1. PURPOSE

The purpose of this note is to confirm that the future four step WRTM models respond appropriately in terms of both mode split and bus patronage.

2. INTRODUCTION

There are two future year sets of three step models developed within the WRTM, which has been extensively reported in Technical Notes 18 (modelling assumptions) and 19 (modelling outputs).

The four step morning peak and interpeak models have been developed for the future landuse year of 2021 for this assessment. The do minimum works and future landuse assumptions have been taken directly from the three step equivalent models and as such are consistent with that documented n Technical Note 18.

As such the future model has been run using the accepted network do-min, and the 2021 landuse. In order to enable a direct comparison between the 2021 results and the 2006 results, the 2008 bus service routes, frequencies and fares have been maintained. These are the services against which the model has been validated. Whilst some new 'direct' routes have been introduced since 2008 and frequencies on some existing routes have also been changed, the bus services have been kept consistent between the two modelled years.

For project work in the operational phase of the WRTM is it recommended that suitable 'do minimum' bus service assumptions should be agreed, which will include any changes since 2008, new or modified services for patrons in Greenfield development areas (e.g. Peacockes, Rototuna) and any other planned changes to services which the Region may be committed to through NLTP or RLTS planning documents.

3. MODE SPLIT RESPONSE OF FUTURE MODEL

The 2006 and 2021 morning peak and interpeak four step models have been compared in terms of the apportionment of person trips through the various mode splits in the model. For more details as to the mode split process please refer to Technical Note 16.

Table 1 summarises the modelled mode splits for both years by aggregated trip purpose, and a summary of the total trips and percentage growth by model is included in **Table 2** and **Table 3.**.

All modes get significant increases in terms of total trip making. This trend is consistent across both periods and all aggregated trip purposes.

Public transport and vehicle driver modes receive a relative increase in mode share with 0.1% and vehicles passenger and active modes receive a relative decrease in both periods as per **Table 2** and **Table 3** results. Public transport use increases due to congestion on the roading network, however without bus services included in new development areas there is more potential for the use of this mode.

With the majority of the new development area being on the fringes of existing urban areas the future landuse becomes somewhat 'dispersed' as opposed to 'intensified', which tends to result in an increased reliance on vehicle driver trips and less use of other modes. It is also worth noting that car ownership is forecast to increase on both a per capita and a per household basis, which is likely to lead to an increase in mode share for vehicle driver trips.

Modelled Mode Split in 2006 and 2021								Table 1
	Morning Peak Home Based Work				Inter Peak Home Based Work			
Mode	2006		2021		2006		2021	
	Model Trips	Model %	Model Trips	Model %	Model Trips	Model %	Model Trips	Model %
In vehicle	84425	93.3%	104716	93.5%	30002	92.8%	37138	92.8%
Active	6103	6.7%	7331	6.5%	2316	7.2%	2864	7.2%
In Car	82915	98.2%	102777	98.1%	29697	99.0%	36747	98.9%
Bus Passenger	1511	1.8%	1940	1.9%	306	1.0%	391	1.1%
Car Driver	76774	92.6%	95688	93.1%	28172	94.9%	34908	95.0%
Car Passenger	6142	7.4%	7090	6.9%	1525	5.1%	1839	5.0%
	Morning Peak Home Based Education				Inter Peak Home Based Education			
Mode	2006		2021		2006		2021	
	Model Trips	Model %	Model Trips	Model %	Model Trips	Model %	Model Trips	Model %
In vehicle	45629	57.9%	54381	58.1%	107524	89.2%	143977	89.8%
Active	33191	42.1%	39232	41.9%	12979	10.8%	16430	10.2%
In Car	43676	95.7%	51737	95.1%	106093	98.7%	142020	98.6%
Bus Passenger	1953	4.3%	2645	4.9%	1432	1.3%	1958	1.4%
Car Driver	5540	12.7%	6065	11.7%	72710	68.5%	99825	70.3%
Car Passenger	38137	87.3%	45673	88.3%	33384	31.5%	42198	29.7%
	Morning Peak Home all other purposes				Inter Peak Home all other purposes			
Mode	2006		2021		2006		2021	
	Model Trips	Model %	Model Trips	Model %	Model Trips	Model %	Model Trips	Model %
In vehicle	185383	92.8%	230486	93.0%	119164	86.5%	155255	87.1%
Active	14334	7.2%	17443	7.0%	18581	13.5%	22914	12.9%
In Car	184185	99.4%	228938	99.3%	118731	99.6%	154661	99.6%
Bus Passenger	1199	0.6%	1549	0.7%	434	0.4%	595	0.4%
Car Driver	125710	68.3%	158847	69.4%	90817	76.5%	120566	78.0%
Car Passenger	58477	31.7%	70091	30.6%	27915	23.5%	34098	22.0%

Study Area Mode Split Summary 2006 and 2021 AM Peak				Table 2
	Vehicle Drivers	Vehicle Passengers	Public Transport	Active
2006 Total Trips	208024	102756	4663	53628
2021 Total Trips	260576	122891	6147	63980
Percentage Increase of Total Trips	25.3%	19.6%	31.8%	19.3%
2006 Percentage of Trips by Mode	56.4%	27.8%	1.3%	14.5%
2021 Percentage of Trips by Mode	57.4%	27.1%	1.4%	14.1%
Net Change In Mode Shift (2021 – 2006)	1.1%	-0.7%	0.1%	-0.4%
Relative Change in Mode Shift (Net Change/2006)	1.9%	-2.7%	7.3%	-2.9%

Study Area Mode Split Summary 2006 and 2021 Inter Peak				Table 3
	Vehicle Drivers	Vehicle Passengers	Public Transport	Active
2006 Total Trips	191699	62824	2172	33876
2021 Total Trips	255299	78135	2944	42208
Percentage Increase of Total Trips	33.2%	24.4%	35.5%	24.6%
2006 Percentage of Trips by Mode	66.0%	21.6%	0.7%	11.7%
2021 Percentage of Trips by Mode	67.4%	20.6%	0.8%	11.1%
Net Change In Mode Shift (2021 – 2006)	1.5%	-1.0%	0.1%	-0.5%
Relative Change in Mode Shift (Net Change/2006)	2.2%	-4.5%	4.0%	-4.4%

The mode split results in **Table 2** and **Table 3** provide summaries for the entire study area. In order to understand the impact on Hamilton and surrounds the trip totals for Hamilton City and Waipa District have been isolated. This is the core area where public transport services have been coded into the Waikato Regional Transport Model, with corresponding mode split results presented in **Table 4** and **Table 5**.

The same trends emerge between 2006 and 2021 in the Hamilton urban area, however the mode share for public transport is, understandably, higher than the study area average.

Hamilton Mode Split Summary 2006 and 2021 AM Peak				Table 4
	Vehicle Drivers	**Vehicle Passengers**	**Public Transport**	**Active**
2006 Total Trips	60709	28431	4618	13536
2021 Total Trips	80812	35941	6088	17826
Percentage Increase of Total Trips	33.1%	26.4%	31.8%	31.7%
2006 Percentage of Trips by Mode	56.6%	26.5%	4.3%	12.6%
2021 Percentage of Trips by Mode	57.4%	25.6%	4.3%	12.7%
Net Change In Mode Shift (2021 – 2006)	0.9%	-0.9%	0.0%	0.1%
Relative Change in Mode Shift (Net Change/2006)	1.5%	-3.6%	0.6%	0.4%

Hamilton Mode Split Summary 2006 and 2021 Inter Peak				Table 5
	Vehicle Drivers	**Vehicle Passengers**	**Public Transport**	**Active**
2006 Total Trips	56060	17912	2166	6713
2021 Total Trips	78506	23157	2935	8893
Percentage Increase of Total Trips	40.0%	29.3%	35.5%	32.5%
2006 Percentage of Trips by Mode	67.7%	21.6%	2.6%	8.1%
2021 Percentage of Trips by Mode	69.2%	20.4%	2.6%	7.8%
Net Change In Mode Shift (2021 – 2006)	1.5%	-1.2%	0.0%	-0.3%
Relative Change in Mode Shift (Net Change/2006)	2.2%	-5.6%	-1.1%	-3.3%

4. BUS PATRONAGE RESPONSE OF FUTURE MODEL

Passenger Numbers per Service

The total number of passengers for all services during each period has been compared for the two modelled years. **Table 6** details the total passenger numbers by route and overall for each period. A map of the bus routes is included as Appendix One.

The changes in patronage by service as well as total patronage are very consistent in both periods. Increased use of all services is evident with only a few exceptions in the morning peak period. These exceptions relate to a very small decrease in patronage in areas with low projected growth and a number of other competing services. As such they do not invalidate the model.

Total Bus Patronage Comparison							Table 6
Bus Route	Route Name	2006 am	2021 am	Change in Am Trips	2006 int	2021 int	Change in Int trips
1	Pukete In	100	99	-1	33	42	9
1a	Pukete Out	22	32	10	79	102	23
2	Silverdale In	127	167	40	24	34	10
2a	Silverdale Out	112	158	46	80	105	25
3	Dinsdale In	75	109	34	21	28	7
3a	Dinsdale Out	16	25	9	70	101	31
4	Flagstaff In	114	136	22	34	48	14
4a	Flagstaff Out	70	94	24	51	76	25
5	Chartwell In	79	104	25	41	52	11
5a	Chartwell Out	34	41	7	0	0	0
6	Mahoe In	72	84	12	73	99	26
6a	Mahoe Out	54	76	22	34	50	16
7	Glenview In	104	144	40	13	16	3
7a	Glenview Out	41	50	9	78	100	22
8	Frankton In	237	348	111	71	91	20
8a	Frankton Out	96	114	18	84	93	9
9	Nawton IN	103	113	10	32	43	11
9a	Nawton OUT	66	98	32	36	73	37
10	Hillcrest IN	78	120	42	23	42	19
10a	Hillcrest OUT	136	185	49	59	80	21
11	Fairfield IN	170	189	19	59	69	10
11a	Fairfield OUT	41	43	2	36	50	14
12	Fitzroy IN	177	227	50	15	21	6
12a	Fitzroy OUT	60	87	27	30	42	12
13	University IN	146	206	60	46	61	15
13a	University OUT	104	153	49	48	75	27
14	Claudelands IN	69	88	19	20	25	5
14a	Claudelands OUT	58	83	25	55	66	11
15	Ruakura IN	20	31	11	28	44	16
15a	Ruakura OUT	69	75	6	40	47	7
16	Rotoruna IN	100	130	30	41	59	18
16a	Rotoruna OUT	48	57	9	71	108	37
17	Hamilton East Uni IN	41	62	21	16	26	10
17a	Hamilton East Uni OUT	65	58	-7	17	20	3
18	Te Rapa IN	167	184	17	62	63	1
18a	Te Rapa OUT	97	127	30	80	105	25
26	Bremworth/Temple View IN	90	123	33	25	34	9
26a	Bremworth/Temple View OUT	47	61	14	32	41	9
30	Northerner IN	34	65	31	8	17	9
30a	Northerner OUT	24	24	0	15	25	10
16rd	Rototuna Direct In	72	126	54	0	0	0
16rda	Rototuna Direct Out	19	28	9	0	0	0
51	CBD Shuttle	434	646	212	164	244	80
24a	Te Awamutu to Hamilton	116	120	4	0	0	0
52a	OrbiterC: University-University-Base	561	666	105	259	332	73
52	OrbiterA: Univeristy-University-Base	380	586	206	153	200	47
1pd	Pukete Direct In	7	11	4	0	0	0
1pda	Pukete Direct Out	44	44	0	0	0	0
3dd	Dinsdale Direct In	8	9	1	0	0	0
3dda	Dinsdale Direct Out	4	1	-3	0	0	0
TOTAL TRIPS		4638	6096	1458	2172	2944	772