Appendix E - Shortlist [Alternatives] Evaluation

Environmental Statement
East-West Arterial Extension:
Section 2 (Woodland Drive – Lookout Road)
Section 3 (Lookout Road – Frank Sound Road)

Shortlist Evaluation

Assessment of Alternatives
Grand Cayman East-West Arterial Extension

NRA
NATIONAL ROADS AUTHORITY

December 11, 2024

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CMW	Central Mangrove Wetland
CO_2e	Carbon dioxide equivalent
CSF	Critical Success Factor
Cu yd	Cubic Yard
EAB	Environmental Assessment Board
EIA	Environmental Impact Assessment
EWA	East-West Arterial
GHG	Greenhouse Gas
ha	Hectare
km	Kilometre
LOAEL	Lowest observed adverse effect level
LTS	Level of Traffic Stress
m^3	Cubic metre
MT	Metric tonnes
NRA	National Roads Authority
NT	National Trust
PAHI-TD	Planning, Agriculture, Housing, Infrastructure, Transport & Development
SOAEL	Significant observed adverse effect level
tCO_2e/yr	Tonnes of carbon dioxide equivalent per year
ToR	Terms of Reference
UK	United Kingdom
VfM	Value for Money
WebTAG	UK Transport Appraisal Guidance

1 Introduction

The East-West Arterial (EWA) Extension Environmental Impact Assessment (EIA) evaluates an alternative east-west travel route between Woodland Drive and Frank Sound Road on Grand Cayman. The purposes of the proposed project are to improve traffic conditions between the eastern and western districts of Grand Cayman, bolster resiliency by adding another travel route between districts, and facilitate better access to amenities. The EWA Extension also provides opportunities for multimodal usage (e.g. pedestrian, biking, and micromobility facilities), transit expansion, and accommodation for a potential solar canopy.

In accordance with the National Conservation Council's (NCC) EIA Directive, issued under section 3(12)(j) and with effect under section 43(2)(c) of the National Conservation Act (NCA), the NCC decided to require an EIA for the proposed EWA road extension in October of 2016. In 2019, an Environmental Assessment Board (EAB) was empanelled to guide the EIA. The EAB is a subcommittee of the NCC and includes members of the Department of Environment (statutory members), Department of Planning, Water Authority Cayman, and the Public Works Department's Major Projects Office. The EAB is a member of the Project Steering Committee, which also includes the National Roads Authority (NRA).

As is required in the EIA Directive, a Final Terms of Reference (ToR) for the proposed EWA Extension EIA was finalized on April 4, 2023. As part of the process described in Section 43 and outlined in the EWA EIA ToR, an alternatives analysis was undertaken. The alternatives analysis process is discussed in more detail in **Section 2: Assessment of Alternatives** below. During the early stages of the EIA, five Build alternatives (B1, B2, B3, B4, and C1), in addition to the No-Build scenario, were developed and assessed as part of the Longlist Alternatives Evaluation (**Figure 1**). A separate Longlist Evaluation Document has been prepared and finalized to document this analysis.

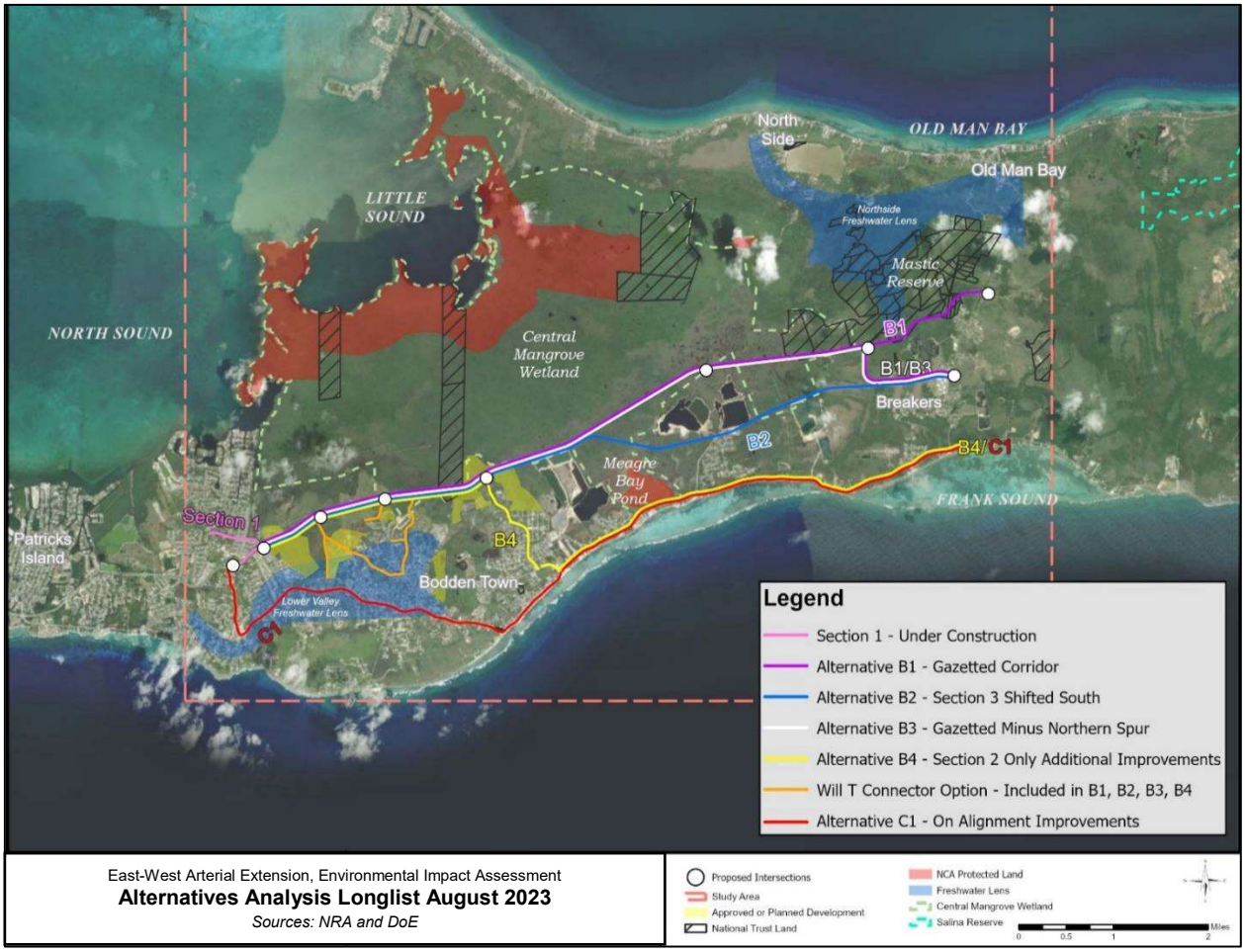

Figure 1: Longlist of Build Alternatives

As a result of the Longlist Alternatives Evaluation, four Build alternatives (B1, B2, B3, and B4) and the No-Build scenario were advanced as a Shortlist of Alternatives (**Figure 2**). As shown in **Figure 2**, the four Build alternatives share the same common section beginning at the western terminus, near Woodland Drive, and continuing east to near Lookout Road. They also share the same common improvements to the local roadway network referred to as the Will T Connector. Additional details describing the Shortlist of Alternatives can be found in **Section 3: Shortlist of Alternatives** of this report and **Attachment B - Engineering – Assessment of Alternatives**. This report focuses on the evaluation of these Shortlisted Alternatives and recommendation of a Preferred Alternative.

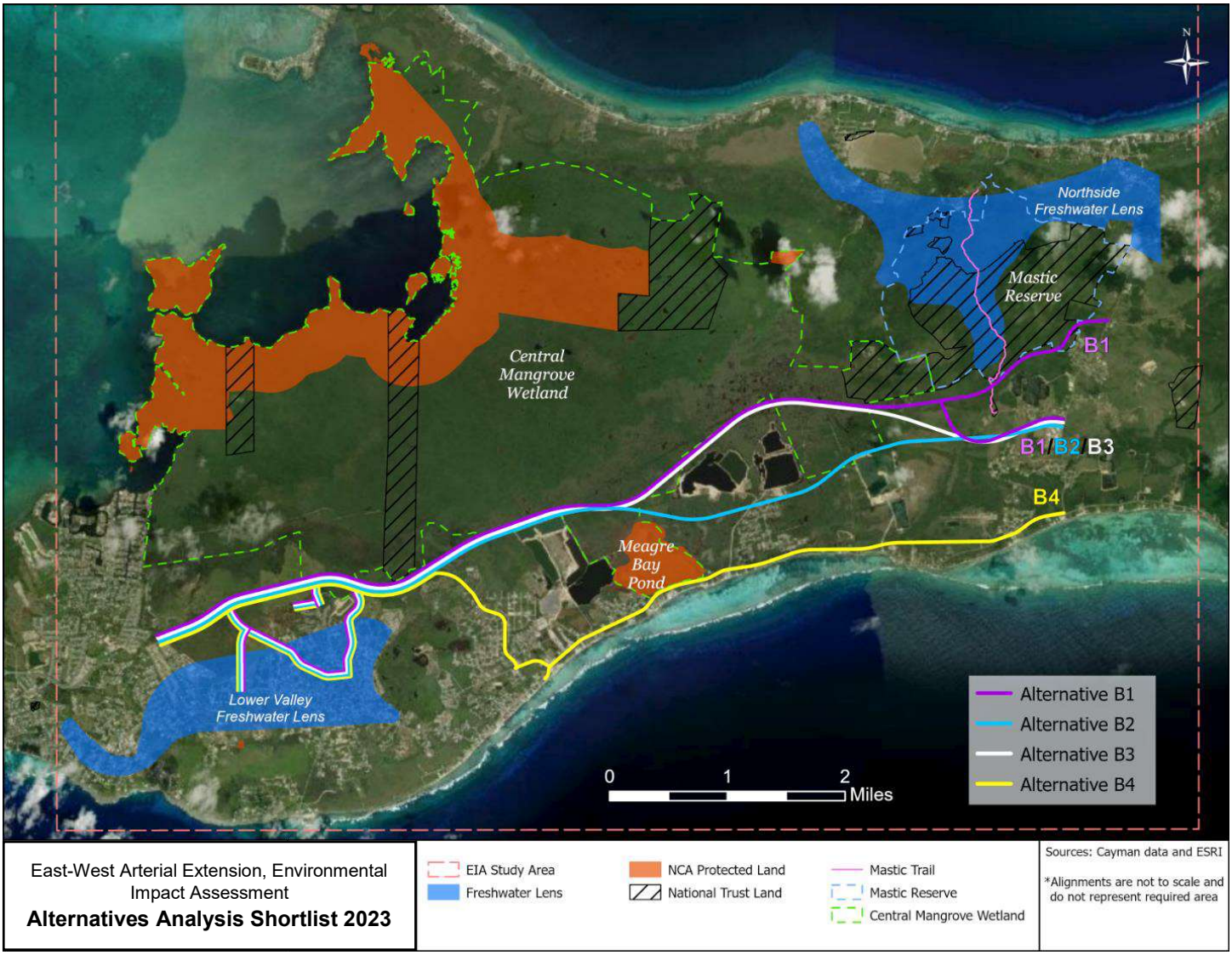

Figure 2: Shortlist of Build Alternatives

2 Assessment of Alternatives

This section describes the overall process that was utiltized for the assessment of alternatives in preparing the EIA for the EWA Extension project. **Figure 3** depicts the steps identified for the assessment of alternatives, as presented in Section 3.2 of the Final ToR. The Critical Success Factors (CSFs) and constraints and dependencies identified in Step 1, and the longlist of alternatives identified in Step 2, can be referenced in the separate Longlist Evaluation Document, which is the deliverable for Step 3.

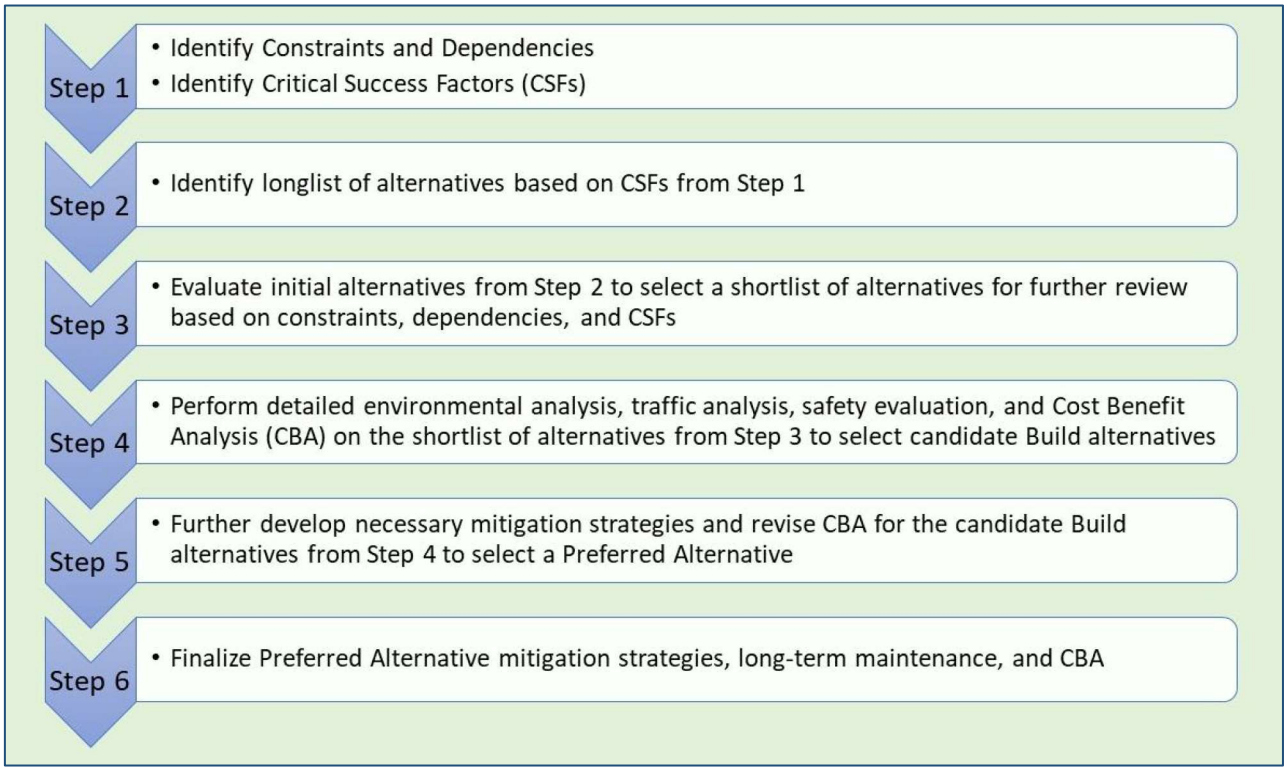

Figure 3: Steps for the Alternative Solutions Evaluation
Source: Section 3.2 of the EWA Extension Final ToR

Based on the limited number of alternatives, it was determined that the steps of the assessment of alternatives would be slightly modified to streamline the evaluation process. **Figure 4** depicts the revised steps of the assessment of alternatives process being prepared for this project. The primary modification to this process is the deletion of Step 5, which indicates the evaluation of Candidate Build alternatives. Based on the development of alternatives, a higher level of detail has been included within the studies performed in Step 4 in order to faciltiate the recommendation of the Preferred Alternative from this step (Step 4). The Shortlist Evaluation is the main deliverable of Step 4, which is satisfied by this document. The following sections describe the alternatives and the analyses conducted for Step 4, the impacts anticipated from each alternative, and the recommendation of a Preferred Alternative.

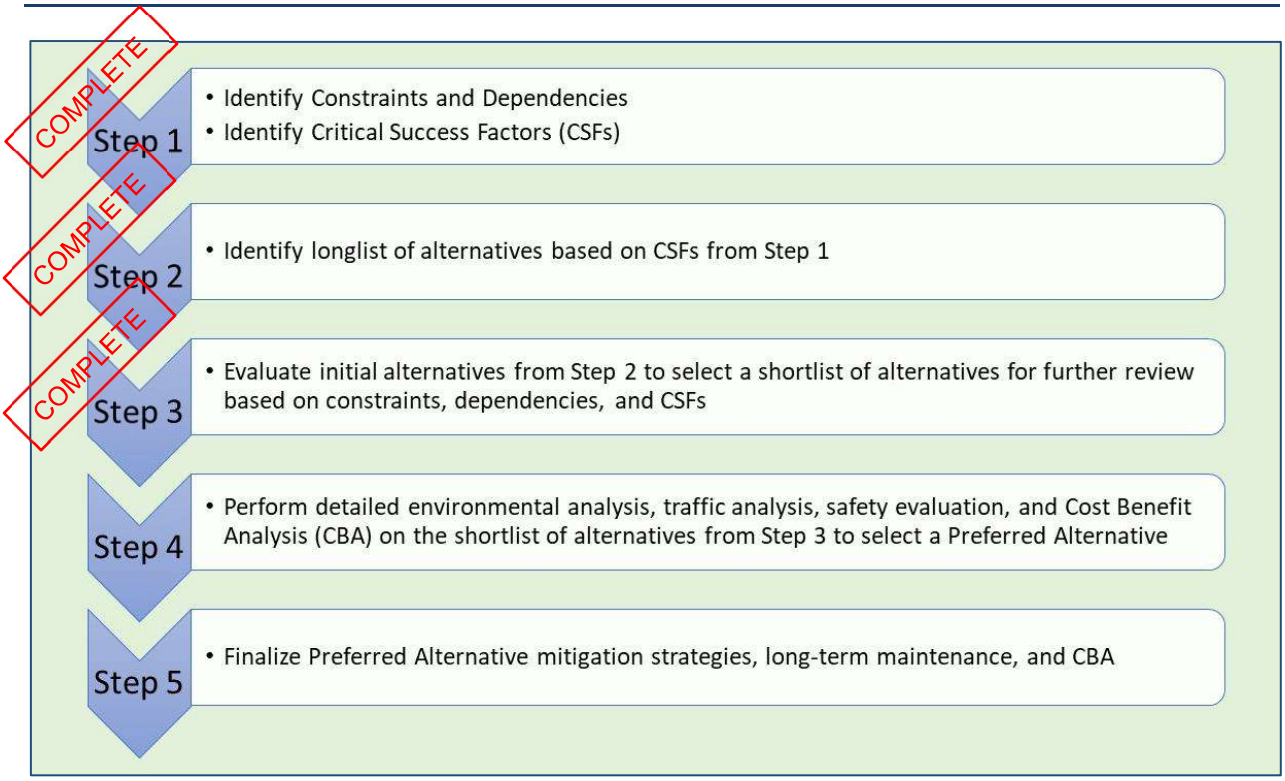

Figure 4: Revised Steps for the Alternative Solutions Evaluation

3 Shortlist of Alternatives

Based on the analysis completed in the Longlist Alternatives Evaluation Document, the following alternatives were carried forward as Shortlisted Alternatives. The Project Steering Committee decided on the following Shortlisted Alternatives:

- Planned Future Roadway Infrastructure (No-Build)
- Alternative B2
- Alternative B3
- Alternative B4

On 5 September 2024, the Project Steering Committee received a memorandum including a directive from the Ministry of PAHITD to carry forward Alternative B1 as one of the Shortlitsed Alternatives. The four Shortlisted Alternatives are shown in **Figure 2**.

Following the Longlist Alternatives Evaluation, additional information was collected on the environmental and man-made features throughout the EIA study area. This included a field verification in July 2023. As a result of the additional and verified information, the locations of the shortlisted build alternatives were modified to best avoid and minimise impacts to these features. Depictions of the revisions in the locations for the Shortlist Alternatives in comparison to the Longlist Alternatives can be found in **Attachment B - Engineering – Assessment of Alternatives**. Summaries and visual representations of the No-Build scenario and the Build alternatives can be found in **Sections 3.1** through **3.5** below.

3.1 Planned Future Roadway Infrastructure (No-Build)

The Planned Future Roadway Infrastructure (No-Build) Alternative describes a scenario under which the EWA Extension is not undertaken. The No-Build scenario is included as a benchmark from which to evaluate and compare the impacts of other alternatives. The difference between No-Build and Build conditions is that the Build conditions will include the proposed project-specific alternatives. The No-Build scenario also:

- Encompasses future year land use assumptions within and around the project study area. Future land use reflects the growth in population, households, and employment.
- Includes planned improvements to the island roadway network independent of Build alternatives B1, B2, B3, and B4. These planned improvements have been included as part of future year traffic evaluations but not evaluated for environmental or social impact as the Cayman Islands Government is planning these improvements as independent projects.

3.2 Build Alternatives

The proposed corridor width for all new roadway construction for the Build alternatives is 220 feet (67 m). This corridor width allows for the area needed to accommodate a variety of features including roadway travel lanes and shoulders, transit transportation lanes, a pedestrian sidewalk, a micromobility path, lighting, utilities, and a solar panel canopy. The transit transportation lanes, lighting, utilities, and solar panel canopy are not within the ambit of the NRA and their inclusion within the corridor is dependent on the appropriate responsible entity. This corridor width also allows for elevating the vertical roadway profile from the existing ground profile to accommodate

a roadway surface elevation above the chosen parameter of a 50-year storm event. These considerations were in support of the CSFs identified during the Longlist Evaluation. Additional information regarding the hydrology evaluation can be found in **Attachment H – Hydrology & Drainage – Assessment of Alternatives**.

The EIA is examining Section 2 and Section 3 of the four shortlisted Build alternatives, B1, B2, B3, and B4. Section 2 is common between the four shortlisted alternatives; it proposes a new section of roadway located from Woodland Drive to Lookout Road and includes a series of improved roadways described as the Will T Connector. As a result of information collected on natural and human features within the study area following the Longlist Evaluation, Section 2 was shifted south near Lookout Road in order to avoid impacting National Trust (NT)-owned Central Mangrove Wetland (CMW) land.

Build alternatives B1, B2, and B3 propose new roadway construction for Section 3. The proposed new roadway would have the same 220-foot (67-m) wide corridor and features as described above. Alternative B4 would primarily follow the existing path of Bodden Town Road for Section 3, therefore a narrower corridor with different accommodations is proposed for Alternative B4.

Details regarding the components of the proposed corridor and timeline of completion can be found in **Attachment B - Engineering – Assessment of Alternatives**. The opening year 2026 and horizon year 2074 roadway typical sections for the Build alternatives are provided in **Figures 5** and **6** below.

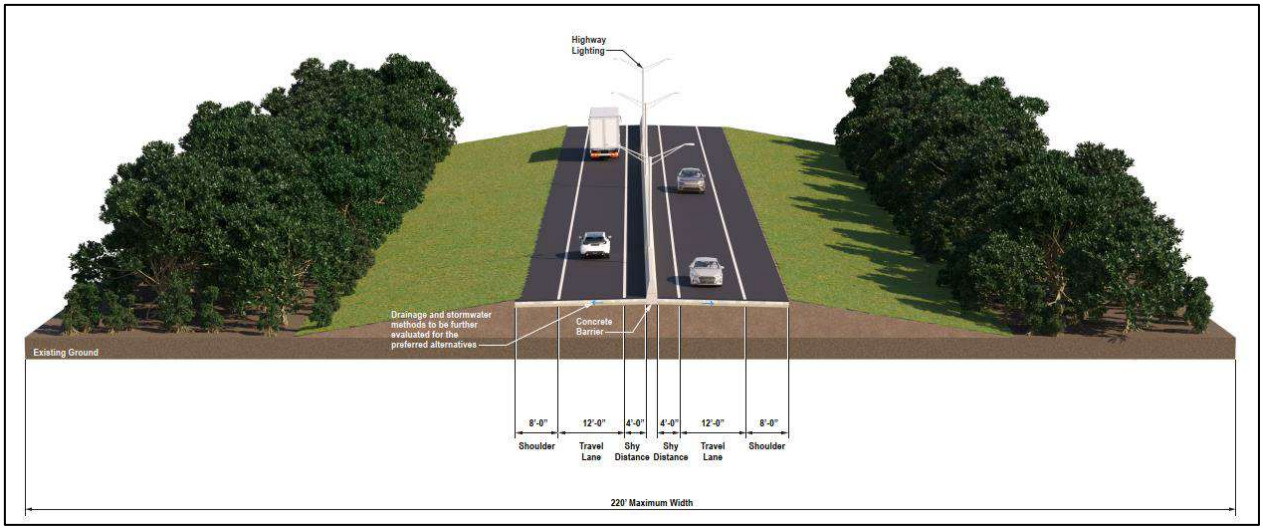

Figure 5: 2026 Build Alternative Section 2 Cross-Section for All Alternatives and Section 3 Cross Section for B1, B2, and B3

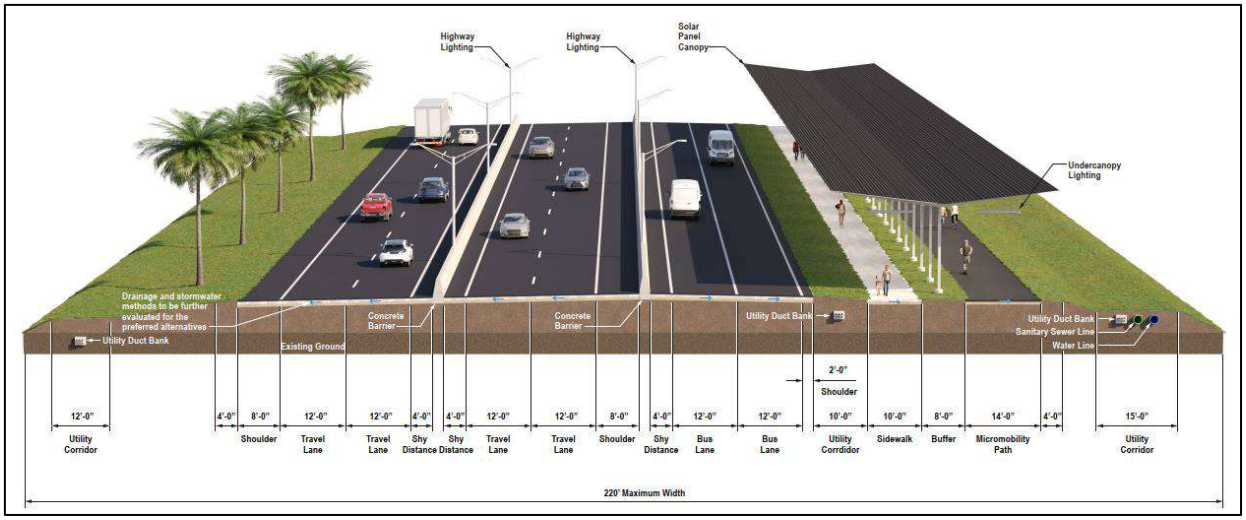

Figure 6: 2074 Build Alternative Section 2 Cross-Section for all Alternatives and Section 3 Cross Section for B1, B2, and B3

Build alternatives B1, B2, B3, and B4 also include a series of improved roadways described as the Will T Connector. These roadways would provide access to the common Section 2 of Build alternatives B1, B2, B3, and B4. **Figure 7** shows the typical section for the Will T Connector. The proposed corridor width for the Will T Connector is 41 feet (12.5 m) including a single travel lane in each direction, bike lanes on both sides of the roadway, and concrete curb and gutter on both sides of the roadway. A sidewalk would also be included along one side of the roadway.

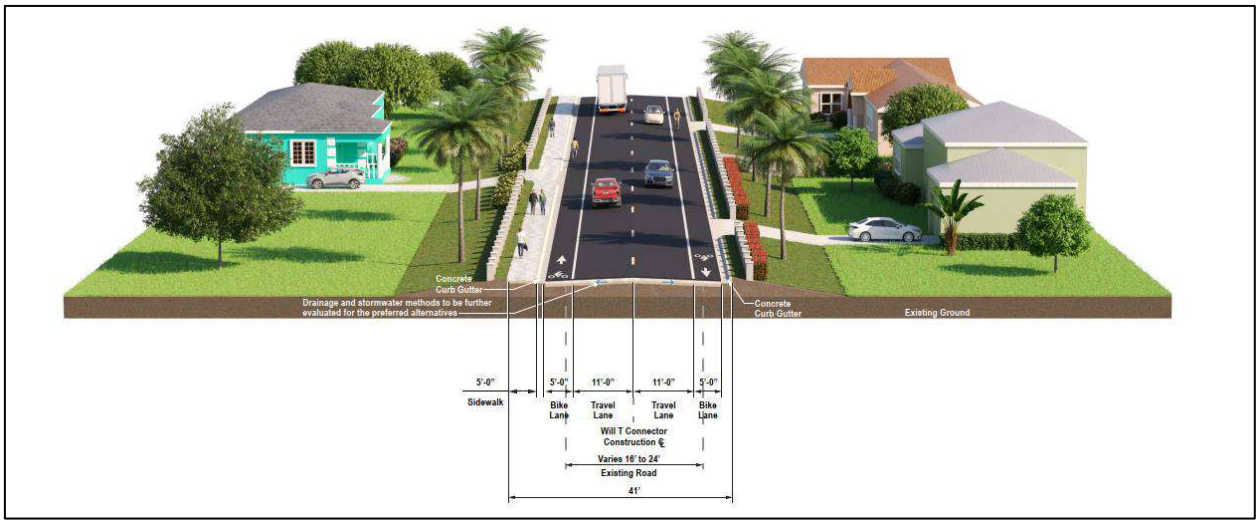

Figure 7: Will T Connector Typical Section for Alternatives B1, B2, B3 and B4

3.3 Alternative B1

Alternative B1, shown in **Figure 8**, was developed to follow the original corridor that was gazetted by the NRA in 2005 as published in the Cayman Islands Gazette, Extraordinary Supplement Number 13/2005, in accordance with Section 25 of the Roads Law (2000 Revision), (now known as Section 26 under the Roads Law (2005 Revision)). The western limit for Alternative B1 begins at the terminus of Section 1 of the EWA (currently under construction) in the area of Woodland Drive and travels east with the construction of a new roadway for approximately 8 miles (13 km) to Frank Sound Road [approximately 9 miles (14 km) with inclusions of the northern connection]. As shown in **Figure 8**, Alternative B1 includes two segments of new roadway with two separate connections to Frank South Road.

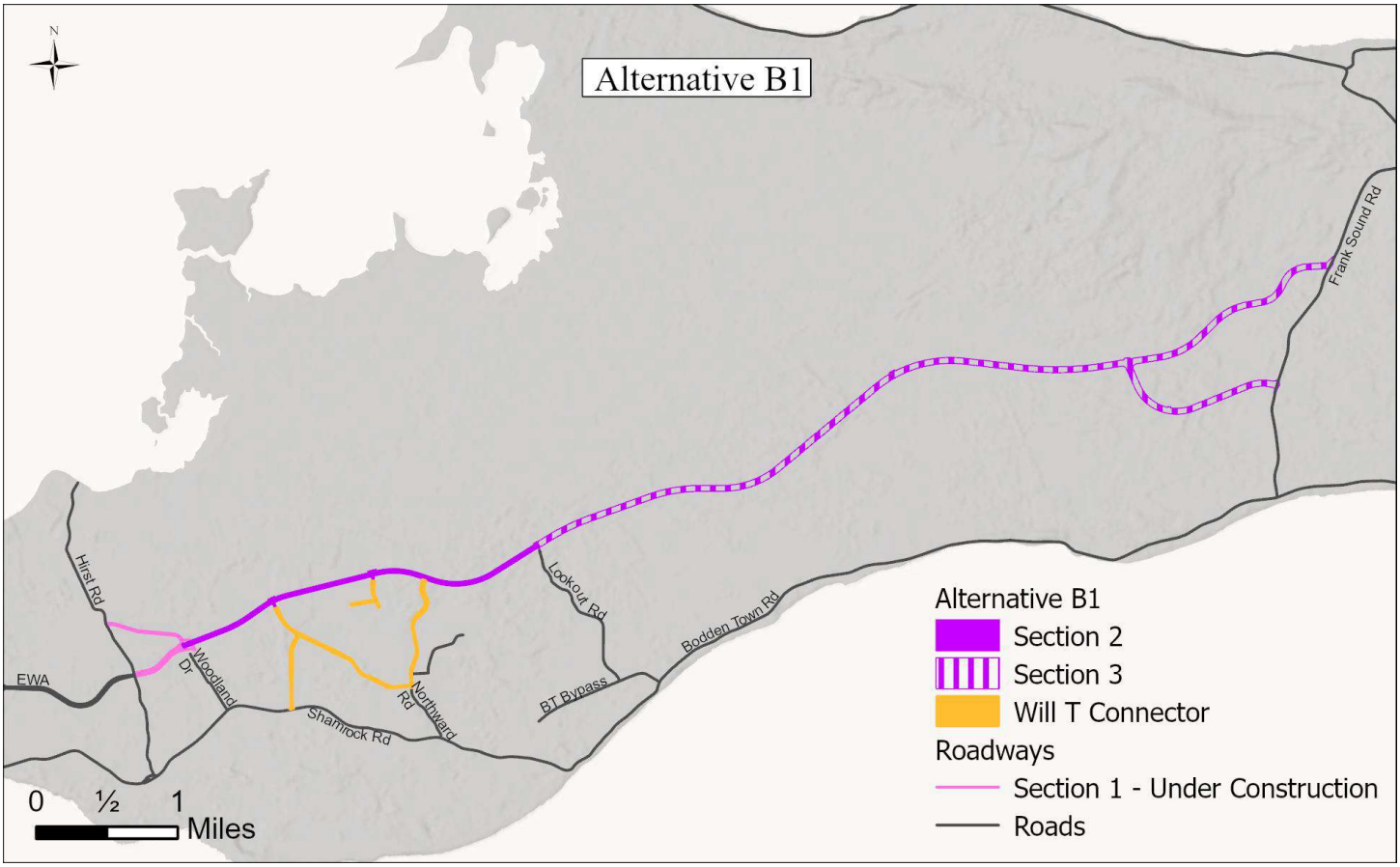

Figure 8: Alternative B1

Following the Longlist Evaluation, the location of segments of Alternative B1 were shifted slightly to the south in areas to avoid impacts to NT-owned Mastic Reserve parcels. In addition, the location of Alternative B1 was also shifted slightly north in some areas to avoid encroachment on active quarries. A figure showing the originally gazetted corridor and the modifications made to Alternative B1 can be found in **Attachment B - Engineering – Assessment of Alternatives**.

3.4 Alternative B2

Alternative B2, shown in **Figure 9**, has the same western limit as Alternative B1. It begins at the terminus of Section 1 of the EWA (currently under construction) in the area of Woodland Drive and travels east with the construction of a new roadway for approximately 8 miles (13 km) to Frank Sound Road. Instead of running north above the quarries like Alternatives B1 and B3, Alternative B2 runs south beneath the quarries. It lacks the northern connection to Frank Sound Road described for Alternative B1, and it ties in at Frank Sound Road at the same place where B1's southern connection ties in.

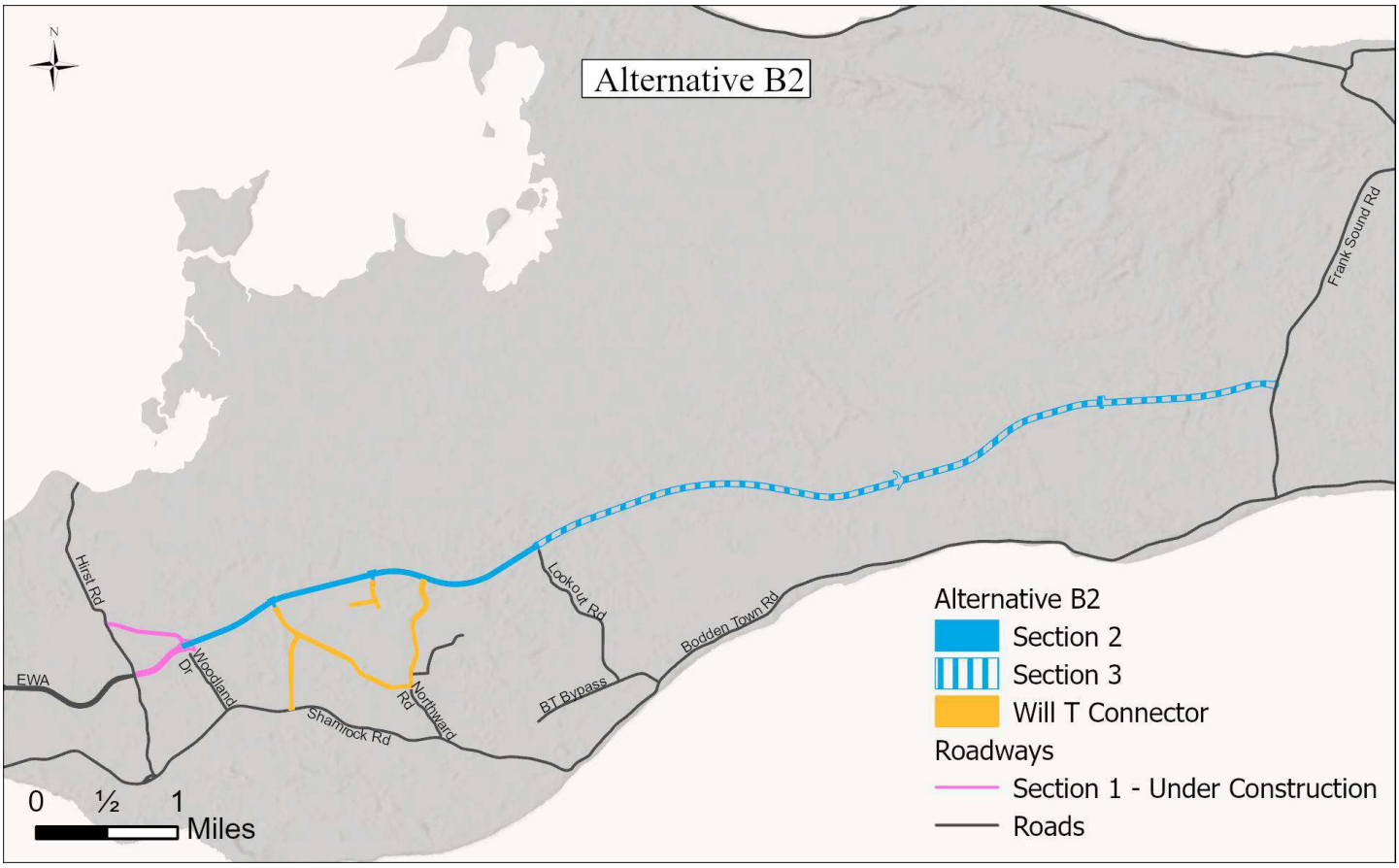

Figure 9: Alternative B2

3.5 Alternative B3

Alternative B3, shown in **Figure 10**, has the same western limit as Alternatives B1 and B2. It begins at the terminus of Section 1 of the EWA (currently under construction) in the area of Woodland Drive and travels east with the construction of a new roadway for approximately 8 miles (13 km) to Frank Sound Road. Within Section 3, Alternative B3 follows the same alignment as Alternative B1 until reaching the Mastic Reserve; at this point, Alternative B3 shifts farther south to connect to Frank Sound Road.

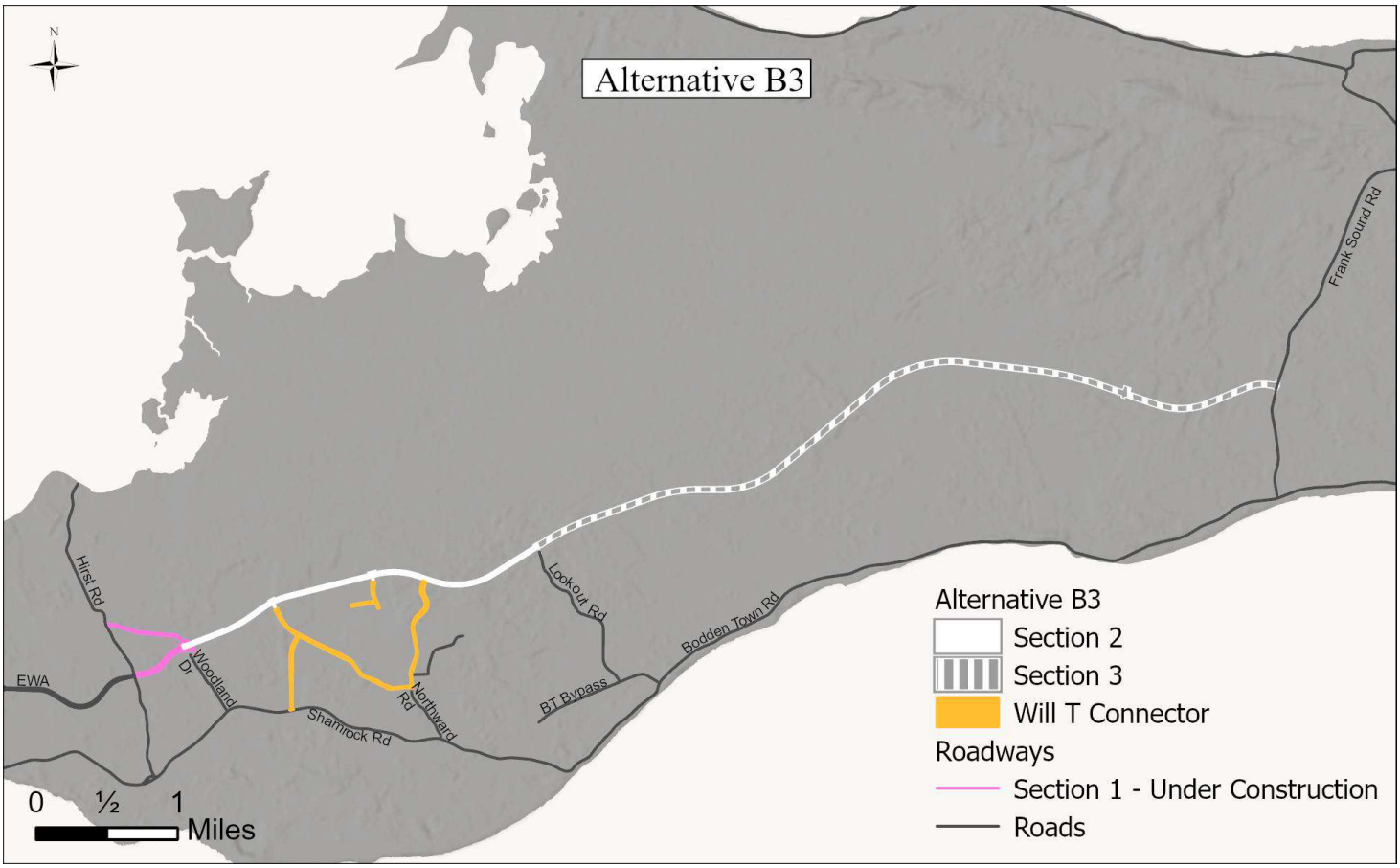

Figure 10: Alternative B3

3.6 Alternative B4

Alternative B4, shown in **Figure 11**, has the same western limit as Alternatives B1, B2, and B3. It begins at the terminus of Section 1 of the EWA (currently under construction) in the area of Woodland Drive and travels east for approximately 8 miles (13 km) to connect to Frank Sound Road at Bodden Town Road's current connection. Alternative B4 follows the same routing as Alternatives B1, B2, and B3 for Section 2 between Woodland Drive and Lookout Road. Within Section 3, Alternative B4 primarily follows the existing roadways of Lookout Road and Bodden Town Road.

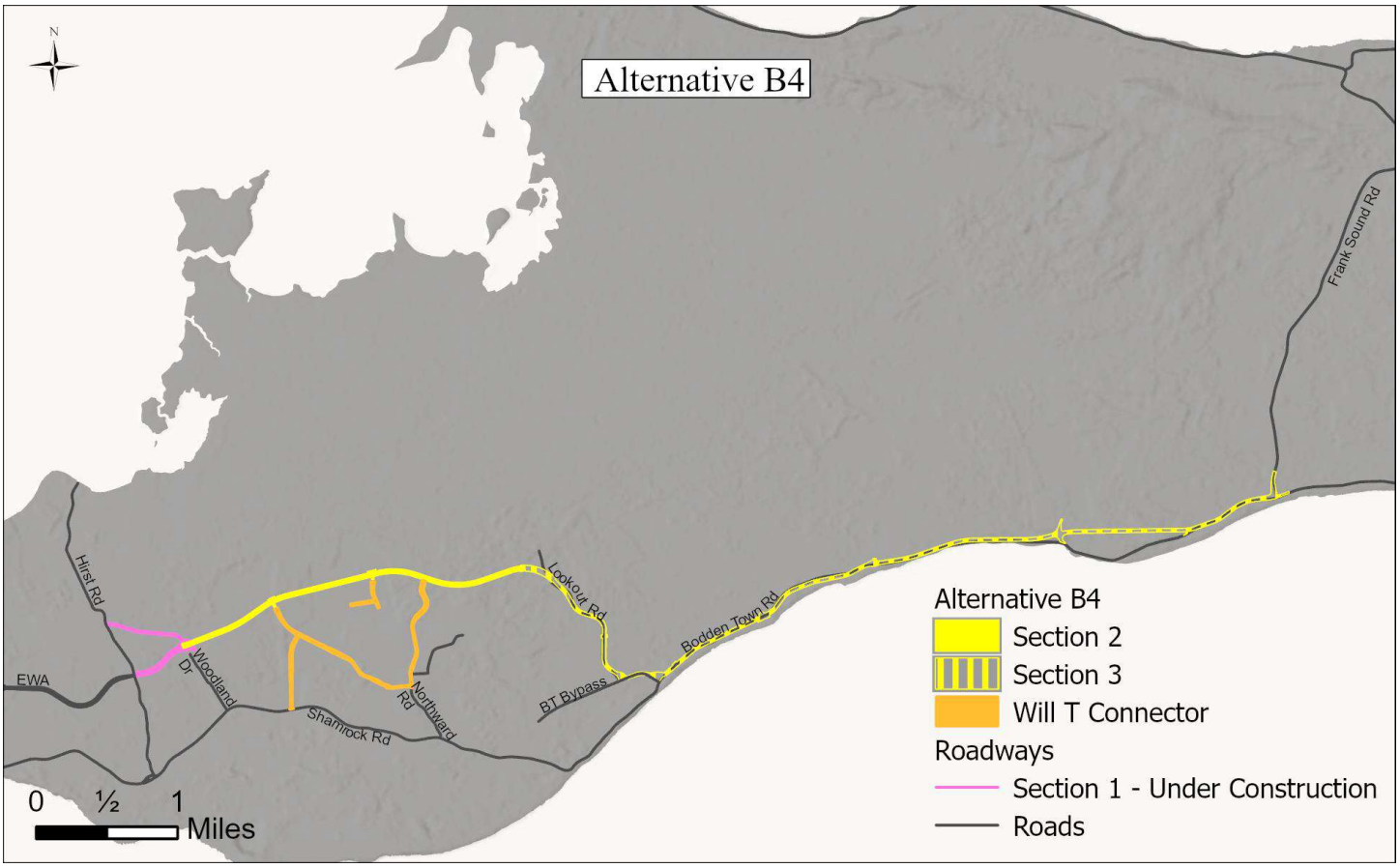

Figure 11: Alternative B4

3.6.1 Resiliency and Elimination from Consideration

As part of the EIA, a *Flood Modeling and Roadway Drainage Openings - Final Report* (Baird and Associates, 2024) was completed. Based on the 2024 report results, Section 3 of Alternative B4 along the southern coast would require an elevation or beach berm of over 20 feet (6 m) above mean sea level to meet the resiliency criteria set forth for this project. This is due to the high risk of the roadway being blocked by sand during a severe event with wave overtopping.

Based on the level of development and its adjacency to the proposed route along Section 3 of Alternative B4, it was determined that satisfying the resiliency criteria would be infeasible without significant social and cost impacts and engineering constraints (i.e., property acquisitions, severing of access, viewshed impacts, and impacts to cross street and driveway connections).

In addition to the hydrological findings, the EWA EIA project team has also completed evaluations in multiple disciplines, and the results provide important insights, particularly through a socio-economic and transportation and mobility lens. In terms of resiliency, Alternative B4 (1) only provides an alternate route west of Lookout Road in the event of road closures or emergency events and (2) the on-alignment improvements, east of Lookout Road, would provide additional travel lanes to the existing road but would likely increase the road's traffic volume, thereby proportionally increasing the likelihood of crashes along the existing road. This inability to provide a complete alternate east-west travel route in the event of road closures or emergencies translates into a diminished journey quality and decreased accessibility, thereby reducing overall quality of life from a socio-economic perspective.

Therefore, the NRA and EAB concurred with the elimination of Alternative B4 from further evaluation on March 14, 2024.

The remainder of the Shortlist Evaluation evaluates Alternative B1, B2, B3, and the No-Build scenario. However, because Alternative B4 was included in the Shortlist Evaluation process for many of the technical disciplines before the decision of its dismissal, Alternative B4 is included in the Technical Reports for Socio-Economics, Traffic, Geo-Environmental, Cultural and Natural Heritage, Terrestrial Ecology, Noise, and Hydrology and Drainage. Alternative B4 is not included within the Engineering, Greenhouse Gases, or Cost-Benefit Analysis attachments. Because of its dismissal, Alternative B4 is also not included or evaluated for anticipated impacts within this Shortlist Evaluation Document.

4 Assumptions

This section describes the key assumptions that were utilized for the Shortlist Evaluation analyses. Additional assumptions related to individual disciplines are provided within the discipline's description and the technical reports prepared for this project. The main objective of the Shortlist Evaluation is to develop and assess the alternatives in a consistent manner to develop a balanced comparison for use in identifying a Preferred Alternative.

4.1 2074 Land Use Scenario

According to the United Kingdom (UK) Green Book, which is the Central Government Guidance on Appraisal and Evaluation, "Costs and benefits should be calculated over the lifetime of an intervention. As a guideline, a time horizon of 10 years is a suitable working assumption for many interventions. In some cases, up to 60 years may be suitable, for example for buildings and infrastructure." Therefore, the EWA EIA Steering Committee chose to use a 50-year time horizon, 2074, that would represent the life-cycle year for construction for all evaluations.

For future year 2074, three land use scenarios of low, medium, and high population and employment growth forecasts were developed based on input from various stakeholders and agencies in Grand Cayman, as detailed in the Land Use Planning Charrette Summary memorandum dated September 8, 2023. Based on WebTAG (Transport Appraisal Guidance) Unit M4, a "core scenario" was selected to reflect the most realistic set of assumptions for the analysis. Of these three 2074 land use scenarios, the medium growth scenario was carried forward as the "core scenario" for the Shortlist Evaluation, assuming a future population of 135,000 people. Details regarding the Land Use Planning Charrette and the "core scenario" can be found in **Attachment A – Traffic – Assessment of Alternatives** and **Attachment C – Socio-Economic – Assessment of Alternatives**.

4.2 Corridor Widths

As part of the EWA EIA Shortlist Evaluation, all evaluations assumed that the entire corridor widths would be disturbed by the project and therefore evaluated for impacts (corridor widths shown in each of the Typical Sections in **Figures 6** and **7**). For Alternatives B1, B2, and B3, the corridor width used for the analysis was 220 feet (67 m) wide. For the Will T Connector portion of Alternatives B1, B2, and B3, the corridor width used for the analysis was 41 feet (12.5 m). The corridor widths represent the maximum width necessary and provide a conservative determination of impact values for the Shortlist Evaluation. As part of the Preferred Alternative Evaluation, further efforts to minimise and reduce disturbance within the Preferred Alternative corridor will be evaluated as applicable.

4.3 Indirect and Cumulative Effects

The Shortlist Evaluation specifically concentrates on analysing direct impacts since these impacts can be more accurately assessed and quantified based on the project's level of design. The potential for possible indirect and cumulative effects has been discussed where applicable; however, since these impacts are less defined due to numerous variables outside of the project's design process, they have only been noted and qualitatively described. Additionally, Alternatives B1, B2, and B3 are anticipated to have similar indirect and cumulative effects. Further evaluation of indirect and

cumulative effects will occur, as applicable, as part of the analyses to be carried out for the Preferred Alternative.

4.4 Induced Growth

The potential for induced growth created by the project along the EWA corridor and adjacent areas is dependent on numerous factors such as island economy, global economy, availability of materials, availability of labour, capacity and location of utilities, buildable land, land use planning and zoning, intersections and access points, and government policy. Based on the current planned development information collected during this study, planned development within the EIA study area is primarily anticipated to be concentrated along Section 2 of the EWA (Woodland Drive to Lookout Road). The proposed designs within Section 2 of the EWA are the same for all Build alternatives (Alternative B1, B2, and B3). The inclusion of the Will T Connector with all the Build alternatives in this area is provided to assist in accommodating travel needs within the Section 2 area. Due to the numerous undetermined future factors, further induced growth was not projected and evaluated for the Shortlist Evaluation. Further evaluation of induced growth will occur, as applicable, as part of the analyses to be carried out for the Preferred Alternative.

4.5 Mitigation

A conceptual level of mitigation measures is presented within the Shortlist Evaluation. Additional evaluation and monetary valuation of mitigation measures will occur as part of the Preferred Alternative Evaluation, as applicable.

5 Anticipated Impacts

5.1 Assessment Methodology

Assessment of the Shortlist of Alternatives utilized methodology from UK guidance, Cayman policies, and international policies, as applicable to each of the individual disciplines being examined. The UK's Department for Transport has extensive guidance for transport projects, called WebTAG (Transport Appraisal Guidance). It extends the UK Treasury's "Green Book" (Guidance on Appraisal and Evaluation) concepts for transport in terms of a Value for Money (VfM) Framework. A key aspect of this framework is the recognition that roads, highways, and rail lines have distinct spatial locations, leading to effects on adjacent communities with unintended consequences such as traffic noise, and the potential for loss of cultural heritage, biodiversity, and others. Those issues are not addressed in the Green Book. However, the VfM framework recognizes them in terms of a split between intended effects that can usually be monetized, and unintended effects that often cannot be monetized.

Applicable WebTAG reference documents have been applied and referenced within the sections below, along with relevant Cayman and international policies. A summary 7-point qualitative scale utilized from WebTAG is depicted in **Table 1** below. Discipline-specific 7-point qualitative scales can be found in the technical reports.

Table 1: Summary 7-Point Scale from WebTAG

Score	Comment
Large Beneficial	The scheme would provide significant improvement or enhancement to the category being examined.
Moderate Beneficial	The scheme would provide an improvement or enhancement to the category being examined.
Slight Beneficial	The scheme would provide a small improvement to the category being examined.
Neutral	The scheme is not in conflict with the category being examined.
Slight Adverse	Some small degradation or damage may result from the scheme.
Moderate Adverse	The scheme may result in direct damage to the category being examined.
Large Adverse	A significant degradation of the category being examined or a major damaging direct impact is predicted to result from the scheme.

5.2 Traffic Operational Impacts

Detailed evaluation of Traffic Operation impacts can be found in the Traffic – Assessment of Alternatives document (**Attachment A – Traffic – Assessment of Alternatives**). Evaluation of traffic operations follows the appropriate WebTAG units, including Unit M4 *Forecasting and Uncertainty*, Unit M1-1 *Principles of Modelling and Forecasting*, and Unit M3-1 *Highway Assignment Modelling*.

The No-Build scenario and each of the Build alternatives (B1, B2, and B3) were assessed in terms of the CSFs established for the Longlist Evaluation, addressing factors such as resiliency, future traffic demand, access to jobs, travel times, intersection delay, safety, and walk/bicycle

accessibility. **Table 2** summarizes qualitative results of each evaluation, organized by their relevant CSFs. Monetization of traffic operation impacts are included within the Cost-Benefit Analysis (**Section 6**).

Table 2: Summary of Traffic Evaluation CSFs

	No-Build	B1	B2	B3
CSF: Create an alternative travel route to the existing two-lane Bodden Town Road. Improve resiliency of existing roadway between North Side/East End and George Town/West Bay				
Alternative Routes	Neutral*	Large Beneficial	Large Beneficial	Large Beneficial
Existing Roadway Resiliency	Neutral*	Large Beneficial	Large Beneficial	Large Beneficial
CSF: Support current and future traffic demand				
Future Traffic Demand	Neutral*	Large Beneficial	Large Beneficial	Large Beneficial
District-to-District Access	Neutral	Large Beneficial	Large Beneficial	Large Beneficial
Employment Access	Neutral	Large Beneficial	Large Beneficial	Large Beneficial
CSF: Improve travel time between North Side/East End and George Town				
Study Area Travel Times	Neutral*	Large Beneficial	Large Beneficial	Large Beneficial
Key Destination Travel Times	Neutral*	Slight Beneficial	Slight Beneficial	Slight Beneficial
CSF: Reduce tourism travel time between North Side/East End and George Town				
Tourist Travel Times	Neutral*	Slight Beneficial	Slight Beneficial	Slight Beneficial
CSF: Improve safe vehicular travel by reducing roadway conflict points				
Conflict Points	Neutral	Large Beneficial	Large Beneficial	Large Beneficial
Safety	Neutral*	Large Beneficial	Large Beneficial	Large Beneficial
Level of Service	Neutral*	Large Beneficial	Large Beneficial	Large Beneficial
CSF: Provide opportunity for enhanced and safe pedestrian and bicycle travel				
Bicycle Level of Traffic Stress (LTS)	Neutral*	Large Beneficial	Large Beneficial	Large Beneficial
Non-Vehicular Accessibility	Neutral*	Large Beneficial	Large Beneficial	Large Beneficial
Overall Qualitative Rating	**Neutral***	**Large Beneficial**	**Large Beneficial**	**Large Beneficial**

*The No-Build scenario is rated "Neutral" because it serves as the baseline for comparison against the Build alternatives. Despite its "Neutral" rating, the No-Build represents anticipated worsening traffic conditions.

The following summarizes the results of the analysis for traffic operations:

Overall, it is projected that the No-Build scenario would have a neutral impact in all categories. The No-Build scenario was evaluated as the baseline for comparison against the Build alternatives, and the traffic evaluation results generally indicate that travel conditions will continue to deteriorate within the EIA study area without any roadway infrastructure improvements.

Build Alternatives B1, B2, and B3 generally have the same qualitative rankings due to design similarities, resulting in an overall anticipated qualitative rating of "Large Beneficial." The breakdown of each target criteria rating for Alternatives B1, B2, and B3 is as follows:

- In terms of resiliency, Alternatives B1, B2, and B3 will likely have a "Large Beneficial" impact by (1) providing an alternate route in the event of road closures or emergency events, and (2) reducing the number of crashes and road closures by shifting most of the east-west traffic volume to the safer EWA facility.
- In terms of supporting future traffic demand, Alternatives B1, B2, and B3 will likely have a "Large Beneficial" impact by (1) reducing the amount of traffic demand that gets held up at upstream congestion in the No-Build scenario, (2) accommodating longer distance commutes between eastern districts and employment opportunities in western districts, and (3) increasing access to job opportunities for eastern residents.
- In terms of improving east-west travel times, Alternatives B1, B2, and B3 will likely have a "Large Beneficial" impact on improving travel times within the study area between Hirst Road and Frank Sound Road, and a "Slight Beneficial" impact on improving travel times between eastern and western districts due to congestion that exists outside the study area.
- In terms of tourist travel times, Alternatives B1, B2, B3 will likely have a "Slight Beneficial" impact on reducing travel times from the Owen Roberts Airport and George Town Cruise Terminal.
- In terms of safety, Alternatives B1, B2, and B3 will likely have a "Large Beneficial" impact by (1) providing a new controlled access roadway facility that significantly reduces conflict points, (2) designing a safer facility that incorporates separated pedestrian/bicycle facilities and roundabout access points, (3) by reducing volume on the existing coastal roadway, and (4) improving operations by reducing intersection delay.
- In terms of pedestrian and bicycle travel, Alternatives B1, B2, and B3 will likely have a "Large Beneficial" impact by (1) providing dedicated sidewalks and bicycle paths on a LTS 1 facility (a facility with the lowest amount of stress for cyclists) connecting Hirst Road to Frank Sound Road, and (2) improving multimodal access to key destinations such as the Mastic Trial, Clifton Hunter High School, and Bodden Town Valu-Med pharmacy.

Therefore, Build Alternatives B1, B2, and B3 are rated as producing an anticipated "Large Beneficial" impact from a traffic perspective.

As part of **Section 6: Cost-Benefit Analysis**, the transportation benefits of each alternative were monetized to further differentiate Alternatives B1, B2, and B3 and determine the most beneficial alternative.

The traffic operational impact values informed the engineering requirements described in Section 5.3 and **Attachment B Engineering – Assessment of Alternatives**. The traffic operational

impacts and engineering impacts assumptions lead to the anticipated impacts to resources described in Sections 5.4 through 5.10 below. Additional coordination regarding avoidance, minimisation, and mitigation measures will occur with the EWA EIA resource teams as appropriate for the Preferred Alternative.

5.3 Engineering Impacts

Detailed evaluation of Engineering impacts can be found in **Attachment B Engineering – Assessment of Alternatives**. The engineering report evaluated design criteria, roadway profiles, bridges, sidewalk and micromobility, right of way acquisitions, constructability, utilities, transit, and estimated construction costs. The engineering report also assessed the No-Build scenario and each of the Build alternatives (B1, B2, and B3) in terms of the CSFs and engineering constraints established for the Longlist Evaluation, addressing factors such as resiliency, utility accommodation, opportunity to accommodate public transportation and other modes, and providing for construction areas and sound geometric design. A summary of results is included in **Table 3**.

Table 3: Summary Table of Qualitative Assessment of CSFs and Engineering Constraints

	No-Build	B1	B2	B3
CSFs Relevant to the Engineering Features*				
CSF: Create an alternative travel route to the existing two-lane Bodden Town Road				
Provide an alternative roadway facility to accommodate travel in the event of a roadway closure (Also included in the Traffic Assessment)	Neutral	Large Beneficial	Large Beneficial	Large Beneficial
CSF: Improve resiliency of existing roadway between North Side/East End and George Town/West Bay				
Improve resiliency of the travel route to flooding from sea level rise, storm surge, wave overtopping, and rainfall (Also included in the Traffic Assessment)	Neutral	Large Beneficial	Large Beneficial	Large Beneficial
CSF: Accommodate utility expansion (electricity, fiber, water, central sewage) **				
Establish area adjacent to roadway to provide for utility needs	Neutral	Large Beneficial	Large Beneficial	Large Beneficial
CSF: Provide opportunity to safely accommodate and expand public transportation **				
Establish public transportation facilities and improve bus travel reliability (Also included in the Socioeconomic Assessment)	Neutral	Large Beneficial	Large Beneficial	Large Beneficial
CSF: Provide opportunity for enhanced and safe pedestrian and bicycle travel				
Establish dedicated pedestrian and bicycle facilities adjacent to vehicular travel lanes (Also included in the Traffic Assessment)	Neutral	Large Beneficial	Large Beneficial	Large Beneficial
CSF: Overall Qualitative Rating	**Neutral**	**Large Beneficial**	**Large Beneficial**	**Large Beneficial**

	No-Build	B1	B2	B3
Engineering Constraints*				
Provide for sound geometric design conditions				
Amount of property affected to improve roadway to achieve sound geometric design conditions	Neutral	Slight Adverse	Slight Adverse	Slight Adverse
Provide for the areas necessary for construction				
Provide areas required for construction staging and for construction activities	Neutral	Slight Adverse	Slight Adverse	Slight Adverse
Engineering Constraints: Overall Qualitative Rating	**Neutral**	**Slight Adverse**	**Slight Adverse**	**Slight Adverse**
Estimated Total Cost US Dollars (CI Dollars)* **	**$71,656,230 ($60,191,233)**	**$924,186,118 ($776,316,339)**	**$831,590,139 ($698,535,717)**	**$834,020,969 ($700,577,613)**

**As identified in the Longlist Evaluation*

*** These criteria are to provide opportunities to accommodate these features. It is outside of ambit of the NRA to provide utilities or public transportation.*

**** Includes estimated costs for Construction, Right-of-Way, & Maintenance. Does not include estimated costs for mitigation measures and utilities relocation.*

The following summarizes the results of the engineering analysis:

- *No-Build* – The No-Build scenario was evaluated as the baseline for comparison against the Build alternatives, and the engineering evaluation results generally indicate that travel conditions will continue to deteriorate within the EIA study area without any large-scale roadway infrastructure improvements. This alternative would also not satisfy any of the CSFs identified for the engineering features for this project. Any individual improvement projects to the existing roadway network would not result in the magnitude of impacts compared to any of the Build alternatives thus resulting in an overall **Neutral** qualitative rating.

- *Alternative B2* – Alternative B2 is anticipated to be the least impactful (in terms of total cost) of the Build alternatives, while meeting the CSFs. Although Alternative B2 has the same qualitative ratings as Alternative B1 and Alternative B3, Alternative B2 is anticipated to have lower total construction and maintenance costs due to the fact that it is a slightly more direct route than Alternatives B1 and B3.

- *Alternative B3* – Alternative B3 is anticipated to be the second least impactful of the Build alternatives, while meeting the CSFs. Although Alternative B3 has the same qualitative ratings as Alternative B1 and Alternative B2, Alternative B3 is anticipated to have the second highest total costs.

- *Alternative B1* - Alternative B1 is anticipated to be the most impactful of the three Build alternatives, while meeting the CSFs. Although Alternative B1 has the same qualitative ratings as Alternative B2 and Alternative B3, Alternative B1 is anticipated to have the highest impacts and costs due to the addition of a northern spur connection to Frank Sound Road which would include two additional bridges for surface drainage runoff and a bridge over the existing Mastic Trail.

The engineering impact values are based on the anticipated requirements to meet CSFs, design criteria, and the traffic operational needs described in Section 5.2 and **Attachment A – Traffic – Assessment of Alternatives**. The traffic operational impacts and engineering impact assumptions lead to the anticipated impacts to resources described in Sections 5.4 through 5.10 below. Coordination with the resource teams occurred as part of the Shortlist Evaluation to avoid and minimise impacts through corridor shifts and bridges. Additional coordination regarding avoidance, minimisation, and mitigation measures will occur with the EWA EIA resource teams as appropriate for the Preferred Alternative.

5.4 Socio-Economics Impacts

Detailed evaluation of Socio-economic impacts can be found in the Socioeconomics – Assessment of Alternatives document (**Attachment C – Socio-Economic – Assessment of Alternatives**). A summary of results is included below. Evaluation of Socioeconomic impacts follows the WebTAG Unit A4-1 *Social Impact Appraisal* and Unit A4-2 *Distributional Impact Appraisal*, which encompassed quality of life impacts associated with the proposed project, including evaluating access to goods and services, vulnerable populations, and ease of travel. Four categories were evaluated: 1) Accessibility (the ability of residents and visitors to reach goods and services), 2) Severance (the potential for the project to increase or decrease community cohesion), 3) Journey Quality (elements of travel quality like the stress caused by travelling the proposed route), and 4) Option Values (the potential for additional choices associated with the project).

The Socio-economic – Assessment of Alternatives included a quantitative analysis and a qualitative analysis for each of the shortlisted Build alternatives along with the No-Build scenario. A monetary assessment is not applicable for socio-economic resources. The listed evaluations have been compiled into **Table 4** below.

Table 4: Socio-economic Shortlist Evaluation Summary Table

	No-Build	B1	B2	B3
Accessibility	Neutral	Large Beneficial	Large Beneficial	Large Beneficial
Severance	Neutral	Moderate Beneficial	Moderate Beneficial	Moderate Beneficial
Journey Quality	Neutral	Large Beneficial	Large Beneficial	Large Beneficial
Option Values	Neutral	Large Beneficial	Large Beneficial	Large Beneficial
Overall Qualitative Rating	**Neutral**	**Large Beneficial**	**Large Beneficial**	**Large Beneficial**

The following summarizes the results of the analysis for the identified socio-economic categories:

- *No-Build* – The No-Build scenario is anticipated to have a "Neutral" impact in the categories of accessibility, severance, journey quality, and option values, due to it being assessed as the baseline for comparison for the Build alternatives. This results in an overall **Neutral** qualitative rating.

- *Alternatives B2 and B3* – Alternatives B2 and B3 would offer significant benefits from a socio-economic standpoint, since both received a "Large Beneficial" rating in three of four categories, resulting in an overall **Large Beneficial** qualitative rating. Though Alternative B1 also received a "Large Beneficial" rating in three of four categories, Alternatives B2 and B3 both received a 22% score under accessibility (the ability to reach goods and services), versus a 21% score for Alternative B1. However, at this level of evaluation, there is no significant difference in the level of benefit between Alternatives B2 and B3.

- *Alternative B1* – Alternative B1 would offer significant benefits from a socio-economic standpoint since it received a "Large Beneficial" rating in three of four categories, resulting in an overall **Large Beneficial** qualitative rating. For the reasons stated in the above paragraph, it is slightly less suitable than Alternatives B2 and B3; however, at this level of evaluation there is no significant difference in the level of benefit between Alternative B1 and Alternatives B2 and B3.

Avoidance, minimisation, and mitigation measures will be further evaluated for socio-economic resources as part of the Preferred Alternative in order to best reduce impacts and compensate for unavoidable impacts. Potential avoidance measures that could be evaluated include identifying measures to maximise the use of local employment. Potential minimisation measures that could be evaluated include recommending updates or new policies to discourage developments within existing communities and sensitive natural areas. Potential mitigation measures that could be evaluated include reviewing existing planning and zoning policies and regulations to account for project components and providing recommendations for updates or revisions. Based on the similarity of Alternatives B1, B2, and B3 in relation to the socio-economic resources impacted, the possible mitigation measures are anticipated to be similar. Therefore, the implementation of mitigation measures is not anticipated to impact the differentiation of alternatives within the Shortlist Evaluation.

5.5 Noise Impacts

Detailed evaluation of Noise impacts can be found in the Noise – Assessment of Alternatives document (**Attachment D – Noise – Assessment of Alternatives**). A summary of results is included below. Evaluation of Noise impacts follows WebTAG Unit A3 *Environmental Impact Appraisal*. This analysis encompassed the potential effects of operational day-time noise of vehicles projected to be travelling along the alternatives. Key parameters for noise impact analysis include detection of the lowest observed adverse effect level (LOAEL), above which adverse effects on quality of life and health can be observed, and the significant observed adverse effect level (SOAEL), above which significant adverse effects on quality of life and health occur.

The Noise – Assessment of Alternatives included a quantitative analysis and a monetary analysis for each of the shortlisted Build alternatives along with the No-Build scenario. A qualitative assessment is not applicable for noise impacts. The listed evaluations have been compiled into **Table 5** below. Additional information regarding the monetisation of noise impacts can be found in **Section 6: Cost-Benefit Analysis.**

Table 5: Noise Evaluation Summary

Year	No-Build	B1	B2	B3
2026	Baseline	Overall decrease (benefit)	Overall decrease (benefit)	Overall decrease (benefit)
2074	Overall increase (disbenefit) 130 noise receptors at or above the SOAEL	Overall increase (disbenefit) 167 noise receptors at or above the SOAEL	Overall increase (disbenefit) 163 noise receptors at or above the SOAEL	Overall increase (disbenefit) 160 noise receptors at or above the SOAEL
Monetized Disbenefit (2026-2074) Net Present Value USD (CI$)	N/A*	**- $11,934,779 (-CI$10,025,214)**	**-$11,323,154 (-CI$9,511,449)**	**- $12,141,363 (-CI$10,198,745)**

**Monetization of benefits compares the Build alternative to the No-Build condition*

The following summarizes the results of the analysis for the identified noise sensitive receptors.

- *No-Build*: The No-Build scenario is the baseline condition of comparison for the opening year (2026). The No-Build scenario results in an overall increase (disbenefit) in noise levels to noise sensitive receptors in 2074 compared to the 2026 No-Build. Compared to the Build alternatives, the No-Build scenario results in lower magnitudes of noise level increase and less noise receptors at or above the SOAEL threshold (68 dBA) in 2074.
    - 2074 Magnitude of Change above Negligible: Increase at 597 noise receptors
    - 2074 Receptors at or above SOAEL (68 dBA): 130 noise receptors

- *Alternatives B1, B2, and B3*: Alternatives B1, B2, and B3 result in an overall decrease (benefit) in noise levels to noise sensitive receptors when compared to the No-Build for the opening year (2026) due to decreases in the volume of traffic along the existing roadway network. However, Alternatives B1, B2, and B3 result in an overall increase (disbenefit) in noise levels to noise sensitive receptors when compared to the No-Build for the horizon year (2074) due to the significant increase in traffic volume and operational speeds along the EWA corridor and existing roadway network. Compared to the No-Build, these alternatives result in higher magnitudes of noise level increase and more noise receptors at or above the SOAEL threshold (68 dBA) in 2074. Overall, these alternatives are anticipated to result in similar noise impacts. Based on the monetization of noise impacts, Alternative

B2 is anticipated to result in the least disbenefit, followed by Alternative B1, with Alternative B3 anticipated to result in the highest disbenefit.

- 2074 Magnitude of Change above Negligible:
  - Alternative B1: Increase at 799 noise receptors
  - Alternative B2: Increase at 884 noise receptors
  - Alternative B3: Increase at 772 noise receptors
- 2074 Receptors at or above SOAEL (68 dBA):
  - Alternative B1: 167 noise receptors
  - Alternative B2: 163 noise receptors
  - Alternative B3: 160 noise receptors

- Monetized Disbenefit (2026-2074):
  - Alternative B1: -$11,934,779 USD (CI$10,025,214)
  - Alternative B2: -$11,323,154 USD (CI$9,511,449)
  - Alternative B3: -$12,141,363 USD (CI$10,198,745)

Avoidance, minimisation, and mitigation measures will be further evaluated for noise impacts as part of the Preferred Alternative to best reduce impacts and compensate for unavoidable impacts. Potential avoidance measures that could be evaluated include the alteration of vertical or horizontal alignments, and noise compatible land use planning. Potential minimisation/mitigation measures that could be evaluated include constructing noise barriers or berms. Based on the similarity of Alternatives B1, B2, and B3 in relation to the noise impacts, the possible mitigation measures are anticipated to be similar. Therefore, the implementation of mitigation measures is not anticipated to impact the differentiation of alternatives within the Shortlist Evaluation.

5.6 Geo-Environmental Impacts

Detailed evaluation of Geo-Environmental impacts can be found in the Geo-Environmental – Assessment of Alternatives document (**Attachment E – Geo-Environmental – Assessment of Alternatives**). A summary of results is included below. Evaluation of Geo-Environmental impacts follows WebTAG Unit A3 *Environmental Impact Appraisal*. The most applicable category for Geo-Environmental impacts is "Impacts to Water Environment". This analysis evaluated the potential effects of the shortlisted alternatives on Geo-Environmental features, including freshwater lenses, brackish groundwater, and peat.

The Geo-Environmental – Assessment of Alternatives included a quantitative analysis and a qualitative analysis for each of the shortlisted Build alternatives along with the No-Build scenario. A monetary assessment is not applicable for geo-environmental resources. The listed evaluations have been compiled into **Table 6** below.

Table 6: Summary Table Geo-Environmental Shortlist Evaluation

Resource	No-Build	B1	B2	B3
Lower Valley Freshwater Lens	Slight Adverse (0 acre; 0 ha of construction)	Moderate Adverse (10.1 acres; 4.1 ha of construction)	Moderate Adverse (10.1 acres; 4.1 ha of construction)	Moderate Adverse (10.1 acres; 4.1 ha of construction)
North Side Freshwater Lens	Slight Adverse	Moderate Adverse	Slight Adverse	Slight Adverse
Brackish Groundwater	Neutral (0 acre; 0 ha)	Neutral (161 acres; 65 ha)	Neutral (132 acres; 53 ha)	Neutral (135 acres; 55 ha)
Peat	Slight Adverse (0 mile; 0 km thru CMW) (0 Cu yd; 0 ***m³)***	Large Adverse (2.8 miles; 4.5 km thru CMW) (550,994 Cu yd; 421,265 m³***)***	Large Adverse (2.1 miles; 3.4 km thru CMW) (223,811 Cu yd; 171,116 m³***)***	Large Adverse (2.8 miles; 4.5 km thru CMW) (454,153 Cu yd; 347,225 m3***)***
Overall Qualitative Rating	**Slight Adverse**	**Large Adverse**	**Large Adverse**	**Large Adverse**

The following summarizes the results of the analysis for the identified geo-environmental resources:

- *No-Build* – Based on the parameters of the evaluation, the No-Build scenario is not anticipated to have additional direct impacts on the identified geo-environmental resources and considered the baseline of comparison. However, even a negligible impact on a resource of very high importance, such as the Freshwater Lenses and the peat, results in a "Slight Adverse" impact per WebTAG Unit A3. Therefore, it results in an overall **Slight Adverse** qualitative rating.

- *Alternative B2*– Based on the parameters of the evaluation, Alternative B2 would be the least impactful of the Build alternatives. While Alternative B2 has the same overall qualitative rating as Alternative B1 and Alternative B3 (**Large Adverse**), Alternative B2 results in less acreage of additional impervious surface area, miles of roadway through the CMW, and volume of peat removal than Alternative B1 or Alternative B3. Therefore, it is anticipated to be less impactful than Alternative B1 and Alternative B3 overall.

- *Alternative B3* – Based on the parameters of the evaluation, Alternative B3 would be the next least impactful of the Build alternatives. Alternative B3 has the same overall qualitative rating as Alternative B1 and Alternative B2 (**Large Adverse**). However, as discussed in the Alternative B2 section above, Alternative B3 is anticipated to overall be more impactful than Alternative B2 based on the higher acreage of additional impervious surface area, miles of roadway through the CMW, and volume of peat removal.

- *Alternative B1* – Based on the parameters of the evaluation, Alternative B1 would be the most impactful of the Build alternatives. While Alternative B1 has the same overall qualitative rating as Alternative B2 and Alternative B3 (**Large Adverse**), Alternative B1 is the closest of the Build alternatives to the North Side Freshwater Lens recharge area, requires the most acreage of additional impervious surface area, miles of roadway through the CMW, and volume of peat removal.

Avoidance, minimisation, and mitigation measures will be further evaluated for geo-environmental resources as part of the Preferred Alternative in order to best reduce impacts and compensate for unavoidable impacts. Potential avoidance measures that could be evaluated include the use of elevated structures in highly vulnerable areas and avoiding the placement of staging or stockpiles in areas of peat or near freshwater lenses. Potential minimisation measures that could be evaluated include developing best practice pollution prevention techniques to minimise release of contaminants during construction and operation. Potential mitigation measures that could be evaluated include the salvage or reuse of mangrove peat and designing measures to maintain good water quality in the discharged water. Based on the similarity of Alternatives B1, B2, and B3 in relation to the geo-environmental resources impacted, the possible mitigation measures are anticipated to be similar. Therefore, the implementation of mitigation measures is not anticipated to impact the differentiation of alternatives within the Shortlist Evaluation.

5.7 Terrestrial Ecology Impacts

Detailed evaluation of Terrestrial Ecology impacts can be found in the Terrestrial Ecology – Assessment of Alternatives document (**Attachment F – Terrestrial Ecology – Assessment of Alternatives**). A summary of results is included below. Evaluation of Terrestrial Ecology impacts follows WebTAG Unit A3 *Environmental Impact Appraisal*. This analysis evaluated the potential effects of the shortlisted alternatives on terrestrial resources, such as protected natural areas and important habitats.

The Terrestrial Ecology – Assessment of Alternatives included a quantitative analysis, a qualitative analysis, and a monetary valuation for each of the shortlisted Build alternatives along with the No-Build scenario. The listed evaluations have been compiled into **Table 7** below.

Table 7: Summary Table Terrestrial Ecology Shortlist Evaluation

Resource	No-Build	B1	B2	B3
Man-Modified	Neutral	Moderate Adverse 93.0 acre (*37.7 ha*)	Moderate Adverse 108.6 acre (*43.9 ha*)	Moderate Adverse 89.5 acre (*36.2 ha*)
Coastal Habitat	Neutral	Neutral	Neutral	Neutral
Upland Habitats	Neutral	Slight Adverse 2.4 acre (*1.0 ha*)	Slight Adverse 1.8 acre (*0.7 ha*)	Slight Adverse 2.5 acre (*1.0 ha*)
Wetland Habitats*	Neutral	Large Adverse 194.3 acre (*78.6 ha*)	Large Adverse 128.2 acre (*51.9 ha*)	Large Adverse 151.1 acre (*61.1 ha*)
Parrot Habitat *(Cayman Parrot Nesting and Density)*	Neutral	Large Adverse 117.5 acre (*47.5 ha*)	Large Adverse 91.4 acre (*37.0 ha*)	Large Adverse 80.1 acre (*32.4 ha*)
Pygmy blue butterfly	Neutral	Neutral	Neutral	Neutral
Tea Banker	Neutral	Neutral	Neutral	Neutral
Overall Qualitative Rating	**Neutral**	**Large Adverse**	**Large Adverse**	**Large Adverse**
Overall Acres of Resource Impacts	**0.0** *(0.0 ha)*	**407.2 acre** *(164.8 ha)*	**330.0 acre** *(133.5 ha)*	**323.2 acre** *(130.8 ha)*
Amenity Value Loss 2017 USD *(CI$)*	**$0**	**-$10,045,000 USD** *(CI$8,437,800)*	**-$7,545,000 USD** *(CI$6,337,800)*	**-$8,345,000 USD** *(CI$7,009,800)*
Carbon Sequestration Loss (tCO2e/yr)	**0.0**	**453.5**	**300.7**	**354.6**

*Wetland Habitat impacts include but are not limited to the Department of Environment's geospatial CMW boundary, as some wetland habitats occur outside of that boundary.

The following summarizes the results of the analysis for the identified terrestrial ecology resources:

- *No-Build* – The No-Build scenario is anticipated to have no direct impacts on the identified resources (0 acres) resulting in an overall **Neutral** qualitative rating, no loss of amenity value, and no loss of carbon sequestration.

- *Alternative B2* – Alternative B2 would be the least impactful of the Build alternatives. While Alternative B2 has the same overall qualitative rating as Alternative B1 and Alternative B3 (**Large Adverse**), Alternative B2 results in less monetary loss of amenity value (a value derived from hedonic pricing based on mangrove location) and lower carbon sequestration loss than either alternative B1 or B3. Alternative B2 results in a slightly higher overall acreage of resource impacts than Alternative B3 (approximately 2% higher).

However, the loss of amenity value and carbon sequestration are approximately 10% and 15% lower than Alternative B3, respectively. Overall, Alternative B2 has a more southerly placement in relationship to the CMW and anticipated to result is less wetland (mangrove) impact. Therefore, it is anticipated to be less impactful than Alternative B3 overall.

- *Alternative B3* – Alternative B3 would be the next least impactful of the Build alternatives. Alternative B3 has the same overall qualitative rating as Alternative B1 and Alternative B2 (**Large Adverse**). However, as discussed in the Alternative B2 section above, Alternative B3 is anticipated to overall be more impactful than Alternative B2 based on the higher loss of amenity value and carbon sequestration.

- *Alternative B1* – Alternative B1 would be the most impactful of the Build alternatives. While Alternative B1 has the same overall qualitative rating as Alternative B2 and Alternative B3 (**Large Adverse**), Alternative B1 results in the highest overall acreage of resource impacts, results in the highest monetary loss of amenity value, and results in the highest amount of carbon sequestration loss.

Avoidance, minimisation, and mitigation measures will be further evaluated for terrestrial ecology resources as part of the Preferred Alternative in order to best reduce impacts and compensate for unavoidable impacts. Potential avoidance and minimisation measures that could be evaluated include incorporating reduced cross sections in highly vulnerable areas and avoiding the placement of staging or stockpiles in areas of high-quality habitat. Other measures include fencing and wildlife crossings to reduce habitat fragmentation and conflicts between the corridor and wildlife. Potential considerations for mitigation measures for unavoidable impacts are broad ranging, including creation of new habitat, restoration of impacted resources, enhancement of degraded areas through hydrological improvements or exotic removal, and preservation and/or purchase of habitat that will be conserved and protected. Based on the similarity of Alternatives B1, B2, and B3 in relation to the terrestrial ecology resources impacted, the possible mitigation measures are anticipated to be similar. However, the overall acreage of impact to high-quality habitats varies by alternative and would impact the anticipated mitigation cost for the Preferred Alternative.

5.8 Cultural and Natural Heritage Impacts

Detailed evaluation of Cultural and Natural Heritage impacts can be found in the Cultural and Natural Heritage – Assessment of Alternatives document (**Attachment G – Cultural & Natural Heritage – Assessment of Alternatives**). A summary of results is included below. Evaluation of Cultural and Natural Heritage impacts follows WebTAG Unit A3 *Environmental Impact Appraisal*. This analysis encompassed the potential impacts of the shortlisted alternatives on resources that contribute to the cultural identity of the Cayman Islands. This section evaluates resources like the CMW and the Mastic Reserve from a heritage perspective *only*, which means acreages of impact are accounted for based on geospatial boundaries provided by the Department of Environment or the NT. To avoid double-counting, ecosystem function and services are addressed in **Attachment F – Terrestrial Ecology – Assessment of Alternatives**.

The Cultural and Natural Heritage – Assessment of Alternatives included a quantitative analysis and a qualitative analysis for each of the shortlisted Build alternatives along with the No-Build scenario. A monetary assessment is not applicable for cultural and natural heritage resources. The listed evaluations have been compiled into **Table 8** below.

Table 8: Summary Table of Qualitative Impacts on Cultural and Natural Resources

Resource	No-Build	B1	B2	B3
CMW	Neutral	Slight Adverse 76 acres (*31 ha*)	Slight Adverse 57 acres (*23 ha*)	Slight Adverse 76 acres (*31 ha*)
Mastic Reserve	Neutral	Slight Adverse 8 acres (*3 ha*)	Neutral	Neutral
Mastic Trail	Neutral	Slight Adverse	Neutral	Neutral
Meagre Bay Pond	Neutral	Neutral	Neutral	Neutral
Cemeteries	Neutral	Neutral	Neutral	Neutral
Overall Qualitative Rating	**Neutral**	**Moderate Adverse**	**Slight Adverse**	**Slight Adverse**
Overall Acres of Resource Impacts	**0.0** *(0.0 ha)*	**84 acres** *(34 ha)*	**57 acres** *(23 ha)*	**76 acres** *(31 ha)*

The following summarizes the results of the analysis for the identified cultural and natural heritage resources:

- *No-Build* – The No-Build scenario is anticipated to have no direct impacts on the identified cultural and natural heritage resources (0 acres) resulting in an overall **Neutral** qualitative rating.

- *Alternative B2* – Alternatives B2 would be the least impactful of the Build alternatives since it is anticipated to have a direct minor impact on one cultural and natural heritage resource: the CMW (57 acres), resulting in an overall **Slight Adverse** impact on cultural and natural heritage resources. While Alternative B2 has the same overall qualitative rating as Alternative B3, Alternative B2 results in less acreage of impact to the CMW in comparison to Alternative B3, with 57 acres and 76 acres, respectively.

- *Alternative B3* – Alternatives B3 would be the next least impactful of the Build alternatives since it is anticipated to have a direct minor impact on one cultural and natural heritage resource: the CMW (76 acres), resulting in an overall **Slight Adverse** impact on cultural and natural heritage resources.

- *Alternative B1* – Alternative B1 would be the most impactful of the Build alternatives since it is anticipated to have direct minor impacts to the CMW (76 acres) and the Mastic Reserve (8 acres). In addition, Alternative B1 would include a bridge that would carry the new roadway over the Mastic Trail allowing for the continued use of the trail but changing the character of the trial as users pass under the bridge section. Based on these impacts Alternative B1 results in a **Moderate Adverse** rating on the identified cultural and natural heritage resources.

Avoidance, minimisation, and mitigation measures will be further evaluated for cultural and natural heritage resources as part of the Preferred Alternative in order to best reduce impacts and compensate for unavoidable impacts. Potential avoidance measures that could be evaluated include the incorporation of reduced cross sections in highly vulnerable areas and avoiding the placement of staging or stockpiles in areas of cultural significance. Potential minimisation measures that could be evaluated include replanting/establishment of temporary habitat impacts. Potential mitigation measures that could be evaluated include conservation of cultural resources, viewshed enhancements, and landscaping. Based on the similarity of Alternatives B1, B2, and B3 in relation to the cultural and natural heritage impacted, the possible mitigation measures are anticipated to be similar. Therefore, the implementation of mitigation measures is not anticipated to impact the differentiation of alternatives within the Shortlist Evaluation.

5.9 Hydrology and Drainage Impacts

Detailed evaluation of Hydrology and Drainage impacts can be found in the Hydrology and Drainage – Assessment of Alternatives document (**Attachment H – Hydrology & Drainage – Assessment of Alternatives**). A summary of results is included below. Evaluation of Hydrology and Drainage impacts follows WebTAG Unit A3 *Environmental Impact Appraisal*. The most applicable category for hydrology and drainage impacts is "Impacts to Water Environment". This analysis encompassed the potential effects of the shortlisted alternatives on hydrologic features and functions within the EIA study area.

The Hydrology and Drainage – Assessment of Alternatives included a quantitative analysis and a qualitative analysis for each of the shortlisted Build alternatives along with the No-Build scenario. A monetary assessment is not applicable for hydrology and drainage resources. The listed evaluations have been compiled into **Table 9** below.

Table 9: Hydrology and Drainage Evaluation Summary

Water Environment Feature	No-Build	B1	B2	B3
Central Mangrove Wetland	Slight Adverse	Moderate Adverse	Moderate Adverse	Moderate Adverse
Mastic Reserve	Slight Adverse	Large Adverse	Moderate Adverse	Moderate Adverse
Meagre Bay Pond	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse
Freshwater Lenses	Slight Adverse	Slight Adverse	Slight Adverse	Slight Adverse
Developed Areas	Slight Adverse	Moderate Adverse	Moderate Adverse	Moderate Adverse
Existing Drainage Infrastructure	Neutral	Neutral	Neutral	Neutral
Overall Qualitative Rating	**Slight Adverse**	**Large Adverse**	**Moderate Adverse**	**Moderate Adverse**

The following summarizes the results of the analysis for the identified hydrology and drainage resources:

- *No-Build* – Based on the parameters of the evaluation, the No-Build scenario is not anticipated to have additional direct impacts on the identified water environment features and considered the baseline of comparison. However, even a negligible impact on a resource of very high importance (e.g., the CMW, Mastic Reserve, Freshwater Lenses, etc.) results in a "Slight Adverse" impact per WebTAG Unit A3. The No Build alternative is anticipated to have a "Slight Adverse" impact to five of the six water environment features discussed in this technical report resulting in an overall **Slight Adverse** rating.

- *Alternative B2* – Alternative B2 is anticipated to be the least impactful of the Build alternatives on water environment features. Alternatives B2 and B3 have the same overall qualitative rating (**Moderate Adverse**), and each was assessed to have a "Moderate Adverse" impact on three water environment features (CMW, Mastic Reserve and Developed Areas.) Because Alternative B2 is anticipated to impact 57 acres (23 ha) of CMW and Alternative B3 is anticipated to impact 76 acres (31 ha) of CMW, Alternative B2 is anticipated to be slightly less impactful than Alternative B3.

- *Alternative B3* – Alternative B3 is anticipated to be the second least impactful of the Build alternatives. As described for Alternative B2, Alternative B3 would have a slightly larger impact on the CMW by area (still less than 1% of the total area) than Alternative B2.

- *Alternative B1* – Alternative B1 is anticipated to be the most impactful of the Build alternatives. Alternative B1 has an overall qualitative rating **Large Adverse** due to the **Large Adverse** impact to the Mastic Reserve, as it is the only alternative that would intersect the Mastic Reserve.

Avoidance, minimisation, and mitigation measures will be further evaluated for hydrology and drainage resources as part of the Preferred Alternative in order to best reduce impacts and compensate for unavoidable impacts. Potential avoidance measures that could be evaluated include designing stormwater management plans to avoid or minimise impacts on important resources, such as the freshwater lenses, Meagre Bay Pond, the CMW, and the Mastic Reserve. Potential minimisation measures that could be evaluated include elevating/bridging portions of the road to preserve hydrological flow in critical areas. Potential mitigation measures that could be evaluated include assessing the potential for native plantings and wetland plans to filter pollutants. Based on the similarity of Alternatives B1, B2, and B3 in relation to the hydrology and drainage resources impacted, the possible mitigation measures are anticipated to be similar. Therefore, the implementation of mitigation measures is not anticipated to impact the differentiation of alternatives within the Shortlist Evaluation.

5.10 Greenhouse Gas Impacts

Detailed evaluation of Greenhouse Gas (GHG) impacts can be found in the Greenhouse Gases – Assessment of Alternatives document (**Attachment I – Greenhouse Gas – Assessment of Alternatives**) and Cost-Benefits Analysis – Assessment of Alternatives document (**Attachment J – Cost-Benefit Analysis – Assessment of Alternatives)**. A summary of results is included below. Evaluation of GHG impacts follows WebTAG Unit A3 *Environmental Impact Appraisal*.

The Greenhouse Gases – Assessment of Alternatives included a quantitative analysis and a monetary analysis for each of the shortlisted Build alternatives along with the No-Build scenario. A qualitative assessment is not applicable for GHG impacts. Total GHG emissions and monetization associated with the No-Build scenario and for each of the Build alternatives B1, B2, and B3 are provided in **Tables 10 - 12** below. These emissions include both one-time emissions related to construction (2024-2026) and annual emissions related to traffic operations (2026-2074). The emissions also include benefits from the proposed solar panel canopy along Build alternatives B1, B2, and B3 and annual carbon sequestration loss.

Table 10: GHG One-Time Emissions (2024-2026)

Alternative	Habitat/Peat		Construction		Bulk Material		Total Emissions	Monetized Benefit (Disbenefit) Net Present Value		
	MT CO_2e	Ton CO_2e	MT CO_2e	Ton CO_2e	MT CO_2e	Ton CO_2e	MT CO_2e	Ton CO_2e	USD	CI$
No-Build	0	0	0	0	0	0	**0**	**0**	**$0**	**$0**
B1	90,336	99,578	2,364	2,606	27,199	29,982	**119,899**	**132,166**	**- $42,275,740**	**-$35,511,622**
B2	42,878	47,265	2,001	2,206	22,449	24,745	**67,328**	**74,216**	**- $23,739,489**	**-$19,941,171**
B3	73,703	81,243	2,075	2,288	22,798	25,131	**98,576**	**108,662**	**- $34,757,365**	**-$29,196,187**

Table 11: GHG Annual Operational Traffic Emissions (2026 through 2074)

Alternative	2026 Traffic		2074 Traffic		Average Annual Emissions (2026-2074)		Monetized Benefit/Disbenefit (2026-2074) Net Present Value	
	MT CO_2e	Ton CO_2e	MT CO_2e	Ton CO_2e	MT CO_2e	Ton CO_2e	USD	CI$
No-Build	64,134	70,696	124,739	137,501	**94,437**	**104,099**	**N/A***	**N/A***
B1	68,031	74,991	115,681	127,516	**91,856**	**101,254**	**$7,992,666**	**$6,713,839**
B2	70,044	77,210	115,238	127,028	**92,641**	**102,119**	**-$5,345,402**	**-$4,490,138**
B3	68,038	74,999	114,976	126,740	**91,507**	**100,870**	**$10,988,189**	**$9,230,079**

**Monetization of benefits compares the Build alternative to the No-Build condition*

As shown in **Table 11**, Alternative B2 has a monetized disbenefit for operational traffic emissions (2026 thru 2074). This is due to the fact that Alternative B2 is the alternative in which people are likely to most increase the miles they travel to take advantage of faster speeds to access better opportunities. Therefore, carbon emissions in the opening year are highest under Alternative B2.

A cost-benefit analysis was completed for the proposed solar panel canopy along Alternatives B1, B2, and B3 (**Attachment J – Cost-Benefit Analysis – Assessment of Alternatives)**. Disbenefit from manufacturing of the solar panel canopy and battery components, along with the benefit from carbon savings compared to the current production mode were tabulated over the anticipated 30-year lifespan of the system. The results show a reduction in GHG emissions (benefit) of 566,644 MT (624,618 short ton) and $114,899,000 (CI$$96,515,160) (**Table 13**). The cost-benefit analysis also included the monetization of annual carbon sequestration loss included within **Section 5.7: Terrestrial Ecology Impacts**.

The overall GHG monetized benefit (including habitat/peat removal, construction, bulk material, operational traffic emissions, solar panel canopy, and annual carbon sequestration loss) are shown in **Table 12** below. See **Attachment J – Cost-Benefit Analysis – Assessment of Alternatives** for additional information regarding the monetized benefit.

Table 12: Overall GHG Monetized Benefit (2026 through 2074)

Alternative	Monetized Benefit (2026-2074) Net Present Value	
	USD	CI$
No-Build	**N/A***	**N/A***
B1	**$73,521,000**	**$61,757,640**
B2	**$81,110,000**	**$68,132,400**
B3	**$85,582,000**	**$71,888,880**

**Monetization of benefits compares the Build alternative to the No-Build condition*

The following summarizes the results of the analysis for the identified GHG emissions. Note that this summary incorporates results from both **Attachment I – Greenhouse Gas – Assessment of Alternatives** and **Attachment J – Cost-Benefit Analysis – Assessment of Alternatives.**

- *No-Build*: The No-Build scenario is assumed to require no habitat/peat removal, construction, or bulk materials; therefore, it results in no GHG emissions within these

categories. Compared to the Build alternatives, the No-Build scenario results in the lowest total one-time emissions outlined in **Table 10**. However, the GHG emissions from traffic are projected to generate approximately 9,000 MT (10,000 tons) more than any other alternative by 2074 (**Table 11**) and the No-Build scenario does not include the solar panel canopy, which provides GHG emissions reduction.

- *Alternative B3*: Compared to the other Build alternatives, Alternative B3 is anticipated to result in the second highest GHG emissions from the one-time emissions (**Tables 10**) and the lowest average annual operational traffic emissions (**Tables 11**). Overall, Alternative B3 is anticipated to result in the least GHG emissions based on the overall monetized benefit (**Tables 12**). Note that Alternatives B1, B2, and B3 are all anticipated to result in an overall benefit (reduction in GHG emissions) due to incorporation of the solar panel canopy.
- *Alternative B2*: Compared to the other Build alternatives, Alternative B2 is anticipated to result in the least GHG emissions from the one-time emissions (**Tables 10**) and the highest average annual operational traffic emissions (**Tables 11**). Overall, Alternative B2 is anticipated to result in the second lowest GHG emissions based on the combined monetized benefit (**Tables 12**). Note that Alternatives B1, B2, and B3 are all anticipated to result in an overall benefit (reduction in GHG emissions) due to incorporation of the solar panel canopy.
- *Alternative B1*: Compared to the other Build alternatives, Alternative B1 is anticipated to result in the highest GHG emissions from the one-time emissions (**Tables 10**) and the second lowest average annual operational traffic emissions (**Tables 11**). Overall, Alternative B1 is anticipated to result in the highest GHG emissions based on the combined monetized benefit (**Tables 12**). Note that Alternatives B1, B2, and B3 are all anticipated to result in an overall benefit (reduction in GHG emissions) due to incorporation of the solar panel canopy.

Avoidance, minimisation, and mitigation measures will be further evaluated for GHG impacts as part of the Preferred Alternative in order to best reduce impacts and compensate for unavoidable impacts. Potential avoidance measures that could be evaluated include revising the road design to reduce the need for peat removal. Potential minimisation measures that could be evaluated include the efficient use of materials and prioritising reusable or recyclable materials. Potential mitigation measures that could be evaluated include landscaping bare areas to re-establish vegetative cover. Based on the similarity of Alternatives B1, B2, and B3 in relation to GHG impacts, the possible mitigation measures are anticipated to be similar. Therefore, the implementation of mitigation measures is not anticipated to impact the differentiation of alternatives within the Shortlist Evaluation.

6 Cost-Benefit Analysis

As discussed in **Section 5.1: Assessment Methodology** above, the UK Department for Transport's WebTAG (Transport Appraisal Guidance) was utilized to the extent practicable for the EWA EIA Shortlist Evaluation (**Attachment J – Cost-Benefit Analysis – Assessment of Alternatives**).

After each individual discipline has been assessed with the applicable WebTAG documents and Cayman and international policy, the WebTAG process affords the ability to create a Cost-Benefit Analysis for monetizable portions of the project. **Table 13** below provides a summary of the monetized costs and benefits in 2023 USD.

Table 13: Monetized Costs and Benefits

Monetized Costs and Benefits (US 2023 $M)*			
	B1	**B2**	**B3**
Noise Impact	-11.935	-11.323	-12.141
Electric Cost Savings From Solar Canopy	83.627	83.627	83.627
Amenity Loss from Construction	-11.325	-8.506	-9.408
Total Carbon Benefits	73.521	81.110	85.582
Subtotal - Carbon Emissions from Construction	-42.276	-23.739	-34.757
Subtotal - Carbon Sequestration Impact	-7.094	-4.704	-5.547
Subtotal - Carbon Emissions from Traffic Operations	7.993	-5.345	10.988
Subtotal - Carbon Emissions Savings from Solar Canopy	114.899	114.899	114.899
Total Transportation Benefits	510.405	521.37	509.898
*Subtotal - Economic Efficiency: Consumer Users (Commuting)***	123.04	126.47	121.95
*Subtotal - Economic Efficiency: Consumer Users (Other)***	246.22	249.93	245.32
*Subtotal - Economic Efficiency: Business Users and Providers***	130.09	134.12	131.14
*Subtotal – Freight and Reliability***	11.065	10.867	11.488
Present Value of Benefits (PVB)	644.293	666.285	657.558
Total Construction Cost with Contingency	489.039	439.328	439.32
Right of Way Cost	21.78	20.782	19.477
Solar Canopy Cost	36.043	36.043	36.043
Present Value of Costs (PVC)	546.863	496.154	494.841
OVERALL IMPACTS			
Net Present Value (NPV)	97.430	170.131	162.717
Benefit to Cost Ratio (BCR)***	**1.2**	**1.3**	**1.3**

** It should be noted for this Shortlist Evaluation that traffic and cost estimate components assumed discrete benchmark years, while some of the components assumed conservative assumptions in the timeline of impacts. See **Attachment J – Cost-Benefit Analysis – Assessment of Alternatives** for additional information regarding the CBA assumptions and methodology.*

***Transportation benefit subtotals include the value of disbenefits from non-carbon emissions (VOCs, NOX, SO_2, $PM_{2.5}$), associated with travel, totalling -$1.885M for Alternative B1, -$2.14M for Alternative B2, and -$1.806M for Alternative B3.*

****A BCR above 1.0 represents the anticipated benefits being greater than the anticipated costs.*

The following summarizes the results of the CBA:

- *No-Build* – The CBA evaluates each of the Build alternatives (B1, B2, and B3) in comparison to the No-Build scenario. Therefore, the No-Build scenario does not have a separate CBA.

- *Alternative B2* – Alternative B2 is anticipated to provide the highest present value of benefits (~$666,285,000 USD) and require the second highest present value of costs (~$496,154,000 USD). Overall, Alternative B2 and Alternative B3 both provide the highest benefit/cost ratio at 1.3.

- *Alternative B3* – Alternative B3 is anticipated to provide the second highest present value of benefits (~$657,558,000 USD) and require the lowest present value of costs (~$494,841,000 USD). Overall, Alternative B2 and Alternative B3 both provide the highest benefit/cost ratio at 1.3.

- *Alternative B1* – Alternative B1 is anticipated to provide the least present value of benefits (~$644,293,000 USD) and require the highest present value of costs (~$546,863,000 USD). Overall, Alternative B1 provides the lowest benefit/cost ratio at 1.2.

7 Summary & Conclusion

This section provides a summary of the anticipated impacts (**Section 5**) and Cost-Benefit Analysis (**Section 6**) to compare the Shortlist of Alternatives. The information is grouped to address CSFs, engineering constraints, social impacts, natural environment impacts, and project costs.

The CSFs are the aspects of the project that are vital to its success. These are the main goals that the completed project would accomplish. The CSFs were developed based on the purpose and need statements from the original Gazetting of the EWA Extension and further refined through the ToR and Longlist Evaluation process. **Table 14** provides a summary of the alternatives and the degree to which they meet the CSFs based on the 7-point qualitative scale (**Table 1**).

Table 14: Summary of Critical Success Factors (CSFs)

Critical Success Factors		No-Build	B1	B2	B3
Traffic Evaluation					
Create an alternative travel route to the existing two-lane Bodden Town Road. Improve resiliency of existing roadway between North Side/East End and George Town/West Bay	Alternative Routes	Neutral*	Large Beneficial	Large Beneficial	Large Beneficial
	Existing Roadway Resiliency	Neutral*	Large Beneficial	Large Beneficial	Large Beneficial
Support current and future traffic demand	Future Traffic Demand	Neutral*	Large Beneficial	Large Beneficial	Large Beneficial
	District-to-District Access	Neutral	Large Beneficial	Large Beneficial	Large Beneficial
	Employment Access	Neutral	Large Beneficial	Large Beneficial	Large Beneficial
Improve travel time between North Side/East End and George Town	Study Area Travel Times	Neutral*	Large Beneficial	Large Beneficial	Large Beneficial
	Key Destination Travel Times	Neutral*	Slight Beneficial	Slight Beneficial	Slight Beneficial
Reduce tourism travel time between North Side/East End and George Town	Tourist Travel Times	Neutral*	Slight Beneficial	Slight Beneficial	Slight Beneficial
Improve safe vehicular travel by reducing roadway conflict points	Conflict Points	Neutral	Large Beneficial	Large Beneficial	Large Beneficial
	Safety	Neutral*	Large Beneficial	Large Beneficial	Large Beneficial
	Level of Service	Neutral*	Large Beneficial	Large Beneficial	Large Beneficial
Provide opportunity for enhanced and safe pedestrian and bicycle travel	Bicycle Level of Traffic Stress	Neutral*	Large Beneficial	Large Beneficial	Large Beneficial
	Non-Vehicular Accessibility	Neutral*	Large Beneficial	Large Beneficial	Large Beneficial

Critical Success Factors		No-Build	B1	B2	B3
Engineering Evaluation					
Create an alternative travel route to the existing two-lane Bodden Town Road	Provide an alternative roadway facility to accommodate travel in the event of a roadway closure +	Neutral	Large Beneficial	Large Beneficial	Large Beneficial
Improve resiliency of existing roadway between North Side/East End and George Town/West Bay	Improve resiliency of the travel route to flooding from sea level rise, storm surge, wave overtopping, and rainfall +	Neutral	Large Beneficial	Large Beneficial	Large Beneficial
Accommodate utility expansion (electricity, fiber, water, central sewage)	Establish area adjacent to roadway to provide for utility needs	Neutral	Large Beneficial	Large Beneficial	Large Beneficial
Provide opportunity to safely accommodate and expand public transportation	Establish public transportation facilities and improve bus travel reliability +	Neutral	Large Beneficial	Large Beneficial	Large Beneficial
Provide opportunity for enhanced and safe pedestrian and bicycle travel	Establish dedicated pedestrian and bicycle facilities adjacent to vehicular travel lanes +	Neutral	Large Beneficial	Large Beneficial	Large Beneficial
Overall Qualitative Rating		**Neutral**	**Large Beneficial**	**Large Beneficial**	**Large Beneficial**

*The No-Build scenario is rated "Neutral" because it serves as the baseline for comparison against the Build alternatives. Despite its "Neutral" rating, the No-Build represents anticipated worsening traffic conditions.

+ Also included in the Traffic Assessment

The Engineering Constraints include the necessities to construct the proposed project. The goal of the project is to construct a sound and resilient roadway that best meets the identified CSFs for the project. The Engineering Constraints below were developed based on the anticipated constructability challenges and evaluated using professional experience and desktop analysis. **Table 15** provides a summary of the engineering constraints.

Table 15: Summary of Engineering Constraints

Resource	No-Build	B1	B2	B3
Provide for sound geometric design conditions				
Amount of property affected to improve roadway to achieve sound geometric design conditions	Neutral	Slight Adverse	Slight Adverse	Slight Adverse
Provide for the areas necessary for construction				
Provide areas required for construction staging and for construction activities	Neutral	Slight Adverse	Slight Adverse	Slight Adverse
Engineering Constraints: Overall Qualitative Rating	**Neutral**	**Slight Adverse**	**Slight Adverse**	**Slight Adverse**

Sensitive social resources were considered during the Shortlist Evaluation, with a goal of developing alternatives that best meet the CSFs and offer benefits to people and their quality of life while minimising negative impacts to social categories. Social impacts in the categories of Noise and Socio-economics were evaluated quantitatively, qualitatively, and monetarily (where applicable) using the UK's WebTAG guidance. **Table 16** provides a summary of the impacts each of the Build alternatives would have on these social categories. Note that all three Build alternatives (Alternative B1, B2, and B3) are anticipated to provide similar benefits and disbenefits regarding social impacts.

Table 16: Summary of Social Impacts

Resource		No-Build	B1	B2	B3
Socio-economics	**Overall Qualitative Rating**	Neutral	Large Beneficial	Large Beneficial	Large Beneficial
Resource		**No-Build**	**B1**	**B2**	**B3**
Noise	**2074 Horizon Year compared to 2026 No-Build noise levels**	Overall increase (disbenefit)	Overall increase (disbenefit)	Overall increase (disbenefit)	Overall increase (disbenefit)
	Monetized Disbenefit (2026-2074) Net Present Value USD (CI$)	N/A*	**-$11,934,779 (-$10,025,214)**	**-$11,323,154 (-$9,511,449)**	**- $12,141,363 (-$10,198,745)**
**Monetization of benefits compares the Build alternative to the No-Build condition*					

Natural environment impacts in the categories of Terrestrial Ecology, Cultural and Natural Heritage, Greenhouse Gas, Hydrology and Drainage, and Geo-Environmental were evaluated quantitatively, qualitatively, and monetarily (where applicable) using the UK's WebTAG guidance. **Table 17** provides a qualitative summary of the impacts each Build alternative would have on environmental resources. Where appropriate, quantitative details are included.

Table 17: Summary of Natural Environment Impacts

Category		No-Build	B1	B2	B3
Terrestrial Ecology	**Overall Qualitative Rating**	Neutral	Large Adverse	Large Adverse	Large Adverse
	Overall Acres of Wetland Impacts*	**0.0** *(0.0 ha)*	**194.3 acre** (*78.6 ha*)	**128.2 acre** (*51.9 ha*)	**151.1 acre** (*61.1 ha*)
Cultural & Natural Heritage	**Overall Qualitative Rating**	Neutral	Moderate Adverse	Slight Adverse	Slight Adverse
	Overall Acres of Resource Impacts	**0.0** *(0.0 ha)*	**84 acres** *(34 ha)*	**57 acres** *(23 ha)*	**76 acres** *(31 ha)*
Greenhouse Gas Impacts	**One-time CO2e Emissions (2024-2026)**	**0.0 MT** *(0.0 ton)*	**119,899 MT** *(132,166 ton)*	**67,328 MT** *(74,216 ton)*	**98,576 MT** *(108,662 ton)*
	Monetized Benefit (2026-2074) Net Present Value USD *(CI$)*	**N/A****	**$73,521,000** *($61,757,640)*	**$81,110,000** **(***$68,132,400)*	**$85,582,000** *($71,888,880)*
Hydrology & Drainage	**Overall Qualitative Rating**	Slight Adverse	Large Adverse	Moderate Adverse	Moderate Adverse
Geo-Environmental	**Overall Qualitative Rating**	Slight Adverse	Large Adverse	Large Adverse	Large Adverse
Overall Qualitative Rating		**Slight Adverse**	**Large Adverse**	**Moderate Adverse**	**Moderate Adverse**

*See additional habitat impacts in **Section 5.7: Terrestrial Ecology** above. Wetland Habitat impacts include but are not limited to the Department of Environment's geospatial CMW boundary, as some wetland habitats occur outside of that boundary.

***Monetization of benefits compares the Build alternative to the No-Build condition

A CBA was performed by monetizing the anticipated costs and quantitative benefits of construction of the EWA Extension Alternatives B1, B2, and B3 compared to a No-Build scenario using the UK's WebTAG guidance. **Table 18** provides a summary of the total anticipated benefits, costs, and benefit to cost ratio.

Table 18: Summary of Cost-Benefit Analysis

Resource	No-Build	B1	B2	B3
Present Value of Benefits (PVB)	N/A	$644,293,000 USD	$666,285,000 USD	$657,558,000 USD
Present Value of Costs (PVC)	N/A	$546,863,000 USD	$496,154,000 USD	$494,841,000 USD
Benefit to Cost Ratio (BCR)	N/A	1.2	1.3	1.3

The following describes the conclusions of this Shortlist Evaluation including the similarities and differences between each of the Build alternatives.

From a CSFs and Engineering Constraints perspective, all three Build alternatives are comparable due to design similarities by providing an alternate route in the event of road closures that shifts most east-west traffic volume to the safer, restricted access EWA facility, which is anticipated to significantly reduce conflict points, thereby reducing the number of crashes. This alternate corridor is expected to provide improved resiliency and opportunities for multimodal accessibility with separated/dedicated facilities for transit, pedestrians, bicycles, and other micromobility modes of travel. The proposed corridor width also allows for the area needed to accommodate additional features including lighting, utilities, and a solar panel canopy that would not only provide electricity generation but also shade for the sidewalk and micromobility facilities. Even though some of these features, particularly the dedicated transit lanes and the solar panel canopy, are not within the ambit of the NRA, both components are expected to provide benefits. The solar panel canopy benefits alone (in terms of avoiding diesel fuel costs and carbon emissions) are expected to significantly exceed the investment cost of purchasing, installing, and operating the proposed solar facility.

From a Social Impacts perspective, all three Build alternatives are comparable: providing a Large Beneficial impact for socio-economics and a monetary disbenefit for noise.

From a Natural Environment Impacts perspective, Alternatives B2 and B3 result in the same overall qualitative rating (Moderate Adverse), whereas Alternative B1 is anticipated to be the most impactful of the Build alternatives with an overall qualitative rating of Large Adverse.

From a Cost-Benefit Analysis perspective, Alternatives B2 and B3 both resulted in the highest B/C ratio of 1.3 (versus a B/C ratio of 1.2 for Alternative B1).

8 Preferred Alternative

As described throughout this Shortlist Evaluation Document, the studies conducted for each of the Build alternatives (Alternatives B1, B2, and B3) as well as the No-Build scenario included a comprehensive analysis of the established CSFs and the anticipated direct impacts to environmental and social features along with evaluations of the engineering features. The alternatives were evaluated quantitatively, qualitatively, and monetarily (where applicable) using the UK's WebTAG guidance. A comprehensive CBA was also completed. The goal of the Shortlist Evaluation was to develop alternatives that best meet the CSFs while avoiding and minimising impacts to sensitive and important environmental and social resources. This evaluation focused on determining the most suitable alternative by evaluating the anticipated direct natural environment impacts, including possible considerations for avoidance or minimisation of impacts through design, to identify a Preferred Alternative that meets the CSFs while resulting in as little environmental and social impacts as possible.

The EWA EIA Steering Committee met on May 7th, May 8th, and May 13th of 2024 to discuss the Shortlist Alternatives Evaluation. The EAB recommended Alternative B2 due to its lower overall quantitative impact on natural resources compared to the other Build alternatives (B1 and B3). See **Attachment K** for additional details regarding EAB's recommendation. The NRA/ PAHI-TD recommendation was Alternative B3 for constructability reasons and to avoid disturbance to the trafficked area and residential and commercial routes. In addition, the NRA/PAHI-TD also viewed the Alternative B3 as providing a protective boundary between developed areas in the south and naturally preserved areas at the north but recognised that currently there is no legal or policy means to give effect to this. The PAHI-TD recommended Alternative B3 due to its higher GHG benefit, not having the potential impact of Alternative B2 on quarry operations, and, in their view, lower impact on Cayman parrot habitat.

A High-Level Summary Report of the EWA EIA Study Findings for the Selection of a Preferred Alternative memorandum was provided to the Cabinet (**Attachment L**). On June 27, 2024, Cabinet granted approval for the selection of **Alternative B3** as the Preferred Alternative. See **Attachment M** for the memorandum from the PAHI-TD Ministry noting the progress made to date on the EWA EIA and approval for selection of Alternative B3 as the preferred route.

Planned Future Roadway Infrastructure (No-Build) Alternative: The Planned Future Roadway Infrastructure Alternative (No-Build) is to be carried forward through the entire EIA evaluation process per the UK Greenbook guidance as a baseline of comparison.

Alternative B1: Alternative B1 will **not** be carried forward, as agreed by all members of the Project Steering Committee.

Alternative B2: Alternative B2, chosen by the EAB as the least impactful option, will **not** be carried forward.

Alternative B3: **Alternative B3 is chosen to be carried forward by Cabinet approval.**

X

Digitally signed by Gina Petrie
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Gina Ebanks-Petrie
Environmental Assessment Board Chair

X

Edward Howard
National Roads Authority Managing Director

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