Central Park AAP, Milehouse Junction – Preliminary Scheme Evaluation

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1 BACKGROUND

1.1 Overview

Plymouth City Council is to produce an Area Action Plan (AAP) for Central Park, the largest park in the City.

Historic plans to develop the park were never fully implemented due to a number of perceived constraints, which include a lack of clear and safe access to the park due to barriers formed by major roads and junctions. In particular, the Milehouse junction (the intersection of the A386 and the A3064) was felt to be a significant barrier to movement.

The City Council prepared a preliminary design for a development scheme in the Central Park area which included the addition of residential, retail and leisure facilities. Also included was an outline plan for the re-modelling of the Milehouse junction. SIAS were commissioned SIAS to carry out an evaluation of the proposals using an S-Paramics model of the Central Park Area.

1.2 Proposed Scheme

In summary, the development proposals for the Central Park AAP Preferred Option are;

- three new residential development areas adjacent to; A386 (bus depot), Peverell Park Rd and Central Park Av.
- improved leisure facilities at the Mayflower Centre
- retail facilities on Peverell Park Rd.
- re-design of the Milehouse junction to reduce impact on pedestrian movement.

1.3 Purpose of Testing

An S-Paramics model of the Central Park area was used to evaluate the proposals. The purpose of the testing was to examine the effects of the new development proposals on the highway network, including analysis of traffic flows and journey times in the area.

Although not originally included in the testing programme additional models were produced to allow a preliminary estimate to be made of the effects of the Derriford development proposals.

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2 METHODOLOGY

2.1 Base Model

Three models were produced in order to provide an analysis of the Central Park AAP Preferred Option proposals. A base model was produced for 2016. This was a cordon model from the larger 2016 TTWA model.

Details of any proposed highway changes and traffic growth were provided by Plymouth City Council and coded into the TTWA model before a cordon model was produced for the Central Park area.

2.2 Do-Nothing Model

The 'Do-Nothing' model includes the traffic generated by the proposed residential, retail and leisure developments but not the associated highway modifications. The purpose of the 'Do-Nothing' model is to provide a 'like-for-like' comparison with the model containing the highway proposals.

2.3 Do-Something Model

The 'Do-Something' model includes not only the new development traffic but also the highway network changes being proposed at Milehouse junction. This allows a direct comparison with the 'Do-Nothing' model. The only reason for any variation in the traffic flows is the effect of the Milehouse junction proposals, as the new development traffic is included in both models.

2.4 Derriford Models

The main testing concentrated on the proposals to be included in the Central Park AAP Preferred Option Report. However, the A386 is a major route into the City Centre and forms an important connection to the A38 and Derriford. The scale of the current development proposals in the Derriford area make it reasonable to assume that the A386 will be required to accommodate a significant amount of the generated traffic, hence some allowance should be made for this in the Central Park analysis.

Two additional models were produced; a 'Do-Nothing' plus Derriford and a 'Do-Something' plus Derriford. Again, the purpose of these models was to allow a 'like-for-like' comparison between networks which discounted the effects of any traffic volume increase. Preliminary analysis was carried out at a 'network' level only.

All models were run for both the morning and evening peak periods; morning 07:00 – 10:00 and evening 15:00 to 19:00.

2.5 Network Changes

The network changes in the 'Do-Something' models were to the Milehouse junction area only. The objective of the design changes was to reduce the overall size of the junction and improve pedestrian access from the west side of the A386 to the park.

The basic proposal for the junction layout is shown in Figure 2.1 below.

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Figure 2.1 : Milehouse Junction Preliminary Scheme Evaluation – Proposed Junction Layout

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2.6 Demand Changes

The demand changes related to the Central Park AAP Preferred Option development proposals were calculated from a TRICS analysis. The peak hour trip generations are shown in Table 2.1. Trips from the Base model were removed from the appropriate zones (for example, the bus depot site at Milehouse) and the new trips added.

Table 2.1 : Milehouse Junction Preliminary Scheme Evaluation – Development Trip Generation

Land Use		Arrive	Depart
AM (08:00 - 09:00)			
Residential			
	Bus Depot	25	105
	Peverell Park Rd	5	5
	Central Park Av	25	60
Leisure			
	Mayflower Centre	35	40
Retail			
	Peverell Park Rd	20	20
Total		**110**	**230**
PM (17:00 - 18:00)			
Residential			
	Bus Depot	90	50
	Peverell Park Rd	5	5
	Central Park Av	50	35
Leisure			
	Mayflower Centre	100	80
Retail			
	Peverell Park Rd	50	50
Total		**295**	**220**

Because no definitive information on trip generation was available for the Derriford development an assumption was made that an increase of around 5% would occur on the A386. This increase equated to around 650 trips in the morning peak period and 1200 in the evening.

3 RESULTS

3.1 Overall Network

Table 3.1, below, shows the overall network statistics from each model run. The overall network statistics cover the whole of the model run period.

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Table 3.1 : Milehouse Junction Preliminary Scheme Evaluation – Overall Network Statistics

	AM Peak (07:00 - 10:00)				PM Peak (15:00 - 19:00)			
Base	run-001	run-002	run-003	**Avg**	run-004	run-005	run-006	**Avg**
Av Journey Time (s)	356	397	387	**380**	499	493	505	**499**
Total Num Veh	58312	58374	58320	**58335**	87257	87179	87129	**87188**
Mean Speed (mph)	18	17	17	**17**	13	13	13	**13**
Do-Nothing	run-001	run-002	run-003	**Avg**	run-004	run-005	run-006	**Avg**
Av Journey Time (s)	430	385	397	**404**	506	545	521	**524**
Total Num Veh	58937	58881	58879	**58899**	88455	88350	88356	**88387**
Mean Speed (mph)	15	17	17	**16**	13	12	12	**12**
Do-Something	run-001	run-002	run-003	**Avg**	run-004	run-005	run-006	**Avg**
Av Journey Time (s)	435	433	425	**431**	501	578	515	**531**
Total Num Veh	58863	58995	58877	**58912**	88547	88058	88437	**88347**
Mean Speed (mph)	15	15	15	**15**	13	11	12	**12**
Do-Nothing + Der	run-001	run-002	run-003	**Avg**	run-004	run-005	run-006	**Avg**
Av Journey Time (s)	455	459	460	**458**	552	540	557	**550**
Total Num Veh	59309	59415	59405	**59376**	89235	89185	89171	**89197**
Mean Speed (mph)	15	14	14	**14**	12	12	12	**12**
Do-Something + Der	run-001	run-002	run-003	**Avg**	run-004	run-005	run-006	**Avg**
Av Journey Time (s)	448	474	448	**457**	862	674	584	**707**
Total Num Veh	59381	59110	59643	**59378**	85601	87822	88760	**87394**
Mean Speed (mph)	15	14	15	**14**	7	10	11	**9**

Table 3.1 demonstrates that over the network as a whole, the proposals make very little impact on average vehicle speeds between the Base, Do-Nothing and Do-Something networks. Total trip numbers rise slightly as would be expected but average journey times are approximately constant.

Adding an allowance for the development at Derriford has a more significant impact, particularly on the 'Do-Something' network i.e. the network which includes the new Milehouse junction proposals. As the evening peak is significantly busier in terms of total trip numbers, the figures generally show a more dramatic change than the morning peak outputs.

3.2 Traffic Flows

Tables 3.2 and 3.3, below, show the predicted changes in traffic flow on key links in the Central Park model road network. The comparisons are between the Do-Nothing and Do-Something models and do not include an allowance for development at Derriford.

The traffic flows on all the main approaches to Milehouse junction decrease in the Do-Something (i.e. proposed scheme) model tests, indicating that the proposed junction is not operating with the same efficiency as the current design.

However, flows on roads further away from the Milehouse junction area (including more minor roads such as Park Rd and Melville Rd) show an increase in flow. This indicates that the less efficient Milehouse junction displaces traffic onto other less suitable areas of the network.

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Table 3.2 : Milehouse Junction Preliminary Scheme Evaluation – Traffic Flow Comparison AM Peak

AM Peak (08:00 - 09:00)						
Road		**Do-Nothing**		**Do-Something**		**Difference**
		Directional	Two-way	Directional	Two-way	
Outland Rd	NB	1131	2717	1105	2658	**-59**
	SB	1586		1553		
Alma Rd	NB	1112	3106	1073	2918	**-188**
	SB	1994		1845		
Milehouse Rd	EB	687	1475	634	1375	**-100**
	WB	788		741		
Wolseley Rd	NB	728	2085	678	1858	**-227**
	SB	1357		1180		
Central Park Av	EB	111	351	91	369	**18**
	WB	240		278		
Stuart Rd	EB	260	759	285	798	**39**
	WB	499		513		
Mannamead Rd	NB	494	1239	523	1305	**66**
	SB	745		782		
Park Rd	EB	191	329	213	371	**42**
	WB	138		158		
Keyham Rd	NB	265	1176	274	1166	**-10**
	SB	911		892		
A38	EB	2169	4187	2224	4248	**61**
	WB	2018		2024		
Melville Rd	NB	206	525	207	574	**49**
	SB	319		367		
Hyde Park Rd	NB	566	1137	556	1163	**26**
	SB	571		607		
St Budeaux Bypass	NB	627	2180	643	2175	**-5**
	SB	1553		1532		

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Table 3.3 : Milehouse Junction Preliminary Scheme Evaluation – Traffic Flow Comparison PM Peak

PM Peak (17:00 - 18:00)						
Road		**Do-Nothing**		**Do-Something**		**Difference**
		Directional	Two-way	Directional	Two-way	
Outland Rd	NB	1759	2972	1673	2873	**-99**
	SB	1213		1200		
Alma Rd	NB	2053	3527	2000	3432	**-95**
	SB	1474		1432		
Milehouse Rd	EB	1016	1617	934	1504	**-113**
	WB	601		570		
Wolseley Rd	NB	1302	2175	1251	2056	**-119**
	SB	873		805		
Central Park Av	EB	201	465	211	479	**14**
	WB	264		268		
Stuart Rd	EB	274	540	295	562	**22**
	WB	266		267		
Mannamead Rd	NB	573	1391	589	1407	**16**
	SB	818		818		
Park Rd	EB	330	447	302	417	**-30**
	WB	117		115		
Keyham Rd	NB	718	1189	851	1326	**137**
	SB	471		475		
A38	EB	2466	4576	2532	4634	**58**
	WB	2110		2102		
Melville Rd	NB	493	710	417	649	**-61**
	SB	217		232		
Hyde Park Rd	NB	667	1070	740	1156	**86**
	SB	403		416		
St Budeaux Bypass	NB	1303	2063	1395	2163	**100**
	SB	760		768		

3.3 Journey Times

A summary of journey times for each single peak hour is shown in table 3.3.

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Table 3.4 : Milehouse Junction Preliminary Scheme Evaluation – Journey Time Results

AM Peak 08:00 to 09:00

JT Route	Base	Do-Nothing	Do-Something	Diff
A386 Manadon Rbt to North Cross	450	450	440	-10
A386 North Cross to Manadon Rbt	350	350	370	20
A3064 Milehouse Jct to Honicknowle Jct	360	360	360	0
A3064 Honicknowle Jct to Milehouse Jct	320	310	390	80
A38 Honicknowle Jct to Manadon Jct	140	140	140	0
A38 Manadon Jct to Honicknowle Jct	150	180	150	-30

PM Peak 17:00 to 18:00

JT Route	Base	Do-Nothing	Do-Something	Diff
A386 Manadon Rbt to North Cross	340	350	380	30
A386 North Cross to Manadon Rbt	470	450	460	10
A3064 Milehouse Jct to Honicknowle Jct	380	420	420	0
A3064 Honicknowle Jct to Milehouse Jct	577	621	624	2
A38 Honicknowle Jct to Manadon Jct	140	140	140	0
A38 Manadon Jct to Honicknowle Jct	160	160	160	0

Table 3.4 demonstrates the varying journey times on strategic links in the Do-Nothing and Do-Something models. It can be seen that the journey times are showing an overall increase in both the morning and evening peak hours. Although these increases may seem modest in some cases, when viewed against the significant reduction in traffic flows that accompanies them, the increases are put into context. What the model has done is to reflect what would happen in reality. Vehicles will, in all probability, reroute to equalise their journey times should the capacity of Milehouse junction be reduced.

4 SUMMARY AND CONCLUSIONS

4.1 Summary

The proposals for the Central Park AAP Preferred Option Report were tested using the Central Park S-Paramics model. Proposed development trips were added using TRICS trip rate estimates and the Milehouse Junction proposals were coded and optimised.

'Do-Nothing' and 'Do-Something' models were produced to represent 2016 traffic flows. These models included the same development traffic data and thus allowed a 'like-for-like' comparison between the existing Milehouse junction layout and the proposed scheme.

Additional tests were carried out to estimate the effects of proposed development at Derriford. These were preliminary tests only and provide an indication of overall network performance.

4.2 Conclusions

The results of this testing indicate that the overall network impact of the Do-Something scheme is negative. In general the average speeds in the Do-Something network are lower than the Do-Nothing and average journey times are higher.

A study of the link flow results shows that all approaches to the reconfigured Milehouse junction carry significantly less traffic in the peak hours, indicating that the layout is less efficient (from a traffic flow

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standpoint) than the current design. This decrease in capacity pushes traffic onto alternative routes, creating an increase in 'rat-running' to avoid the Milehouse area.

Although a localised increase in journey times could be considered acceptable, as long as public transport journey times showed a net gain, there are other factors to be considered. The A386 is an important link in the northern corridor approach to Plymouth City Centre. It currently plays a significant role in allowing access to the A38, Derriford and beyond. This role could potentially be given even greater importance should key scheme proposals in the northern corridor be given the go-ahead. Two major proposals are the development plans for Derriford and the Northern Corridor bus priority programme. Both of these proposals will in all likelihood require the strategic importance of the A386 to be reinforced as the preferred access route to the City Centre. This would give rise to a conflicting set of priorities in the Milehouse junction area as reducing capacity at this key intersection would probably hinder any strategic traffic management improvements, not only to general traffic flow but also to the public transport network.

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