15. APPENDIX F – Conceptual Cost Estimates

mcmurtrie
CONSULTING ENGINEERS

Date: Monday, 10 April 2017
Job No. 102-16-17 Rev A

Preliminary Civil Construction Estimate

Mt Morgan Mine Route Upgrades Creek St/Razorback/Burnett Hway Widening

Client **Carbine Resources**

The following Schedule is an ESTIMATE ONLY and therefore all items represented are subject to change

Cost of Works		Amount
Section 1: Road Works		22,750.00
	Sub Total	**22,750.00**
Section 2: Engineering Design (plans & Surveys)		4,550.00
Section 5: Contract Supervision		1,706.25
	Total	**29,006.25**
	GST	2,900.63
	Total Incl. GST	**31,906.88**

Preliminary Civil Construction Estimate

Mt Morgan Mine Route Upgrades Creek St/Razorback/Burnett Hway Widening

Section 1: Road Works Date: 10 April 2017

No.	Description of Work	Unit	Quantity	Unit Rate	Amount
1001	Establishment on Site and site preparation	Item	1.0	2000.00	$2,000.00
1002	Provision for Traffic Control including submission, approval and implementation of Traffic Management Plan from relevant authority (in accordance with CMDG Construction Specification C201)	Item	1.0	5000.00	$5,000.00
1003	Clearing and Grubbing (including stripping of grass, removal of trees and any rubbish) in accordance with CMDG Construction Specification C212 and to the satisfaction of Superintendent	Item	1.0	2000.00	$2,000.00
1004	Control and Setting out Survey information (Provisional Item)	Item	1.0	500.00	$500.00
1005	Final Cleanup and Restoration works	Item	1.0	1000.00	$1,000.00
1006	Earthworks as Specified				
1006.1	Earthworks to spoil to selected site	m^3	50.0	100.00	$5,000.00
1007	Subgrade preparation including trim and compact	m^2	30.0	50.00	$1,500.00
1008	Pavement Material as Specified for (Complete in Place) including load, haul, spread compact and trim (Provisional Quantities)				
1008.1	150mm Base Type 2.1 (min. 80 CBR)	m^3	5.0	160.00	$800.00
1008.2	150mm Sub Base Type 2.3 (min. 45 CBR)	m^3	5.0	160.00	$800.00
1008.3	150mm Select Subgrade Type 2.5 (min. 15 CBR)	m^3	5.0	130.00	$650.00
1009	Asphaltic Surfacing and Profile correction (including surface preparation / priming / tack coat) 50mm Compacted Thickness DG14)	T	5.0	350.00	$1,750.00
1010	Saw Cut existing pavement and cut back neatly to match in	Item	1.0	500.00	$500.00
1014	Linemarking	Item	1.0	500.00	$500.00
1016	Supply & installation of REGPs	Item	5.0	150.00	$750.00
				TOTAL SECTION 1	$22,750.00

mcmurtrie
CONSULTING ENGINEERS

Date: Monday, 10 April 2017
Job No. 102-16-17 Rev A

Preliminary Civil Construction Estimate

Mt Morgan Mine Route Upgrades Creek St Reverse Curves

Client **Carbine Resources**

The following Schedule is an ESTIMATE ONLY and therefore all items represented are subject to change

Cost of Works		Amount
Section 1: Road Works		878,800.00
	Sub Total	878,800.00
Section 2: Engineering Design (plans & Surveys)		21,970.00
Section 3: Environmental Management		40,000.00
Section 4: Services Relocations		200,000.00
Section 5: Contract Supervision		65,910.00
	Total	1,206,680.00
	GST	120,668.00
	Total Incl. GST	1,327,348.00

Preliminary Civil Construction Estimate

Mt Morgan Mine Route Upgrades Creek St Reverse Curves

Section 1: Road Works Date: 10 April 2017

No.	Description of Work	Unit	Quantity	Unit Rate	Amount
1001	Establishment on Site and site preparation	Item	1.0	15000.00	$15,000.00
1002	Provision for Traffic Control including submission, approval and implementation of Traffic Management Plan from relevant authority (in accordance with CMDG Construction Specification C201)	Item	1.0	40000.00	$40,000.00
1003	Clearing and Grubbing (including stripping of grass, removal of trees and any rubbish) in accordance with CMDG Construction Specification C212 and to the satisfaction of Superintendent	Item	1.0	10000.00	$10,000.00
1004	Control and Setting out Survey information (Provisional Item)	Item	1.0	5000.00	$5,000.00
1005	Final Cleanup and Restoration works	Item	1.0	10000.00	$10,000.00
1006	Earthworks as Specified				
1006.1	Earthworks to spoil to selected site	m^3	715.0	80.00	$57,200.00
1006.2	Earthworks to embankment on leads (provisional)	m^3	285.0	150.00	$42,750.00
1007	Subgrade preparation including trim and compact	m^2	1910.0	25.00	$47,750.00
1008	Pavement Material as Specified for (Complete in Place) including load, haul, spread compact and trim (Provisional Quantities)				
1008.1	150mm Base Type 2.1 (min. 80 CBR)	m^3	290.0	160.00	$46,400.00
1008.2	150mm Sub Base Type 2.3 (min. 45 CBR)	m^3	320.0	160.00	$51,200.00
1008.3	150mm Select Subgrade Type 2.5 (min. 15 CBR)	m^3	350.0	130.00	$45,500.00
1009	Asphaltic Surfacing and Profile correction (including surface preparation / priming / tack coat) 50mm Compacted Thickness DG14)	T	400.0	350.00	$140,000.00
1010	Saw Cut existing pavement and cut back neatly to match in	Item	1.0	2000.00	$2,000.00
1011	Extension to existing culvert crossings	Item	1.0	200000.00	$200,000.00
1013	Reinstatement of signs	Item	1.0	10000.00	$10,000.00
1014	Linemarking	Item	1.0	10000.00	$10,000.00
1015	Supply & install Guardrail	m	400.0	350.00	$140,000.00
1016	Supply & installation of REGPs	Item	40.0	150.00	$6,000.00

Preliminary Civil Construction Estimate

Mt Morgan Mine Route Upgrades Creek St Reverse Curves

Section 1: Road Works Date: 10 April 2017

No.	Description of Work	Unit	Quantity	Unit Rate	Amount
1017	Batter Protection	Item	1.0	50000.00	$50,000.00
				TOTAL SECTION 1	$878,800.00

mcmurtrie
CONSULTING ENGINEERS

Date: Monday, 10 April 2017
Job No. 102-16-17 Rev A

Preliminary Civil Construction Estimate

Mt Morgan Mine Route Upgrades Razorback Road Jump Up

Client **Carbine Resources**

The following Schedule is an ESTIMATE ONLY and therefore all items represented are subject to change

Cost of Works		Amount
Section 1: Road Works		2,281,550.00
	Sub Total	2,281,550.00
Section 2: Engineering Design (plans & Surveys)		57,038.75
Section 3: Environmental Management		70,000.00
Section 4: Geotechnical Management		100,000.00
Section 5: Contract Supervision		171,116.25
	Total	2,679,705.00
	GST	267,970.50
	Total Incl. GST	2,947,675.50

Preliminary Civil Construction Estimate

Mt Morgan Mine Route Upgrades Razorback Road Jump Up

Section 1: Road Works Date: 10 April 2017

No.	Description of Work	Unit	Quantity	Unit Rate	Amount
1001	Establishment on Site and site preparation	Item	1.0	100000.00	$100,000.00
1002	Provision for Traffic Control including submission, approval and implementation of Traffic Management Plan from relevant authority (in accordance with CMDG Construction Specification C201)	Item	1.0	120000.00	$120,000.00
1003	Clearing and Grubbing (including stripping of grass, removal of trees and any rubbish) in accordance with CMDG Construction Specification C212 and to the satisfaction of Superintendent	Item	1.0	40000.00	$40,000.00
1004	Control and Setting out Survey information (Provisional Item)	Item	1.0	10000.00	$10,000.00
1005	Final Cleanup and Restoration works	Item	1.0	40000.00	$40,000.00
1006	Earthworks as Specified				
1006.1	Earthworks to spoil to selected site	m^3	5540.0	80.00	$443,200.00
1006.2	Earthworks to embankment on leads (provisional)	m^3	250.0	150.00	$37,500.00
1007	Subgrade preparation including trim and compact	m^2	1730.0	30.00	$51,900.00
1008	Pavement Material as Specified for (Complete in Place) including load, haul, spread compact and trim (Provisional Quantities)				
1008.1	150mm Base Type 2.1 (min. 80 CBR)	m^3	260.0	160.00	$41,600.00
1008.2	150mm Sub Base Type 2.3 (min. 45 CBR)	m^3	309.0	160.00	$49,440.00
1008.3	150mm Select Subgrade Type 2.5 (min. 15 CBR)	m^3	357.0	130.00	$46,410.00
1009	Asphaltic Surfacing and Profile correction (including surface preparation / priming / tack coat) 50mm Compacted Thickness DG14)	T	800.0	350.00	$280,000.00
1010	Saw Cut existing pavement and cut back neatly to match in	Item	1.0	5000.00	$5,000.00
1011	Alterations to existing culvert crossings	Item	1.0	150000.00	$150,000.00
1013	Reinstatement of signs	Item	1.0	10000.00	$10,000.00
1014	Linemarking	Item	1.0	10000.00	$10,000.00
1015	Supply & install Guardrail	m	250.0	350.00	$87,500.00
1016	Supply & installation of REGPs	Item	60.0	150.00	$9,000.00

Preliminary Civil Construction Estimate

Mt Morgan Mine Route Upgrades Razorback Road Jump Up

Section 1: Road Works Date: 10 April 2017

No.	Description of Work	Unit	Quantity	Unit Rate	Amount
1017	Retaining Structures	Item	1.0	350000.00	$350,000.00
1018	Batter Protection	Item	1.0	100000.00	$100,000.00
1017	Excavation in Rock (Provisional Quantity)	m^3	1000.0	300.00	$300,000.00
				TOTAL SECTION 1	$2,281,550.00

16. APPENDIX G – Pavement Impact Assessment

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Developer Contribution Summary

Sect No.	Road No.	Road Name	Road Sections	Lgth (km)	Reduced Pvt Life To	Reduced Pvt Life From	Dev. Contribution (@ the PV Base Yr.) Rehab ($) To	Rehab ($) From	Mtce ($) To	Mtce ($) From	Total ($)
1	41F	Burnett Hway	Gordon St - Creek St	0.795	0.7%	8.8%		$13,240		$14,498	$27,738
2	41F	Burnett Hway	Poison Ck Rd to Mt Usher	4.857	1.1%	12.9%		$80,161		$131,170	$211,331
3	41F	Burnett Hway	Mt Usher to Ch 19	2.987	1.5%	18.5%		$163,210		$91,305	$254,516
4	41F	Burnett Hway	Ch 19 - Ch 27.7	8.7	0.9%	11.0%		$135,608		$324,031	$459,639
5	41F	Burnett Hway	Ch 27.7 - 10E	4.21	0.4%	5.2%		$32,193		$63,560	$95,753
6	10E	Bruce Hway	GML to Ch 50.15		0.1%	0.9%				$0	$0
7	10E	Bruce Hway	Ch 50.15 Ch 66.2		0.1%	1.0%				$0	$0
8	10E	Bruce Hway	Ch 66.2 - Ch 80.35		0.1%	1.0%				$0	$0
9	10E	Bruce Hway	Ch 80.35 - Ch 85.32		0.1%	0.9%				$0	$0
10	10E	Bruce Hway	Ch 85.32 - Ch 90.68		0.1%	1.1%				$0	$0
11	10E	Bruce Hway	Ch 95.98 - Ch 90.68		0.1%	1.1%				$0	$0
12	10E	Bruce Hway	Ch 95.98 - Ch 103.71		0.1%	1.1%				$0	$0
13	10E	Bruce Hway	Ch 103.71 - Ch 108.95		0.1%	1.3%				$0	$0
14	10E	Bruce Hway	Ch 108.95 - Ch 114.4		0.1%	1.0%				$0	$0
15	181	GML	Ch 0.175. to Ch 1.409		0.1%	1.0%				$0	$0
16	181	GML	Ch 1.409 - Ch 3.258		0.1%	1.1%				$0	$0
17	181	GML	Ch 3.258 - Ch 4.625		0.1%	1.2%				$0	$0
18	181	GML	Ch 4.625 - Ch 12.292		0.1%	1.5%				$0	$0
19	181	GML	Ch 12.292 - Ch 15.28	2.988	0.2%	2.0%				$22,217	$22,217
20	181	GML	Ch 15.28 to End	16.86	0.2%	1.9%				$107,715	$107,715
21	183	GPAR	Start to Finish	0.858	0.2%	2.7%				$6,558	$6,558
22											
23											
24											
25											
26											
27											
28											
29											
30											
			Totals [1] =	42.3			$0	$424,413	$0	$761,054	**$1,185,467**

Start of Development Traffic = 2017

Development Duration 9 years

ESA Increase Trigger = 5.0%

Total Tonnage = 1,881,000 tonnes

Developer Contribution expressed as a Cost per Tonne (@ the PV Base Yr.)

cents / tonne = 63.02

cents / tonne / km = 1.49

Protection Passord for all worksheets = mrd

[1] Includes only road sections that are subject to Development Generated Traffic > 5%

Increase Trigger = 5.0%

Routine Mtce Contribution Calculation

Sect. No.	Road No.	Road Name	Length (km)	ESA's/lane per Year	Routine Mtce $/lane-km/yr	Unit Cost $/ESA/km/yr	TO(WARDS) Development - PV of Increases in Mtce Costs (year by year) Discount Rate = 6.0%											FROM Development - PV of Increases in Mtce Costs (year by year) Discount Rate = 6.0%										
				Mtce Costs at PV Base Year (2017)			1	2	3	4	5	6	7	8	9	10	PV	1	2	3	4	5	6	7	8	9	10	PV
							2017	2018	2019	2020	2021	2022	2023	2024	2025		Total	2017	2018	2019	2020	2021	2022	2023	2024	2025		Total
1	41F	Gordon St - Creek St	0.795	1.65E+05	$10,131	$0.0614												$2,011	$1,897	$1,790	$1,688	$1,593	$1,503	$1,418	$1,337	$1,262		$14,498
2	41F	Poison Ck Rd to Mt Usher	4.857	9.85E+04	$8,951	$0.0909												$18,193	$17,163	$16,192	$15,275	$14,411	$13,595	$12,826	$12,100	$11,415		$131,170
3	41F	Mt Usher to Ch 19	2.987	9.85E+04	$10,131	$0.1029												$12,664	$11,947	$11,271	$10,633	$10,031	$9,463	$8,928	$8,422	$7,946		$91,305
4	41F	Ch 19 - Ch 27.7	8.7	9.85E+04	$12,344	$0.1253												$44,943	$42,399	$39,999	$37,735	$35,599	$33,584	$31,683	$29,890	$28,198		$324,031
5	41F	Ch 27.7 - 10E	4.21	2.25E+05	$11,409	$0.0508												$8,816	$8,317	$7,846	$7,402	$6,983	$6,588	$6,215	$5,863	$5,531		$63,560
6	10E	GML to Ch 50.15	5.105	1.21E+06	$12,000	$0.0099																						$0
7	10E	Ch 50.15 Ch 66.2	16.05	1.21E+06	$13,868	$0.0115																						$0
8	10E	Ch 66.2 - Ch 80.35	14.15	1.21E+06	$13,278	$0.0110																						$0
9	10E	Ch 80.35 - Ch 85.32	4.97	1.21E+06	$12,688	$0.0105																						$0
10	10E	Ch 85.32 - Ch 90.68	5.36	1.05E+06	$13,868	$0.0133																						$0
11	10E	Ch 95.98 - Ch 90.68	5.3	1.05E+06	$11,409	$0.0109																						$0
12	10E	Ch 95.98 - Ch 103.71	7.73	1.05E+06	$13,868	$0.0133																						$0
13	10E	Ch 103.71 - Ch 108.95	5.25	1.05E+06	$10,819	$0.0104																						$0
14	10E	Ch 108.95 - Ch 114.4	5.05	1.22E+06	$13,868	$0.0113																						$0
15	181	Ch 0.175. to Ch 1.409	1.234	1.01E+06	$13,278	$0.0132																						$0
16	181	Ch 1.409 - Ch 3.258	1.849	9.55E+05	$12,344	$0.0129																						$0
17	181	Ch 3.258 - Ch 4.625	1.387	1.03E+06	$13,278	$0.0129																						$0
18	181	Ch 4.625 - Ch 12.292	7.667	8.26E+05	$13,868	$0.0168																						$0
19	181	Ch 12.292 - Ch 15.28	2.988	5.31E+05	$13,278	$0.0250												$3,081	$2,907	$2,742	$2,587	$2,441	$2,303	$2,172	$2,049	$1,933		$22,217
20	181	Ch 15.28 to End	16.86	5.31E+05	$11,409	$0.0215												$14,940	$14,094	$13,297	$12,544	$11,834	$11,164	$10,532	$9,936	$9,374		$107,715
21	183	Start to Finish	0.858	4.44E+05	$11,409	$0.0257												$910	$858	$809	$764	$720	$680	$641	$605	$571		$6,558
22																												
23																												
24																												
25																												
26																												
27																												
28																												
29																												
30																												
		Total =	123.4														$0											$761,054

Rehabilitation Contribution Calculation

Rehab Design Life = 20

Sect No.	Road No.	Road Name	Road Sections	Length (km)	Rehab. Year **WITHOUT** Dev Traffic. Based on 2015 Roughness Data: Exist. Roughness	Roughness at fail	Years to failure	Rehab. Yr. (Rough)	Rehab. Year for Contrib Calc	PVT. Life **WITHOUT** Dev. Traffic - (Dev. Start to Rehab. Year): Years to Rehab. From Dev Start	ESA's/yr at Dev Start (2017)	Cumul.B'gr ESA (Dev Start to Rehab)
					1	2	3	4	5	6	7	8
1	41F	Burnett Hway	Gordon St - Creek St	0.795	88	120	10.7	2026	2026	8.7	1.65E+05	1.65E+06
2	41F	Burnett Hway	Poison Ck Rd to Mt Usher	4.857	73	120	15.7	2031	2031	13.7	9.85E+04	1.68E+06
3	41F	Burnett Hway	Mt Usher to Ch 19	2.987	108	120	4.0	2019	2019	2.0	9.85E+04	2.06E+05
4	41F	Burnett Hway	Ch 19 - Ch 27.7	8.7	58	120	20.7	2036	2036	18.7	9.85E+04	2.49E+06
5	41F	Burnett Hway	Ch 27.7 - 10E	4.21	67	120	17.7	2033	2033	15.7	2.25E+05	4.54E+06
6	10E	Bruce Hway	GML to Ch 50.15	5.105	52	110	19.3	2034	2034	17.3	1.21E+06	2.77E+07
7	10E	Bruce Hway	Ch 50.15 Ch 66.2	16.05	58	110	17.3	2032	2032	15.3	1.21E+06	2.38E+07
8	10E	Bruce Hway	Ch 66.2 - Ch 80.35	14.15	61	110	16.3	2031	2031	14.3	1.21E+06	2.19E+07
9	10E	Bruce Hway	Ch 80.35 - Ch 85.32	4.97	48	110	20.7	2036	2036	18.7	1.21E+06	3.05E+07
10	10E	Bruce Hway	Ch 85.32 - Ch 90.68	5.36	59	110	17.0	2032	2032	15.0	1.05E+06	2.00E+07
11	10E	Bruce Hway	Ch 95.98 - Ch 90.68	5.3	60	110	16.7	2032	2032	14.7	1.05E+06	1.95E+07
12	10E	Bruce Hway	Ch 95.98 - Ch 103.71	7.73	55	110	18.3	2033	2033	16.3	1.05E+06	2.23E+07
13	10E	Bruce Hway	Ch 103.71 - Ch 108.95	5.25	76	110	11.3	2026	2026	9.3	1.05E+06	1.14E+07
14	10E	Bruce Hway	Ch 108.95 - Ch 114.4	5.05	60	110	16.7	2032	2032	14.7	1.22E+06	2.28E+07
15	181	GML	Ch 0.175. to Ch 1.409	1.234	55	120	21.7	2037	2037	19.7	1.01E+06	2.73E+07
16	181	GML	Ch 1.409 - Ch 3.258	1.849	61	120	19.7	2035	2035	17.7	9.55E+05	2.25E+07
17	181	GML	Ch 3.258 - Ch 4.625	1.387	71	120	16.3	2031	2031	14.3	1.03E+06	1.86E+07
18	181	GML	Ch 4.625 - Ch 12.292	7.667	76	120	14.7	2030	2030	12.7	8.26E+05	1.29E+07
19	181	GML	Ch 12.292 - Ch 15.28	2.988	60	120	20.0	2035	2035	18.0	5.31E+05	1.28E+07
20	181	GML	Ch 15.28 to End	16.86	52	120	22.7	2038	2038	20.7	5.31E+05	1.53E+07
21	183	GPAR	Start to Finish	0.858	72	120	16.0	2031	2031	14.0	4.44E+05	7.81E+06
22												
23												
24												
25												
26												
27												
28												
29												
30												

To(wards) Development — Discount Rate = 6.0%

Sect No.	Reduced PVT. Life **WITH** Dev. Traffic - (Dev. Start to Rehab. Year): Cumul. Dev Traffic	Reduced B'ground ESA's to Rehab	Years to Rehab (with Dev)	Reduced Pvt. Life (years)	PV - Rehab.: Bring Forward Factor	Dev. Contrib.
	9	10	11	12	13	14
1	32,353	1622478	8.5	0.15	0.0053	$1,076
2	32,353	1.65E+06	13.4	0.22	0.0057	$6,300
3	32,353	1.74E+05	1.7	0.31	0.0160	$12,251
4	32,353	2.46E+06	18.5	0.19	0.0037	$10,818
5	32,353	4.51E+06	15.6	0.09	0.0021	$2,693
6	32,353	2.77E+07	17.3	0.02	0.0003	$548
7	32,353	2.37E+07	15.3	0.02	0.0004	$2,465
8	32,353	2.18E+07	14.3	0.02	0.0004	$2,282
9	32,353	3.05E+07	18.7	0.02	0.0003	$526
10	32,353	2.00E+07	15.0	0.02	0.0005	$979
11	32,353	1.94E+07	14.6	0.02	0.0005	$793
12	32,353	2.22E+07	16.3	0.02	0.0004	$1,256
13	32,353	1.14E+07	9.3	0.02	0.0008	$1,194
14	32,353	2.28E+07	14.6	0.02	0.0004	$811
15	32,353	2.73E+07	19.6	0.02	0.0003	$149
16	32,353	2.25E+07	17.6	0.02	0.0004	$257
17	32,353	1.86E+07	14.3	0.02	0.0005	$263
18	32,353	1.28E+07	12.6	0.03	0.0007	$2,178
19	32,353	1.28E+07	18.0	0.04	0.0007	$795
20	32,353	1.53E+07	20.6	0.03	0.0006	$2,934
21	32,353	7.77E+06	14.0	0.05	0.0012	$321
22						
23						
24						
25						
26						
27						
28						
29						
30						
						$50,890

From Development — Discount Rate = 6.0%

Sect No.	Reduced PVT. Life **WITH** Dev. Traffic - (Dev. Start to Rehab. Year): Cumul. Dev Traffic	Reduced B'ground ESA's to Rehab	Reduced years to Rehab.	Reduced Pvt. Life (years)	PV - Rehab.: Bring Forward factor	Dev. Contrib.
	15	16	17	18	19	20
1	370,933	1.28E+06	6.9	1.76	0.0651	$13,240
2	370,933	1.31E+06	11.1	2.57	0.0730	$80,161
3	370,933	-1.65E+05	-1.7	3.69	0.2137	$163,210
4	370,933	2.12E+06	16.5	2.21	0.0463	$135,608
5	370,933	4.17E+06	14.6	1.04	0.0251	$32,193
6	370,933	2.74E+07	17.2	0.18	0.0039	$6,331
7	370,933	2.34E+07	15.1	0.19	0.0046	$28,485
8	370,933	2.15E+07	14.1	0.20	0.0051	$26,370
9	370,933	3.02E+07	18.5	0.17	0.0034	$6,071
10	370,933	1.97E+07	14.8	0.23	0.0055	$11,331
11	370,933	1.91E+07	14.4	0.23	0.0057	$9,171
12	370,933	2.19E+07	16.1	0.22	0.0049	$14,530
13	370,933	1.10E+07	9.1	0.27	0.0091	$13,834
14	370,933	2.24E+07	14.5	0.19	0.0048	$9,376
15	370,933	2.69E+07	19.5	0.20	0.0038	$1,725
16	370,933	2.21E+07	17.4	0.23	0.0048	$2,973
17	370,933	1.82E+07	14.1	0.23	0.0060	$3,045
18	370,933	1.25E+07	12.4	0.31	0.0086	$25,276
19	370,933	1.24E+07	17.6	0.41	0.0084	$9,267
20	370,933	1.50E+07	20.3	0.38	0.0066	$34,152
21	370,933	7.44E+06	13.5	0.55	0.0144	$3,763
22						
23						
24						
25						
26						
27						
28						
29						
30						
						$630,113

MRD INPUT DATA

Start of Development Traffic = 2017 (= PV Base Yr.)

Development Duration = 9 years

ESA Increase Trigger = 5.0%

Roughness Increase = 3 Counts / yr

Treasury Discount Rate = 6.0%

Inflation % =	7.0%	Inflation % =	7.0%

UNIT COSTS - Inflated up from Base Yr.

ROAD SECTIONS AND LENGTHS						ARMIS TRAFFIC DATA 2015			CONDITION AND STANDARDS 2015				Rehab. Costs		Mtce. Costs	
Sect. No.	Road No.	Road Name	Road Sections	Ch.	Ch	Length (km)	AADT 2015	HV %	Growth Adopt	ESA per HV	Exist. Rough	Terminal Rough.	Seal Width	Base Year **2007** $/km	PV Base Yr. 2017 $/lane-km	Base Year **2007** Mtce $/km	PV Base Yr. 2017 $/lane-km
1	41F	Burnett Hway	Gordon St - Creek St	1.7	2.5	0.8	3901	6.83	3.0%	3.2	88	120	8.4	$260,000	$255,730	$10,300	$10,131
2	41F	Burnett Hway	Poison Ck Rd to Mt Usher	11.3	16.1	4.9	2007	7.92	3.0%	3.2	73	120	7.2	$230,000	$226,222	$9,100	$8,951
3	41F	Burnett Hway	Mt Usher to Ch 19	16.0	19.0	3.0	2007	7.92	3.0%	3.2	108	120	8.4	$260,000	$255,730	$10,300	$10,131
4	41F	Burnett Hway	Ch 19 - Ch 27.7	19.0	27.7	8.7	2007	7.92	3.0%	3.2	58	120	10.6	$342,500	$336,875	$12,550	$12,344
5	41F	Burnett Hway	Ch 27.7 - 10E	27.7	31.9	4.2	3578	10.13	3.0%	3.2	67	120	9.6	$310,000	$304,908	$11,600	$11,409
6	10E	Bruce Hway	GML to Ch 50.15	45.4	50.5	5.1	5836	36.85	3.0%	2.9	52	110	10.3	$325,000	$319,662	$12,200	$12,000
7	10E	Bruce Hway	Ch 50.15 Ch 66.2	50.2	66.2	16.1	5836	36.85	3.0%	2.9	58	110	12	$390,000	$383,595	$14,100	$13,868
8	10E	Bruce Hway	Ch 66.2 - Ch 80.35	66.2	80.4	14.2	5836	36.85	3.0%	2.9	61	110	11.5	$375,000	$368,841	$13,500	$13,278
9	10E	Bruce Hway	Ch 80.35 - Ch 85.32	80.4	85.3	5.0	5836	36.85	3.0%	2.9	48	110	11	$360,000	$354,087	$12,900	$12,688
10	10E	Bruce Hway	Ch 85.32 - Ch 90.68	90.7	85.3	5.4	6354	29.3	3.0%	2.9	59	110	14	$390,000	$383,595	$14,100	$13,868
11	10E	Bruce Hway	Ch 95.98 - Ch 90.68	90.7	96.0	5.3	6354	29.3	3.0%	2.9	60	110	9.6	$310,000	$304,908	$11,600	$11,409
12	10E	Bruce Hway	Ch 95.98 - Ch 103.71	96.0	103.7	7.7	6354	29.3	3.0%	2.9	55	110	12	$390,000	$383,595	$14,100	$13,868
13	10E	Bruce Hway	Ch 103.71 - Ch 108.95	103.7	109.0	5.3	6354	29.3	3.0%	2.9	76	110	9.4	$295,000	$290,155	$11,000	$10,819
14	10E	Bruce Hway	Ch 108.95 - Ch 114.4	109.0	114.0	5.1	7002	31.13	3.0%	2.9	60	110	12.9	$390,000	$383,595	$14,100	$13,868
15	181	GML	Ch 0.175. to Ch 1.409	0.2	1.4	1.2	9233	17.62	3.0%	3.2	55	120	11.7	$375,000	$368,841	$13,500	$13,278
16	181	GML	Ch 1.409 - Ch 3.258	1.4	3.3	1.8	7143	21.58	3.0%	3.2	61	120	10.5	$342,500	$336,875	$12,550	$12,344
17	181	GML	Ch 3.258 - Ch 4.625	3.3	4.6	1.4	10500	15.78	3.0%	3.2	71	120	11.5	$375,000	$368,841	$13,500	$13,278
18	181	GML	Ch 4.625 - Ch 12.292	12.3	4.6	7.7	6751	19.74	3.0%	3.2	76	120	13.1	$390,000	$383,595	$14,100	$13,868
19	181	GML	Ch 12.292 - Ch 15.28	15.3	12.3	3.0	3637	23.55	3.0%	3.2	60	120	11.5	$375,000	$368,841	$13,500	$13,278
20	181	GML	Ch 15.28 to End	32.1	15.3	16.9	3637	23.55	3.0%	3.2	52	120	9.7	$310,000	$304,908	$11,600	$11,409
21	183	GPAR	Start to Finish	0.0	0.9	0.9	3906	18.33	3.0%	3.2	72	120	9.9	$310,000	$304,908	$11,600	$11,409
22																	
23																	
24																	
25																	
26																	
27																	
28																	
29																	
30																	
					Total =	123.4											

MRD INPUT COSTS

BITUMEN ROADS REHAB. & MTCE (incl. RESEAL) COSTS

INPUT COSTS		
Seal Width	Rehabilitation Costs	Annual Routine Mtce.
m	$ / km	$ / km
3.6	$115,000	$4,700
4	$127,860	$5,070
4.5	$150,360	$5,720
5	$160,000	$6,000
5.5	$177,500	$7,900
6	$195,000	$9,800
6.5	$212,500	$9,450
7	$230,000	$9,100
7.5	$245,000	$9,700
8	$260,000	$10,300
8.5	$277,500	$10,650
9	$295,000	$11,000
9.5	$310,000	$11,600
10	$325,000	$12,200
10.5	$342,500	$12,550
11	$360,000	$12,900
11.5	$375,000	$13,500
12	$390,000	$14,100
Base year for the above costs =		2007

OTHER INPUT DATA

(a) ESA's / HV = 2.9 ESA's/HV (Bruce Hwy)
= 3.2 ESA's/HV (All Other Roads)

(b) Roughness Increase = 3 counts per year

(c Terminal Roughness*= 110 NRM (Bruce Hwy)
= 120 NRM (All other Roads)

(d) Inflation Rate = 7%

(e) Discount Rate = 6%

(f) HV Growth Rate (background traffic) = adopt a constant 3% for all road sections, unless agreed otherwise by Central District.

*Note :- Terminal Roughness is considered to be a more realistic indicator of rehabilitation timing than pavement age or other methods of estimating the life of the existing pavement.

APPENDIX 3

Estimated Background Traffic ESA'S at Development Start Date (2017)

Pavement Design Life = 20 yrs

Sect. No.	Link	Road Section	Length (km)	Estimated ESA's per Year at Dev Start (2017) AADT Traffic (HV/day) 2015	% HV	Growth	2017	%HV	Heavy	HV per LANE	ESA per HV	ESA's per Yr (2017)	Design Traffic (20 yr life)	Background ESAs (EACH LANE) Year by Year without Dev. 1 2017	2 2018	3 2019	4 2020	5 2021	6 2022	7 2023	8 2024	9 2025	10	Cumul. B'ground ESAs
1	41F	Gordon St - Creek St	0.795	3901	6.83	3.0%	4139	6.83	283	141	3.2	165,076	4.57E+06	1.65E+05	1.70E+05	1.75E+05	1.80E+05	1.86E+05	1.91E+05	1.97E+05	2.03E+05	2.09E+05		1.68E+06
2	41F	Poison Ck Rd to Mt Usher	4.857	2007	7.92	3.0%	2129	7.92	169	84	3.2	98,483	2.73E+06	9.85E+04	1.01E+05	1.04E+05	1.08E+05	1.11E+05	1.14E+05	1.18E+05	1.21E+05	1.25E+05		1.00E+06
3	41F	Mt Usher to Ch 19	2.987	2007	7.92	3.0%	2129	7.92	169	84	3.2	98,483	2.73E+06	9.85E+04	1.01E+05	1.04E+05	1.08E+05	1.11E+05	1.14E+05	1.18E+05	1.21E+05	1.25E+05		1.00E+06
4	41F	Ch 19 - Ch 27.7	8.7	2007	7.92	3.0%	2129	7.92	169	84	3.2	98,483	2.73E+06	9.85E+04	1.01E+05	1.04E+05	1.08E+05	1.11E+05	1.14E+05	1.18E+05	1.21E+05	1.25E+05		1.00E+06
5	41F	Ch 27.7 - 10E	4.21	3578	10.13	3.0%	3796	10.13	385	192	3.2	224,562	6.22E+06	2.25E+05	2.31E+05	2.38E+05	2.45E+05	2.53E+05	2.60E+05	2.68E+05	2.76E+05	2.84E+05		2.28E+06
6	10E	GML to Ch 50.15	5.105	5836	36.85	3.0%	6191	36.85	2282	1141	2.9	1,207,503	3.34E+07	1.21E+06	1.24E+06	1.28E+06	1.32E+06	1.36E+06	1.40E+06	1.44E+06	1.49E+06	1.53E+06		1.23E+07
7	10E	Ch 50.15 Ch 66.2	16.05	5836	36.85	3.0%	6191	36.85	2282	1141	2.9	1,207,503	3.34E+07	1.21E+06	1.24E+06	1.28E+06	1.32E+06	1.36E+06	1.40E+06	1.44E+06	1.49E+06	1.53E+06		1.23E+07
8	10E	Ch 66.2 - Ch 80.35	14.15	5836	36.85	3.0%	6191	36.85	2282	1141	2.9	1,207,503	3.34E+07	1.21E+06	1.24E+06	1.28E+06	1.32E+06	1.36E+06	1.40E+06	1.44E+06	1.49E+06	1.53E+06		1.23E+07
9	10E	Ch 80.35 - Ch 85.32	4.97	5836	36.85	3.0%	6191	36.85	2282	1141	2.9	1,207,503	3.34E+07	1.21E+06	1.24E+06	1.28E+06	1.32E+06	1.36E+06	1.40E+06	1.44E+06	1.49E+06	1.53E+06		1.23E+07
10	10E	Ch 85.32 - Ch 90.68	5.36	6354	29.3	3.0%	6741	29.3	1975	988	2.9	1,045,322	2.89E+07	1.05E+06	1.08E+06	1.11E+06	1.14E+06	1.18E+06	1.21E+06	1.25E+06	1.29E+06	1.32E+06		1.06E+07
11	10E	Ch 95.98 - Ch 90.68	5.3	6354	29.3	3.0%	6741	29.3	1975	988	2.9	1,045,322	2.89E+07	1.05E+06	1.08E+06	1.11E+06	1.14E+06	1.18E+06	1.21E+06	1.25E+06	1.29E+06	1.32E+06		1.06E+07
12	10E	Ch 95.98 - Ch 103.71	7.73	6354	29.3	3.0%	6741	29.3	1975	988	2.9	1,045,322	2.89E+07	1.05E+06	1.08E+06	1.11E+06	1.14E+06	1.18E+06	1.21E+06	1.25E+06	1.29E+06	1.32E+06		1.06E+07
13	10E	Ch 103.71 - Ch 108.95	5.25	6354	29.3	3.0%	6741	29.3	1975	988	2.9	1,045,322	2.89E+07	1.05E+06	1.08E+06	1.11E+06	1.14E+06	1.18E+06	1.21E+06	1.25E+06	1.29E+06	1.32E+06		1.06E+07
14	10E	Ch 108.95 - Ch 114.4	5.05	7002	31.13	3.0%	7428	31.13	2312	1156	2.9	1,223,874	3.39E+07	1.22E+06	1.26E+06	1.30E+06	1.34E+06	1.38E+06	1.42E+06	1.46E+06	1.51E+06	1.55E+06		1.24E+07
15	181	Ch 0.175. to Ch 1.409	1.234	9233	17.62	3.0%	9795	17.62	1726	863	3.2	1,007,943	2.79E+07	1.01E+06	1.04E+06	1.07E+06	1.10E+06	1.13E+06	1.17E+06	1.20E+06	1.24E+06	1.28E+06		1.02E+07
16	181	Ch 1.409 - Ch 3.258	1.849	7143	21.58	3.0%	7578	21.58	1635	818	3.2	955,035	2.64E+07	9.55E+05	9.84E+05	1.01E+06	1.04E+06	1.07E+06	1.11E+06	1.14E+06	1.17E+06	1.21E+06		9.70E+06
17	181	Ch 3.258 - Ch 4.625	1.387	10500	15.78	3.0%	11139	15.78	1758	879	3.2	1,026,558	2.84E+07	1.03E+06	1.06E+06	1.09E+06	1.12E+06	1.16E+06	1.19E+06	1.23E+06	1.26E+06	1.30E+06		1.04E+07
18	181	Ch 4.625 - Ch 12.292	7.667	6751	19.74	3.0%	7162	19.74	1414	707	3.2	825,662	2.29E+07	8.26E+05	8.50E+05	8.76E+05	9.02E+05	9.29E+05	9.57E+05	9.86E+05	1.02E+06	1.05E+06		8.39E+06
19	181	Ch 12.292 - Ch 15.28	2.988	3637	23.55	3.0%	3858	23.55	909	454	3.2	530,666	1.47E+07	5.31E+05	5.47E+05	5.63E+05	5.80E+05	5.97E+05	6.15E+05	6.34E+05	6.53E+05	6.72E+05		5.39E+06
20	181	Ch 15.28 to End	16.86	3637	23.55	3.0%	3858	23.55	909	454	3.2	530,666	1.47E+07	5.31E+05	5.47E+05	5.63E+05	5.80E+05	5.97E+05	6.15E+05	6.34E+05	6.53E+05	6.72E+05		5.39E+06
21	183	Start to Finish	0.858	3906	18.33	3.0%	4144	18.33	760	380	3.2	443,590	1.23E+07	4.44E+05	4.57E+05	4.71E+05	4.85E+05	4.99E+05	5.14E+05	5.30E+05	5.46E+05	5.62E+05		4.51E+06
22																								0.00E+00
23																								0.00E+00
24																								0.00E+00
25																								0.00E+00
26																								0.00E+00
27																								0.00E+00
28																								0.00E+00
29																								0.00E+00
30																								0.00E+00

Vehicle Combination / ESA Calculation 1

Bus / Truck — O O

	Axles / Tyres	Single / Single	Single / Dual						Totals	
	Legal Loading (t)	6	9						15.00	tonne
	Base Load / ESA	5.4	8.2							
Unloaded	Axle Group Load (t)	4.5	4						8.5	tonne
	ESA's	0.482	0.057						0.54	ESA
Loaded	Axle Group Load (t)	6.00	9.00						15.00	tonne
	ESA's [1]	1.524	1.451						2.98	ESA
	Payload =	6.5	tonne				ESA/t Payload =		0.0829	unloaded
	Max Legal Payload =	6.5	tonne [2]				ESA/t Payload =		0.4577	loaded

Tandem Truck — O OO

	Axles / Tyres	Single / Single	Tandem / Dual						Totals	
	Legal Loading (t)	6	16.5						22.50	tonne
	Base Load / ESA	5.4	13.8							
Unloaded	Axle Group Load (t)	4.5	5						9.5	tonne
	ESA's	0.482	0.017						0.50	ESA
Loaded	Axle Group Load (t)	6.00	16.50						22.50	tonne
	ESA's [1]	1.524	2.044						3.57	ESA
	Payload =	13.0	tonne				ESA/t Payload =		0.0384	unloaded
	Max Legal Payload =	13.0	tonne [2]				ESA/t Payload =		0.2745	loaded

Semi-Trailer — O OO OOO

	Axles / Tyres	Single / Single	Tandem / Dual	Tri / Dual					Totals	
	Legal Loading (t)	6	16.5	20.00					42.50	tonne
	Base Load / ESA	5.4	13.8	18.5						
Unloaded	Axle Group Load (t)	4.5	5	6.5					16	tonne
	ESA's	0.482	0.017	0.015					0.51	ESA
Loaded	Axle Group Load (t)	6.00	16.50	20.00					42.50	tonne
	ESA's [1]	1.524	2.044	1.366					4.93	ESA
	Payload =	26.5	tonne				ESA/t Payload =		0.0194	unloaded
	Max Legal Payload =	26.5	tonne [2]				ESA/t Payload =		0.1862	loaded

B-Double — O OO OOO OOO

	Axles / Tyres	Single / Single	Tandem / Dual	Tri / Dual	Tri / Dual				Totals	
	Legal Loading (t)	6	16.5	20.00	20.00				62.50	tonne
	Base Load / ESA	5.4	13.8	18.5	18.5					
Unloaded	Axle Group Load (t)	4.5	5	6.5	6.5				22.5	tonne
	ESA's	0.482	0.017	0.015	0.015				0.53	ESA
Loaded	Axle Group Load (t)	6.00	16.50	20.00	20.00				62.50	tonne
	ESA's [1]	1.524	2.044	1.366	1.366				6.30	ESA
	Payload =	40.0	tonne				ESA/t Payload =		0.0132	unloaded
	Max Legal Payload =	40.0	tonne [2]				ESA/t Payload =		0.1575	loaded

Road Train 1 — O OO OOO OOO OOO

	Axles / Tyres	Single / Single	Tandem / Dual	Tri / Dual	Tri / Dual	Tri / Dual			Totals	
	Legal Loading (t)	6	16.5	20.00	20.00	20.00			82.50	tonne
	Base Load / ESA	5.4	13.8	18.5	18.5	18.5				
Unloaded	Axle Group Load (t)	4.5	5	6.5	6.5	6.5			29	tonne
	ESA's	0.482	0.017	0.015	0.015	0.015			0.55	ESA
Loaded	Axle Group Load (t)	6.00	16.50	20.00	20.00	20.00			82.50	tonne
	ESA's [1]	1.524	2.044	1.366	1.366	1.366			7.67	ESA
	Payload =	53.5	tonne				ESA/t Payload =		0.0102	unloaded
	Max Legal Payload =	53.5	tonne [2]				ESA/t Payload =		0.1433	loaded

[1] If the "payload" is more or less than legal, "axle group loadings" are proportioned based on the legal and the unloaded tonnages.

[2] Calculated from the max legal loads & generic unloaded (tare) weights for each axle group of the HV.

Vehicle Combination / ESA Calculation 2

	Truck + 4 Dog	O	OO	OO	OO				
	Axles Tyres	Single Single	Tandem Dual	Tandem Dual	Tandem Dual				Totals
	Legal Loading (t)	6.5	16.5	13.75	13.75				50.50 tonne
	Base Load / ESA	5.4	13.8	13.8	13.8				
Unloaded	Axle Group Load (t)	4.5	5	5	5				19.5 tonne
	ESA's	0.482	0.017	0.017	0.017				0.53 ESA
Loaded	Axle Group Load (t)	6.50	16.50	13.75	13.75				50.50 tonne
	ESA's [1]	2.099	2.044	0.986	0.986				6.11 ESA
	Payload =	31.0	tonne				ESA/t Payload =		0.0172 unloaded
	Max Legal Payload =	31.0	tonne [2]				ESA/t Payload =		0.1972 loaded

		O	OO						
	Axles Tyres	Single Single	Tandem Dual						Totals
	Legal Loading (t)	6	16.5						22.50 tonne
	Base Load / ESA	5.4	13.8						
Unloaded	Axle Group Load (t)	4.5	5						9.5 tonne
	ESA's	0.482	0.017						0.50 ESA
Loaded	Axle Group Load (t)	4.50	5.00						9.50 tonne
	ESA's [1]	0.482	0.017						0.50 ESA
	Payload =		tonne				ESA/t Payload =		#DIV/0! unloaded
	Max Legal Payload =	13.0	tonne [2]				ESA/t Payload =		#DIV/0! loaded

		O	OO						
	Axles Tyres	Single Single	Tandem Dual						Totals
	Legal Loading (t)	6	16.5						22.50 tonne
	Base Load / ESA	5.4	13.8						
Unloaded	Axle Group Load (t)								0 tonne
	ESA's	0.000	0.000						0.00 ESA
Loaded	Axle Group Load (t)	0.00	0.00						0.00 tonne
	ESA's [1]	0.000	0.000						0.00 ESA
	Payload =		tonne				ESA/t Payload =		#DIV/0! unloaded
	Max Legal Payload =	22.5	tonne [2]				ESA/t Payload =		#DIV/0! loaded

Unloaded Vehicles			
HV Type	ESA / t (payload)	% of HV fleet	Weigthed Average
Bus / Truck	0.0829		
Tandem Truck	0.0384		
Semi-Trailer	0.0194		
B-Double	0.0132		
Road Train 1	0.0102		
Truck + 4 Dog	0.0172		
0			
0			
		0.0%	0.0000 ESAs / tonne of product "out the gate"

Loaded Vehicles			
HV Type	ESA / t (payload)	% of HV fleet	Weigthed Average
Bus / Truck	0.4577		
Tandem Truck	0.2745		
Semi-Trailer	0.1862		
B-Double	0.1575		
Road Train 1	0.1433		
Truck + 4 Dog	0.1972		
0			
0			
		0.0%	0.0000 ESAs / tonne of product "out the gate"

Development Generated ESA's per Year

"Base" Annual Tonnage = 209,000

Development Generated Tonnages (Year by Year)											
	1	2	3	4	5	6	7	8	9	10	
	2017	2018	2019	2020	2021	2022	2023	2024	2025		
% of "Base" Annual Tonnage	100%	100%	100%	100%	100%	100%	100%	100%	100%		Total
Annual Tonnage	209,000	209,000	209,000	209,000	209,000	209,000	209,000	209,000	209,000		1,881,000

Sect No.	Road No.	Road Section	%	Av. ESA / t		TO(WARDS) - Development Generated ESA's (Year by Year)										Cumul. Dev Traffic ESA's	(AWAY) FROM - Development Generated ESA's (Year by Year)										Cumul. Dev Traffic ESA's
				To	From	1 2017	2 2018	3 2019	4 2020	5 2021	6 2022	7 2023	8 2024	9 2025	10		1 2017	2 2018	3 2019	4 2020	5 2021	6 2022	7 2023	8 2024	9 2025	10	
1	41F	Gordon St - Creek St	100.0%	0.0172	0.1972	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03		3.24E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04		3.71E+05
2	41F	Poison Ck Rd to Mt Usher	100.0%	0.0172	0.1972	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03		3.24E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04		3.71E+05
3	41F	Mt Usher to Ch 19	100.0%	0.0172	0.1972	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03		3.24E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04		3.71E+05
4	41F	Ch 19 - Ch 27.7	100.0%	0.0172	0.1972	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03		3.24E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04		3.71E+05
5	41F	Ch 27.7 - 10E	100.0%	0.0172	0.1972	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03		3.24E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04		3.71E+05
6	10E	GML to Ch 50.15	100.0%	0.0172	0.1972	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03		3.24E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04		3.71E+05
7	10E	Ch 50.15 Ch 66.2	100.0%	0.0172	0.1972	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03		3.24E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04		3.71E+05
8	10E	Ch 66.2 - Ch 80.35	100.0%	0.0172	0.1972	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03		3.24E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04		3.71E+05
9	10E	Ch 80.35 - Ch 85.32	100.0%	0.0172	0.1972	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03		3.24E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04		3.71E+05
10	10E	Ch 85.32 - Ch 90.68	100.0%	0.0172	0.1972	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03		3.24E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04		3.71E+05
11	10E	Ch 95.98 - Ch 90.68	100.0%	0.0172	0.1972	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03		3.24E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04		3.71E+05
12	10E	Ch 95.98 - Ch 103.71	100.0%	0.0172	0.1972	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03		3.24E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04		3.71E+05
13	10E	Ch 103.71 - Ch 108.95	100.0%	0.0172	0.1972	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03		3.24E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04		3.71E+05
14	10E	Ch 108.95 - Ch 114.4	100.0%	0.0172	0.1972	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03		3.24E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04		3.71E+05
15	181	Ch 0.175. to Ch 1.409	100.0%	0.0172	0.1972	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03		3.24E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04		3.71E+05
16	181	Ch 1.409 - Ch 3.258	100.0%	0.0172	0.1972	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03		3.24E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04		3.71E+05
17	181	Ch 3.258 - Ch 4.625	100.0%	0.0172	0.1972	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03		3.24E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04		3.71E+05
18	181	Ch 4.625 - Ch 12.292	100.0%	0.0172	0.1972	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03		3.24E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04		3.71E+05
19	181	Ch 12.292 - Ch 15.28	100.0%	0.0172	0.1972	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03		3.24E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04		3.71E+05
20	181	Ch 15.28 to End	100.0%	0.0172	0.1972	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03		3.24E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04		3.71E+05
21	183	Start to Finish	100.0%	0.0172	0.1972	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03		3.24E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04		3.71E+05
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Parked Formula

Parked Formula

0

Developer Contribution Summary

Sect No.	Road No.	Road Name	Road Sections	Lgth (km)	Reduced Pvt Life To	Reduced Pvt Life From	Dev. Contribution (@ the PV Base Yr.) Rehab ($) To	Rehab ($) From	Mtce ($) To	Mtce ($) From	Total ($)
1		Gordon Lane	Access to Burnett Hway	0.16	18.3%	213.8%	$6,986	$325,844	$4,770	$54,689	$392,288
2		Razorback Rd	F	1.074	1.3%	16.0%		$20,313		$37,437	$57,750
3			G	0.464	1.5%	17.5%		$11,582		$16,174	$27,755
4			H	0.49	1.8%	21.6%		$22,779		$17,080	$39,859
5			I	0.906	1.1%	13.0%		$12,679		$26,973	$39,652
6			J	0.079	1.3%	16.1%		$2,102		$2,352	$4,454
7			K	1.034	1.1%	13.0%		$14,470		$30,783	$45,254
8			L	0.124	1.0%	12.3%		$1,490		$3,692	$5,182
9		Poison Ck Rd	A	0.516	2.2%	26.5%		$20,976	$2,289	$26,249	$49,514
10			B	0.028	2.6%	32.5%		$2,096	$124	$1,424	$3,644
11			C	1.15	1.6%	19.7%		$19,380	$5,102	$58,500	$82,982
12			D	0.86	1.4%	17.0%		$9,393	$3,816	$43,748	$56,956
13			E	0.074	1.8%	22.4%		$1,815	$328	$3,764	$5,907
14			G	0.042	1.8%	22.4%		$1,030	$186	$2,137	$3,353
15											
16											
17											
18											
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23											
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25											
26											
27											
28											
29											
30											
			Totals [1] =	7.0			$6,986	$465,949	$16,616	$324,999	**$814,551**

Start of Development Traffic = 2017

Development Duration = 9 years

ESA Increase Trigger = 5.0%

Total Tonnage = 1,881,000 tonnes

Developer Contribution expressed as a Cost per Tonne (@ the PV Base Yr.)

cents / tonne = 43.30

cents / tonne / km = 6.19

Protection Passord for all worksheets = mrd

[1] Includes only road sections that are subject to Development Generated Traffic > 5%

Increase Trigger = 5.0%

Routine Mtce Contribution Calculation

Sect. No.	Road No.	Road Name	Length (km)	ESA's/lane per Year	Routine Mtce $/lane-km/yr	Unit Cost $/ESA/km/yr	TO(WARDS) 1 2017	2 2018	3 2019	4 2020	5 2021	6 2022	7 2023	8 2024	9 2025	10	PV Total	FROM 1 2017	2 2018	3 2019	4 2020	5 2021	6 2022	7 2023	8 2024	9 2025	10	PV Total
	Link Data			Mtce Costs at PV Base Year (2017)			TO(WARDS) Development - PV of Increases in Mtce Costs (year by year)								Discount Rate =	6.0%		FROM Development - PV of Increases in Mtce Costs (year by year)								Discount Rate =	6.0%	
1		Access to Burnett Hway	0.16	8.81E+03	$10,131	$1.1503	$662	$624	$589	$555	$524	$494	$466	$440	$415		$4,770	$7,585	$7,156	$6,751	$6,369	$6,008	$5,668	$5,347	$5,045	$4,759		$54,689
2		F	1.074	7.63E+04	$8,951	$0.1173												$5,192	$4,899	$4,621	$4,360	$4,113	$3,880	$3,660	$3,453	$3,258		$37,437
3		G	0.464	7.63E+04	$8,951	$0.1173												$2,243	$2,116	$1,997	$1,884	$1,777	$1,676	$1,581	$1,492	$1,407		$16,174
4		H	0.49	7.63E+04	$8,951	$0.1173												$2,369	$2,235	$2,108	$1,989	$1,876	$1,770	$1,670	$1,576	$1,486		$17,080
5		I	0.906	8.93E+04	$8,951	$0.1002												$3,741	$3,529	$3,330	$3,141	$2,963	$2,796	$2,637	$2,488	$2,347		$26,973
6		J	0.079	8.93E+04	$8,951	$0.1002												$326	$308	$290	$274	$258	$244	$230	$217	$205		$2,352
7		K	1.034	8.93E+04	$8,951	$0.1002												$4,270	$4,028	$3,800	$3,585	$3,382	$3,191	$3,010	$2,840	$2,679		$30,783
8		L	0.124	8.93E+04	$8,951	$0.1002												$512	$483	$456	$430	$406	$383	$361	$341	$321		$3,692
9		A	0.516	5.23E+04	$8,951	$0.1712	$318	$300	$283	$267	$252	$237	$224	$211	$199		$2,289	$3,641	$3,435	$3,240	$3,057	$2,884	$2,721	$2,567	$2,421	$2,284		$26,249
10		B	0.028	5.23E+04	$8,951	$0.1712	$17	$16	$15	$14	$14	$13	$12	$11	$11		$124	$198	$186	$176	$166	$156	$148	$139	$131	$124		$1,424
11		C	1.15	5.23E+04	$8,951	$0.1712	$708	$668	$630	$594	$561	$529	$499	$471	$444		$5,102	$8,114	$7,655	$7,221	$6,813	$6,427	$6,063	$5,720	$5,396	$5,091		$58,500
12		D	0.86	5.23E+04	$8,951	$0.1712	$529	$499	$471	$444	$419	$395	$373	$352	$332		$3,816	$6,068	$5,724	$5,400	$5,095	$4,806	$4,534	$4,278	$4,035	$3,807		$43,748
13		E	0.074	5.23E+04	$8,951	$0.1712	$46	$43	$41	$38	$36	$34	$32	$30	$29		$328	$522	$493	$465	$438	$414	$390	$368	$347	$328		$3,764
14		G	0.042	5.23E+04	$8,951	$0.1712	$26	$24	$23	$22	$20	$19	$18	$17	$16		$186	$296	$280	$264	$249	$235	$221	$209	$197	$186		$2,137
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27																											
28																											
29																											
30																											
		Total =	7.0														$16,616										$324,999

Rehabilitation Contribution Calculation

Sect No.	Road No.	Road Name	Road Sections	Length (km)	Rehab Design Life = 20					PVT. Life **WITHOUT** Dev. Traffic - (Dev. Start to Rehab. Year)			**To(wards) Development**						**From Development**					
					Rehab. Year **WITHOUT** Dev Traffic. Based on 2016 Roughness Data				Rehab. Year for Contrib Calc	Years to Rehab. From Dev Start	ESA's/yr at Dev Start (2017)	Cumul.B'gr ESA (Dev Start to Rehab)	Reduced PVT. Life **WITH** Dev. Traffic - (Dev. Start to Rehab. Year)				Discount Rate =	6.0%	Reduced PVT. Life **WITH** Dev. Traffic - (Dev. Start to Rehab. Year)				Discount Rate =	6.0%
					Exist. Roughness	Roughness at fail	Years to failure	Rehab. Yr. (Rough)					Cumul. Dev Traffic	Reduced B'ground ESA's to Rehab	Years to Rehab (with Dev)	Reduced Pvt. Life (years)	PV - Rehab. Bring Forward Factor	Dev. Contrib.	Cumul. Dev Traffic	Reduced B'ground ESA's to Rehab	Reduced years to Rehab.	Reduced Pvt. Life (years)	PV - Rehab. Bring Forward factor	Dev. Contrib.
					1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*	*18*	*19*	*20*
1		Gordon Lane	Access to Burnett Hway	0.16	160	120	-13.3	2003	2023	5.7	8.81E+03	5.01E+04	32,353	17722	2.0	3.66	0.1707	$6,986	370,933	-3.21E+05	-37.1	42.76	7.9636	$325,844
2		Razorback Rd	F	1.074	71	120	16.3	2032	2032	15.3	7.63E+04	1.50E+06	32,353	1.47E+06	15.1	0.27	0.0064	$1,557	370,933	1.13E+06	12.1	3.19	0.0836	$20,313
3			G	0.464	80	120	13.3	2029	2029	12.3	7.63E+04	1.15E+06	32,353	1.12E+06	12.0	0.29	0.0083	$876	370,933	7.81E+05	8.8	3.50	0.1103	$11,582
4			H	0.49	100	120	6.7	2023	2023	5.7	7.63E+04	4.78E+05	32,353	4.45E+05	5.3	0.36	0.0150	$1,666	370,933	1.07E+05	1.4	4.32	0.2055	$22,779
5			I	0.906	67	120	17.7	2034	2034	16.7	8.93E+04	1.95E+06	32,353	1.92E+06	16.4	0.22	0.0049	$996	370,933	1.58E+06	14.1	2.60	0.0619	$12,679
6			J	0.079	88	120	10.7	2027	2027	9.7	8.93E+04	1.01E+06	32,353	9.82E+05	9.4	0.27	0.0090	$161	370,933	6.44E+05	6.4	3.22	0.1176	$2,102
7			K	1.034	67	120	17.7	2034	2034	16.7	8.93E+04	1.95E+06	32,353	1.92E+06	16.4	0.22	0.0049	$1,136	370,933	1.58E+06	14.1	2.60	0.0619	$14,470
8			L	0.124	122	120	-0.7	2015	2035	18.3	8.93E+04	2.21E+06	32,353	2.17E+06	18.1	0.21	0.0042	$118	370,933	1.84E+06	15.9	2.47	0.0531	$1,490
9		Poison Ck Rd	A	0.516	81	120	13.0	2029	2029	12.0	5.23E+04	7.64E+05	32,353	7.32E+05	11.6	0.43	0.0126	$1,473	370,933	3.93E+05	6.7	5.30	0.1797	$20,976
10			B	0.028	160	120	-13.3	2003	2023	5.7	5.23E+04	3.27E+05	32,353	2.95E+05	5.1	0.52	0.0221	$140	370,933	-4.36E+04	-0.8	6.50	0.3309	$2,096
11			C	1.15	53	120	22.3	2038	2038	21.3	5.23E+04	1.58E+06	32,353	1.55E+06	21.0	0.33	0.0055	$1,440	370,933	1.21E+06	17.4	3.94	0.0745	$19,380
12			D	0.86	39	120	27.0	2043	2043	26.0	5.23E+04	2.08E+06	32,353	2.04E+06	25.7	0.28	0.0037	$713	370,933	1.71E+06	22.6	3.41	0.0483	$9,393
13			E	0.074	125	120	-1.7	2014	2034	17.3	5.23E+04	1.20E+06	32,353	1.17E+06	17.0	0.37	0.0079	$132	370,933	8.30E+05	12.9	4.47	0.1084	$1,815
14			G	0.042	125	120	-1.7	2014	2034	17.3	5.23E+04	1.20E+06	32,353	1.17E+06	17.0	0.37	0.0079	$75	370,933	8.30E+05	12.9	4.47	0.1084	$1,030
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28																								
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30																								
																		$17,469						$465,949

MRD INPUT DATA

Start of Development Traffic = 2017 (= PV Base Yr.)

Development Duration = 9 years

ESA Increase Trigger = 5.0%

Roughness Increase = 3 Counts / yr

Treasury Discount Rate = 6.0%

Sect. No.	Road No.	Road Name	Road Sections	Ch.	Ch	Length (km)	ARMIS TRAFFIC DATA 2016 AADT 2016	HV %	Growth Adopt	CONDITION AND STANDARDS 2016 ESA per HV	Exist. Rough	Terminal Rough.	Seal Width	Inflation % = 7.0% Rehab. Costs Base Year 2007 $/km	PV Base Yr. 2017 $/lane-km	Inflation % = 7.0% Mtce. Costs Base Year 2007 Mtce $/km	PV Base Yr. 2017 $/lane-km
														UNIT COSTS - Inflated up from Base Yr.			
1		Gordon Lane	Access to Burnett Hway	0.0	0.2	0.2	486	3.1	0.1%	3.2	160	120	8	$260,000	$255,730	$10,300	$10,131
2		Razorback Rd	F	0.0	1.1	1.1	1982	6.4	3.0%	3.2	71	120	7	$230,000	$226,222	$9,100	$8,951
3			G	0.0	0.5	0.5	1982	6.4	3.0%	3.2	80	120	7	$230,000	$226,222	$9,100	$8,951
4			H	0.0	0.5	0.5	1982	6.4	3.0%	3.2	100	120	7	$230,000	$226,222	$9,100	$8,951
5			I	0.0	0.9	0.9	2007	7.4	3.0%	3.2	67	120	7	$230,000	$226,222	$9,100	$8,951
6			J	0.0	0.1	0.1	2007	7.4	3.0%	3.2	88	120	7	$230,000	$226,222	$9,100	$8,951
7			K	0.0	1.0	1.0	2007	7.4	3.0%	3.2	67	120	7	$230,000	$226,222	$9,100	$8,951
8			L	0.0	0.1	0.1	2007	7.4	3.0%	3.2	122	120	7	$230,000	$226,222	$9,100	$8,951
9		Poison Ck Rd	A	0.0	0.5	0.5	1060	8.2	3.0%	3.2	81	120	7	$230,000	$226,222	$9,100	$8,951
10			B	0.0	0.0	0.0	1060	8.2	3.0%	3.2	160	120	7	$230,000	$226,222	$9,100	$8,951
11			C	0.0	1.2	1.2	1060	8.2	3.0%	3.2	53	120	7	$230,000	$226,222	$9,100	$8,951
12			D	0.0	0.9	0.9	1060	8.2	3.0%	3.2	39	120	7	$230,000	$226,222	$9,100	$8,951
13			E	0.0	0.1	0.1	1060	8.2	3.0%	3.2	125	120	7	$230,000	$226,222	$9,100	$8,951
14			G	0.0	0.0	0.0	1060	8.2	3.0%	3.2	125	120	7	$230,000	$226,222	$9,100	$8,951
15																	
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					Total =	7.0											

MRD INPUT COSTS

BITUMEN ROADS REHAB. & MTCE (incl. RESEAL) COSTS

INPUT COSTS		
Seal Width	Rehabilitation Costs	Annual Routine Mtce.
m	$ / km	$ / km
3.6	$115,000	$4,700
4	$127,860	$5,070
4.5	$150,360	$5,720
5	$160,000	$6,000
5.5	$177,500	$7,900
6	$195,000	$9,800
6.5	$212,500	$9,450
7	$230,000	$9,100
7.5	$245,000	$9,700
8	$260,000	$10,300
8.5	$277,500	$10,650
9	$295,000	$11,000
9.5	$310,000	$11,600
10	$325,000	$12,200
10.5	$342,500	$12,550
11	$360,000	$12,900
11.5	$375,000	$13,500
12	$390,000	$14,100
Base year for the above costs =		2007

OTHER INPUT DATA

(a) ESA's / HV = 2.9 ESA's/HV (Bruce Hwy)
= 3.2 ESA's/HV (All Other Roads)

(b) Roughness Increase = 3 counts per year

(c Terminal Roughness*= 110 NRM (Bruce Hwy)
= 120 NRM (All other Roads)

(d) Inflation Rate = 7%

(e) Discount Rate = 6%

(f) HV Growth Rate (background traffic) = adopt a constant 3% for all road sections, unless agreed otherwise by Central District.

*Note :- Terminal Roughness is considered to be a more realistic indicator of rehabilitation timing than pavement age or other methods of estimating the life of the existing pavement.

APPENDIX 3

Estimated Background Traffic ESA'S at Development Start Date (2017)

Pavement Design Life = 20 yrs

Sect. No.	Link	Road Section	Length (km)	Estimated ESA's per Year at Dev Start (2017) AADT Traffic (HV/day) 2016	% HV	Growth	2017	%HV	Heavy	HV per LANE	ESA per HV	ESA's per Yr (2017)	Design Traffic (20 yr life)	Background ESAs (EACH LANE) Year by Year without Dev. 1 2017	2 2018	3 2019	4 2020	5 2021	6 2022	7 2023	8 2024	9 2025	10	Cumul. B'ground ESAs
1		Access to Burnett Hway	0.16	486	3.1	0.1%	486	3.1	15	8	3.2	8,807	1.78E+05	8.81E+03	8.82E+03	8.82E+03	8.83E+03	8.84E+03	8.85E+03	8.86E+03	8.87E+03	8.88E+03		7.96E+04
2		F	1.074	1982	6.4	3.0%	2041	6.4	131	65	3.2	76,302	2.11E+06	7.63E+04	7.86E+04	8.09E+04	8.34E+04	8.59E+04	8.85E+04	9.11E+04	9.38E+04	9.67E+04		7.75E+05
3		G	0.464	1982	6.4	3.0%	2041	6.4	131	65	3.2	76,302	2.11E+06	7.63E+04	7.86E+04	8.09E+04	8.34E+04	8.59E+04	8.85E+04	9.11E+04	9.38E+04	9.67E+04		7.75E+05
4		H	0.49	1982	6.4	3.0%	2041	6.4	131	65	3.2	76,302	2.11E+06	7.63E+04	7.86E+04	8.09E+04	8.34E+04	8.59E+04	8.85E+04	9.11E+04	9.38E+04	9.67E+04		7.75E+05
5		I	0.906	2007	7.4	3.0%	2067	7.4	153	76	3.2	89,337	2.47E+06	8.93E+04	9.20E+04	9.48E+04	9.76E+04	1.01E+05	1.04E+05	1.07E+05	1.10E+05	1.13E+05		9.08E+05
6		J	0.079	2007	7.4	3.0%	2067	7.4	153	76	3.2	89,337	2.47E+06	8.93E+04	9.20E+04	9.48E+04	9.76E+04	1.01E+05	1.04E+05	1.07E+05	1.10E+05	1.13E+05		9.08E+05
7		K	1.034	2007	7.4	3.0%	2067	7.4	153	76	3.2	89,337	2.47E+06	8.93E+04	9.20E+04	9.48E+04	9.76E+04	1.01E+05	1.04E+05	1.07E+05	1.10E+05	1.13E+05		9.08E+05
8		L	0.124	2007	7.4	3.0%	2067	7.4	153	76	3.2	89,337	2.47E+06	8.93E+04	9.20E+04	9.48E+04	9.76E+04	1.01E+05	1.04E+05	1.07E+05	1.10E+05	1.13E+05		9.08E+05
9		A	0.516	1060	8.2	3.0%	1092	8.2	90	45	3.2	52,284	1.45E+06	5.23E+04	5.39E+04	5.55E+04	5.71E+04	5.88E+04	6.06E+04	6.24E+04	6.43E+04	6.62E+04		5.31E+05
10		B	0.028	1060	8.2	3.0%	1092	8.2	90	45	3.2	52,284	1.45E+06	5.23E+04	5.39E+04	5.55E+04	5.71E+04	5.88E+04	6.06E+04	6.24E+04	6.43E+04	6.62E+04		5.31E+05
11		C	1.15	1060	8.2	3.0%	1092	8.2	90	45	3.2	52,284	1.45E+06	5.23E+04	5.39E+04	5.55E+04	5.71E+04	5.88E+04	6.06E+04	6.24E+04	6.43E+04	6.62E+04		5.31E+05
12		D	0.86	1060	8.2	3.0%	1092	8.2	90	45	3.2	52,284	1.45E+06	5.23E+04	5.39E+04	5.55E+04	5.71E+04	5.88E+04	6.06E+04	6.24E+04	6.43E+04	6.62E+04		5.31E+05
13		E	0.074	1060	8.2	3.0%	1092	8.2	90	45	3.2	52,284	1.45E+06	5.23E+04	5.39E+04	5.55E+04	5.71E+04	5.88E+04	6.06E+04	6.24E+04	6.43E+04	6.62E+04		5.31E+05
14		G	0.042	1060	8.2	3.0%	1092	8.2	90	45	3.2	52,284	1.45E+06	5.23E+04	5.39E+04	5.55E+04	5.71E+04	5.88E+04	6.06E+04	6.24E+04	6.43E+04	6.62E+04		5.31E+05
15																								0.00E+00
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Vehicle Combination / ESA Calculation 1

Bus / Truck — O O

	Axles / Tyres	Single / Single	Single / Dual						Totals	
	Legal Loading (t)	6	9						15.00	tonne
	Base Load / ESA	5.4	8.2							
Unloaded	Axle Group Load (t)	4.5	4						8.5	tonne
	ESA's	0.482	0.057						0.54	ESA
Loaded	Axle Group Load (t)	6.00	9.00						15.00	tonne
	ESA's [1]	1.524	1.451						2.98	ESA
	Payload =	6.5	tonne				ESA/t Payload =		0.0829	unloaded
	Max Legal Payload =	6.5	tonne [2]				ESA/t Payload =		0.4577	loaded

Tandem Truck — O OO

	Axles / Tyres	Single / Single	Tandem / Dual						Totals	
	Legal Loading (t)	6	16.5						22.50	tonne
	Base Load / ESA	5.4	13.8							
Unloaded	Axle Group Load (t)	4.5	5						9.5	tonne
	ESA's	0.482	0.017						0.50	ESA
Loaded	Axle Group Load (t)	6.00	16.50						22.50	tonne
	ESA's [1]	1.524	2.044						3.57	ESA
	Payload =	13.0	tonne				ESA/t Payload =		0.0384	unloaded
	Max Legal Payload =	13.0	tonne [2]				ESA/t Payload =		0.2745	loaded

Semi-Trailer — O OO OOO

	Axles / Tyres	Single / Single	Tandem / Dual	Tri / Dual					Totals	
	Legal Loading (t)	6	16.5	20.00					42.50	tonne
	Base Load / ESA	5.4	13.8	18.5						
Unloaded	Axle Group Load (t)	4.5	5	6.5					16	tonne
	ESA's	0.482	0.017	0.015					0.51	ESA
Loaded	Axle Group Load (t)	6.00	16.50	20.00					42.50	tonne
	ESA's [1]	1.524	2.044	1.366					4.93	ESA
	Payload =	26.5	tonne				ESA/t Payload =		0.0194	unloaded
	Max Legal Payload =	26.5	tonne [2]				ESA/t Payload =		0.1862	loaded

B-Double — O OO OOO OOO

	Axles / Tyres	Single / Single	Tandem / Dual	Tri / Dual	Tri / Dual				Totals	
	Legal Loading (t)	6	16.5	20.00	20.00				62.50	tonne
	Base Load / ESA	5.4	13.8	18.5	18.5					
Unloaded	Axle Group Load (t)	4.5	5	6.5	6.5				22.5	tonne
	ESA's	0.482	0.017	0.015	0.015				0.53	ESA
Loaded	Axle Group Load (t)	6.00	16.50	20.00	20.00				62.50	tonne
	ESA's [1]	1.524	2.044	1.366	1.366				6.30	ESA
	Payload =	40.0	tonne				ESA/t Payload =		0.0132	unloaded
	Max Legal Payload =	40.0	tonne [2]				ESA/t Payload =		0.1575	loaded

Road Train 1 — O OO OOO OOO OOO

	Axles / Tyres	Single / Single	Tandem / Dual	Tri / Dual	Tri / Dual	Tri / Dual			Totals	
	Legal Loading (t)	6	16.5	20.00	20.00	20.00			82.50	tonne
	Base Load / ESA	5.4	13.8	18.5	18.5	18.5				
Unloaded	Axle Group Load (t)	4.5	5	6.5	6.5	6.5			29	tonne
	ESA's	0.482	0.017	0.015	0.015	0.015			0.55	ESA
Loaded	Axle Group Load (t)	6.00	16.50	20.00	20.00	20.00			82.50	tonne
	ESA's [1]	1.524	2.044	1.366	1.366	1.366			7.67	ESA
	Payload =	53.5	tonne				ESA/t Payload =		0.0102	unloaded
	Max Legal Payload =	53.5	tonne [2]				ESA/t Payload =		0.1433	loaded

[1] If the "payload" is more or less than legal, "axle group loadings" are proportioned based on the legal and the unloaded tonnages.

[2] Calculated from the max legal loads & generic unloaded (tare) weights for each axle group of the HV.

Vehicle Combination / ESA Calculation 2

	Truck + 4 Dog	O	OO	OO	OO				
	Axles Tyres	Single Single	Tandem Dual	Tandem Dual	Tandem Dual				Totals
	Legal Loading (t)	6.5	16.5	13.75	13.75				50.50 tonne
	Base Load / ESA	5.4	13.8	13.8	13.8				
Unloaded	Axle Group Load (t)	4.5	5	5	5				19.5 tonne
	ESA's	0.482	0.017	0.017	0.017				0.53 ESA
Loaded	Axle Group Load (t)	6.50	16.50	13.75	13.75				50.50 tonne
	ESA's [1]	2.099	2.044	0.986	0.986				6.11 ESA
	Payload =	31.0	tonne				ESA/t Payload =		0.0172 unloaded
	Max Legal Payload =	31.0	tonne [2]				ESA/t Payload =		0.1972 loaded

		O	OO						
	Axles Tyres	Single Single	Tandem Dual						Totals
	Legal Loading (t)	6	16.5						22.50 tonne
	Base Load / ESA	5.4	13.8						
Unloaded	Axle Group Load (t)	4.5	5						9.5 tonne
	ESA's	0.482	0.017						0.50 ESA
Loaded	Axle Group Load (t)	4.50	5.00						9.50 tonne
	ESA's [1]	0.482	0.017						0.50 ESA
	Payload =		tonne				ESA/t Payload =		#DIV/0! unloaded
	Max Legal Payload =	13.0	tonne [2]				ESA/t Payload =		#DIV/0! loaded

		O	OO						
	Axles Tyres	Single Single	Tandem Dual						Totals
	Legal Loading (t)	6	16.5						22.50 tonne
	Base Load / ESA	5.4	13.8						
Unloaded	Axle Group Load (t)								0 tonne
	ESA's	0.000	0.000						0.00 ESA
Loaded	Axle Group Load (t)	0.00	0.00						0.00 tonne
	ESA's [1]	0.000	0.000						0.00 ESA
	Payload =		tonne				ESA/t Payload =		#DIV/0! unloaded
	Max Legal Payload =	22.5	tonne [2]				ESA/t Payload =		#DIV/0! loaded

Unloaded Vehicles			
HV Type	ESA / t (payload)	% of HV fleet	Weigthed Average
Bus / Truck	0.0829		
Tandem Truck	0.0384		
Semi-Trailer	0.0194		
B-Double	0.0132		
Road Train 1	0.0102		
Truck + 4 Dog	0.0172		
0			
0			
		0.0%	0.0000 ESAs / tonne of product "out the gate"

Loaded Vehicles			
HV Type	ESA / t (payload)	% of HV fleet	Weigthed Average
Bus / Truck	0.4577		
Tandem Truck	0.2745		
Semi-Trailer	0.1862		
B-Double	0.1575		
Road Train 1	0.1433		
Truck + 4 Dog	0.1972		
0			
0			
		0.0%	0.0000 ESAs / tonne of product "out the gate"

Development Generated ESA's per Year

"Base" Annual Tonnage = 209,000

Development Generated Tonnages (Year by Year)											
1	2	3	4	5	6	7	8	9	10		
2017	2018	2019	2020	2021	2022	2023	2024	2025			
% of "Base" Annual Tonnage	100%	100%	100%	100%	100%	100%	100%	100%	100%		Total
Annual Tonnage	209,000	209,000	209,000	209,000	209,000	209,000	209,000	209,000	209,000		1,881,000

Sect No.	Road No.	Road Section	%	Av. ESA / t To	Av. ESA / t From	TO(WARDS) - Development Generated ESA's (Year by Year) 1 2017	2 2018	3 2019	4 2020	5 2021	6 2022	7 2023	8 2024	9 2025	10	Cumul. Dev Traffic ESA's	(AWAY) FROM - Development Generated ESA's (Year by Year) 1 2017	2 2018	3 2019	4 2020	5 2021	6 2022	7 2023	8 2024	9 2025	10	Cumul. Dev Traffic ESA's
1		Access to Burnett Hway	100.0%	0.0172	0.1972	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03		3.24E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04		3.71E+05
2		F	100.0%	0.0172	0.1972	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03		3.24E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04		3.71E+05
3		G	100.0%	0.0172	0.1972	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03		3.24E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04		3.71E+05
4		H	100.0%	0.0172	0.1972	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03		3.24E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04		3.71E+05
5		I	100.0%	0.0172	0.1972	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03		3.24E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04		3.71E+05
6		J	100.0%	0.0172	0.1972	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03		3.24E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04		3.71E+05
7		K	100.0%	0.0172	0.1972	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03		3.24E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04		3.71E+05
8		L	100.0%	0.0172	0.1972	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03		3.24E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04		3.71E+05
9		A	100.0%	0.0172	0.1972	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03		3.24E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04		3.71E+05
10		B	100.0%	0.0172	0.1972	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03		3.24E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04		3.71E+05
11		C	100.0%	0.0172	0.1972	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03		3.24E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04		3.71E+05
12		D	100.0%	0.0172	0.1972	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03		3.24E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04		3.71E+05
13		E	100.0%	0.0172	0.1972	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03		3.24E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04		3.71E+05
14		G	100.0%	0.0172	0.1972	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03	3.59E+03		3.24E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04	4.12E+04		3.71E+05
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