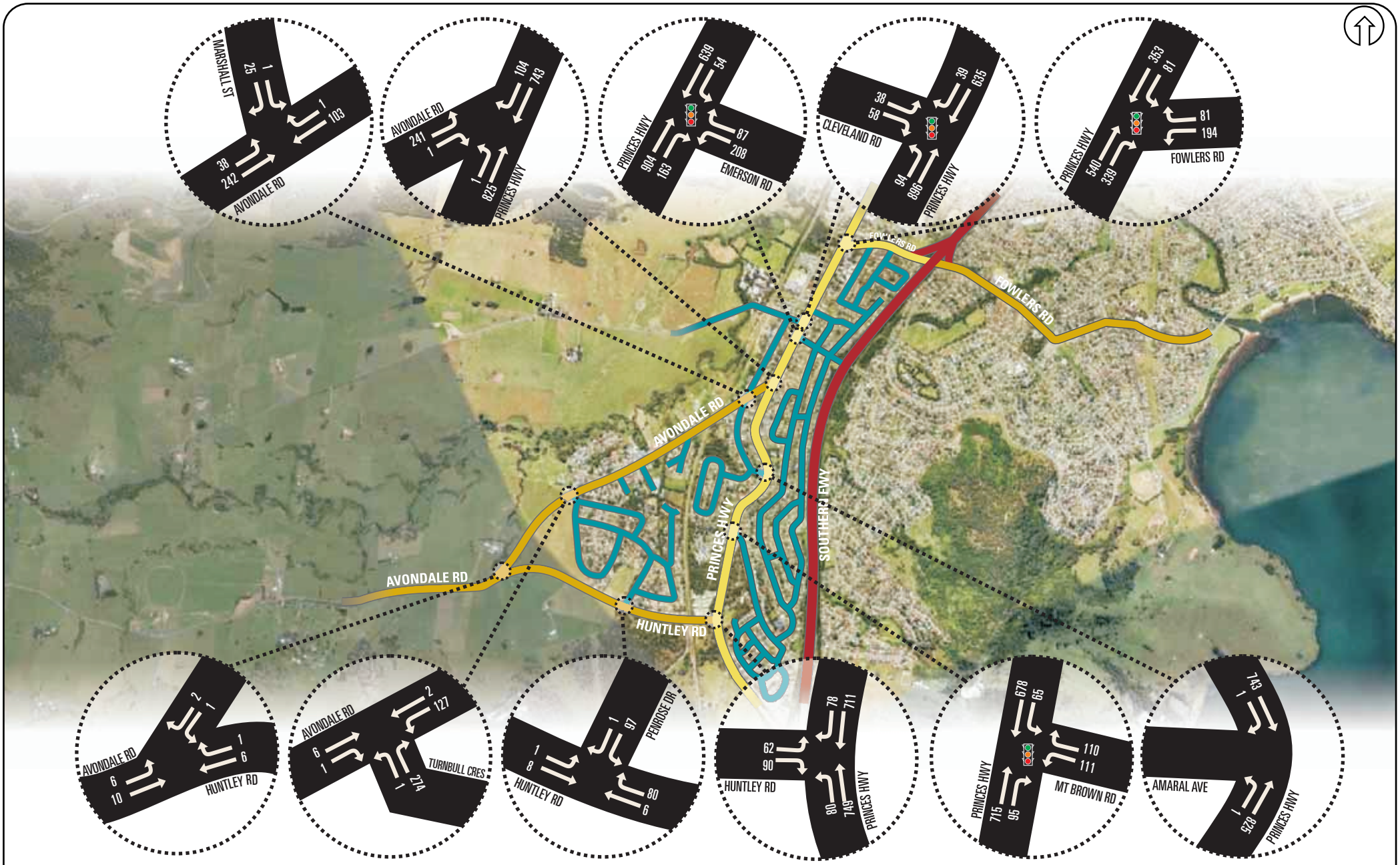

2008 AM Peak Background Turning Traffic Volumes

Date: 06.04.09 | Project No: FR108121

Figure No: 3.6

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2008 PM Peak Background Turning Traffic Volumes

Date: 06.04.09 | Project No: FR108121

Figure No: 3.7

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3.2.4 Mid-Block Carriageway Capacity

The capacity of major streets within an urban area can be based on an assessment of their operating Level of Service. Level of Service (LoS) is defined by AUSTROADS *Guide to Traffic Engineering Guidelines – Part 2 Roadway Capacity* (1988) as a qualitative measure of the effects of a number of features, which include speed and travel time, traffic interruptions, freedom to manoeuvre, safety, driving comfort and convenience, and operating costs. LoS is designated from A to F from best (free flow conditions) to worst (forced flow with stop start operation, long queues and delays) as follows:

- A - Free flow (almost no delays);
- B - Stable flow (slight delays);
- C - Stable flow (acceptable delays);
- D - Approaching unstable flow (tolerable delays);
- E - Unstable flow (congestion; intolerable delays); and
- F - Forced flow (jammed).

A service volume, as defined by AUSTROADS, is the maximum number of vehicles that can pass over a given section of roadway in one direction during one hour while operating conditions are maintained at a specified LoS. It is suggested that ideally arterial and sub-arterial roads should not exceed service volumes at LoS C. At this level, whilst most drivers are restricted in their freedom to manoeuvre, operating speeds are still reasonable and acceptable delays experienced. However, in urban situations, arterial and sub-arterial roads operating at LoS D are still considered adequate.

Table 3.5 Level of Service Uninterrupted Flow Conditions Along Urban Roads (One Way Hourly Volumes)

Road Description	LEVEL OF SERVICE (LoS)					
	A	B	C	D	E	F
2 Lane Undivided (2U)	760	880	1000	1130	1260	Flows Forced
2 Lane with Clearways and limited access (2CL)	1010	1170	1330	1500	1680	
4 Lane Undivided (13m) (4U)	1260	1470	1680	1890	2100	
4 Lane Undivided with Clearways (4UC)	1510	1760	2010	2270	2520	
4 Lane Divided with Clearways (4DC)	1600	1860	2130	2400	2660	
4 Lane Divided with Clearways, limited access and intersections(4DCI)	2250	2620	3000	3380	3740	
6 Lane Undivided (6U)	2020	2350	2690	3020	3360	
6 Lane Divided with Clearway (6DC)	2440	2840	3250	3660	4060	
6 Lane Divided with Clearways, limited access and intersections (6DCL)	3375	3930	4500	5070	5610	

Source: AUSTROADS *Guide to Traffic Engineering Guidelines – Part 2 - Roadway Capacity (1988)*

Table 3.5 is applied to the traffic volume data provided by Wollongong Council to determine a LoS for mid block volume capacities under existing conditions in Table 3.6 below.

Table 3.6 Existing Mid-block Traffic Volumes & Carriageway Level of Service

Road/ Location	Lanes	AM Peak Hour					PM Peak Hour				
		East/ North	LoS	West/ South	LoS	Total	East/ North	LoS	West/ South	LoS	Total
Princes Highway											
· Between Kanahooka Rd and Mt Brown Rd	4U	771	A	616	A	1387	663	A	810	A	1473
· Between Mt Brown Rd and Huntley Rd	2U	625	A	585	A	1210	575	A	602	A	1177
Avondale Rd											
· Between Princes Hwy and Marshall St	2U	187	A	103	A	290	123	A	220	A	343
· Between Amaral Ave and Oakhurst Close	2U	105	A	189	A	294	210	A	136	A	346
· Between Turnbull Crnt and Huntley Rd	2U	29	A	20	A	49	21	A	38	A	59
Cleveland Rd											
· Between Princes Hwy and Marshall St	2U	220	A	257	A	477	186	A	147	A	333
Huntley Rd											
· Between Avondale Colliery Rd and Penrose Drive	2U	32	A	21	A	53	28	A	28	A	56
· Between Penrose Drive and Marshall Mt Rd	2U	111	A	53	A	164	75	A	98	A	173
· Between Princes Hwy and Marshall Mt Rd	2U	135	A	89	A	224	102	A	125	A	227
Marshall Mt Rd											
· Between Huntley Rd and Yallah Rd (north of Yallah Rd)	2U	45	A	38	A	83	39	A	37	A	76
· Between Huntley Rd and Yallah Rd (south of Yallah Rd)	2U	33	A	48	A	81	43	A	36	A	79

Source of traffic counts – Wollongong Council

Table 3.6 above shows that:

- Avondale Road, Cleveland Road, Huntley Road and Marshall Mount Road operate at LoS A for mid-block capacity during the peak periods.
- Princes Highway between Kanahooka Road and Mount Brown Road is four lane undivided road and operates at LoS A.
- Princes Highway between Mount Brown Road and Huntley Road is two lane undivided with clearways and limited access operating at LoS B.
- No mid-block capacity issues currently exist within the surrounding road network.

3.3 PUBLIC TRANSPORT SYSTEM

3.3.1 Rail Infrastructure and Services

The South Coast Railway Line is located to the east of the proposed development site and bisects the study area on a north-south axis, running parallel to and west of, Princes Highway. It is currently a single, electrified track with a number of at-grade road crossings. Vehicular and pedestrian crossing opportunities within the study area are located at Cleveland Road (road overbridge), Avondale Road (level crossing, controlled by flashing lights), and Huntley Road (road overbridge).

Dapto Railway Station is the closest railway station to the proposed development and is located approximately 3 kilometres north and accessed via Avondale Road, Princes Highway and Bong Bong Road. The development site is located well outside of the walking catchment of the station and consequently it is expected that people travelling to or from the site by rail will generally interchange to bus services at Dapto, or proceed to the site via bicycle.

Dapto railway station is comprised of three platforms – two through and one terminating. Access between the platforms is only available at the southern (Bong Bong Road) end of the station, via an at-grade crossing. A small car park, bus layover and a kiss and ride area are provided off Station Street.

Currently, services on the railway line operate as through services between Sydney Terminal and the end of the electrified track at Kiama, although some diesel services from Bomaderry terminate at Dapto with connecting electric services commencing at Dapto and heading to Sydney.

Table 3.7 presents a guide to the frequency of rail services serving Dapto railway station.

Table 3.7 Frequency of Rail Services serving Dapto Railway Station

Direction	Weekdays				Weekends	
	AM Peak	Daytime	PM Peak	Evening	Daytime	Evening
Northbound	2tph	1tph	1-2tph	1-4tph	1tph	1tph
Southbound	2tph	1tph	1-2tph	1tph	1tph	1tph

Note: tph = trains per hour

The service frequency levels quoted in **Table 3.7** are approximate only, as services do not operate to a consistent clock face timetables. The infrequency and irregularity of services is a disincentive to travel, as waiting times can be significant and variable, requiring passengers to plan around the rail timetable. Infrastructure constraints, including the single track are impediments to any increase in service frequency. At-grade road crossings are also considered an impediment to increasing service frequency due to the additional delays.

A brief analysis of the potential rail patronage catchment was undertaken by estimating travel times to and from the site using existing rail services. The estimates of travel time were derived from:

- An average of travel times quoted in the Cityrail timetable for the South Coast Line;
- An average waiting time between buses arriving at Dapto town centre or railway station and the departing train, and vice versa, during three different periods of the day and for allowing for both arriving and departing trains in each direction;
- An allowance for sufficient walking time between the town centre bus stops and the railway station;
- No allowance for walking time between the site and the bus stops, as bus stops will be located along both the Avondale Road and Huntley Road frontages of the site; and
- No assessment of the walking catchments of the railway stations at the origin/destination.

Presently, the service frequency and timing of bus and rail services does not facilitate easy or convenient intermodal transfers. An average transfer time of 20 minutes was adopted based on a comparison of the bus and rail timetables, combined with a 10 minute average travel time from the IIHP site to the Dapto town centre or railway station.

For this reason, all origins or destinations along the rail line are greater than 30 minutes travel time from the IIHP site. **Figure 3.8** presents the indicative travel time to and from the site via rail services. These times are indicative only and can vary significantly.

Due to the poor service frequency on both rail and bus services, the time taken to transfer from rail services at Dapto and reach the site indicates that rail services are unlikely to be viewed by travelers as an attractive mode of transport to reach the site. Unless duplication of the track and increased service frequencies are implemented along this section of the rail network it would be expected that rail will only play a small part in the provision of transport services to this development.

This map is indicative only and not to scale

Public Transport Travel Time - Rail

figure no: 3.8 | date: 02.02.2009 | project no: FR107077

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3.3.2 Proposed Huntley Railway Station

As part of planning for the West Dapto Urban Release Area, a new railway station was proposed adjacent to the Huntley Road bridge over the South Coast railway line, 3km south of Dapto station. The station was a long-term proposal, with the intention of forming the focus of a higher density residential node and assisting the provision of viable public transport services. Railcorp estimated that the critical point for determining whether the station would be provided or not would be reached in 10-15 years time. The Growth Centres Commission review of planning for the West Dapto Urban Release Area in November 2008 questioned the need for the provision of a railway station at Huntley, indicating that it was unlikely that development of the release area would produce sufficient patronage to justify the cost of the station and associated track amplifications.

Should the proposed Huntley railway station be constructed, the development site would be located between 700m (closest point) and 1.1km (furthest point) from the station platforms. Provided that frequent services were provided, it would be anticipated walking to and from the railway station would be an attractive option for visitors and in particular employees to the centre.