Prospect Aquatic Investments Pty Ltd

Wet 'n' Wild Sydney

Supplementary Transport and Accessibility Impacts

REP01

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1 Introduction

Arup was commissioned by Prospect Aquatic Investments Pty Ltd (PAI) to undertake a Transport and Accessibility Impacts Assessment (Construction and Operational) for a proposed world class water theme park to be known as Wet 'n' Wild Sydney.

The project application is currently being assessed as a Major Project by the Director-General of the NSW Department of Planning under Part 3A of the Environmental Planning and Assessment Act. DGRs were issued on 20 December 2010 (MP09_0190).

The Environmental Assessment, including a Transport and Accessibility Impacts (Construction and Operational) report (referred to in this document as "Main Report"), was placed on public exhibition in February/March 2011. A number of submissions were received from various agencies, industry and the community.

This Supplementary Transport and Accessibility Impacts report has been prepared to respond to issues raised in these various submissions.

2 Forecast Trip and Traffic Generation

2.1 Attendance Scenarios

The attendance scenario data presented in Section 4.1 of the Main Report refers to total daily figures including special events such as live performances and dive-in movies.

2.2 Person Trip Generation

The person trip generation data presented in Section 4.2 of the Main Report remains unchanged and has been used for traffic modelling of a number of additional scenarios (refer Section 3).

2.3 Vehicular Traffic Generation

The vehicular traffic generation data presented in Section 4.3 of the Main Report remains unchanged with the exception of traffic distribution assumptions. Mode split and vehicle occupancy assumptions are based on surveys undertaken at Wet 'n' Wild Water World on the Gold Coast.

The RTA has requested that additional traffic modelling be undertaken to incorporate the proposed Reconciliation Road extension. The traffic distribution assumptions have been revised to model this extension for the forecast years of 2011 and 2021.

The development will attract visitors from all over the Greater Sydney Metropolitan region and therefore the Reconciliation Road extension will have only a minor impact on routes used by traffic generated by the development.

Most of the vehicular traffic would use the M4 to access the water theme park with only a small proportion coming from north of the M4 on Prospect Highway and Reservoir Road, and from the south on Reconciliation Road.

For the purposes of this assessment, it has been assumed that all traffic approaching from the M4 east of the Prospect Highway interchange would use this interchange to access the site. Similarly, all traffic approaching from the M4 west of the Reservoir Road interchange would use this interchange.

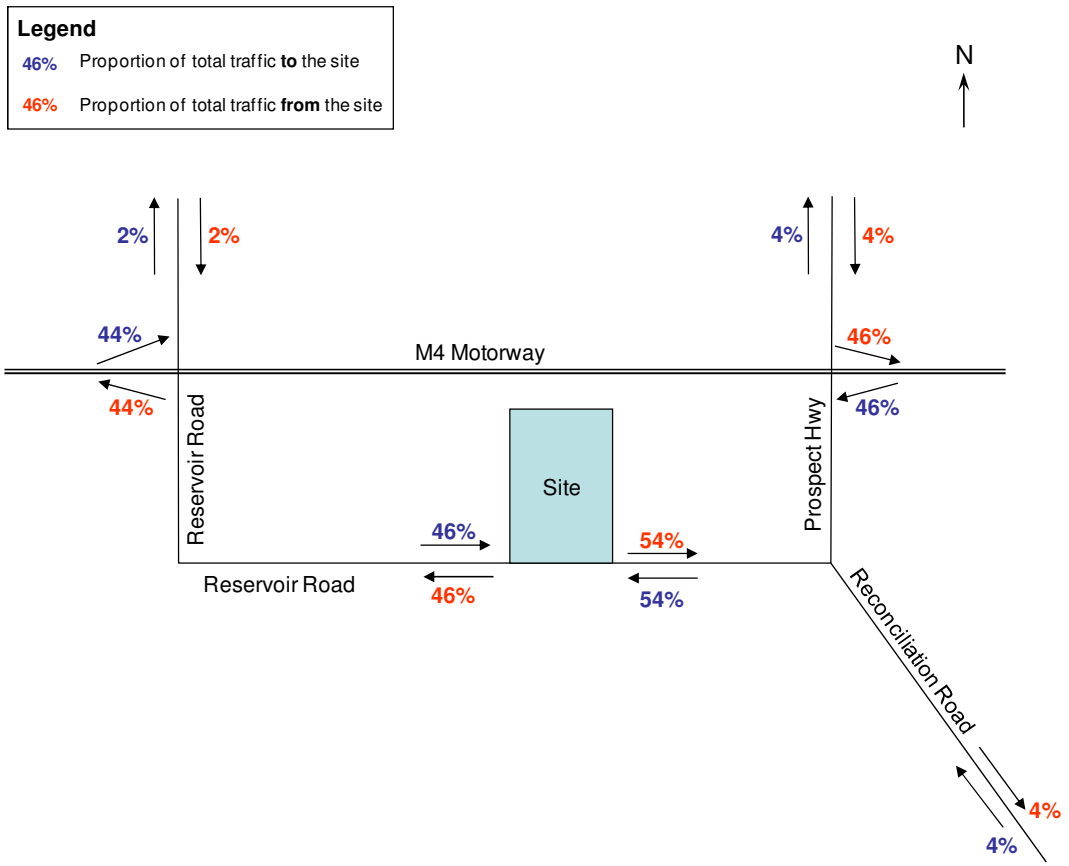
The traffic distribution used in the analysis is presented in Table 1 and Figure 1.

Table 1 Forecast Traffic Distribution

Region	Proportion of All Traffic	Proportion of All Traffic by Approach Route				
		M4 East	M4 West / M7	Prospect Hwy (north)	Reconciliation Road (south)	Reservoir Road (N of M4)
Sydney North	17.5%	13.5%	3.0%	1.0%	0.0%	0.0%
Sydney CBD / East	15.0%	15.0%	0.0%	0.0%	0.0%	0.0%
Sydney South	18.1%	0.0%	16.1%	0.0%	2.0%	0.0%
Sydney West*	11.6%	0.0%	10.6%	0.0%	0.0%	1.0%
Sydney Central*	37.8%	17.5%	14.3%	3.0%	2.0%	1.0%
Total	100%	46%	44%	4%	4%	2%

*Sydney West refers to an area generally west of the M7, Sydney Central includes Blacktown town centre

Figure 1 Traffic Distribution Diagram



3 Traffic Modelling

3.1 Traffic Modelling Scenarios

The RTA has requested that in addition to the modelling contained in the Main Report, the impact of the proposed Reconciliation Road extension is to be assessed.

The RTA has not requested that any additional intersections be modelled although Blacktown Council has requested that a number of other intersections be modelled. However, as stated in the Main Report, the forecast traffic increase as a result of the development through intersections north of the M4 would be relatively low, i.e. less than 25 vehicles per hour. This level of increase is well within the capacity of the key intersections north of the M4 and therefore these intersections have not been included in the modelling.

The peak activity time of the development itself has been used to assess the operation of the site access on Reservoir Road, i.e:

- Weekday AM Peak (9-10am)
- Weekday PM Peak (4-5pm)
- Weekend AM Peak (11am-12pm)

The peak activity time of the adjacent road network has been used to assess the operation of existing intersections, i.e:

- Weekday AM Peak (8-9am)
- Weekday PM Peak (4-5pm)
- Weekend AM Peak (11am-12pm)

The following three scenarios were modelled for the three time periods:

A. 2011 Base
B. 2011 Base + site development traffic (including Reconciliation Road extension)
C. 2021 Base + site development traffic + background traffic growth (including Reconciliation Road extension)

The above modelled time periods and scenarios have been agreed with RTA.

3.2 Future Traffic Flows

3.2.1 Site Development Traffic

The forecast site development traffic is unchanged from the Main Report. The assessment of the site access is based on the “Peak” operational period whilst the “Shoulder” period is used for the other intersections (refer to Tables 6 and 7 of Main Report).

3.2.2 Background Traffic Growth

Model plots of the RTA's strategic EMME model, for the years 2011 and 2021 and including the Reconciliation Road extension, were supplied by RTA. These plots give an indication of possible future changes to peak hour demand (7-9am and 4-6pm) on the main road network.

On the basis of the RTA's model the following background growth rates were assumed:

- On opening of the Reconciliation Road extension, a fourfold increase in traffic on Reconciliation Road in the peak direction (SB in AM peak and NB in PM peak) and twofold increase in the non-peak direction. South of the M4, approximately 85% of this traffic is forecast to use the Prospect Highway and the remaining 15% Reservoir Road.
- For the period 2011 to 2021, a uniform 2% per annum growth rate on all roads within the traffic model area.

These background growth rate values are independent of traffic generated by the proposed development. The modelling assumes full development of the site in 2011 and therefore site-generated traffic volumes for 2021 are the same as for 2011.

3.2.3 Forecast Future Traffic Flows

The forecast "Peak" turning movement flows at the proposed site access on Reservoir Road are shown in Table 2.

Table 2 Forecast Future Traffic Flows – Site Access ("Peak")

Movement		WD-AM (09:00 - 10:00)		WD-PM (16:00 - 17:00)		WE-AM (11:00 - 12:00)	
		B. 2011 Site Devel.	C. 2021 Site Devel.	B. 2011 Site Devel.	C. 2021 Site Devel.	B. 2011 Site Devel.	C. 2021 Site Devel.
Site Access N	L	40	40	212	212	83	83
	R	34	34	181	181	71	71
Reservoir Rd E	T	37	44	412	494	150	180
	R	159	159	53	53	331	331
Reservoir Rd W	L	136	136	45	45	282	282
	T	211	253	86	103	105	126
Total		**617**	**667**	**989**	**1,089**	**1,022**	**1,073**

The forecast turning movement flows through the key intersections/interchanges in the vicinity of the site are summarised in Table 3.

Table 3 Forecast Future Traffic Flows – Existing Intersections ("Shoulder")

Intersection / Movement		WD-AM (08:00 - 09:00)			WD-PM (16:00 - 17:00)			WE-AM (11:00 - 12:00)		
		A. 2011 Base	B. 2011 Site Devel.	C. 2021 Site Devel.	A. 2011 Base	B. 2011 Site Devel.	C. 2021 Site Devel.	A. 2011 Base	B. 2011 Site Devel.	C. 2021 Site Devel.
Prospect Hwy / M4 Northern Roundabout										
Prospect Hwy N	L	522	522	626	604	604	725	261	261	313
	T	817	819	982	881	884	1060	408	430	512
Prospect Hwy S	T	794	795	953	1,006	1016	1217	397	402	482
	R	203	211	251	286	406	463	102	164	185
M4 EB Off-ramp W	L	726	726	871	400	400	480	363	363	436
	R	42	42	50	27	27	32	21	21	25
Total		**3,104**	**3,114**	**3,735**	**3,203**	**3,337**	**3,977**	**1,552**	**1,642**	**1,952**
Prospect Hwy / M4 Southern Roundabout										
Prospect Hwy N	T	396	399	478	137	139	166	198	220	259
	R	618	618	742	848	848	1018	309	309	371
M4 WB Off-ramp E	L	347	377	447	141	171	199	174	424	459
	R	635	635	762	757	757	908	318	318	381
Prospect Hwy S	L	23	23	28	45	45	54	12	12	14
	T	362	370	443	534	665	772	181	249	285
Total		**2,381**	**2,422**	**2,898**	**2,461**	**2,625**	**3,117**	**1,191**	**1,531**	**1,769**
Reservoir Rd / M4 Northern Intersection										
Reservoir Rd N	L	476	476	571	710	710	852	238	238	286
	T	405	406	487	762	763	916	203	213	254
Reservoir Rd S	T	602	602	723	761	766	918	301	304	364
M4 EB Off-ramp W	L	571	571	685	336	336	403	286	286	343
	R	236	265	312	35	64	71	118	358	382
Total		**2,290**	**2,320**	**2,778**	**2,604**	**2,639**	**3,160**	**1,145**	**1,399**	**1,628**
Reservoir Rd / M4 Southern Intersection										
Reservoir Rd N	L	332	332	398	750	750	900	166	166	199
	T	309	339	401	47	77	87	154.5	405	436
M4 WB Off-ramp E	L	22	22	26	5	5	6	11	11	13
	R	567	567	680	640	640	768	283.5	284	340
Reservoir Rd S	T	89	89	107	238	243	291	45	47	56
	R	2	9	10	85	200	217	1	61	61
Total		**1,321**	**1,359**	**1,623**	**1,765**	**1,916**	**2,269**	**661**	**974**	**1,106**
Prospect Hwy / Reservoir Rd / Reconciliation Rd										
Prospect Hwy N	L	4	4	5	6	6	7	2	2	2
	T	684	684	821	252	252	302	342	342	410
	R	62	95	107	31	64	70	31	304	310
Reservoir Rd E	L	1	1	1	1	1	1	1	1	1
	T	0	0	0	7	7	8	0	0	0
	R	3	3	4	6	6	7	2	2	2
Reconciliation Rd S	L	72	75	89	234	237	283	36	58	65
	T	296	296	355	482	482	578	148	148	178
	R	4	4	5	2	2	2	2	2	2
Reservoir Rd W	L	69	77	91	65	196	209	35	103	110
	T	8	8	10	7	7	8	4	4	5
	R	240	241	289	18	28	32	120	125	149
Total		**1,443**	**1,487**	**1,776**	**1,111**	**1,288**	**1,510**	**722**	**1,090**	**1,234**

3.3 Intersection Modelling

Sidra, a computer program, was used to assess the operational performance of intersections which may be either signal, roundabout or priority controlled.

Figure 1 shows that 90% of site-generated traffic is forecast to use the M4 Motorway to access the site, from either the east or west. The following intersections were therefore excluded from the Sidra modelling because site-generated traffic would be relatively low (i.e. less than 25 vehicles per hour):

- Great Western Highway and Reservoir Road
- Great Western Highway and Prospect Highway
- Prospect Highway and Ponds Road

Results of the Sidra analysis are summarised in Table 4 and Table 5. An electronic copy of the Sidra files have been provided to RTA and Blacktown Council.

Table 4 Results of Sidra Intersection Analysis - Site Access ("Peak")

Intersection	Control	WD/WE	Scenario	Sidra Result		
				DS	AVD (s)	LOS
Reservoir Road / Site Access	Signals	WD-AM (9-10AM)	2011: Base + development	0.28	13.4	A
			2021: Base + development + background	0.30	13.2	A
		WD-PM (4-5 PM)	2011: Base + development	0.43	16.2	B
			2021: Base + development + background	0.49	15.8	B
		WE-AM (11AM-12PM)	2011: Base + development	0.63	16.5	B
			2021: Base + development + background	0.64	16.2	B

Notes:
- Terminology: DS – Degree of Saturation, AVD – Average Vehicle Delay, LOS – Level of Service
- LOS for signals and roundabouts is based on average overall delay, and based on highest movement delay for priority intersections.

The results of the analysis show that:

- The site access intersection is forecast to perform at an acceptable LOS for all modelled "Peak" time periods.
- All intersections are forecast to perform at an acceptable LOS for the Weekday AM Peak and Weekend AM Peak.
- All intersections are forecast to perform at an acceptable LOS for the Weekday PM Peak with the exception of both roundabouts of the M4 / Prospect Highway Interchange and the southern intersection of the M4 / Reservoir Road interchange.

These results are discussed in more detail in Section 4.1.

Table 5 Results of Sidra Intersection Analysis - Existing Intersections ("Shoulder")

Intersection	Control	WD/WE	Scenario	Sidra Result		
				DS	AVD (s)	LOS
Prospect Hwy / M4 Eastbound Ramps (northern roundabout)	Roundabout	WD-AM	WD-AM - 2011: Exisiting	0.83	9	A
			WD-AM - 2011: Base	0.99	18	B
			WD-AM - 2011: Base + Development	0.99	18	B
			WD-AM - 2021: Base + Development + Background	1.22	100	F
		WD-PM	WD-PM - 2011: Exisiting	1.00	19	B
			WD-PM - 2011: Base	1.15	77	F
			WD-PM - 2011: Base + Development	1.25	114	F
			WD-PM - 2021: Base + Development + Background	1.55	236	F
		WE-AM	WE-AM - 2011: Exisiting	0.42	8	A
			WE-AM - 2011: Base	0.49	8	A
			WE-AM - 2011: Base + Development	0.55	8	A
			WE-AM - 2021: Base + Development + Background	0.60	9	A
Prospect Hwy / M4 Westbound Ramps (southern roundabout)	Roundabout	WD-AM	WD-AM - 2011: Exisiting	0.44	13	A
			WD-AM - 2011: Base	0.68	15	B
			WD-AM - 2011: Base + Development	0.70	15	B
			WD-AM - 2021: Base + Development + Background	1.12	42	C
		WD-PM	WD-PM - 2011: Exisiting	0.82	21	B
			WD-PM - 2011: Base	1.38	103	F
			WD-PM - 2011: Base + Development	1.66	182	F
			WD-PM - 2021: Base + Development + Background	3.32	579	F
		WE-AM	WE-AM - 2011: Exisiting	0.18	11	A
			WE-AM - 2011: Base	0.22	11	A
			WE-AM - 2011: Base + Development	0.35	10	A
			WE-AM - 2021: Base + Development + Background	0.40	11	A
Reservoir Road / M4 Eastbound Ramps (northern intersection)	Stop	WD-AM	WD-AM - 2011: Exisiting	0.32	5	A
			WD-AM - 2011: Base	0.54	7	A
			WD-AM - 2011: Base + Development	0.60	7	A
			WD-AM - 2021: Base + Development + Background	0.85	9	A
		WD-PM	WD-PM - 2011: Exisiting	0.41	3	A
			WD-PM - 2011: Base	0.41	3	A
			WD-PM - 2011: Base + Development	0.40	3	A
			WD-PM - 2021: Base + Development + Background	0.66	4	A
		WE-AM	WE-AM - 2011: Exisiting	0.16	5	A
			WE-AM - 2011: Base	0.18	5	A
			WE-AM - 2011: Base + Development	0.55	8	A
			WE-AM - 2021: Base + Development + Background	0.66	9	A
Reservoir Road / M4 Westbound Ramps (southern intersection)	Give Way	WD-AM	WD-AM - 2011: Exisiting	0.75	12	B
			WD-AM - 2011: Base	0.92	18	C
			WD-AM - 2011: Base + Development	0.96	22	C
			WD-AM - 2021: Base + Development + Background	1.34	149	F
		WD-PM	WD-PM - 2011: Exisiting	1.09	49	F
			WD-PM - 2011: Base	1.28	106	F
			WD-PM - 2011: Base + Development	1.57	185	F
			WD-PM - 2021: Base + Development + Background	2.33	421	F
		WE-AM	WE-AM - 2011: Exisiting	0.30	9	A
			WE-AM - 2011: Base	0.33	9	A
			WE-AM - 2011: Base + Development	0.48	10	B
			WE-AM - 2021: Base + Development + Background	0.62	11	B
Prospect Hwy / Reservoir Road / Reconciliation Road	Roundabout	WD-AM	WD-AM - 2011: Exisiting	0.32	8	A
			WD-AM - 2011: Base	0.66	9	A
			WD-AM - 2011: Base + Development	0.69	9	A
			WD-AM - 2021: Base + Development + Background	0.87	13	A
		WD-PM	WD-PM - 2011: Exisiting	0.25	7	A
			WD-PM - 2011: Base	0.48	7	A
			WD-PM - 2011: Base + Development	0.49	7	A
			WD-PM - 2021: Base + Development + Background	0.59	7	A
		WE-AM	WE-AM - 2011: Exisiting	0.14	7	A
			WE-AM - 2011: Base	0.28	7	A
			WE-AM - 2011: Base + Development	0.47	9	A
			WE-AM - 2021: Base + Development + Background	0.54	9	A

4 Transport and Accessibility Impacts

4.1 Traffic Generation and Traffic Impact

The forecast trip and traffic generation was described in Section 2, the traffic modelling in Section 3 and the traffic impacts are discussed below.

4.1.1 M4 on and off ramps/intersections to Prospect Highway

The M4 / Prospect Highway interchange is currently performing at an acceptable level of service, although at a high degree of saturation, at all times except for the weekday PM peak. The main impact of the Reconciliation Road extension, based on the RTA's forecast traffic volumes, will be a significant deterioration in the PM peak performance.

The current configuration of the M4 / Prospect Highway interchange limits the increase in traffic flow that can be accommodated as shown by the results in Table 5.

Various short-term measures have been investigated to increase capacity at this location, such as part-time traffic signals on key movements. Full signalisation of the two roundabouts, in addition to widening of the bridge, is one possible solution to address current capacity constraints. The benefits of signalisation would be:

- signals generally have higher capacity than roundabouts
- ability to provide signal coordination between the northern and southern intersections
- ability to overcome existing situation where two dominant right turn flows exist at the southern intersection

Other possible options involving changes to the existing on and off-ramp arrangements may also be appropriate design solutions.

Improvements to the M4 / Prospect Highway interchange are already warranted as a result of current traffic volumes. The Reconciliation Road extension, resulting in additional traffic, will be operational before the development is completed. Site-generated traffic will increase traffic at this location increasing the need for capacity improvements.

4.1.2 M4 on and off ramps/intersections to Reservoir Road

The M4 / Reservoir Road interchange is currently performing at a good level of service in the AM peak. However, in the PM peak, significant queues form on the westbound off-ramp due to capacity constraints on the give way controlled right turn. The Reconciliation Road extension will not result in a significant change in performance.

The scenario analysis confirmed that the northern priority-controlled intersection will continue to perform at a good level of service for the modelled time periods in 2021. Therefore, capacity improvements are not required at this location

although could be considered in conjunction with improvements to the southern intersection.

The southern priority-controlled intersection will continue to experience capacity constraints on the westbound off-ramp. The safety and operational performance of the interchange could be improved by:

- Conversion of both the southern and northern Reservoir Road intersections from priority control to traffic signal control;
- New ramp connection to the eastbound M4 on-ramp to permit a right turn from Reservoir Road south to M4 eastbound; and
- Accommodation of right turn lanes in areas currently marked with chevron markings.

Improvements to the southern intersection of the M4 / Reservoir Road interchange are already warranted as a result of current traffic volumes and the intersection configuration.

4.1.3 Prospect Highway / Reservoir Road / Reconciliation Road Intersection

The Prospect Highway / Reservoir Road / Reconciliation Road intersection is currently performing at a good level of service at all times. The roundabout has considerable spare capacity to accommodate additional traffic.

The scenario analysis confirmed that the intersection will continue to perform at a good level of service for the modelled time periods in 2021, including as a result of the Reconciliation Road extension, and therefore no capacity improvements are required at this location.

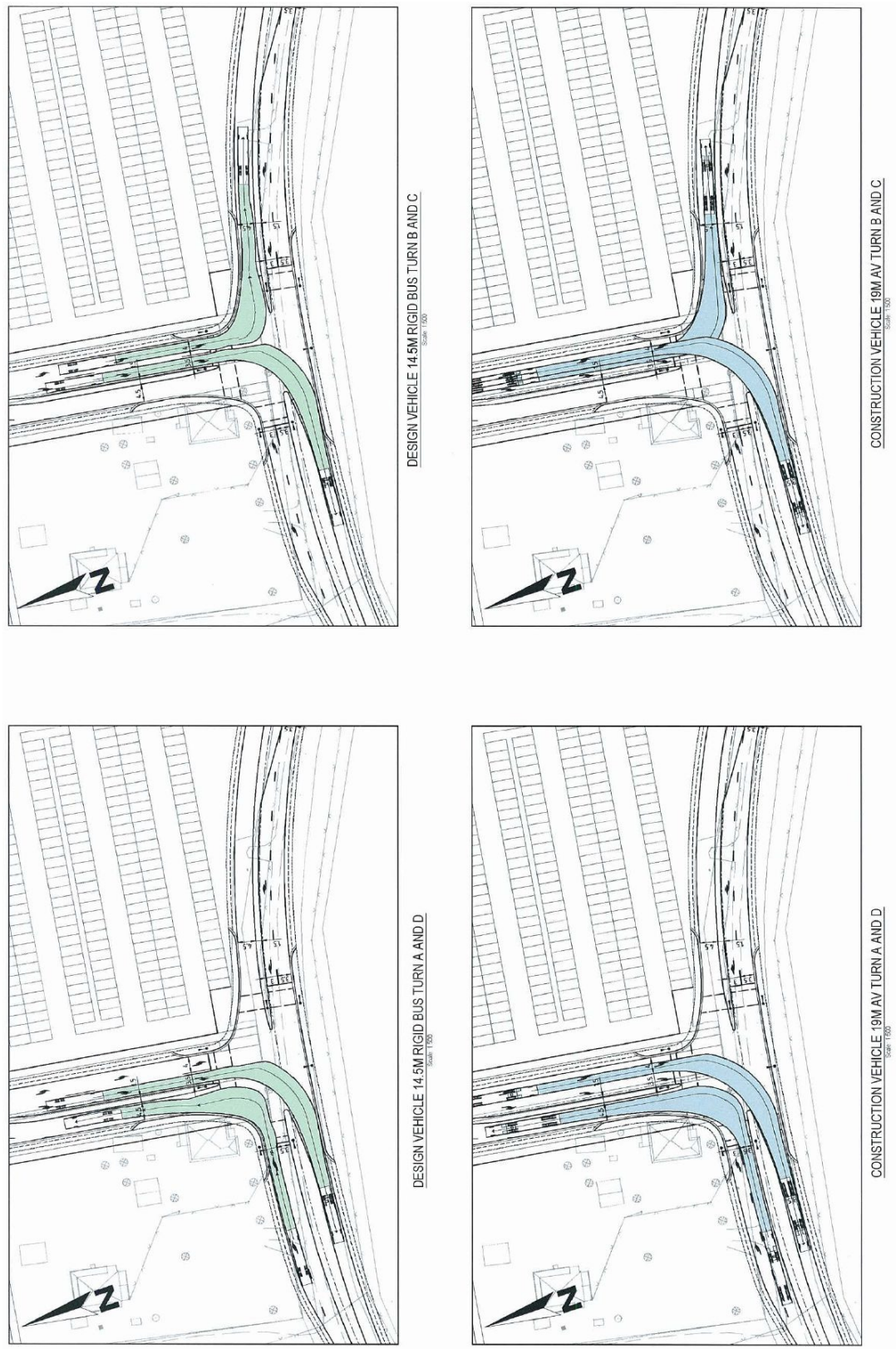
4.2 Proposed Access

The proposed Reservoir Road / Site Access signalised intersection, with pedestrian crossings on all approaches, is forecast to perform at a good level of service at all times. Therefore, an additional left turn exit only access on Reservoir Road east of the proposed traffic control signals is not warranted.

Turn paths for a 14.5m coach at the proposed site access intersection on Reservoir Road were included as Appendix V_Building_Design_Drawings 45 of the Environmental Assessment and are reproduced as Figure 2.

The need for bus bays on Reservoir Road on both departure sides of the proposed intersection will be discussed with the local bus operator and Transport NSW at detail design stage.

Figure 2 14.5m Coach Turn Paths



4.3 On-site Car Parking

A staff parking and service vehicle area will be provided adjacent to the administration building. The parking area will be accessed from Watch House Road (refer to item 49 on Overall site Plan). It will have approximately 47 parking spaces to be shared between service vehicles and staff vehicles.

4.4 Service Vehicle Movements

Service vehicle traffic generated by the development will be due to a range of uses including deliveries, catering, waste and maintenance. Service vehicle access to the development will be from Watch House Road.

On the basis of the operation of Wet 'n' Wild Gold Coast, it is estimated that number of service vehicle movements will typically be no more than10 vehicles per hour. Most service traffic will be scheduled to occur outside peak arrival/departure times for visitors, and outside peak periods on the surrounding road network.

4.5 Promotion of Non-car Travel Modes

The Main Report listed a number of measures that will be considered, to be provided by either proponent, tourist operators or government to promote non-car travel modes to the development.

The proposed Reservoir Road / Site Access signalised intersection (refer to Section 4.2) will have pedestrian crossings on all approaches. This will enable pedestrians and cyclists to safely cross Reservoir Road in the vicinity of the site.

The proponent, as part of the terms of the lease agreement for the site, has negotiated an upfront payment with RTA, via NSW Treasury, for road network improvements. This payment may include funding for pedestrian and cyclist facilities such as a shared path along Reservoir Road.

Blacktown Development Control Plan 2006 does not give guidance on bike parking and therefore the most appropriate reference document is the *Planning Guidelines for Walking and Cycling* (NSW Government, 2004). It recommends that for a theme park, bike parking should be provided for 3-5% of total staff numbers and 3-5% of daily visitor capacity. This equates to 9-15 bike parking spaces for staff and 150-250 spaces for visitors on a typical busy day of 5,000 visitors.

A class 2 (high security) bike parking area for staff, accommodating up to 20 bikes, will be provided near the administration building with access from Watch House Road.

A class 3 (high to medium security) bike parking area for visitors, accommodating up to 200 bikes, will be provided in a highly visible location near the main entry plaza with access from the signalised intersection on Reservoir Road.

4.6 Transport Management Plan

An Operational Transport and Traffic Management Plan will be prepared once planning approval for the project has been granted. It will be prepared in

consultation with Transport NSW detailing how the need for seasonal shuttle bus services and overflow parking will be determined to suit variations in demand.

It may be possible to accommodate overflow parking on land adjacent to the site subject to consultation with Western Sydney Parklands Trust. Overflow parking is unlikely to be required for some time until the ramp-up patronage period has occurred.

Blacktown Council has raised the issue of special events at Eastern Creek Raceway. It is highly unlikely that major events at Eastern Creek would coincide with peak Wet N Wild days. The former have historically been held outside the Christmas holiday period which will be the peak period for Wet N Wild. If, however, major events are scheduled to occur simultaneously in the area these will be addressed in the Operational Transport and Traffic Management Plan in consultation with Transport NSW.