

**PROPOSED REZONING FOR
BULKY GOODS DEVELOPMENT
GREAT WESTERN HIGHWAY,
HUNTINGWOOD**

***Assessment of Traffic and
Parking Implications***

February 2012
(C Issue)

Reference 11058

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1. INTRODUCTION

This report has been prepared to accompany an Application to Blacktown City Council for the proposed rezoning of a site at Huntingwood to permit development of a Bunnings 'Warehouse' with frontages to Great Western Highway and Reservoir Road (Figure 1).

The development site is located within the Huntingwood East precinct which is defined in SEPP (WS EA 2009) as land suitable for employment related development. The area has ready access to the arterial road system and is strategically located in relation to the needs of the developing Western Metropolitan Area.

The Huntingwood East Precinct occupies an area of some 83.5 ha with some 42 ha nett developable area and is divided into 3 zones (ie Eastern, Central and Western) and the subject site is located in the north western corner of the Central Zone.

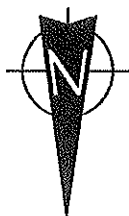
Planning assessments have been prepared and applications submitted and negotiated with RMS (previously RTA) and Blacktown Council. In particular there has been detailed traffic modelling undertaken and agreements reached in relation to:

- * dedication of land for road requirements
- * detailed road improvement requirements
- * contributions to regional transport infrastructure and services

Subject to the proposed rezoning the envisaged Bunnings development would comprise:

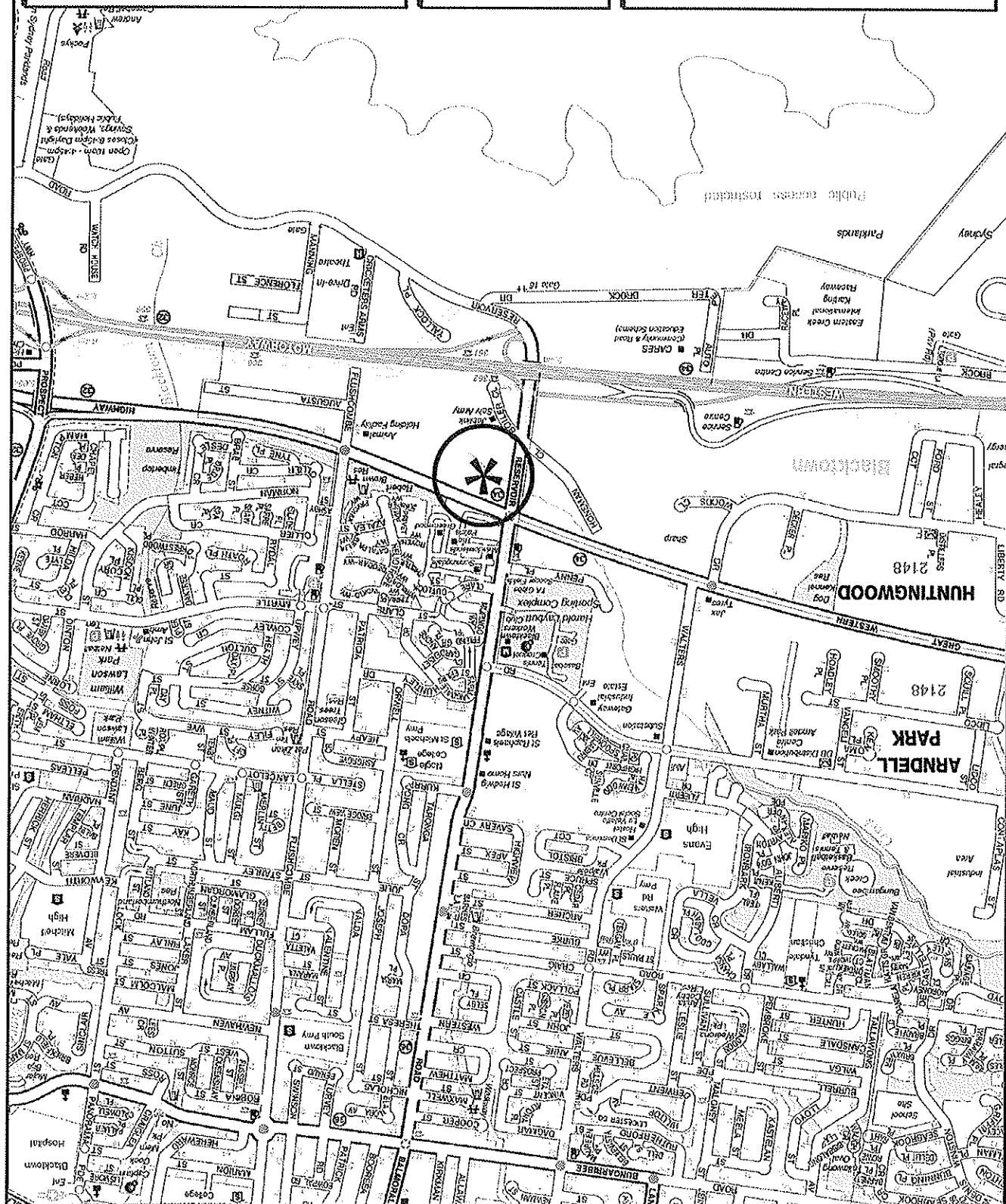
Warehouse	8,885m ²
Trade Area	3,160m ²
Nursery	2,640m ²
Total	14,685m²

LEGEND



LOCATION

FIG 1



The purpose of this report is to:

- * describe the site, its context and the envisaged development
- * describe the road network serving the site and traffic conditions
- * describe the precinct planning and the future road/traffic circumstances
- * assess the proposed vehicles access arrangements
- * assess the potential traffic implications of the development
- * assess the envisaged parking, internal circulation and servicing arrangements.

2. DEVELOPMENT SCHEME

2.1 SITE AND CONTEXT

The site (Figure 2) is a generally rectangular shaped area of some 39,353m² with a frontage to the southern side of Great Western Highway and the eastern side of Reservoir Road at Huntingwood.

The site, which falls away to the west towards Reservoir Road, comprises essentially undeveloped agricultural land.

The nearby uses comprise:

- * the residential development along the northern side of Great Western Highway including townhouse complexes
- * the existing Huntingwood Industrial Estate to the west
- * the parkland/bushland along the northern side of Prospect Reservoir to the south.

2.2 PRECINCT PLANNING

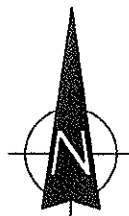
The Huntingwood East Precinct is an area defined in the SEPP as land suitable for release for employment related development. The precinct is bounded by the Great Western Highway to the north, the M4 Motorway to the south, Prospect Highway to the east and the former M5 connection corridor to the west. Details of the Precinct and the 3 designated zones are provided in Appendix A being extracts for a study undertaken by Traffix.

A number of traffic modelling assessments have been undertaken and agreements reached with RMS and Council in relation to:

- * dedication of land for future road purposes including a wide strip along Reservoir Road



LEGEND



SITE

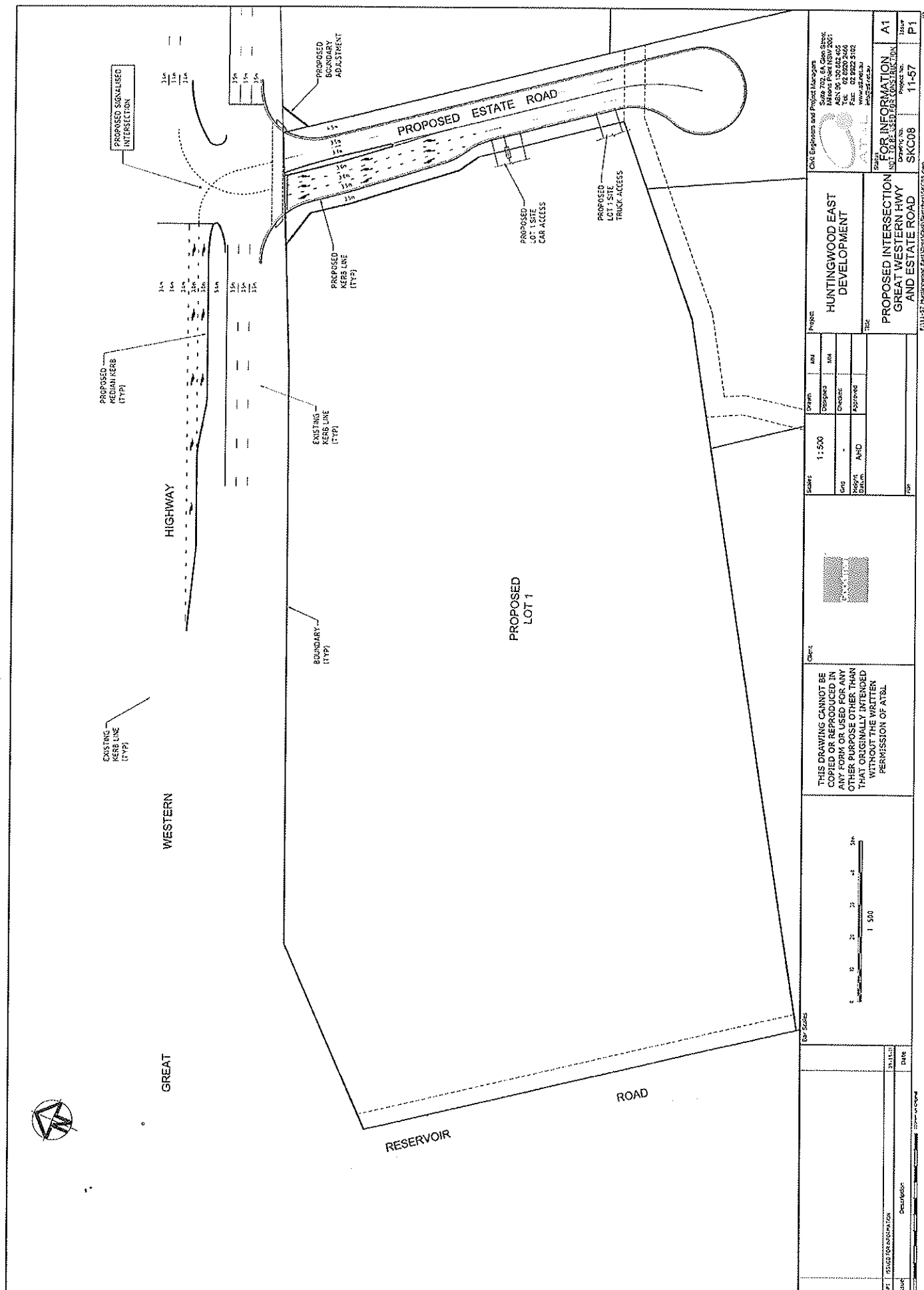
FIG 2

- * contributions towards regional transport infrastructure and services
- * detailed road improvements to be undertaken to facilitate the traffic movements generated by development of the site

In particular agreement has been reached regarding a new access roadway to serve the Central Precinct with a traffic signal controlled intersection on Great Western Highway to the east of Reservoir Road. The projected traffic generation of the envisaged Bunnings development (as provided by TTPA) was incorporated into recent Linsig traffic modelling undertaken by Traffix for submission to RMS.

The traffic modelling outcome for the 2021 AM and PM peak periods is summarised in the results reproduced from Traffix in Appendix B and the road improvement works incorporated in the modelling comprised:

- * provision of the new signal controlled access intersection for the Central precinct with 2 lanes for the right turn out of the Highway. Details of the proposed access intersection are provided on the diagram overleaf
- * construction of an additional 150m right turn lane for the turn from Great Western Highway into Reservoir Road
- * lengthening of the existing left turn lane eastbound on the Great Western Highway to Reservoir Road to 190m
- * construction of an additional 140m right turn lane for the turn from Reservoir Road east into the Highway
- * construction of a 150m left turn lane for the turn from Reservoir Road west into the Highway
- * construction of a 25m left turn slip lane from Reservoir Road for the turn east into the Highway
- * changed lane allocations in Flushcombe Road with extension of the 'auxiliary' lane to 170m



The RMS have accepted that the Linsig modelling undertaken (including the projected Bunnings traffic generation) presents acceptable operational outcomes.

2.3 ENVISAGED DEVELOPMENT

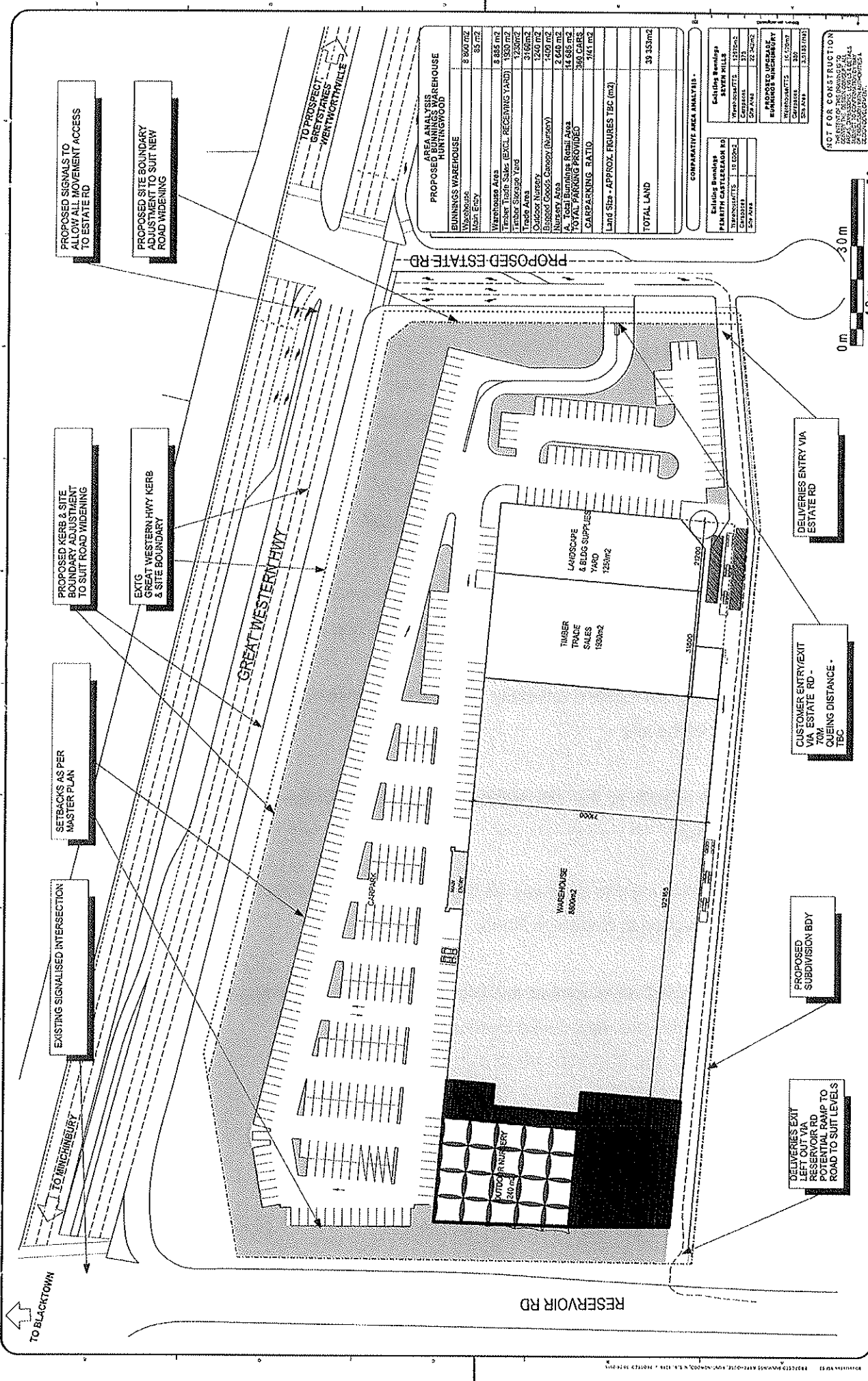
The development scheme would involve some cut and fill excavation to provide for level building and hardstand areas. The envisaged Bunnings warehouse building will occupy the southern part of the site with:

Warehouse	-	8,885m ²
Timber Trade	-	3,160m ²
Nursery	-	2,640m ²
Total Retail	-	14,685m ²

A total of some 360 parking spaces would be provided in an at grade carpark along the northern part of the site with vehicle access arrangements comprising:

- * a combined ingress/egress driveway on a new access road running along the eastern side of the site
- * traffic control signals at the intersection of the Great Western Highway and the new access road
- * a delivery vehicle ingress driveway on the new access road and egress by a left-turn only connection to Reservoir Road.

Details of the envisaged development are provided on the plans prepared by John R Brogan Architects which are reproduced overleaf.



AREA ANALYSIS	
PROPOSED BUNTINGS WAREHOUSE	
Warehouse	8 000 m ²
Timber Trade Sales Yard	1 500 m ²
Landscape & Bldg Supplies Yard	1 250 m ²
Outdoor Nursery	2 400 m ²
Car Park	316 m ²
Trade Area	1 400 m ²
Biggest Goods Display (Nursery)	1 400 m ²
Nursery Area	2 400 m ²
A. Total Building Retail Area	14 550 m ²
TOTAL PARKING PROVIDED	360 CARS
CARPARKING RATIO	7/11 m ²
Land Size - APPROX. FIGURES TBC (m ²)	
TOTAL LAND	39 353 m ²

COMPARATIVE AREA ANALYSIS	
Existing Buildings	
PERKINS CASTLEMEAD RD	1 100 m ²
Warehouse	1 100 m ²
Car Park	173
Site Area	22 340 m ²
PROPOSED UPGRADE	
WAREHOUSE	8 000 m ²
Car Park	360
Site Area	23 135 m ²

NOT FOR CONSTRUCTION
DO NOT CONSTRUCT OR
OCCUPY ANY PART OF THE
SITE OR ANY OF THE BUILDINGS
OR LANDS SHOWN ON THIS PLAN
UNLESS YOU HAVE BEEN ADVISED
IN WRITING BY THE AUTHOR

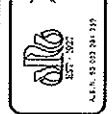
0 m 10 m 30 m 50 m

PROJ. NO.
2209
SCALE
1:500
DATE
APR 11

PROPOSED BUNTINGS WAREHOUSE
CNR GREAT WESTERN HWY & RESERVOIR RD
HUNTINGWOOD NSW 2148
CONCEPT SITE PLAN D



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CLIENT
Buntings Warehouse

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This plan is for the proposed site shown on the plan and is not to be used
for any other purpose without the written consent of the author.
Approved by the author and the author's professional indemnity insurer.
By the author and the author's professional indemnity insurer.
By the author and the author's professional indemnity insurer.
By the author and the author's professional indemnity insurer.

NO.	REVISION	DATE	BY	CHKD.
1	ISSUED FOR TENDERS	11/04/11	JRB	JRB
2	REVISED TO REFLECT COMMENTS	12/04/11	JRB	JRB
3	REVISED TO REFLECT COMMENTS	13/04/11	JRB	JRB
4	REVISED TO REFLECT COMMENTS	14/04/11	JRB	JRB
5	REVISED TO REFLECT COMMENTS	15/04/11	JRB	JRB
6	REVISED TO REFLECT COMMENTS	16/04/11	JRB	JRB
7	REVISED TO REFLECT COMMENTS	17/04/11	JRB	JRB
8	REVISED TO REFLECT COMMENTS	18/04/11	JRB	JRB
9	REVISED TO REFLECT COMMENTS	19/04/11	JRB	JRB
10	REVISED TO REFLECT COMMENTS	20/04/11	JRB	JRB

3. ROAD NETWORK AND TRAFFIC CONTROLS

3.1 ROAD NETWORK

The road network serving the site (Figure 3) comprises:

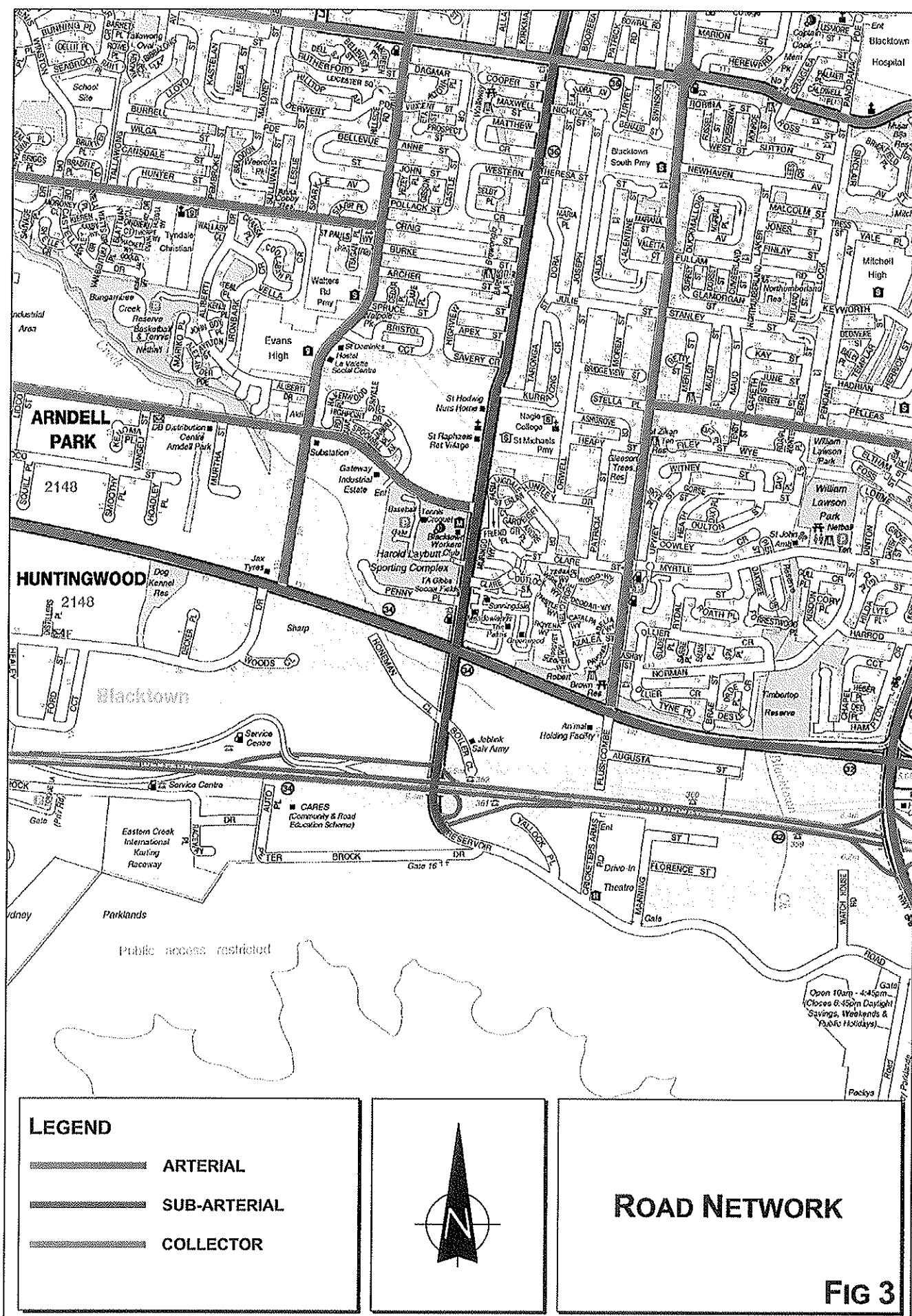
- * the *Great Western Highway and the M4 Motorway* linking between Sydney and Penrith
- * *Reservoir Road* – a State Road and sub-arterial route linking between the Great Western Highway and Blacktown
- * *Flushcombe Road* – a Regional Road and major collector road also linking between Great Western Highway and Blacktown CBD
- * *Walters Road and Holbeche Road* – local collector roads serving the Arndell Park area.

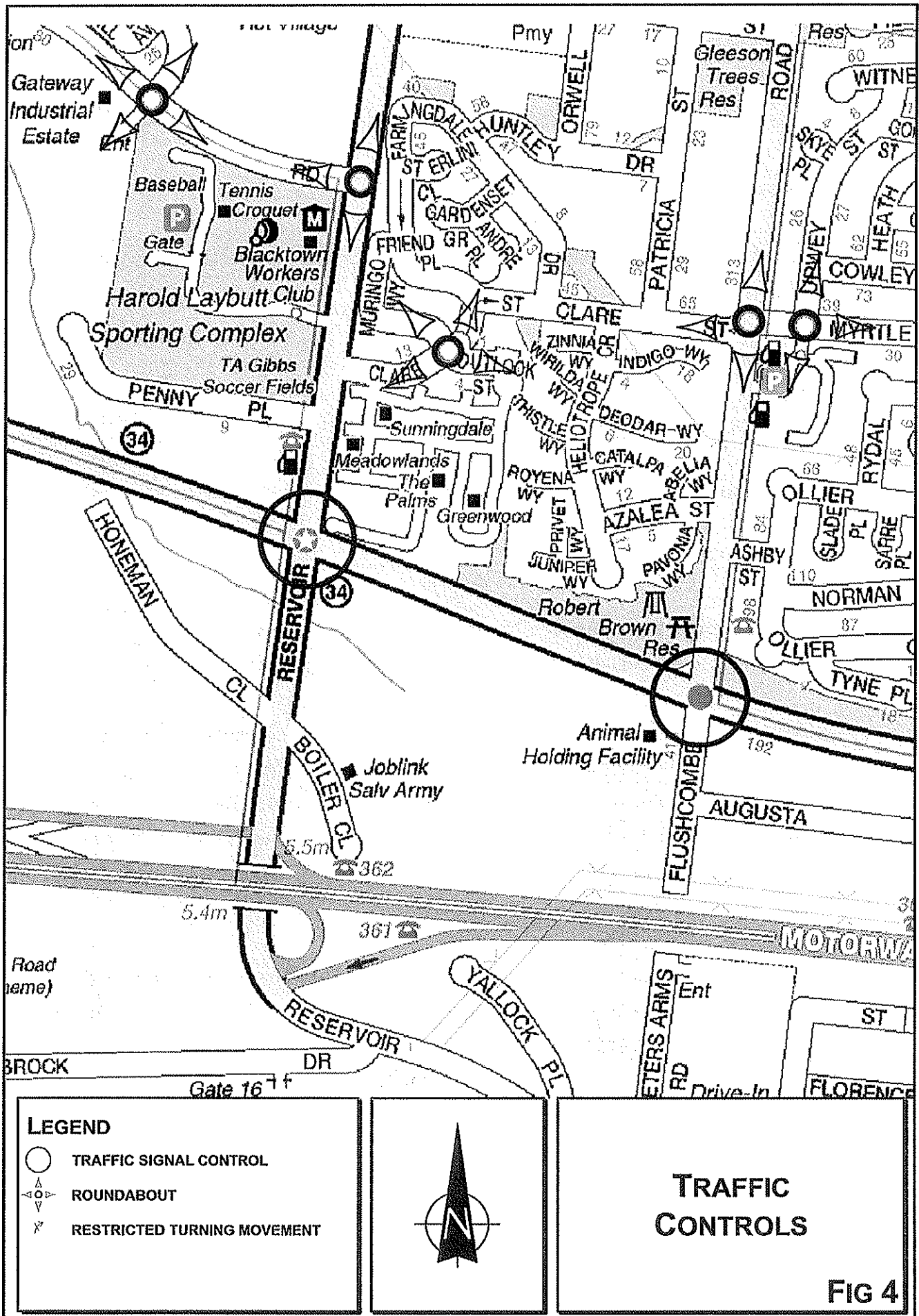
The Great Western Highway and Reservoir Road are both relatively straight with central median islands and there is an existing deceleration lane along the site frontage for the turn into Reservoir Road.

3.2 TRAFFIC CONTROLS

The existing traffic controls in the vicinity of the site (Figure 4) comprise:

- * the traffic signals at the Great Western Highway and Reservoir Road intersection
- * the B Double routes along the Great Western Highway, the M4 Motorway and Reservoir Road
- * the traffic signals on the Great Western Highway at the Huntingwood Drive and Flushcombe Road intersections





- * the central median islands along Great Western Highway and Reservoir Road
- * the 60 kmph speed restriction on Reservoir Road
- * the NO STOPPING restrictions along both sides of Great Western Highway and Reservoir Road.

3.3 TRAFFIC CONDITIONS

An indication of the prevailing traffic conditions on the road system serving the site is provided by data published by the RMS and other surveys. This data is expressed in terms of Annual Average Daily Traffic (AADT) and the most recently recorded volumes indicate:

	AADT
Great Western Highway east of Reservoir Road	32,563
Reservoir Road north of Holbeche Road	23,409

An extract from the RMS Traffic Volume publication is provided overleaf for a 7 day/24 hour recording on the Great Western Highway at Huntingwood. The results indicate that the peak directional flows on the Highway (ie eastbound AM and Westbound PM are some 2000-2100 vph whereas the peak flows on the weekend (midday) are only some 50% of the weekday peaks. Similar traffic flow characteristics also prevail on the M4 Freeway at Huntingwood.

Traffic surveys have been undertaken at a number of intersections during the morning peak period and the results of these surveys are provided on the diagram reproduced from the Traffix Report in Figure 5.

3.4 PUBLIC TRANSPORT SERVICES

The only public service available in the area is the Route 722 and 724 Busways services along Reservoir Road which connect to Blacktown Railway Station.

3.5 FUTURE CIRCUMSTANCES

The future circumstances in terms of corridor traffic growth, precinct development/traffic generation, traffic demands and road improvements are appropriately incorporated into the traffic modelling undertaken by Traffix and accepted by RMS.

HOURLY TRAFFIC VOLUMES for Week commencing MON 12/08/02

Station No. 70.001.E

GT WESTERN HWY,SH5-SL12 EASTERN CREEK-AT EASTERN CK BR

HOUR	MON	TUE	WED	THU	FRI	SAT	SUN	WEEKDAYS			WEEKEND (+HOLIDAYS)			WHOLE WEEK		
								TOTAL	MEAN	%	TOTAL	MEAN	%	TOTAL	MEAN	%
comm.	12/08	13/08	14/08	15/08	16/08	17/08	18/08									
0	77	77	85	90	117	199	235	446	89	0.51	434	217	1.92	880	126	0.80
1	59	58	52	68	89	153	143	326	65	0.37	296	148	1.31	622	89	0.56
2	56	53	75	81	67	121	139	332	66	0.38	260	130	1.15	592	85	0.54
3	112	90	90	91	109	113	80	492	98	0.56	193	97	0.85	685	98	0.62
4	230	221	269	260	257	182	101	1237	247	1.41	283	142	1.25	1520	217	1.38
5	880	864	884	866	879	387	195	4373	875	4.99	582	291	2.57	4955	708	4.50
6	1843	1900	2054	1952	1844	478	218	9593	1919	10.96	696	348	3.07	10289	1470	9.33
7	2105	2169	2313	2103	2004	464	236	10774	2155	12.30	700	350	3.09	11474	1639	10.41
8	1684	2154	2099	1833	1731	594	421	9501	1900	10.85	1015	508	4.48	10516	1502	9.54
9	878	1027	882	990	930	708	694	4707	941	5.38	1402	701	6.19	6109	873	5.54
10	822	754	814	853	851	803	798	4094	819	4.68	1601	801	7.06	5695	814	5.17
11	805	807	866	814	859	939	896	4151	830	4.74	1835	918	8.10	5986	855	5.43
12	821	814	794	856	933	899	916	4218	844	4.82	1815	908	8.01	6033	862	5.47
13	767	916	870	888	976	823	864	4417	883	5.04	1687	844	7.44	6104	872	5.54
14	942	1006	911	917	1002	788	731	4778	956	5.46	1519	760	6.70	6297	900	5.71
15	862	941	1021	1006	999	780	706	4829	966	5.52	1486	743	6.56	6315	902	5.73
16	825	825	866	892	831	738	673	4239	848	4.84	1411	706	6.23	5650	807	5.13
17	804	784	787	769	802	766	666	3946	789	4.51	1432	716	6.32	5378	768	4.88
18	559	565	606	656	680	595	456	3066	613	3.50	1051	526	4.64	4117	508	3.74
19	386	351	404	436	484	406	348	2061	412	2.35	754	377	3.33	2015	402	2.55
20	309	362	341	403	394	312	304	1809	362	2.07	616	308	2.72	2425	346	2.20
21	309	324	336	372	355	345	281	1696	339	1.94	626	313	2.76	2322	332	2.11
22	263	233	302	324	408	320	228	1530	306	1.75	548	274	2.42	2078	297	1.89
23	131	142	142	203	326	300	121	944	189	1.08	421	211	1.86	1365	195	1.24
DAY																
TOT	16529	17437	17863	17723	18007	12213	10450	87559	17512	100.00	22663	11332	100.00	110222	15746	100.00
MAX	2105	2169	2313	2103	2004	939	916	AWT =	17512		AWE =	11332		ADT =	15746	

HOURLY TRAFFIC VOLUMES for Week commencing MON 12/08/02

Station No. 70.001.W

GT WESTERN HWY,SH5-SL12 EASTERN CREEK-AT EASTERN CK BR

HOUR	MON	TUE	WED	THU	FRI	SAT	SUN	WEEKDAYS			WEEKEND (+HOLIDAYS)			WHOLE WEEK		
								TOTAL	MEAN	%	TOTAL	MEAN	%	TOTAL	MEAN	%
comm.	12/08	13/08	14/08	15/08	16/08	17/08	18/08									
0	100	113	141	117	189	227	238	660	132	0.79	465	233	2.00	1125	161	1.06
1	56	77	67	99	121	182	180	420	84	0.50	362	181	1.56	782	112	0.73
2	45	51	70	87	82	147	115	335	67	0.40	262	131	1.13	597	85	0.56
3	55	58	62	80	97	98	104	352	70	0.42	202	101	0.87	554	79	0.52
4	109	95	104	100	94	106	81	502	100	0.60	187	94	0.81	689	98	0.65
5	207	201	220	198	218	142	106	1044	209	1.25	248	124	1.07	1292	185	1.21
6	386	425	454	405	399	267	157	2069	414	2.48	424	212	1.83	2493	356	2.34
7	571	575	604	592	556	340	178	2898	580	3.47	518	259	2.23	3416	488	3.20
8	734	774	715	743	732	493	295	3698	740	4.43	788	394	3.39	4486	641	4.21
9	694	728	726	733	763	655	571	3644	729	4.37	1226	613	5.28	4870	696	4.57
10	771	774	834	834	814	807	717	4027	805	4.83	1524	762	6.57	5551	793	5.21
11	893	836	874	887	900	897	880	4390	878	5.26	1777	889	7.66	6167	881	5.78
12	829	873	877	891	924	1060	934	4394	879	5.27	1994	997	8.59	6388	913	5.99
13	941	890	890	945	1017	1016	857	4683	937	5.61	1873	937	8.07	6556	937	6.15
14	1138	1242	1251	1240	1308	1048	917	6179	1236	7.41	1965	983	8.47	8144	1163	7.64
15	1582	1630	1610	1614	1683	941	859	8119	1624	9.73	1800	900	7.75	9919	1417	9.30
16	1798	1884	1878	1844	1741	811	830	9145	1829	10.96	1641	821	7.07	10786	1541	10.12
17	1914	1979	1964	2008	1947	805	625	9812	1962	11.76	1430	715	6.16	11242	1606	10.54
18	1138	1215	1231	1151	1283	695	466	6018	1204	7.22	1161	581	5.00	7179	1026	6.73
19	564	609	624	680	711	476	344	3188	638	3.82	820	410	3.53	4008	573	3.76
20	438	438	491	563	532	368	329	2462	492	2.95	697	349	3.00	3159	451	2.96
21	363	401	415	499	440	388	289	2118	424	2.54	677	339	2.92	2795	399	2.62
22	284	311	293	352	459	392	208	1699	340	2.04	600	300	2.58	2299	328	2.16
23	227	268	315	298	438	397	174	1546	309	1.85	571	286	2.46	2117	302	1.99
DAY																
TOT	15837	16447	16710	16960	17448	12758	10454	83402	16680	100.00	23212	11606	100.00	106614	15231	100.00
MAX	1914	1979	1964	2008	1947	1060	934	AWT =	16680		AWE =	11606		ADT =	15231	

4. TRAFFIC

A guide to the traffic generation of 'Large Format Hardware' developments is provided by recent RMS studies and the common feature of the traffic generation/floorspace relationship is that the larger the floorspace the lower the traffic generation rate is per 100m² and the envisaged Bunnings development represents large contemporary floorspace.

The RMS "Hardware" study surveyed sites ranging up to 14,111m² and the established RMS results for the large floorspace Hardware outlets (the lower rate per 100m²) are provided in Appendix D and summarised in the following:

AM	0.60 vtpm
PM	2.05 vtpm (say 2.2)
WEEKEND	3.15 vtpm (say 3.5)

Thus the proposed Bunnings of some 15,000m² will have a projected generation of:

AM	100 vtpm
PM	350 vtpm
WEEKEND	560 vtpm

This generation would be discounted by a normal 20-25% passing trade factor as follows:

	P/Trade		Distribution of Additional
100 vtpm	0% (-)	100 vtpm	50 IN 50 OUT
350 vtpm	20% (70)	280 vtpm	140 IN 140 OUT
560 vtpm	25% (140)	420 vtpm	210 IN 210 OUT

The projected distribution of future site generated traffic is as follows:

- GWH West 20%
- GWH East 20%
- Flushcombe Road North 20%
- Reservoir Road North 30%
- Reservoir Road South 10%

The outcome of the projected Bunnings traffic generation and distribution have been incorporated into the Linsig modeling undertaken by Traffix and accepted by RMS as providing a satisfactory operational performance outcome. Whilst there is no Linsig model for the weekend peak it is apparent that the traffic flows along the Highway, Reservoir Road and M4 freeway are only some 50% of the weekday peaks at the weekend and accordingly there will not be any adverse implications for the Bunnings generated traffic.

5. PARKING

Blacktown City Councils' Development Control Plan 2006 specifies a parking provision for bulky goods use of 1 space per 45m² GFA while the recent RMS assessment indicated a demand of 1 space per 59m² to 78m² GFA

Application of these criterium to the envisaged 15,000m² GFA would indicate:

Council code	-	356 spaces
RMS min	-	272 spaces
Max	-	206 spaces

The envisaged development will provide some 360 spaces although this is subject to design development and some additional spaces could be provided.

6. INTERNAL CIRCULATION AND SERVICING

Internal Circulation

There will be internal circulation systems for cars and trucks which will largely be independent of each other with the Bunnings delivery vehicles ingressing through the segregated access on the Access Road into the delivery areas and departing along the southern side to turn left into Reservoir Road.

Cars will circulate through the central parking area and the design of the aisles and parking bays etc will accord with the design criteria of AS 2890.1 as well as Council's DCP. The circulation system will be very flexible due to the two-way traffic provisions.

Servicing

The design provisions for service vehicles will accord with the AS 2890.2 criteria and the requirements of all vehicles requiring to access the site.

7. CONCLUSION

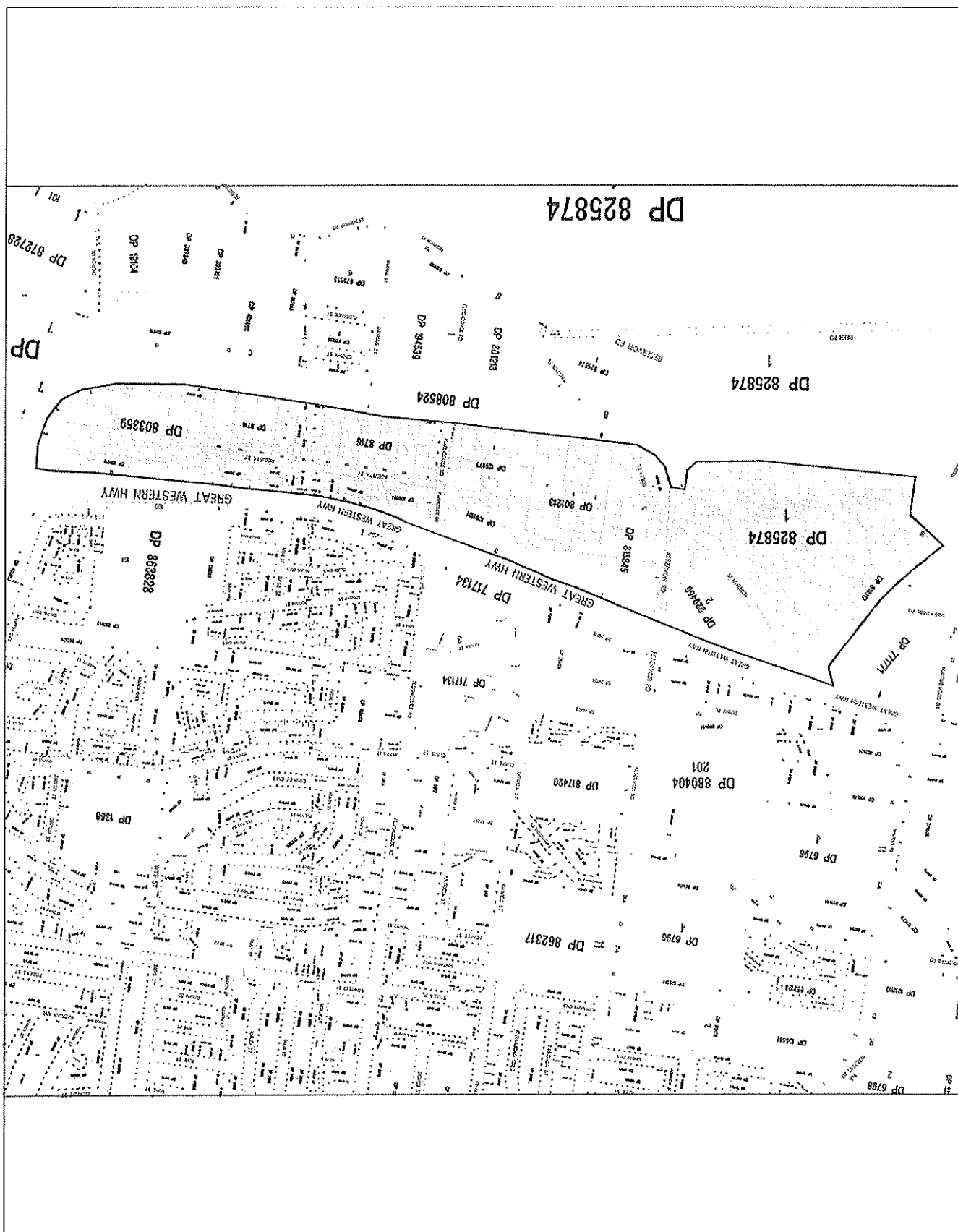
The proposed rezoning for a Bunnings development at Huntingwood will utilise the relatively large site which has convenient access to the arterial road system within the Huntingwood East Precinct. This assessment has concluded that the envisaged development:

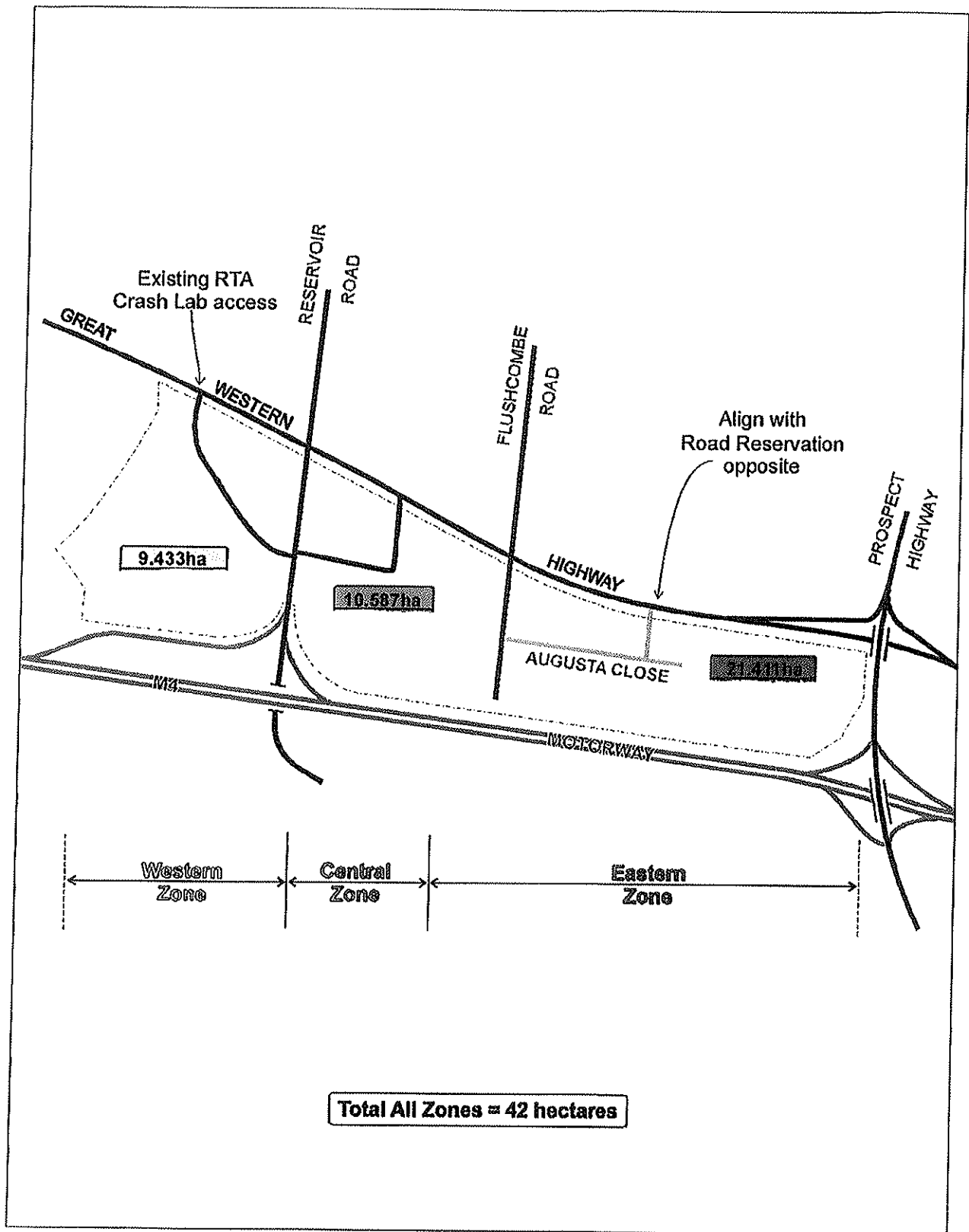
- * will be consistent with the traffic assessment undertaken for the Huntingwood East Precinct which has been accepted by RMS
- * will not present an unsatisfactory traffic outcome
- * will provide a suitable quantum of onsite parking
- * will have appropriate vehicle access, internal circulation and servicing arrangements

Appendix A

HUNTINGWOOD EAST PRECINCT DETAILS

Figure 2





HUNTINGWOOD EAST TRAFFIC STUDY

Prepared on behalf of DPL Property Pty. Ltd.

Figure 6

HUNTINGWOOD EAST PRECINCT DEVELOPMENT VOLUMES (AM & PM PEAKS)

TRAFFIX Traffic & Transport Planners: Level 2, 65 Mountain Street, Broadway, 2007.

Appendix B

TRAFFIC MODELLING RESULTS

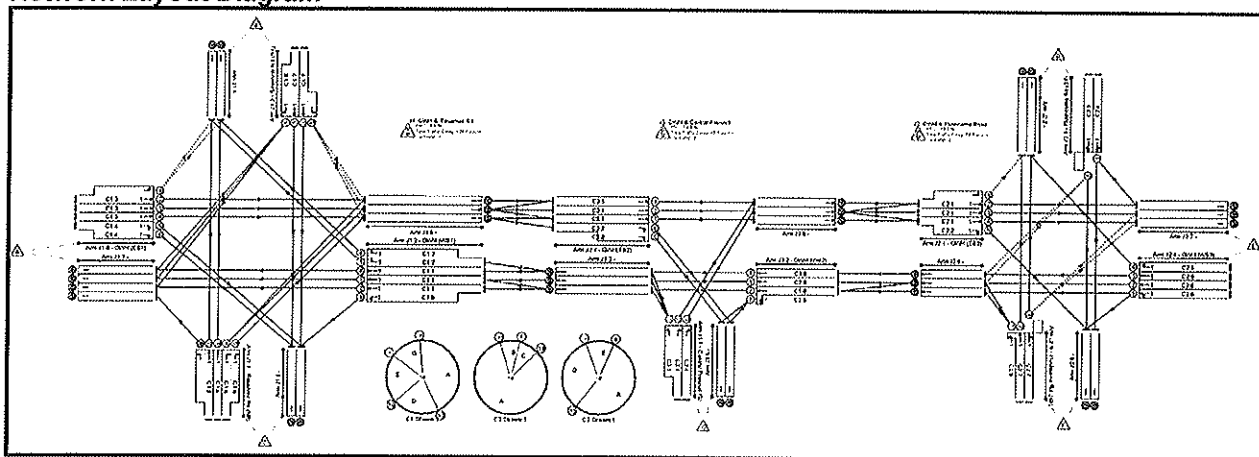
Basic Results Summary

User and Project Details

Project:	Huntingwood East
Title:	GWH & Reservoir Rd
Location:	
File name:	Future Opt 4 Review.lsg3x
Author:	Andrew Johnson
Company:	TRAFFIX
Address:	Suite 3.08 46a Macleay Street, Potts Point NSW 2011
Notes:	

Scenario 1: 'FU-AM' (FG3: 'FU - AM', Plan 1: 'AM')

Network Layout Diagram



Basic Results Summary
Network Results

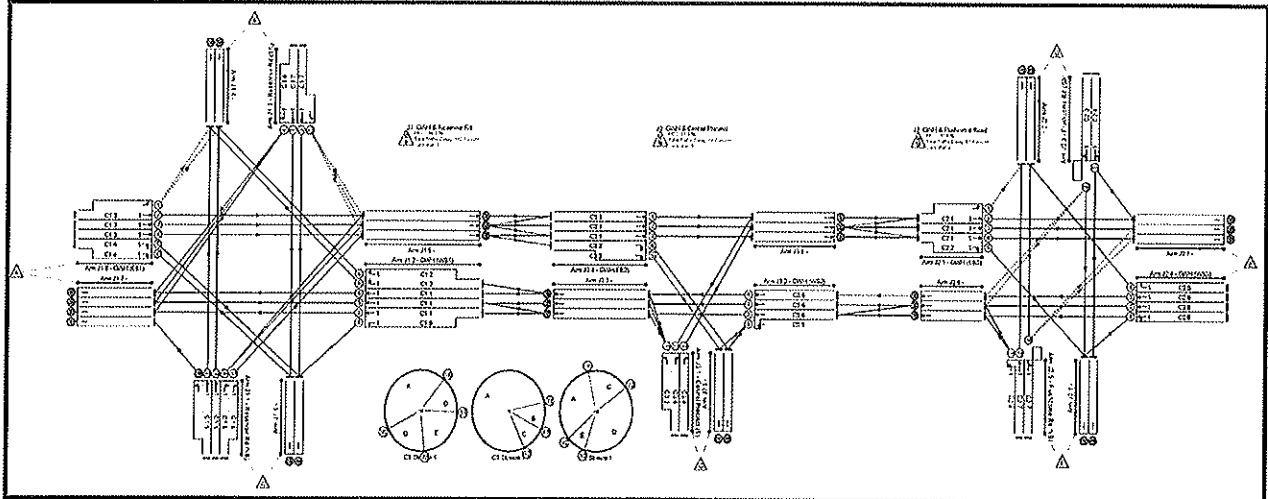
Item	Lane Type	Num Greens	Total Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network: GWH && Reservoir Rd	-	-	-	-	-	-	99.3%	-	-
J1: GWH && Reservoir Rd	-	-	-	-	-	-	95.3%	-	-
1/2+1/1	U	1	23	537	1800:1857	590	91.1%	59.1	15.1
1/3	U	1	23	339	2300	394	86.0%	85.9	15.6
1/4+1/5	U	1	22	420	2050:2050	449	93.5%	101.6	17.4
2/2+2/1	U	1	55:84	517	1950:1700	1505	34.4%	23.1	7.5
2/3	U	1	55	447	2250	900	49.7%	35.4	13.4
2/4	U	1	55	391	2250	900	43.4%	34.0	11.4
2/5+2/6	U	1	12	287	2381:2381	442	64.9%	72.8	6.3
3/2+3/1	U+O	1	23	446	2000:1800	507	87.9%	63.3	13.2
3/3+3/4	U	1	23:22	597	2000:2000	671	88.9%	79.1	16.3
5/1	U	-	-	809	1800	1800	44.9%	3.2	20.5
5/2	U	-	-	1079	1800	1800	59.9%	5.0	31.3
5/3	U	-	-	1032	1800	1800	57.3%	8.0	37.7
8/2+8/1	U+O	1	55	806	2050:1857	1043	77.3%	34.7	21.3
8/3	U	1	55	779	2050	820	95.0%	73.3	36.3
8/4	U	1	55	850	2250	900	94.4%	68.9	38.3
8/5+8/6	U	1	12	392	2190:2238	411	95.3%	120.2	13.9
J2: GWH && Flushcome Road	-	-	-	-	-	-	99.3%	-	-
1/2+1/1	U+O	1	69	951	2000:1800	1084	87.7%	36.7	31.7
1/3	U	1	69	911	2100	1050	86.8%	43.3	34.3
1/4+1/5	U	1	69:10	1003	2100:2100	1131	88.7%	47.7	36.5
3/1	U	1	40	513	2000	586	87.6%	69.8	22.2
3/2	O	1	40	445	2000	448	99.3%	130.7	26.8
4/1	U	1	69	367	1950	975	37.6%	24.5	9.1
4/2	U	1	69	414	1950	975	42.5%	25.4	10.5
4/3	U	1	69	417	1950	975	42.8%	25.5	10.7
4/4	U	1	10	154	2095	165	93.6%	159.9	10.0
5/2+5/1	U	1	40:57	46	1800:1800	545	8.4%	34.3	0.9
5/3	O	1	40	29	1800	330	8.8%	42.1	0.9
J3: GWH && Central Precinct	-	-	-	-	-	-	58.6%	-	-
1/2+1/1	U	1	7:20	84	1800:1439	297	28.2%	69.9	2.2
1/3	U	1	7	0	1800	96	0.0%	0.0	0.0
2/2+2/1	U	1	118:131	625	1950:1950	1559	40.1%	6.4	7.9
2/3	U	1	118	367	1950	1547	23.7%	5.5	4.0
2/4	U	1	118	656	1950	1547	42.4%	6.8	8.8
4/1	U	1	131	870	1950	1716	50.7%	4.1	8.2
4/2	U	1	131	1006	1950	1716	58.6%	4.8	11.0
4/3	U	1	131	959	1950	1716	55.9%	4.5	10.0
4/4+4/5	U	1	7	85	1900:1800	197	43.1%	84.7	2.1

Basic Results Summary

C1	Stream: 1	PRC for Signalled Lanes (%)	-5.9	Total Delay for Signalled Lanes (pcuHr):	119.91
C2	Stream: 1	PRC for Signalled Lanes (%)	-10.3	Total Delay for Signalled Lanes (pcuHr):	76.03
C3		PRC for Signalled Lanes (%)	53.5	Total Delay for Signalled Lanes (pcuHr):	10.06
		PRC Over All Lanes (%)	-10.3	Total Delay Over All Lanes (pcuHr):	210.51

Scenario 2: 'FU-PM' (FG4: 'FU - PM', Plan 2: 'PM')

Network Layout Diagram



Basic Results Summary

Network Results

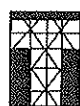
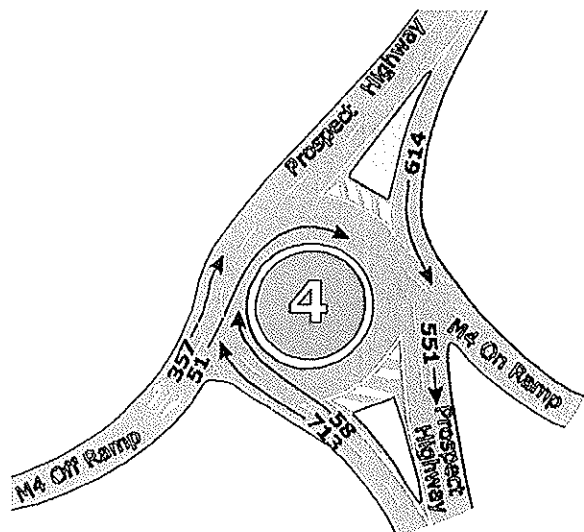
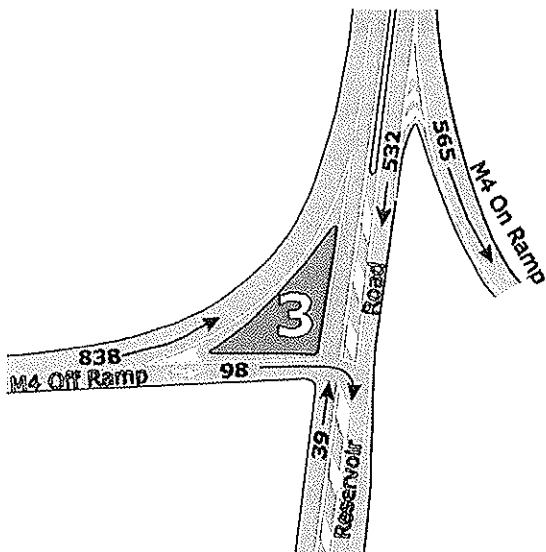
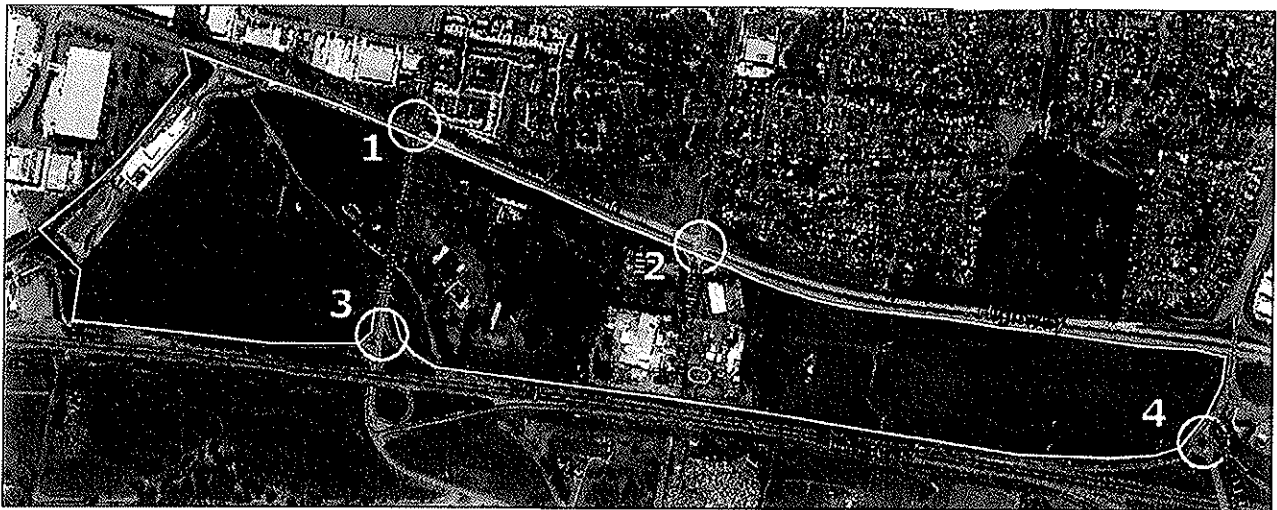
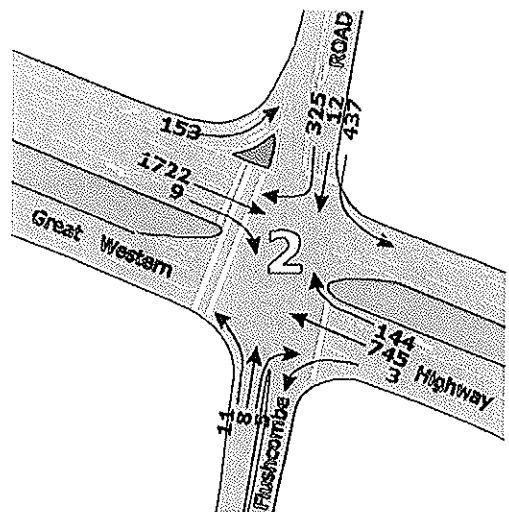
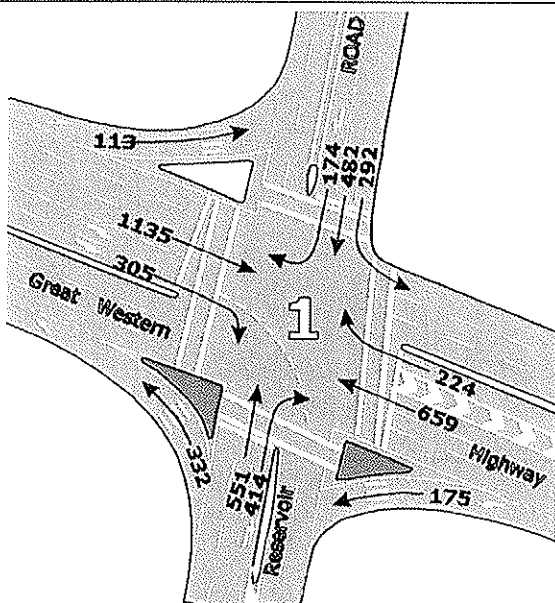
Item	Lane Type	Num Greens	Total Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Av. Delay Per PCU (s/pcu)	Mean Max Queue (pcu)
Network: GWH && Reservoir Rd	-	-	-	-	-	-	102.9%	-	-
J1: GWH && Reservoir Rd	-	-	-	-	-	-	102.9%	-	-
1/2+1/1	U	1	26	519	1800:1857	526	98.8%	106.0	23.1
1/3	U	1	26	421	2300	428	98.3%	132.3	25.4
1/4+1/5	U	1	14	307	2050:2050	299	102.8%	198.9	20.1
2/2+2/1	U	1	56:77	1187	1950:1700	1582	75.0%	37.9	35.1
2/3	U	1	56	860	2250	884	97.2%	84.6	34.8
2/4	U	1	56	748	2250	884	84.1%	48.4	26.5
2/5+2/6	U	1	21	478	2381:2381	723	66.0%	65.8	9.9
3/2+3/1	U+O	1	26	453	2000:1800	444	102.1%	151.9	29.0
3/3+3/4	U	1	26:14	596	2000:2000	579	102.9%	175.0	34.4
5/1	U	-	-	289	1800	1800	16.0%	1.4	4.9
5/2	U	-	-	722	1800	1800	39.7%	2.5	14.9
5/3	U	-	-	585	1800	1800	32.4%	2.8	13.6
8/2+8/1	U+O	1	56	477	2050:1857	918	52.0%	21.7	6.3
8/3	U	1	56	459	2050	806	57.0%	39.6	15.1
8/4	U	1	56	429	2250	884	48.5%	36.9	13.3
8/5+8/6	U	1	21	663	2190:2238	672	98.7%	120.3	24.3
J2: GWH && Flushcome Road	-	-	-	-	-	-	101.5%	-	-
1/2+1/1	U+O	1	41	671	2000:1800	829	80.2%	44.5	18.8
1/3	U	1	41	432	2100	608	70.7%	82.9	17.1
1/4+1/5	U	1	41:5	458	2100:2100	644	71.1%	89.5	16.9
3/1	U	1	56	192	2000	786	24.4%	32.6	5.3
3/2	O	1	51	445	2000	438	101.5%	154.3	30.2
4/1	U	1	68	810	1950	928	87.3%	48.5	32.3
4/2	U	1	68	810	1950	928	87.3%	48.5	32.3
4/3	U	1	68	819	1950	928	88.3%	49.9	33.3
4/4	U	2	25	358	2095	390	91.8%	88.9	15.0
5/2+5/1	U	1	51:63	410	1800:1800	685	59.8%	37.6	12.7
5/3	O	1	51	44	1800	523	8.4%	34.9	1.2
J3: GWH && Central Precinct	-	-	-	-	-	-	80.8%	-	-
1/2+1/1	U	1	9:25	239	1800:1439	330	72.5%	77.3	8.3
1/3	U	1	9	41	1800	124	33.0%	85.9	1.8
2/2+2/1	U	1	108:123	1196	1950:1950	1478	80.8%	12.7	17.7
2/3	U	1	108	801	1950	1466	54.6%	5.1	3.0
2/4	U	1	108	1169	1950	1466	79.4%	9.2	12.7
4/1	U	1	124	436	1950	1681	25.7%	2.9	2.3
4/2	U	1	124	575	1950	1681	33.9%	3.2	2.7
4/3	U	1	124	457	1950	1681	27.2%	1.8	0.6

Basic Results Summary

4/4+4/5	U	1	10	128	1900:1800	281	45.2%	71.1	2.8
		C1	Stream: 1 PRC for Signalled Lanes (%):			-14.3	Total Delay for Signalled Lanes (pcuHr):		181.68
		C2	Stream: 1 PRC for Signalled Lanes (%):			-12.8	Total Delay for Signalled Lanes (pcuHr):		97.05
		C3	PRC for Signalled Lanes (%):			11.3	Total Delay for Signalled Lanes (pcuHr):		18.03
			PRC Over All Lanes (%):			-14.3	Total Delay Over All Lanes(pcuHr):		297.81

Appendix C

EXISTING TRAFFIC VOLUMES



HUNTINGWOOD EAST TRAFFIC STUDY

Prepared on behalf of DPL Property Pty. Ltd.

Figure 4 EXISTING AM PEAK TRAFFIC VOLUMES (7:45-8:45)

TRAFFIX Traffic & Transport Planners: Level 2, 55 Mountain Street, Broadway, 2007.

Appendix D

BUNNINGS TRAFFIC CHARACTERISTICS

Table 3-2 Trips Rate Summary – Hardware DIY

	Sydney Metropolitan Area HW1 to HW5			Non-Metropolitan Area HW6 to HW9			All Survey Sites HW1 to HW9			Avg Non-metro / Metro %
	Min	Max	Avg	Min	Max	Avg	Min	Max	Avg	
Trips/ 100m² GFA										
Weekdays										
Person-based Trips										
- Site Peak Hour	4.00	5.77	5.06	3.95	6.40	5.49	3.95	6.40	5.25	108.6%
- Vehicle Network AM Peak	0.65	2.72	2.01	1.28	4.75	2.97	0.65	4.75	2.43	147.9%
- Vehicle Network PM Peak	2.48	4.89	3.50	2.79	4.65	3.78	2.48	4.89	3.63	108.0%
Daily Total Person Trips	32.88	53.26	42.42	29.22	43.40	38.34	29.22	53.26	40.51	90.4%
Vehicle-based Trips										
- Site Peak Hour	3.15	4.67	4.03	2.74	5.60	4.41	2.74	5.60	4.20	109.6%
- Network AM Peak	0.60	2.22	1.68	1.09	3.88	2.50	0.60	3.88	2.05	148.7%
- Network PM Peak	2.05	3.56	2.70	1.99	3.80	3.03	1.99	3.80	2.85	112.5%
Daily Total LV Trips	25.21	38.25	30.59	20.66	35.90	30.30	20.66	38.25	30.46	99.0%
Daily Total HV Trips	0.99	6.17	2.40	0.69	2.25	1.49	0.69	5.17	2.00	62.0%
Daily Total Vehicle Trips	26.80	39.75	32.99	21.35	38.15	31.79	21.35	39.75	32.46	96.4%
Peak Parking Accumulation	0.78	1.67	1.16	1.05	1.90	1.48	0.78	1.90	1.30	127.8%

Appendix E

DIVERTED TRIP RESEARCH

Appendix F: Linked trips

Traffic generation data for movements in and out of certain development types is readily available. However, there is a need to understand how much of the generated traffic is new and how much is already on the road network prior to opening of the development.

Historically, traffic impact assessments conservatively assumed that all generated traffic was new. More recently, 'discounts' have been applied to generated traffic to account for the 'drop in' component, which is not new traffic to the network.

Research undertaken on this subject has concluded that it is appropriate to make adjustments to generated traffic due to linked trips.

Trips can be broadly categorised into the following types:

<i>Linked Trip</i>	A journey where there is a chain of stops from origin to ultimate destination. A trip from home to work with stops at school and the post office comprises three linked trips: home to school; school to post office; and post office to work.
<i>Unlinked Trip</i>	A journey with no intermediate stops (generally referred to as New Trips in the RIA)

For the purposes of an RIA, the following three types of trips are commonly used:

<i>New Trip</i>	In traffic impact studies, unlinked trips are generally referred to as new trips. These are trips attracted to the development and without the development would not have been made – hence a new trip.
<i>Diverted Drop In Trips</i>	A linked trip from an origin to a destination that has made a significant network diversion to use the new development.
<i>Undiverted Drop In Trips</i>	A linked trip from an origin to a destination that previously passed the development site. This is also referred to as a 'pass by' trip and the new development is an intermediate stop on a trip that is made from an origin to a destination.

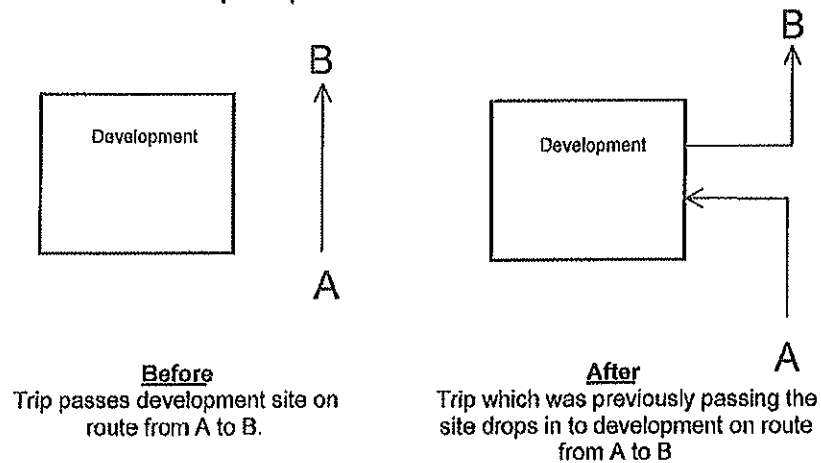
The diverted and undiverted drop-in trips are considered to be trips that are already part of the existing flows on the road network.

The treatment of the different trip types varies with the level of assessment. Hallam (1988) provides a reasoned basis for separating assessment into three levels:

- Regional Assessment – consideration of the impact of a development in the context of the total urban area;
- Local Assessment – consideration of the effect of a development over a substantial area focussed on the development; and
- Access Level – micro level assessment.

At the regional level, insertion of a new development could be considered to only increase travel by the new trips proportion of generation. Diverted and undiverted drop in trips would already be on the network.

Figure: F.1 : Undiverted drop in trips



Note: One original pass by trip becomes 2 drop in trips (1 in and 1 out)

An RIA is usually conducted over a limited part of the network. At a local level, both the new trips and diverted drop-in trips are introduced into the area and represent additional trips on the local network. This local network may contain roads of regional significance. The undiverted drop-in trips to developments on roads of regional significance can be regarded as already on the local network. It is important that these trips are considered. They must be rerouted from movements past the development to movements into and out of the development. For every two development trips assigned as undiverted drop-in trips (one in / one out), one through trip should be removed from passing traffic.

In 1995, Eppell Olsen & Partners carried out surveys for Main Roads to segment traffic generation for specific developments. The results of these surveys are documented in the report, *Development Traffic Surveys: Linked / Unlinked Trips*.

The segmentation of traffic generation for shopping centres and fast food outlets is shown below:

Table F.1			
Development	Trip Segmentation		
	New (%)	Diverted Drop In (%)	Undiverted Drop In (%)
Shopping Centres >20 000 m ²	63	18	19
Shopping Centre 3 000 m ² – 20 000 m ²	50	22	28
Shopping Centres <3 000 m ²	50	32	18
Fast Food Outlets	40	25	35

Shopping Centres

The traffic generated by shopping centres is most influenced by the proximity of other centres. On site facilities such as cinemas, restaurants etc. can also have a significant impact on generation rates.

Thursday design generation rates are shown on Figure 2A.4 while Saturday rates are included as Figure 2A.5. Survey results indicate that during these peak hour periods the in/out proportion is approximately 50/50.

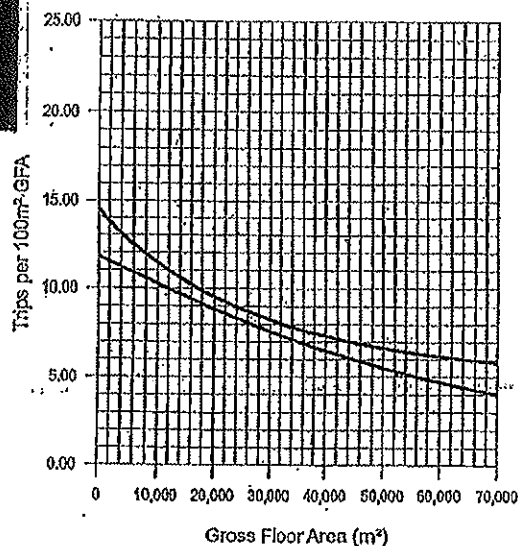


Figure 2A.1 SEQ Shopping Centre Generation (Thursday Afternoon peak)

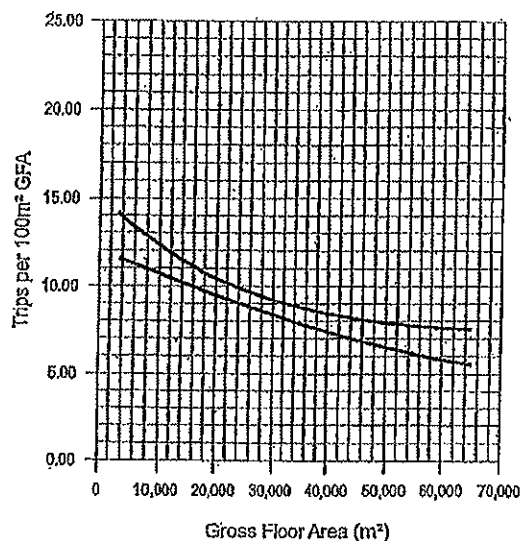


Figure 2A.2 SEQ Shopping Centre Generation (Saturday peak)

Considering the adjacent road network, three shopping centre trip types have been defined as follows:

- New Trips

Trips that would not have appeared on the immediate approaches, local street network or

shopping centre. These trips only appear as a consequence of the opening of the centre.

- Diverted Trips

Linked trips (i.e. in conjunction with another trip purpose) which are diverted off the regional road network to access the shopping centre.

- Drop-In Trips

Linked trips that would have appeared in the local road network irrespective of the presence of the shopping centre.

Research undertaken by Hallam that developed the rates shown in Table 2A.7 for estimating the proportion of drop-in and diverted trips.

Table 2A.7 Proportion of Drop-in and Diverted Trips

Trip Type	Proportion of Trips	
	Thursday	Saturday
New Trip	50%	68%
Diverted Trip	30%	20%
Drop-in Trip	20%	12%

Studies undertaken in the USA suggest the factors in Table 2A.8 are applicable to the above percentages to accommodate different diverted pattern trips for different sized centres.

Table 2A.8 Factors in Drop-in and Diverted Trips

Shopping Centre Size	Factors to be Applied to Proportion of Drop-in and Diverted Trips
0 - 10,000 m ²	1.2
10,000 - 35,000 m ²	1.0
> 35,000 m ²	0.8

Upon determining the proportion of drop-in and diverted trips the traffic discounts in Table 2A.9 would be applicable.

Table 2A.9 Trip Discounts

Road Network Element	Trip Discounts Applicable
Immediate approach and site access	None
Local Road Network	Drop-in Trips
Regional Road Network	Drop-in + Diverted Trips

