Lei Deposit

Haulage Route Assessment

Lithium Plus Minerals Ltd

09 September 2024

→ **The Power of Commitment**

Project name		Lei Deposit Traffic Assessment					
Document title		Lei Deposit | Haulage Route Assessment					
Project number		12641480					
File name		12641480-RPT-Lei_Deposit_Haulage_Route_Assessment.docx					
Status Code	Revision	Author	Reviewer		Approved for issue		
			Name	Signature	Name	Signature	Date
S3	A	L. Trang	T. Cooper		S. Boer		09/09/24
[Status code]							
[Status code]							
[Status code]							
[Status code]							

GHD Pty Ltd | ABN 39 008 488 373
Contact: Farn-Ling Khung, Senior Traffic Engineer | GHD
180 Lonsdale Street, Level 9
Melbourne, Victoria 3000, Australia
T +61 3 8687 8000 +61 3 8732 7046 | **E** melmail@ghd.com | **ghd.com**

Contents

Table index

Figure index

Appendices

1. Introduction

1.1 Project background

Lithium Plus Minerals Ltd has engaged GHD to undertake a Haulage Route Assessment for the proposed Lei Deposit Project (the Project). Lithium Plus Minerals proposes to mine spodumene, a mineral which can be processed to produce lithium from the Lei Deposit located approximately 90 km south of Darwin. This beneficiated product will then be transported via quad road train to the East Arm Wharf (Darwin Port) facility for export.

1.2 Purpose of this report

The purpose of this report is to undertake a Haulage Route Assessment to determine the most appropriate haulage route between the Project site and the East Arm Wharf facility in Darwin Port by assessing four potential route options as well as potential traffic impacts.

1.3 Scope and limitations

This report: has been prepared by GHD for Lithium Plus Minerals Ltd and may only be used and relied on by Lithium Plus Minerals Ltd for the purpose agreed between GHD and Lithium Plus Minerals Ltd as set out in section 1.2 of this report.

GHD otherwise disclaims responsibility to any person other than Lithium Plus Minerals Ltd arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer section(s) 1.4 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

Accessibility of documents

If this report is required to be accessible in any other format, this can be provided by GHD upon request and at an additional cost if necessary.

1.4 Assumptions

Any assumptions that have been made during the course of this assessment have been mentioned within the relevant sections of the report including key assumptions shown below:

– Background traffic volume assumptions outlined in Section 3.3 along with the latest traffic volumes obtained from Northern Territory Government's *Annual Traffic Report 2023* were used to estimate the percentage of development traffic.
– Data relating to but not limited to the site location, construction details and operational details of the site have been provided by Lithium Plus

2. Project overview

2.1 Site location

The proposed underground mine is located in Charlotte, Northern Territory, with access to mine to be directly off Fog Bay Road, near its intersection with Cox Peninsula Road as seen in Figure 1.

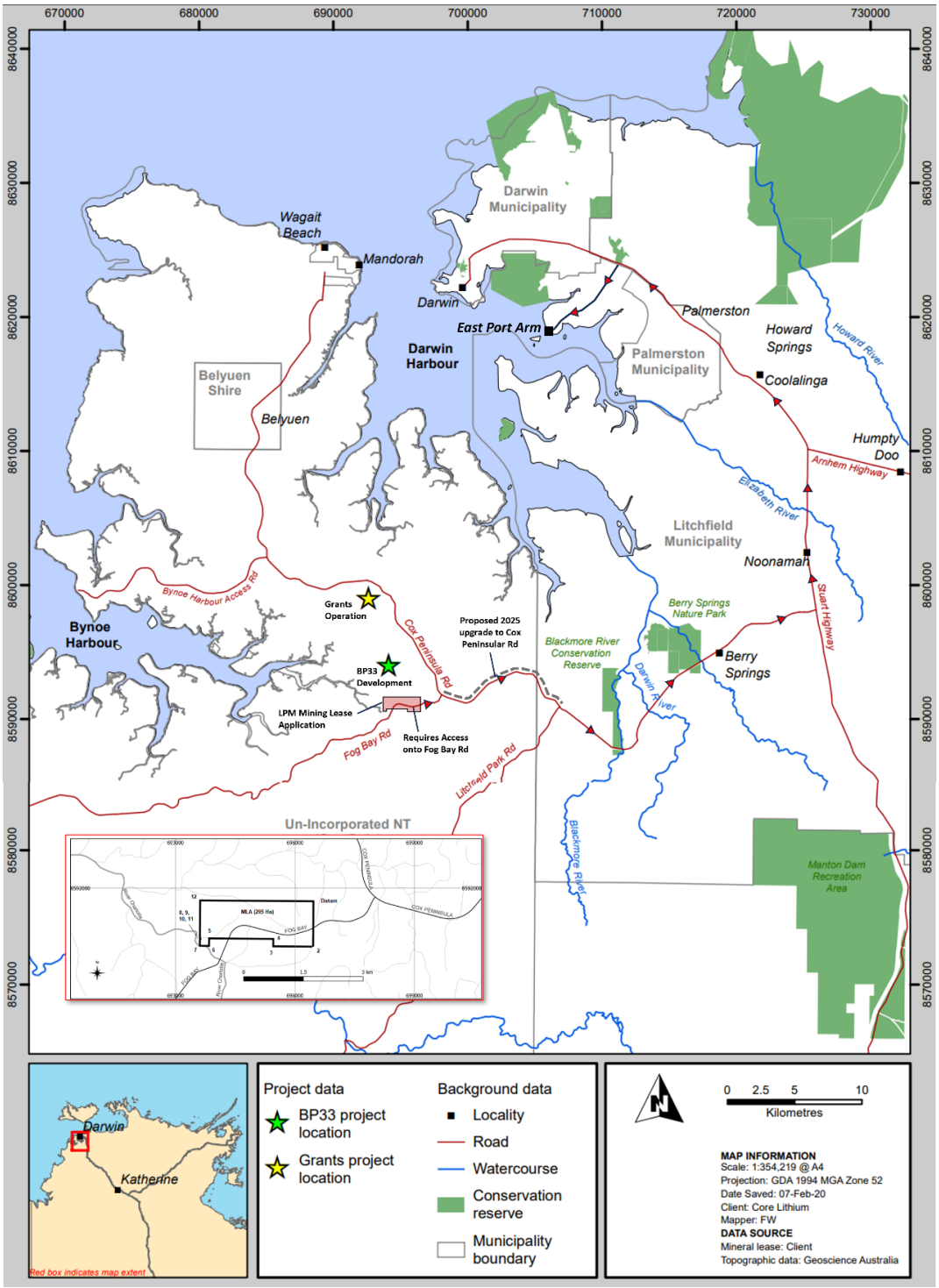


Figure 1 Site locality plan

Image source: Lithium Plus Minerals, extracted July 2024

2.2 Spodumene transport task

Lithium Plus Minerals proposes to ship spodumene as a Direct Shipping Ore (DSO) product from Darwin Port to customers in China. The Lei Deposit contains an estimated 3.10 million tonnes of high grade spodumene. The transfer of the DSO to East Arm is planned to commence in the first quarter 2027, peaking at a haulage rate of 600,000 tonnes in 2029 and concluding in the third quarter of 2032. Table 1 outlines the proposed DSO haulage schedule.

Table 1 Proposed DSO haulage schedule

Year	2027	2028	2029	2030	2031	2032	Total
	Operational Phase						
Ore Hauled (t)	475,913	510,000	600,000	600,000	600,000	300,000	3.10M

On the assumption that the ore haulage will be undertaken by quad road trains with a notional carrying capacity of 95 tonnes per vehicle combination and a round-trip duration of approximately 3 hours to East Arm, the following trip generation per 12-hour day / 7 days per week will result for the DSO haulage operation. Table 2 outlines the proposed DSO haulage truck movements.

Table 2 Proposed DSO haulage truck movements

Year	2027	2028	2029	2030	2031	2032
Daily No of trips	15	15	18	18	18	9
Truck Fleet	4	4	5	5	5	3
Average Truck Movements per Hr	1.2	1.2	1.5	1.5	1.5	0.8

2.3 East Arm Wharf facility

The East Arm Wharf facility will be utilised to export the DSO. The East Arm Wharf is operated by Darwin Port Operations Pty Ltd (part of the Landbridge Group). It is located on the Darwin harbour approximately 6km south-east of Darwin CBD and 31km north-east of the proposed Lithium Plus Minerals mine. Key features of the East Arm Wharf facility include the following:

– The wharf is accessible for quad road trains.
– The wharf operates 24 hours a day.

3. Haulage route options

An evaluation of four different haulage route options between the Project site and East Arm Wharf was undertaken to determine the most appropriate and efficient haulage route for the transportation of the DSO material.

The process for identify the most appropriate and efficient haulage route is described as follows:

– Determine the minimum haulage route performance parameters.
– Identify potential haulage route options based on the performance parameters.
– Determine route options selection criteria to further aid in selection of preferred route.
– Undertake a Multi Criteria Analysis (MCA) of the four haulage route options to facilitate selection of the preferred route.

These processes are further detailed below as follows.

3.1 Minimum haulage route performance parameters

Selected haulage routes should meet the following parameters outlined below as a minimum standard:

– Routes should be capable in accommodating the movement of quad road trains.
– Route should be direct as possible with a return travel time no greater than 3 hours.
– Route must be safe in accommodating the movement of quad road trains.

3.2 Haulage route identification

Based on the parameters outlined above in Section 3.1, four potential haulage route options have been identified. The four routes are as follows:

– Route 1: Stuart Highway – Berrimah Road
– Route 2: Stuart Highway – Wishart Road – Berrimah Road
– Route 3: Jenkins Road – Berrimah Road
– Route 4: Finn Road - Berrimah Road

Haulage route maps and key characteristics for each of these haulage routes are further described in the sections below.

3.2.1 Route 1: Stuart Highway – Berrimah Road

The key characteristics of Route 1 are outlined below:

– Route via Fog Bay Road, Cox Peninsula Road, Stuart Highway, Tiger Brennan Drive, Berrimah Road and East Arm Wharf. This is outlined in Figure 2.
– Distance: Approximately 79.2 km
– There are three (3) turning movements located outside of the port at the following intersections:
  - Fog Bay Road and Cox Peninsula Road
  - Stuart Highway and Cox Peninsula Road
  - Berrimah Road and Tiger Brennan Drive intersection overpass
– Table 3 illustrates the direction of the turning movements and intersection configuration.
– As of 18 June 2024, an overpass has been constructed and is in use at the Berrimah Road and Tiger Brennan Drive intersection. This can also be seen in Table 3.
– The route is an established road train route.
– The route crosses one at grade rail crossings.

– Major intersections along the route (including Jenkins Road, Arnhem Highway, Berrimah Road, Tiger Brennan Drive) are signalised or grade separated.
– Stuart Highway is a four-lane divided carriageway, allowing for safe overtaking and passing of road trains. This configuration ensures smoother traffic flow and enhances safety for other road users.

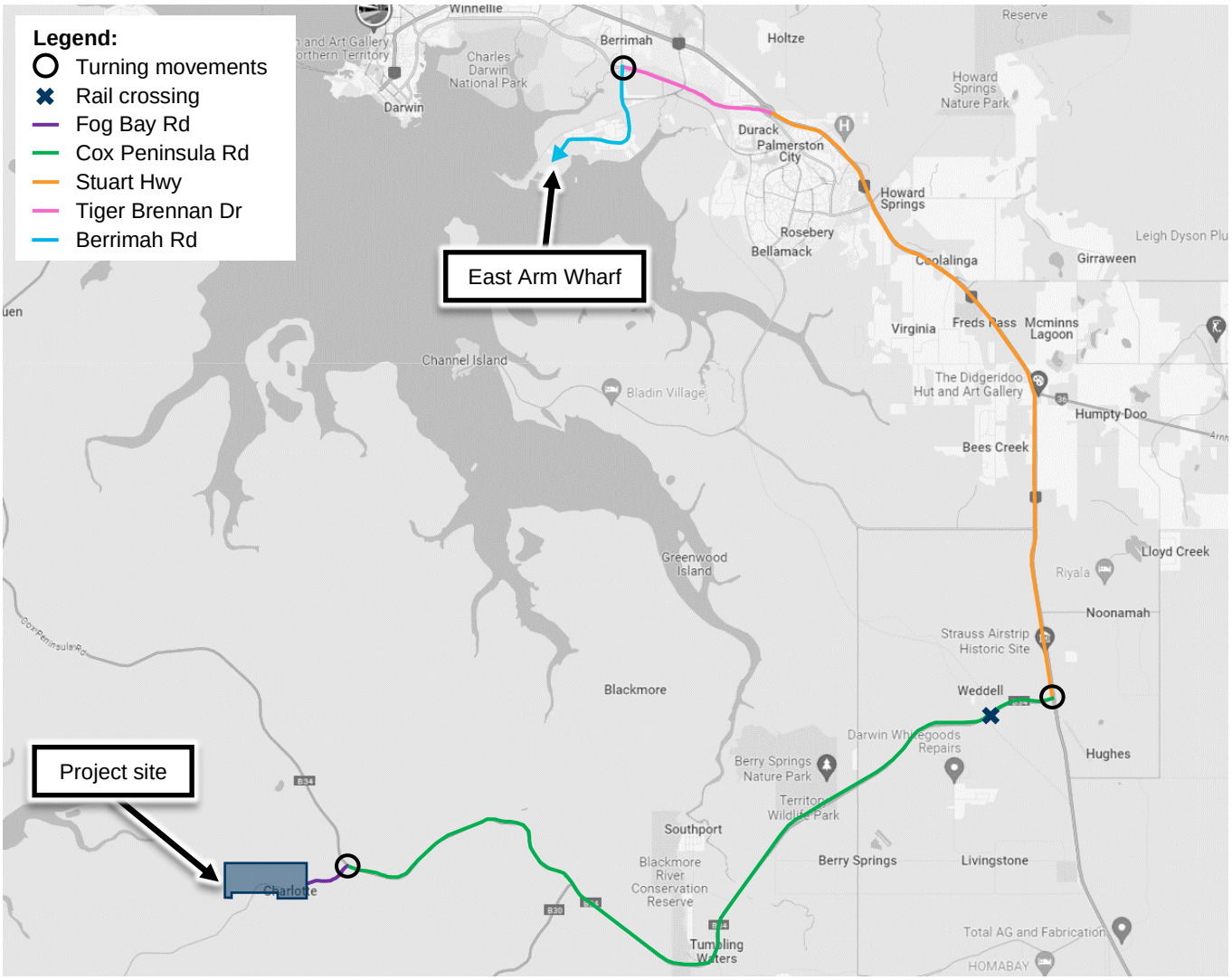
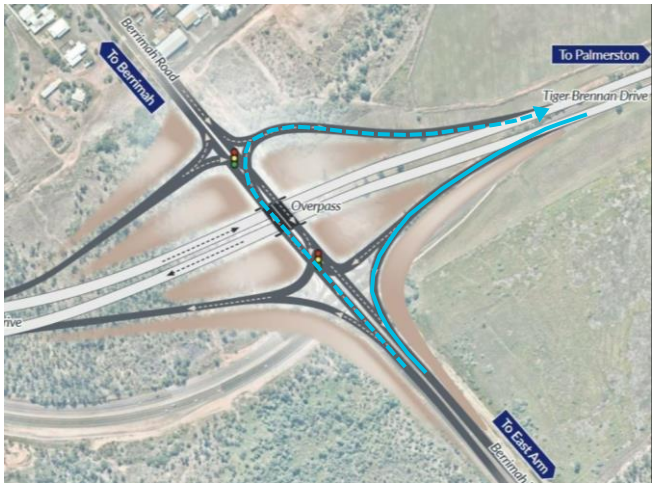


Figure 2 *Haulage Route 1*

Image source: Google Images, extracted July 2024

Table 3 Route 1 turning movements

Fog Bay Road and Cox Peninsula Road	Stuart Highway and Cox Peninsula Road
	
Berrimah Road and Tiger Brennan Drive intersection overpass	
	

Note: Solid blue line – loaded direction, dashed blue line – unloaded direction

3.2.2 Route 2: Stuart Highway – Wishart Road – Berrimah Road

The key characteristics of Route 2 are outlined below:

– Route via Fog Bay Road, Cox Peninsula Road, Stuart Highway, Tiger Brennan Drive, Wishart Road, Berrimah Road and East Arm Wharf. This is outlined in Figure 3.
– Route is similar to that of Route 1, it utilises Wishard Road instead of the Berrimah Road/Tiger Brennan Drive intersection.
– Distance: Approximately 77.9 km
– There are four (4) turning movements located outside of the port at the following intersections:
  - Fog Bay Road and Cox Peninsula Road
  - Stuart Highway and Cox Peninsula Road
  - Tiger Brennan Drive and Wishart Road
  - Wishart Road and Berrimah Road
– Table 4 illustrates the direction of the turning movements and intersection configuration.
– The Wishart Road / Berrimah Road intersection is signalised.
– The route is an established road train route.
– The route crosses one at grade rail crossings.
– Wishart Road runs alongside several commercial industries, resulting in multiple access points and exits along the corridor. This increases the likelihood of vehicle conflicts and accidents.

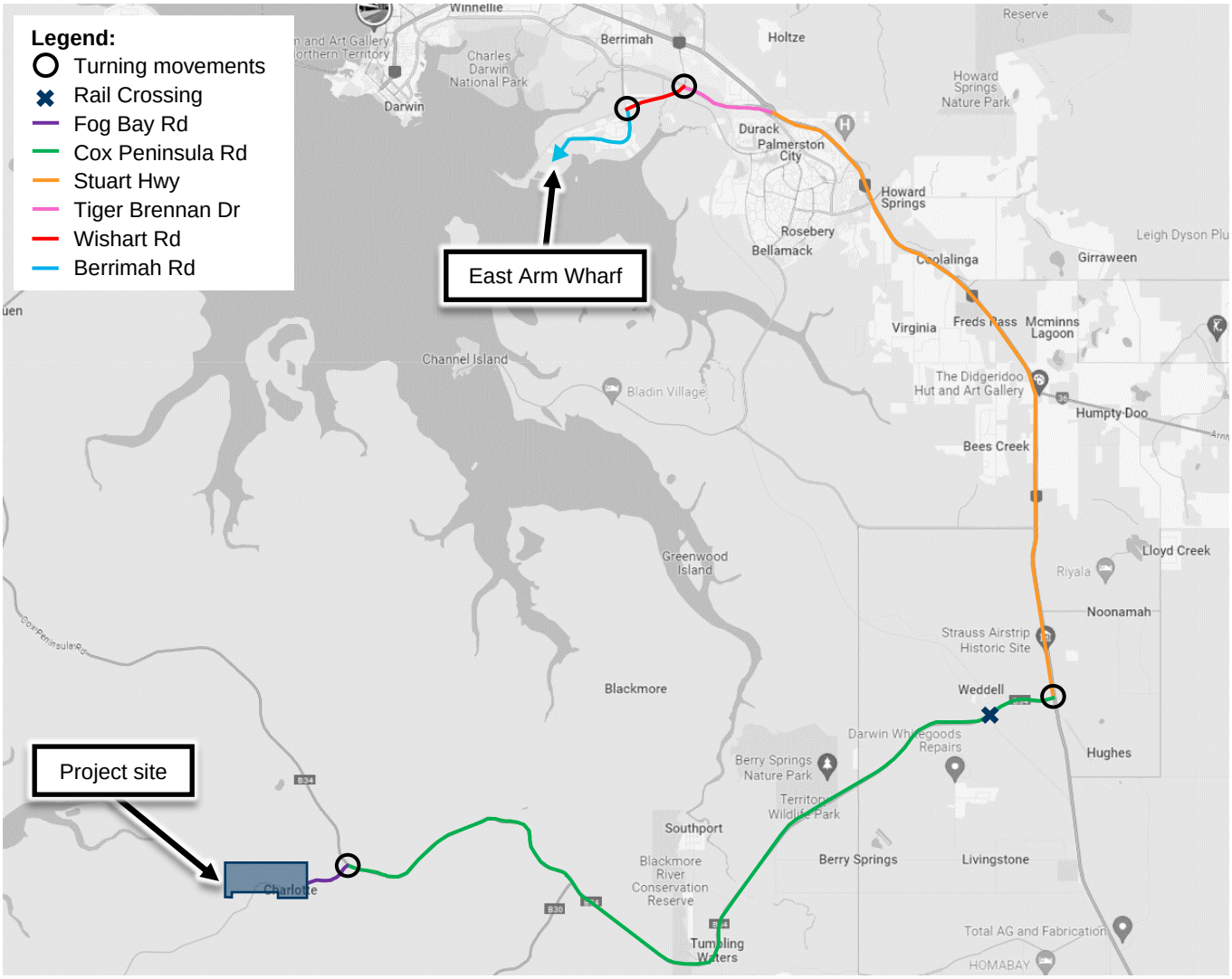


Figure 3 Haulage Route 2

Image source: Google Images, extracted July 2024

Table 4 Route 2 turning movements

Fog Bay Road and Cox Peninsula Road	**Stuart Highway and Cox Peninsula Road**
Refer to Table 3	Refer to Table 3
Tiger Brennan Drive and Wishart Road	**Wishart Road and Berrimah Road**
	

Note: Solid blue line – loaded direction, dashed blue line – unloaded direction

3.2.3 Route 3: Jenkins Road – Berrimah Road

The key characteristics of Route 3 are outlined below:

– Route via Fog Bay Road, Cox Peninsula Road, Stuart Highway, Jenkins Road, Channel Island Road, Elrundie Avenue, Kirkland Road, Wishart Road, Berrimah Road and East Arm Wharf. This is outlined in Figure 4.
– Distance: Approximately 81.9 km
– There are seven (7) turning movements located outside of the port at the following intersections:
  - Fog Bay Road and Cox Peninsula Road
  - Stuart Highway and Cox Peninsula Road
  - Stuart Highway and Jenkins Road
  - Jenkins Road and Channel Island Road
  - Elrundie Avenue and Kirkland Road
  - Kirkland Road and Wishart Road
  - Wishart Road and Berrimah Road
– Table 5 illustrates the direction of the turning movements and intersection configuration.
– The route is an established road train route.
– The route crosses five at grade rail crossings.
– The route runs along residential access on Elrundie Avenue and commercial access on Wishart Road.

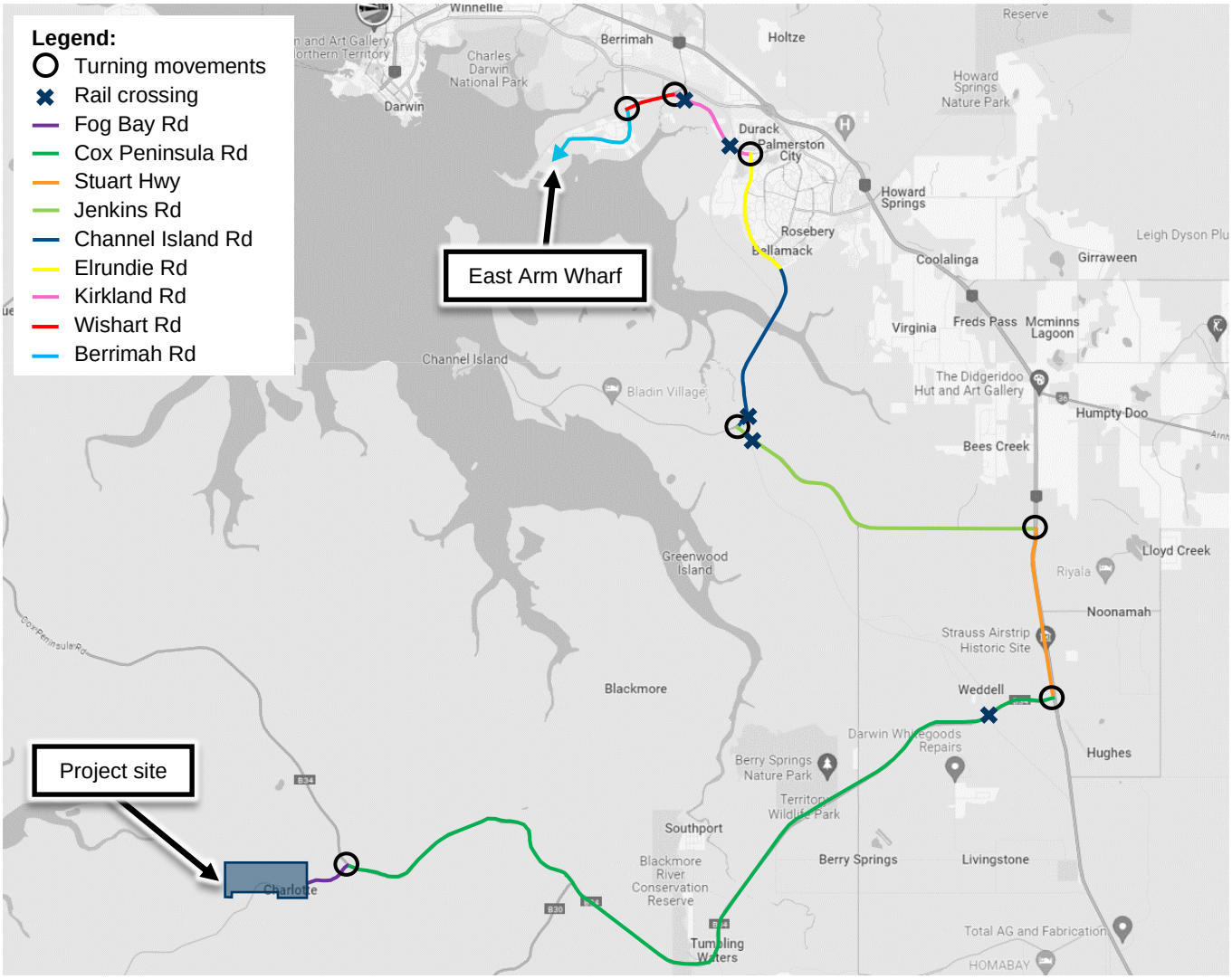
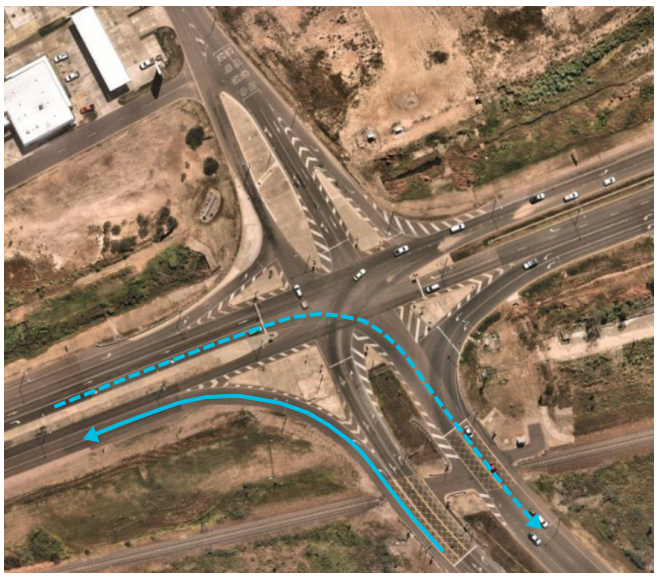


Figure 4 Haulage Route 3

Image source: Google Images, extracted July 2024

Table 5 Route 3 turning movements

Fog Bay Road and Cox Peninsula Road	**Stuart Highway and Cox Peninsula Road**
Refer to Table 3	Refer to Table 3
Stuart Highway and Jenkins Road	**Jenkins Road and Channel Island Road**
	
Elrundie Avenue and Kirkland Road	**Kirkland Road and Wishart Road**
	
Wishart Road and Berrimah Road	
Refer to Table 4	

Note: Solid blue line – loaded direction, dashed blue line – unloaded direction

3.2.4 Route 4: Finn Road - Berrimah Road

The key characteristics of Route 4 are outlined below:

– Route via Fog Bay Road, Cox Peninsula Road, Finn Road, Jenkins Road, Channel Island Road, Elrundie Avenue, Kirkland Road, Wishart Road, Berrimah Road and East Arm Wharf. This is outlined in Figure 5.
– Route is similar to that of Route 3, it utilises Finn Road.
– Distance: Approximately 69.6 km
– There are seven (7) turning movements located outside of the port at the following intersections:
  - Fog Bay Road and Cox Peninsula Road
  - Cox Peninsula Road and Finn Road
  - Finn Road and Jenkins Road
  - Jenkins Road and Channel Island Road
  - Elrundie Avenue and Kirkland Road
  - Kirkland Road and Wishart Road
  - Wishart Road and Berrimah Road
– Table 6 illustrates the direction of the turning movements and intersection configuration.
– The route is not established road train route and cannot cater for road train movements on Finn Road. Significant upgrade on Finn Road will be required to cater for road trains.
– The route crosses five at grade rail crossings.
– Like Route 3, this route also runs along residential access on Elrundie Avenue and commercial access on Wishart Road.

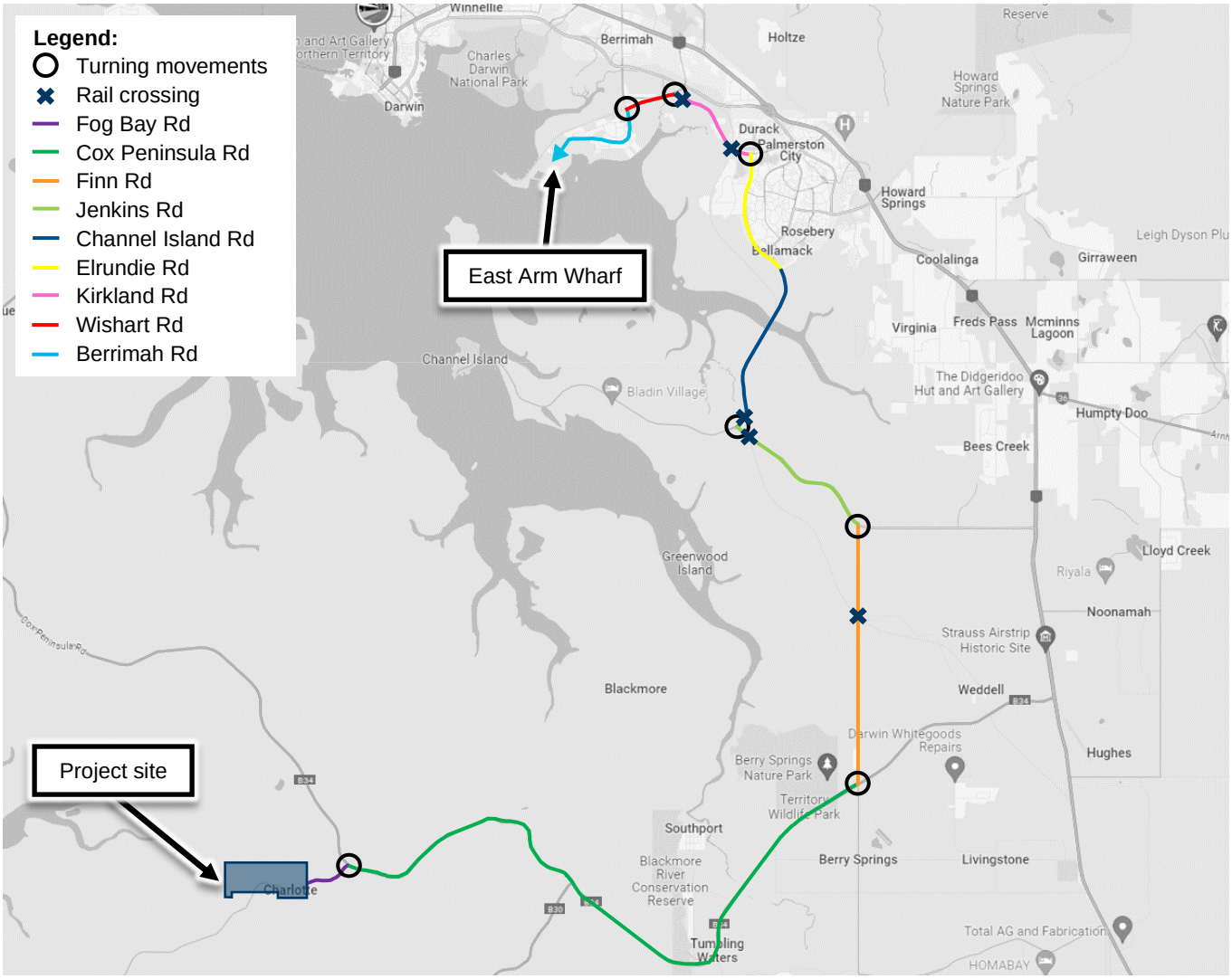
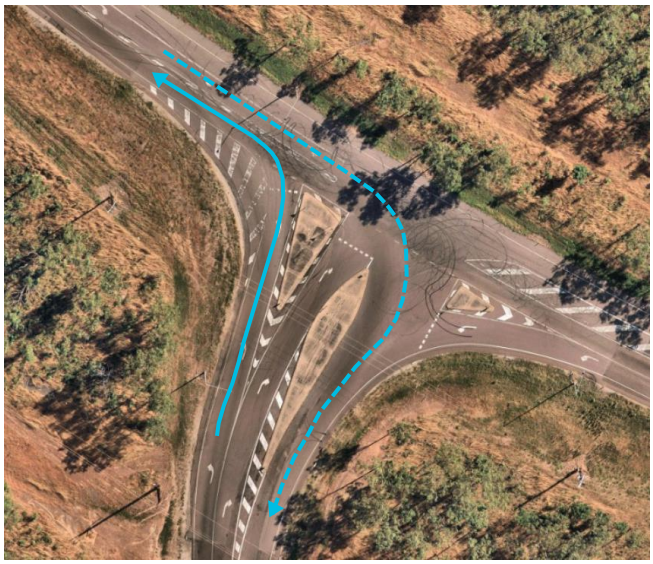


Figure 5 Haulage Route 4

Image source: Google Images, extracted July 2024

Table 6 Route 4 turning movements

Fog Bay Road and Cox Peninsula Road	**Cox Peninsula Road and Finn Road**
Refer to Table 3	
Finn Road and Jenkins Road	**Jenkins Road and Channel Island Road**
	Refer to Table 5
Elrundie Avenue and Kirkland Road	**Kirkland Road and Wishart Road**
Refer to Table 5	Refer to Table 5
Wishart Road and Berrimah Road	
Refer to Table 4	

Note: Solid blue line – loaded direction, dashed blue line – unloaded direction

3.3 Potential traffic impacts

Further detailed analysis of the potential traffic impact on the preferred route will be analysed in a subsequent body of work and be delivered as another report.

In order to understand the existing and future traffic volumes, the latest traffic volumes were obtained from Northern Territory Government's *Annual Traffic Report 2023*. This report provides the average annual daily traffic for a ten-year period (from 01 January 2014 until 31 December 2023).

The following assumptions listed below are based off annual traffic growth in the Northern Territory Government Traffic Report and were applied to the 2023 traffic counts to estimate the future daily traffic volumes:

– Annual growth rate of 3%
– Peak hour traffic volume as 15%
– Proportion of heavy vehicles as 20%

As a first assessment, potential traffic impacts were calculated for 2029 during the peak haulage period with an annual haulage rate of 600,000 tonnes which equates to 1.5 trips per hour as shown in Table 2. This estimated development traffic was compared to the baseline traffic data to assess the relative increase in traffic. Detailed calculations of future traffic volumes and the percentage of development traffic are included in Appendix A.

A threshold of 5% increase on the background traffic and/or background heavy vehicle traffic was adopted, as the measure by which increase in traffic volume triggers a "material impact" and warrants further analysis. This analysis was conducted relative to total traffic movements and heavy vehicle movements. A summary of this analysis is given in Table 7 below:

Table 7 Percentage of development traffic in 2029 (all vehicles and heavy vehicles)

Count Station	Vehicle Type	Percentage of Development Traffic (2029)
Berrimah Road (UDVDP029)	All vehicles	0.55%
	Heavy vehicles	2.88%
Berrimah Road 400 m South of Tiger Brennan Drive (UDVDP028)	All vehicles	0.12%
	Heavy vehicles	0.52%
Berrimah Road 100 m South Marlow Road (UDVDC024)	All vehicles	0.10%
	Heavy vehicles	0.52%
Tiger Brennan Dr (UDVDP022)	All vehicles	0.04%
	Heavy vehicles	0.21%
Stuart Highway Midway Yarrawonga & Tulagi Rd (UDVDC079)	All vehicles	0.03%
	Heavy vehicles	0.15%
Stuart Highway 500 m West of Howard Springs Rd (UDVDP017)	All vehicles	0.03%
	Heavy vehicles	0.15%
Stuart Highway 100 m North of Henning Rd (UDVDC021)	All vehicles	0.04%
	Heavy vehicles	0.24%
Stuart Highway 500 m North of Arnhem Hwy (UDVDP020)	All vehicles	0.07%
	Heavy vehicles	0.32%
Stuart Highway 500 m North of Gulnare (RDVDC051)	All vehicles	0.12%
	Heavy vehicles	0.60%

Count Station	Vehicle Type	Percentage of Development Traffic (2029)
Stuart Highway 500 m North of Cox Peninsula Rd (RDVDC049)	All vehicles	0.11%
	Heavy vehicles	0.54%
Cox Peninsula Road 4 km West of Stuart Hwy (RDVDP009)	All vehicles	0.32%
	Heavy vehicles	0.82%
Cox Peninsula Road at Blackmore River Bridge (RDVDC030)	All vehicles	0.61%
	Heavy vehicles	3.00%
Cox Peninsula Road at Pioneer Creek Bridge (RDVDP010)	All vehicles	0.82%
	Heavy vehicles	4.55%
Fog Bay Road 2 Km West of Cox Peninsula Road (RDVDP032)	All vehicles	1.60%
	Heavy vehicles	**7.50%**

Based on the above, Fog Bay Road exceeds the 5% threshold for heavy vehicles and will require further additional assessment in terms of traffic and pavement impact during the haulage operation as per the Development Guidelines for Northern Territory Controlled Roads.

4. Multi-criteria analysis

4.1 Framework

A multi-criteria analysis (MCA) has been undertaken on all the routes listed above in Section 3.2 of this report to determine the preferred heavy vehicle haulage route between the Project site and the East Arm Wharf facility.

The key characteristics of each route option were documented and given a rating out of 5 (with 1 representing poor condition and 5 representing very good condition) based on the following criteria:

– Road suitability
– Stakeholder benefits and impacts
– Value for money
– Technical risk and opportunity
– Other

Each of these criteria are further broken down into sub criteria and are assigned a weighting based upon relative importance and are listed below in Table 8. A full breakdown of each sub criteria is provided in Appendix B which outlines the different requirements defining a rating of five and a rating of one.

Table 8 MCA criteria weighting

Criteria	Sub criteria	Weighting
Road suitability (30%)	Road train approved	30%
	Geometry (seal width)	10%
	Geometry (seal width)	10%
	Length	10%
	Intersections and rail crossings	10%
	Congestion	10%
	Time	10%
	Planned upgrade impacts	10%
	Total sub criteria weighting	**100%**
Stakeholder benefits and impacts (20%)	Operational safety	40%
	Local traffic impacts/delay	20%
	Compliments local network function	20%
	Impacts on local businesses	20%
	Total sub criteria weighting	**100%**
Value for money (20%)	Capital Costs	60%
	Lifecycle Costs	40%
	Total sub criteria weighting	**100%**
Technical risk and opportunity (15%)	Bridges and Culverts	25%
	Floodway	25%
	Pavements	25%
	Traffic	25%
	Total sub criteria weighting	**100%**
Other (15%)	Vegetation	30%
	Land use	40%

Criteria	Sub criteria	Weighting
	Drainage	30%
	Total sub criteria weighting	**100%**

4.2 Assessment

The MCA is provided in Appendix B and a summary of the weighted scores and ranking for each route option are shown below in Table 9. From the MCA analysis, the preferred haulage route is route 1.

Table 9 Ranking of route options

Criteria	Route 1	Route 2	Route 3	Route 4
Road suitability (30%)	4.3	4.4	3.9	3.1
Stakeholder benefits and impacts (20%)	3.4	2.8	2.6	2.6
Value for money (20%)	5	5	4	2
Technical risk and opportunity (15%)	4.75	4.5	3.25	3
Other (15%)	4.3	3.9	3.5	3.5
Overall weighted score	**4.3**	**4.1**	**3.5**	**2.8**
RANK	**1**	**2**	**3**	**4**

5. Summary and recommendations

Lithium Plus Minerals proposes to ship 3.10 million tonnes of spodumene as a Direct Shipping Ore (DSO) product. The proposed mine is located 2km south of Core Lithium's BP33 Underground mine with access to mine to be directly off Fog Bay Road, near its intersection with Cox Peninsula Road. The transfer of DSO to East Arm through the use of quad road trains is to commence in the first quarter of 2027 and to conclude in the third quarter of 2032. Over this time, the haulage operation will operate 12-hour days/7 days per week.

A multi-criteria analysis (MCA) has been undertaken for four different haulage routes to identify the most appropriate route.

The four routes are referred to as:

– Route 1: Stuart Highway – Berrimah Road
– Route 2: Stuart Highway – Wishart Road – Berrimah Road
– Route 3: Jenkins Road – Berrimah Road
– Route 4: Finn Road - Berrimah Road

Assessment criteria for the MCA were derived and weighted by importance as a mean to compare and rank the different routes.

The assessment criteria are described as:

– Road suitability (30%)
– Stakeholder benefits and impacts (20%)
– Value for money (20%)
– Technical risk and opportunity (15%)
– Other (15%)

From the MCA, the ranking of the four haulage routes are as follows:

– 1st: Route 1: Stuart Highway – Berrimah Road
– 2nd: Route 2: Stuart Highway – Wishart Road – Berrimah Road
– 3rd: Route 3: Jenkins Road – Berrimah Road
– 4th: Route 4: Finn Road - Berrimah Road

Route 1 is recommended as the preferred haulage route of DSO from the mine to the East Arm Wharf facility. Upon acceptance of this recommendation, further detailed analysis of the potential traffic impact on the preferred route will be analysed in a subsequent body of work and be delivered as another report.

Appendix A

Traffic Volumes

LEGEND
Volumes Obtained from TAMS Report 2023
Volumes Calculated Based on Assumed Parameters
Heavy Vehicle Volumes Based on Assumed Parameters
Development Traffic Within 5% Threshhold
Development Traffic Exceeds 5% Threshhold

CALCULATION PARAMETERS	
Assumed Annual Growth Rate	3%
Assumed Peak Hour Proportion	15%
Assumed Proportion of Heavy Vehicles	20%

TRIP GENERATION	
Parameter	Peak Haulage
Assumed One Way Trip Duration (Hours)	1.5
Assumed Two Way Trip Duration (Hours)	3
Assumed Length of Working Day (Hours)	12
Number of Trips per Month	526
Number of Trips per Day	18
Number of Trips per Hour	1.5

		VOLUMES PREVIOUS				VOLUMES ESTIMATED		VOLUMES FORECASTED										Peak Hour Traffic Volumes		Percentage of Development Traffic
Road Counter	Direction	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2029	2030	Peak Haulage (2029)
Berrimah Road (UDVDP029)	Inbound	514	576	683	754	777	800	824	849	874	900	927	955	984	1,013	1,044	1,075	136	140	
	Outbound	533	602	700	773	796	820	845	870	896	923	951	979	1,009	1,039	1,070	1,102	139	143	
	Both	1,047	1,178	1,383	1,527	1,573	1,620	1,669	1,719	1,770	1,823	1,878	1,934	1,992	2,052	2,114	2,177	274	282	0.55%
	HV Inbound	103	115	137	141	145	149	154	158	163	168	173	178	184	189	195	201	26	26	
	HV Outbound	107	120	140	144	149	153	158	162	167	172	177	183	188	194	200	206	26	27	
	HV Both	209	236	277	285	293	302	311	321	330	340	350	361	372	383	394	406	52	53	2.88%
Berrimah Road 400 m Sth of Tiger Brennan Drive (UDVDP028)	Inbound	4,139	4,201	4,443	3,776	3,889	4,006	4,126	4,250	4,377	4,509	4,644	4,783	4,927	5,075	5,227	5,384	677	697	
	Outbound	3,117	3,124	3,337	2,992	3,082	3,174	3,269	3,368	3,469	3,573	3,680	3,790	3,904	4,021	4,142	4,266	536	552	
	Both	7,256	7,325	7,780	6,768	6,971	7,180	7,396	7,617	7,846	8,081	8,324	8,573	8,831	9,096	9,368	9,650	1,213	1,249	0.12%
	HV Inbound	828	840	889	915	943	971	1,000	1,030	1,061	1,093	1,126	1,159	1,194	1,230	1,267	1,305	164	169	
	HV Outbound	623	625	667	687	708	729	751	774	797	821	845	871	897	924	952	980	124	127	
	HV Both	1,451	1,465	1,556	1,603	1,651	1,700	1,751	1,804	1,858	1,914	1,971	2,030	2,091	2,154	2,218	2,285	288	296	0.52%
Berrimah Road 100 m South Marlow Road (UDVDC024)	Inbound	3,373	3,476	4,443	4,576	4,714	4,855	5,001	5,151	5,305	5,464	5,628	5,797	5,971	6,150	6,335	6,525	820	845	
	Outbound	3,319	3,365	3,337	3,437	3,540	3,646	3,756	3,868	3,985	4,104	4,227	4,354	4,485	4,619	4,758	4,900	616	635	
	Both	6,692	6,841	7,780	8,013	8,254	8,501	8,756	9,019	9,290	9,568	9,855	10,151	10,456	10,769	11,092	11,425	1,436	1,479	0.10%
	HV Inbound	675	695	889	915	943	971	1,000	1,030	1,061	1,093	1,126	1,159	1,194	1,230	1,267	1,305	164	169	
	HV Outbound	664	673	667	687	708	729	751	774	797	821	845	871	897	924	952	980	124	127	
	HV Both	1,338	1,368	1,556	1,603	1,651	1,700	1,751	1,804	1,858	1,914	1,971	2,030	2,091	2,154	2,218	2,285	288	296	0.52%
Tiger Brennan Dr (UDVDP022)	Inbound	9,868	10,794	10,116	11,828	12,183	12,548	12,925	13,313	13,712	14,123	14,547	14,983	15,433	15,896	16,373	16,864	2,119	2,183	
	Outbound	8,965	10,087	9,420	10,076	10,378	10,690	11,010	11,341	11,681	12,031	12,392	12,764	13,147	13,541	13,948	14,366	1,805	1,859	
	Both	18,833	20,881	19,536	21,904	22,561	23,238	23,935	24,653	25,393	26,155	26,939	27,747	28,580	29,437	30,320	31,230	3,924	4,041	0.04%
	HV Inbound	1,974	2,159	2,023	2,084	2,146	2,211	2,277	2,345	2,416	2,488	2,563	2,640	2,719	2,801	2,885	2,971	374	385	
	HV Outbound	1,793	2,017	1,884	1,941	1,999	2,059	2,120	2,184	2,250	2,317	2,387	2,458	2,532	2,608	2,686	2,767	348	358	
	HV Both	3,767	4,176	3,907	4,024	4,145	4,270	4,398	4,530	4,665	4,805	4,950	5,098	5,251	5,408	5,571	5,738	721	743	0.21%
Stuart Highway Midway Yarrawonga & Tulagi Rds UDVDC079	Inbound	12,413	15,000	14,934	14,854	15,300	15,759	16,231	16,718	17,220	17,736	18,269	18,817	19,381	19,963	20,561	21,178	2,661	2,741	
	Outbound	10,310	12,005	11,887	11,685	12,036	12,397	12,769	13,152	13,546	13,953	14,371	14,802	15,246	15,704	16,175	16,660	2,093	2,156	
	Both	22,723	27,005	26,821	26,539	27,335	28,155	29,000	29,870	30,766	31,689	32,640	33,619	34,627	35,666	36,736	37,838	4,754	4,896	0.03%
	HV Inbound	2,483	3,000	2,987	3,076	3,169	3,264	3,362	3,463	3,566	3,673	3,784	3,897	4,014	4,134	4,258	4,386	552	568	
	HV Outbound	2,062	2,401	2,377	2,449	2,522	2,598	2,676	2,756	2,839	2,924	3,012	3,102	3,195	3,291	3,390	3,491	439	452	
	HV Both	4,545	5,401	5,364	5,525	5,691	5,862	6,037	6,219	6,405	6,597	6,795	6,999	7,209	7,425	7,648	7,878	990	1,020	0.15%
Stuart Highway 500 m West of Howard Springs Rd UDVDP017	Inbound	12,265	14,101	13,927	14,029	14,450	14,883	15,330	15,790	16,263	16,751	17,254	17,772	18,305	18,854	19,419	20,002	2,513	2,589	
	Outbound	12,209	13,688	13,452	13,542	13,948	14,367	14,798	15,242	15,699	16,170	16,655	17,155	17,669	18,199	18,745	19,308	2,426	2,499	
	Both	24,474	27,789	27,379	27,571	28,398	29,250	30,128	31,031	31,962	32,921	33,909	34,926	35,974	37,053	38,165	39,310	4,939	5,087	0.03%
	HV Inbound	2,453	2,820	2,785	2,869	2,955	3,044	3,135	3,229	3,326	3,426	3,528	3,634	3,743	3,856	3,971	4,090	514	530	
	HV Outbound	2,442	2,738	2,690	2,771	2,854	2,940	3,028	3,119	3,212	3,309	3,408	3,510	3,616	3,724	3,836	3,951	497	512	
	HV Both	4,895	5,558	5,476	5,640	5,809	5,984	6,163	6,348	6,538	6,735	6,937	7,145	7,359	7,580	7,807	8,041	1,011	1,041	0.15%
Stuart Highway 100 m North of Henning Rd UDVDC021	Inbound	9,746	6,548	10,025	11,138	11,472	11,816	12,171	12,536	12,912	13,299	13,698	14,109	14,533	14,969	15,418	15,880	1,995	2,055	
	Outbound	6,879	7,843	6,621	7,747	7,979	8,219	8,465	8,719	8,981	9,250	9,528	9,814	10,108	10,411	10,724	11,045	1,388	1,430	
	Both	16,625	14,391	16,646	18,885	19,452	20,035	20,636	21,255	21,893	22,550	23,226	23,923	24,641	25,380	26,141	26,925	3,383	3,484	0.04%
	HV Inbound	1,949	1,310	2,005	2,065	2,127	2,191	2,257	2,324	2,394	2,466	2,540	2,616	2,695	2,775	2,859	2,944	370	381	
	HV Outbound	1,376	1,569	1,324	1,364	1,405	1,447	1,490	1,535	1,581	1,629	1,677	1,728	1,780	1,833	1,888	1,945	245	252	
	HV Both	3,325	2,878	3,329	3,429	3,532	3,638	3,747	3,859	3,975	4,094	4,217	4,344	4,474	4,608	4,747	4,889	615	633	0.24%
Stuart Highway 500 m North of Arnhem Hwy UDVDP020	Inbound	5,431	7,051	6,107	6,065	6,247	6,434	6,627	6,826	7,031	7,242	7,459	7,683	7,913	8,151	8,395	8,647	1,087	1,119	
	Outbound	5,940	7,630	6,630	6,561	6,758	6,961	7,169	7,384	7,606	7,834	8,069	8,311	8,561	8,817	9,082	9,354	1,176	1,211	
	Both	11,371	14,681	12,737	12,626	13,005	13,395	13,797	14,211	14,637	15,076	15,528	15,994	16,474	16,968	17,477	18,002	2,262	2,330	0.07%
	HV Inbound	1,086	1,410	1,221	1,258	1,296	1,335	1,375	1,416	1,458	1,502	1,547	1,594	1,641	1,691	1,741	1,794	226	233	
	HV Outbound	1,188	1,526	1,326	1,366	1,407	1,449	1,492	1,537	1,583	1,631	1,680	1,730	1,782	1,835	1,891	1,947	245	252	
	HV Both	2,274	2,936	2,547	2,624	2,703	2,784	2,867	2,953	3,042	3,133	3,227	3,324	3,423	3,526	3,632	3,741	470	485	0.32%
Stuart Highway 500 m North of Gulnare RDVDC051	Inbound	3,202	3,230	3,442	3,589	3,697	3,808	3,922	4,039	4,161	4,285	4,414	4,546	4,683	4,823	4,968	5,117	643	663	
	Outbound	3,228	2,424	3,386	3,533	3,639	3,748	3,861	3,976	4,096	4,219	4,345	4,475	4,610	4,748	4,890	5,037	633	652	
	Both	6,430	5,654	6,828	7,122	7,336	7,556	7,782	8,016	8,256	8,504	8,759	9,022	9,293	9,571	9,859	10,154	1,276	1,314	0.12%
	HV Inbound	640	646	688	709	730	752	775	798	822	847	872	898	925	953	981	1,011	127	131	
	HV Outbound	646	485	677	698	718	740	762	785	809	833	858	884	910	937	966	994	125	129	
	HV Both	1,286	1,131	1,366	1,407	1,449	1,492	1,537	1,583	1,631	1,680	1,730	1,782	1,835	1,890	1,947	2,005	252	260	0.60%
Stuart Highway 500 m North of Cox Peninsula Rd RDVDC049	Inbound	3,548	3,655	3,764	3,877	3,993	4,113	4,237	4,364	4,495	4,629	4,768	4,911	5,059	5,210	5,367	5,528	695	716	
	Outbound	3,561	3,668	3,778	3,891	4,008	4,128	4,252	4,380	4,511	4,647	4,786	4,930	5,077	5,230	5,387	5,548	697	718	
	Both	7,109	7,323	7,542	7,769	8,002	8,242	8,489	8,744	9,006	9,276	9,554	9,841	10,136	10,440	10,753	11,076	1,392	1,434	0.11%
	HV Inbound	710	731	753	775	799	823	847	873	899	926	954	982	1,012	1,042	1,073	1,106	139	144	
	HV Outbound	712	734	756	778	802	826	850	876	902	929	957	986	1,015	1,046	1,077	1,110	140	144	
	HV Both	1,422	1,465	1,508	1,554	1,600	1,648	1,698	1,749	1,801	1,855	1,911	1,968	2,027	2,088	2,151	2,215	279	287	0.54%
Cox Penisula Road 4 km West of Stuart Hwy RDVDP009	Inbound	997	1,170	2,424	1,291	1,330	1,370	1,411	1,453	1,497	1,542	1,588	1,635	1,684	1,735	1,787	1,841	232	239	
	Outbound	1,053	1,213	2,502	1,335	1,375	1,416	1,459	1,503	1,548	1,594	1,642	1,691	1,742	1,794	1,848	1,903	240	247	
	Both	2,050	2,383	4,926	2,626	2,705	2,786	2,870	2,956	3,044	3,136	3,230	3,327	3,426	3,529	3,635	3,744	471	485	0.32%
	HV Inbound	199	234	485	499	514	530	546	562	579	596	614	633	652	671	691	712	90	93	
	HV Outbound	211	243	500	515	531	547	563	580	598	615	634	653	672	693	713	735	93	96	
	HV Both	410	477	985	1,015	1,045	1,077	1,109	1,142	1,176	1,212	1,248	1,285	1,324	1,364	1,405	1,447	182	188	0.82%
Cox Penisula Road At Blackmore River Bridge RDVDC030	Inbound	494		673	693	714	735	757	780	804	828	853	878	904	932	960	988	125	128	
	Outbound	484		659	679	699	720	742	764	787	810	835	860	886	912	940	968	122	126	
	Both	978		1,332	1,372	1,413	1,456	1,499	1,544	1,590	1,638	1,687	1,738	1,790	1,844	1,899	1,956	246	254	0.61%
	HV Inbound	99		135	139	143	147	151	156	161	166	171	176	181	186	192	198	25	26	
	HV Outbound	97		132	136	140	144	148	153	157	162	167	172	177	182	188	194	25	26	
	HV Both	196		266	274	283	291	300	309	318	328	337	348	358	369	380	391	50	51	3.00%
Cox Penisula Road At Pioneer Creek Bridge RDVDP010	Inbound	346	376	441	505	520	536	552	568	585	603	621	640	659	679	699	720	91	94	
	Outbound	350	380	445	521	537	553	569	586	604	622	641	660	680	700	721	743	94	97	
	Both	696	756	886	1,026	1,057	1,088	1,121	1,155	1,189	1,225	1,262	1,300	1,339	1,379	1,420	1,463	184	190	0.82%
	HV Inbound	69	75	88	91	94	96	99	102	105	108	112	115	119	122	126	130	17	17	
	HV Outbound	70	76	89	92	94	97	100	103	106	109	113	116	120	123	127	131	17	17	
	HV Both	139	151	177	183	188	194	199	205	212	218	224	231	238	245	253	260	33	34	4.55%
Fog Bay Road 2 Km West of Cox Peninsula Road RDVDP032	Inbound	2,237	254	257	255	263	271	279	287	296	304	314	323	333	343	353	364	46	48	
	Outbound	238	256	258	265	273	281	290	298	307	316	326	336	346	356	367	378	48	49	
	Both	2,475	510	515	520	536	552	568	585	603	621	640	659	678	699	720	741	94	96	1.60%
	HV Inbound	447	51	51	53	55	56	58	60	61	63	65	67	69	71	73	75	10	10	
	HV Outbound	48	51	52	53	55	56	58	60	62	63	65	67	69	71	74	76	10	10	
	HV Both	495	102	103	106	109	113	116	119	123	127	130	134	138	143	147	151	20	20	7.50%

Appendix B

MCA

				HAULAGE OPTIONS				Legend: 5 = Very Good 4 = Good 3 = Average 2 = Fair 1 = Poor
				Route 1	Route 2	Route 3	Route 4	
				Stuart Hwy - Berrimah Rd	Stuart Hwy - Wishart Rd - Berrimah Rd	Jenkins Rd - Berrimah Rd	Finn Rd - Berrimah Rd	
Criteria	**Sub Criteria**	**Criteria Weighting**	**Comment Defining a Score of 5**	**Score**				**Comment Defining a Score of 1**
Road Suitability	Road train approved	30%	All Sections Quad Road Train Approved	5	5	5	1	No Sections Quad Road Train Approved
	Geometry (seal width)	10%	Seal Width Compliant for Quad Road Trains >7m	4	4	4	4	Seal Width Not Compliant for Quad Road Trains <4m
	Geometry (shoulder width)	10%	Shoulder Width Compliant for Quad Road Trains >2m	4	4	3	3	Shoudler Width Not Compliant for Quad Road Trains <0.25m
	Length	10%	Shortest Route	3	4	2	5	Longest Route
	Intersections and rail crossings	10%	Minimal High Volume Unsignalised/Signalised Intersections	5	4	2	2	High Number of High Volume Unsignalised/Signalised Intersections
	Congestion	10%	Minimal Congestion on all Sections	5	5	5	4	High Level of Congestion on all Sections
	Time	10%	Lowest Average Travel Time	4	4	3	5	Highest Average Travel Time
	Planned upgrade impacts	10%	No Planned Road Works during the Haul Period	3	4	5	5	Significant Sections of Roadworks during the Haul Period
30%	Total Criteria Weighting	100%	**Weighted Score**	**4.3**	**4.4**	**3.9**	**3.1**	
Stakeholder Benefits and Impacts	Operational safety	40%	Low volumes of crashes based on a five year crash history (2018-2023)	2	2	3	3	High volumes of crashes based on a five year crash history (2018-2023)
	Local traffic impacts/delay	20%	Minimal impact on traffic movements during operation.	5	4	2	2	Significant impact on traffic movements during Construction
	Compliments local network function	20%	No impacts on adjoining local street network	4	3	2	2	Negative impacts on adjoining local street network
	Impacts on local businesses	20%	Low impacts on access to and operation	4	3	3	3	High impacts on access to and operation
20%	Total Criteria Weighting	100%	**Weighted Score**	**3.4**	**2.8**	**2.6**	**2.6**	
Value for Money	Capital Costs	60%	Lowest cost of construction	5	5	4	2	Highest Cost of Construction
	Lifecycle Costs	40%	Lowest recurrent cost of rehab and maintenance	5	5	4	2	Highest recurrent cost of rehab and maintenance
20%	Total Criteria Weighting	100%	**Weighted Score**	**5**	**5**	**4**	**2**	
Technical Risk and Opportunity	Bridges and Culverts	25%	Bridge risks are well understood and have low potential to impact the option.	5	5	5	5	Bridge risks are well understood and have high potential to impact the option.
	Floodways	25%	Hydraulics risks are well understood and have low potential to impact the option.	5	5	3	3	Hydraulics risks are well understood and have high potential to impact the option.
	Pavements	25%	Pavement risks are well understood and have low potential to impact the option.	4	4	3	2	Pavement risks are well understood and have high potential to impact the option.
	Traffic	25%	Traffic risks are well understood and have low potential to impact the option.	5	4	2	2	Traffic risks are well understood and have high potential to impact the option.
15%	Total Criteria Weighting	100%	**Weighted Score**	**4.75**	**4.5**	**3.25**	**3**	
Other	Vegetation	30%	Clear vegetation	4	4	4	4	Significant presence of overhead vegation and other vegetation
	Land use	40%	No rural residential access, farming access and commerical access	4	3	2	2	Rural residential access, farming access and commerical access
	Drainage	30%	Does not abut major waterway	5	5	5	5	Abuts major waterway
15%	Total Criteria Weighting	100%	**Weighted Score**	**4.3**	**3.9**	**3.5**	**3.5**	
100%			**Overall Weighted Score**	**4.3**	**4.1**	**3.5**	**2.8**	

ghd.com

The Power of Commitment