

Appendix 2

Road design Calculations

Client	Beachlands South Partnership
Project Name	Beachlands South Fast track
Project Number	A2515591
Designer	PSJ
Review	
External Review	

Traffic Analysis



Client:	Beachlands South Partnership	Date:	18/02/2026
Project Name:	Beachlands South Fast track	Designed By:	PSJ
Project Number:	A2515591	Reviewed By:	0
		External Review:	0

Traffic Generation

Generation Rate	
Low Density	8.3 vpd/dwelling
Medium Density	6.5 vpd/dwelling
High density	2.9 vpd/dwelling
VC	18.7 vpd/1000sm
CM	2.2 vpd/1000sm
Light Industrial	
Retirement	
Retail	31.2 vpd/1000sm

VPD = VPH x F	assumed
VPH (Stantec ITA)	F
0.83	10
0.65	10
0.29	10
1.87	10
0.22	10
0.68	10
0.31	10
15.6	2

Refer to area sheet for layout

Map Area	Low	Medium	High
1	-	-	30
	-	-	87
2	32	-	-
	266	-	-
3	7	26	-
	58	169	-
4	6	33	22
	50	215	64
5	-	19	81
	-	124	235
6	-	31	53
	-	202	154
7	16	19	434
	133	124	1,259
8	-	27	40
	-	176	116
9	15	24	-
	125	156	-
10	8	77	-
	66	501	-
11	3	57	-
	25	371	-
12	-	62	-
	-	403	-
13	42	-	-
	349	-	-
14	-	107	-
	-	696	-
15	-	-	72
	-	-	209
16	59	-	152
	490	-	441

ADDT per area	Total dwellings
87	30
266	32
227	33
328	61
358	100
355	84
1,515	469
292	67
281	39
567	85
395	60
403	62
349	42
696	107
209	72
931	211

	VPD average	ADDT
Road 14	6.595652174	1,365
Road 4	5.055731225	1,279
Road 2/3		1,127

17 (VC)	11,100	208
18 (VC)	8,100	151
19 (VC)	8,700	163
20 (VC))	12,100	226
21(CM)	8,100	18
22 (CM)	28,800	899
CM8 School		1,306

ADDT	10,227	1,554
		Dwellings

Traffic Growth

Development	Dwellings	Years of growth	Growth (units/yr)	All non residential (VPD - 2038
Live Zone	1554	11	141	2,970
(2027 - 2038)				

1782	40% internal
1188	60% JL drive

Traffic growth vpd/year - residential only
660

Notes

- 1 Assume Y2027 as Year 0
- 2 As the growth rate is non uniform, this design has been completed year by year, rather than using the CGF portion of a standard pavement design for JLD, Road 1, 2, 3
- 3 Local roads assumed to have full design ADDT from Year 0
- 4 Asphalt design life 12.5 years
- 5 Commercial and retail to be online 2038
- 6 Current AADT on JLD of 2072 used as base traffic (source One Road Network)
- 7 HCV % = 7% from One road network, increase HCV to 10% post 2038
- 8 Full live zone to be developed by 2038, beyond 2038 growth rate of 4%
- 9 Construction traffic allowance of 25% ADDT during growth - till 2038
- 10 External Commercial, retail, school traffic to be distributed on Road 2 and 3
- 11 40% of commercial/retail traffic to internal, Balance 60% ADT of Commercial,retail,school used on JLD
- 12 Commercial traffic generation divided as 50% Road 1, 50% Road 2 and road 3
- 13 DF - 1 (TDM)
- 14 LDF - 1 (TDM)
- 15 Bus traffic not modelled separately for pavement design purposes - assumes ADDT and high HCV % with TLD covers for the bus as per TDM 4.14.3 - buses part of general traffic
- 16 Mid block design speed - 30km/h

$$HVAG = \left[\frac{HVAG}{HCV} \right] * AADT * DF * \%ageHCV * LDF * No.of Day;$$

Where

HVAG/HCV	=	No. of heavy vehicle axle groups per heavy vehicle
DF	=	Direction Factor
LDF	=	Lane Distribution Factor
CGF	=	Cumulative Growth Factor
DESA	=	Design No. of Equivalent Standard Axles

Jack Lochlan Drive			HCV Classification and Count									
Year	AADT	% Growth	Classification	AADT	Days/Year	%CV Total	DF	HVAG/HCV	LDF	ESA/HVAG (Drury)	HVAG/Year (NDT)	DESA
2027	2237		Arterial/collector with bus routes	2237	365	7%	1	2.61	1	0.605	149175	90251
2028	3061.7	36.9	Arterial/collector with bus routes	3062	365	7%	1	2.61	1	0.605	204168	123522
2029	3886.3	26.9	Arterial/collector with bus routes	3886	365	7%	1	2.61	1	0.605	259161	156792
2030	4711.0	21.2	Arterial/collector with bus routes	4711	365	7%	1	2.61	1	0.605	314154	190063
2031	5535.6	17.5	Arterial/collector with bus routes	5536	365	7%	1	2.61	1	0.605	369147	223334
2032	6360.3	14.9	Arterial/collector with bus routes	6360	365	7%	1	2.61	1	0.605	424139	256604
2033	7185.0	13.0	Arterial/collector with bus routes	7185	365	7%	1	2.61	1	0.605	479132	289875
2034	8009.6	11.5	Arterial/collector with bus routes	8010	365	7%	1	2.61	1	0.605	534125	323146
2035	8834.3	10.3	Arterial/collector with bus routes	8834	365	7%	1	2.61	1	0.605	589118	356416
2036	9658.9	9.3	Arterial/collector with bus routes	9659	365	7%	1	2.61	1	0.605	644111	389687
2037	10483.6	8.5	Arterial/collector with bus routes	10484	365	7%	1	2.61	1	0.605	699104	422958
2038	12793.4	22.0	Arterial/collector with bus routes	12793	365	10%	1	2.61	1	0.605	1218767	737354
2039	13305.2	4.0	Arterial/collector with bus routes	13305	365	10%	1	2.61	1	0.605	1267518	766848
2040	13837.4	4.0	Arterial/collector with bus routes	13837	365	10%	1	2.61	1	0.605	1318218	797522
2041	14390.9	4.0	Arterial/collector with bus routes	14391	365	10%	1	2.61	1	0.605	1370947	829423
2042	14966.5	4.0	Arterial/collector with bus routes	14967	365	10%	1	2.61	1	0.605	1425785	862600
2043	15565.2	4.0	Arterial/collector with bus routes	15565	365	10%	1	2.61	1	0.605	1482816	897104
2044	16187.8	4.0	Arterial/collector with bus routes	16188	365	10%	1	2.61	1	0.605	1542129	932988
2045	16835.3	4.0	Arterial/collector with bus routes	16835	365	10%	1	2.61	1	0.605	1603814	970308
2046	17508.7	4.0	Arterial/collector with bus routes	17509	365	10%	1	2.61	1	0.605	1667967	1009120
2047	18209.1	4.0	Arterial/collector with bus routes	18209	365	10%	1	2.61	1	0.605	1734686	1049485
2048	18937.4	4.0	Arterial/collector with bus routes	18937	365	10%	1	2.61	1	0.605	1804073	1091464
2049	19694.9	4.0	Arterial/collector with bus routes	19695	365	10%	1	2.61	1	0.605	1876236	1135123
2050	20482.7	4.0	Arterial/collector with bus routes	20483	365	10%	1	2.61	1	0.605	1951285	1180528
2051	21302.0	4.0	Arterial/collector with bus routes	21302	365	10%	1	2.61	1	0.605	2029337	1227749
2052	22154.1	4.0	Arterial/collector with bus routes	22154	365	10%	1	2.61	1	0.605	2110510	1276859

Total	2.91E+07	1.76E+07
for Pavement Design	Design HVAG (NDT)	DESA

9.69E+06

Road 2 and 3 with bus route			HCV Classification and Count									
Year	AADT	% Growth	Classification	AADT	Days/Year	%CV Total	DF	HVAG/HCV	LDF	ESA/HVAG (Drury)	HVAG/Year (NDT)	DESA
2027	705		collector with bus routes	705	365	7%	1	2.61	1	0.605	46980	28423
2028	732.7	4.0	collector with bus routes	733	365	7%	1	2.61	1	0.605	48859	29560
2029	762.0	4.0	collector with bus routes	762	365	7%	1	2.61	1	0.605	50813	30742
2030	792.5	4.0	collector with bus routes	792	365	7%	1	2.61	1	0.605	52846	31972
2031	824.2	4.0	collector with bus routes	824	365	7%	1	2.61	1	0.605	54960	33251
2032	857.1	4.0	collector with bus routes	857	365	7%	1	2.61	1	0.605	57158	34581
2033	891.4	4.0	collector with bus routes	891	365	7%	1	2.61	1	0.605	59445	35964
2034	927.1	4.0	collector with bus routes	927	365	7%	1	2.61	1	0.605	61822	37403
2035	964.2	4.0	collector with bus routes	964	365	7%	1	2.61	1	0.605	64295	38899
2036	1002.7	4.0	collector with bus routes	1003	365	7%	1	2.61	1	0.605	66867	40455
2037	1042.8	4.0	collector with bus routes	1043	365	7%	1	2.61	1	0.605	69542	42073
2038	2899.3	178.0	collector with bus routes	2899	365	7%	1	2.61	1	0.605	193343	116972
2039	3015.3	4.0	collector with bus routes	3015	365	7%	1	2.61	1	0.605	201076	121651
2040	3135.9	4.0	collector with bus routes	3136	365	7%	1	2.61	1	0.605	209119	126517
2041	3261.3	4.0	collector with bus routes	3261	365	7%	1	2.61	1	0.605	217484	131578
2042	3391.8	4.0	collector with bus routes	3392	365	7%	1	2.61	1	0.605	226183	136841
2043	3527.5	4.0	collector with bus routes	3527	365	7%	1	2.61	1	0.605	235231	142315
2044	3668.6	4.0	collector with bus routes	3669	365	7%	1	2.61	1	0.605	244640	148007
2045	3815.3	4.0	collector with bus routes	3815	365	7%	1	2.61	1	0.605	254426	153928
2046	3967.9	4.0	collector with bus routes	3968	365	7%	1	2.61	1	0.605	264603	160085
2047	4126.6	4.0	collector with bus routes	4127	365	7%	1	2.61	1	0.605	275187	166488
2048	4291.7	4.0	collector with bus routes	4292	365	7%	1	2.61	1	0.605	286194	173148
2049	4463.4	4.0	collector with bus routes	4463	365	7%	1	2.61	1	0.605	297642	180073
2050	4641.9	4.0	collector with bus routes	4642	365	7%	1	2.61	1	0.605	309548	187276
2051	4827.6	4.0	collector with bus routes	4828	365	7%	1	2.61	1	0.605	321930	194767
2052	5020.7	4.0	collector with bus routes	5021	365	7%	1	2.61	1	0.605	334807	202558

Total	4.17E+06	2.52E+06
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Road 1 with bus route			HCV Classification and Count									
Year	AADT	% Growth	Classification	AADT	Days/Year	%CV Total	DF	HVAG/HCV	LDF	ESA/HVAG (Drury)	HVAG/Year (NDT)	DESA
2027	660		collector with bus routes	660	365	7%	1	2.61	1	0.605	43994	26617
2028	1484.4	125.0	collector with bus routes	1484	365	7%	1	2.61	1	0.605	98987	59887
2029	2309.0	55.6	collector with bus routes	2309	365	7%	1	2.61	1	0.605	153980	93158
2030	3133.7	35.7	collector with bus routes	3134	365	7%	1	2.61	1	0.605	208973	126428
2031	3958.4	26.3	collector with bus routes	3958	365	7%	1	2.61	1	0.605	263965	159699
2032	4783.0	20.8	collector with bus routes	4783	365	7%	1	2.61	1	0.605	318958	192970
2033	5607.7	17.2	collector with bus routes	5608	365	7%	1	2.61	1	0.605	373951	226240
2034	6432.3	14.7	collector with bus routes	6432	365	7%	1	2.61	1	0.605	428944	259511
2035	7257.0	12.8	collector with bus routes	7257	365	7%	1	2.61	1	0.605	483937	292782
2036	8081.7	11.4	collector with bus routes	8082	365	7%	1	2.61	1	0.605	538929	326052
2037	8906.3	10.2	collector with bus routes	8906	365	7%	1	2.61	1	0.605	593922	359323
2038	11587.5	30.1	collector with bus routes	11587	365	7%	1	2.61	1	0.605	772716	467493
2039	12051.0	4.0	collector with bus routes	12051	365	7%	1	2.61	1	0.605	803625	486193
2040	12533.0	4.0	collector with bus routes	12533	365	7%	1	2.61	1	0.605	835769	505641
2041	13034.3	4.0	collector with bus routes	13034	365	7%	1	2.61	1	0.605	869200	525866
2042	13555.7	4.0	collector with bus routes	13556	365	7%	1	2.61	1	0.605	903968	546901
2043	14097.9	4.0	collector with bus routes	14098	365	7%	1	2.61	1	0.605	940127	568777
2044	14661.8	4.0	collector with bus routes	14662	365	7%	1	2.61	1	0.605	977732	591528
2045	15248.3	4.0	collector with bus routes	15248	365	7%	1	2.61	1	0.605	1016841	615189
2046	15858.2	4.0	collector with bus routes	15858	365	7%	1	2.61	1	0.605	1057515	639797
2047	16492.6	4.0	collector with bus routes	16493	365	7%	1	2.61	1	0.605	1099816	665388
2048	17152.3	4.0	collector with bus routes	17152	365	7%	1	2.61	1	0.605	1143808	692004
2049	17833.4	4.0	collector with bus routes	17833	365	7%	1	2.61	1	0.605	1189561	719684
2050	18551.9	4.0	collector with bus routes	18552	365	7%	1	2.61	1	0.605	1237143	748472
2051	19294.0	4.0	collector with bus routes	19294	365	7%	1	2.61	1	0.605	1286629	778410
2052	20065.7	4.0	collector with bus routes	20066	365	7%	1	2.61	1	0.605	1338094	809547
										I total	1.90E+07	1.15E+07

Traffic Analysis

Client:		Beachlands South Partnership	
Project Name:		Beachlands South Fast track	
Project Number:		A2515591	

$$N_{DT} = 365 \cdot CGF \cdot AADT \cdot DF \cdot \frac{\%HV}{100} \cdot LDF \cdot N_{HVAG}$$

$$DESA = 365 \cdot CGF \cdot AADT \cdot DF \cdot \frac{\%HV}{100} \cdot LDF \cdot N_{HVAG} \cdot \frac{ESA}{HVAG}$$

		Jack Lochlan Drive	Road 1	Primary Collector with Bus route
Classification		Collector with bus route	Collector with bus route	Collector with bus routes
		JLD	Road 1	Road 2, Road 3, 5, 6
		P2/M3	P2/M3	P2/M2
		95%	95%	95%
Design Reliability	Lots			
Development Lot	vpd/dwelling			
Traffic Generation				
(commercial)	vpd/ha	As per yearly DESA and NDT calculations -		
Construction Traffic	25% Increase			
AADT	vpd			
Design Period	years (P)			
Growth Rate	R			
Heavy Vehicle Total	%			
DF (Direction Factor)				
NHVAG (Drury)				
LDF				
CGF= (((1+0.01*R)*P)-1)/(0.01*R)				
ESA/HVAG (Drury)				
NDT		2.91E+07	1.90E+07	4.17E+06
DESA		1.76E+07	1.15E+07	2.52E+06
		From Manual calculation	From Manual calculation	From Manual calculation

Granular - Deep	JLD	Road 1	Road 2, Road 3, 5, 6
	N/A - Bus route	N/A - Bus route	N/A - Bus route
Asphalt 1 - DG10			
Asphalt 2 - AC14 PG64 H			
Asphalt 3 - AC20 PG64 H			
Asphalt 3 - AC14 HF PG64 S			
Basecourse - ATAP40 - 300Mpa			
Subbase - ATAP 65 - 200Mpa			
CEM s- Subbase AP40			
SIL			Geotextile class C
Subgrade - 3.5 (35Mpa)			
Total Thickness		0	0

Structural/CEM -shallow

	Circly design	Circly design	Catalogue design
Asphalt 1 - DG10			
Asphalt 2 - AC14 PG64 H	55	55	55
Asphalt 3 - AC20 PG64 H	110	100	85
Asphalt 3 - AC14 HF PG64 S	60	60	60
Basecourse - ATAP40 - 200Mpa	300	250	200
Subbase - ATAP 65 - 150Mpa			
CEM s- Subbase AP40			
SIL	Geotextile class C	Geotextile class C	Geotextile class C
Subgrade - 3.5 (35Mpa)			

Total Thickness

525

465

400

HARRISON
GRIERSON

	Date:		8/05/2026
	Designed By:		PSJ
	Reviewed By:		0

Secondary Collector	Commercial Road	Residential streets some routes shown as secondary collector on ITA but portions of them could be downgraded for pavement design	Local Road
Secondary Collector Road 4, 14, P2/M2 95%	Industrial/commercial P3/M2 95%	Residential streets P1/M2 90%	local roads P1/M1 90%
250 6 1500	5 180 900	100 8 800	30 8 240
1875	1125	1000	300
1875	1125	1000	300
25 3	25 3	25 3	25 3
7%	15%	3%	3%
1 2.61 1	1 2.61 1	1 2.61 1	1 2.61 1
36.46	36.46	36.46	36.46
0.61	0.61	0.61	0.61
4.56E+06 2.78E+06	5.86E+06 3.58E+06	1.04E+06 6.36E+05	3.13E+05 1.91E+05

Road 4, 14,	Commercial Road	Residential streets	local roads
Catalogue design	Catalogue design	Catalogue design	Catalogue design
55	55	40	40
190	190	200	150
		400	400
300	300		
Geotextile class C	Geotextile class C	Geotextile class C	Geotextile class C
545	545	640	590

Catalogue design	Catalogue design	Catalogue design	Catalogue design
55	55	40	40
85	85		
60	60		
200	200	190	190
		240	200
Geotextile class C	Geotextile class C	Geotextile class C	Geotextile class C

400

400

470

430