procurement and delivery of the vehicles used by the CIG to deliver the bus service throughout Grand Cayman is a key activity that contains variables and risk outside the control of the CIG that can impact timing and cost (as further detailed in Phase 5 of this report). The CIG can take steps that will minimise the impact of these risks via the types of vehicles used to deliver the services and how they are supplied;

b) Other variables that may present a risk to the implementation of the Government-run bus service is the availability of the staff needed to drive the fleet of buses and delivery of the training by the PTU to ensure that they bus drivers and depot staff are trained to the desired passengers service levels set by the CIG;

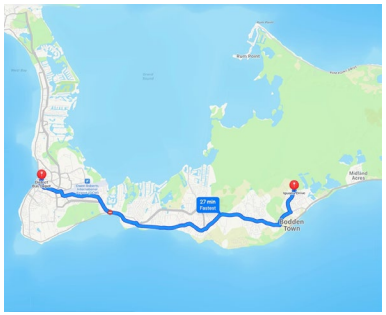
c) The current Government bus depot in central George Town can also be initially used as the staging area for buses that service the various routes across the island, however with the addition of new routes and the extra buses to service those routes along with possible changes in scheduling with extended operating hours, the current location may need to be reconfigured to accommodate the increased volume of traffic, or a new location may be needed to meet the Passenger Experience Standards set by the PTU and to comply with the health and safety requirements of the Cayman Islands; and

d) The fleet storage and maintenance requirements can be flexible depending on the types and number of vehicles used to deliver the bus service. Should the CIG elect to introduce EVs within the fleet at the start, the storage site and charging stations will take longer time to prepare and become operational at an increased cost as compared to buses utilising other propulsion systems.

8. Operational Framework Option 1 (continued)

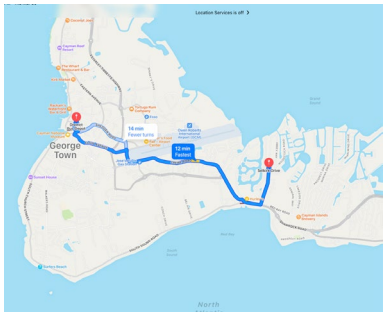
Potential Community Routes (to the Eastern Districts)[2]

Figure 1.1 Map of Potential Community Bus Route 1



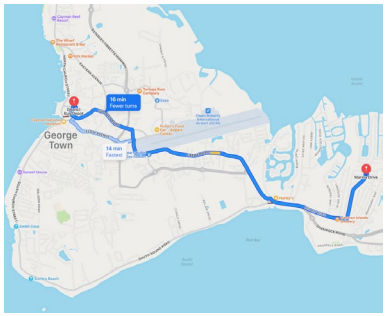
A bus service is needed within Lookout Gardens and the surrounding area within Bodden Town. The current route is along the costal Bodden Town Road.

Figure 1.2 Map of Potential Community Bus Route 2



A bus service is needed within the Red Bay area along Selkirk Drive and surrounding area as the current bus route is along Shamrock Road.

Figure 1.3 Map of Potential Community Bus Route 3



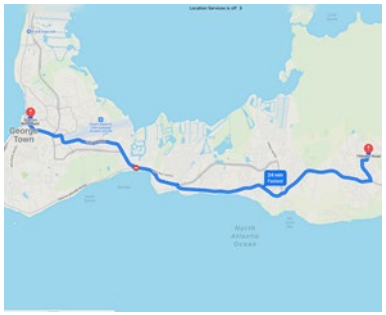
A bus service is needed along Marina Drive and the surrounding Prospect area as the current bus route is along Shamrock Road.

[2] *Please note potential destinations/stops along the proposed routes are out of scope for this Project.*

8. Operational Framework Option 1 (continued)

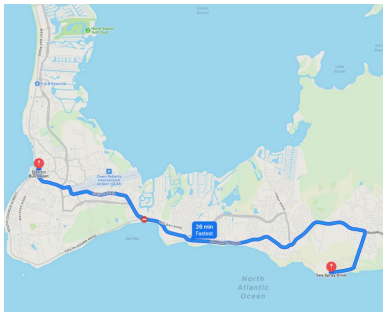
Potential Community Routes (to the Eastern Districts)

Figure 1.4 Map of Potential Community Bus Route 4



A bus service is needed along Northward Road and the surrounding Northward community, as the current route is along Shamrock Road.

Figure 1.5 Map of Potential Community Bus Route 5



A bus service is needed along Beach Bay Road and the surrounding Beach Bay Community as the current route is along Shamrock Road.

8. Operational Framework Option 1 (continued)

Potential rapid increase in passenger utilisation

While the rapid increase in passenger utilisation was not defined by the Ministry as an intended outcome of a Government-run public bus service, an assessment was conducted to better understand the needs of the travelling public in Grand Cayman and why people would select a private vehicle for transportation and not the public bus system. The travelling public assessment identified three (3) core potential passenger groups within Grand Cayman:

Residents who currently use the public bus services in Grand Cayman.

This group can be further broken down into two (2) additional groups:

a) Residents who are considering buying a private vehicle because the current bus service does not meet their transportation needs; and

b) Residents who are not considering buying a private vehicle but utilise a private vehicle at times when needed.

Residents who have existing private vehicles currently in operation on the roadways in Grand Cayman. (There are **58,311** licensed motor vehicles on the roadways as of February 2023[1]). This group can be further broken down into two (2) additional groups:

a) Residents who are unlikely to use the public bus services; and

b) Residents who would prefer to or are likely to use the public bus services if there was better alignment of the service to their travelling needs.

Visitors to Grand Cayman whose transport needs are met by:

a) Taxis (299 licensed taxis in the Cayman Islands as of February 2023);

b) Car rental companies (**140** licensed rental car companies in the Cayman Islands as of February 2023);

c) Public Bus Services; and

d) Friends with private vehicles.

An analysis of each core potential and current user group indicates that those residents with a private vehicle who are unlikely to use the public bus service for reasons such as culture, school drop-off and pick-up, etc., would be the most difficult to move from their private vehicle onto the public bus service, however those residents who own and use a private vehicle mainly because the current public service does not meet their transportation needs, are likely to utilise public transport if the service is enhanced and upgraded. In the second group, those residents who currently utilise the public bus service but are considering buying a private vehicle are also likely to continue to use the public bus service should it be enhanced and upgraded. Those who are not considering buying a private vehicle but utilise one when needed, are less likely to use a private vehicle if the service in upgraded. Also, as visitors come to the Cayman Islands for a short period of time, their transportation needs, and available options differ to the residents of Grand Cayman. An enhanced public transport service will likely increase passenger utilisation, especially with those visitors that are staying in North Side and East End and are looking for less expensive options to travel into George Town and the West Bay Road peninsula.

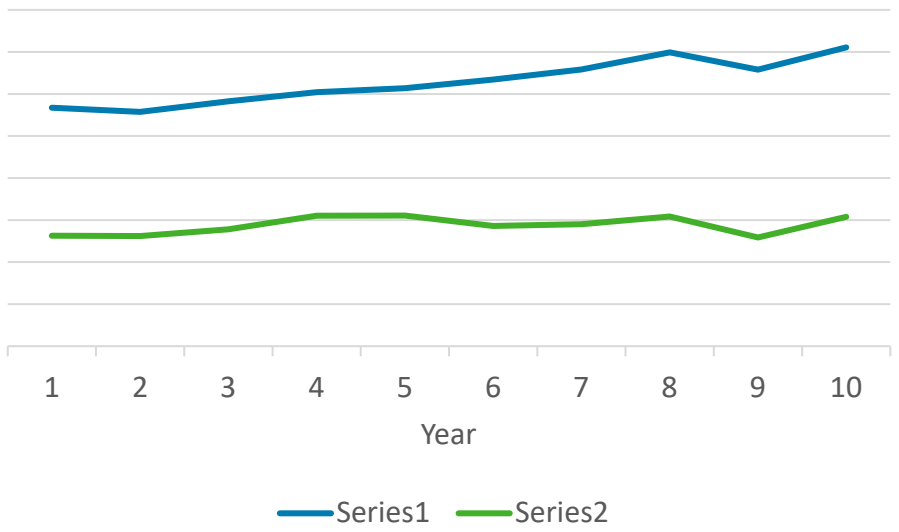
8. Operational Framework Option 1 (continued)

Potential rapid increase in passenger utilisation (continued)

As part of the analysis for Option 1, Deloitte examined the correlation between the increase in motor vehicles on the roads in the Cayman Islands and the increase in the population over the last 10 years.

Given the low incremental population growth rate (2.4%) resulting from the births within the Cayman Islands, the majority of the population growth can be attributed to people coming to the country, specifically those on work permits. Of the 4,200 increase in work permit holders between 2020 and 2021, 70% of this increase are within four (4) industries within the Cayman Islands.

The information provided therefore indicates that the increase in private vehicles to the country is a result of people who have purchased vehicles upon arrival or shortly after arrival and possibly once it is discovered that the public bus service does not meet their needs.



8. Operational Framework Option 1 (continued)

Potential rapid increase in passenger utilisation (continued)

Feedback received through our stakeholder engagements validates the presence of those persons within the local population who would rather **not** own and operate a vehicle if there was a public bus system that catered to their needs. With an enhanced public bus service those people would abandon their cars (or reduce their usage) and use the public bus system saving money as a result.

In an October 2022 survey sponsored by the Ritz Carlton Grand Cayman, responses from 1007 hotel employees from four (4) of the largest hotels on West Bay road indicated **that 916 responders stated that they would use public transportation if it were reliable** and available. **602 of these employees has access to reliable transport (private vehicles).**

The introduction of an enhanced bus service run by the CIG would be attractive to those persons in Grand Cayman who do not want a vehicle for economic or other reasons. In determining this as an option for the CIG we have considered the following:

1. **Demographic makeup of the Cayman Islands**:
    a) Numbers – **70% of the work permit holders** (over 20,000 people) fall within a specific demographic profile. An effective strategy would therefore have a far-reaching impact;
    b) Socioeconomic profile – **Average earnings is below KYD$3,000 a month,** resulting in a smaller proportion of digressionary income to allocate to more costly transportation options; and
    c) Transportation needs – **the current public bus system does not meet the needs of this demographic sector,** hence the positive correlation between the growth on work permits in this sector and the growth in the number of vehicles on the road.

Table 8.1 Analysis of Work Permit Holders

Industry	Number of Work Permits	Average Length of Work Permit (Years)	Average Advertised Income (KY$ Annualised)	Number of Work Permit Holders with Dependents
Construction	5,368	1.5	$36,115	152
Wholesale Retail and Mechanics	3,607	1.5	$27,534	47
Accommodation and food service	4,118	1.6	$22,475	142
Administrative and support service	3,464	N/A	$27,414	N/A
Activities of household as employers	3,969	2.1	$22,354	49
TOTAL	**20,526**			**390**

Source: The Cayman Islands' Compendium of Statistics 2021 and the Ministry of Border Control & Labour.
Source: Marc Langevin.

8. Operational Framework Option 1 (continued)

Potential rapid increase in passenger utilisation (continued)

2. The top five (5) most popular (make and model) licensed on the roads in the Cayman Islands. As per Department of Vehicles and Drivers Licenses the following table is the five (5) most popular (make and model) licensed on the roads in the Cayman Islands**:**

Table 8.2 Top 5 Most Popular Vehicles Licensed

Number of Licensed Vehicles (As of Feb 2023)	Make/Model	Percentage over 10 years old
5,916	Honda Fit	75%
2,612	Honda CRV	74%
2,074	Honda Accord	95%
1,168	Kia Sportage	20%
1,139	Honda Civic	86%

Source: The Department of Vehicle and Drivers' Licensing

The Honda vehicles noted in the Table 1.2 are well known for their reliability and durability over the years and have earned the reputation of being a good all-around value vehicle in the automobile industry (the Honda Accord has been on the Car and Driver 10 Best list a record 36 times since the list started in 1983 and over 30 million Honda Civics have been sold since inception globally). Their numbers and quality are reflected in the number of vehicles on the Cayman roads. **The price point for these vehicles also makes them attractive to people that are in need low-cost reliable transportation.**

8. Operational Framework Option 1 (continued)

Potential rapid increase in passenger utilisation (continued)

3. Estimated annual transport costs

A high-level calculation of the first-year cost (in KYD) to purchase and operate a 2012 Honda Fit indicates the following:

Table 8.3 First Year Costs to Purchase a Honda Fit

First Year Activities	Cost (KYD)
Purchase:	
Vehicle Price	7,000
Maintenance and Operations:	
Insurance	350
Vehicle License	180
Vehicle Inspection	35
Maintenance	250
Gas	700
Total	**KYD 8,515**

Total first year cost to the owner is **KYD 8,515**, or about **40%** of the average annual income of an 18-month work permit holder in the **Accommodation and Food industry** (this calculation does not include any salvage value received on the disposal of the vehicle).

Source: The Department of Vehicle and Drivers' Licensing; EcayTrade and Deloitte analysis.

The estimation of the annual transportation costs for that same worker in the **Accommodations and Food industry** who lives Bodden Town and is on an 18-month work permit, if they were to use the Public Bus services is as follows:

Table 8.4 Annual Transportation Costs

Annual Cost of Transport for Employment:	
Cost per Trip	KYD 2
Number of trips during the weekdays for employment	20
Number of weeks employed	48
Total annual cost of transport for employment	**KYD 1,920**

Annual Cost of Transport for Other Needs:	
Cost per Trip	KYD 2
Number of trips per week	8
Number of weeks employed	48
Total annual cost of transport for other needs	**KYD 768**

8. Operational Framework Option 1 (continued)

The approach taken in Option 1 is to start by targeting those persons in Grand Cayman who do not want a vehicle for economic or other reasons. In considering this as an option for the CIG we have considered the following:

a) Cost and Speed of Implementation

1. The main focus of the first wave of activity is to **enhance the Governance and effectiveness of the existing PTU and the PTB** to make the public bus services more aligned to the needs of an identified demographic group and other residents on the Island. **While this strategy is also required for Option 2: A Central Depot with Community Sub-depots (detailed further in the Project report), the implementation of this Option does not require the completion of any significant capital projects (e.g., EV bus purchases, sub-depot fit-out or road works); and**
2. The relative cost to implement Option 1 is less than Option 2. It should be noted that while Option 1 requires an upgrade of the current public bus system run by private operators, it is not envisioned to be at the same level of the enhancement needed for Option 2.

b) Cultural makeup of the country

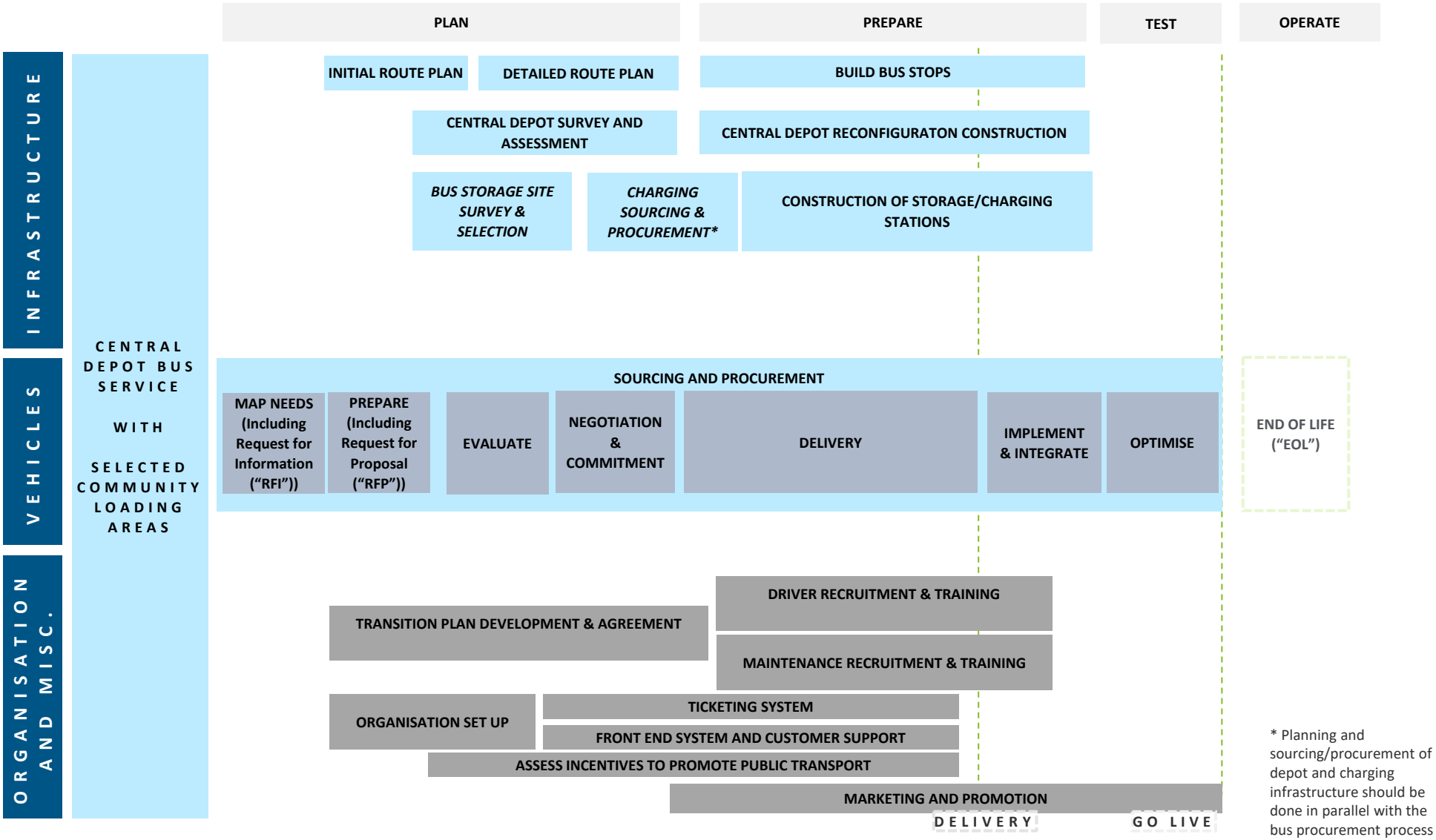
As a critical success factor is the change of culture and attitude towards Public Transport in the Cayman Islands. It will be difficult to pull people out of cars into a public bus unless there is a compelling benefit to them to do so. It will take time to deliver an exhaustive list of benefits such as cost, convenience, safety, connectivity and speed, however **as each benefit is rolled out, those people within the Cayman Islands that are accustomed to using Public Transport in their home country, are more likely to move to public transport once the service is enhanced.**

Table 8.5 The following table is the list of the core activities required for Option 1 with an estimate of time and level of effort need for the Government to implement

	Activity	Time (Months)	Level of Effort/Required Resources
1	PTU restructuring with enhanced powers	12	Medium to High
2	Enhance the Current Bus Service: a) Expand timing of operations and scheduling; b) Routing and Transparency; c) Enhanced Passenger Experience; d) Marketing and Communications; and e) Safety and Security Improvements.	9 – 18	High
3	Bus Procurement and delivery (dependent on Buses used)	8 – 15	Medium to High
4	Bus Drivers and Maintenance team onboarding and training	6 – 8	Medium

8. Operational Framework Option 1 (continued)

Implementation Road Map: Option 1: A Central Bus Depot



* Planning and sourcing/procurement of depot and charging infrastructure should be done in parallel with the bus procurement process which can be procured together.

9. Operational Framework Option 2

9. Operational Framework Option 2

Option 2: A Central Depot with Community Sub-depots

This option considers a Government-run semi-express public bus service from a centrally located bus depot to a number of strategically placed bus sub-depots within selected communities across Grand Cayman. The functionality of each sub-depot will be developed in phases and would first start as a community Park and Ride terminal where passengers would be able to drive their cars to the sub-depot to take a semi-express bus into a centrally located bus depot to then be able to catch a connector bus to their destination.

It is therefore important to note that for this option to be successfully implemented the connector bus network within the core tourist and business and employment district, consisting mainly of the George Town and the lower Seven Mile Beach Corridor area, would need to be effectively functional as to enable passengers to still have the ability to get to where they need to go throughout the day without any significant added expense and reduction in convenience. The connector bus network would need to be designed to provide the following items:

- Consistency
- Extended operating hours with adequate capacity during peak hours
- Ease of payment systems for all passengers
- Enhanced routing to high demand locations
- Strict scheduling as passengers may have limited time (use of technology)
- Comfortable with security and safety a priority
- Adequate shelter from the elements for waiting passengers

Once the semi-express service into George Town and the connector network is functioning as intended, the operations of each sub-depot would be further enhanced to incorporate the development of a community bus network that will enable further bus connectivity within the relevant communities outside of central business and employment areas in Grand Cayman.

9. Operational Framework Option 2 (continued)

This operational model was selected as an option for the following reasons:

a) It will **reduce the volume of private vehicles** travelling into and out of the main employment and business areas utilising the main roadways at peak hours (**58,311** licensed vehicles as of February 2023);

b) It will **better cater to the transport needs within the various communities** once fully implemented; and

c) It is **scalable and adaptable** to the changes in the strategic transportation needs of the country over time.

A version of this operational model can be seen in other locations around the world. The public bus service in Barbados for example, utilises five (5) strategically placed bus terminals and two (2) loading areas. Each terminal and loading area services a combination of Transport Board (Government-run) buses, minibuses and route taxis on defined routes authorised by the relevant authorities.

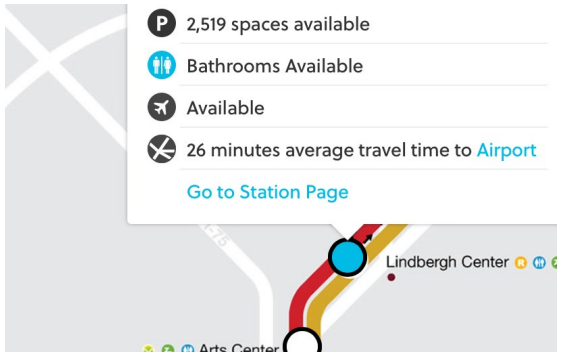
Fairchild Street Terminal

Princess Alice Terminal

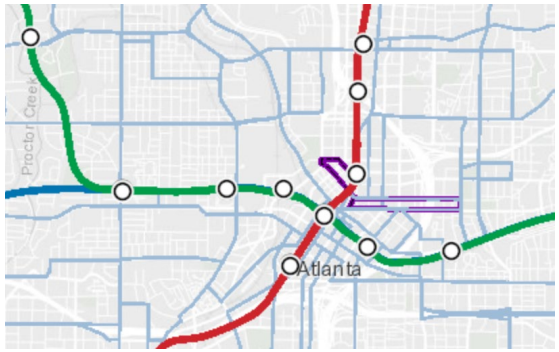
Speightstown Terminal

Another version of this operational model can be seen in Atlanta Georgia in the United States, where a simple rail system utilises a north-south rail line and an east-west rail line, with the intersection point being downtown Atlanta. Each rail line has several stations that has a defined number of parking stops at each location along with being the origination point for a robust community bus service.

A map of Atlanta's rail system



Atlanta's interactive mapping system shows parking availability in real time.



A map of Atlanta's community bus service routes

9. Operational Framework Option 2 (continued)

While this option will first target those persons that are travelling to work utilising a private vehicle, it does not address the needs of those people that do not have a vehicle and are currently relying on the existing public bus services. It is therefore important that relevant and impactful enhancements are made to the existing public bus service during the transition period to better align the privately operated service to meet the needs of the travelling public. The proposed enhancements outlined below are aimed at reducing the potential of existing passengers purchasing a private vehicle to satisfy their basic transport needs.

Needed temporary enhancements to the current private operator bus service

a) Expand timing of operations and scheduling:

The current private bus services operate on a schedule that does not align to all passenger needs. As per the PTU, the operators are scheduled to commence their services at 6:00 a.m. and terminate their services at 7:00 p.m. In addition, there is a reduced schedule on the weekends especially on Sunday, as private operators decide if they will work or not. To avoid this issue, the defined expanded operating hours can be a condition of the license provided by the PTU with systems installed that will monitor and track compliance with the terms of each operator's agreement with the PTU.

b) Expanded routing enabling convenient access to the service and transparency:

The current routes defined by the PTU has the buses passing thorough parts of George Town and on the main roadways towards West Bay and towards East End and North Side. The buses however are not routed through key residential communities within the districts or essential locations within George Town resulting in passengers having to walk to areas where they can catch the bus. The walking distance can be lengthy at times and can be impacted by the weather or subject to safety and security issues. Therefore, an expansion of routing through the main arterial roads within various communities (e.g., Selkirk Drive, Marina Drive, Beach Bay Road and Northward Road and the Bodden Town Bypass) is needed. The lack of knowledge of the location of the buses on their defined routes is also an issue for passengers as they have expressed frustration in waiting an extended amount of time for a bus which may eventually pass them full or not arrive at all. The technology currently exists to track the location of all buses using an application that can be loaded on a personal mobile device, which should be offered to the travelling public for greater transparency in bus locations at any time.

c) Enhanced passenger experience:

Every bus operator should be required to attend mandatory annual customer service training with systems established by a compliance team of the PTU to ensure the customer service standards established are maintained.

9. Operational Framework Option 2 (continued)

Needed temporary enhancements to the current private operator bus service (continued)

d) Safety and security:

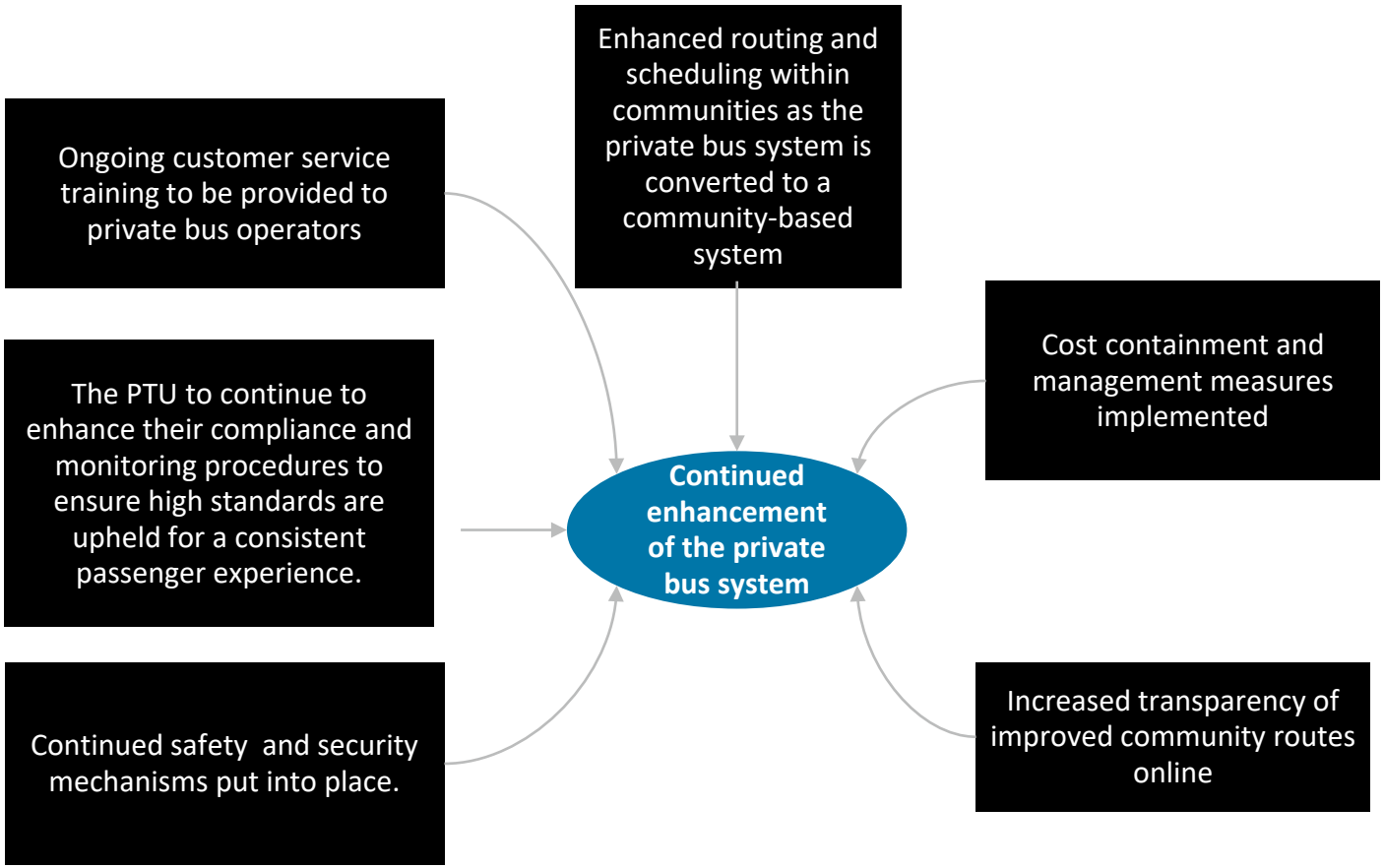
With the expanded hours of service, it is important that the travelling public have a strong sense of safety and security when utilising the public bus service, especially at night. Expanding routes within communities will reduce the time passengers will need to walk to get to their final destinations, however steps may need to be taken by the CIG to ensure all passengers are not exposing themselves to any additional risks by selecting public transportation over any other means of transportation.

e) Cost to passenger:

1. It is essential that the monthly cost to the public of utilising the public bus service is maintained below the cost to own and operate a private vehicle (see calculation on page 67), as the full benefits of an enhanced bus service will not be delivered to the public all at the same time. As a result, the cost to the passenger may have a heavier weighting in a person's decision to purchase a car or continue to use an existing car but this weighting will reduce as other benefits such as connectivity or speed become available;
2. Maintaining the cost to passengers, however, will be difficult in the current inflationary climate seen within the global economy. Access to capital has become more difficult because of the rising interest rates on borrowing, and the operating cost to the bus operators have also increased as seen in increased fuel prices and the wider cost of labour within the Cayman Islands. The current reported behaviour by some operators (i.e., racing each other to get the next passenger or not completing their routes in the Eastern Districts) can be attributed to their desire to maximise their passenger loads per trip (giving them increased income) while reducing their operating costs, resulting in greater profits;
3. A higher utilisation per trip resulting from passengers choosing the public bus over a private vehicle would give operators additional income, however higher standards of service levels required by the PTU along with greater enforcement over route compliance will result in increased operating cost for some operators. It is difficult to determine what the overall financial impact of these changes will be for the public bus operators, along with the changes to the current supply in the number of seats licensed for public transport, as some operators may not be able to meet the new quality standards or may not find operating a public bus financially viable; and
4. The CIG will need to monitor the impact of new standards carefully and may have to consider some kind of intervention to ensure the cost to the passenger is kept low and the supply of buses are maintained to service the increased number of passengers resulting from the enhancement to the public bus services during the transition period.

9. Operational Framework Option 2 (continued)

Continued enhancement of the passenger experience within the private bus system

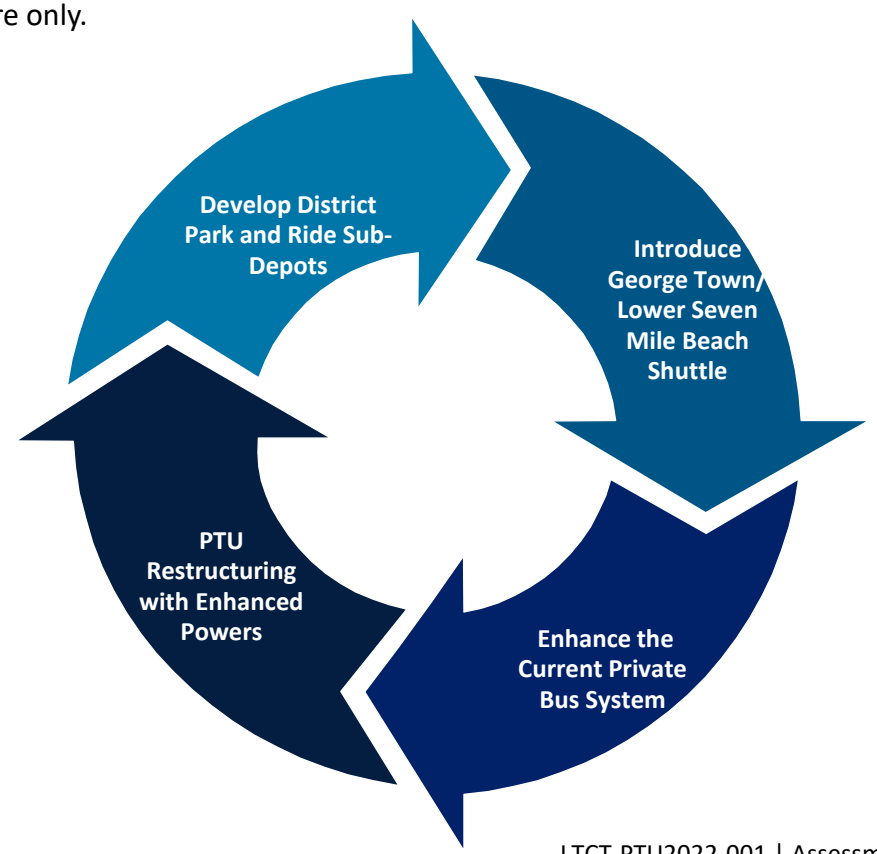


9. Operational Framework Option 2 (continued)

Implementation Steps

The implementation plan developed for the initial phase that includes the district community sub-depots and George Town and West Bay road corridor community bus service will be heavily influenced by locations selected for each district sub-depot and the options selected by the CIG for the buses used for the actual delivery of the services. A high-level implementation plan is included in the baseline case for the introduction of a Government owned and operated electronic vehicle ("EV") bus fleet **(Phase 5 of this Project)**, with 30 Buses of 60 feet for the District-to-District semi-express service, along with 10 buses of 40 feet for the George Town and West Bay road corridor. The initial first cost estimates for the implementation of this baseline approach are anticipated to be in excess of KYD$25 million and can take up to 24 months to fully implement. These costs do not include the district sub-depot build out as these costs can be material depending on the locations selected within each district. The total cost and timing needed to implement the baseline solution outlined in the report are influenced by the EV buses used and the required charging infrastructure. The total cost needed to implement the bus service can however be reduced by as much as 50% should the Government elect to use the same size buses with a different propulsion system. As an example, a 60-foot bus that uses diesel can costs up to KYD$180,000 per bus (compared to KYD$500,000 per EV bus) without the charging infrastructure needed for each electric bus. It should be noted that this is an estimate of costs of the buses and bus infrastructure only.

Sub-depots in each District for passengers to park their vehicles and travel into and out of the George Town depot on an **express Government-run bus service.**



To **ensure connectivity** for residents who travel into George Town on the public buses as well as for visiting tourists.

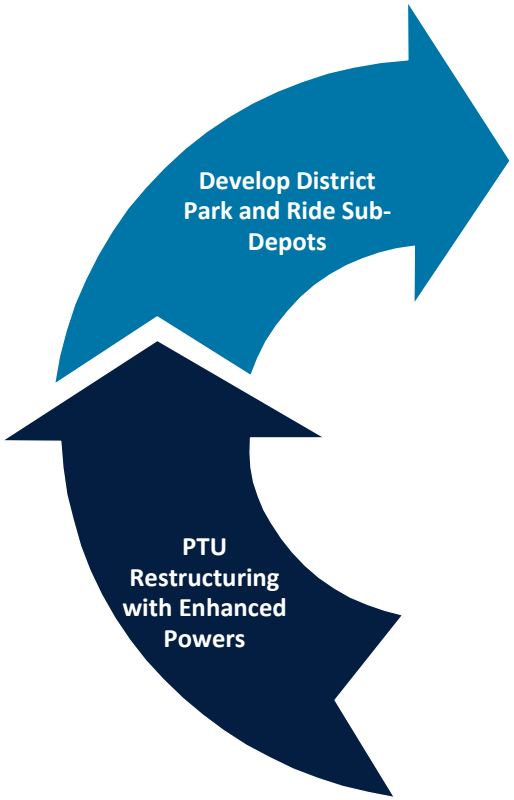
The effective operations of the PTU and associated regulatory compliance, including Government bus operators, will need to be an **immediate focus to ensure that services are enhanced, and enforcement of customer experience standards and safety mechanisms** are adhered to.

See Section 10 of this report for further details

During transition period the **current private bus system will remain island wide** with marked improvements to encourage an increase in utilisation by residents.

9. Operational Framework Option 2 (continued)

Develop District Park and Ride Sub-Depots



In order to identify possible land on which to develop District Park and Ride Sub-Depots, Deloitte met with the CIG Lands and Survey Department to identify undeveloped parcels of land which may be suitable. **While we recognise that a few undeveloped parcels exist across Grand Cayman, our main focus has been on CIG owned land for two (2) reasons:**

a) There are **lower costs** associated with the development of land already owned by the Government as opposed to acquiring land that is privately owned; and

b) **Faster speed of implementation** can be achieved should the CIG not have to spend the time sourcing privately owned land parcels, undergoing negotiations as well as the legal processes involved in land acquisition.

When identifying the most suitable CIG owned land parcels for the potential development of District Park and Ride Sub-Depots, the following factors have been taken into consideration:

a) Size of Land Parcels

1. Government owned parcels need to have sufficient space to allow for the required parking space for motor vehicles, buses to pull into, and passengers to have sufficient shelter available when they are waiting for scheduled buses; and
2. Park and Ride Sub-Depots will need to be an appropriate size to accommodate the expected demand from each District which can be indicated by the population density by District and the number of motor vehicles owned within each District as per the Cayman Islands' 2021 Census of Population and Housing Report.

b) Location and Accessibility

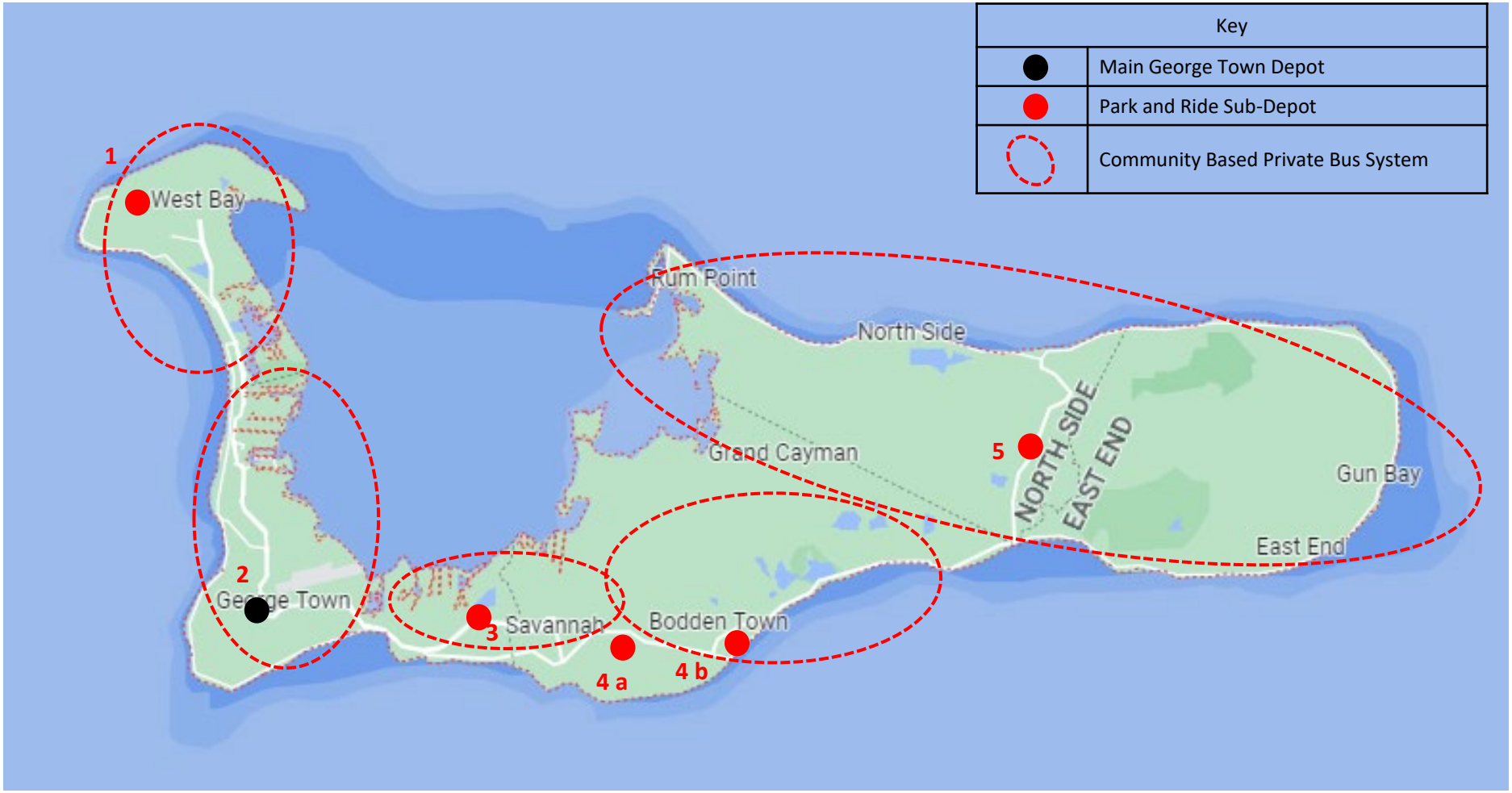
1. The vicinity of each land parcel to other unutilised Government owned land was a deciding factor. Neighbouring parcels if developed into Park and Ride Sub-Depots could be expanded into this space if needed should there be no plans to utilise allocated land;
2. The accessibility of the land parcels to main roadways may have an effect on timing and effort required to develop as any land without access to main roadways may need to have existing roads extended; and
3. Existing surrounding infrastructure may render some identified land more appealing to develop as the Sub-Depots could share pre-existing amenities.

9. Operational Framework Option 2 (continued)

Develop District Park and Ride Sub-Depots (continued)

The figure below shows the future state proposed five (5) potential locations that we have identified as suitable for the development of Park and Ride Sub-Depots, as well as the proposed community based private bus routes and the George Town/ Camana Bay Shuttle.

Figure 1 Map of Potential Locations for Park and Ride Sub-Depots



9. Operational Framework Option 2 (continued)

Develop District Park and Ride Sub-Depots (continued)

District Park and Ride Sub-Depot 1	
District/ Area Serviced	West Bay
Location	Next to Scholars Park and the Sir John A Cumber Primary School
Size	20 acres

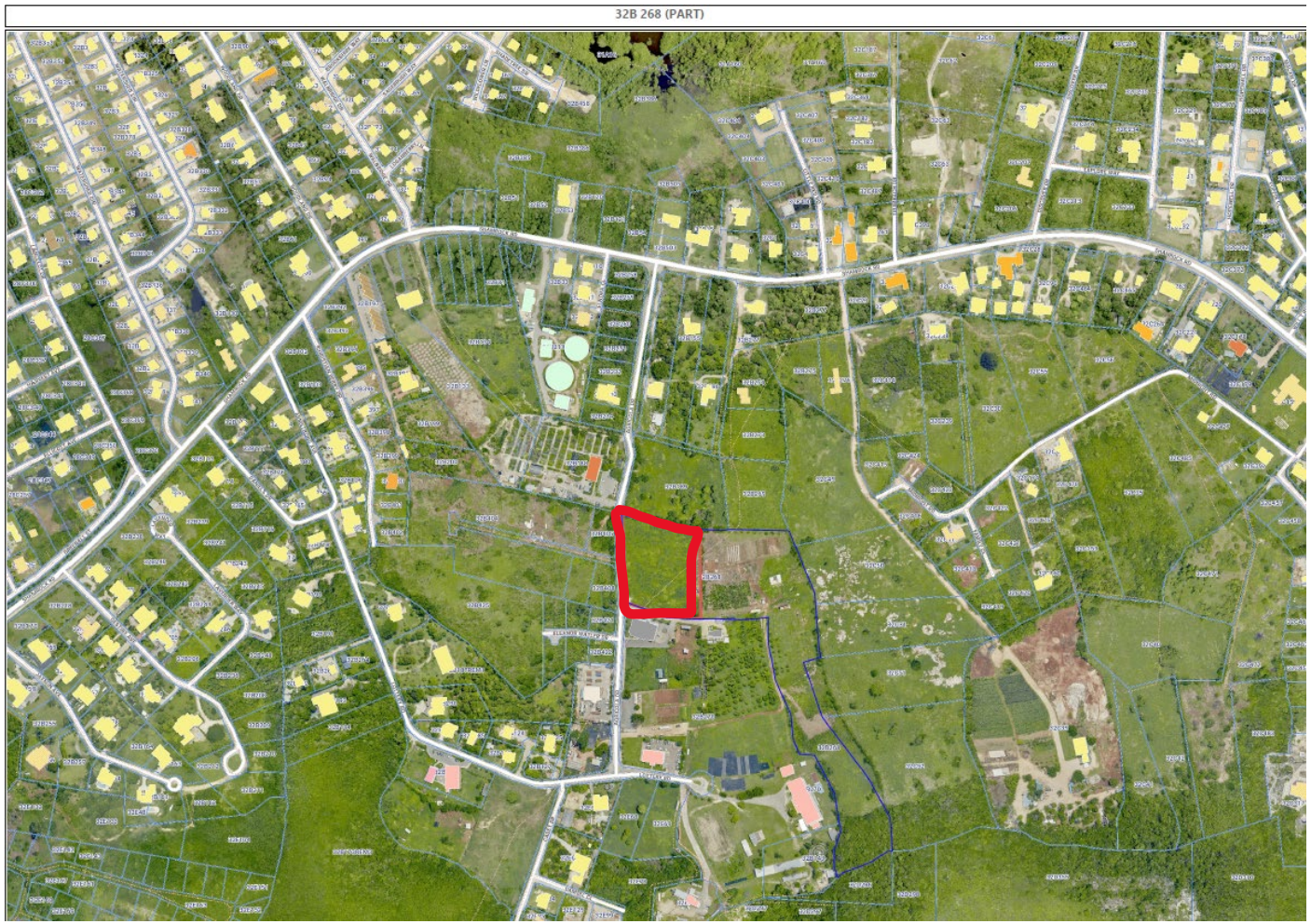
9. Operational Framework Option 2 (continued)

Develop District Park and Ride Sub-Depots (continued)

District Park and Ride Sub-Depot 3	
District/ Area Serviced	Red Bay/Prospect/Savannah /Newlands
Location	Next to Red Bay Primary School
Size	5 acres

9. Operational Framework Option 2 (continued)

Develop District Park and Ride Sub-Depots (continued)



District Park and Ride Sub-Depot 4 a	
District/ Area Serviced	Savannah/Lower Valley/Northward
Location	To the right of Agricola Drive
Size	2.5 acres

There is currently no unused Government owned land available within the Savannah/ Newlands areas, thus we have identified one (1) 10-acre parcel to the right of Agricola Drive which could be used to service these areas.

9. Operational Framework Option 2 (continued)

Develop District Park and Ride Sub-Depots (continued)

District Park and Ride Sub-Depot 4 b	
District/ Area Serviced	Bodden Town/Northward/Beach Bay
Location	Near the Police Station
Size	3 acres

9. Operational Framework Option 2 (continued)

Develop District Park and Ride Sub-Depots (continued)

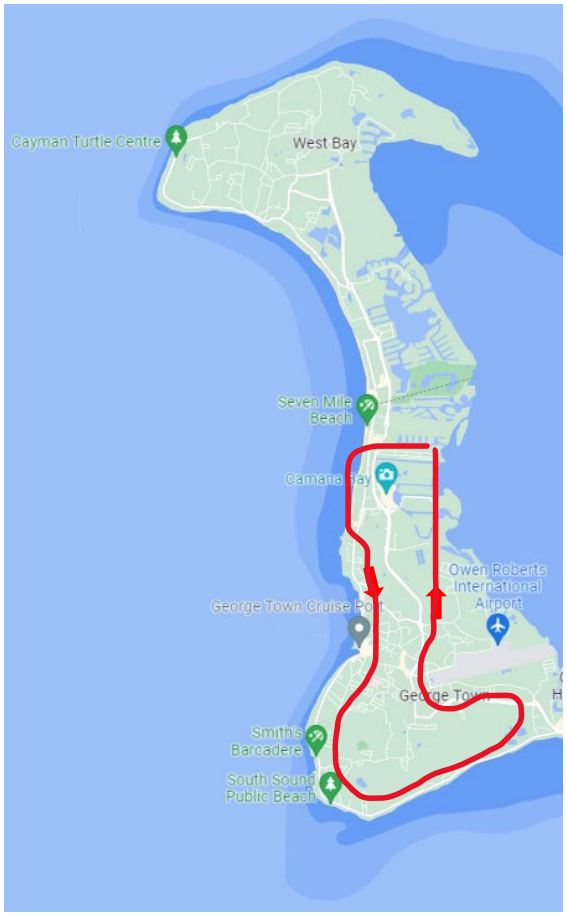
District Park and Ride Sub-Depot 5	
District/ Area Serviced	Frank Sound/North Side/East End
Location	Along Frank Sound Road behind the Fire Station
Size	2 acres

9. Operational Framework Option 2 (continued)

Develop District Park and Ride Sub-Depots (continued)

introduce George Town/ Lower Seven Mile Beach Shuttle

To **ensure connectivity** for residents who travel into George Town on the public buses as well as for visiting tourists.



This activity is to address the connectivity issue. Without a private vehicle to use during the day once passengers reach their primary destination, they need to still have the ability to get to where they need to go throughout the day without any significant added expense and reduction in convenience.

9. Operational Framework Option 2 (continued)

Develop District Park and Ride Sub-Depots (continued)

Through a review of the previous George Town Shuttle initiative implemented in 2020, the following elements were identified as key for success:

01 **Consistency**
The shuttle service should provide a consistent service to residents and visitors allowing passengers to hop-on and hop-off at their will at defined stops on the route. Buses should arrive at stops at regular intervals for example every 15 minutes for a consistent service throughout peak hours.

02 **Enhanced routing to high demand locations**
The shuttle route and stops should consider key services such as supermarkets, hospitals, schools, bars and restaurants, shops, banking facilities and Government offices to maximise connectivity and convenience for passengers.

03 **Extended operating hours with adequate capacity during peak hours**
Operating hours should meet the needs of residents and visitors during weekdays and weekends. To encourage utilisation at the onset, a 24-hour service could be provided with increased capacity during peak hours.

04 **Strict scheduling as passengers may have limited time (use of technology)**
The shuttle buses should be easily tracked using technology by passengers with an uninterrupted route ensuring that passengers do not have long wait times at any shuttle stop before being able to hop-onto the shuttle.

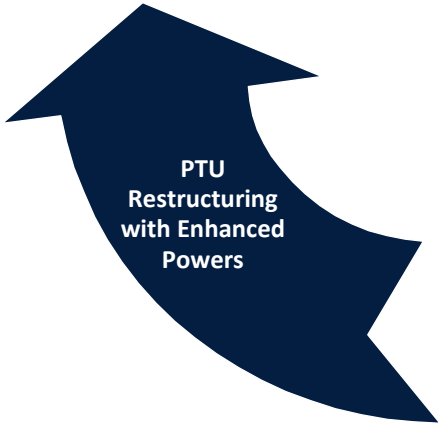
05 **Adequate shelter from the elements for waiting passengers**
Shuttle stops should provide adequate sun and rain shelter for passengers. It is important that the stops be comfortable to encourage utilisation.

06 **Ease of payment systems for all passengers**
Passengers need to be able to pay conveniently online in advance and/or with ease on the buses themselves with cards and online payments being accepted, as well as the use of prepaid cards.

07 **Comfortable with security and safety**
The buses need to be adequately comfortable and safe for passengers to use during the day or night and provide security monitoring services to ensure enforcement of safety measures are in place.

9. Operational Framework Option 2 (continued)

Develop District Park and Ride Sub-Depots (continued)



The effective operations of the PTU and associated regulatory compliance, including CIG bus operators, will need to be an **immediate focus to ensure that services are enhanced, and enforcement of customer experience standards and safety mechanisms** are adhered to.
(See Section 10 of this report for further details)

A. Enhanced powers of enforcement within the PTU

The current legislation governing the activities of the PTU provides limited powers of enforcement of public transportation operators who circumvent the defined rules of conduct established by the PTB. Given the multiple stakeholders involved in the various aspects of governing the provision of public transportation within the Cayman Islands (e.g., the National Roads Authority, the Royal Cayman Islands Police Service, the Department of Vehicle and Drivers' Licensing), a comprehensive review of the role of each stakeholder, along with their ability to deliver on their responsibilities is needed with the objective to identify opportunities for enhanced efficiencies that would drive better outcomes. This review would also include changes in legislation to support the enhancement needed for enforcement recommendations.

B. Full complement of staff is required

Pages 49 to 55 covers the Organisational Structure Review where two Future State Organisational Structures are recommended for the CIG to consider for the PTU. It is important that whichever direction the CIG decides to take regarding the PTU's Organisational Structure, that special effort is made to quickly onboard the resources needed to deliver the results to the travelling public.

Critical support services responsible for such things as the procurement and maintenance of buses, human resources, technology, project management, finance, legal and facilities (depots and charging facilities for low emission vehicles or EVs), may be outsourced to other Government departments, however contract management will be required to ensure timely delivery and quality control.

9. Operational Framework Option 2 (continued)

Community Run Bus Service

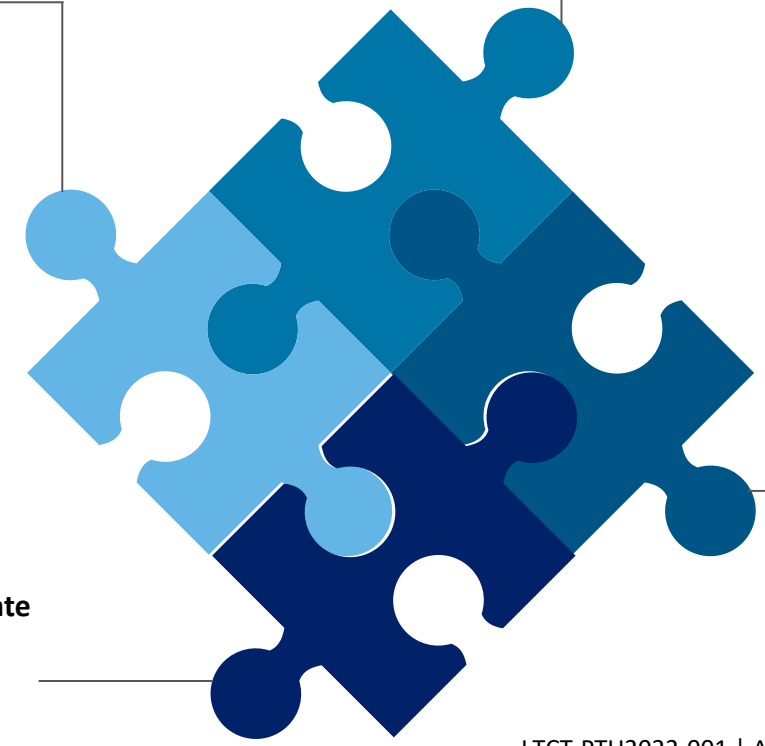
One of the CIG objectives defined in the Project scope is to develop an effective community bus service that does not utilise the main arterial roadways. The delivery of this service would be through established sub-depots within selected communities where the Government-run District-to-District semi-express bus service would collect and deliver passengers. As previously outlined, these sub-depots would serve both as a Park and Ride and the main hub for the community bus service. The communities identified to be serviced by the community buses are:

1. George Town/Lower West Bay Road Corridor;
2. West Bay;
3. Red Bay/Prospect/Savannah/Newlands;
4. Bodden Town/Northward/Beach Bay; and
5. Frank Sound/North Side/East End.

The four options selected as ways the CIG can implement a community based public bus service are:

Private independent operators servicing all communities

Limited number of companies with the requisite fleet servicing all communities



Government-run public bus service to all communities

Hybrid system – Limited number of private companies and a Government- run community bus service

9. Operational Framework Option 2 (continued)

Community Run Bus Service (continued)

1. Private independent operators servicing all communities:

As of February 2023, the PTU had 63 active public bus operators with a total fleet of 115 vehicles in service. As outlined in the Current State Assessment phase of this Project, these operators and vehicles are used to service a number of routes, originating from the bus depot in George Town to the five (5) Districts on Grand Cayman. This approach was considered as an option as the current licensed operators have an existing supply of vehicles with 88 licensed drivers, which could facilitate a relatively short implementation process with smaller incremental costs to the Government once the infrastructure is in place and the required changes within the PTU are addressed.

2. Limited number of companies with the requisite fleet servicing all communities:

The next option identified for the provision of a community bus service is for the CIG to contract with a limited number of operators with the requisite fleet, to deliver the bus service to selected communities. This approach was considered as an option to the Government as the requirement to deliver a high-quality passenger experience along with a greater compliance to the requirements defined in the agreement with the PTU, would shift to the management of a limited number of contracted companies. This transition would allow the PTU to strategically allocate resources to ensure contract compliance and monitoring of a few vendors, eliminating the need to be able to regulate the 63 operators that are currently active on the roads in Grand Cayman. Each contracted company would have to demonstrate to the PTU that they have the following:

a) The fleet to appropriately service their allocated communities at all times;

b) The ability to train their drivers to the required passenger service standards, with monitoring and an adequate feedback process to monitor their performance; and

c) The ability to quickly investigate all complaints issued by the PTU with the appropriate disciplinary procedures for drivers when necessary.

3. Government-run public service to all communities:

The next identified approach for the delivery of the community bus service is for the CIG to offer the full bus service within all the identified communities on Grand Cayman. This approach will enable the CIG to directly control all aspects of the service delivery within the selected communities to then ensure that the bus service being provided aligns to the needs of the travelling public.

9. Operational Framework Option 2 (continued)

Community Run Bus Service (continued)

4. Hybrid System – Limited number of private companies and a Government- run community bus service:

This approach to the delivery of a community bus service consists of the introduction of a CIG run community bus service within those communities that are located east of George Town with low passenger volumes and are deemed financially challenging to private operators, while those other communities with high passenger volumes would be serviced by a limited number of private companies that are selected through a procurement process. Having the inclusion of the CIG run bus service to selected communities with a relatively low volume of passengers would eliminate any financial viability concerns that the private operators may have. In addition, having the Government commence their operations of a public bus service within communities with lower passenger volumes and fewer bus routes, will enable the bus service to be appropriately phased in and refined before it is introduced to other communities closer to George Town if needed. This approach also includes an entrepreneurial element by allowing local business participation.

Key challenges with implementing the four proposed community based public bus service options:

1. The Research, Planning, Safety & Security and Communications functionalities of the PTU will need to be enhanced to establish the various routes within the communities that are safe and secure and effectively communicate those routes to the travelling public. The PTU would also be required to monitor the usage patterns, evaluate passenger feedback and make refinements to the established community routes and schedules to better align the service to the passengers' needs. The external communications to the travelling public is key for the successful introduction of a community run system and to support further refinements of the service as the system matures.

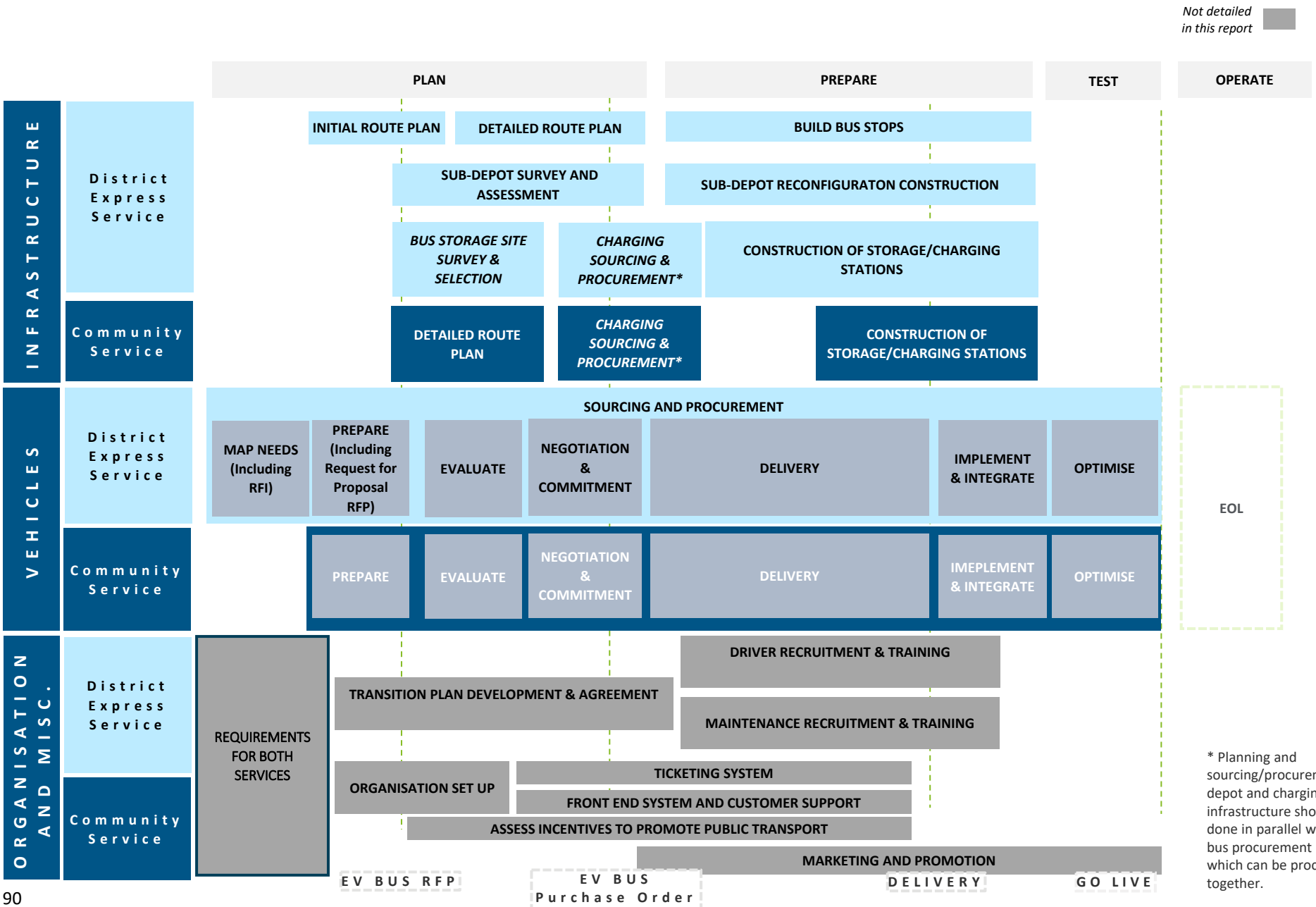
2. The Facilities and Asset Management & Maintenance team within the PTU would need to ensure that each depot/sub-depot is appropriately configured to manage the additional volume of bus traffic resulting from the movements of the community buses. As passenger volumes increase, considerations would need to be made to the development of terminal style bus sub-depots to ensure the targeted passenger experience levels throughout are achieved and maintained.

3. The Compliance, Inspection and Enforcement functionality of the PTU is needed to give the travelling public the required confidence in the community bus service. Route completion is currently a common complaint along with the quality of the buses utilised and customer service offered by some drivers. The enforcement of the various operating requirements issued by the PTU needs improvement, while penalties for infractions may need to be enhanced. Carefully deployed technology is an effective tool to assist with the compliance function that can reduce the number of required headcount, while allowing existing employees to be better utilised in performing other essential duties.

4. Bus Scheduling and Capacity is an area that will need to be changed for better alignment with the travelling public volumes and requirements. An updated traffic flow analysis would need to be conducted to better understand the traffic flows within the communities throughout the day and the bus seat capacity would need to be scheduled to match those traffic flow patterns. There is a need for the community service to be offered as a 24-hour service; however, the frequency of the bus traffic would reflect the travel demand throughout the 24-hour period. The capacity of the buses used would also need to be adjusted over time as more data is collected and the utilisation increases.

9. Operational Framework Option 2 (continued)

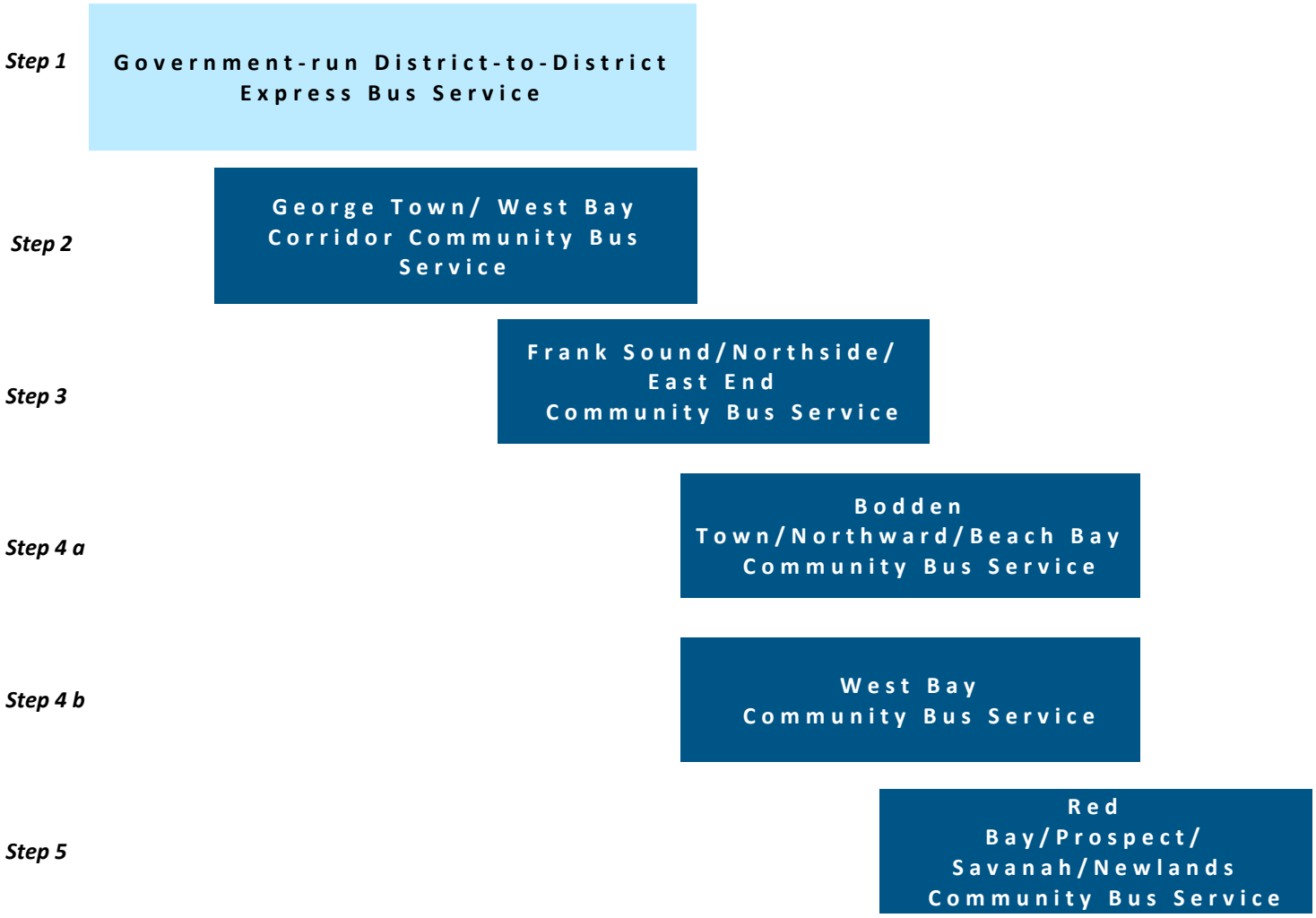
Implementation Road Map: Option 2: A Central Depot with Community Sub-depots



* Planning and sourcing/procurement of depot and charging infrastructure should be done in parallel with the bus procurement process which can be procured together.

9. Operational Framework Option 2 (continued)

Implementation Steps: Option 2: A Central Depot with Community Sub-depots



10. PTU Restructuring Recommendations

10. PTU Restructuring Recommendations

Deloitte's review of the PTU consisted of an assessment of the PTU's current organisational structure against eight organisational design principles (see Appendix C for further details). The review was based on primary research conducted through interviews with internal and external stakeholders and from information obtained through current job descriptions, and legislation governing the operations of the PTU.

A summary of the work conducted throughout this phase of the Project is outlined below:

Interviews

A number of interviews were conducted with senior members of the management team within the PTU to confirm the key roles and responsibilities of employees, to identify any potential resource requirements of the PTU, to assess the productivity and effectiveness of the headcount, skills, capability, and capacity of the current structure of the PTU, to determine key stakeholder interactions, and to identify risks and key issues or challenges within the PTU.

Policy and Legislation Review

Relevant policies and legislation were reviewed by Deloitte to better understand the legislative mandate of the PTU, the scope of activities of the Board of the PTU as well as the PTU's ability to effectively deliver on the wider expectations of the travelling public and bus operators.

Internal Ministry Documents Review

Deloitte's review of the PTU also consisted of a detailed assessment of documentation such as the PTU's organisation charts, roles and responsibilities, job descriptions and any other traveller feedback reports regarding their experiences with the current public bus services provided.

10. PTU Restructuring Recommendations (continued)

Once the data collection process was complete, we applied our organisation design principals to conduct a gap analysis of the current organisation structure and compared the results to the findings of the previous review of the PTU that was performed by Deloitte in 2007.

Item	Organisational issue identified in 2007	Issue identified in 2022/2023
1	Administrative Secretary role not as expected and at high risk for turnover	X
2	Lack of resources for enforcement	✓
3	Multiple reporting relationships	X
4	Lack of legislative framework that allows effective enforcement	✓
5	Lack of proper facilities for unit operations and expansion	✓
6	Inefficient processes	✓
7	Inefficient systems	✓
8	Lack of Communication	✓
9	Current structure of PTU not adequate	✓
10	Inadequate processes to assist and develop operators	✓
11	Lack of accountability	✓

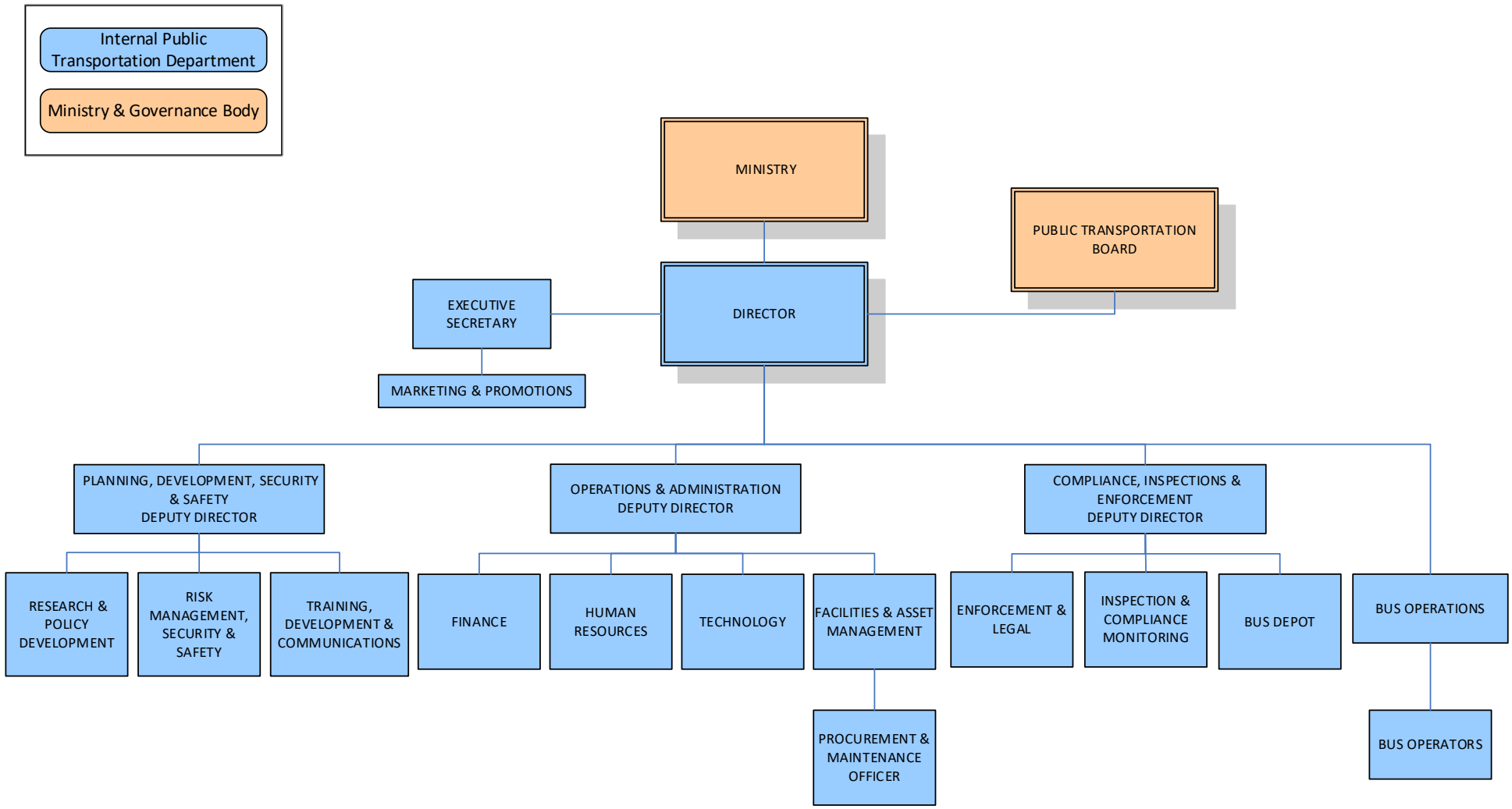
While the PTU has made changes in enhancing their services over the years, many of the issues identified in 2007 are still relevant today, as the demands for public transportation services out-pace the rate of change within the PTU.

The implementation of each Organisational Structure outlined will depend on a number of decisions taken by the CIG, including the approach taken to deliver the bus service, types of buses, and other forms of transport.

10. PTU Restructuring Recommendations (continued)

In considering the options for change to the PTU's organisational structure to meet the public bus services demands of today, additional changes will be needed for the Functional Design recommended by Deloitte in 2007 for both Options 1 and 2 of the proposed Operational Frameworks of the wider public bus services strategy. However, the order of the required changes within the PTU would be different, depending on the strategy selected.

1. New Future State Functional Design Organisational Structure



10. PTU Restructuring Recommendations (continued)

As documented in the previous Deloitte report completed in 2007, the proposed functional design organisation structure provides a clear division of PTU functions into core services and operational support units and then creates units that are purely function-focused (e.g., Planning, Development and Safety, Operations and Administration and Compliance, Inspections and Enforcement). The **Director** would have the overall responsibility for all PTU functions but passes down authority to three (3) **Deputy Directors** within the new structure.

The addition of the three (3) Deputy Director positions will facilitate the delivery of prompt service, decision-making, and advice to address issues that arise within the daily operations of the PTU, allowing the Director to focus on more strategic level activities. As discussed previously, a key feature of the 2007 structure includes an expansion of managerial support for the Director by pulling the decision making closer to the event requiring a decision to be made by adequately qualified individuals within the organisation. The proposed structure also provides a clear balance of employees and responsibilities between units, and clearly distinguishes roles by function in all cases.

Functional Design Changes:

In considering the required changes to the Deloitte 2007 proposed organisation functional design structure, we note the following:

1. **Planning, Development, Security & Safety section** – special emphasis would be on routing and scheduling, and the passenger experience would also be added as a responsibility of this area**. The Research & Policy Development Manager** will be responsible for defining and publishing the Service Standards Document for the PTU. See the following link as an example of Service Standards: https://www.itsmarta.com/uploadedfiles/FY2021%20Service%20Standards.pdf, while the **Training & Development Manager** would be responsible for the communication of the standards and the training of the operators as needed.

   In addition, the **Training & Development Manager** position should be changed to **Training, Development & Communication Manager** and will be responsible for content for the enhanced communication strategies to be deployed by the PTU. Also, the **Risk Management & Safety Manager** should be titled the **Risk Management, Security & Safety Manager.**

10. PTU Restructuring Recommendations (continued)

Functional Design Changes (continued):

2. **The addition of an Operations & Administration Section** – this section would include the following six (6) areas:

   a) **Finance** – the build out of this section would be dependent on the timing of the introduction of Government-run bus fleet;
   b) **Human Resources** – additional resources will be needed to address the expanded functionality of the PTU, especially when the Government-run bus fleet is introduced;
   c) **Technology** – the further introduction of technology is needed to enhance the passenger experience and the compliance and enforcement functionality. Various aspect of the technology services can be outsourced (e.g., web design), however the relevant service contracts will need to be managed;
   d) **Marketing and Promotions** – the PTU will need access to resources that are able to work closely with the **Training, Development & Communication Manager.** This function can be outsourced but the outsourced contract would need to be managed (possibly by the Deputy Director of this section);
   e) **Facilities** – while the timing of the development of facilities needs will differ depending on the strategy selected by the CIG, upon full implementation of each strategy there will be a need for the following:
      1. Central George Town depot upgrades;
      2. District sub-depot/Park and Ride facilities; and
      3. Bus storage and charging facilities.

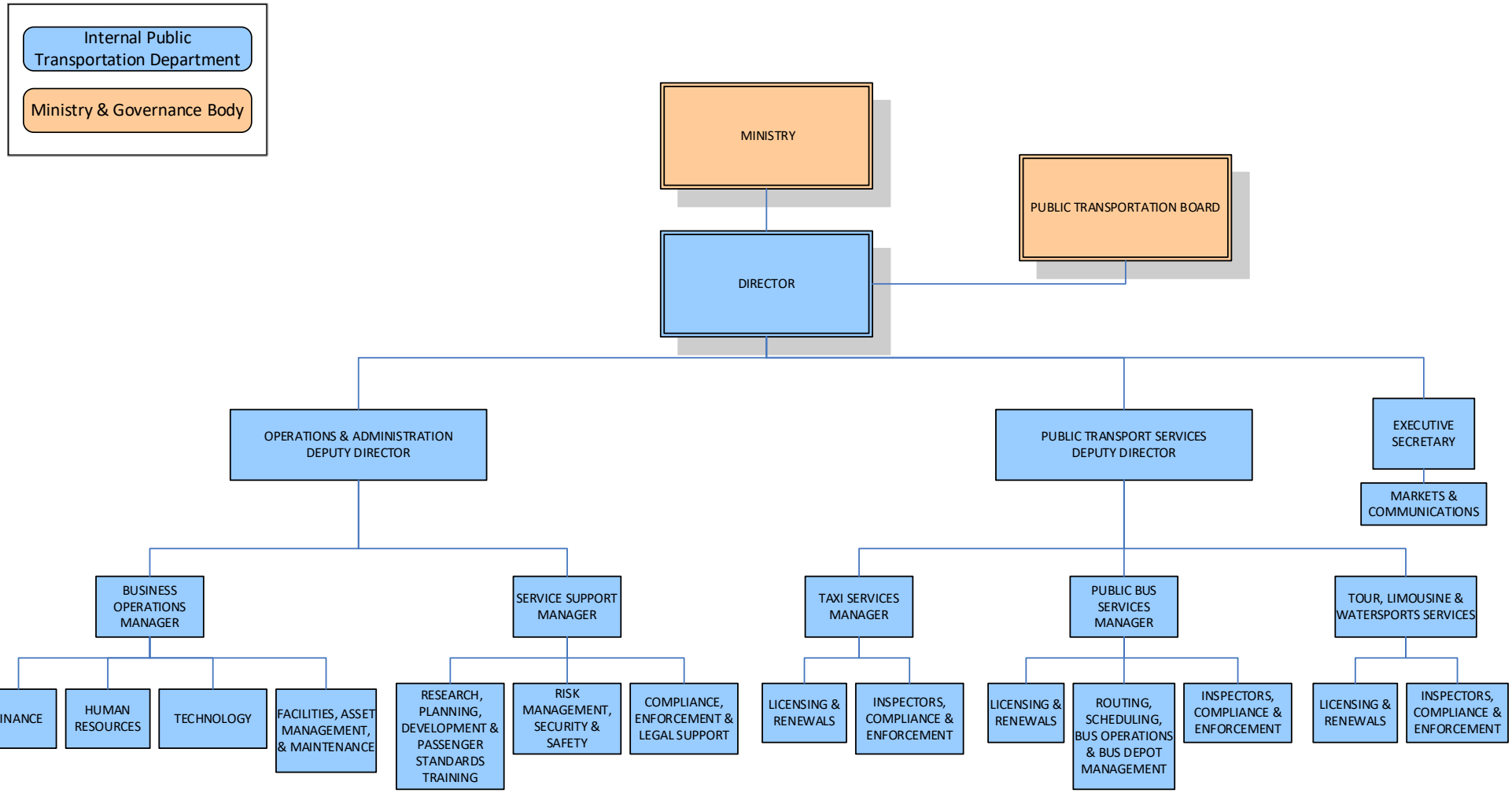
   f. Procurement & Asset Maintenance – this service can be outsourced to the Department of Vehicle and Equipment Service ("DVES") and could potentially be done by the Deputy Director of Operations & Administration.

3. **Compliance & Inspection Section** – this section should add the function of enforcement and be titled **Compliance, Inspection & Enforcement**, and should include the addition of a Legal Division (can be outsourced) and Technology Monitoring section with appropriately trained personnel.

4. **Bus Operations** – this would be a new section that is responsible for delivering the Government-run bus service and would mainly focus on driver scheduling and back up services and would be headed by a Manager and not a Deputy Director.

10. PTU Restructuring Recommendations (continued)

2. New Future State Product Design Organisational Structure



The key features of this structure includes an expansion of managerial support for the Director and redistribution of reports to the two different **Deputy Directors** and delivers a clear balance of employees and responsibilities between units along with clearly distinguished roles by core service areas. The major difference with the proposed product design organisational structure is the dedicated focus to products and services.

10. PTU Restructuring Recommendations (continued)

The changes required for the implementation of a product design organisation structure includes special focus on public bus operator compliance and enforcement along with the introduction of a Government-run public bus service. Similar to the changes recommended for the functional design organisational structure, we recommend that Manager positions be upgraded to Deputy Director positions and some of the Officers on the 2007 design be upgraded to Manager positions. In addition, we recommend that a Deputy Director of Public Bus Services be established separating that function from the Omnibus, Tour, Limo & Watersports Services group.

Product Design Changes:

The core changes recommended for each core area are as follows:

1. **The Operations & Administration** group would be headed by a **Chief Operations Officer** and be split between the Business Administration and Services Support:
   - The Business Operations would include core functions as:
     a) **Finance;**
     b) **Human Resources;**
     c) **Technology;**
     d) **Facilities, Asset Management & Maintenance; and**
     e) **Marketing & Communications.**
   - The Service Support area would include the following:
     a) **Research, Planning and Route Development;**
     b) **Passenger Standards Training;**
     c) **Risk Management, Security and Safety; and**
     d) **Compliance, Enforcement and Legal Support.**
2. **The Taxi Services** group would include a Licensing and Renewals function but would not include any major changes at this time without a detailed assessment of the Taxi Services.
3. **Public Bus Services group** is a new section that would include three (3) sections specifically:
   a) **Licensing and Renewals;**
   b) **Routing, Scheduling, Public Bus Operations and Bus Depot Management; and**
   c) **Monitoring, Compliance and Enforcement.**
4. **Like Taxis the Tour, Limo and Watersports Services** group would include a **Licensing and Renewals** function but would not include any major changes at this time without a detailed assessment of this service area.

Phase 5

11. High-Level Considerations

11. High-Level Considerations

The implementation of zero emission buses ("ZEBs") can help the CIG to achieve net zero targets, cleaner air, green growth, and improved health and wellbeing outcomes. In this section of the report, we explore the benefits of implementing ZEBs and the key considerations necessary for its successful implementation.

Benefits of Zero Emission Buses

What makes a bus "Zero emission"?

Emissions

A net zero bus is a vehicle not emitting any exhaust gas or other pollutants from the onboard source of power. Each ZEB reduces carbon emissions by about **70%** (46 tons) annually and avoids 23kg of nitrogen oxides (NOx) compared to a diesel bus each year. Using electric or hydrogen-fueled buses will require an analysis of the source of the energy used to power them in order to ensure that a truly sustainable solution is implemented. When ZEBs are introduced under the right operating conditions, appropriately supported through promotional activity and combined with wider changes to the road network, they can offer an enhanced passenger service. This can encourage bus usage by offering a faster, cleaner and more attractive travel option than other forms of transport.

Operating costs

When implementing electric buses, one must be prepared for higher initial costs. An electric-bus may be 50% more expensive than a standard diesel option, and that's not including the cost of charging stations. However, a study in Austin, Texas, found that electric buses could save between $73,000 and $173,000 per unit over their lifetimes, since they make up for their higher sticker prices with massive savings in fuel and maintenance costs down the line.

What makes a bus "Zero emission"?

In order to understand what makes a bus net zero, it is important to understand that emissions do not simply come from the usage of the vehicle (Tank-To-Wheel) but also from the method used to extract the energy that will fuel the vehicle (Well-To-Tank).

Source: Deloitte analysis with information from the Open Access Government article "JIVE: Decarbonising Europe's public transport one bus at a time" September 13, 2021

11. High-Level Considerations (continued)

Overview of Fuel Cell Buses

Fuel cell buses consists of converting hydrogen (typically stored on the roof of the bus) into electricity to power the vehicle.

Energy source (*Well-To-Tank*)

Hydrogen is produced by using either energy or chemical reactions to split hydrogen atoms from water and then storing it in liquid form to be later used to create electricity.

The energy used to split hydrogen atoms from water will impact the sustainability of using hydrogen as a fuel source:

a) Green hydrogen uses renewable energy to be produced;

b) Blue hydrogen emits carbon dioxide but captures it to avoid emissions; and

c) Grey hydrogen emits carbon dioxide but doesn't capture it.

High-level considerations

Hydrogen needs to be transported on site in a liquified form by tanker trunk or as a compressed gas in cylinders.

Hydrogen requires safety precautions since it is a highly flammable gas.

Source: Deloitte analysis with information from the Open Access Government article "JIVE: Decarbonising Europe's public transport one bus at a time" September 13, 2021

Fueling Methods (*Tank-To-Wheel*)

Liquid hydrogen is stored and transferred into the tank on the buses. Hydrogen tanks are usually located on the roof of the buses. Fuel cells will then transform the chemical energy of hydrogen into electrical energy to power the vehicles.

Hydrogen refueling at depot

Buses running on fuel cell technology can refuel in just 10 minutes at a depot when needed. Storage capacity needs to be built in the depot however, to ensure safe manipulation and handling of hydrogen.

Central refueling location

If other means of transport also runs on hydrogen, it is possible to build a central refueling location where all types of vehicles can come and share a common infrastructure.

When handling hydrogen, a qualified workforce is necessary. Hydrogen being a nascent technology, this workforce may be harder to find in the Cayman Islands. Sourcing and training this workforce would need to be considered when choosing the technology to power the buses. Additionally, facilities for storing hydrogen will need to be hurricane-proof for environmental and safety impact.

11. High-Level Considerations (continued)

Overview of Fuel Cell Buses (continued)

Fuel cell technology is new; however, it has been adopted and used by many countries.

Decarbonising Europe's public transport – the JIVE project

Leading Europe's initiatives for hydrogen fuel cell electric buses and their infrastructure, is the Joint Initiative for Hydrogen Vehicles Across Europe ("JIVE"). To date, around 90 JIVE fuel cell buses are operating in Aberdeen, Bolzano, the Cologne region, Groningen, London, Pau and Wuppertal. They are in regular service in some of the cities' most demanding routes. In addition, more fuel cell buses have been commissioned and will be deployed by the end of 2023 in other cities.

European industry players in the fuel cell market.

European industry players have also increasingly entered the fuel cell bus market thanks to the demand for vehicles generated by the JIVE project. European bus manufacturers such as Alexander Dennis, Caetano, Safra, Solaris, Van Hool and Wrightbus have shown their commitment to commercialising these vehicles.

VANHOOL

SOLARIS
A CAF GROUP COMPANY

CaetanoBus

ALEXANDER DENNIS

WRIGHT

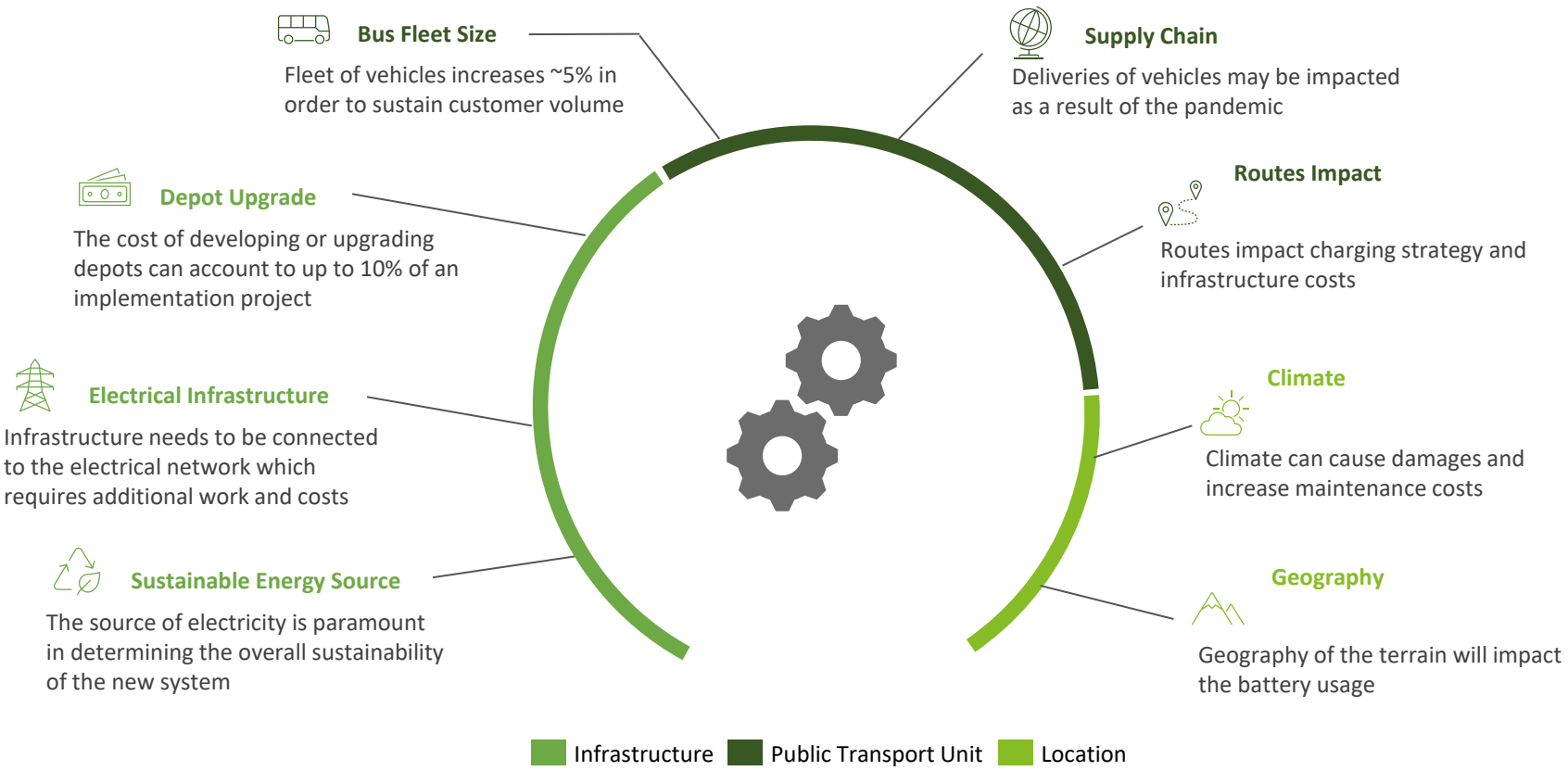
Source: Deloitte analysis with information from the Open Access Government article "JIVE: Decarbonising Europe's public transport one bus at a time" September 13, 2021

11. High-Level Considerations (continued)

Overview of Fuel Cell Buses (continued)

(Well-To-Tank considerations)

Outlined below are the key considerations that will impact procurement, operations and costs:

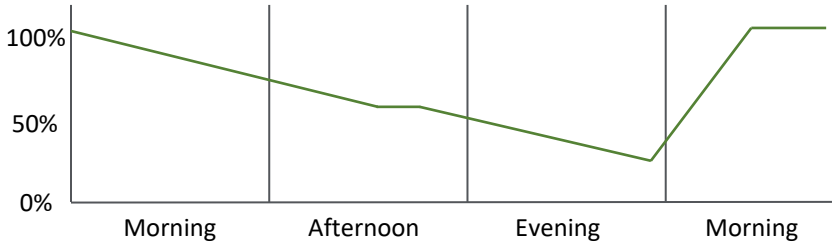
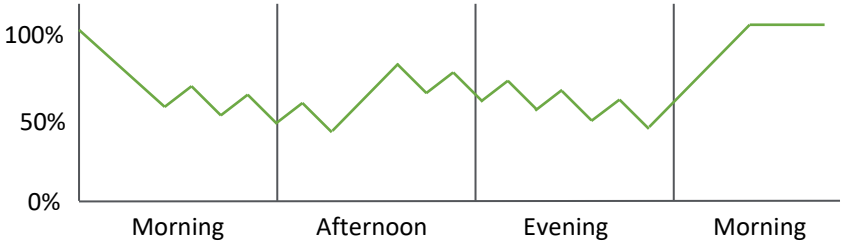


11. High-Level Considerations (continued)

Overview of Fuel Cell Buses (continued)

(Tank-to-Wheel considerations)

How buses are charged whether it is purely overnight or also tactically during the day will have different impacts.

	Deport Overnight Charging	Depot and Opportunity Charging
Charger Type	Depot: 30 to 150 kW (depending on the buses range)	Depot: 30 to 150 kW (depending on the buses range) Opportunity: 150/300/450/600 kW
Charging Technology	Mostly plug-in	Pantograph: Roof or pole mounted (different advantages) Plug-In Induction
Load profile		
Typical range	100-250 km/day (depending on buses)	200-500 km/day
Cost drivers	Higher battery cost Lower charging infrastructure cost (depending on depot charger)	Lower battery costs Higher charging infrastructure costs Slightly higher maintenance costs

11. High-Level Considerations (continued)

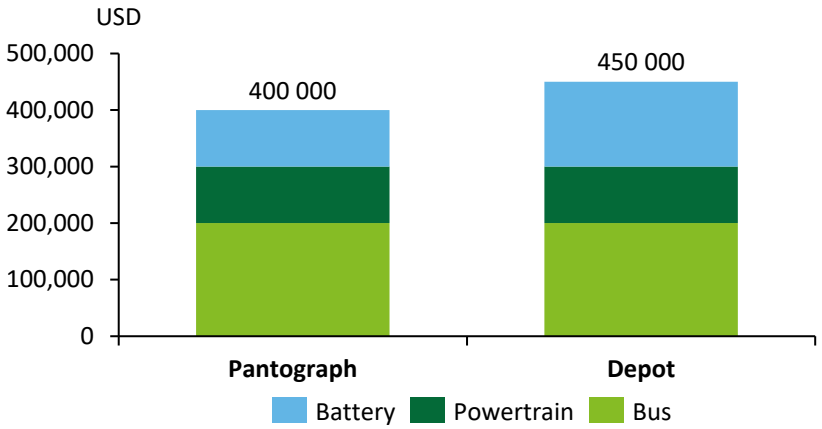
Overview of Fuel Cell Buses (continued)

Cost can be divided in two categories: cost of material and infrastructure

Cost of bus material

The cost of acquiring buses can be divided into three categories:

- **Bus –** bus costs will depend on choices regarding length, seats, tires, and other specifications.
- **Powertrain –** powertrain is the assembly of every component that pushes the bus forward.
- **Battery –** battery cost differ based on the technology in use. Lithium iron phosphate ("LFP")batteries (used in depot/overnight charging) are usually more expensive than lithium-titanate ("LTO") batteries (used in pantograph/opportunity charging).



Cost of infrastructure

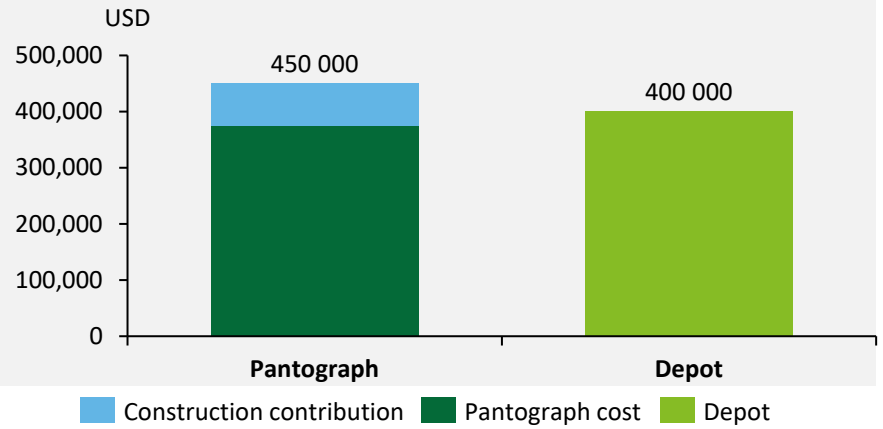
Pantograph and depot charging have major differences in infrastructure costs.

Pantograph

Vendors indicate that pantograph infrastructure costs can vary from USD$250,000 to USD$450,000. In addition, there are installation costs for the construction contribution of USD$75,000 to the network supplier.

Depot

The estimated cost for depot chargers are approximately USD$40,000 per charging outlet.



Source: Deloitte analysis with information from the Thema Consulting Group and Norconsult Report "Agder Kollektivtrafikk AS" December 2017

11. High-Level Considerations (continued)

Electric Buses: Market and Material Considerations

		Capacity sitting and standing	Range	Charging method	Battery capacity	Battery type
VDL BUS & COACH	**15m Citea LE 149**	Max 130, (each model has a min.45 seats)	500-600km	Max 674 kWh	Combined Charging System ("CCS")2, Pantograph, both up and down	LFP CTL (CATL)
	18m Citea LF-181	Max 153 passenger - Sitting and standing (each model has a min.45 seats)	500-600km	Max 674 kWh	CCS2, Pantograph, both up and down	LFP CTL (CATL)
SOLARIS	**15m**	Max 65	At least 200km over 12 years	6 batteries over 470kWh	CCS2:	LFP
	18m	Max 49 + 8	At least 200km over 12 years	Over 550 kWh	Pantograph CCS2	LFP
BYD	**13m**	45 seats, max 69 passengers	Up to 400km	Up to 422 kWh	CCS2 fast charging Pantograph, up and down	LFP
	15m	53 seats, max 100 passengers	Up to 450	Up to 563 kWh	CCS2 and Pantograph –both up and down	LFP
	18,75m	Max 130 passengers	Up to 400	Up to 563 kWh	CCS2 and Pantograph, both - up and down	LFP

11. High-Level Considerations (continued)

Electric Buses: Market and Material Considerations (continued)

		Capacity sitting and standing	Range	Charging method	Battery capacity	Battery type
VOLVO	15m	40 seats/60standing	Up to 200km	150,200,250 kWh	CCS2, Pantograph, both up and down	LFP
	18m	Up to 150 passengers	Up to 200km	Up to 396 kWh	CCS2, Pantograph, both up and down	LFP
	18m	45 seats standard	At least 200km over 12 years	Over 550 kWh	CCS2, Pantograph, both up and down	Solid state & Lithium
GOLDEN DRAGON	18m	120 passengers' capacity	Up to 500km	N/A	CCS2 (and other Asian plug-in standards)	LFP

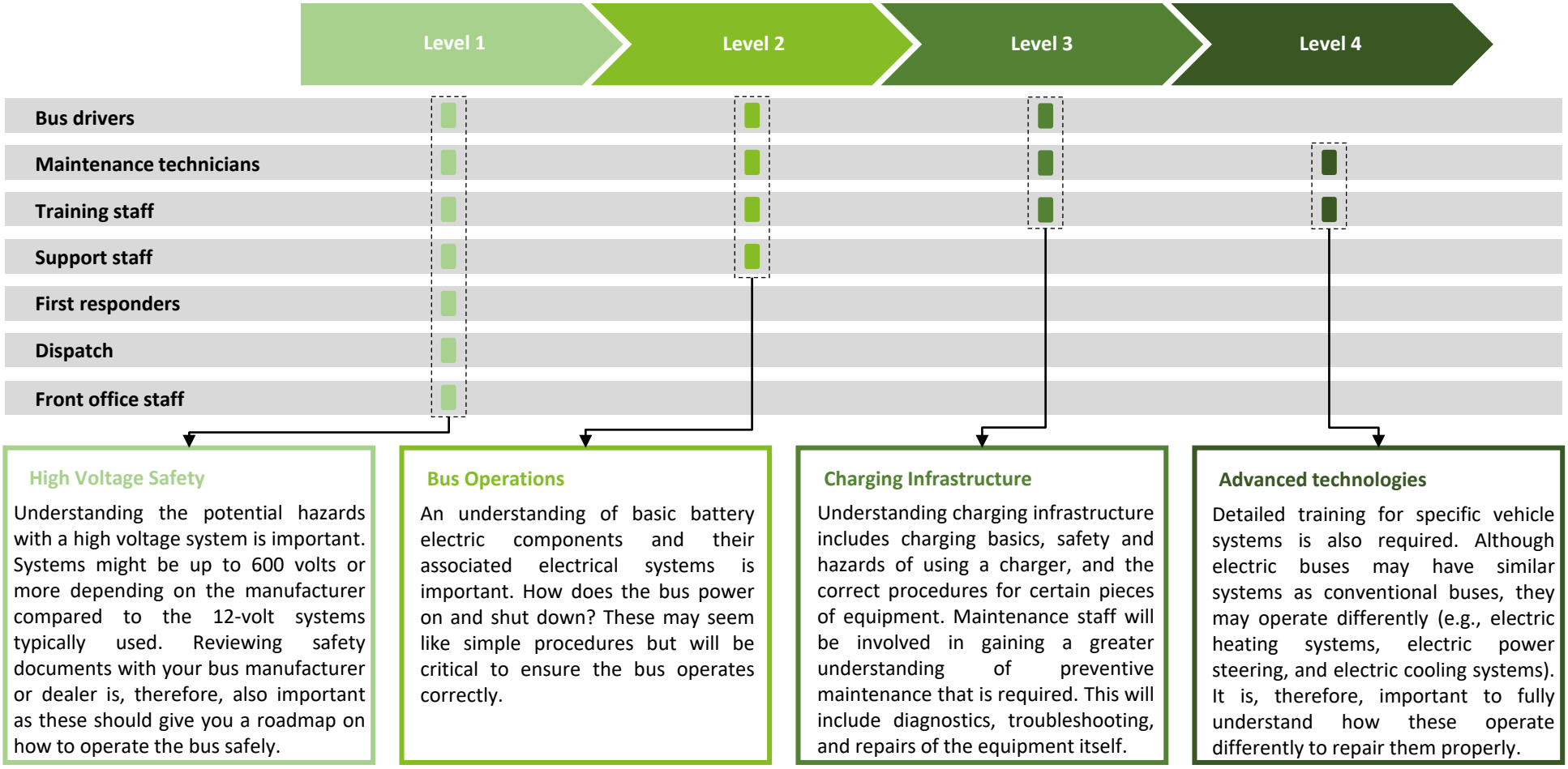
Other brands with buses under 13m

MELLOR	12m	70 passengers	480km	N/A210-kWh CATL Battery	CCS2, rapid charging	LFP
CaetanoBus	12m	Up to 87 passengers	Up to 300km	NMC – 385 kWh LTO – 100 kWh	CCS2, Pantograph.	LFP

11. High-Level Considerations (continued)

Training and Maintenance Considerations

Training required when operating electric buses:



Source: Deloitte analysis with information from the Alternative Fuels Data Centre training module "Flipping the Switch on Electric School Buses" December 2021

11. High-Level Considerations (continued)

Training and Maintenance Considerations (continued)

Training required when operating electric buses (continued):

Level 1 and Level 2

Level 1 - High Voltage

High voltage components require drivers to be trained on the specificities of electric buses.

High voltage training is necessary for all stakeholders who will be in contact with electric buses. Although the systems are designed to be safe it is necessary to have awareness of the potential dangers associated with electric vehicles.

Training should at least cover the essentials when it comes to:

1. Basics of electric vehicles;
2. Hazard labels;
3. Functioning of the bus;
4. Identifying faults; and
5. Procedures in case of identified faults with the vehicle.

Format: Classroom Learning

Level 2 - Bus Operations

Differences between traditional and electric buses and how one needs to act around electric buses.

This Level will focus on the practical understanding of how an electric bus functions. It is targeted for individuals with a daily interaction with buses.

Training will focus on:

1. Ignition of the bus;
2. Dashboard information;
3. Driving and using regenerating braking; and
4. Understanding how the bus functions to better use it.

Format: Classroom and Practical Learning

Source: Deloitte analysis with information from the Alternative Fuels Data Centre training module "Flipping the Switch on Electric School Buses" December 2021

11. High-Level Considerations (continued)

Training and Maintenance Considerations (continued)

Training required when operating electric buses (continued):

Level 3 and Level 4

Level 3 - Charging Infrastructure

Charging a vehicle is different than refueling and therefore it requires a good understanding of the process.

All personal in contact with buses, charging stations or service equipment should undergo this training. Charging has its own specificities, and the entire operations depends on it.

Training will enable for good usage and maintenance of the charging infrastructure and encompasses:

1. Charging basics;
2. Safety and hazards of using chargers;
3. Understanding of procedures concerning equipment; and
4. A deep understanding of chargers for maintenance staff.

Format: Classroom and Practical Learning

Advanced Technologies

Difference between traditional and electric buses and how one needs to act around electric buses.

Technicians need to understand in-depth how the vehicles operate in order to diagnose and repair efficiently. They need to understand how energy is stored and used in a vehicle.

Training will be tightly based on the specific vehicle the fleet has chosen and needs to be developed with the bus manufacturer:

1. Electric Power System;
2. Electric Heating system;
3. Electric Power Steering;
4. Electric Cooling System; and
5. Energy Storage.

Format: Classroom and Practical Learning

Source: Deloitte analysis with information from the Alternative Fuels Data Centre training module "Flipping the Switch on Electric School Buses" December 2021

11. High-Level Considerations (continued)

Training and Maintenance Considerations (continued)

The training principles that need to be followed to train the workforce around electric vehicles:

To conduct operations effectively, the entire workforce needs to be trained accordingly. Executing these trainings requires following a few principles to ensure all stakeholders are up-to-date at all time and that the training is tailored to fits the needs of the organisation.

Efficient training leads to better use of the buses, higher customer satisfaction and reduced operational costs.

Consideration

The Cayman Islands geographical location may influence the capacity to conduct training and the cost of it.

1 **Train the Trainer**

To better handle future training it is essential to also train the workforce to conduct the training themselves and be proficient enough to continuously deliver it. It is necessary when dealing with turnover.

2 **Review Training with Bus Manufacturer**

The chosen bus manufacturer will be able to provide documentation and potentially training on the specificities of the vehicles sold. Therefore, the Training programme needs to be elaborated in collaboration with them. A lot of them offer trainings as part of the sales deal.

3 **Adapt the training to your organisation**

Use feedback from participants and from practice to constantly modify and improve training to fit your organisation. Certain technicians may also need additional learning on certain aspects or specialised training. The use of opportunity charging or not will also impact the breadth of necessary training.

4 **Refresh knowledge**

Re-train the staff regularly. Safety training and general technological updates ensures operations are run smoothly and no stones are left unturned at all times.

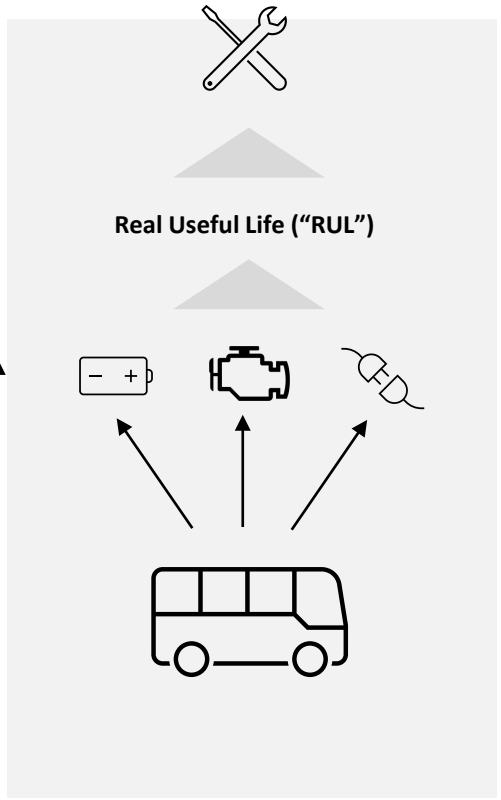
Source: Deloitte analysis with information from the Alternative Fuels Data Centre training module "Flipping the Switch on Electric School Buses" December 2021

11. High-Level Considerations (continued)

Training and Maintenance Considerations (continued)

Shifting to electric buses will impact maintenance and incur additional cost but over time will be more profitable than with traditional fuel buses.

	Description	Implications
Cost	Electric buses are on average costing between three and four times less in maintenance costs per mile. These costs are also more stable than with traditional fuel engines.	The advantages of using electric buses are not limited to the operational cost of using electricity rather than fuel but also electric engines have fewer parts than fuel engines and cost less to maintain.
Training	Training of the entire workforce that will be in contact with the electric buses and in particular operators that will oversee the maintenance of the vehicles.	Training will induce costs and due to the geographic location of the Cayman Islands may be harder to organise and more expensive.
Planning	Preventive maintenance ("PM") where data on the wear of components is collected throughout regular operations is adapted to electric vehicles management as it enables optimal planning of maintenance.	PM requires technological and human capability to collect data and schedule maintenance. Weather, infrastructure and capacity to order spare parts on the island needs to be considered.



Sources: Deloitte analysis with information from:

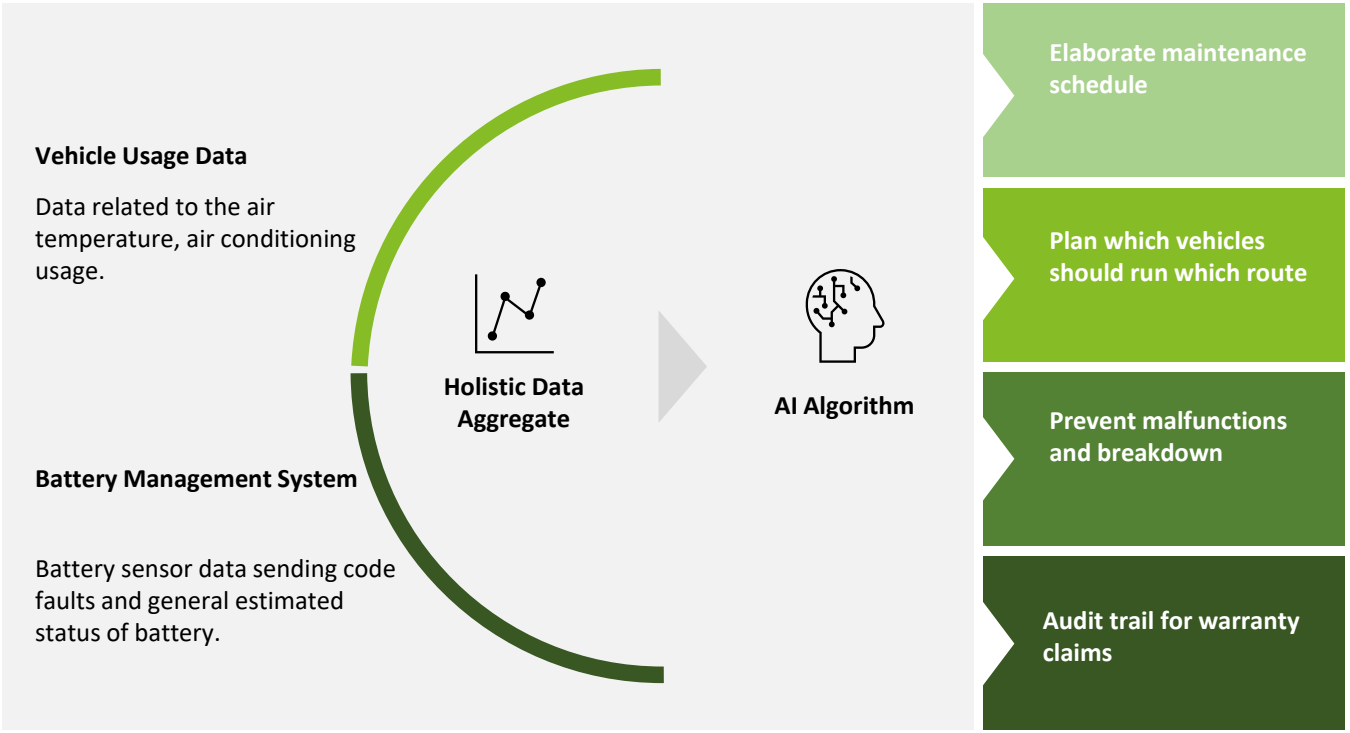
1. *The Automotive World Article "Predictive maintenance pivotal to electric fleet success" October 14, 2022;*
2. *Stratio Article "Predictive Battery Analytics for Electric Buses" June 15, 2022;*
3. *Clean Mobility Shift Article "Seven charts showing how e-buses are more economical than their petrol or diesel counterparts in public transport" April 7, 2021;*
4. *The American Public Power Association Article "Electric buses for mass transit seen as cost effective" October 17, 2019; and*
5. *The catalogue of measures for transport Article "Electric buses" 2017: https://www.tiltak.no/c-miljoeteknologi/c1-drivstoff-og-effektivisering/elbusser/*

11. High-Level Considerations (continued)

Training and Maintenance Considerations (continued)

Leveraging Technology to optimise spare management and maintenance of your electric buses fleet.

Caetano buses have partnered with Stratio and Halmstad University to develop a holistic tool to conduct predictive maintenance. Electric buses having only around 20 components against 2000 in conventional bus engines making maintenance simpler and the implementation of innovative tools and processes easier.



45%

Decrease in life cycle costs

Unwanted vehicle downtime, preventive maintenance inefficiencies and incidents

50%

Vehicle availability increase

150%

Improvement in vehicle reliability

Sources: Deloitte analysis with information from:

1. *Sustainable BUS Article "Masats on predictive maintenance: Pilots on buses show it can increase vehicle availability by 50%" November 4, 2022;*
2. *The Automotive World Article "Predictive maintenance pivotal to electric fleet success" October 14, 2022;*
3. *Stratio Article "Predictive Battery Analytics for Electric Buses" June 15, 2022; and*
4. *The catalogue of measures for transport Article "Electric buses" 2017: https://www.tiltak.no/c-miljoeteknologi/c1-drivstoff-og-effektivisering/elbusser/*

11. High-Level Considerations (continued)

End of Life Considerations

Repurposing Electric Buses Batteries - Use Cases

Choosing what to do with used batteries will impact your finances and the planet. With electric buses, two options exists. Buses manufacturers often offer support when dealing with end of life of their batteries.

A battery in an electric bus suffers performance losses after 8-10 years that require it to be changed. Once a battery is retired from a bus, two options are possible: Repurposing or Recycling

Repurposing

The battery is readapted for use as another source of energy. It is the most sustainable choice as it enables further use.

Repurposed batteries can be used in Energy Suppliers & Grid Operators, Homes and Individuals or Energy communities for example.

Recycling

The battery is dismantled, and its metal parts are sold while the rest is recycled.

Selling the expensive metal to reuse while recycling the other components bring additional revenues although it isn't the most sustainable solution.

Ultimately the decision to repurpose or recycle batteries depends on the type of battery:

- NCA or NMC
- LFP

NCA/NMC batteries are made of more expensive metal which leads to better revenues when recycling

Additionally, LFP batteries have better life and safety performance which is better for stationary storage and therefore usage as a power bank which is the favored strategy for repurposing.

Many LFP batteries manufacturers are working on developing second-life solutions with their batteries (Nissan, Renault, BMW, BYD, Volkswagen and General Motors for example)

Sources: Deloitte analysis with information from:

1. *Sustainable BUS Article "Masats on predictive maintenance: Pilots on buses show it can increase vehicle availability by 50%" November 4, 2022;*
2. *The Automotive World Article "Predictive maintenance pivotal to electric fleet success" October 14, 2022;*
3. *Stratio Article "Predictive Battery Analytics for Electric Buses" June 15, 2022; and*
4. *Tiltakskatalog for transport og miljø Article "Elbusser" 2017. and*
5. *The catalogue of measures for transport Article "Electric buses" 2017: https://www.tiltak.no/c-miljoeteknologi/c1-drivstoff-og-effektivisering/elbusser/*

11. High-Level Considerations (continued)

End of Life Considerations (continued)

Sustainability and Electric Buses

What kind of repurposing options exist for electric buses batteries

Repurposing

Examples of battery repurposing as power banks once replaced and where how these power banks can be used. Batteries can also be used to power smaller vehicle producing less strain on the battery.

Home Storage

Repurposing your batteries to store additional energy generated by solar panels on your roof for example enables people to store additional energy when conditions are good and use it when the weather is overcast or if there are any outages. Most household consume 30 kWh per day with irregular consumption. Power banks may lift strain on the grid.

Project Anubis

43 VDL buses batteries in usage since 2016 in Eindhoven, Netherlands are being replaced and VDL is partnering with energy company RWE to repurpose all the buses batteries into a megawatt energy storage system.

Similar projects are being studied in UK, Germany and the United States.

Manufacturing

Nissan uses used "Leaf" batteries to power its Automated Guided Vehicles (AGV) which are present in the production line for new vehicles. They use modules from the batteries in these vehicles. One Leaf battery can power up to 16 AGVs for example.

Charging Station

Implement, operate and monitor a functional Level 3-equivalent, direct current, fast charge (DCFC) light-duty vehicle charging station based on used-batteries taken from battery-electric buses. It will improve the performance of rapid charging stations by using more efficient battery-to-battery energy transfers; reduce cost of rapid charging stations, through the use of lower-cost used batteries.

Sources: Deloitte analysis with information from:

1. *IDTechEx Report "Second-life Electric Vehicle Batteries 2023-2033" February 2023;*
2. *IDTechEX Article "End-Of-Life Electric Vehicle Batteries: Recycling or Second-Life?" June 11, 2020; and*
3. *Green Tech Media Article "Nissan, Green Charge Networks Turn 'Second-Life' EV Batteries Into Grid Storage Business" June 15, 2015.*

11. High-Level Considerations (continued)

End of Life Considerations (continued)

Recycling Electric Buses Batteries

What are the options and what does it consist of?

Recycling

How recycling works with electric buses' batteries

Recycling Process

When dealing with the recycling of used batteries there are two types of companies that can help you:

- Third-party specialised in the recycling
- Bus Manufacturer running recycling programmes

If the recycling option is chosen, batteries are treated in a facility where they are first shredded into a powder and its various elements chemically separated. Certain processes enable the retrieving of up to 95% of all material making up batteries significantly reducing the ecological footprint of recycling batteries.

Sources: Deloitte analysis with information from:

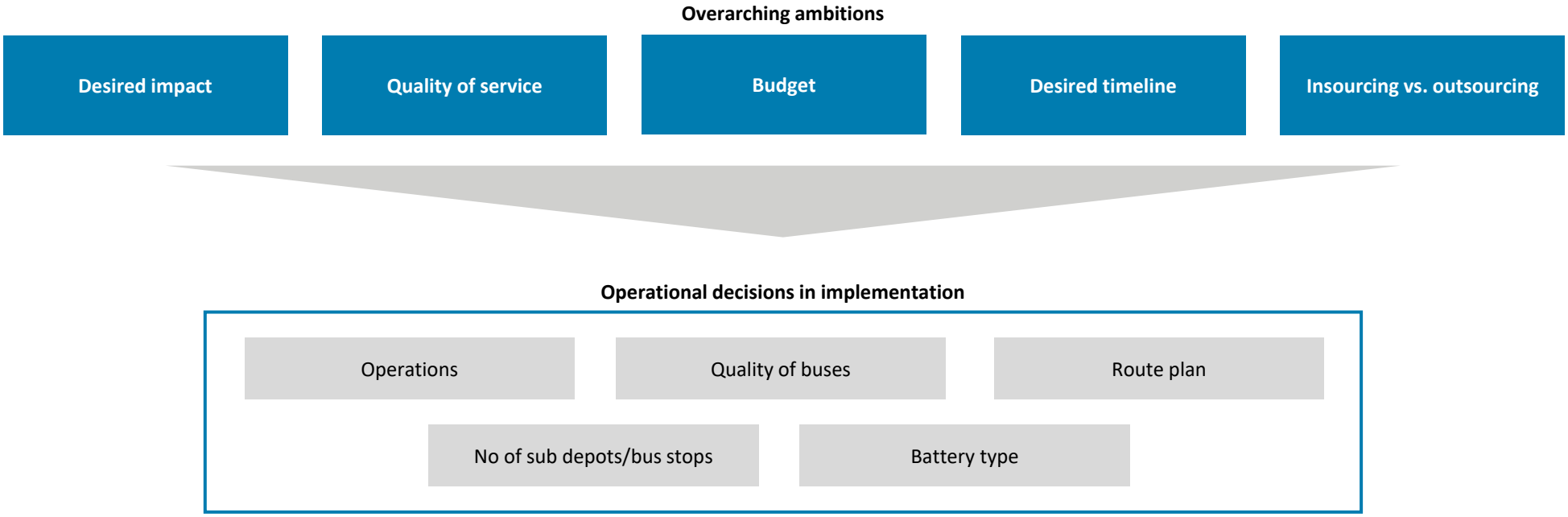
1. *IDTechEx Report "Second-life Electric Vehicle Batteries 2023-2033" February 2023;*
2. *IDTechEX Article "End-Of-Life Electric Vehicle Batteries: Recycling or Second-Life?" June 11, 2020; and*
3. *Green Tech Media Article "Nissan, Green Charge Networks Turn 'Second-Life' EV Batteries Into Grid Storage Business" June 15, 2015.*

12. Baseline Case Description

12. Baseline Case Description

Overview

Overarching ambitions will frame the operational decisions in the implementation process for ZEBs. We have therefore made assumptions based on preliminary information to form a baseline case to form the scope for implementation.



The details in this baseline case are described on the next few pages. This baseline case was developed to form a preliminary case which can be used as an input for a Request for Information ("RFI"). The CIG must qualify and do further analyses in order to make final decisions on bus types, routes, quality, etc.

12. Baseline Case Description (continued)

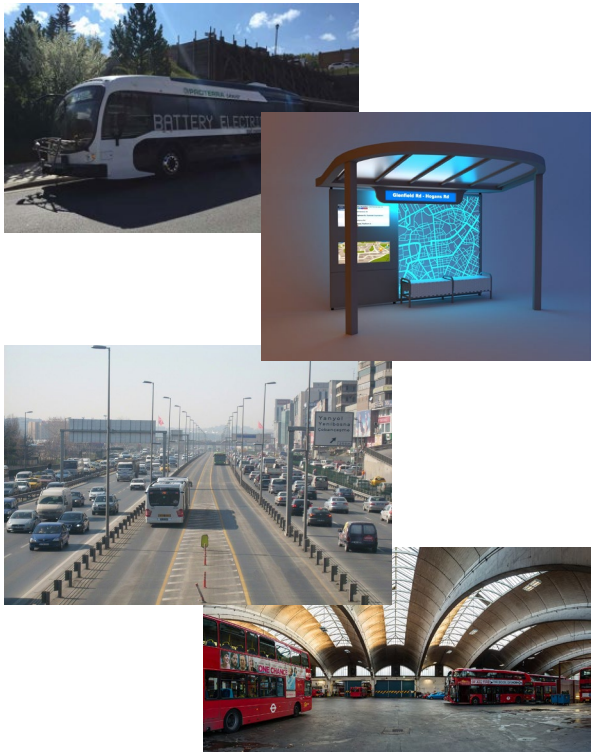
Overview (continued)

A **realistic mid-way** is assumed for the baseline presented, which means that minimum solutions, such as low-quality buses and decisions limiting operations are avoided, but also that costly best-in-class solutions were also not considered.

Minimum requirements

Realistic mid-way

Best-in-class



Images: Wikipedia, Alamy, Zf Group; and WongM.com

12. Baseline Case Description (continued)

Overview (continued)

The baseline case includes a semi-express **long-haul (district-to-district) bus service reducing traffic by 20%** as well as an **inter-city (i.e. central George Town) mini-bus route running every 10 minutes in two directions.**

Ambition 1. Long-haul bus routes to reduce traffic to/from George Town ("GT")

Overall ambition: Reduce number of cars travelling to/from George Town city area during rush hour peak hours by implementing a new EV bus transportation system, running one route north and two east. The baseline case involves setting up enough departures and buses (12m/40ft buses due to current road capacity) to be able to **reduce cars by 20%.** The long-haul bus service will then run 23 trips per hour, serving approximately 1370 people per hour.

ROUTE A: GT-West Bay (WB)

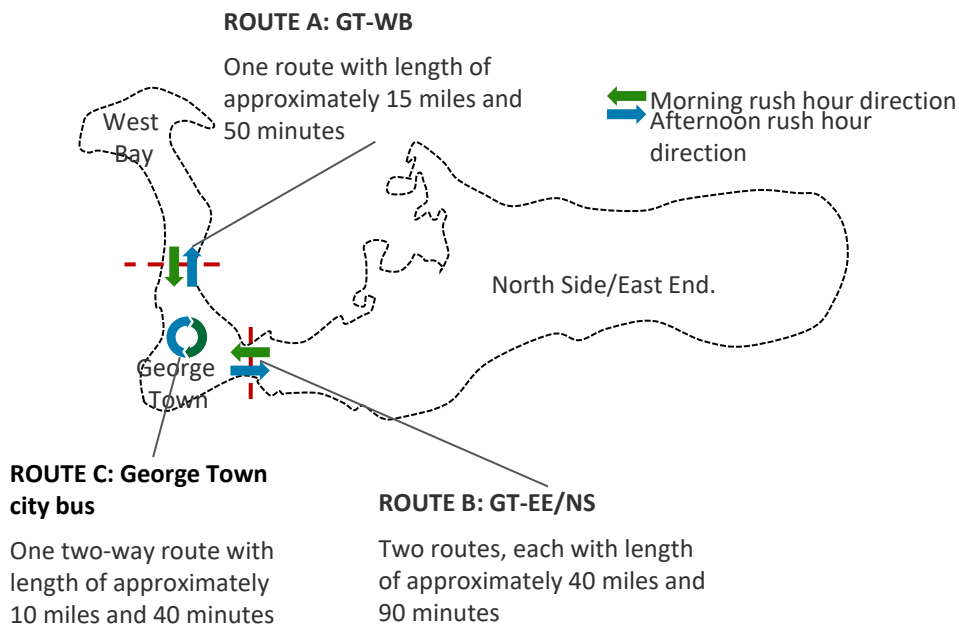
a) One (1) round-trip route;
b) 15 miles per round-trip;
c) 50 minutes per round-trip (incl. stops, rest, slower sp.); and
d) Five (5) stops + end stop

ROUTE B: GT-East End ("EE")/North Side ("NS")

a) Two (2) round-trip routes (one to North side, one to East end);
b) 40 miles per round-trip;
c) 90 minutes per round-trip (incl. stops, rest, slower speed); and
d) Five (5) common stops and separate end stops.

ROUTE C: Central George Town bus

a) One (1) route, two (2) ways;
b) Approximately 10 miles x 2 (both directions);
c) Approximately 40 minutes (includes stops, rest, slower speed); and
d) Approximately 20 stops.



Ambition 2. Central GT mini-bus route to reduce traffic inside city centre

Overall ambition: Reduce GT inner city traffic by running one inter-city route, two ways with electric mini-buses (8m/26ft). The service will then run **12 trips per hour,** at 80 % capacity, this will serve around 300 people per hour if all seats are used.

Sources: Travel time and distances from Google maps; and NRA 2016 traffic data collection programme.

12. Baseline Case Description (continued)

Overview (continued)

Baseline: Desired Impact

Based on the desired effects in baseline and resulting consequences for routes and capacity needs, necessary fleet size is estimated to be **~26 large buses (~40ft/12m, ~35 seats) and ~10 mini-buses (~30ft/9m, ~25 seats)**

Estimated required number of large buses (12m, ~35 seats) for [Ambition 1. Long-haul bus routes to reduce traffic to/from George Town]

Ambition level (% reduction in cars during peak hour traffic)	Demand/hour (# people to be transported per hour during peak, rounded and adjusted)*	Trips needed/hour (per hour during peak, rounded and adjusted for quality purposes)*	Required No. of large buses (~60ft/18m) (adjusted for regular need for service)*
-10%	680	12	16
-20%	1370	23	**30**
-30%	2050	35	44

Estimated required number of mini-buses (~30ft/9m, ~25 seats) for [Ambition 2. Inter-city mini-bus route to reduce traffic inside city center]

Trips/hour	×	Routes	×	Adjustment factor**	=	Required No. of mini-buses (~40ft/12m)
6		**2**				**10**

Estimated total fleet size
40

Quantity used as assumption for calculations in this document

*** 12 departures per hour can be run by less than 12 buses. However, add-on is also necessary to compensate for regular need for service*

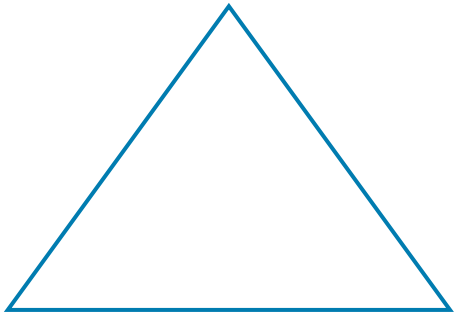
12. Baseline Case Description (continued)

Overview (continued)

Timeline, quality and cost of the implementation are dependent on choices related to ambition levels, in terms of reduced congestion, environmental effects and approach to implementation.

Timeline

Key drivers: *bus delivery time (bus vendor, vendor capacity, bus customisation etc.)*
Timeline for baseline case: ~16-30 months



Quality[2]

Key driver: *Route availability and service reliability (low delay frequency), quality and capacity of buses*
Assumed quality for baseline case: realistic mid-way

Cost[3]

Key drivers: *Vendor selection, depot build, battery size, bus length and quality, charging alternative*
*Estimated total cost: $CI25-30 million**
(Preliminary assessment of costs for baseline case)

*Costs for implementation timeline, not operational expenditure ("OPEX")

Most decisive factors that influence the Cost-Time-Quality-triangle

1. Ambition level for reduction in traffic;
2. Ambition level related to quality of service;
3. Depot size, location and quality;
4. Road modifications needed, e.g., dedicated bus lanes;
5. Charging type and how to make it environmentally friendly; and
6. Implementation approach in terms pace and degree of outsourcing, e.g., phased approach.

Description of chosen baseline case

1. 20 large buses (40ft/12m) running one route to West Bay and two east to North Side/East End;
2. 10 mini-buses running one two-way route every 10 minutes in city center;
3. One new bus depot for all 40 buses with plug-in charging at depot;
4. Few road modifications; and
5. Other assumptions are specified in each section.

[2] Further recommendations on quality and how to increase customer satisfaction as well as how to make bus travel more attractive is covered in Phase 1 of this report.

[3] There are several factors that would impact on cost and timing. However, the proposed baseline provides a preliminary assessment of costs and timing.

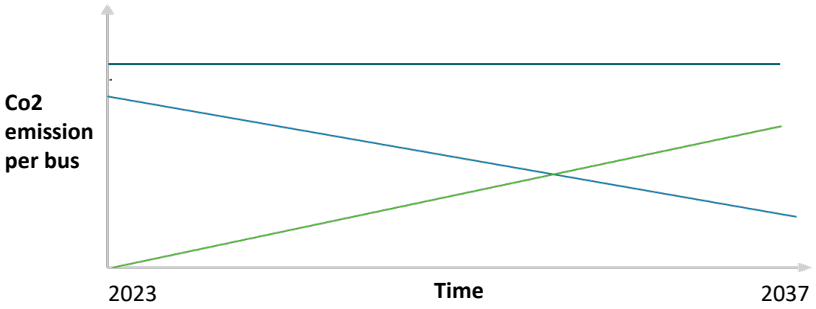
12. Baseline Case Description (continued)

Overview (continued)

Environmental benefits from implementation of electric buses are dependent on the energy mix assumed for producing electricity. Solar panel solutions can be one initiative to increase the mix of renewable energy.

Energy mix

Currently, the Cayman Islands energy comes mainly from fuel generators, which means that the ecological benefits of driving electric buses are very limited. As the country develops their renewable energy production, the positive impact of electric buses will increase.



Share of renewable energy
From 1% in 2023 to 70% in 2037

Co2 emissions per fuel bus
216 liters per 300 kilometers

Co2 emissions per electric bus
Decreasing by 70% as the energy mix's renewable energy share increases

EXAMPLES FROM THE CARIBBEAN

CURACAO – PLANNING TO USE OFFGRID SOLAR ENERGY PRODUCTION TO POWER BUSES
Curacao is building a powerplant powered by a solar panel operating off grid over one (1) acre able to power six (6) electric buses daily. Ultimately the plant will be able to create six (6) times more energy and the surplus will be sold back to the grid.

- 100 % Sustainable from the start
- Can turn bus operation into a profitable venture
- Will change the planning and cost structure
- Bus manufacturer can assist with development

BARBADOS – GOAL TO 100 % RENEWABLE ENERGY BY 2030
Barbados is the first Caribbean country to deploy a large-scale electric bus fleet. Barbados is demonstrating how electric buses can be an effective way to reduce air pollution and noise pollution, while also helping the transition to renewable energy and combat climate change.

- Goal: transition to 100 % renewable energy by 2030
- Introduced 33 electric buses in 2020
- Reduction in emission of greenhouse gases
- Reduction in noise pollution on city streets

12. Baseline Case Description (continued)

Overview (continued)

Insights on Costs

Buses and bus depots are the two most significant cost components. Road improvements constitute a major cost risk factor but can be mitigated or reduced by doing proper analyses prior to deciding on bus types and depot specifications.

Bus main cost drivers

1. Number of buses (requirement needed to fill desired routes/departure frequency);
2. Battery size;
3. Charger type;
4. Length of bus/capacity;
5. Brand/vendor; and
6. Level and quality of vendor support (can be OPEX or capital expenditure ("CAPEX"))

Depot main cost drivers

1. Fleet size and bus types/sizes;
2. Charging type (plug-in vs. pantograph and fast vs. slow chargers); and
3. Electric grid connection/power supply (e.g., solar panel roof).

In addition, ordinary construction project costs can have a significant impact on total costs, e.g., location, land, labor costs etc.

Road improvements/ modifications

Road improvements can significantly increase total costs. Road dimensions and capacities should therefore be assessed.

Final decisions should be based on an overall assessment including life-cycle-costs ("LCC"), environmental aspects, fleet implications on depot, roads and other infrastructure enhancements.

12. Baseline Case Description (continued)

Overview (continued)

Insights on Costs (continued)

The preliminary assessment of costs performed for the chosen baseline case indicates that a realistic mid-way approach would be approximately KYD$25-30 million.

Baseline case

In our baseline case, buses and bus depots amount to about 90% of the total investment costs considered. Moreover, in our baseline case, the costs related to buses are about twice of the total costs related to depot and charging.

There are significant cost variances in both components, most of which can be managed by special requirements. The cost ranges at the right are based on benchmarks. These are detailed further in the Baseline Case: Activities and Timeline section of this report.

Cost estimates for baseline case

Buses:

30 buses at approximately KYD$500,000 (based on case studies)

10 mini-buses at approximately KYD$250,000 (based on preliminary prices from vendor interviews)

Bus depot (including charging infrastructure):

KYD$10 million ("mil") for 40 buses (based on case studies)

Road improvements and the need for bus stops is currently estimated at KYD$3 million but should be further assessed.

Baseline case – share of total cost per component

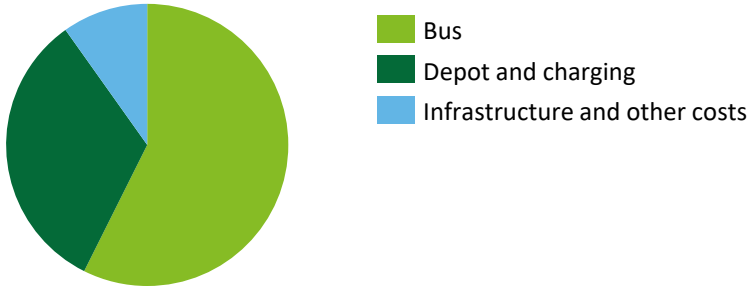
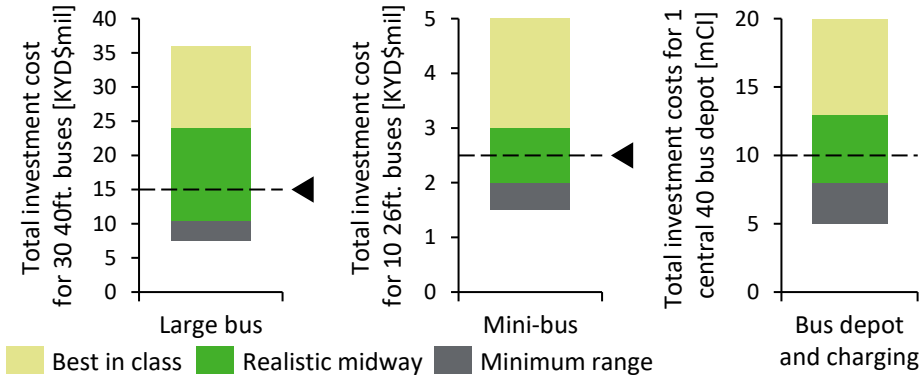


Illustration of ranges for cost estimates



Sources: Deloitte analysis with information from the U.S Energy Information Administration Report "Electric Power Annual" November 8, 2022

12. Baseline Case Description (continued)

Overview (continued)

Insights on Costs (continued)

Below are case studies showcasing references for price ranges.

				
LOCATION	ROMANIA	BERMUDA	BARBADOS	United States ("U.S")
DESCRIPTION	The city of Craiova in Romania placed an order for their first electric buses in 2020	Bermuda received its first 10 electrical buses in February 2022 from an order for 30 buses	In 2020, the Government authorised an order for electrical buses	Park City Transit (in Utah, U.S.) bought electric buses in 2016
NUMBER OF BUSES	16	30 + 40 at later stage	33 + 14 at later stage	6
TOTAL COST**	USD$ 13,100,000 KYD$ 10,900,000	BMD$3,960,000 KYD$1,600,000	USD$10,000,000 KYD$8,300,000	USD$3,900,000 KYD$3,250,000
COST PER BUS**	USD$490,000* KYD$408,000	BMD$132,000 KYD$110,000	USD$303,300 KYD$252,500	USD$650,000 KYD$541,500
BUS TYPE	Solaris 18 Urbino, 60 feet	Golden Dragon, 26 feet	BYD, 30 feet	Proterra, 40 feet
SEATS/TOTAL CAPACITY	~55/~146	~25/~40	~30/~50	~40/~90
CHARGING INCLUDED	16 depot and 4 pantograph	No	No	No

*Approximately 60% of total investments towards buses

** Exchange rates between foreign currencies and KYD were taken in February 2023 and may be subject to fluctuations

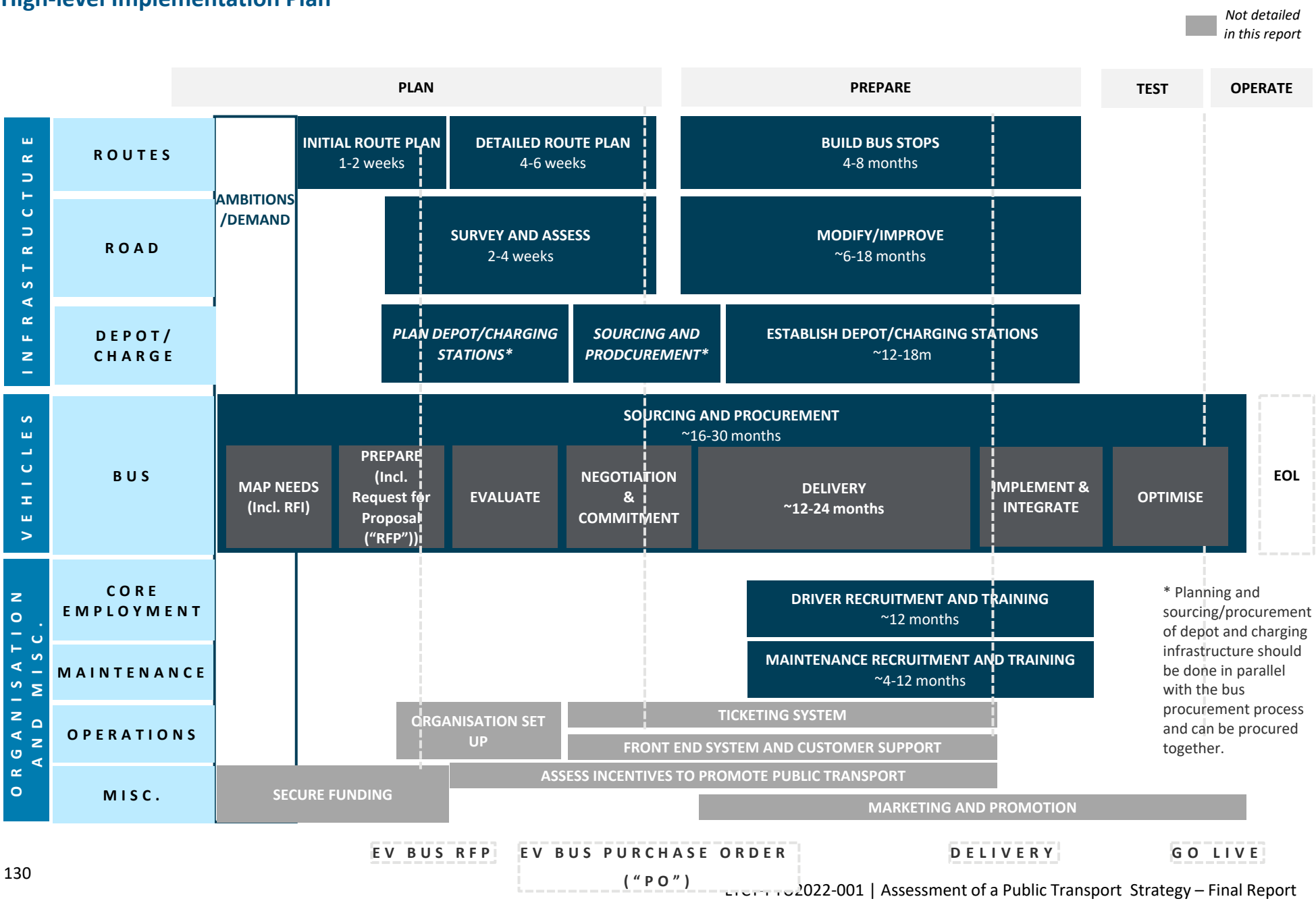
Sources: Deloitte analysis with information from:

1. *The Interamerican Development Bank Article "Government electromobility investments in Barbados are paying off" March 17, 2022;*
2. *Government of Bermuda Article "Update on the New Electric Buses" February 18, 2022;*
3. *Insideevs Article "Solaris To Deliver 16 Articulated Electric Buses To Romania" May 23, 2020; and*
4. *Park City Press release "Park City Transit Awarded Another "Low-No" Emission Grant ($500,000) from Federal Transit Administration" October 4, 2017.*

13. Baseline Case: Activities and Timeline

13. Baseline Case: Activities and Timeline

High-level Implementation Plan



13. Baseline Case: Activities and Timeline (continued)

Implementation Plan: Infrastructure Summary

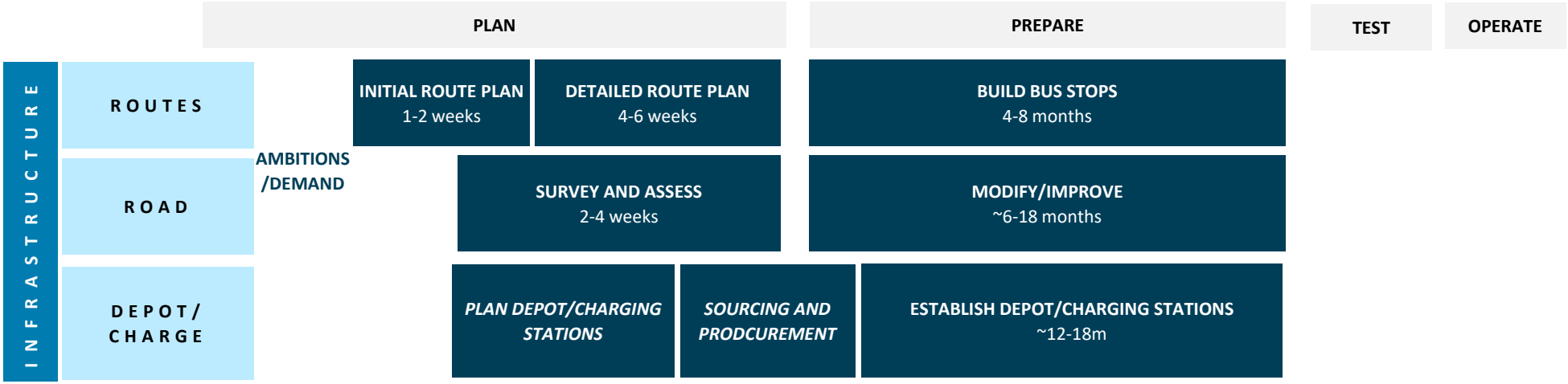
Depot and charging stations are the main infrastructure investment costs. Road modifications may also be costly but will depend on the need and desired standards for speed and punctuality of service.

Key takeaways

1. Depot building costs are the second largest cost after EV buses;
2. Infrastructure planning should be done in parallel with EV bus procurement due to the important connections between infrastructure requirements and bus specifications;
3. Some vendors can deliver entire bus fleets and the necessary infrastructure;
4. Road improvements are considered a high-risk factor and if not properly managed can lead to significant cost overrun and/or delays; and
5. **Costs and timelines for Park & Rides are not estimated in this baseline case**.

TIME ESTIMATE

12-20 months



13. Baseline Case: Activities and Timeline (continued)

Implementation Plan: Vehicles Summary

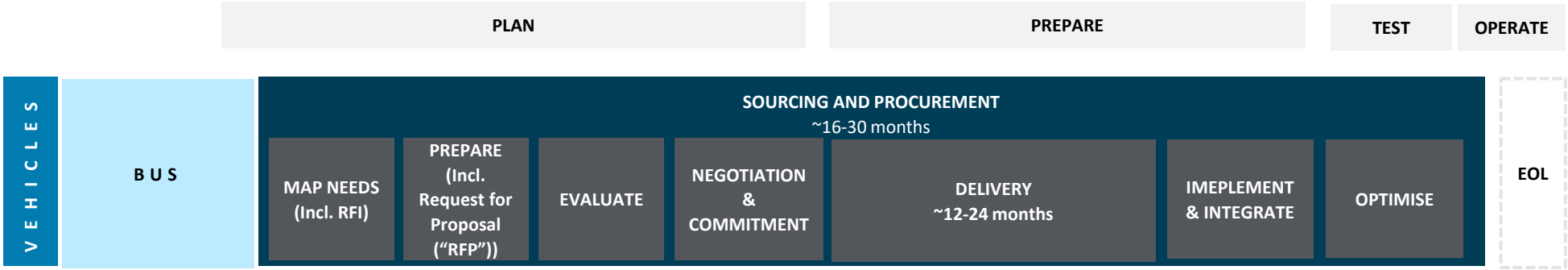
Ambition levels and operations need to be considered before finalising the RFP. The number of buses as well as the vendor and bus selection process can drive costs and delivery time should also be a key consideration.

Key takeaways

1. Sourcing is highly dependent on ambition level and scope/routes;
2. Operational decisions need to be assessed before developing the final RFP;
3. Delivery time is a main driver– it may take between 12 to 24 months, depending on the degree of standardisation required and vendor selection; and
4. Number of buses, brand/type, as well as battery size are the main cost drivers, but can be minimised through strategic routing.

TIME ESTIMATE

16-30 months



13. Baseline Case: Activities and Timeline (continued)

Implementation Plan: Organisation and Miscellaneous Summary

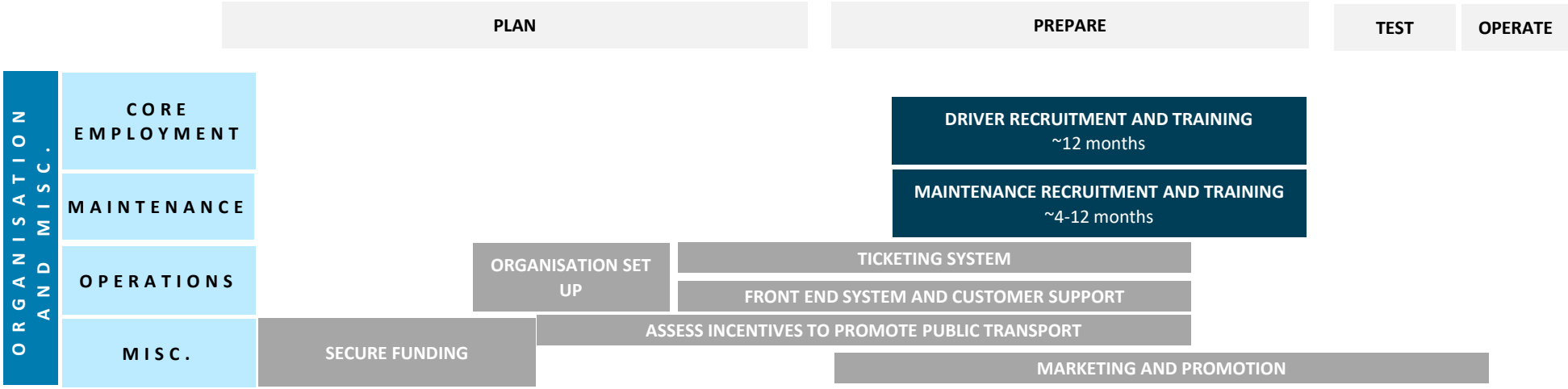
The recruitment of drivers and maintenance staff can be performed while waiting for bus delivery and does not pose a significant cost, however, some complexity may arise if there is a need for overseas recruitment and training.

Key takeaways

1. Costs estimated for this category are marginal compared to bus and infrastructure. However, the importance of staff and organisation should not be underestimated when building a new transport system; and
2. Recruiting and training may have to be done abroad in order to get/train staff.

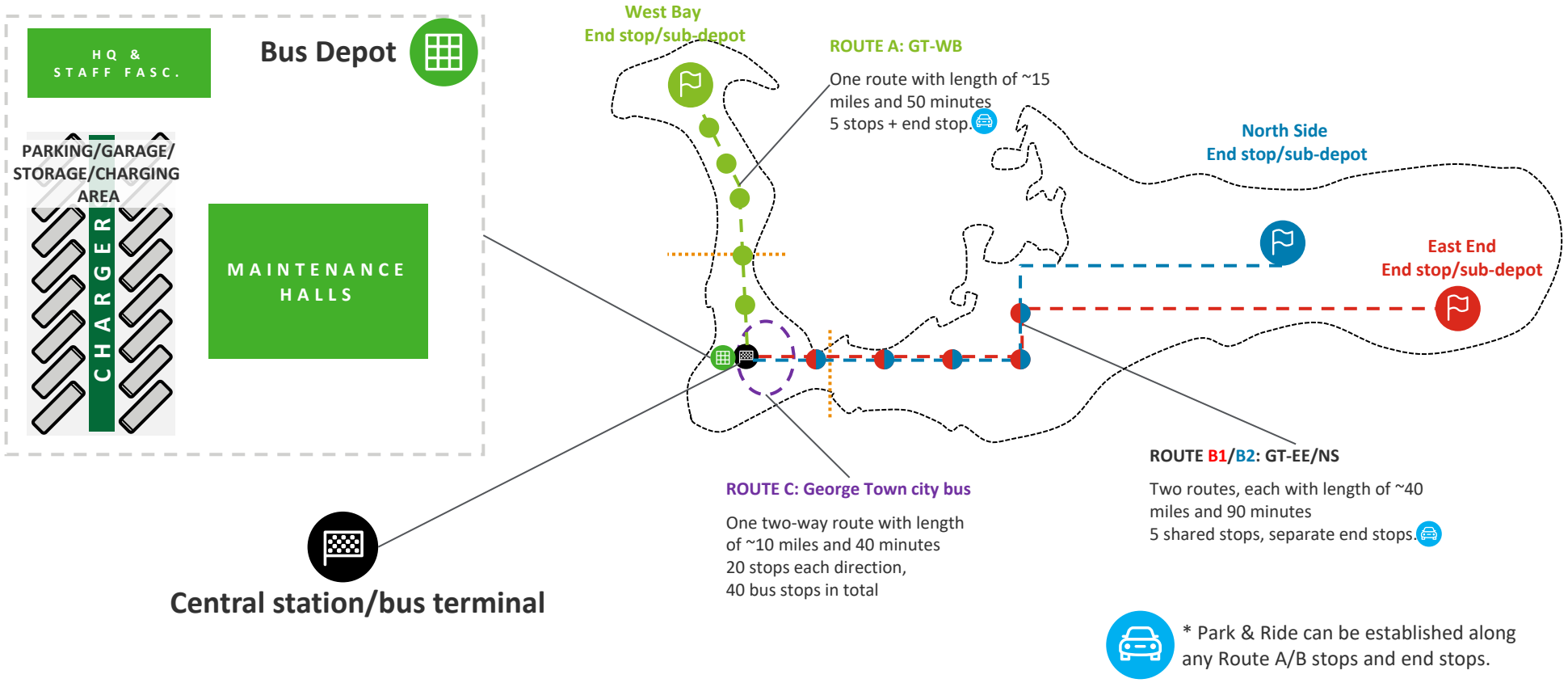
TIME ESTIMATE

4-12 months



13. Baseline Case: Activities and Timeline (continued)

Implementation Plan: Definitions Used



13. Baseline Case: Activities and Timeline (continued)

Implementation Plan: Setting Ambitions and Assessing Demand for Future Transport System

A high-level ambition for a future transport system is an essential input for EV bus procurement and future route and road planning.

Having a clear ambition for a future public transport system is essential because it provides a clear and consistent direction for planning and implementation. Without a clear vision or set of goals, public transport systems may be developed in a piecemeal or ad-hoc manner, leading to inefficiencies, inconsistencies and missed opportunities.

The three examples of different ambition statements can lead to entirely different requirements with regards to type and quality of service and equipment, timelines and cost. A clear ambition will also help ensure all stakeholders involved are aligned, leading to a more effective use of resources. A clear ambition can also help with providing consistency and coherence, which is particularly important when working with new technology and new ecosystems, such as an EV bus transportation system. A clear ambition can also contribute to public engagement and accountability.

Ambitions for the future transport system should be stated in a manner that gives an initial idea on the most significant costs and time drivers, such as:

1. The number and type of buses needed;
2. Charging/fuel specifications and requirements; and
3. Route design and transport availability, i.e., the number of routes and route frequencies.

Examples of different ambition statements

a) "REDUCE THE NUMBER OF PEOPLE TRAVELLING TO GEORGE TOWN DURING RUSH HOUR TRAFFIC BY X % BY THE YEAR 2025"

b) "REDUCE THE TOTAL TRANSPORT EMISSIONS IN THE CAYMAN ISLANDS BY Y % BY 2025"

c) "PROVIDE AN ATTRACTIVE AND SUSTAINABLE PUBLIC TRANSPORT SYSTEM TO AT LEAST 90% OF THE CAYMAN ISLANDS POPULATION BY 2025"

13. Baseline Case: Activities and Timeline (continued)

Implementation Plan: Infrastructure Details

Routes (Initial route plan)

An initial route plan should be developed before reaching out to potential suppliers of both infrastructure and EVs with an RFI. The current route system can be used as the initial route plan.

The initial route plan will give providers an overall understanding of the situation and give enough to have a long-list of possible vendors. Initial discussions and information provided by vendors will be crucial input for final RFP.

Important elements in an initial route plan:

1. Estimated number of routes (or a range);
2. Length per route;
3. Initial plans for charging (all charging at depot vs. charging stations along route);
4. Estimate of (target) population along the specific route; and
5. Dimension limits (due to bridges, roads or other elements that won't/can't be modified).

Calculation assumptions/inputs:

1. The existing routes used as a starting point, but alternatives are considered in order to estimate number of routes, length per route etc.;
2. 1-2 weeks job for a small specialised team; and
3. Considered completed by the National Road Authority, no cost is therefore estimated.

TIME ESTIMATE
Total time estimate: 1-2 weeks

COST ESTIMATE
Costs are not estimated.

13. Baseline Case: Activities and Timeline (continued)

Implementation Plan: Infrastructure Details

Routes (Detailed route plan)

After vendors have answered RFIs, a detailed route plan should be prepared so that the RFP provides enough details for vendors to make a proposal. The content of a detailed route plan are shown on the right-hand side.

The detailed route plan will also be used to finalise road survey and assessments and to plan bus stop/shelter building.

There are specialised traffic/public transport experts who conducts these kinds of tasks. The time estimate will vary depending several factors, such as availability of data and statistics, public engagement, etc.

Calculation assumptions/inputs:

1. Today's routes used as a starting point, but alternatives are considered in order to estimate number of routes, length per route etc.
2. 4-6 weeks job for a small specialised team, 1-3 FTEs
3. Considered done by road authorities, no cost is therefore estimated.

TIME ESTIMATE
Total time estimate: 4-6 weeks

COST ESTIMATE
Costs are not estimated.

*Not necessarily essential for RFP but should be supplemented for final route plan.

Important elements in a detailed route plan:

1. **Bus stops**: The location and design* of each bus stop on the route, including any amenities such as shelters, benches, and information displays;
2. **Route distance and time**: The total distance of the route, including the estimated time it takes to complete each trip;
3. **Frequency**: The frequency of bus service along the route, including peak and off-peak periods;
4. **Schedule**: A detailed schedule of bus departures and arrivals at each stop, including any variations by day of the week or time of day;
5. **Route map**: A map showing the route and the location of each bus stop, as well as any other points of interest along the way;
6. **Operational details**: Information about the operational aspects of the bus service, such as the number and type of buses used, staffing levels*, and any special procedures or rules;
7. **Fares*:** The fares charged for travel along the route, including any discounts or promotions;
8. **Connections***: Information about connections to other modes of transport, such as other bus routes, including transfer points and schedules; and
9. **Performance metrics***: Performance metrics, such as on-time performance, passenger volumes, and revenue, which can be used to monitor and improve the effectiveness of the bus service.

13. Baseline Case: Activities and Timeline (continued)

Implementation Plan: Infrastructure Details

Routes (Bus stops)

We have categorised bus stops into three categories:

1. Simple: a simple sign with minor-to-none improvements in curb/road.

2. Medium: roof for sun/rain cover, bench.

3. Modern/high quality: digital bus information system, lightning, high quality materials. Higher quality bus stops will usually also demand road improvements (height, capacity, connections to internet/power, etc.).

Usually, public transport systems will have a mix of these categories based on, for example, location and traffic. Spacing between stops must be calculated and planned based on population density and assessed with demand along the route. Due to reuse of bus stops for several routes, additional routes can be added with reduced cost per mile.

Alternative funding sources (corporations, organisations etc.) can also be used to reduce government investment costs for bus stops.

Calculation assumptions/inputs:

Route A (GT-WB): Five (5) stops + end stop/sub-depot, six (6) stops in total.
Route B (GT-EE/NS Five (5) stops + two (2) end stops/sub-depots, seven (7) stops in total.
Route C (GT): 100 % of route in city*: approximately 40 stops (for two (2) routes going the opposite direction).
This gives a total of 53 stops. Applying an average cost of KYD$15,000 per stop (medium category)
* Assuming average spacing between stops (location/district): 0.5/2 miles

TIME ESTIMATE
Total time estimate: 4-8 months

COST ESTIMATE
KYD$800,000
(Should be further assessed)

Sources images: Wikipedia, Wiktionary, RenderHub/malibusan

Main drivers of bus stop costs and time consumption:

1. **The number of bus stops**;
2. **Size and complexity of the stop**: The size of the stop and the level of complexity of the amenities provided, such as shelters, seating, and lighting can impact the cost of building the stop;
3. **Location**: The cost of building a bus stop can vary depending on the location, including the cost of land, local labour and construction costs, and any necessary permits or approvals;
4. **Materials used**: The cost of materials used in the construction of the stop, such as concrete, steel, and glass, can also impact the overall cost of the stop;
5. **Equipment and systems**: The cost of installing equipment and systems, such as lighting and signage, can also impact the cost of building the stop; and
6. **Construction resources availability and building approval time**.

Illustration of bus stop categories

Simple *Medium* *Modern*

13. Baseline Case: Activities and Timeline (continued)

Implementation Plan: Infrastructure Details

Routes (Survey and assessment)

Both the procurement of EV buses and route planning rely on an assessment of the road infrastructure. For example, road curves can disqualify certain bus lengths/weights if not improved. It is normal for route plans to consider the introduction of separate bus lanes in areas with dense traffic, pedestrians, accessibility etc.

An initial road survey and assessment should be in place before a final decision on an EV bus order. An initial route plan can be used as an initial road survey plan. Cost-benefit analysis should also be performed in order to evaluate road improvements versus other bus types.

The time it takes to survey and assess road conditions per mile can vary depending on a range of factors, such as the type of survey and assessment method used, the complexity of the road network, and the level of detail required in the assessment. For simple inspection, a conservative estimate would be 30 minutes per mile, while a more detailed inspection can take many hours and up to days for a mile. We have assumed 20 hours per mile, for 5% of the total route length.

Calculation assumptions/inputs:

1. Visual inspection: 15-30 minutes/mile;
2. Detailed inspection: 20 hours/mile;
3. Based on three (3) routes, total 90 miles, an assumption of 3-10 miles needing more detailed inspection; and
4. Considered done by road authorities, no cost is therefore estimated.

TIME ESTIMATE

90miles x 30 minutes = 45 hours visual inspection
4.5miles x 20 hours = 90 hours detailed inspection
Total time estimate: 2-4 weeks*

COST ESTIMATE

Costs are not estimated

Important factors to assess:

1. **Road infrastructure**: The condition of the roads, including the pavement, tunnels, and intersections, should be assessed to determine if any improvements or upgrades are needed to accommodate electric buses;
2. **Road capacity**: The road capacity, including the number of lanes, speed limits, and traffic volumes, should be evaluated;
3. **Road safety**: The safety of the roads, including the presence of accidents, intersections, and other hazards, should be evaluated to determine if any improvements are needed to ensure the safe operation of electric buses;
4. **Road accessibility**: The accessibility of the roads, including the presence of sidewalks, crosswalks, and bus stops, should be evaluated to determine if any improvements are needed to ensure that passengers can safely access and use the electric bus system; and
5. **Charging infrastructure**: The availability and accessibility of charging infrastructure, such as charging stations and electrical grids, should be assessed to determine if any upgrades are needed to support the operation of electric buses.

13. Baseline Case: Activities and Timeline (continued)

Implementation Plan: Infrastructure Details

Routes (Modifications and improvements)

The road modifications and improvements that may be necessary in order to accommodate large buses can vary depending on the existing road infrastructure and the specific needs of the buses.

Road improvements/modifications should be considered together with charging infrastructure.

Please note that the type and size of the bus can significantly increase the need for road and pavement improvements. Accessibility for moving the impaired, children, strollers, elderly, etc. should be taken into consideration when assessing pavement improvements at bus stops.

Calculation assumptions/inputs:

1. Previous road modification projects costs $CI1000 per ft of road modification; and
2. Assumed the need for pavement and road improvements for approximately 20 bus stops, including improvements near end stops/sub-depot.

.

TIME ESTIMATE

Time is highly dependent on road conditions and the size of buses, as well as resources available

Total time estimate: 6-18 months

COST ESTIMATE

Pavement improvements for bus stops 20m for ~20 bus stops = 400m = 1300 ft = cost of KYD$1.3 million

Total cost estimate: KYD$1.3 million Should be further assessed.

Common road improvements and modifications:

1. **Lane widening**: In some cases, roads may need to be widened to accommodate larger buses. This may be necessary to provide adequate space for the bus to safely operate and maneuver. In some cases, specific lanes may need to be created only for the use of buses, to enable fast and timely transportation. This must be considered and could incur major costs if there is a need to expand additional lanes;
2. **Shoulder improvements**: Improving the shoulders of roads can provide additional space for buses to pull over and allow for safer and more efficient operations;
3. **Pavement improvements**: Improving the pavement of roads can help to ensure that the roads can support the weight of large buses. This may include smoothing rough pavement, and strengthening the road base;
4. **Intersection improvements**: Improving intersections can help to ensure that buses can safely and efficiently navigate through intersections, reducing the risk of accidents and delays;
5. **Signage and marking improvements**: Improving signage and road markings can help to clearly identify the path that buses should take and improve the safety of the road; and
6. **Traffic management improvements**: Improving traffic management, such as adding traffic signals and cameras, can help to improve the flow of traffic and reduce the risk of accidents and delays.

13. Baseline Case: Activities and Timeline (continued)

Implementation Plan: Infrastructure Details

Storage and Charging Depot

The bus storage and charging depot is the second largest cost when implementing a new EV bus transport system. This particular depot is a transport system's operating base. It provides storage accommodation, charging, servicing and maintenance facilities for vehicles, an administrative function, and facilities for staff.

Each of these elements must be estimated individually, and quality may be adjusted for each separate part.

Calculation assumptions/inputs:

1. Two reference cases are used as a benchmark:
    a) UK: £10m for 120 buses, i.e., £83k/bus (~KYD$83k/bus)
    b) US: USD$86m for 250 buses, i.e., $344k/bus (~KYD$286k/bus)
    c) Australia: AUS$36m for 55 buses, i.e., $654k/bus (~KYD$375k/bus)
2. All reference cases are for EVs or prepared for EVs. The Australia case includes solar panel roofing and a microgrid system and is considered very high quality.

TIME ESTIMATE

Based on the reference cases, depot building time is estimated to be 14-18 months, but this does not include land acquisition, building permits etc.

Total time estimate: 14-18 months

COST ESTIMATE

Average benchmark is approximately KYD$250k/bus. Based on a requirement to accommodate three (3) large and 10 small buses. This gives an estimate of KYD$10m.

Total cost estimate: KYD$10 million
Should be further assessed.

Main factors for time and cost estimate:

1. **EV Bus related factors**: Fleet size and bus types/sizes, Charging type (plug-in vs. pantograph, fast vs. slow chargers), Electric grid connection/power supply (e.g., solar panel roof);
2. **Land acquisition**: The cost and time it takes to acquire land can be a significant factor in the overall cost and timeline of the project;
3. **Site preparation**: Preparing the site for construction can involve various activities, such as excavation, grading, and utility installation, which can affect the cost and timeline of the project;
4. **Construction materials**: The cost of construction materials, such as concrete, steel, and asphalt, can impact the overall project cost;
5. **Design and engineering**: Developing a detailed design and engineering plan is critical to the success of the project and can also impact the project timeline and cost;
6. **Labor costs**: The cost of skilled labor, such as architects, engineers, and construction workers, can significantly impact the overall cost of the project;
7. **Environmental considerations**: Bus storage depots may have environmental considerations, such as managing stormwater, which can impact the cost and timeline of the project;
8. **Regulations and permitting**: Obtaining necessary permits and complying with regulations can be time-consuming and costly;
9. **Equipment and machinery**: The cost of heavy equipment and machinery required for construction, such as cranes and excavators, can also impact the project cost and timeline; and
10. **Transportation and logistics**: Transporting materials, equipment, and personnel to the construction site can impact the timeline and cost of the project.

13. Baseline Case: Activities and Timeline (continued)

Implementation Plan: Infrastructure Details

Depot Charging Options

We have assessed two main alternatives for charging:

1. A centralised plug-in charging infrastructure at the depot where vehicles charge over night; and
2. Distributed charging pantographs/terminals where vehicles can charge, usually at end stations and at a bus storage depot.

Pantograph and depot charging have big differences in infrastructure costs. There are both fast and slow plug-in chargers available.

Calculation assumptions/inputs:

1. Centralised plug-in charging;
2. 30 large buses and 10 minibuses, gives a demand of 16 fast and five (5) slow chargers; and
3. Installation and modifications on grid is not included.

TIME ESTIMATE

Buying, delivering and installing chargers is done simultaneously with building the depot. Connecting to the grid depends on the state of the network capacity and specifications

Total time estimate: 1-2 months

COST ESTIMATE

Fast chargers: 16 x KYD$18k = ~KYD$300k

Slow chargers: 5 x KYD$3,500 = ~KYD$20k

Total cost estimate: KYD$320K

Should be further assessed.

Main factors for time and cost estimate:

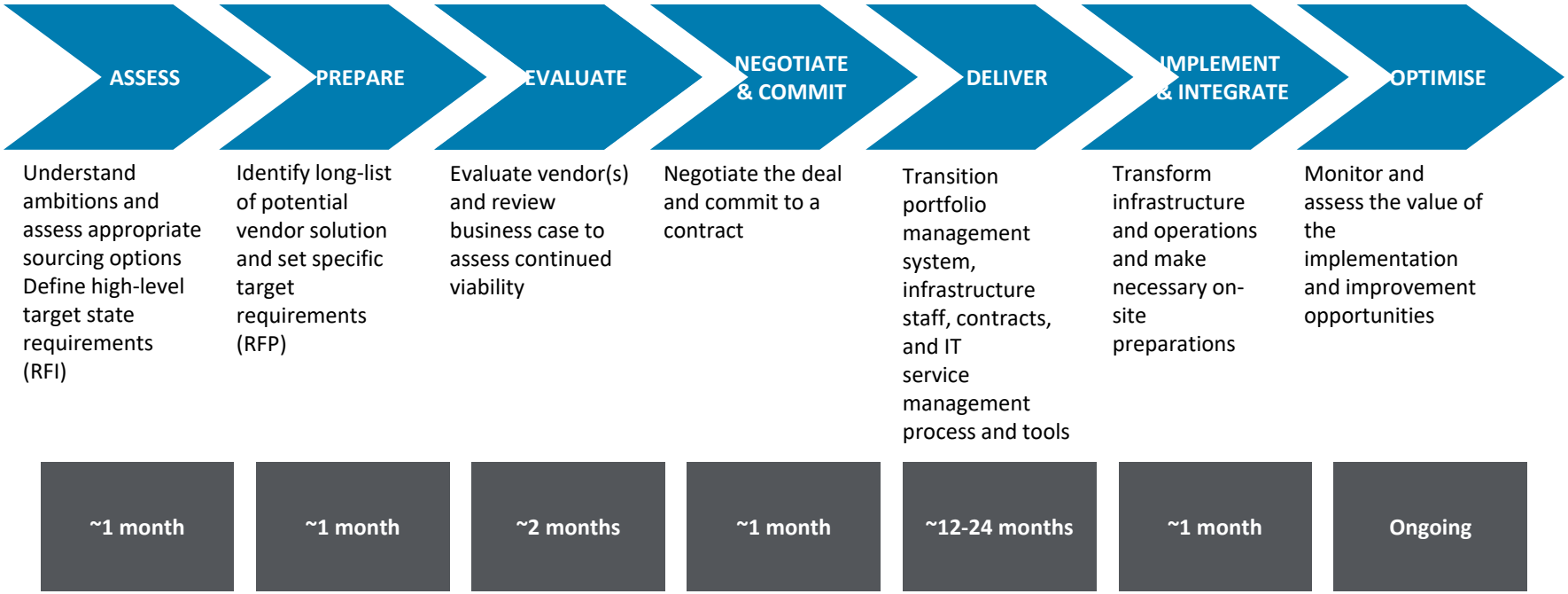
1. **Charger type and equipment**: As described, the type of charger is significantly the biggest cost driver. Not only is the charger more expensive, but installation, connection to grid, and bus acquisition will also in general be more expensive;
2. **Number of chargers and number of locations**: The more chargers at more locations will increase cost significantly;
3. **Electric grid capacity**: Based on indications from an executives at the local electrical provider (Caribbean Utilities Company), there is sufficient capacity to handle the additional load, however if grid capacity needs to be increased, this could have a huge implication on both cost and time; and
4. **Equipment and systems**: The cost of installing equipment and systems, such as charging infrastructure, ventilation systems, and security systems, can also impact the cost of building the depot.

13. Baseline Case: Activities and Timeline (continued)

Implementation Plan: Vehicle Details

Bus: Sourcing and Procurement

Stages for sourcing and procurement process:



13. Baseline Case: Activities and Timeline (continued)

Implementation Plan: Vehicle Details

Bus: Sourcing and Procurement

Main drivers:

1. Number of buses (requirement needed to fill desired routes);
2. Battery size;
3. Type of chargers;
4. Length of bus (capacity);
5. Brand/vendor;
6. Level and quality of vendor support (can be OPEX or CAPEX);
7. Bus delivery; and
8. Complexity of procurement process.

Calculation assumptions/inputs:

1. 30 buses at ~KYD$500 000 (based on case studies);
2. 10 mini-buses at ~KYD$250 000 (based on preliminary price from vendor interview);
3. Preparations for sourcing and procurement ~five (5) months;
4. Delivery ~9-12 months for minibuses, 12-24 months for large buses; and
5. Implement & integrate – at least 1 month.

TIME ESTIMATE

Total time estimate: 18-30 months

COST ESTIMATE

10 x 26 feet buses: ~KYD$2.5m
30 x 40 feet buses ~KYD$15m
Total cost estimate: KYD$17.5m
Should be further assessed.

Important factors to assess

1. The assessment phase consists of defining the complexity and length of the procurement process. It is essential to establish scope and ambitions;
2. The preparation phase is important to reduce risk and make sure requirements and expectations will be met by vendor propositions;
3. Some vendors sell or provide entire ecosystems (charging, depots, energy sources, route information systems etc.) for buses while others only provide vehicles;
4. Vendors may also be engaged to drive the entire implementation process;
5. It is possible to lease batteries “as a service”, which reduces CAPEX and buyer responsibility for maintenance, EOL etc.; and
6. Phased implementation can reduce the time to get the first bus on the ground but can increase total costs. This should be assessed as part of the vendor communication and procurement process.

13. Baseline Case: Activities and Timeline (continued)

Implementation Plan: Organisation and Miscellaneous details

Recruitment & Training

Recruiting experienced long bus drivers will simplify and reduce the time needed for training. Due to lack of large EV buses currently in operation in the Cayman Islands, the recruitment and onboarding of new drivers, may however be a lengthy process. The number of drivers needed is highly dependent on the number of routes and route frequency, as well as operating hours. Based on 40 buses in the baseline case, we assess a need for about 100 drivers. This is based on "normal" operating hours i.e., 2-3 shifts per weekday and fewer on the weekends. Recruitment costs are not estimated, since this can be done "in-house" by the Ministry.

Hiring and training this amount of drivers can be done in phases to align with the expected delivery of the buses.

Important considerations:

1. Driver training is provided by most bus manufacturers. The typical training programme is built on a train-the-trainer method;
2. The training can take everything from 2-3 days to one (1) month, depending on a drivers' previous experience; and
3. Based on availability of buses, the training might have to be done abroad which will increase cost.

TIME ESTIMATE

Recruitment time depends on availability. If drivers need to be recruited from abroad, this process can take up to 8-10 months. Training is estimated to take 1-2 months, depending on a drivers' experience.

Total time estimate: 12 months

COST ESTIMATE

Costs are not estimated.

13. Baseline Case: Activities and Timeline (continued)

Implementation Plan: Organisation and Miscellaneous details

Recruitment & Training (continued)

Recruiting mechanics can prove to be challenging, since there are few ZEBs currently operating in the Cayman Islands. To do maintenance on EVs, mechanics also need high-voltage training/certification, which further complicates recruitment.

Bus manufacturers state that the benchmark for mechanics is ~1 mechanic/10 vehicles with a new fleet buses between 1-5 years old. The need for mechanics will increase as the fleet gets older and may be double near EOL (~15 years old). Weather conditions (temperature, salt, sand, etc.), road conditions, and other external factors may also affect the maintenance needs.

Recruitment time necessary for maintenance staff is considered short, since there is a relatively low number of staff needed (approximately 4-5 for 40 buses). If recruitment must be done abroad, the time will increase.

Recruitment costs are not estimated, since this can be done "in-house" by the PTU.

TIME ESTIMATE

Time for recruitment: 3-9 months.
Time for training: 3 months.

Total time estimate: 6-12 months

COST ESTIMATE

Costs are not estimated.

Important considerations:

1. Maintenance training is provided by most bus manufacturers as part of the procurement process. The training period is typically about 2 weeks for 5-8 experienced bus mechanics. The time needed can be longer for inexperienced mechanics;
2. Training might also occur abroad and training on the job training at other locations facilitated by the manufacturer; and
3. The training period will also be longer if maintenance staff do not hold the necessary certifications/experience, e.g., high volt.

14. Appendix A: PTU Bus Routes

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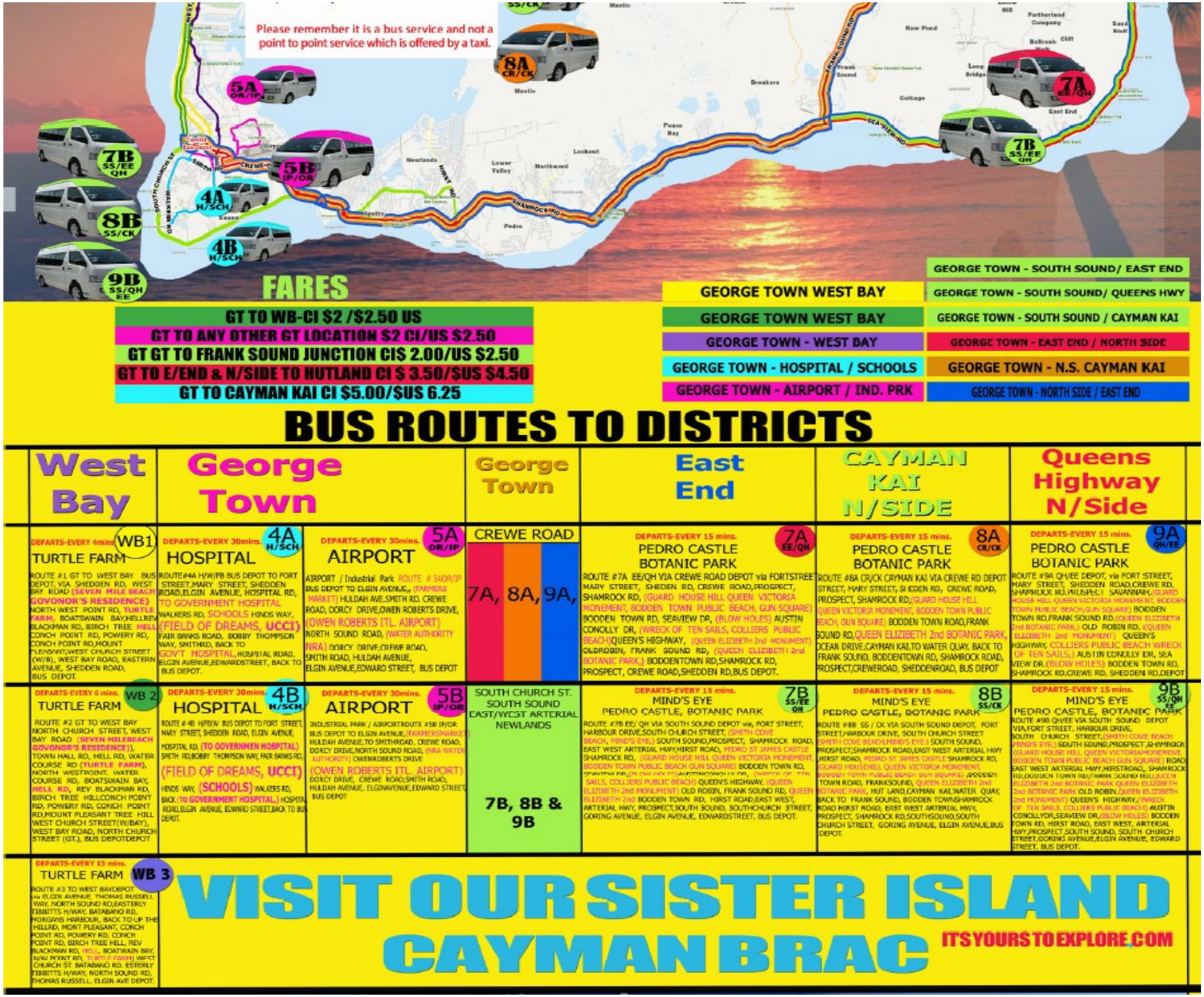

15. Appendix B: Other Factors to Consider

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1. School Buses

Information from The Cayman Islands' 2021 Census of Population and Housing Report shows that almost 70% of school goers are transported to schools in Grand Cayman via private vehicle. This is an indication that there may be more vehicles on the main roadways at peak hours as parents transport their children to and from schools. As part of both implementation strategy options laid out in this Report, the CIG could look to implement a smaller fleet of school buses as part of the core activities aimed at enhancing the current public bus system. The introduction of school buses could reduce the number of vehicles on the roads as parents rely on the school buses to transport their children to schools, which could reduce congestion levels at peak times and in turn, result in increased speed of service delivery on the existing private bus system.

2. Water Taxis/ Ferries

Feedback received through our stakeholder engagements, indicates that there is a demand from a segment of residents and visitors who would prefer to avoid travel via the roadways between George Town and North Side, particularly to save time. This suggests that should there be a scheduled water taxi service operating regularly this could be used to transport visitors to and from North Side during peak tourism season to allow them to experience the tourist attractions along the Northern side of the island, e.g., Rum Point, Bio-luminescent Bay, Starfish Point, etc. Residents living in North Side as well as individuals who work in North Side who live on the Western side of Grand Cayman, could utilise scheduled water taxi services during the week for transport to and from their homes or place of employment, respectively. This would in turn pull additional vehicles off the roads during peak hours.

3. Car Sharing Initiatives

Car sharing initiatives are a great way to reduce congestion and promote sustainability. By sharing cars, fewer vehicles are needed on the road, which can alleviate traffic and reduce the overall carbon footprint. Car sharing can incentivise users to make more sustainable choices, such as combining trips or using alternative modes of transportation for shorter journeys. By reducing the number of cars on the road, car sharing initiatives can also decrease the amount of greenhouse gas emissions and air pollution, contributing to a cleaner and healthier environment. Overall, car sharing initiatives offer a practical and eco-friendly transportation option that benefits both individuals and society as a whole. The CIG could implement an island-wide marketing campaign, using incentives, to encourage the public to car-pool or implement other car sharing initiatives.

15. Appendix B: Other Factors to Consider (continued)

4. Micro Mobility

The CIG, in an effort to alleviate the number of vehicles on the roads, could target residents and visitors and lead the introduction of certain types of micro mobility to be used as an alternative to cars and larger modes of transportation. Micro mobility could be particularly useful for short trips and last-mile transportation, as it could be faster, cheaper, and more convenient than driving or using the existing private bus system in Grand Cayman. In addition, micro mobility options are often environmentally-friendly, producing little to no emissions, and can help to reduce the overall carbon footprint of transportation. As more and more people adopt micro mobility solutions, the number of cars on the road is likely to decrease, resulting in less traffic and a more sustainable transportation system overall.

Examples of different types of micro mobility options that the CIG could look to implement include:

1. Bicycles: Traditional bicycles, as well as e-bikes and pedal-assisted bikes, are a popular micro mobility option for many people. Bikes are lightweight, environmentally-friendly, and can be used to cover short distances quickly and easily;
2. Electric scooters: Electric scooters, or e-scooters, have become increasingly popular in recent years as a convenient and eco-friendly mode of transportation. They are lightweight, easy to use, and can often be rented on a per-minute basis through various sharing services; and/or
3. Kick scooters: Kick scooters are similar to electric scooters, but they are powered by a person's leg muscles rather than an electric motor. They are lightweight, easy to use, and can be a fun and practical way to get around in urban environments.

16. Appendix C: Organisational Design Principles

16. Appendix C: Organisational Design Principles

Deloitte's approach to providing a restructuring solution to the PTU's organisational structure consisted of an assessment of the PTU's current organisational structure against the following eight organisational design principles:

Strategic Alignment – Every segment (job / component) of the organisation should be designed and maintained as a means of achieving part of the organisation's overall strategy.

Simplicity – The purpose of organising is to accomplish the corporate mission. This mission is accomplished expeditiously and economically when: procedures are understood; flexibility and balance exist; communications are swift; decisions are correct; accountability is established; and hospitable environments for people are provided.

Layers of Supervision – The number of levels of authority should be held to a minimum. Additional levels encourage sending communication upwards instead of making the decision as close to the issue as possible and impedes communication and decision making.

Span of Control – The span of control should be broad without sacrificing efficiency. However, there is a limit to the number of positions one person can effectively supervise.

One over One – A supervisor should have more than one direct subordinate. An assistant supervisor position should never be authorised because the division of authority becomes cloudy.

Complement – Division heads should ensure that they have a sufficient number of people to delegate, review and coordinate work. Divisions should be staffed to handle average workloads over a given time period and not based on peak demand.

Decentralisation of Authority – The responsibility for making a decision should be placed as far down in the organisation as appropriate. Decisions should be made at the level in the organisation where the work is being performed and the facts are known.

Span of Interest – There is a limit to the number of functions for which a supervisor can be responsible. Span of interest refers to the number of areas which the individual deals with routinely. Span of interest may be equal to but should never exceed span of control.

Deloitte.