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Traffic and Services Report
Leederville Masterplan
Town of Vincent

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Connell Wagner

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Contents

1. Executive Summary

1.1 Introduction

The Town of Vincent "aims to create a social, physical and economic environment where people universally feel invited to live, work and play." To initiate this, the Town has undertaken Masterplanning for the area bounded by Richmond Street, Oxford Street, Leederville Parade and Loftus Street.

The Town is now entering into the delivery phase of this project and appointed Connell Wagner to assist with the investigation of infrastructure works and the traffic aspects of the Plan. In particular the focus was on the areas of land within the Masterplan area that are owned by the Town of Vincent.

1.2 Land Use

The Leederville Masterplan envisages the following maximum additional land use (nett lettable) in the area:

Precinct	Commercial (m^2)	Mixed business (m^2)	Residential (dwellings)	Education (m^2)	Recreation (m^2)
Oxford Street North	1,160	570	50	2,550	
Education / Sports and Recreation				10,050	
Loftus Street Civic Precinct	2,300			3,490	4,100
Oxford Markets	3,400	3,880	130		
Entertainment Precinct	3,610	2,480	40		
Oxford Town Square	3,400	1,910	175		(1,800)
Carr St Residential			490		
Newcastle Street Commercial	36,260				
TOTAL	50,130	8,840	880	16,080	2,300

This compares with the estimated existing land use of:

TOTAL	74,800	10,300	140	20,900	11,300

1.3 Services

Connell Wagner has liaised with the service authorities in the area and collated a plan of the major services infrastructure within the Masterplan boundary.

Generally, the size and location of the services is as expected. The main exceptions are:

- A Water Corporation main drain that takes stormwater from the area to the west of the freeway and the Masterplan area down to Mounts Bay Road.
- Major optical fibre cables.

The servicing requirements for the Town owned land were calculated based on the land uses and heights of buildings proposed in the Masterplan. From this order of magnitude cost estimates were obtained from the relevant service authorities or estimated based upon past project experience.

Water	$	350,000
Wastewater	$	480,000
Gas	$	55,000
Power	$	1,725,000
Telecommunications	$	6,000

1.4 Traffic

A site visit was conducted to determine the existing traffic patterns, including the turning restrictions at intersections, and the general parking arrangements.

Using the land uses from the Masterplan traffic generation for the whole of the area was calculated. Two timeframes were considered; 2014 when the Town owned land will be fully developed, and 2024 when the whole of the Masterplan area will have reached the higher densities expected. The generation rates used reflected TravelSmart estimates and the existing demographic information, in relation to the car ownership and transport modes for trips to work, within the Leederville West Perth area. The traffic was distributed across the network and the functioning of the critical Oxford Street intersections was examined. This showed that proposed changes to Vincent Street should emphasise road safety, rather than capacity, and Leederville Parade, whilst experiencing the greatest increase in traffic, will continue to operate satisfactorily.

An important part of this study is the movement and safety of vulnerable road users. To encourage less car trips, there need to be safe and practical alternatives. The pedestrian network was examined and the following recommendations made:

- The pedestrian desire lines to and from TAFE, the station and the Water Corporation, as the three main pedestrian destinations, need to be legible and active throughout the day and into the evening.
- The current building guidelines need to incorporate a higher requirement for end of trip facilities for cyclists.
- There is a need for a pedestrian north-south link from Newcastle Street to Vincent Street to allow permeability of the Carr Place Residential precinct.
- There is a need for an east west pedestrian link from Newcastle Street through to the Food precinct (Oxford Markets).

An increase in public transport to the area was seen as an essential component of the development's desire to be a transit orientated development. In particular, the bus service needs to be improved to provide integration with the rail service and the east of the Town. There are ongoing discussions between the Town and DPI regarding the introduction of Central Area Transit (CAT) buses.

1.5 Parking

The provision of parking produces a dichotomy: the perception that the businesses are suffering in the area due to a lack of parking and the desire to minimise parking provision in line with transit orientated developments. Previous studies have shown that there is a sufficient number of parking bays, however, they are not necessarily in the highest demand locations or of adequate condition.

The commercial reality of residential developments is that new apartments need one or two private parking bays in order to sell. In the Carr Place Residential precinct this is seen as acceptable. However, for the high rise residential developments, this needs to be re-examined. It is common practice for social housing to be developed without parking spaces and therefore a mix of social and private housing could achieve a development with an average below one car bay per apartment.

The focus of the parking in the area should be for the local community, rather than for long term commuter parking. On street parking adds activity to the streets and acts as a traffic calming measure, therefore it should be retained.

1.6 Workshop

A workshop on the Masterplan was organised by the Department for Planning and Infrastructure. Connell Wagner presented an interim report on this Traffic and Services Report.

2. Introduction

2.1 Leederville Masterplan area

The Leederville Masterplan encompasses the area of land bounded by Loftus Street, Leederville Parade, Oxford Street, and Richmond Street. The Town of Vincent aims to increase the intensity of land use over this 34ha site.

Included in this Masterplan area are the Water Corporation premises and the TAFE Leederville Campus, for which separate Masterplans are being prepared by the relevant authority.

The existing land use within the Masterplan area is a mix of residential, commercial / offices, retail, and entertainment. The built height is generally 1 to 2 storeys.

Sketch SK-001, contained within Appendix A, presents a plan of the Masterplan area.

2.2 Methodology

2.2.1 Meeting with Town of Vincent staff

A project conception meeting was held at the Town's offices with appropriate officers in August, prior to commencement of the study. This meeting established the final scope of work, project timeline and available information. The meeting also looked at the two key drivers of this project, which were the lack of parking for visitors to the area and the relocation of major services from the Avenue Car Park. The relocation of the Water Corporation's stormwater drain and major sewer allows the Town to amalgamate land that was previously crossed by the services corridor. The land, of the now empty services corridor, is held by the Town.

2.2.2 Site visit

A site visit to the Leederville Masterplan area, to examine the condition and constraints of the transportation network, drainage system and infrastructure network that exists in this area, was conducted. This visit looked at the traffic movement at the existing intersections, general land use and traffic patterns.

2.2.3 Data collection

The following reports were reviewed for background to this study:

Oxford Centre Study	Taylor Burrell	2000
Vincent Vision 2024	Town of Vincent	2005
Car Parking Strategy	Town of Vincent	
The Leederville Masterplan - Discussion Paper	Town of Vincent	2007

3. Town of Vincent landholdings

3.1 Background

The Town owned land is generally located within the southern portion of the Masterplan area; a plan of the landholdings is contained within Appendix A.

The Masterplan divides the landholdings into a number of sites, being:

- Site 1 – the northern part of the current The Avenue Car Park and has an indicative land area of 3,900m^2.
- Site 2 – the southern part of the current The Avenue Car Park and has an indicative land area of 3,200m^2.
- Site 3 – the current Oxford Street Park and has an indicative land area of 3,850m^2.
- Site 4 – the northern part of the current Frame Court Car Park and has an indicative land area of 2,500m^2.
- Site 5 – the southern part of the current Frame Court Car Park and the HQ Youth Facility Skate Park. It has an indicative land area of 2,250m^2.
- Site 6 – numbers 291 (vacant) and 295 (house and land) Vincent Street. These have a combined land area of approximately 1050m^2.

These sites are composed of a number of lots. The Town will need to amalgamate existing lots and carry out new subdivision. The Masterplan proposes for this to occur once the redevelopment plan is approved.

3.2 Existing land use

The existing land use of the Town owned land is predominately as car parks. The HQ Youth Facility and one house are also contained on Town land.

The level of service infrastructure required by these existing land uses is minimal when compared to the proposed redevelopment. As such, the existing level of service required by these facilities is assumed to be zero.

3.3 Proposed redevelopment

The Town of Vincent sites fall within three precincts as identified by the Masterplan:

- Food precinct (Oxford Street Markets) – Sites 1 and 2
- Town Centre precinct – Sites 3, 4 and 5
- Carr Place Residential precinct – Site 6

The redevelopment of Sites 1 to 5 is proposed to occur via a Joint Venture. It is noted that the concept plan for the Town of Vincent landholdings may change as a result of the financial arrangements of the Joint Venture. For the purpose of this report, the proposed development of the sites shall be in accordance with the Masterplan *(Engineering Consultancy Services Leederville Masterplan, Town of Vincent, July 2007),* and as follows:

Site 1

"Under the current proposal, the land will be sold for a supermarket (approximately 1,250m^2) and speciality shops (700m^2) constructed on a new road ("The Avenue"). A multi-level car park for 360 bays (eg 90 bays per level) will also be built over the supermarket and the Town will retain ownership of this."

Site 2

"The land will be sold and redeveloped for:
Residential tower (16-24 storeys) – allowing 1,000m^2 per residential floor.
Podium (ground level for shops, 2-3 levels for commercial/residential)

Car park – some below ground level"

Site 3

"It will be sold and redeveloped for:
Podium (3 levels) for ground floor shops, offices and commercial on levels 2 and 3 / 2,000m^2 / floor for commercial
A high rise residential tower (up to 24 storeys) will be constructed above."

Site 4 and Site 5

A 360 (maximum) multi-bay car park and shop front to car park. Some residential units.

Site 6

"These lots are recommended to be sold and redeveloped for mixed commercial / residential (shops / offices on the ground floor, with offices / residential above)."

In addition, a new civic park is proposed to be constructed north of Site 3 (west of Site 4) on land currently being used as part of the Frame Court Car Park (off Oxford Street).

3.3.1 Building heights

The Masterplan document provides a visual indication of building heights within the Masterplan area. For the Town owned land, an 8 storey building is proposed for Site 1 and an icon building proposed for Sites 2 and 3. The icon buildings have a height of 16 – 24 storeys.

The Town of Vincent has carried out economic analysis for 8, 16 and 24 storey options. The traffic and services investigation will be carried out for a 24 storey icon building situation. This will establish the maximum estimated requirements, and hence costs, for servicing these developments.

3.3.2 Timeframes

The Leederville Masterplan Joint Venture is potentially a ten year project, with the redevelopment of Town owned land taking between 2 – 7 years. Redevelopment of land outside the town's ownership (eg Water Corporation, TAFE) will follow and may take longer (*Engineering Consultancy Services Leederville Masterplan, Town of Vincent, July 2007).*

Two key dates are assumed in this report: 2014 for the development of the Town owned land and 2024 for the fruition of the Masterplan.

4. Yield from redevelopment

The Masterplan covers an area of land that is already developed and will undergo an intensification of land uses.

Upon full redevelopment occurring, the following increase in number of dwellings (residential) or m^2 floor space (mixed business, commercial, or education) is expected.

Table 1: Yield from redevelopment (nett lettable area)

Item	Option			
	Total area		Town owned land only	
	24 storey	16 storey	24 storey	16 storey
Commercial offices m2 (NLA)	50,120	50,120	5,100	5,100
Mixed business m2 (NLA)	8,850	8,850	4,130	4,130
Residential dwellings	880	770	310	200
Education m2 (NLA)	16,080	16,080	0	0
Recreation / civic m2	2,300	2,300	0	0

Appendix A contains the calculation of these figures.

The Town of Vincent landholding calculations do not include the small Vincent Street Town owned land. It is assumed that this will be sold and redeveloped outside of the Joint Venture, and the subsequent increase in residential dwellings is accounted for in the remaining Masterplan area.

The redevelopment will take place across the eight precincts identified in the Masterplan. Table 2 shows the spread of the development and gives a comparison with the existing land use.

Table 2: Nett lettable area per precinct

Precinct	Commercial (m^2)	Mixed business (m^2)	Residential (dwellings)	Education (m^2)	Recreation (m^2)
Oxford Street North	1,160	570	50	2,550	
Education / Sports and Recreation				10,050	
Loftus Street Civic Precinct	2,300			3,490	4,100
Oxford Markets	3,400	3,880	130		
Entertainment Precinct	3,610	2,480	40		
Oxford Town Square	3,400	1,910	175		(1,800)
Carr Place Residential			490		
Newcastle Street Commercial	36,260				
TOTAL	50,120	8,850	880	16,080	2,300

This compares with the estimated existing land use of:

TOTAL	74,800	10,300	140	20,900	11,300

5. Planning Issues

5.1 Town Planning Scheme No. 1

The current Town Planning Scheme (TPS) No. 1 is under review by the Town. It is expected that the revised TPS will be gazetted in June 2009. The parking ratios and trip generation rates that are considered in this report will need to be incorporated into the TPS No.2, as appropriate.

5.2 Oxford Centre Policy and Vision 2024

These two reports have been reviewed and they cover the strategic planning issues for the area. Connell Wagner is in agreement with the traffic recommendations of the reports, with the exception of the provision of raised plateaus for pedestrian crossings in Oxford Street. These plateaus cause confusion as to who has priority at the crossing points.

The recommendations of the reports have been used to guide the traffic generation and distribution from the new developments, both for the Leederville Masterplan area and the Town owned land.

5.3 Built Form Guidelines

JCY Architects are currently preparing built form guidelines for the Masterplan area. The guidelines are currently at a draft status.

5.4 Water Corporation

Connell Wagner initiated a meeting with the Water Corporation after being informed by the Town of Vincent that the Water Corporation is undertaking masterplanning of its own. The purpose of the meeting was to discuss the Water Corporation Masterplan (WCMP) the level of input into the Plan and what Water Corporation would like to get out of the Masterplan.

The Water Corporation provided a brief introduction to the WCMP. The plan is at the 'concept' stage, and still in the process of being finalised. The plan concentrates on the Monarch car park (NW of site), the Operations Centre building (N NE of site), and car parking / access to the Water Corporation site.

5.4.1 Timeframes

Water Corporation presented two broad timeframes and associated actions for the WCMP. These are concept only and not yet finalised.

2010 / 2012

- The Monarch car park site to be redeveloped as a 6 storey building with 2 or 3 underground car park levels (195 car bays). This building could provide for ~600 people.
- The new building is intended for use by the Water Corporation, both in terms of office space and car parks.
- Water Corporation is exploring the idea of a privately run gym to be located in the building. The gym would be open to both Water Corporation staff and the public. The retail frontage of the gym could assist in improving the streetscape of Newcastle Street.
- If Water Corporation ever considers selling the new building, it has "stand alone" parking.
- The access from Newcastle Street (main access to site) is to be reconfigured, and also the general entrance area of the Water Corporation buildings.
- A childcare facility is to be established in the SW corner of the site, with access from Frame Court. The childcare facility would be open to both Water Corporation staff and the public.

2015 / 2017, or later

- The Operations Centre building is to be demolished. Another 6 storey building will be built in its place.

- The two new buildings (Monarch car park site and the Operations Centre site) will provide approximately the same floor space as the existing Water Corporation building.
- The existing main Water Corporation building may need refurbishment at this point in time; the two new buildings could provide office space for the existing employees whilst this occurs.

5.4.2 Comments on Leederville Masterplan

Water Corporation outlined some parts of the Masterplan that they do not support or agree with at present:

Frame Court extension

Frame Court is shown as a public road from Leederville Parade through to Newcastle Street on the Masterplan. Water Corporation do not want Frame Court to be extended through to Newcastle Street as this would sever their site.

Replacement Operations Centre building

The Masterplan shows this building to be a 16 – 24 storey iconic building. Water Corporation are not planning for this, they would prefer to build a wider 6 storey building. The Water Corporation would not build a 16 – 24 storey building themselves - the eventual number of storeys may depend upon the financial position / arrangements at the time of development eg build in partnership with a private developer.

Walkway from Water Corporation site towards Oxford Street

The Masterplan shows a proposed walkway from the Water Corporation site to Oxford Street, which Water Corporation do not consider to be appropriate. The walkway follows an existing services corridor, which is freehold land held by the Water Corporation. Lease agreements also exist for parts of this land.

Security for the Site

The Water Corporation has security issues with the proposed walkway; it connects the public to the Water Corporation buildings.

Water Corporation presented security issues that may impact upon the Masterplan:

- Security is being increased. The Water Corporation would not support proposals that reduce the security of the building eg public parking under the building in the evening.
- The skate park is considered to be a factor in presenting security problems to the Water Corporation building.

Outcomes

The Water Corporation is a major stakeholder in the area and discussed the outcomes they would like from the Masterplan:

- The Water Corporation plans to be situated in Leederville for the “long term” and the number of employees is growing. Onsite parking at the Water Corporation is full, and some employees park in the Town of Vincent public car parks. Demand for parking within these public car parks is generally expected to increase as the number of Water Corporation employees increases, the Masterplan should consider and aim to address this demand.
- Lighting and security to be considered and improved if necessary eg between train station and Water Corporation building.
- Traffic management and layout of roads, to enable safe and efficient access to the childcare facility from Frame Court.

Inputs

The Water Corporation outlined inputs they could provide to the Masterplan:

- Future workforce planning information to Connell Wagner, if needed.

- Input into the number of car parks, if the number of car parks is being reduced by a large extent.
- Additional information / advice if appropriate and as required by Connell Wagner during the Masterplan services and traffic investigation.

5.4.3 Other points of discussion

There were several other items touched on in the discussion:

- The Water Corporation is in favour of extending CAT buses through Leederville, with due consideration to the financial implications.
- The Water Corporation believes that Newcastle Street should not be made one-way.
- Water Corporation employees utilise a number of different travel methods and travel routes. On an individual person basis, the method and route may change as often as day-to-day.
- Water Corporation have considered / are considering a number of ideas to help reduce parking demand eg promotion of car pooling, fee parking for employees under the Water Corporation buildings.
- The Monarch car park site was discussed in the past (between Water Corporation and Town of Vincent) as being developed as a stand alone parking building. This idea is no longer current.
- The development of the Monarch car park site, especially during the construction period, presents a good opportunity to encourage public transport.
- The Water Corporation has a 'Green Transport Plan' which may be bought back into focus within the next few years.
- The growth in number of Water Corporation employees is expected to increase demand for and put pressure on parking within the Town of Vincent.

5.5 TAFE

It is understood that Central TAFEWA is undertaking masterplanning for its campus on Richmond Street. Central TAFE provides training for some 20,000 students across its eight sites. Its own masterplanning includes the development of a new campus in Northbridge, with two new buildings on Newcastle and Aberdeen Street. The Leederville campus will focus on health, education and community services.

There is strong pedestrian demand from the rail station to the TAFE, which is considered in setting the standard for the footpaths.

5.6 Expansion of the Railway

With the opening of the railway on 23 December 2007 there will be an increase in the catchment area for the Leederville Station. This will allow residents of the area to potentially travel to work by train in the southern suburbs, in particular to the education and employment areas in Murdoch, and will also allow workers from the southern suburbs to travel to work and education in Leederville.

There is also the potential for Leederville to become an entertainment destination, similar to Fremantle or Northbridge, for residents of the southern suburbs.

This puts greater emphasis on the need to upgrade the station to create an entry statement and to encourage people onto the train.

The expansion of the railway will not generate significantly more vehicle trips as there are no plans for park and ride facilities. However, better arrangements for set down and pick up should be developed.

5.7 WA Local Government Association

The WA Local Government Association (WALGA) is the peak industry body advocating on behalf of the State's 142 Local Governments and negotiating service agreements for the sector. The association is currently based in West Perth and has recently reached agreement with the Town of Vincent to relocate to a site adjacent to the Town's administration centre. This relocation is expected to involve 150-200 employees.

6. Services

6.1 Liaison with external authorities

In liaising with the various authorities Connell Wagner investigated the adequacy of the existing infrastructure services within the study area to cater for future demand. The forward planning that has been undertaken by the various authorities to establish new infrastructure or upgrading requirements and to establish proposed alignments and corridor requirements was also investigated. Liaison with the authorities established broad design parameters. Costing information, which was available within their forward works estimates for the proposed infrastructure upgrading, was also obtained. If cost estimates were not available, an indicative figure is provided based upon Connell Wagner's past project experience. Any constraints were identified during these discussions and are documented below.

Staging options for the provision of infrastructure was also discussed with the various relevant authorities, to understand the costings and timings associated with the provision of upgraded services.

6.2 Mapping

All the current and proposed services and infrastructure alignments are shown on a mapping base of the Masterplan area, refer Appendix B for sketches SK-003 and SK-004.

6.3 Water Corporation (water)

6.3.1 Existing infrastructure

The Water Corporation has an existing network of water infrastructure within the Leederville Masterplan area. This network services existing land developments, and consists of Cast Iron (CI) and Reinforced Concrete (RC) water mains located within the road reserve, often on either side of the reserve. The network consists of both reticulation mains and distributions mains (a main of 300mm or larger in size). The distribution mains include a 535 RC main along Vincent Street, and a 460 CI main along Oxford Street.

When redevelopment works are undertaken, the Water Corporation assets should be anticipated, located and protected during excavation and construction activities. If the works are in close proximity to a strategic asset (distribution main or pressure main) the Water Corporation should be notified and, if required, a 'Clearance to Work' permit obtained.

In the vicinity of the Town of Vincent landholdings, the existing Water Corporation water infrastructure includes:

- Reticulation mains along Vincent Street, Newcastle Street, Frame Court, and Oxford Street;
- A distribution main along Oxford Street; and
- A distribution main through the intersection of Leederville Parade and Oxford Street.

The redevelopment of the Town of Vincent landholdings is not expected to conflict with existing water infrastructure. From the plans provided by Water Corporation, no mains traverse the Town of Vincent sites. It is noted that the plans do not show property connections, but as the Town land is used for car parks, the presence of live property mains is unlikely.

If the streetscape is modified, or road works undertaken, the Water Corporation assets will need to be accounted for, as necessary.

6.3.2 Town of Vincent landholding redevelopments

Redevelopment of the Town of Vincent sites will generate demands for a potable water supply. The Water Corporation was provided with estimated demand rates, as contained within Appendix B.

The Water Corporation advised that reticulated water infrastructure is available to serve the area in accordance to the current Water Corporation Scheme Planning. Further, the existing water infrastructure is adequate to serve the proposed developments and currently no upgrading of infrastructure is required.

Dependent upon the development designs and their exact locations, main extensions may be required to serve the developments. Water Corporation noted that generally, lots within the vicinity of the Town of Vincent landholdings have frontage to a water main.

Prior to the commencement of works, approval from the Water Corporation Building Services section is required.

The information was provided by Water Corporation on 11 January 2008 and is valid for six months.

6.4 Water Corporation (wastewater)

6.4.1 Existing infrastructure

The existing Water Corporation network of wastewater sewer infrastructure within the Leederville Masterplan area is located both within the road reserves and within private property. Particular infrastructure items to note include:

- 150VC (Vitrified Clay) sewer line at the back of lots between Vincent Street and Carr Street;
- 150VC and 150P (unplastisized Polyvinylchloride) sewer line through lots located between Carr Street and Newcastle Street; and
- 1525RC sewer line through the Water Corporation services corridor (which runs south-east from the Vincent Street / Leederville Parade intersection to Loftus Street, aligned with the northern boundary of Town of Vincent site 3 and 4).

These infrastructure items will need to be addressed as required if amalgamation of lots occurs and / or developments are desired to occur over the present location of the infrastructure.

When redevelopment works are undertaken, the services corridor assets should be anticipated, located and protected during excavation and construction activities.

In the vicinity of the Town of Vincent landholdings, the Water Corporation sewer infrastructure includes:

- A 1800RC line along Leederville Parade (north of intersection with Oxford Street);
- The 1525RC line within the services corridor. This line has recently been realigned to allow for amalgamation of the Town site's 1 and 2; and
- Smaller lines along Oxford Street, and property connections.

The redevelopment of the Town of Vincent landholdings is not expected to conflict with major items of existing wastewater infrastructure. Relocation of the 1525RC line has been undertaken by the Town of Vincent, and the smaller lines which in part traverse Town land are expected to be replaced and/or relocated as part of the redevelopment works.

As similar to the Water Corporation water infrastructure, if the streetscape is modified or road works undertaken, the Water Corporation assets will need to be accounted for as necessary.

6.4.2 Town of Vincent landholding redevelopments

Redevelopment of the Town of Vincent sites will generate flows of wastewater. The Water Corporation was advised estimated flows, as contained within Appendix B.

The Water Corporation advised that reticulated sewer infrastructure is available to serve the area in accordance to the current Water Corporation Scheme Planning. Further, the existing sewer

infrastructure is adequate to serve the proposed developments and currently no upgrading of infrastructure is required.

Dependent upon the development designs and their exact locations, main extensions may be required to serve the developments.

Prior to the commencement of works, approval from the Water Corporation Building Services section is required.

The information was provided by Water Corporation on 11 January 2008 and is valid for six months.

6.5 Alinta

6.5.1 Existing infrastructure

Alinta has an existing network of gas reticulation infrastructure within the Leederville Masterplan area. This network includes a high pressure gas main, which runs along Loftus Street, Richmond Street, the northern portion of Oxford Street, Melrose Street, and Stamford Street. Medium pressure distribution mains also traverse the Masterplan area, and are located within the road reserves.

When redevelopment works are undertaken, no gas pipeline can be cut, altered or removed without approval from Alinta, and attendance by Alinta personnel prior to and during the works is generally required. This applies to works including the excavation of pipelines, the crossing of pipelines by other facilities (eg roads, drains), road works and road widening, and structural installations.

In the vicinity of the Town of Vincent landholdings, the existing infrastructure includes:

- A high pressure main at the intersection of Vincent Street and Leederville Parade;
- A medium pressure main at the intersection of Newcastle Street and Oxford Street;
- A medium pressure main along Frame Court, and south from the intersection along Leederville Parade; and
- Abandoned pipelines along Vincent Street, Oxford Street, Frame Court, and the intersection of Oxford Street with Leederville Parade.

The redevelopment of the Town of Vincent landholdings is not expected to conflict with the high pressure gas main, for which Alinta has additional requirements if works are undertaken within 15m of the main.

The medium pressure mains are also not expected to conflict with the Town of Vincent developments, although their presence should be noted where necessary and may need consideration if the streetscape is modified or road works carried out.

The abandoned pipelines will need to be accounted for during the redevelopment works, as their location is beneath the existing skate park, and close to the Leederville Parade / Oxford Street intersection and train station pedestrian bridge. The road layout and streetscape in this area are potentially to be modified under the Masterplan works.

6.5.2 Town of Vincent landholding redevelopments

The redevelopment of the Town of Vincent landholdings is expected to generate additional residences, commercial offices, and mixed business. Of these, the residences and restaurants / cafes (included as part of mixed business land use) are expected to generate a potential demand for reticulated gas.

Alinta was advised that redevelopment of the Town land could result :

- In the order of 300 new residences contained within three multi-storey buildings, on Sites Two, Three, and Four; and
- A nominal six restaurants, on Sites One, Two, Three, and Four.

These developments are generally moderate consumers of gas, and Alinta advised that the existing network should have the capacity to service them based on the current network situation.

To service the developments, discussions with Alinta provided the following information:

- Sites One, Two, and Three – a gas mains extension of approximately 350m along Leederville Parade.
- Site Four – potential to service from the existing gas main in Frame Court, depending upon the required gas meter location and actual location of building on the site.

It is noted that gas is not considered an 'essential' service, and may be substituted for by electricity. With reference to this, Alinta do not generally undertake forward planning of works, and there is no current forward planning for the Masterplan area.

6.6 Western Power

6.6.1 Existing infrastructure

The existing Western Power network within the Leederville Masterplan area consists of overhead and underground infrastructure, generally located within the road reserve. High voltage cables (underground) run along Vincent Street, Loftus Street, Leederville Parade (east of Frame Court intersection), and Frame Court. Overhead high voltage cables run along Newcastle Street and Carr Place. Low voltage cables and street light circuits also generally run along each road, as is typical in a suburban area.

When redevelopment works take place, Western Power should be contacted if the works are near overhead power lines or involve excavation (and therefore possible conflict) in the vicinity of underground cables.

In the vicinity of the Town of Vincent landholdings, the existing Western Power infrastructure includes:

- Within the road reserve, underground and / or overhead cables along Vincent Street, Leederville Parade, Frame Court, and Oxford Street, and street light circuits.
- At the southern section of Site 3 (beneath the existing skate park) underground cables.

The redevelopment of the Town of Vincent landholdings is not expected to conflict with Western Power assets located within the road reserve. If the skate park is redeveloped, the underground cables may need relocating.

If the streetscape is modified or road works undertaken, the Western Power assets will need to be accounted for and protected as necessary.

6.6.2 Town of Vincent landholding redevelopments

Redevelopment of the Town of Vincent sites will generate demands for electricity. Western Power was advised estimated demands, as contained within Appendix B.

Correspondence between Connell Wagner and Western Power provided the following information:

Planning

The capacity plans of Western Power do not specifically target the potential developments as outlined in the Leederville Masterplan. Based on the information supplied (The Leederville Masterplan Public Consultation Discussion Paper, Town of Vincent 2007), Western Power will consider the potential new loads in their long term development plans.

For development of the Town of Vincent landholdings, Western Power has noted the estimated future demands in their long term planning in the area, and will make provision for them in its network reinforcement plans over the next five years. Western Power advised that their forward planning currently includes some network reinforcement in the Leederville area, with an approximate timeframe

of around 2010 / 2011. This may assist in the connection of initial additional loads. Loads coming towards the end of the 7 year development timeframe will need to be assessed against the network loading of the day; network reinforcement is likely to be required.

Staging of works

For the overall Masterplan area, the additional electrical load arising from renewal works will appear gradually over time and in line with the rate of development. From a planning perspective, Western Power stages its works such that additional capacity is installed to meet demand as it arises.

New infrastructure

The existing distribution network within the Leederville Masterplan area is supplied from the North Perth substation. The existing network capacity would need to be augmented to support the potential load growth as created by renewal works under the Masterplan.

In general, Western Power would undertake feeder extension works, or construction of new feeders; most likely from the North Perth substation. A possible advance of the substation capacity may also occur.

Detailed information and costs

To connect the Town of Vincent developments to the Western Power network, standard connection assets would be required, to provide access to the distribution network. It is likely network backbone reinforcements will also be required.

Details of required infrastructure and costs are derived from an analysis of the network capacity of the day ie when a connection application is submitted by the developer. The quote given by Western Power is valid for approximately two months. It is noted that an assessment made now of the connection costs may not give a clear reflection of future (actual) costs.

The allocation of cost (for backbone network reinforcement) to the customer is dependent upon the load size and tariff revenue derived from the customer. This calculation is done as part of the quotation process when application to connect is made.

Recommended actions

That the Town of Vincent make an application for a budget cost for connection of the new loads, through Western Power's customer connection gateway.

However, it is noted that this cost may not accurately reflect the future (actual) cost of connection.

6.7 Telstra

6.7.1 Existing infrastructure

The existing Telstra infrastructure within the Masterplan area consists of minor and major cables, as is typical in a suburban area. The cables are generally located within the road reserves. Major cables, including in some instances optical fibres, are located along the majority of roads within the Masterplan area. Redevelopment works within lots are not expected to conflict with these cables, but they should be located and protected as necessary during road works and / or modifications to the streetscape.

In the vicinity of the Town of Vincent landholdings, the existing Telstra infrastructure includes:

- Major cables and / or optical fibres along Leederville Parade and Oxford Street;
- Minor cables along Leederville Parade, Oxford Street, Vincent Street, Frame Court, and within the services corridor;
- Minor cables at the southern section of Site 3 (beneath the existing skate park); and
- A mobile telephone base station on Site 1 (refer section 6.7.3 for details).

The redevelopment of the Town of Vincent landholdings is not expected to conflict with Telstra assets located within the road reserve. The minor cables beneath the skate park may need relocating if the site is redeveloped.

6.7.2 Town of Vincent landholding redevelopments

Redevelopment of the Town of Vincent sites will require telephone connection to the new buildings, as this is considered an essential service. Telstra advise that they can provide standard copper telephone lines to the developments.

It is anticipated that the developer will also wish to provide broadband internet and "smart" wiring facilities to the buildings. These facilities can be provided as part of Telstra's Smart Community service, which includes cabling for access to high speed broadband and Foxtel.

Preliminary discussions with Telstra indicated that infrastructure surrounding the Town of Vincent landholdings is well developed, and the cost to provide connection to the Smart Community main cables should be the standard connection fee which is dependent upon the number of floors and level of services required. Upon investigation by Telstra, if the network capacity is deemed insufficient, the cost of upgrades / extensions will be negotiated between Telstra and the developer.

6.7.3 Mobile Telephone Base Station

A Mobile Telephone Base Station is located on a tower within the 'The Avenue' car park site. From initial investigations the structure currently provides mobile coverage from multiple Carriers, being Telstra, and 3GIS (a joint venture between Hutchison and Telstra), both which lease the land from the Town of Vincent. The structure was originally constructed in the mid 1990's.

The base station provides mobile coverage to the surrounding areas including the main shopping, residential and restaurant precincts along Oxford Street and surrounds, including up into West Leederville.

This base station is also providing continuation and depth of coverage for users along the immediate facing section of the Mitchell Freeway, including commuters travelling via train. The construction of buildings on this site will interfere with services provided by the tower.

The proposed redevelopment of the 'The Avenue' car park presents a potential opportunity to relocate the antennas to the top of the new building(s). The Carriers have registered legal tenure established with the Town of Vincent for use of the land, and negotiations would need to occur between the affected parties. Specific attention will need to be paid to whether a relocation clause exists within the current tenure documentation.

If the option to relocate to the new buildings is to be considered, the following is noted:

- The establishment of antennas on top of buildings can be incorporated at the architectural stage of planning, to lessen the visual impact of the infrastructure
- Involving the Carriers at an early stage provides them with the opportunity to work with the local council and community on issues such as future expansion and introduction of new technologies
- The 'Owners' of the new building would become the new Lessors to the Carriers, thus resulting in a potential ongoing rental income from the Carriers
- The Carriers are more likely to be in support of relocation to a multi-story building whereby its height above ground level is not compromised by the move. Carriers' antenna height is critical to the level of service it is able to provide, with either a 16 storey or a 24 storey there would be an opportunity for the Carriers to increase their coverage.
- The mobile phone Carriers are more likely to support the new infrastructure being in approximately the same location as the existing tower, to ensure (as a minimum) the same level of coverage.

- If the base station is relocated atop a new building, the development of a subsequent neighbouring building at a greater height may interfere with the coverage (ie "block" the signal).
- A temporary arrangement to allow continued service whilst development is occurring is likely to be requested by the phone Carriers.

6.8 Amcom and Optus

6.8.1 Existing infrastructure

Amcom and Optus have existing underground infrastructure within the Leederville Masterplan area. The location of this infrastructure is along Leederville Parade, Frame Court, Oxford Street, Newcastle Street, and Loftus Street. The assets are located within the road reserves.

The redevelopment of the Town of Vincent landholdings is not expected to conflict with Amcom and Optus existing infrastructure.

If the streetscape is modified or road works undertaken, the infrastructure will need to be accounted for and protected as necessary. It is noted that the Amcom fibre optic cable (along Frame Court) services a critical piece of third party infrastructure, and disruptions to this service are unlikely to be supported.

6.8.2 Town of Vincent landholding redevelopments

Amcom and Optus were advised of the Leederville Masterplan and developments proposed for the Town of Vincent landholdings. To date, no response has been received as to any planned works within the vicinity of the Town of Vincent landholdings.

It is expected that the telecommunication infrastructure requirements of the developments will be serviced by Telstra, and thus connection to Optus or Amcom infrastructure would not be required.

7. Cost estimate

Any opinion or estimate of costs by Connell Wagner will be made on the basis of Connell Wagner's experience and qualifications and will represent Connell Wagner's judgment as an experienced and qualified professional engineer, familiar with the construction industry. However, Connell Wagner has no control over the cost of labour, materials, equipment or services furnished by others or over Contractors' methods of determining prices or over competitive bidding or market conditions. Therefore, Connell Wagner cannot and does not guarantee that proposals, bids or actual construction costs will not vary from Connell Wagner's estimates.

The cost estimates are given in today's dollars, with no allowance for the potential increase in cost of works over time.

Some of the service authorities had costing information for their forward works. However, due to the uncertain nature of the developments, both in terms of the exact size and the location and orientation within the lots, the service authorities were unwilling to provide cost estimates for the works. In the absence of an estimate from the authority Connell Wagner has provided an order of cost estimate, based upon Connell Wagner's past project experience.

7.1 Water

The Water Corporation advised that the developer is required to fund the full cost of all new works or for the protecting, relocating or modifying of any of the existing Water Corporation water facilities which may be affected by the developments. Land or easements being ceded free of cost to the Water Corporation may also be required.

The works required to provide a potable water supply to the developments are expected to involve possible extensions of the water mains. An assessment of this requirement can be undertaken when the location of the buildings is more certain.

To provide an indicative cost for these potential works, Connell Wagner has assumed the following works:

- Sites 1 and 2 may be serviced by extending a connection to the 460CI water main located along Oxford Street, via Vincent Street and The Avenue. Assume a 150mm diameter main over 150m length.
- Sites 3 and 4 & 5 may be serviced via a direct connection into the 460CI water main (no extension of main required).

The connection to Water Corporation assets is assumed to allow for indicative costing only and Connell Wagner has not undertaken any design work. The connection will require further design investigation and approval from Water Corporation as to actual type and location.

For the above length of pipework, with an allowance for trenching, reinstatement, access chambers, valves, design work and preliminaries, Connell Wagner estimate a sum of $60,000.

Headwork contributions are also likely to be required prior to development of the sites. In accordance with the Water Corporation's Development Services Branch Information Sheets, the amount is estimated to be $ $290,000, for all sites combined and in today's dollars (refer Appendix B for details of this calculation and a per site cost estimate).

Therefore, a total of $350,000 is estimated for the supply cost of potable water to the developments.

7.2 Wastewater

Similar to the provisions for a water supply, the Water Corporation advised that the developer is required to fund the full cost of all new works or for the protecting, relocating or modifying of any of the

existing Water Corporation sewerage facilities which may be affected by the developments. Land or easements being ceded free of cost to the Water Corporation may also be required.

The works required to provide a sewer infrastructure connection to the developments are expected to involve possible extensions of the sewer mains. An assessment of this requirement can be undertaken when the location of the buildings is more certain.

Discussion with Water Corporation indicated that connection to the large diameter existing sewer infrastructure (1525mm or 1800mm) would be highly unlikely due to the cost of connection. A sum of greater than $250,000 could be expected to provide a single connection point to these pipes. Connection to the smaller mains (eg 300VC along part of Oxford Street) is more likely.

To provide an indicative cost for these potential works, Connell Wagner has assumed the following works:

- Sites 1 and 2 may be serviced by extending a connection to the 300VC sewer main located along the southern portion of Oxford Street, via Leederville Parade. Assume a 150mm diameter main over 200m length.
- Sites 3 and 4 & 5 may be serviced via a direct connection into the 300VC sewer main (no extension of main required).

The connection to Water Corporation assets is assumed to allow for indicative costing only and Connell Wagner has not undertaken any design work. The connection will require further design investigation and approval from Water Corporation as to actual type and location.

For the above length of pipework, with an allowance for trenching, reinstatement, access chambers, valves, design work and preliminaries, Connell Wagner estimate a sum of $40,000.

Headwork contributions are also likely to be required prior to development of the sites. In accordance with the Water Corporation's Development Services Branch Information Sheets, the amount is estimated to be $ $440,000, for all sites combined and in today's dollars (refer Appendix B for details of this calculation and a per site cost estimate).

Therefore, a total of $480,000 is estimated for the supply cost of sewer infrastructure to the developments.

7.3 Gas

To construct the gas main extension along Leederville Parade, Alinta advised that a capital contribution of approximately $55,000 (at today's costs) would be required. This cost is paid by the developer of the project or builder, or by the Town of Vincent if the Town chooses to make gas available for the developers.

7.4 Electrical supply

From correspondence with Western Power it has been noted that there is insufficient capacity and infrastructure in the area to provide power to all of the proposed developments. Backbone network reinforcement is likely to be required. All headworks extensions, removals, moving or upgrades to the network external are generally fully funded by the Developer.

The cost of connection is determined by Western Power from an analysis of the network capacity of the day. Western Power has indicated that there are planned network reinforcements within the Leederville area, with an approximate timeframe of 2010 / 2011. As such, a cost estimate undertaken today may not give a correct indication of actual costs to connect the developments when they are built.

Connell Wagner recommends that the Town of Vincent apply to Western Power for a quote of works and budget cost to connect the new loads, through Western Power's customer connection gateway.

However, the change in network capacity over the coming years and hence a potential change in required works and cost should be noted.

Connell Wagner supplies the following example costs for information only. The costs are based upon past project experience of Connell Wagner, and may not accurately reflect the Town of Vincent situation.

- HV subdivision pool
  - The HV subdivision pool allows the cost of installing high voltage infrastructure to be shared among developers of residential subdivisions.
  - The HV Pool System Charge is $277 / kVA.
  - A total demand of 2,330 kVA is estimated for the Town of Vincent developments. Applying $277 / kVA gives $645,000. (note: Town developments also include commercial and mixed business uses)
- Network reinforcements
  - A single developer intended to subdivide their land and to provide sufficient power required network reinforcement. This involved providing new overhead lines from the zone substation and rearrangement of the existing overhead lines. Undergrounding of existing high voltage cables was also required.
  - The estimated costs were $600 / m (undergrounding) and $150 / m (new overhead lines and rearrangement of existing). This excludes traffic management, easements, or generator provisions during changeovers.
  - The North Perth substation is approximately 2000m (along road network) from the Town of Vincent landholdings. Applying $150 / m for new lines gives $300,000. Undergrounding at $600 / m gives $1,200,000. Total cost of $1,500,000. Allow a further nominal 15% for sundries, resultant total cost of $1,725,000.

7.5 Telecommunications

The requirement of the developer is to provide a trench from the entrance of the development to the point of connection into the Telstra network. As the Telstra network is well developed within the vicinity of the Town of Vincent landholdings, this work is expected to be of minimal quantity. Connell Wagner estimates that $25 / m is required for the trenching works, and a further $50 / linear m for pavement reinstatement and sundries. Allowing a nominal 20m of trench to each site, a cost of $6,000 is obtained.

Note that the above applies to standard telephone cables.

Telstra Smart Community wiring would create an additional cost to the developer.

7.6 Asset relocation

The services investigation indicated the presence of Telstra, Western Power, and Alinta assets beneath the existing skate park, located on the corner of Frame Court and Leederville Parade. If this site is redeveloped, the assets would require relocation.

The Alinta asset was indicated to be “abandoned.”

Western Power was contacted regarding the relocation of their cables. A quote of $12,339.00 was provided to Connell Wagner on the 14th March 2008 for these works. Western Power’s initial investigation indicated that the cables are likely to be ‘dead;’ the quote is based on this being true.

Telstra was contacted regarding the relocation of their cables. A budgetary quote of $32,000.00 was provided to Connell Wagner on the 15th February 2008. Telstra also commented that there is a good possibility that the cables are not in use, and provided a secondary quote of $2,500.00 to verify that the cable is not in use, remove the cable, and make good the remaining network to suit.

Appendix B contains a copy of the correspondence from Western Power and Telstra.

7.7 Summary of costs

A summary of the estimated cost of connection to service infrastructure for the Town of Vincent developments is contained within Table 3.

Table 3: Summary of cost estimates

Service	Cost estimate
Water	$ 350,000
Wastewater	$ 480,000
Gas	$ 55,000
Power	$ 1,725,000
Telecommunications	$ 6,000
Relocation works	$ 45,000
Total	$ 2,660,000

8. Drainage and Water Management

8.1 Existing system

The existing drainage system within the Masterplan investigation area consists of a series of roadside soakwells with some minor pipe networks which drain down to Leederville Parade. The drainage for the area discharges either into the Stamford Street compensating basin or directly into the DN 1500 Mounts Bay Water Corporation main drain. There are limited records for the system and the asset database is incomplete.

The Mounts Bay main drain has recently been diverted within the Oxford Street CBD precinct. This assists in development of the Town of Vincent owned lots, as the drain no longer divides the Town landholdings. A conversation with the Water Corporation provided information that general modelling of the drain had indicated that it was at capacity, or close to. A more detailed study of the Mounts Bay drain is being undertaken, but the results are not expected until late 2008.

Discussion with Town officers is they have not had any flooding issues or problems with the drainage system in this area.

8.2 Impacts on drainage from development

There are two key areas within the Masterplan that will be impacted from development. These are the redevelopment of Oxford Street CBD and the rezoning of the residential area bounded by Vincent Street, Loftus Street and Newcastle Street.

The type of development in these areas will increase the level of impervious area, and hence potentially the peak discharge that occurs in the system. Based on current best practice it is usually a requirement of development that pre and post development peak flows and volumes do not increase. Each of the above areas are discussed below:

8.2.1 Residential Rezoning Vincent Street to Newcastle Street

This area currently has a series of single fronted dwellings which either discharge to soakwells or directly onto the street. Currently, the Town requires all residential dwellings to retain up to 1:5 year flows on site. Due to the age of the area the extent of compliance is unknown.

Council will require high density developments in this area to retain a 1:10 year event on site. Although the impermeable area will significantly increase – with the implementation of this criteria, flows off lots from the area can actually be expected to decrease. We would recommend that the Town set the volume to be retained based on time event (say 6, 12 or 24 hours) and expected infiltration rate for a soakwell. This can be based on the time of concentration for the main drain plus a factor of safety to allow for clogging and siltation of the soakwells.

8.2.2 Oxford Street CBD precinct

The Oxford Street precinct is anticipated to have a significant level of development undertaken, including several multi storey office and residential buildings. This will also potentially significantly increase the peak flow and volume from the lots.

Council will require for development in this area attenuation of flows up to the 1:10 year event on site. Significant runoff can also be developed from walls of multi storey developments and we would recommend the Town adopt a policy similar to the City of Perth, where over a certain height 50% of the largest wall face is added to the lot area for assessing the anticipated runoff generated by the lot. Due to the size of area, this can result in some form of discharge rate being allowed from the lot and set by the Town. Flows are therefore typically attenuated, not detained as per a typical soakwell design procedure. Further, soakage may not be viable as the basement depth can extend down into the water

table. Therefore we envisage the Town will need to develop an attenuation policy for the Oxford Street precinct as an alternative to on site detention.

The capacity and type of system that is currently installed in Oxford Street is unknown. The area is relatively flat and low lying. Although the Town have had limited problems in the area it is recommend a drainage study be completed in the area to confirm the system can cater for a 1:10 and 1:100 year events, post development. This includes achieving an adequate freeboard to floor levels, and overtopping into future basements / car parks. As development occurs, and the types and nature of business changes, failure of the drainage system can cause a significant increase in liability claims and the Town need to be aware of the capability of their system.

8.3 Stormwater quality

Assessing stormwater quality and the effects it has on downstream systems is now becoming a requirement for development in the Perth region. Stormwater quality is related to environmental flows which are events up to the 1: 1 year event. Council currently do not have any requirements regarding stormwater, however, the following is noted:

- Council have a requirement to detain on site for up to the 1:5 year and 1:10 year event. As stormwater quality is related to the environmental 1:1 year flows there are typically no flows to address.
- Council also utilise soakwells and are retrofitting sediment traps into their road network. Sediment traps typically have trapped overflows. Provided these are maintained they will cater for a significant portion of flows up to a 1:1 year event.
- The usage of the above soakage strategy maximises local recharge of the aquifer and limits the smaller day to day polluted flows, meeting the intent of Water Sensitive Urban Design (WSUD) of recharging aquifers locally and eliminating direct polluted runoff.

Direct detention and soakage can manage a significant amount of sediment trapping and direct discharge of pollutants, however, there is also limited uptake of nutrients from biological processes prior to seepage to the aquifer. The improvement of water quality via the stripping of nutrients usually requires the use of a bioremediation system. Due to the intense nature of redevelopment proposed, these types of systems can be difficult to implement and are not recommended as a requirement. However, where possible, kerb side biological treatment systems prior to the soakwells should be considered. Examples of these are included in Appendix C and include such items as tree soakage bays, and reed or sand stripping bays prior to the soakwell.

8.4 Recommendations

For the implementation of the Masterplan the following is recommended in regards to the Drainage System:

- On site detention for a 1:10 year event, as per current Town policy, be utilised for the rezoning of the residential area;
- Consideration by the Town to provide an attenuation option as an alternative to detention for multi-storey developments with basements;
- Consideration by the Town to include 50 % of the wall area for multi-storey developments of a certain height when assessing attenuation of flows;
- Completion of a drainage study to confirm the Oxford Street precinct can cater for the 1:10 year and 1:100 year flows;
- Ongoing installation of sediment traps and soakwells in the Town road system; and
- Implementation of bioremediation WSUD features in the street scape where possible to improve nutrient stripping over the use of straight soakwells.

9. Traffic Assessment

9.1 Transit oriented development

According to the Department for Planning and Infrastructure's Network City a Transit Orientated Development (TOD) means "a compact, mixed use community within a walkable catchment of a transit place, blending housing, shopping, employment and public uses in a pedestrian friendly environment that makes it convenient and practicable for residents and employees to travel by public transport". The Masterplan area fits these criteria, in particular with the Water Corporation having its headquarters within this area the employment criteria is well met.

This leads to a lower car dependency within this area and the Town would like to see this reduced further. This needs to be balanced by the communities request for the provision of additional parking for the patrons of the commercial and retail outlets within the area.

9.2 Guidelines

The traffic assessment has been prepared in accordance with Volume 4 of the WAPC's, "Traffic Assessment Guidelines For Developments", August 2006.

9.3 Existing situation

9.3.1 Functional Road Hierarchy

Main Roads Western Australia defines a Functional Road Hierarchy as "a listing of the types of roads that perform designated functions required of the road network. It also provides criteria to describe each road functional type."

The Town intends to leave the existing road hierarchy as it currently stands. Whilst there will be an increase in traffic, the road layout will remain essentially the same.

The current hierarchy is as follows:

Vincent Street	District Distributor A
Leederville Parade	District Distributor A
Loftus Street	District Distributor A
Newcastle Street	District Distributor B
Oxford Street (Newcastle St to Scarborough Beach Rd)	District Distributor B
Oxford Street (Leederville Pde to Newcastle St)	Access Road

The above streets form the general road network within the Masterplan area. Also within this network are the minor roads of Richmond Street, Frame Court, Carr Place, Bold Court, and The Avenue, which are classified as Access Roads under the Functional Road Hierarchy.

9.3.2 Existing traffic

Recent traffic counts for the roads within the study area have been sourced from MRWA and the Town of Vincent. The traffic volumes and indicative 85th percentile speeds on the roads are given as follows:

Road	Location	Vehicles per day (vpd)	85th speed (km / hr)
Oxford Street	north of Vincent St	15,500	45
	north of Newcastle St	13,000	37
	north of Leederville Pde	8,000	40
Loftus Street	north of Vincent St	20,800	-
	north of Newcastle St	28,900	-
	north of Leederville Pde	31,000	-
Leederville Parade	north of Oxford St	8,900	54
	west of Loftus St	11,400	55
Vincent Street	west of Oxford St	22,100	47
	west of Loftus St	16,800	60
Carr Place		1,500	39
Newcastle Street		6,700	-
Frame Court		1,900	29

Note: The traffic volumes are from the years 2005 and 2006 (except for Frame Court, being 1999). Some 85th speeds were unavailable.

In addition, the demographic information provided in Vision 2024 for the Leederville West Perth area shows that there are approximately 11% of households in Leederville West Perth that have no vehicle. This is lower than the metropolitan average of 7.8%.

Whilst car, as driver, is the most common method of travel to work at 55% of work trips, this is lower than the metropolitan average of 63%. Use of public transport (12%) and walking or cycling (8%) for trips to work is more common than the metropolitan average (5.7% and 2.7% respectively). This reinforces the Masterplan area as a TOD.

9.4 Assessment year and time period for analysis

The Leederville Masterplan is looking at a 10 year timeframe, with the Town owned land being developed in the next 7 years. The traffic generation and distribution considers two timelines. Firstly, 2014 when the Town owned land is fully developed and 2024, when it is assumed that most of the redevelopment of the Masterplan area will have taken place. The Water Corporation's planning timelines of 2010, for completion of the Monarch car park site, and 2017, for the Operations Centre building being demolished and redeveloped will be taken into consideration in the 2014 and 2024 timelines.

10. Traffic generation and distribution

Using the traffic generation data from the Road Transport Authority NSW (RTA), the traffic generated by the proposed development has been estimated. The following factors are considered to lower the traffic generation from the new development:

- The availability of local work
- Enhanced access to public transport
- The existing cycle network

With the development being a mix of commercial and residential the traffic flow in the peak hours will consist of workers entering the area for work and residents leaving the area for work, there will also be a number of residents who will live and work in the area. Whilst the amount of commercial floor space will almost double the number of residential units will over quadruple. This will bring about a change in the traffic patterns.

The Town has an existing high proportion of professionals as residents and the Town's development is likely to be attractive to this group with its location close to Perth's CBD, with the option of walking or cycling to work. These residents are likely to generate traffic leaving the area in the morning and entering the area in the evening. The recreational trips at the weekend and late in the evening will have a high proportion that are internal to the area and by foot.

In contrast, the businesses will attract traffic into the area in the morning and will generate traffic leaving the area in the evening.

The forecast traffic volumes are comprised of the existing traffic volume plus increases due to:

- The increase of existing traffic due to the increasing population in Perth
- The development of Town of Vincent landholdings
- The development of the Water Corporation Monarch car park site and new Operations Building (to replace existing)
- The construction of the Western Australian Local Government Authority building
- The development of the Masterplan precincts

These are detailed in the following sections.

Once the traffic generation and distribution was complete, the following tasks were undertaken:

- Check on the road capacity
- Check external access to the area
- Report on the impacts and constraints
- Liaise with the relevant authorities on the impacts and constraints
- Recommend solutions to any outstanding issues

10.1 Forecast traffic volumes

10.1.1 Natural increase in traffic volumes

Leederville is located close to the Perth CBD, and is an established suburb with a well developed road network. The natural increase in traffic (ie excluding the Masterplan developments) on these roads is expected to be minimal, and to be a general increase across the entirety of the road network due to population increases and individual, irregular in-filling of development. A nominal 1% per annum growth in daily traffic volumes is assumed, which reflects the average increase in population of the Town of Vincent and nearby Local Governments over the past five years. The 1% pa increase is applied each year over the years 2007 to 2024.

Local government	2001 population	2006p population	Average annual growth rate
City of Bayswater	56,824	58,591	0.6%
Town of Cambridge	24,445	25,168	0.6%
City of Stirling	176,604	186,506	1.1%
Town of Vincent	26,093	28,505	1.8%
Average			1.0%

Source: Australian Bureau of Statistics

10.1.2 RTA Guidelines for Traffic Generating Developments (2002)

RTA Guidelines for Traffic Generating Developments (2002) were used to identify base traffic generation rates, being:

Daily vehicle trips

Residential	4.5	per dwelling	
Commercial	10	per 100m^2 GLFA	
Mixed business	118	per 100m^2 GLFA	*(assume mix of 95% retail and 5% restaurant/café)*
	84	per 100m^2 GLFA	*(assume mix of 40% retail and 60% restaurant/café)*

Weekday peak hour trips

Residential	0.45	per dwelling	
Commercial	2	per 100m^2 GLFA	
Mixed business	12	per 100m^2 GLFA	*(assume mix of 95% retail and 5% restaurant/café)*
	8	per 100m^2 GLFA	*(assume mix of 40% retail and 60% restaurant/café)*

Note: GLFA is the gross leasable floor area of the development

The RTA Guidelines are based on surveys conducted over a variety of locations and magnitudes of development. If site specific data is available, it is suggested to incorporate this into the traffic generation process.

10.1.3 TravelSmart

TravelSmart is a voluntary travel behaviour change program, which addresses information, attitude and motivational barriers to the use of alternative travel modes. Its implementation has been proven to reduce the number of car trips made by people living in a suburb / Local Government eg South Perth.

The Department for Planning and Infrastructure proposed to the Town of Vincent that a 14 % reduction in motor car trips could be achieved through the implementation of the TravelSmart program (Car Parking Strategy, Town of Vincent). As the Leederville Masterplan aims to be a Transit Orientated Development, it is assumed the TravelSmart program will be implemented.

A 14% reduction to the base RTA trip generation rates is applied to give the daily and peak hour trips shown in Table 4.

Table 4: RTA trip rates incorporating TravelSmart 14% reduction

Daily vehicle trips

Residential	3.9	per dwelling	
Commercial	8.6	per 100m^2 GLFA	
Mixed business	101	per 100m^2 GLFA	*(assume mix of 95% retail and 5% restaurant/café)*
	72	per 100m^2 GLFA	*(assume mix of 40% retail and 60% restaurant/café)*

Weekday peak hour trips

Residential	0.39	per dwelling	
Commercial	1.72	per 100m^2 GLFA	
Mixed business	10.3	per 100m^2 GLFA	*(assume mix of 95% retail and 5% restaurant/café)*
	6.8	per 100m^2 GLFA	*(assume mix of 40% retail and 60% restaurant/café)*

10.1.4 Leederville site specific data

For the suburb of Leederville, the following is noted:

- A higher proportion of households have no motor vehicle, when compared to the metropolitan average
- A higher proportion of people travel to / from work by public transport, walking, or riding, when compared to the metropolitan average
- The Leederville train station will be connected to the Southern Suburbs Railway, as of early 2008

and summarised quantitatively as follows:

Item	Perth Metropolitan average (%)	Leederville (%)
Households with no motor vehicle	7.8	10.5
Take public transport to work	5.7	16.8
Walk / bicycle to work	2.7	8.0

Note: Assumed use of 'train' for transport method to work doubles (from 4.8% to 9.6%) within Leederville as a result of new connection to Southern Suburbs railway. This increases public transport to work category from 12% to 16.8%.

These items are expected to reduce the number of daily vehicle trips and peak hour trips generated per residential dwelling.

In addition, the close proximity of public transport linkages are expected to decrease the number of trips (both daily and peak hour) generated by commercial developments (for which the majority are expected to be employee commuter trips).

Incorporating the Leederville site specific data results in the following vehicle trip generation rates, which are adopted within this report and given in Table 5.

Table 5: Vehicle trip generation rates

Land use	Daily vehicle trips	Weekday peak hour trips	
Residential	3.7	0.3	per dwelling
Commercial	7.1	1.4	per 100m^2 GLFA
Mixed business (95% retail)	101.4	10.3	per 100m^2 GLFA
Mixed business (40% retail)	72.6	6.8	per 100m^2 GLFA

10.1.5 Traffic forecasts

Forecast traffic generation figures are summarised in the following sections (refer Appendix D for additional details). It is conservatively assumed (from a traffic assessment viewpoint) that the peak hour for each of the different land uses occurs at the same time of day.

Town of Vincent landholdings

The forecast number of vehicle trips generated by the Town of Vincent redevelopments is given in Table 6.

Table 6: Town of Vincent landholdings – traffic generation

Site	Year 2014		Year 2024	
	Daily vehicle trips	Peak hour trips	Daily vehicle trips	Peak hour trips
1	1,480	150	1,480	150
2	1,370	140	1,370	140
3	2,120	230	2,120	230
4 and 5	720	70	720	70

Water Corporation buildings

The Water Corporation Masterplan entails the construction of two new buildings. The first, located on the existing Monarch car park site, is estimated to provide for an additional 600 employees. Using a rate of 21 m^2 GLFA per employee (RTA 2002), this equates to 12,600 m^2 of new commercial space.

The second building is planned to replace the aging Water Corporation Operations Building. Together these two new buildings are estimated to have approximately the same floor area as the existing three storey Water Corporation building. Thus, the area of new commercial space available in the replacement Operations Building is in the order of 12,000 m^2.

The Water Corporation encourages the use of public transport, walking, and riding by its employees. It also provides end of trip facilities for these methods of transport. It is assumed the new buildings will have similar provisions.

The traffic volumes contained within Table 7 are forecast to be generated by development of the new Water Corporation buildings.

Table 7: Water Corporation Buildings – traffic generation

Building	Year 2014		Year 2024	
	Daily vehicle trips	Peak hour trips	Daily vehicle trips	Peak hour trips
New Monarch site	890	178	890	178
New Operations Building			810	163
less Old Operations Building (assume demolished)			*(160)*	*(33)*
Total Water Corporation	890	178	1,540	308

Western Australian Local Government Association (WALGA)

WALGA is constructing new offices along Vincent Street, beside the existing Town of Vincent administration building. It is expected 150 – 200 employees will be occupy these offices by 2014. Using a rate of 21m^2 GLFA per employee and the commercial land use trip generation rate, the traffic volumes contained within Table 8 are forecast for this development:

Table 8: Western Australian Local Government Association – traffic generation

Building	Year 2014		Year 2024	
	Daily vehicle trips	Peak hour trips	Daily vehicle trips	Peak hour trips
New WALGA site	260	52	260	52

Remaining Masterplan area

The traffic volumes forecast to be generated by the additional residences, commercial and mixed business areas within the Masterplan area (excluding Water Corporation, WALGA, and Town of Vincent sites) are shown in Table 9.

Table 9: Remaining Masterplan area – traffic generation

Precinct	Year 2024	
	Daily vehicle trips	Peak hour trips
1. Oxford Street North	1,100	142
2. Education / Sports and Recreation	1,000	201
3. Loftus Street Civic Precinct	1,300	225
4. Oxford Markets	1,800	195
5. Entertainment Precinct	2,900	318
6. Oxford Town Square	0	0
7. Carr Street Residential	1,800	154
8. Newcastle Street Commercial	1,000	204

10.2 Traffic distribution

10.2.1 Trip attractors and traffic patterns

Leederville is an inner-metropolitan suburb with high connectivity to the surrounding road network. The Mitchell Freeway can be accessed via Vincent Street to the west, and Graham Farmer Freeway via Leederville Parade to the east. Loftus Street, to the east of the Masterplan area, provides connections to Scarborough Beach Road (to the north) and access across the train line (to the south).

Leederville also has a high number of trip attractors including:

- The Water Corporation site, which provides a significant level of employment
- Town of Vincent civic centre, which provides a significant level of employment
- Oxford Street, which has a well-known entertainment and restaurant / café development

A main trip generator is the Perth CBD to the south-east.

The forecast traffic generated by development of the Water Corporation sites, Town of Vincent landholdings, WALGA site, and remaining Masterplan area has been distributed onto the road network with consideration to the origin and destination of the traffic. The east and west connections provided by Vincent Street are considered to attract a significant proportion of the trips, as does the CBD to the south.

10.2.2 Restricted vehicle movements

Restrictions to turning movements were accounted for when distributing the traffic onto the road network. These restrictions are summarised as follows.

- The Town of Vincent has proposed a new intersection layout for Vincent Street / Oxford Street. This prevents the right turn movement from Oxford Street (northbound) onto Vincent Street (eastbound).
- The right turn movement from Vincent Street (westbound) onto Oxford Street (northbound) is currently restricted during peak hour periods. It is assumed this restriction is maintained.
- The right turn movement from Loftus Street (southbound) onto Newcastle Street (westbound) is banned.

10.2.3 Access points to developments

Access points to the redeveloped Town of Vincent sites have been chosen to:

- Limit additional traffic movements on Vincent Street, as this street carries a high volume of traffic.
- Limit additional traffic movements on Oxford Street, as this street is intended to be pedestrian friendly under the Masterplan.
- Utilise Leederville Parade, as this road has limited frontage developments and minimal crossovers (including both driveways and cross streets).

In accordance with the above aims, the access points are assigned to be:

- Site 1 and Site 2
  - Left in entry from Vincent Street.
  - Entry / exit from Leederville Parade
- Site 3 and Sites 4 & 5
  - Left in entry from Oxford Street
  - Left out exit onto Oxford Street
  - Entry / exit from Frame Court

These access points were considered when distributing traffic onto the road network.

The restricted turning movements and access points to developments are shown on Sketch SK-005 within Appendix E.

Petrol station

A Caltex Star Mart petrol station is currently located at the corner of Vincent Street and Leederville Parade. Access to the petrol station is available from Vincent Street, with one full movement cross over and one left in left out access point. Exiting at the back of the petrol station (through the existing The Avenue car park and onto Leederville Parade) is also available to patrons.

To assist in minimising traffic turning movements along Vincent Street, the petrol station access points could be altered. Possible systems include:

- Left in and left out onto Vincent Street only
- Left in from Vincent Street and exit through to Leederville Parade (no exit onto Vincent Street)

10.2.4 2014 and 2024 traffic volumes

The existing (2005/2006) traffic volumes and forecast traffic volumes (in 2014 and 2024) are shown on Sketches SK-006, SK-007 and SK-008, contained within Appendix E. The composition of this traffic is also provided, with percentages of the total volume given for:

- Existing 2005 / 2006 traffic
- Traffic due to 1% pa growth
- Traffic due to redevelopment of Town of Vincent landholdings
- Traffic due to new Water Corporation buildings
- Traffic due to new WALGA building
- Traffic due to development of the remaining parts of the Leederville Masterplan precincts

The existing volume of traffic, and forecast volumes in 2014 and 2024, for key road sections within the Masterplan area are given in Table 10.

Table 10: Traffic Volumes on key road sections

Road	Location	Existing	2014	2024
Vincent Street	East of Oxford Street	16,800	19,100	23,700
Leederville Parade	West of Oxford Street	8,900	11,700	14,900
	East of Oxford Street	11,400	15,200	17,900
Newcastle Street		6,700	7,600	11,100
Oxford Street	North of Newcastle Street	13,000	14,900	17,300
	South of Newcastle Street	8,000	9,400	11,400

10.3 Impact on surrounding roads

10.3.1 Road capacity

The impact of the additional number of daily vehicle trips on the surrounding road network is to be assessed with reference to the capacity of the roads.

The capacity of a road is influenced by variables including the number of lanes, adjacent land use, on-street parking provision, and speed limits. The MRWA Functional Road Hierarchy and Liveable Neighbourhoods (2004) provide guidance as to the capacity or volume of traffic expected on different types of roads, as summarised in Table 11 and Table 12. If the capacity of the road is reached, road users may experience a low Level Of Service. This may include reduced travel times, intersection delays, and more restricted manoeuvring conditions. The six general Levels Of Service are defined in Appendix E.

Table 11: MRWA Functional Road Hierarchy

Classification	Indicative traffic volume	Roads within Masterplan
Primary Distributor	Above 15,000 vpd	
District Distributor A	Above 8,000 vpd	Vincent Street, Leederville Parade and Loftus Street
District Distributor B	Above 6,000 vpd	Newcastle Street and Oxford Street (north of Newcastle Street)
Local Distributor	Maximum desirable volume 6,000 vpd	Oxford Street (south of Newcastle Street)
Access Road	Maximum desirable volume 3,000 vpd	

Table 12: Liveable Neighbourhoods

Description of road	Indicative traffic volume
Primary Distributor – Include the 4 and 6 lane roads under MRWA control.	35,000 to 50,000 vpd
Integrator B – Integrator roads serve the multiple functions of carrying traffic efficiently, facilitating pedestrian activity and public transport usage, and providing development frontage for adjoining properties. Integrator 'B' is for lower volume 2-lane arterials and residential frontage onto service roads, and suit pedestrian based retail streets.	Up to 15,000 vpd Up to 20,000 vpd (outside of Town Centre main street) may be acceptable provided that the road has adequate treatment of intersections, parking, access, and bus movements (if applicable).

10.3.2 Year 2014

At year 2014, the Town of Vincent land, WALGA site and Monarch car park site are assumed to be developed.

An assessment of the forecast traffic volumes in 2014 indicates that the roads within the Masterplan area would generally be carrying a traffic volume below their indicative capacity. An exception to this is Vincent Street.

Vincent Street is forecast to carry in the order of 19,000 to 25,000 vehicles per day. This street currently has two lanes in each direction, with the outside lane being used for on-street parking. At intersections, the parking is restricted to allow for the operation of two through lanes in each direction. The capacity of this street is indicatively 20,000 vehicles per day. Additional numbers of vehicles may increase travel times along the road, which generally lowers the level of service provided by the road.

An option to increase the capacity of Vincent Street is to restrict the on-street parking and allow two lanes operational in each direction. However, this option is not considered an appropriate action in this situation as:

- The on-street parking acts to calm the flow of traffic.
- The provision of four operational lanes could result in a high capacity, high speed road which "divides" the Masterplan area.
- An intention of the Masterplan is to create a pedestrian friendly development, in which public transport, walking and cycling are encouraged. The provision of high capacity, high speed roads does not support this intention.

Therefore, the forecast traffic volumes within the Masterplan area are considered to be acceptable, without further action required, at the year 2014.

10.3.3 Year 2024

At year 2024, ultimate development of the Masterplan is assumed.

An assessment of the forecast traffic volumes in 2024 indicates that the majority of roads within the Masterplan area would be carrying a traffic volume below their indicative capacity. An exception to this is again Vincent Street, and also Oxford Street in the northern portion of the Masterplan area. The Level of Service provided by these two roads may generally become unacceptable (below 'C' Level).

To improve the Level Of Service, the following actions are suggested:

- Liaise with Main Roads to optimise signal timing and signal linking along Loftus Street.
- Liaise with Main Roads to optimise signal timing and signal linking between the intersection of Vincent Street / Oxford Street and Vincent Street / Leederville Parade / Freeway on- and off-ramp.
- Upon development of the Masterplan precincts, encourage access points into the developments to be located along roads other than Vincent Street eg The 'Carr Place Residential' precinct is located between Vincent Street and Carr Place. Encourage driveway crossovers on Carr Place.
- Retain the two way direction and intersection movements available along alternative roads / routes.

These actions are expected to be ongoing throughout the life of the Masterplan. It is not recommended to increase the capacity of the roads, for the reasons outlined previously in relation to Vincent Street (section 10.3.2).

When assessing the road capacity in respect to the traffic generated by the Town of Vincent landholding redevelopments and the remaining Leederville Masterplan precincts, the following is noted for consideration:

- Of the forecast traffic along Vincent Street (23,500 – 29,600), only 3% is generated by the Town of Vincent redevelopments and 7 – 11% by the remaining Masterplan precincts. The balance of 86 – 90% is existing traffic plus a 1% pa natural increase (to account for developments other than within the Masterplan area). Whilst the traffic generated by Masterplan developments contributes to the higher than capacity volume expected on these roads, it is not the major contributing factor.
- Upon full development of the Leederville Masterplan, an intensification of land uses is intended. The traffic generation rates for the new developments were based upon public transport, walking and cycling usages that currently exist in Leederville. If the land use becomes more intense, the proportion of trips made by these modes is also likely to increase and the number of internal trips on foot will also increase.
- TravelSmart suggest a 14% reduction in motor vehicle trips could be achieved if the program is implemented. This reduction was applied to future developments only. In reality, the reduction would also apply to existing traffic within the Masterplan area. This reduction of 14% was not applied in the calculations, and therefore the "base" traffic volumes (existing plus growth of 1% pa) are considered to be a maximum.

10.4 Impact on intersections

10.4.1 Key intersections

Oxford Street is the Leederville town centre's "main street," and intersects with Vincent Street (signalised), Newcastle Street (priority T-junction) and Leederville Parade (roundabout). These intersections are considered to be key intersections within the Masterplan area, and an aerial view of each is provided in Appendix E.

Oxford Street / Vincent Street

The Oxford Street / Vincent Street four-way signalised intersection is currently being investigated by the Town of Vincent for Blackspot funding. The intersection has had a high number of crashes (86

reported in the five years to December 2006), with no dominant pattern. The Town has proposed a modified layout, which includes the reduction of Oxford Street to one through lane in each direction, and the banning of the right turn movement from Oxford Street (northbound) to Vincent Street (eastbound). A copy of the layout is reproduced within Appendix E.

Whilst the capacity of this intersection is not considered to provide a high Level of Service upon full development of the Masterplan area, this is not the main consideration. A lower Level of Service usually reflects longer waiting times for vehicles and slower travel speeds. To improve this, the provision of additional through lanes and turning pockets is the generally accepted practice. However, in the context of the Masterplan, these measures of service are considered to be of a lower priority than:

- The creation of a pedestrian friendly environment, which includes roads with lower vehicle travel speeds;
- The creation of efficient pedestrian routes, which includes minimising the creation of 'major' signalised intersections with long waiting times between the green phase for pedestrian crossing; and
- The retention of heritage buildings, which are located on the corners of this intersection.

It is recommended that the layout of the Oxford Street / Vincent Street intersection be modified only to reflect the outcomes of the Blackspot funding process. No further analysis of this intersection was considered necessary in the context of this report.

Oxford Street / Newcastle Street

The Oxford Street / Newcastle Street junction is a priority T-Junction, with Newcastle Street representing the terminating road.

The intersection provides full turning movements, and it is recommended to retain this function to assist in providing alternative traffic routes (to Vincent Street, refer section 10.3.3).

The current Level of Service provided by this intersection is high; generally at A level (right hand turn from Newcastle Street experiences a lower level, this movement has the lowest priority at the intersection).

The capacity of this intersection was analysed with reference to Austroads Guide to Traffic Engineering Practice Part 2 Roadway Capacity, with the volumes of traffic as predicted for 2024. At this point in time the traffic volume on Oxford Street is forecast to be in the order of 17,000 vpd; this is considered the major traffic stream. The minor traffic stream on Newcastle Street is forecast to be in the order of 11,100 vpd. Based upon existing traffic distribution patterns throughout the day, the percentage of vehicles travelling during the peak hour in 2024 is given in the following table.

Table 13: 2024 Peak Hour Volumes

Time period and street	Percentage of daily vehicles travelling during that hour	Number of vehicles travelling during that hour
AM peak – Newcastle Street	6.6%	730
AM peak – Oxford Street	7.0%	1,190
PM peak – Newcastle Street	6.8%	750
PM peak – Oxford Street	7.8%	1,330

During the peak periods the number of vehicles making the right hand turn from Newcastle Street is forecast to be 375 (AM peak hour) and 480 (PM peak hour).

The practical absorption capacity at the Oxford Street / Newcastle Street intersection is calculated to be in the order of 500 – 550 vehicles (AM peak hour) and 450 – 500 vehicles (PM peak hour). The intersection is therefore assessed to have sufficient capacity to cater for the increased level of traffic.

Oxford Street / Leederville Parade

The Oxford Street / Leederville Parade roundabout currently provides a high Level of Service to road users. Analyses undertaken with utilisation of SIDRA Intersection 3.2 gave a Level of Service A or B for all turning movements, for both the morning and evening peak hour periods.

The impact of the Masterplan, and in particular the Town of Vincent landholding redevelopments, on the function of this roundabout was analysed for the year 2024. This intersection is forecast to become part of the main access route to and from the Town of Vincent landholdings, and thus experience a significant increase in traffic flows through it. For both the AM and PM peak periods in 2024, the turning movements at the roundabout were estimated by:

- Calculating the traffic volume during peak hour as a percentage of the forecast 2024 daily traffic volume for that road (based on existing data).
- Detailed distribution of the likely movements of vehicles exiting (or entering) the Town of Vincent developments. This considered the proposed access points to (and from) the developments and the directional flow of traffic ie residential outbound in the AM period and inbound in the PM period, commercial and mixed business inbound in the AM period and outbound in the PM period.

The analyses indicated:

- The Level Of Service provided by the roundabout during the AM peak period was Level A or Level B; and
- The Level Of Service provided by the roundabout during the PM pear period was Level A or Level B.

The diagrams and SIDRA output contained within Appendix E illustrate the Level Of Service expected of the roundabout at year 2024.

From this assessment, it is not recommended to modify the Oxford Street / Leederville Parade intersection.

11. Parking

11.1 Existing parking

The Town owned land currently comprises The Avenue car park, with 290 bays at grade, and Frame Court car park, with 210 at grade bays. Both of these car parks provide public parking.

The provision of parking produces a dichotomy: the perception that the businesses are suffering in the area due to a lack of parking and the desire to minimise parking provision in line with transit orientated developments. The Town's Car Parking Strategy comprehensively covers the existing demand for car parking in the Town.

11.2 Proposed development

Should the Town owned land be developed with two 24 storey buildings, rather that two 16 storey, the additional storeys will be used for additional residential development. A 16 storey building is likely to yield 68 units, whilst a 24 storey will yield up to 135 units. This gives a range of 136 to 270 units.

Table 14: Estimated redevelopment land use for Town of Vincent landholdings (gross building area)

		Commercial (m^2)	Mixed business (m^2)	Residential units (24 storey)	Special use
The Avenue					Car park
	Site 1		1,950		(360 bays)
	Site 2	2,000	1,000	130	
Frame Court	Site 3	4,000	1,800	135	
					Car park
	Site 4/5		750	40	(360 bays)
	Total	6,000	5,500	305	720

It is intended that the commercial, mixed business and residential units will provide sufficient on site parking to cater for the demand that each site generates. The two new car parks will cater for the existing demand for public parking in the area.

11.3 Commercial Parking

It is accepted practice that where a commercial development generates a demand for parking that parking will be provided on the development site. Some exceptions to these are where the Local Authority has a parking fund that is used for public parking provision, developers are then required to provide less on site parking and contribute an amount into the parking fund, or where the Authority designates a maximum number of bays. In the situation where a maximum number of bays is stipulated the Authority is restricting supply, which ultimately changes behaviour, either by people switching travel modes or not travelling to that destination. The Town will allow a reduced number of parking bays in areas where certain factors apply, for example where there is good public transport provision.

The reduction in parking bays needs to be counterbalanced by understanding the mode of transport that people will shift to in the absence of a parking space. In the Leederville West Perth area 5 % of work trips are made as a passenger in a car. Therefore, commuters do not necessarily shift to public transport, for example, when they do not drive themselves to work.

The Town's parking policy requires commercial buildings to provide good cyclist end of trip facilities, such as showers and lockers, to allow workers to have a practical alternative to driving. A strong cycle network already exists in this area, which is reflected in the high rate of work trips being by bike for the Leederville area. The network provides good access from Subiaco, the City and Lake Monger, which gives a good catchment area of workers travelling into Leederville.

The provision of regular, clean and safe public transport into the Leederville Masterplan area will attract commuters away from cars, once parking is no longer a viable option.

11.3.1 Planning and Building Policy Manual

The exact floor areas and types of business are unknown, therefore, the parking to be provided by the developments, in accordance with the Town's Planning and Building Policy Manual, is assumed to be as follows:

- Commercial 1 space per 50 square metres of gross floor area
- Mixed Business 1 space per 15 square metres of gross floor area

Applying the parking rates gives the unadjusted values contained within Table 15.

Table 15: Parking Bays (Unadjusted)

		Commercial	Mixed business	Total Bays
The Avenue	Site 1		130	130
	Site 2	40	67	107
Frame Court	Site 3	80	120	200
	Site 4/5		50	50
	Total	120	367	487

Applying the various adjustment factors from the Town of Vincent's Planning and Building Policy Manual, refer Appendix F, allows the number of bays to be reduced to 44% of these amounts. The applicable factors are as follows:

	Percentage Reduction	Adjustment Factor	Factors to be successfully justified by the Applicant to the Town of Vincent
1	15 per cent	0.85	The proposed development is within 800 metres of a rail station.
2	15 per cent	0.85	The proposed development is within 400 metres of a buss stop/station.
3	20 per cent	0.80	The proposed development contains a mix of uses, where at least 45 per cent of the gross floor area is residential.
4	15 per cent	0.85	The proposed development is within 400 metres of one or more existing public car parking place(s) with in excess of a total of 75 car parking spaces.
5	10 per cent	0.90	The proposed development provides 'end-of-trip' facilities for bicycle users, in addition to the facilities specified in the Bicycle Parking Requirements Table.

The adjusted parking bay numbers are shown in Table 16.

Table 16: Parking Bays (Adjusted)

		Total Bays	Bays to be provided
The Avenue	Site 1	130	58
	Site 2	107	47
Frame Court	Site 3	200	88
	Site 4/5	50	22
Total			215

11.3.2 Bicycle Parking Requirement

The Town has the following requirements for the provision of bicycle facilities:

Use Class	Employee Bicycle Parking Space	Class	Visitor/Shopper Bicycle Parking Space	Class
Office	1 space per 200 square metres gross floor area	1 or 2	1 space per 750 square metres over 1000 square metres	3
Retail Premises - shop	1 space per 300 square metres gross floor area	1 or 2	1 space per 200 square metres	3

The class of facility is detailed below:

Class	Security Level	Description	Main User Type
1	High	Fully enclosed individual lockers.	Bike and ride commuters at railway and bus stations.
2	Medium	Locked compounds fitted with Class 3 facilities. Communal access using duplicate keys or electronic swipe cards.	Regular employees, students, regular bike and ride commuters.
3	Low	Facilities to which the bicycle frame and wheels can be locked.	Shoppers, visitors to public offices. Places of employment where there is security supervision of the parking facilities.

Applying the Town's rates gives the bicycling parking requirements as listed in Table 17.

Table 17: Bicycle Parking Requirements

		Commercial		Mixed business	
		Employee spaces	Visitor spaces	Employee spaces	Visitor spaces
The Avenue	Site 1			7	10
	Site 2	10 Class 2	2 Class 3	4	5
Frame Court	Site 3	20 Class 2	5 Class 3	6	9
	Site 4/5			3	4
	Total	30 Class 2	7 Class 3	20 Class 2	28 Class 3

For the commercial premises there is an additional requirement for the buildings to provide:

i) A minimum of one female shower and one male shower, located in separate change rooms.
ii) Additional shower facilities to be provided at a rate of one female shower and one male shower for every additional 10 bicycle parking bays, to a maximum of five female and five male showers per development.
iii) End of journey facilities should be located as close as possible to the bicycle parking facilities.
iv) The change rooms to be secure facilities capable of being locked.
v) A locker to be provided for every bicycle parking bay provided.

Applying this to the commercial areas on Sites 2 and 3 gives the end of trip requirements of Table 18.

Table 18: End of Trip Requirements

		Commercial
The Avenue	Site 2	1 female 1 male shower 10 lockers
Frame Court	Site 3	3 female 3 male showers 25 lockers

A higher level of provision should be considered in the Masterplan area to complement the cycle network and to reinforce the area as a TOD. The car park requirement is reduced by 10% where these additional facilities are provided.

A doubling of the requirement for employee facilities would give the values listed in Table 19.

Table 19: Masterplan employee facilitates

		Commercial				Mixed business	
		Employee spaces	Visitor spaces	Showers	Lockers	Employee spaces	Visitor spaces
The Avenue	Site 1					14	10
	Site 2	20	2	2 Female 2 Male	20	8	5
Frame Court	Site 3	40	5	6 Female 6 Male	50	12	9
	Site 4					6	4
	Total	60 Class 2	7 Class 3	16	70	40 Class 2	28 Class 3

11.4 Public Parking

The focus of the parking in the area should be for the local community, rather than for long term commuter parking. On street parking adds activity to the streets and acts as a traffic calming measure, therefore it should be retained.

The existing public parking is going to be replaced with multistorey parking at:

- The Avenue 360 bays
- Frame Court 360 bays

This will increase the number of bays by 220 additional bays to cater for the existing demand in the area. This parking should remain as timed and paid parking to discourage all day parking.

11.5 Residential Parking

The commercial reality of residential developments is that new apartments need one or two private parking bays in order to sell. In the Carr Place residential precinct this is seen as acceptable. However, for the high rise residential developments this needs to be re-examined as the buildings are so well placed for access to the station and cycle network. It is common practice for social housing to be developed without parking spaces and therefore a mix of social and private housing could achieve a development with an average below one car bay per apartment. Table 20 lists the residential parking provisions if one bay per unit was provided.

Table 20: Residential parking

		Residential parking bays
The Avenue	Site 2	130
Frame Court	Site 3	135
	Site 4	40
	Total	305

This parking will be provided within the development and will be private parking for residents and guests only.

11.5.1 Bicycle Parking Requirement

In keeping with the intentions of a TOD development it is proposed to provide bike parking for residents. If secure parking is provided this will discourage residents from taking the bikes into the building and up in the lifts, causing damage to the floors and walls.

The current Town rates are:

Use Class	Resident Bicycle Parking Space	Class	Visitor/Shopper Bicycle Parking Space	Class
Residential Building	1 space per 4 units	2	1 space per 16 units	3

Applying the current Town rates gives 77 bike racks in secure compounds and 19 bike racks for visitors across the three residential components.

For serious cyclists an open compound, even with secure access, is not appealing. Therefore there should be a number of individual Class 1 bike lockers for residents within the secure compound. Consideration should be given to these facilities being provided in lieu of parking bays and sold to residents.

11.6 Parking summary

The following parking should be provided within the proposed buildings, subject to detailed information on the land use.

Table 21: Summary of parking requirements

		Commercial Bays	Residential parking bays	Employee bike racks	Visitor bike racks	Showers	Lockers	Public Car Park
The Avenue	Site 1	58		14	10			360
	Site 2	47	130	28	7	4	20	
Frame Court	Site 3	88	135	52	14	12	50	
	Site 4/5	22	40	6	4			360

12. Public transport accessibility

12.1 Existing situation

The Masterplan area is well placed for access to the Northern Suburbs Railway and a number of bus routes to the western suburbs and into the Perth CBD. With the creation of the Southern Suburbs Railway there will also be a connection to the south of Perth and beyond to Mandurah. This opens up the Masterplan area to a much wider catchment, for both employment and leisure trips.

The weakness of the existing public transport is that there is no east west link from Leederville to the Highgate and Mount Lawley areas.

12.2 Leederville Station entry

Leederville station is located in the centre of the Mitchell Freeway, in common with all the Northern Suburbs stations. It is accessed via a pedestrian overpass at the southern end of Oxford Street. The overpass existed before the station was built. There are no park 'n' ride, or drop off facilities for the station.

The bottom of the pedestrian ramp and hence the entry point to the station are not clearly visible from Oxford Street. In addition, the view from the bridge does not create a sense of entry into the Oxford Street precinct. With the height of the bridge, relative to Oxford Street there is an opportunity to bring the bridge into the first floor of a new building, located at the southern end of Oxford Street. This would also allow for the development of an entry statement.

12.3 CAT Bus

It is understood that the Town and the Water Corporation are both keen to introduce the Central Area Transit (CAT) bus system into the area, possibly as an extension to the existing Blue CAT route. This route currently services Northbridge and connects to Barrack Street jetty. Assuming that the CAT service continues to operate in an anticlockwise direction, then its introduction will only go part way to overcoming the lack of an east west link.

There are ongoing discussions between the Town and DPI regarding the introduction of the CAT bus.

13. Pedestrian issues

To achieve the vision of an "environment where people universally feel invited to live, work and play" provision for pedestrians will need to be of the highest priority. This includes issues of connectivity, personal security and accessibility. The staging of the developments needs to consider pedestrian access so that personal security is maintained by passive surveillance and good lighting levels.

The Western Australian Planning Commission Policy DC 1.6 for enhanced use of public transport suggests pedestrian linkages should be safe, attractive, friendly, efficient and accessible. These principles apply to all situations in which walking is to be encouraged as an alternative form of transport to vehicular usage. The principles can be summarised as:

- Safe - overlooking of streets with building frontage, good footpath design, safe pedestrian crossings at grade;
- Attractive - shade trees or verandas, good pedestrian amenity;
- Friendly - inviting streets, inviting destinations such as cafes and neighbourhood centres;
- Efficient - interconnected street network with direct routes, a choice of routes and visible destinations; and
- Accessible - continuous level access suitable for all people including those with mobility, vision and other impairments.

The Masterplan suggests a pedestrian link from Oxford Street to the Food Market Precinct as an extension westward to Newcastle Street. This allows good pedestrian access between the proposed 360 bay public car park and the retail area of Oxford Street. It also gives pedestrians connectivity between Oxford Street and the proposed food precinct markets in The Avenue. A well used link through an existing building exists in the vicinity, however, this is a private building. There would not necessarily be a need for the walkway to be a public thoroughfare but it would need to operate at night so that patrons of the entertainment precinct could use it to access the car park.

There is a need for a north-south pedestrian link between Carr Place and Vincent Street to increase the permeability of the area. It is not recommended to make this a vehicular access, however, through a combination of vehicular access to redevelopment in this area and pedestrian linkages it would be possible to create effective connection. Likewise for a connection between Newcastle Street and Carr Place.

Typically, most people will consider walking up to 400m (5 minutes) to daily activities, or 800m (10 minutes) to a train station or town centre. The increased permeability of the Masterplan area, by provision of pedestrian linkages between streets, aims to increase the proportion of destinations which can be reached within these distances (timeframes).

The majority of roads within the Masterplan area have existing footpaths located along either side. The standard of these footpaths is generally considered adequate (refer Appendix G for examples).

On developing new pedestrian linkages eg north-south between Carr Place and Vincent Street, the width of the footpaths is suggested to be at least 1.8m. As these links are also expected to service cyclists, dual use paths with a width of 2.5m – 3.0m are an advised alternative.

The redevelopment of Town of Vincent landholdings, and of the Masterplan precincts, is expected to increase the level of pedestrian traffic along key routes eg Oxford Street. However, along existing roads the ability to widen footpaths is limited. To increase the footpath widths along Oxford Street, it would be necessary to: remove the central median; remove a car parking lane; or reduce the level of on-street trading. These actions are not recommended, as:

- The central median acts as a road crossing rest point, important for pedestrian functionality;
- The car parking lanes act to calm traffic; and
- The on-street trading provides a vibrant and friendly pedestrian environment.

Possible actions to increase the pedestrian level of service could be:

- Create additional formal crossing points along Oxford Street. This is important to encourage increased usage of public transport, as the train station pedestrian bridge is located on the "far" (western) side of Oxford Street. It also encourages a well-established retail and café/restaurant precinct;
- Encourage veranda frontage to developments, to provide shade / rain protection to pedestrians; and
- Retain the trees in central median, to provide visual amenity and shade.

14. Cycle issues

In this urban environment on-street cycle facilities are considered to be the most appropriate. The 85th percentile speed of vehicles is at or below the posted 60 km/hr (or 50km/hr on residential streets), for example Oxford Street with 37 – 45 km/hr (dependent upon location). The presence of bike racks along several roads within the Masterplan area provides a visual indication to drivers that cyclists should be anticipated on the roads.

The new pedestrian link from Carr Place to Vincent Street is suggested to be a dual-use path, to provide increased connectivity for both pedestrians and cyclists.

The cycle paths within the Masterplan area will integrate with the existing Perth Bicycle Network. A map of this network is contained within Appendix G. The Masterplan provides connection to this network at Leederville Parade, and also to the north at Richmond Street. The map also indicates local bicycle friendly streets. These form a more detailed network, and include Carr Place and Richmond Street. Additional cyclist links, as outlined previously, will increase the connectivity of this network.

End of trip facilities are one of the best ways to encourage cycling and increasing the Town's requirement for such facilities in both the residential and the office buildings within the Masterplan area will assist this (details section 11). Existing bike racks and lockers are utilised and should be retained (refer Appendix G for examples).

15. Staging of works

15.1 Services constraints

The provision of service infrastructure to the Town of Vincent developments is not expected to be the dominating factor when the staging of works in considered. Correspondence with the service authorities indicated that in general, the existing infrastructure network is adequate to support the new developments. The exception to this is Western Power, who advised that network reinforcements are likely to be required.

Allowance must be made for the lead time for infrastructure works, in particular the potential upgrades by Western Power to the electricity network. However, the service infrastructure is not anticipated to constrain the decision as to the order of developing Sites 1, 2, 3, 4 and 5.

In relation to existing infrastructure:

- The services located under the skate park will need to be relocated before Site 3 is developed.
- The mobile telephone base station will need to be relocated, either temporarily or permanently, before Site 1 is developed.

15.2 Building works

As the residential towers are to be built on the site of the existing surface car parks, these car parks should be replaced with the new multi storey car parks as a first stage.

The Town of Vincent needs to consider the personal security issues associated with the developments. In particular creating car parks that are remote from other developments, or where access on foot is via a circuitous route. The new public car parks are to cater for the existing demand and therefore the patron desire lines should be considered, both during the day and in the evenings. For the car parks to operate efficiently the Town should look at some improvement works to existing laneways and if possible providing better connections to the car park sites.

There does not appear to be any engineering advantage, or disadvantage, to the sequencing of the construction of the residential towers.

16. Peer Review Workshop

16.1 Matters Discussed

The Leederville Masterplan design review was held on 22nd November 2007 in the Town of Vincent Administration and Civic Centre, and was facilitated by the Office of Urban Innovation at the Department for Planning and Infrastructure. The purpose of the design review was to consider the strategic planning and urban design objectives for Leederville; review the draft Leederville Masterplan in terms of those objectives; and establish agreement on key actions required to progress the Masterplan.

16.2 Recommendations

The workshop made the following recommendations that are pertinent to this study:

- Improved integration of the town centre with Leederville Station, with particular emphasis on the southern end of Oxford Street and entry to the station overpass.
- Improved access and parking for the entire centre, including private vehicle, public transport, bicycle and pedestrian movement.
- Improved pedestrian connections between Water Corporation site, train station and the town centre.
- Need to ensure phasing of stages and ensure pedestrian areas continue to be safe for the community.
- Improved pedestrian connections through larger street blocks, particularly the Carr Street precinct.

17. Conclusions

17.1 Services

The service authorities have the capacity to supply the new developments, with the exception of Western Power who will need to upgrade its network.

17.2 Drainage and water management

There is an opportunity for the Town to revise its current policies so that water sensitive design is included in future developments and the streetscaping within the Masterplan area.

17.3 Traffic generation and distribution

The traffic generation from the Masterplan area has been calculated to reflect the current levels of trip generation from land in the Leederville West Perth area. This traffic has been distributed across the network, which is assumed to have an annual growth in traffic, generated by the surrounding areas. This gives us a worst case scenario for the road network. In this situation it is shown that the road network and the intersections will operate satisfactorily.

If the TravelSmart initiative is successful there will be a reduction in traffic in the area, which will offset any increases generated by the developments on the Town owned land. Therefore, it is expected that in 2014 the traffic flows on the roads will be at the level they are currently.

17.3.1 Pedestrian and cyclist network

A strong pedestrian and cyclist network exists. There is a strong desire line between the station and the TAFE, with another one between the Water Corporation and the town centre.

17.4 Public transport

Whilst the area is well served by public transport there are a number of improvements that could be made in order to encourage high levels of usage.

17.5 Parking

The new developments will provide adequate on site parking for the demand that they generate. The proposed public parking will compensate for the loss of the existing parking.

The developments within the Town owned land should provide the following car and bicycle parking spaces:

		Commercial Bays	Residential parking bays	Employee bike racks	Visitor bike racks	Showers	Lockers
The Avenue	Site 1	58		14	10		
	Site 2	47	130	28	7	4	20
Frame Court	Site 3	88	135	52	14	12	50
	Site 4/5	22	40	6	4		

Note: this is based on two 24 storey buildings.

The number of parking bays has been aggressively reduced from conventional rates to reflect the existing town requirements, the increase in end of trip facilities and to encourage the use of alternative means of transport.

With an intensification of land use there will be an increasing number of trips that will be internal to the Masterplan area and will be made on foot, therefore reducing the demand for car parking.

17.6 Staging of works

There are no major engineering issues for the staging of the works.

18. Recommendations

18.1 Services

In general, the service authorities have advised that the existing service infrastructure is adequate to support the new developments. The exception is Western Power, as network reinforcement works are anticipated.

It is recommended the Town of Vincent apply for a works quote and budget cost for connection from Western Power. This could be reapplied for annually, as the quote for connection of new loads is assessed against the network capacity of the day. Western Power planned works mean that the capacity is expected to change over the coming years.

The Town of Vincent should continue dialogue with the service authorities so that the authorities are aware of the scope and demand from the proposed developments. In this way the service authorities can incorporate the demands into their planning for the area.

18.2 Drainage and water management

For the implementation of the Masterplan the following is recommended in regards to the Drainage System:

- On site detention for a 1:10 year event, as per current Town policy, be utilised for the rezoning of the residential area;
- Consideration by the Town to provide an attenuation option as an alternative to detention for multi-storey developments with basements;
- Consideration by the Town to include 50 % of the wall area for multi-storey developments of a certain height when assessing attenuation of flows;
- Completion of a drainage study to confirm the Oxford Street precinct can cater for the 1:10 year and 1:100 year flows;
- Ongoing installation of sediment traps and soakwells in the Town road system; and
- Implementation of bioremediation WSUD features in the streetscape, where possible, to improve nutrient stripping over the use of straight soakwells.

18.3 Traffic generation and distribution

The existing road network should be left as it is, with the proposed changes to the Vincent Street intersection with Oxford Street being implemented.

18.3.1 Pedestrian and cyclist network

A pedestrian link from Oxford Street to the Food Market Precinct, as an extension westward to Newcastle Street, should be provided. The link should operate at night so that patrons of the entertainment precinct could use it to access the car park.

A north-south pedestrian link between Carr Place and Vincent Street should be provided to increase the permeability of the area. It is not recommended to make this a vehicular access. A pedestrian connection between Newcastle Street and Carr Place should also be provided.

18.4 Public transport

An east west bus link, through the Town of Vincent, should be provided.

The entry to the station should be made more inviting and visible, with set down and pick up arrangement.

The CAT bus system should be extended into the area.

18.5 Parking

The Town of Vincent should continue applying the rates given in the Parking and Access Policy.

Long term, commuter parking, should be discouraged with the continued use of timed and paid parking.

18.5.1 Bicycle parking

The requirements for bicycle parking should be increased in the Parking and Access Policy.

18.6 Staging of works

The staging of the developments on the Town of Vincent land should take into consideration the need for the new car parks as the first priority and the need to relocate the telecommunications tower.

18.7 Items to include in the development guidelines

18.7.1 Bicycle Parking Requirement

Use Class	Employee Bicycle Parking Space	Class	Visitor/Shopper Bicycle Parking Space	Class
Office	1 space per 100 square metres gross floor area	1 or 2	1 space per 750 square metres over 1000 square metres	3
Retail Premises - shop	1 space per 150 square metres gross floor area	1 or 2	1 space per 200 square metres	3
Residential Building	1 space per 4 units plus 1 space per 4 units	2 1	1 space per 16 units	3

For the commercial premises:
i) A minimum of one female shower and one male shower, located in separate change rooms.
ii) Additional shower facilities to be provided at a rate of one female shower and one male shower for every additional five bicycle parking bays, to a maximum of 10 female and 10 male showers per development.
iii) End of journey facilities should be located as close as possible to the bicycle parking facilities.
iv) The change rooms to be secure facilities capable of being locked.
v) A locker to be provided for every bicycle parking bay provided.

Appendix A

Masterplan area and yield calculations

LEGEND

- OWNED OR UNDER THE CONTROL OF THE WATER CORPORATION
- OWNED OR UNDER THE CONTROL OF THE TOWN OF VINCENT
- OWNED OR UNDER THE CONTROL OF TAFE
- LEEDERVILLE MASTERPLAN BOUNDARY

No.	Date	Revision Details	Drn	Ver.	App.
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Designed: NMB	Signed	Date
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Drawing Title: MAJOR LANDOWNERS

Project No.: 30483

Scale: 1:400

Sheet Size: A3

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Rev.: B

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YIELD FROM NEW BUILDINGS

GROSS FLOOR AREA

	COMMERCIAL (m^2)	MIXED BUSINESS (m^2)	RESIDENTIAL (DWELLINGS)	SPECIAL USE
SITE 1		1950		CAR PARK (360 BAYS)
SITE 2	2000	1000	130	
SITE 3	4000	1800	135	
SITE 4 & 5		750	40	CAR PARK (360 BAYS)
TOTAL	6000	5500	305	

NETT LEASABLE FLOOR AREA

	COMMERCIAL (m^2)	MIXED BUSINESS (m^2)	RESIDENTIAL (DWELLINGS)	SPECIAL USE
SITE 1		1463		CAR PARK (360 BAYS)
SITE 2	1700	750	130	
SITE 3	3400	1350	135	
SITE 4 & 5		563	40	CAR PARK (360 BAYS)
TOTAL	5100	4125	305	

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Project No. 30483

Scale 1:200

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Precincts

The Masterplan is divided into 8 precincts. Each of these was further divided into a number of sub-precincts, based upon the existing and proposed developments, the density of land use, and access to the road network.

The sub-precincts are defined as:

Existing land uses

Through a site inspection (15.10.2007) and viewing aerial photography of the Masterplan area, the existing land use areas were estimated. Table A1 contains the gross building area (m^2), or number of dwellings, for each of the sub-precincts.

Table A2 contains the estimated existing lettable building area (m^2), or number of dwellings, for each of the sub-precincts.

Redevelopment land uses

Town of Vincent Sites 1 to 5

The floor area (or number of dwellings) of Town of Vincent land was estimated for the case of 16 storey icon buildings and for 24 storey icon buildings. Table A3 contains the calculated gross building area for each of the land uses.

Table A4 contains the estimated redevelopment lettable building area (m^2), or number of dwellings, for each of the Town of Vincent sites.

Remaining Masterplan area

The gross building area and lettable building area (or number of residences) for the entire Masterplan area (less Town of Vincent landholdings Site 1 to Site 5) is contained within Table A5 and Table A6. The Engineering Consultancy Services Leederville Masterplan (Town of Vincent, July 2007) was used to estimate the redevelopment land use areas, by considering the approximate plan area of the proposed new buildings and their number of storeys.

Assumptions

Six land use categories have been assumed:
1 Commercial
2 Mixed business
3 Residential
4 Education
5 Recreation / civic
6 Special purpose.

The Mixed business category includes both retail and café / restaurant uses. The proportion of cafes / restaurants to the total mixed business area is assumed to be:

- 60%, along the southern portion of Oxford Street (located within the 'Oxford Markets' and 'Entertainment' precincts); and
- 5%, within the remaining mixed business areas.

To convert gross building areas to lettable building areas it is assumed:

- $100m^2$ floor area equals 75 m^2 lettable floor area (for mixed business land use) (RTA, 2002); and
- $100m^2$ floor area equals 85 m^2 lettable floor area (for commercial and education land use) (Institute of Transportation Engineers, 1997).

To estimate the number of dwellings created within the Town of Vincent icon buildings

- a conversation with JCY architects was held and an estimated 5 – 6 dwellings per floor was generally assumed.

To estimate the number of residential dwellings created within the general Masterplan area it is assumed:

- $100m^2$ floor area equals 75 m^2 lettable floor area, and dwellings are $120m^2$ each; and
- along Carr Street residential precinct, a plot ratio of buildings of 70%, 75% of this is lettable floor area, an average of 4.5 storeys, and a dwelling area of $120m^2$.

Land Use Tables

Table A 1: Estimated existing land use (gross building area or number of dwellings)

Precinct	Commercial (m2)	Mixed business (m2)	Residential (dwellings)	Education (m2)	Recreation / civic (m2)	Special use
Oxford Street North						
1.1				900		
1.2				2400		
1.3	640	960				
1.4						Cinema
1.5	1500		35			
1.6	700	1400				
Education / Sports and Recreation						
2.1				14600		
2.2				6000		
2.3	8300					
Loftus Street Civic Precinct						
3.1	3300					
3.2					7400	
3.3						Construction in progress
3.4				700		
Oxford Markets						
4.1		6000				
4.2 Site 2						*Car park*
4.3 Site 1						*Car park*
4.4		1380				
4.5						Service station
Entertainment Precinct						
5.1		600				Club (function areas 300ppl)
5.2		1500				
5.3						Pub
5.4						Hotel (function areas 2500ppl)
5.5		1400				
5.6		500	2			
Oxford Town Square						
6.1						Car park
6.2 Site 5						*Car park*
6.3 Site 4						*Car park*
6.4 Site 3					*3900*	
Carr St Residential						
7.1			30			
7.2			40			
7.3	1800		30			
Newcastle St Commercial						
8.1	9000					
8.2	6700					
8.3	20400					
8.4	4560					
8.5	31100					
TOTAL	88000	13740	137	24600	11300	

Table A 2: Estimated existing land use (lettable building area or number of dwellings)

Precinct	Commercial (m2)	Mixed business (m2)	Residential (dwellings)	Education (m2)	Recreation / civic (m2)	Special use
Oxford Street North						
1.1				765		
1.2				2040		
1.3	544	720				
1.4						Cinema
1.5	1275		35			
1.6	595	1050				
Education / Sports and Recreation						
2.1				12410		
2.2				5100		
2.3	7055					
Loftus Street Civic Precinct						
3.1	2805					
3.2					7400	
3.3						Construction in progress
3.4				595		
Oxford Markets						
4.1		4500				
4.2 Site 2						*Car park*
4.3 Site 1						*Car park*
4.4		1035				
4.5						Service station
Entertainment Precinct						
5.1		450				Club (function areas 300ppl)
5.2		1125				
5.3						Pub
5.4						Hotel (function areas 2500ppl)
5.5		1050				
5.6		375	2			
Oxford Town Square						
6.1						Car park
6.2 Site 5						*Car park*
6.3 Site 4						*Car park*
6.4 Site 3					*3900*	
Carr St Residential						
7.1			30			
7.2			40			
7.3	1530		30			
Newcastle Street Commercial						
8.1	7650					
8.2	5695					
8.3	17340					
8.4	3876					
8.5	26435					
TOTAL	74800	10305	137	20910	11300	

Table A3: Estimated redevelopment land use – Town of Vincent landholdings (gross building area)

Icon buildings at 16 storeys

	Commercial (m^2)	Mixed business (m^2)	Residential (dwellings)	Special use
Site 1		1950		Car park (360 bays)
Site 2	2000	1000	80	
Site 3	4000	1800	80	
Site 4 & 5		750	40	Car park (360 bays)
Total	6000	5500	200	

Icon buildings at 24 storeys

	Commercial (m^2)	Mixed business (m^2)	Residential (dwellings)	Special use
Site 1		1950		Car park (360 bays)
Site 2	2000	1000	130	
Site 3	4000	1800	135	
Site 4 & 5		750	40	Car park (360 bays)
Total	6000	5500	305	

Table A4: Estimated redevelopment land use – Town of Vincent landholdings (lettable building area or number of dwellings)

Icon buildings at 16 storeys

	Commercial (m^2)	Mixed business (m^2)	Residential (dwellings)	Special use
Site 1		1463		Car park (360 bays)
Site 2	1700	750	80	
Site 3	3400	1350	80	
Site 4 & 5		563	40	Car park (360 bays)
Total	5100	4125	200	

Icon buildings at 24 storeys

	Commercial (m^2)	Mixed business (m^2)	Residential (dwellings)	Special use
Site 1		1463		Car park (360 bays)
Site 2	1700	750	130	
Site 3	3400	1350	135	
Site 4 & 5		563	40	Car park (360 bays)
Total	5100	4125	305	

Table A 5: Estimated redevelopment land use – Masterplan (excluding Town of Vincent landholdings) (gross building area)

Precinct	Commercial (m2)	Mixed business (m2)	Residential (m2)	Education (m2)	Recreation / civic (m2)	Special use
Oxford Street North						
1.1		760		6300		
1.2			6900			
1.3	1000	960				
1.4						Cinema
1.5	2500		6800			
1.6	700	1400				
Education / Sports and Recreation						
2.1				21900		
2.2				10520		
2.3	8300					
Loftus Street Civic Precinct						
3.1	6000					
3.2					7400	
3.3					4100	
3.4				4800		
Oxford Markets						
4.1	2000	5400				
4.2 Site 2	*refer alternate Table A3 or Table A4*					
4.3 Site 1	*refer alternate Table A3 or Table A4*					
4.4		4200				
4.5						Service station
Entertainment Precinct						
5.1	2350					
5.2		1260				
5.3						Pub
5.4						Hotel (function areas 2500ppl)
5.5	1900	2850				
5.6		3200	6500			
Oxford Town Square						
6.1					2100	
6.2 Site 5	*refer alternate Table A3 or Table A4*					
6.3 Site 4	*refer alternate Table A3 or Table A4*					
6.4 Site 3	*refer alternate Table A3 or Table A4*					
Carr St Residential						
7.1			13800			
7.2			13050			
7.3			2900			
Newcastle Street Commercial						
8.1	18000					
8.2	14700					
8.3	20400					
8.4	4560					
8.5	56800					
TOTAL	139210	20030	49950	43520	13600	

Table A 6: Estimated redevelopment land use – Masterplan (excluding Town of Vincent landholdings) (lettable building area or number of dwellings)

Precinct	Commercial (m2)	Mixed business (m2)	Residential (dwellings)	Education (m2)	Recreation / civic (m2)	Special use
Oxford Street North						
1.1		570		5355		
1.2			43			
1.3	850	720				
1.4						Cinema
1.5	2125		43			
1.6	595	1050				
Education / Sports and Recreation						
2.1				18615		
2.2				8942		
2.3	7055					
Loftus Street Civic Precinct						
3.1	5100					
3.2					7400	
3.3					4100	
3.4				4080		
Oxford Markets						
4.1	1700	4050				
4.2 Site 2	*refer alternate Table A3 or Table A4*					
4.3 Site 1	*refer alternate Table A3 or Table A4*					
4.4		3150				
4.5						Service station
Entertainment Precinct						
5.1	1998					
5.2		945				
5.3						Pub
5.4						Hotel (function areas 2500ppl)
5.5	1615	2137.5				
5.6		2400	41			
Oxford Town Square						
6.1					2100	
6.2 Site 5	*refer alternate Table A3 or Table A4*					
6.3 Site 4	*refer alternate Table A3 or Table A4*					
6.4 Site 3	*refer alternate Table A3 or Table A4*					
Carr St Residential						
7.1			272			
7.2			257			
7.3			57			
Newcastle Street Commercial						
8.1	15300					
8.2	12495					
8.3	17340					
8.4	3876					
8.5	48246					
TOTAL	118295	15022.5	712	36992	13600	

Appendix B

Service infrastructure requirements

LEGEND

G	GAS
S	SEWER
TC	TELSTRA CABLES
W	WATER
UGP	UNDERGROUND POWER
OHP	OVERHEAD POWER
D	DRAINAGE
TF	TELSTRA OPTIC FIBRE
O	OPTUS CABLE
OF	AMCOM OPTIC FIBRE

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Designed: NMB	Signed	Date
Verified	Signed	Date
Approved	Signed	Date

Drawing Title: LOCATION OF EXISTING SERVICES

Project No.: 30483

Scale: 1:400

Sheet Size: A3

Drawing No.: SK-003

Rev.: B

20 10 0 10 20 30 40 50mm

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LEGEND

G — PROPOSED GAS

W — PROPOSED WATER

S — PROPOSED SEWER

NOTES

1. PROPOSED GAS INFRASTRUCTURE AS ADVISED BY ALINTA (DECEMBER 2007)
2. PROPOSED WATER AND SEWER INFRASTRUCTURE ASSUMED BY CONNELL WAGNER FOR COST ESTIMATE PURPOSES (ALIGNMENT OF 'THE AVENUE' IS PROPOSED TO CHANGE UNDER THE MASTERPLAN).

No.	Date	Revision Details	Drn	Ver.	App.
B	31.01.08	FINAL ISSUE	DKG		
A	20.12.07	ISSUED FOR INFORMATION	DKG		

Connell Wagner

Connell Wagner Pty Ltd ABN 54 005 139 873
1st Floor, 256 Adelaide Tce, Perth
Western Australia, 6000, Australia

Telephone: +61 08 9223 1500
Facsimile: +61 08 9223 1605
Email: cwper@conwag.com

Client: TOWN OF VINCENT

Project: LEEDERVILLE MASTERPLAN

Drawn DKG	Signed	Date
Designed NMB	Signed	Date
Verified	Signed	Date
Approved	Signed	Date

Drawing Title: PROPOSED SERVICE INFRASTRUCTURE

Project No. 30483

Scale 1:400

Sheet Size A3

Drawing No. SK-004

Rev. B

20 10 0 10 20 30 40 50mm

00/00/00

Demand rates

Each land use type is expected to generate a different demand rate. The estimated demand generated by redevelopment of the Town of Vincent landholdings is summarised as follows.

Water Corporation - water

Demands

Site	Indicative height	Land use	Demand (L/day)		Peak demand rate (L/s)	
			Per land use	Total for building	Per land use	Total for building
1	5 storey	Mixed business	13,000	13,000	0.05	0.05
2	24 storey	Residential Offices Mixed business	70,000 13,000 6,700	89,700	11.0 0.14 0.03	11.2
3	24 storey	Residential Offices Mixed business	70,000 32,500 16,700	119,200	11.0 0.35 0.06	11.4
4 & 5	5 storey	Residential Mixed business Car park	25,800 5,000 -	30,800	11.0 0.03 -	3.9

Reference material

- Water Corporation 2003 *Domestic Water Use Study*, Perth Western Australia
- Water Services Association of Australia 2002 *Water Supply Code of Australia Part 1 Planning and Design*
- Queensland Department of Natural Resources and Mines 2005 *Planning Guidelines for water supply and sewerage Chapter 5 Demand Flow and Projections*.

Water Corporation – wastewater

Demands

Site	Indicative height	Land use	Flow (L/day)		Gravity sewer design flow (L/s)	
			Per land use	Total for building	Per land use	Total for building
1	5 storey	Mixed business	7,650	7,650	0.04	0.04
2	24 storey	Residential Offices Mixed business	47,300 4,500 3,900	55,700	1.53 0.04 0.02	1.59
3	24 storey	Residential Offices Mixed business	47,300 11,250 9,800	68,350	1.53 0.11 0.05	1.69
4 & 5	5 storey	Residential Mixed business Car park	16,700 3,900 -	20,600	0.54 0.02 -	0.56

Reference material

- Water Corporation 2004 *Wastewater Manual Volume One Design and Construction requirements for gravity sewers DN150 to DN600*
- Australian Standards 2000 AS1547 *On-site Domestic Wastewater Management*
- EPA Victoria 2003 *Septic Tanks Code of Practice*
- Queensland Department of Natural Resources and Mines 2005 *Planning Guidelines for water supply and sewerage Chapter 5 Demand Flow and Projections*.

Western Power

Demands

Building	Indicative height	Land use	Demand (kVA)	
			Per land use	Total for building
1	5 storey	Mixed business Car park	300 40	340
2	24 storey	Residential Offices Mixed business	280 200 140	620
3	24 storey	Residential Offices Mixed business	280 500 350	1,130
4 & 5	5 storey	Residential Mixed business Car park	100 105 35	240

Headworks

Water Corporation – water and wastewater

Assume a master meter with sub-meters.

Assume the peak flow rate for water demand for each building determines the 'Guaranteed Minimum Flow Rate' value required.

Assume a Standard Headworks Contribution (SHC) of $3,328 (water) and $1,537 (wastewater), as per Information Sheet No. 02

Applying the 'Meter Based Contribution Table' (Information Sheet No. 05A):

Site	Water peak demand rate		Guaranteed Minium Flow Rate required	Headworks Contribution Factor	
	L/s	L/min	L/min	Water	Wastewater
1	0.05	3	20	1	1
2	11.2	672	750	37.5	125
3	11.4	684	750	37.5	125
4 & 5	3.9	234	230	11.5	35

Costs:

Site	Water	Wastewater
1	$ 3,328	$ 1,537
2	$ 124,800	$ 192,125
3	$ 124,800	$ 192,125
4 & 5	$ 38,272	$ 53,795
Total	$ 290,000	$ 440,000

It is noted that the peak water demand rate for Sites 2 and 3 is located between the range of 600 L/min and 750 L/min, which are the bounding 'Guaranteed Minimum Flow Rate' values in the 'Meter Based Contribution Table.'

If a minimum rate of 600 L/min was chosen, the Headworks Contribution Factors become 30 (water) and 100 (wastewater) for Sites 2 and 3. This gives a cost of $99,840 (water) and $153,700 (wastewater) for each site, and a total cost of $240,000 (water) and $360,000 (wastewater).

Reference material

- Water Corporation Development Services Branch *Information Sheet No. 02 Standard Headworks Contributions 2007 - 2008*
- Water Corporation Development Services Branch *Information Sheet No. 05A Headworks Contributions*

30483 / 3.1

Your Ref:
Our Ref: MP088253
Enquiries: Customer Contact Centre
Telephone 13 10 87
Fax: 9225 2073

Western Power
Locked Bag 2520
PERTH, WA 6001
Electricity Networks Corporation
ABN 18 540 492 861

Quote

14 March 2008

Connell Wagner
Level 1
256 Adelaide Terrace
PERTH WA 6000

Attention: Nicole Birch

Dear Madam,

FRAME COURT, LEEDERVILLE

Thank you for your request of 04 February 2008 for a quote for the above work.

The detailed design has been completed and we are pleased to provide you with this firm quote.

The attached detailed design drawing MP088253, contains customer conditions, scope of work, requirements and responsibilities as well as Western Power's scope of work. By accepting this quote you are agreeing to abide by all conditions identified on the detailed design drawing and the attached Terms and Conditions.

Our Quote

Our quote for this work is itemised in the table below:

Labour Costs	=	$6,730.36
Equipment Costs	=	$224.35
Material Costs	=	$0.00
Contractor Related Costs	=	$4,262.56
Capital Contribution (excl GST)	=	**$11,217.27**
GST Amount	=	**$1,121.73**
Capital Contribution (non refundable)	=	**$12,339.00**

If you wish to proceed, please refer to the Quotation Acceptance Form.

Please note the following important information about this quote:

- This quote has been calculated in accordance with Western Power's policies on network extensions and customer capital contributions. The cost of the project to Western Power may be

significantly higher than the amount you are required to pay, as a result of these policies. You have only been charged for the minimum infrastructure needed to meet your requirements.

- Any design fee previously paid has been deducted from the total project cost to determine the amount payable to proceed to construction.

HOW TO PROCEED

If you wish for this project to proceed, please advise us within 60 calendar days, by returning the attached *Quote Acceptance Form*, duly completed.

Please note the following important points:

- If we do not receive the Quote Acceptance from you within 60 calendar days, we will assume you do not wish to proceed with the project and will cancel the job.

- If the job has been cancelled but you decide to go ahead with it, or if your requirements change, Western Power reserves the right to charge for the additional time spent preparing a new estimate or detailed design.

- As advised in the past, any design fee previously paid is non-refundable, except where the final quote exceeds our estimate by 30 per cent or more. In which case you may cancel the job and receive a full refund of the design fee.

ANY QUESTIONS?

If you have any questions, please telephone our Customer Contact Centre on 13 10 87 during business hours.

Yours faithfully,

Connections Manager
Customer Assist

Your Ref:
Our Ref: MP088253
Enquiries: Customer Contact Centre
Telephone 13 10 87
Fax: 9225 2073
Email: works.admin.general@westernpower.com.au

Western Power
Locked Bag 2520
PERTH,WA 6001
Electricity Networks Corporation
ABN 18 540 492 861

QUOTATION ACCEPTANCE FORM

You must complete, sign and return this form if you accept the quotation provided by Western Power for the work as specified in our quote letter. You may fax, email or post the completed Quotation Acceptance Form to Western Power, details above.

Project	FRAME CT LEEDERVILLE
Western Power Reference	MP088253
Quotation Date	14 March 2008
Quotation Amount (incl GST)	$12,339.00

CUSTOMER DETAILS (For Tax Invoice Purposes)

Name: _____

Company Name: _____

Address: _____

_____

_____

Phone No: _____

To expedite the processing of these works you may pay by cheque and return with your completed Quotation Acceptance Form. A tax receipt will then be issued.

If you wish to pay via Bpay, Credit Card ($5,000 limit), Post Billpay, Bill Express, EFT, please return this completed form & you will be forwarded a tax invoice to enable payment. Please nominate your preferred option: fax, email, post.

☐ Fax No: _____

☐ Email address: _____

☐ Post ☐ Cheque attached ☐ EFT

I hereby accept this quotation and agree to abide by all conditions listed by Western Power in the quotation letter and any accompanying correspondence. I also acknowledge that the Tax Invoice will be issued in accordance with the Customer Details provided.

Signature: _____ Date: _____

Electricity Networks Corporation
ABN 18 540 492 861

TERMS AND CONDITIONS

1. **Terms and Conditions**
These terms and conditions shall form part of the contract unless specifically excluded in writing by an authorised representative of Western Power.

2. **Period of Acceptance**
This quotation is to remain in force for **60 DAYS** from the date it bears. Acceptance of the quote shall be signified by the signing of the remittance by the customer or other person authorised by the customer and receipt thereof together with payment (and Bank Guarantee if applicable) by Western Power.

3. **Credit Check**
Western Power retains the right to inquire as to the credit worthiness of a customer and retains the right to decline to perform or further perform the works whenever Western Power does not receive an acceptable credit reference, which shall be at the sole discretion of Western Power. The customer acknowledges and agrees that it shall have no claim or right or cause of action against Western Power by reason of Western Power declining to perform or further perform the works in the circumstances described in this clause.

4. **Commencement and Completion of Works**
No work will commence until the price quoted has been received in full unless other arrangements are made in writing.
Western Power does not guarantee the starting or completion dates specified in the quote.

5. **Adverse Conditions**
Adverse conditions will incur additional charges as assessed by Western Power when those conditions are encountered. The cost of the job is based upon sandy soils and normal weather conditions. As such, Western Power reserves the right to charge for any additional costs incurred. Further, any delays incurred as a result of the customer's actions will result in additional charges. You will be notified prior to the work continuing where the additional costs are greater than 20% of the quoted price.

6. **Force Majeure**
Western Power shall not be liable to the customer for any loss, damage or expense caused by or attributable to force majeure. "Force Majeure" means any cause or event which is not reasonably within the control of the party affected and (without listing the generality of the foregoing) includes Acts of God; strikes; lockouts; stoppages or restraints of labour or other industrial disturbances; war, acts of public enemies, riot or civil commotion or sabotage; fire, explosion, earthquake, landslide, flood, washout, lightning, storm or tempest; breakdown or an accident to plant, machinery, equipment, lines or pipes howsoever caused; failure of suppliers to supply equipment or machinery; and restraints, embargoes or other actions of any government.

7. **Consequential Loss**
Damages shall be limited to damages for direct and foreseeable loss attributable to breach or default under this Agreement. The rights of either party to damages for indirect or consequential loss are hereby excluded. Neither party shall be liable to the other for any loss of profit suffered by a party to this Agreement or any other person.

8. **Modification**
A purported modification, variation or amendment of this Agreement including the scope of works or any waiver of any rights of any party or any approval or consent shall have no effect unless in writing and signed by the party to be charged, and may attract a subsequent design quote fee of $345.

9. **Application of Acts and By-Law**
Nothing contained in these Terms and Conditions shall in any way limit the operation or effect of the Electricity Corporation Act 1994, Energy Corporations (Powers) Act 1994, Energy Corporations (Transitional and Consequential Provisions) Act 1994, or any Regulations, By-Laws or Orders made pursuant thereto.

10. **Additional Charges**
Costs for reinstatement are not included unless specifically stated.
Costs for works associated with other services are not included unless specifically stated.
Cancellation or revision of works (see item 8 Modification, above) will result in an Administration fee as published in "Network Charges Schedule", plus any incurred expenses being deducted from a refund cheque, or added to the revised quote, or payable in advance of the revision.

11. **Responsibility for Boundaries.** The Customer shall also be responsible for accurately pegging all necessary boundaries to enable accurate placement of cables in the allocated alignment.

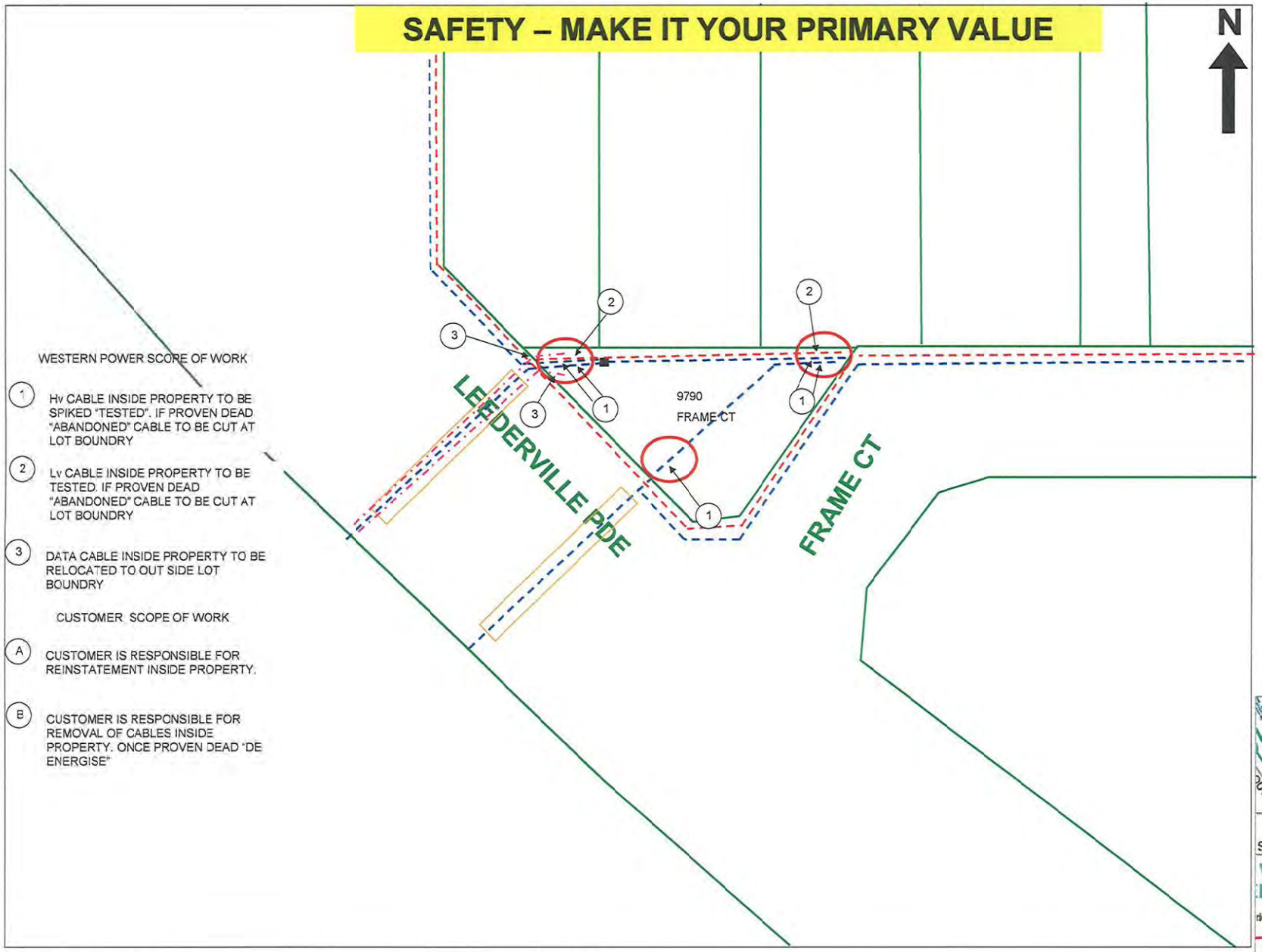
ADDITIONAL TERMS AND CONDITIONS FOR SUPPLY EXTENSION SCHEME APPLICANTS

These terms and conditions shall form part of the Supply Extension Scheme electricity supply proposal (herein after referred to as the proposal) unless specifically excluded in writing by an authorised representative of Western Power.

12. **Clearing of Vegetation**
Where specified in the proposal, the customer will arrange and pay for clearing of vegetation as directed by an authorised representative of Western Power and further that such clearing will be completed prior to commencement of Western Power works.

13. **Ownership of Works**
The whole of the electricity extension that forms the works carried out in accordance with the proposal is the property of Western Power and Western Power has the right to connect additional customers to any part of the extension.

SAFETY – MAKE IT YOUR PRIMARY VALUE



WESTERN POWER SCOPE OF WORK

1. Hv CABLE INSIDE PROPERTY TO BE SPIKED "TESTED". IF PROVEN DEAD "ABANDONED" CABLE TO BE CUT AT LOT BOUNDRY
2. Lv CABLE INSIDE PROPERTY TO BE TESTED. IF PROVEN DEAD "ABANDONED" CABLE TO BE CUT AT LOT BOUNDRY
3. DATA CABLE INSIDE PROPERTY TO BE RELOCATED TO OUT SIDE LOT BOUNDRY

CUSTOMER SCOPE OF WORK

A. CUSTOMER IS RESPONSIBLE FOR REINSTATEMENT INSIDE PROPERTY.

B. CUSTOMER IS RESPONSIBLE FOR REMOVAL OF CABLES INSIDE PROPERTY. ONCE PROVEN DEAD "DE ENERGISE"

WARNING

BEWARE OF UNDERGROUND SERVICES

DIAL 1100 BEFORE YOU DIG

The location of underground cables are approximate only and their exact position should be checked on site. No guarantee is given that all existing cables and services are shown. Locate all underground cables and services before commencement of work. Refer to Worksafe Regulation 3.21.

TRANSFORMER (NEW) (EXISTING)

SWITCHGEAR 2+1 (NEW) 2+1 (EXISTING)

CADASTRE

PILLARS

- U — UNIVERSAL
- MINI
- F/P — LV FRAME / FEEDER PILLAR
- 2 — 200AMP WALL MOUNT
- 1 — 100AMP WALL MOUNT
- MSB — CUSTOMER MSB

CARRIERS

CABLE	TERMINATION	O/H CONDUCTOR
LV		LV
DATA		DATA
HV		HV

- BREECH JOINT
- STRAIGHT JOINT
- DUCT
- AERIAL LAMP
- UNMETERED SUPPLY PIT
- POLES
- DROP OUT FUSE
- POLE TOP SWITCH
- LV ISOLATOR
- STAY

STREET LIGHTS

- 50W MVL
- 80W MVL
- 125W MVL
- 150W HPS
- 250W HPS
- EXISTING

TITLE – HV/LV CABLE TESTING FOR REMOVAL – 9790 FRAME CT LEEDERVILLE WA 6007

DISTRIBUTION DESIGN ENGINEERING

Customer: Connell Wagner ***Contact:*** Nicole Birch - Ph: 9223 1522	***Scale*** : NTS ***Drawn*** : Urrutia, Juan - Ph: 94117605 ***Date*** : 7/03/2008	O 7/03/2008 REVISIONS	***Lat*** - 31° 56' 21"S ***Long*** - 115° 50' 30"E ***Map Ref*** - C9 ***Page*** - 342	western power	Drg No. - MP088253 / Rev O

"Lettieri, Mario"
<Mario.Lettieri@team.telstra.com>
15/02/2008 10:03 AM

To "birchn@conwag.com" <birchn@conwag.com>
cc
bcc
Subject Leederville Masterplan, your Ref 30483, Telstra ref PR80576/01
Project 30483

History: This message has been replied to and forwarded.

Hello Nicole,
in reply to your request dated 4th February 2008.
A budgetary cost to relocate the cable into the road reserve would be approx $32,000.00.
I have been to site to view the network & done futher investigations & have determined that there is a good possibility that the cable is currently not in use & has been superseded by another cable that goes to the YMCA that is located in the vicinity.
Therefore I also give you a budgetary of $2,500.00 which is for work to verifying that the cable is not in use at the time of removal, removal of cable if this is so & to make good network the remaining network to suit.

Regards,

Mario Lettieri
Field Consultant
Network Integrity Services
Western Region
Access Network Programs
Tel (08) 9491 8604
Fax (08) 9202 1254
Mob 0417 989 635
e-mail mario.lettieri@team.telstra.com

Network Integrity Services; **Working with the construction industry to provide Network Integrity solutions and prevent damage to ALL underground assets.**

"Lettieri, Mario"
<Mario.Lettieri@team.telstra.com>
15/02/2008 10:10 AM

To "birchn@conwag.com" <birchn@conwag.com>
cc
bcc
Subject FW: Leederville Masterplan, your Ref 30483, Telstra ref PR80576/01
Project **30483**

Nicole for your info a plan of the cable in question.

Regards,
Mario Lettieri
Field Consultant
Network Integrity Services
Western Region
Access Network Programs
Tel (08) 9491 8604
Fax (08) 9202 1254
Mob 0417 989 635
e-mail mario.lettieri@team.telstra.com

Appendix C

Kerb Side WSUD biological treatment systems
(Refer www.wsud.org)

Street Side Bio retention Systems

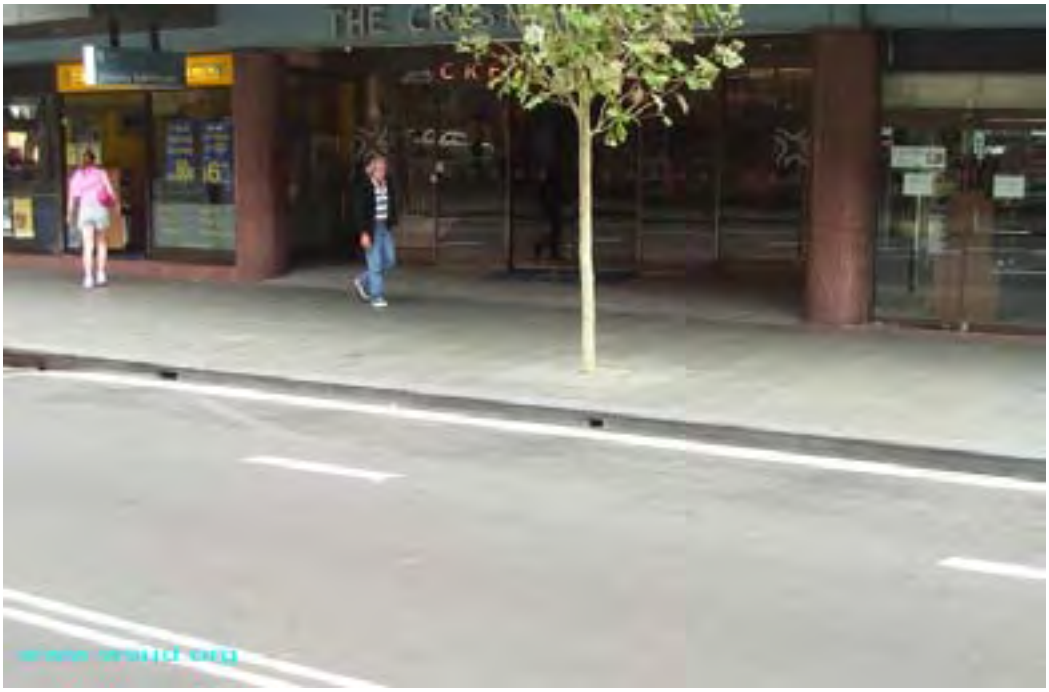
Example 1

Example 2

Tree Soaks

Example 1

Example 2



Example 3

Appendix D

Traffic generation

Existing and forecast traffic volumes
(excluding Town of Vincent, Water Corporation and WALGA developments)

Road	Location	Direction of travel	Vehicles per day (2005/2006)	Forecast 2014 (ex Masterplan traffic)	Forecast 2024 (ex Masterplan traffic)
Oxford Street	(north of Vincent St)	north	7529	8153	9006
		south	8006	8669	9576
Oxford Street	(north of Newcastle St)	north	6492	7030	7765
		south	6501	7040	7776
Oxford Street	(north of Leederville Pde)	north	4025	4358	4814
		south	3961	4289	4738
Loftus Street	(north of Vincent St)	north	11167	12092	13357
		south	9592	10387	11473
Loftus Street	(north of Newcastle St)	north	15258	16522	18251
		south	13603	14730	16271
Loftus Street	(north of Leederville Pde)	north	16795	18187	20089
		south	14155	15328	16931
Leederville Parade	(north of Oxford St)	north	4579	4958	5477
		south	4276	4630	5115
Leederville Parade	(west of Loftus St)	east	7220	7818	8636
		west	4139	4482	4951
Vincent Street	(west of Oxford St)	east	10946	11853	13093
		west	11170	12096	13361
Vincent Street	(west of Loftus St)	east	7924	8581	9478
		west	8828	9559	10560
Carr Place		combined	1452	1572	1737
Newcastle Street		east	3055	3308	3654
		west	3657	3960	4374
Frame Court (1999 data)		combined	1888	2170	2397

Town of Vincent landholding development

Site	Land use	GLFA (m2) or no. dwellings	Daily vehicle trips		Peak hour trips	
			Per land use	Total for site	Per land use	Total for site
Site 1	Mixed business	1,463	1484	1484	150	150
Site 2	Commercial	1,700	120	1369	24	142
	Mixed business	750	761		77	
	Residential	130	488		41	
Site 3	Commercial	3,400	240	2117	48	229
	Mixed business	1,350	1369		139	
	Residential	135	507		43	
Site 4 and 5	Mixed business	563	571	721	58	70
	Residential	40	150		13	

Western Australian Local Government Association

Building	Land use	GLFA (m2)	Daily vehicle trips	Peak hour trips
New site	Commercial	3675	260	52

Water Corporation development

Building	Land use	GLFA (m2)	Daily vehicle trips	Peak hour trips
Monarch car park site (new 2014)	Commercial	12600	890	178
Operations building (new 2024)	Commercial	11523	814	163
less Operations centre (existing)	Commercial	(2312)	(163)	(33)
Additional in 2014	Commercial	12600	890	178
Additional in 2024	Commercial	21811	1540	308

Remaining Masterplan area

Precinct	Land use	GLFA (m2) or no. dwellings	Daily vehicle trips		Peak hour trips	
			Per land use	Total for precinct	Per land use	Total for precinct
1. Oxford Street North	Commercial	1156	82	1105	16	142
	Mixed business	570	578		59	
	Residential	51	190		16	
	Education	2550	255		51	
2. Education / Sports and Recreation	Education	10047	1005	1005	201	201
3. Loftus Street Civic Precinct	Commercial	2295	162	1331	32	225
	Education	3485	349		70	
	Recreation	4100	820		123	
4. Oxford Markets	Commercial	1700	120	1809	24	195
	Mixed business	1665	1689		171	
5. Entertainment Precinct	Commercial	3613	255	2918	51	318
	Mixed business	2483	2518		255	
	Residential	39	145		12	
6. Oxford Town Square	Recreation	-1800	0	0	0	0
7. Carr Street Residential	Residential	486	1825	1825	154	154
8. Newcastle Street Commercial	Commercial	14450	1020	1020	204	204
TOTAL	Commercial	23214	1639	10652	328	1385
	Mixed business	4718	4785		484	
	Residential	575	2160		183	
	Education	16082	1608.2		322	
	Recreation	2300	460		69	

Note: Assumed 95% retail and 5% restaurant / café for all mixed business (conservative)
Note: Assumed rate of 20 trips per 100m2 for recreation (Gym = 20), 3 in peak hour
Note: Assumed rate of 10 trips per 100m2 for education (commercial = 10). The development of the TAFE campus is unknown, this rate allows a nominal figure to be generated.

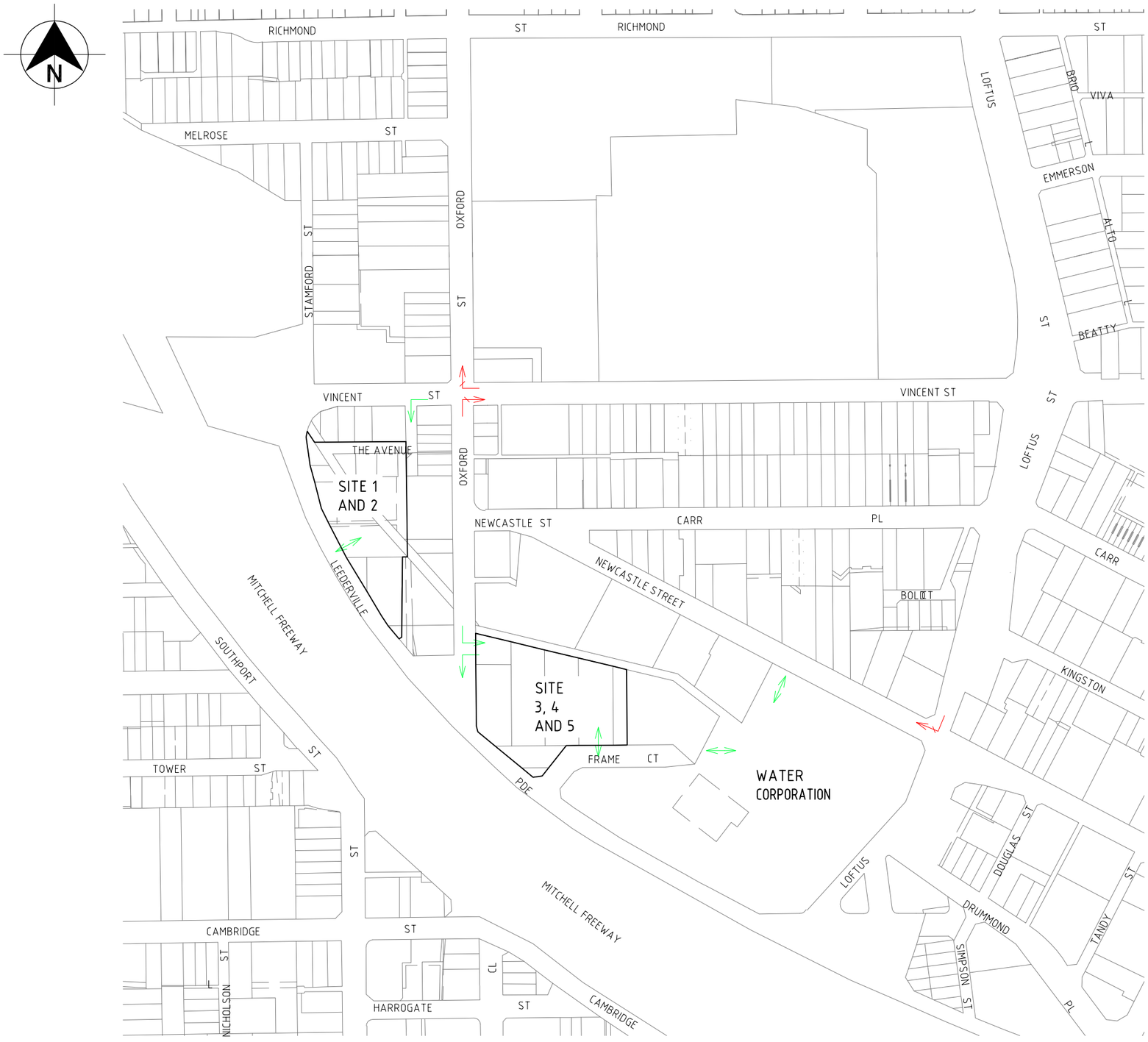
Appendix E

Traffic distribution

LEGEND

RESTRICTED
OR BANNED MOVEMENT

ACCESS POINT



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Connell Wagner

Connell Wagner Pty Ltd ABN 54 005 139 873
1st Floor, 256 Adelaide Tce, Perth
Western Australia, 6000, Australia

Telephone:+61 08 9223 1500
Facsimile: +61 08 9223 1605
Email: cwper@conwag.com

Client: TOWN OF VINCENT

Project: LEEDERVILLE MASTERPLAN

Drawn DKG	Signed	Date
Designed NMB	Signed	Date
Verified	Signed	Date
Approved	Signed	Date

Drawing Title: RESTRICTED MOVEMENTS AND ACCESS POINTS TO DEVELOPMENTS

Project No. 30483

Scale 1:400

Sheet Size A3

Drawing No. SK-005

Rev. B

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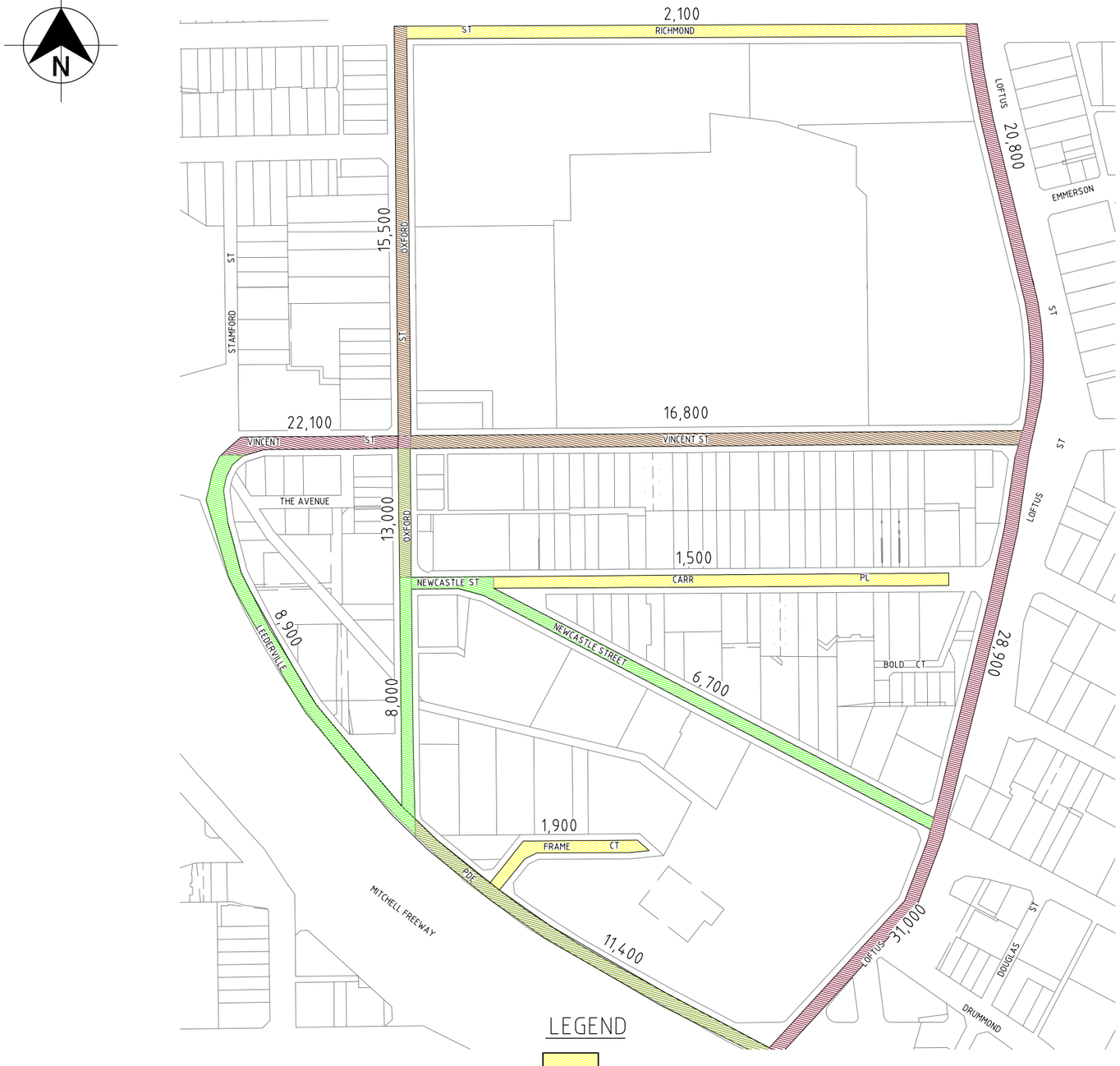
ROAD	LOCATION	VEHICLES PER DAY
OXFORD ST	NORTH OF VINCENT ST NORTH OF NEWCASTLE ST NORTH OF LEEDERVILLE PDE	15,500 13,000 8,000
LOFTUS ST	NORTH OF VINCENT ST NORTH OF NEWCASTLE ST NORTH OF LEEDERVILLE PDE	20,800 28,900 31,000
LEEDERVILLE PDE	WEST OF OXFORD ST WEST OF LOFTUS ST	8,900 11,400
VINCENT ST	WEST OF OXFORD ST WEST OF LOFTUS ST	22,100 16,800
CARR PLACE		1,500
NEWCASTLE ST		6,700
FRAME CRT		1,900



No.	Date	Revision Details	Drn	Ver.	App.
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Connell Wagner

Connell Wagner Pty Ltd ABN 54 005 139 873
1st Floor, 256 Adelaide Tce, Perth
Western Australia, 6000, Australia

Telephone: +61 08 9223 1500
Facsimile: +61 08 9223 1605
Email: cwper@conwag.com

Client: TOWN OF VINCENT

Project: LEEDERVILLE MASTERPLAN

Drawn DKG	Signed	Date
Designed NMB	Signed	Date
Verified	Signed	Date
Approved	Signed	Date

Drawing Title: 2005 / 2006 DAILY TRAFFIC VOLUMES

Project No. 30483

Scale 1:400

Sheet Size A3

Drawing No. SK-006

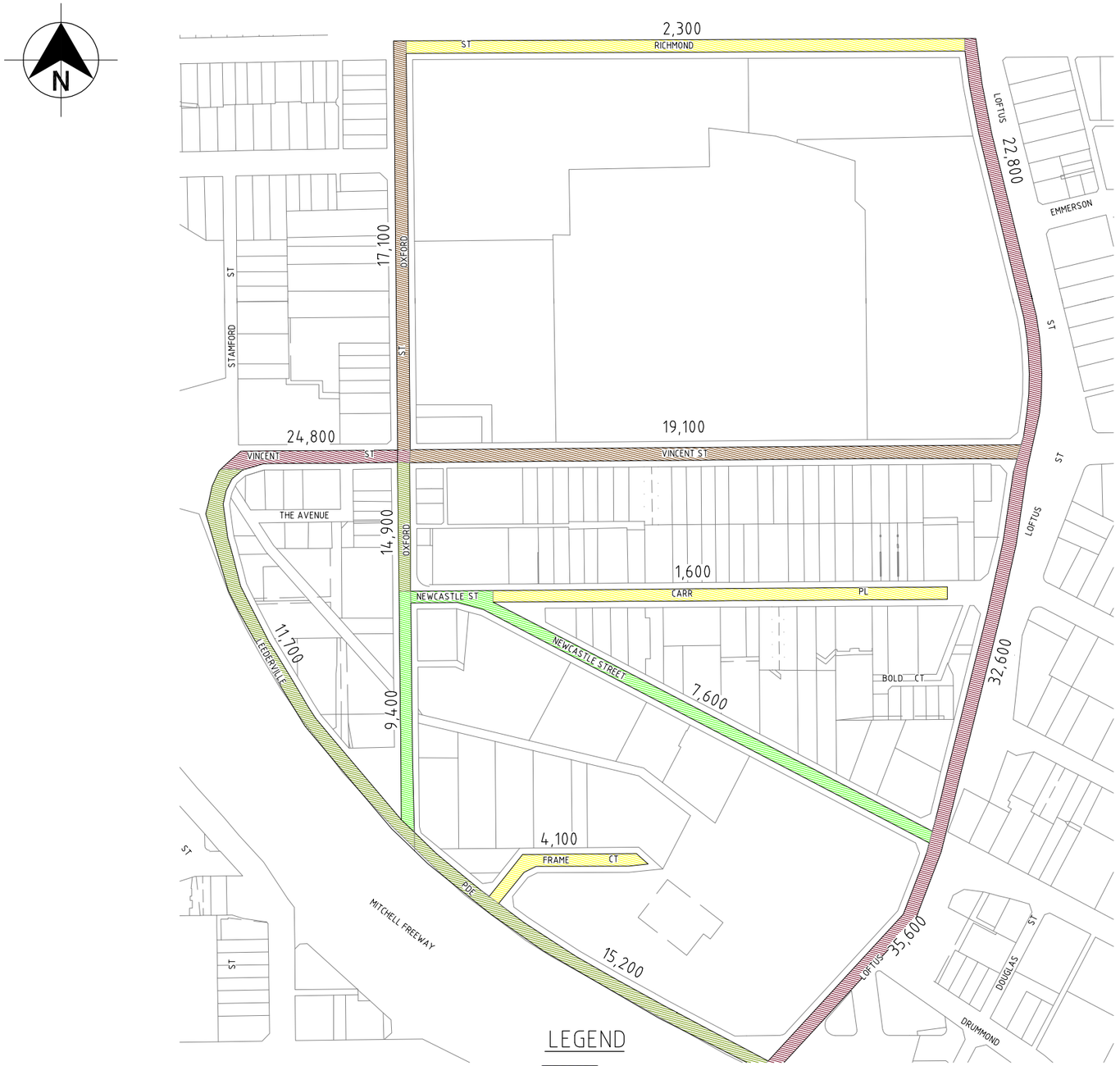
Rev. B

00/00/00

20 10 0 10 20 30 40 50mm

ROAD	LOCATION	VEHICLES PER DAY	COMPOSITION
OXFORD ST	NORTH OF VINCENT ST	17,100	90% 2005 / 2006 EXISTING 8% NATURAL INCREASE (1% PA) 2% TOWN OF VINCENT LANDHOLDINGS 0% WATER CORPORATION 0% WALGA
	NORTH OF NEWCASTLE ST	14,900	87% 2005 / 2006 EXISTING 8% NATURAL INCREASE (1% PA) 5% TOWN OF VINCENT LANDHOLDINGS 0% WATER CORPORATION 0% WALGA
	NORTH OF LEEDERVILLE PDE	9,400	85% 2005 / 2006 EXISTING 8% NATURAL INCREASE (1% PA) 7% TOWN OF VINCENT LANDHOLDINGS 0% WATER CORPORATION 0% WALGA
LOFTUS ST	NORTH OF VINCENT ST	22,800	91% 2005 / 2006 EXISTING 8% NATURAL INCREASE (1% PA) 1% TOWN OF VINCENT LANDHOLDINGS 0% WATER CORPORATION 0% WALGA
	NORTH OF NEWCASTLE ST	32,600	89% 2005 / 2006 EXISTING 7% NATURAL INCREASE (1% PA) 3% TOWN OF VINCENT LANDHOLDINGS 1% WATER CORPORATION 0% WALGA
	NORTH OF LEEDERVILLE PDE	35,600	87% 2005 / 2006 EXISTING 7% NATURAL INCREASE (1% PA) 5% TOWN OF VINCENT LANDHOLDINGS 1% WATER CORPORATION 0% WALGA
LEEDERVILLE PDE	WEST OF OXFORD ST	11,700	76% 2005 / 2006 EXISTING 6% NATURAL INCREASE (1% PA) 15% TOWN OF VINCENT LANDHOLDINGS 3% WATER CORPORATION 0% WALGA
	WEST OF LOFTUS ST	15,200	75% 2005 / 2006 EXISTING 6% NATURAL INCREASE (1% PA) 17% TOWN OF VINCENT LANDHOLDINGS 2% WATER CORPORATION 0% WALGA
VINCENT ST	WEST OF OXFORD ST	24,800	89% 2005 / 2006 EXISTING 7% NATURAL INCREASE (1% PA) 3% TOWN OF VINCENT LANDHOLDINGS 0% WATER CORPORATION 1% WALGA
	WEST OF LOFTUS ST	19,100	88% 2005 / 2006 EXISTING 7% NATURAL INCREASE (1% PA) 4% TOWN OF VINCENT LANDHOLDINGS 0% WATER CORPORATION 1% WALGA
CARR PL		1,600	94% 2005 / 2006 EXISTING 6% NATURAL INCREASE (1% PA) 0% TOWN OF VINCENT LANDHOLDINGS 0% WATER CORPORATION 0% WALGA
NEWCASTLE ST		7,600	88% 2005 / 2006 EXISTING 8% NATURAL INCREASE (1% PA) 4% TOWN OF VINCENT LANDHOLDINGS 0% WATER CORPORATION 0% WALGA
FRAME CRT		4,100	46% 2005 / 2006 EXISTING 5% NATURAL INCREASE (1% PA) 35% TOWN OF VINCENT LANDHOLDINGS 14% WATER CORPORATION 0% WALGA

NOTE: FIGURES ARE ROUNDED TO THE NEAREST INTEGER. "0%" MAY INCLUDE THOSE VALUES BETWEEN 0% AND 0.5%



No.	Date	Revision Details	Drn	Ver.	App.
B	31.01.08	FINAL ISSUE	DKG		
A	20.12.07	ISSUED FOR INFORMATION	DKG		

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Client: TOWN OF VINCENT

Project: LEEDERVILLE MASTERPLAN

Drawn	DKG	Signed	Date
Designed	NMB	Signed	Date
Verified		Signed	Date
Approved		Signed	Date

Drawing Title: 2014 FORECAST DAILY TRAFFIC VOLUMES

Project No. 30483

Scale 1:400

Sheet Size A3

Drawing No. SK-007

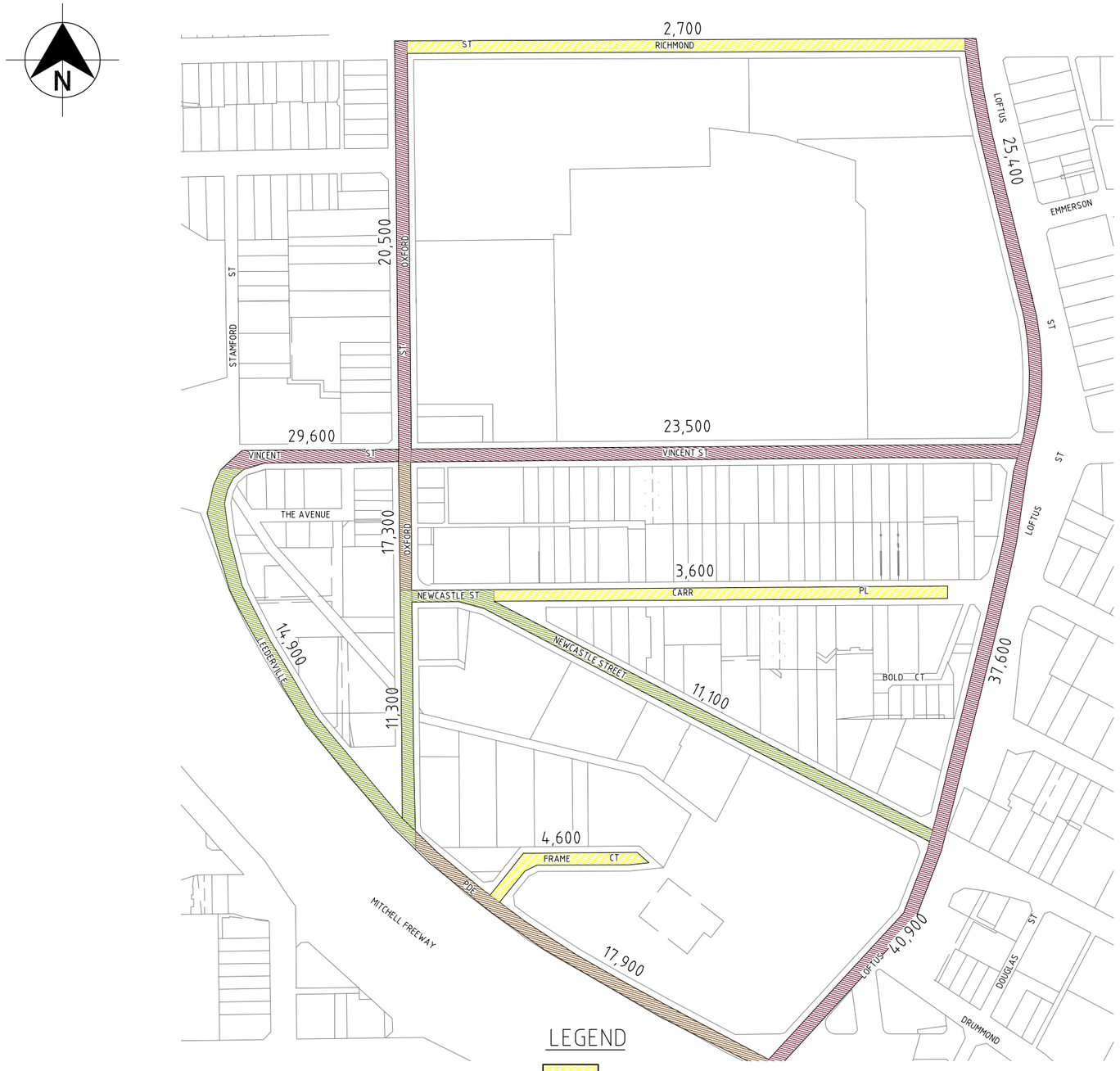
Rev. B

00/00/00

20 10 0 10 20 30 40 50mm

ROAD	LOCATION	VEHICLES PER DAY	COMPOSITION
OXFORD ST	NORTH OF VINCENT ST	20,500	76% 2005 / 2006 EXISTING 15% NATURAL INCREASE (1% PA) 1% TOWN OF VINCENT LANDHOLDINGS 0% WATER CORPORATION 0% WALGA 8% REMAINING MASTERPLAN AREA
	NORTH OF NEWCASTLE ST	17,300	75% 2005 / 2006 EXISTING 15% NATURAL INCREASE (1% PA) 4% TOWN OF VINCENT LANDHOLDINGS 0% WATER CORPORATION 0% WALGA 6% REMAINING MASTERPLAN AREA
	NORTH OF LEEDERVILLE PDE	11,300	70% 2005 / 2006 EXISTING 14% NATURAL INCREASE (1% PA) 6% TOWN OF VINCENT LANDHOLDINGS 0% WATER CORPORATION 0% WALGA 10% REMAINING MASTERPLAN AREA
LOFTUS ST	NORTH OF VINCENT ST	25,400	82% 2005 / 2006 EXISTING 16% NATURAL INCREASE (1% PA) 1% TOWN OF VINCENT LANDHOLDINGS 0% WATER CORPORATION 0% WALGA 1% REMAINING MASTERPLAN AREA
	NORTH OF NEWCASTLE ST	37,600	78% 2005 / 2006 EXISTING 15% NATURAL INCREASE (1% PA) 2% TOWN OF VINCENT LANDHOLDINGS 1% WATER CORPORATION 0% WALGA 4% REMAINING MASTERPLAN AREA
	NORTH OF LEEDERVILLE PDE	40,900	76% 2005 / 2006 EXISTING 15% NATURAL INCREASE (1% PA) 4% TOWN OF VINCENT LANDHOLDINGS 1% WATER CORPORATION 0% WALGA 4% REMAINING MASTERPLAN AREA
LEEDERVILLE PDE	NORTH OF OXFORD ST	14,900	60% 2005 / 2006 EXISTING 12% NATURAL INCREASE (1% PA) 12% TOWN OF VINCENT LANDHOLDINGS 3% WATER CORPORATION 0% WALGA 13% REMAINING MASTERPLAN AREA
	WEST OF LOFTUS ST	17,900	64% 2005 / 2006 EXISTING 12% NATURAL INCREASE (1% PA) 15% TOWN OF VINCENT LANDHOLDINGS 3% WATER CORPORATION 0% WALGA 6% REMAINING MASTERPLAN AREA
VINCENT ST	WEST OF OXFORD ST	29,600	75% 2005 / 2006 EXISTING 15% NATURAL INCREASE (1% PA) 3% TOWN OF VINCENT LANDHOLDINGS 0% WATER CORPORATION 0% WALGA 7% REMAINING MASTERPLAN AREA
	WEST OF LOFTUS ST	19,100	71% 2005 / 2006 EXISTING 14% NATURAL INCREASE (1% PA) 3% TOWN OF VINCENT LANDHOLDINGS 0% WATER CORPORATION 1% WALGA 11% REMAINING MASTERPLAN AREA
CARR PL		3,600	42% 2005 / 2006 EXISTING 8% NATURAL INCREASE (1% PA) 0% TOWN OF VINCENT LANDHOLDINGS 0% WATER CORPORATION 0% WALGA 50% REMAINING MASTERPLAN AREA
NEWCASTLE ST		11,100	60% 2005 / 2006 EXISTING 12% NATURAL INCREASE (1% PA) 0% TOWN OF VINCENT LANDHOLDINGS 4% WATER CORPORATION 0% WALGA 24% REMAINING MASTERPLAN AREA
FRAME CRT		4,600	40% 2005 / 2006 EXISTING 11% NATURAL INCREASE (1% PA) 29% TOWN OF VINCENT LANDHOLDINGS 20% WATER CORPORATION 0% WALGA 0% REMAINING MASTERPLAN AREA

NOTE: FIGURES ARE ROUNDED TO THE NEAREST INTEGER. "0%" MAY INCLUDE THOSE VALUES BETWEEN 0% AND 0.5%



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Drawn	DKG	Signed	Date
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Verified		Signed	Date
Approved		Signed	Date

Drawing Title: 2024 FORECAST DAILY TRAFFIC VOLUMES

Project No. 30483

Scale 1:400

Sheet Size A3

Drawing No. SK-008

Rev. B

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Level Of Service

Level of Service is defined as a qualitative measure describing operational conditions within a traffic stream, and their perception by motorists and/or passengers. In general, there are six Levels of Service, designated from A to F, with Level of Service A representing the best operating condition. AustRoads describes each level as follows:

Level of Service A is a condition of free flow in which individual drivers are virtually unaffected by the presence of others in the traffic stream. Freedom to select desired speeds and to manoeuvre within the traffic stream is extremely high, and the general level of comfort and convenience provided is excellent.

Level of Service B is the zone of stable flow and drivers still have reasonable freedom to select their desired speed and to manoeuvre within the traffic stream, although the general level of comfort and convenience is a little less than with Level of Service A.

Level of Service C is also in the zone of stable flow, but most drivers are restricted in some extent in their freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience declines noticeably at this level.

Level of Service D is close to the limit of stable flow and is approaching unstable flow. All drivers are severely restricted in their freedom to select their desired speed and to manoeuvre within the traffic stream. The general level of comfort and convenience is poor, and small increases in traffic flow will generally cause operational concerns.

Level of Service E occurs when traffic volumes are at or close to capacity, and there is virtually no freedom to select desired speeds or to manoeuvre within the traffic stream. Flow is unstable and minor disturbances within the traffic stream will cause breakdown.

Level of Service F is in the zone of forced flow. With it, the amount of traffic approaching the point under consideration exceeds that which can pass it. Flow break-down occurs, and queuing and delays result.

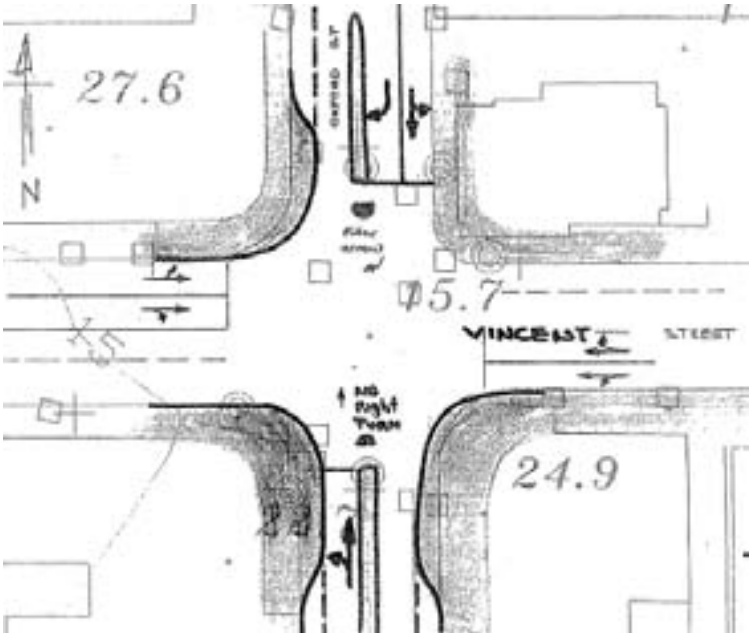
Existing intersection layouts (Oxford Street is north-south alignment)

Oxford Street / Vincent Street

Oxford Street / Newcastle Street

Oxford Street / Leederville Parade

Modified Vincent Street / Oxford Street intersection



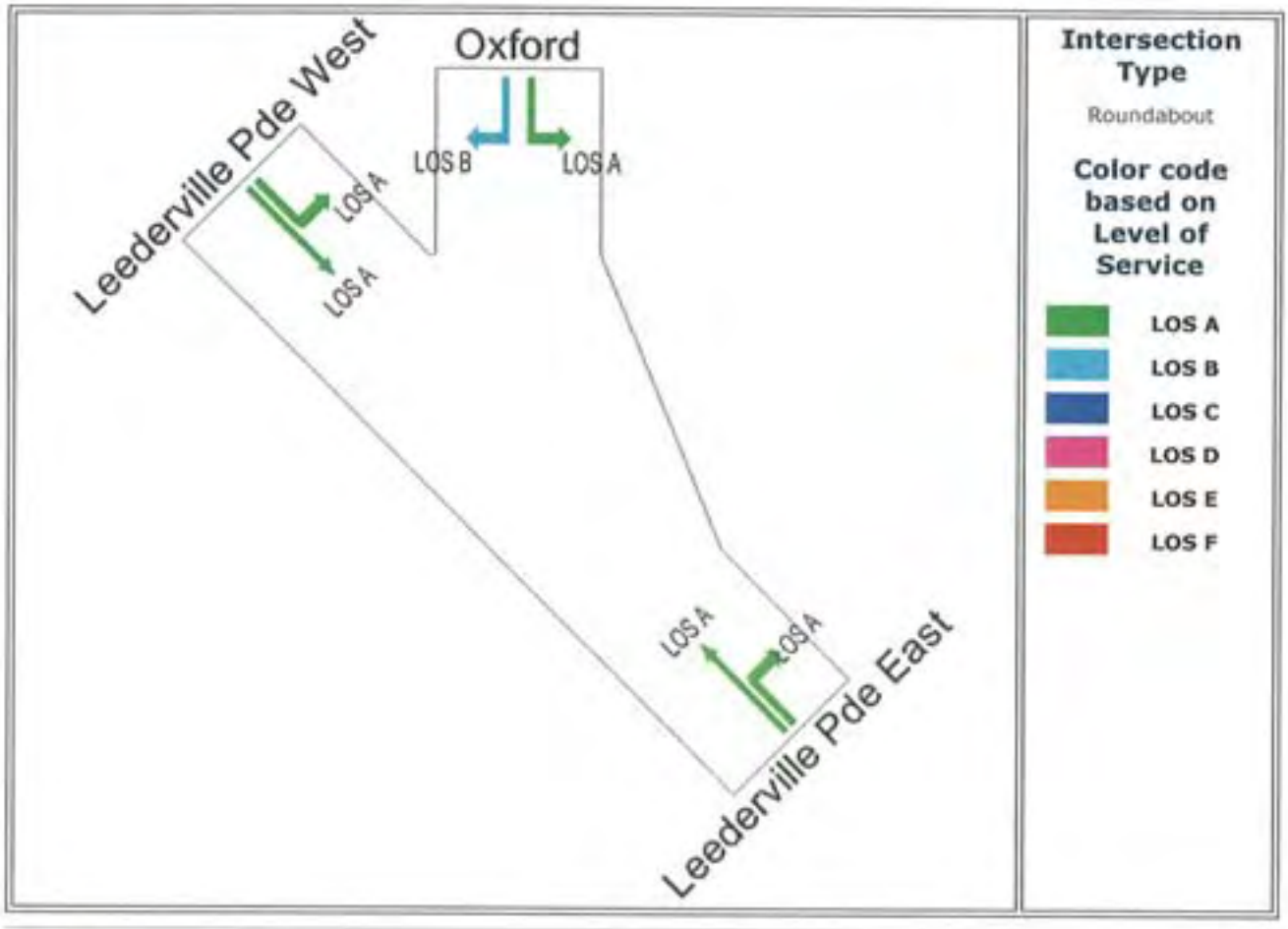
SIDRA INTERSECTION

Level of Service

Based on Delay (HCM method)

Oxford Street/Leederville Pde Roundabout

AM Peak - Year 2024



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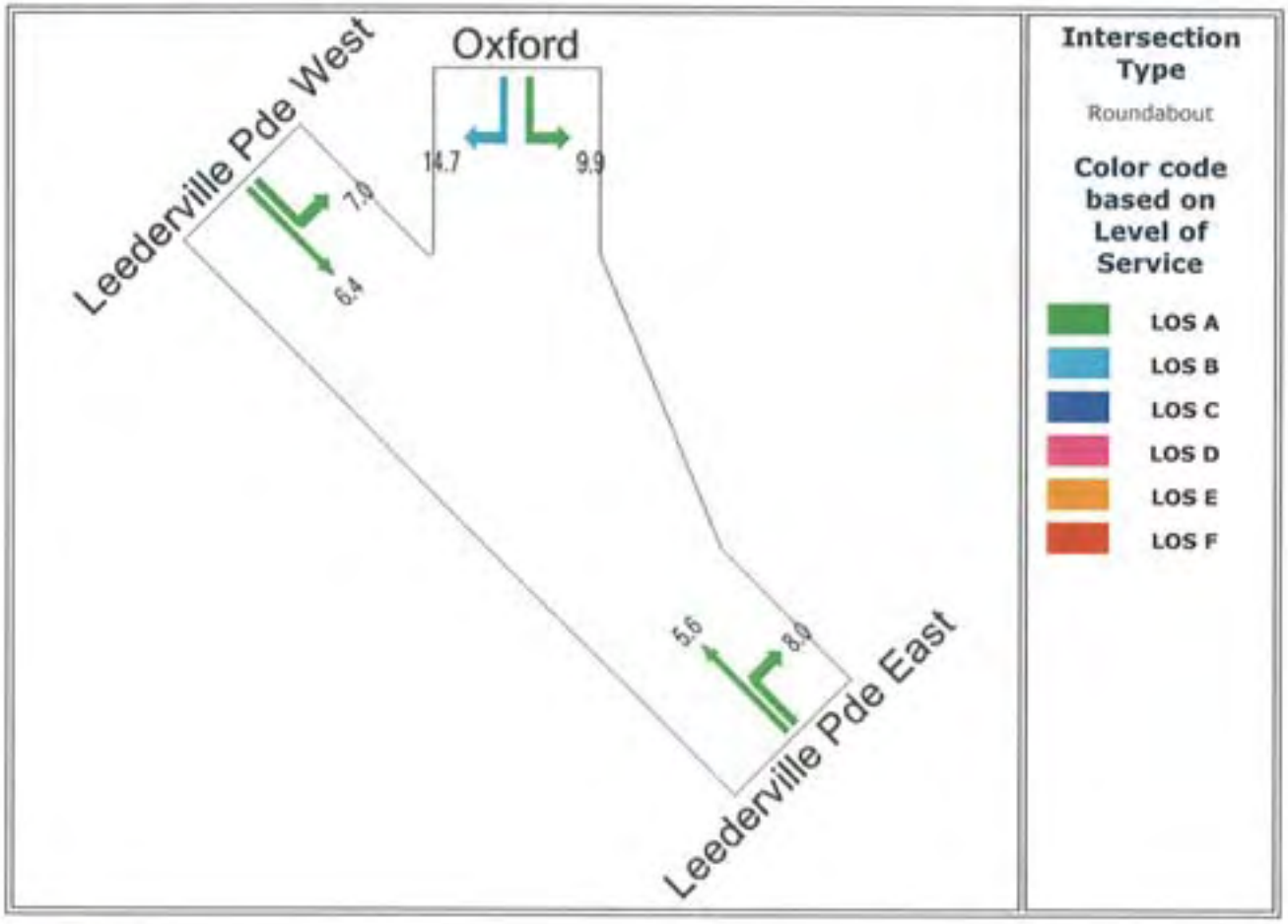
SIDRA INTERSECTION

Control Delay (Average)

Average control delay per vehicle (seconds)

Oxford Street/Leederville Pde Roundabout

AM Peak - Year 2024



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SIDRA INTERSECTION

Movement Summary

Oxford Street/Leederville Pde Roundabout

AM Peak - Year 2024

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Leederville Pde East										
22	T	286	4.9	0.350	5.6	LOS A	26	0.37	0.49	43.0
23	R	158	1.9	0.350	8.0	LOS A	26	0.37	0.59	40.5
Approach		**444**	**3.8**	**0.350**	**6.5**	**LOS A**	**26**	**0.37**	**0.53**	**42.1**
Oxford										
7	L	415	1.9	0.610	9.9	LOS A	51	0.84	0.93	34.2
9	R	81	2.5	0.609	14.7	LOS B	51	0.84	0.98	32.1
Approach		**495**	**2.0**	**0.610**	**10.7**	**LOS B**	**51**	**0.84**	**0.94**	**33.8**
Leederville Pde West										
27	L	217	1.8	0.576	7.0	LOS A	44	0.55	0.62	41.3
28	T	466	4.9	0.575	6.4	LOS A	44	0.55	0.57	42.2
Approach		**683**	**4.0**	**0.575**	**6.6**	**LOS A**	**44**	**0.55**	**0.59**	**42.0**
All Vehicles		**1622**	**3.3**	**0.610**	**7.8**	**LOS A**	**51**	**0.59**	**0.68**	**39.1**

Symbols which may appear in this table:

Following Degree of Saturation
x = 1.00 for Short Lane with resulting Excess Flow
* x = 1.00 due to minimum capacity

Following LOS
- Based on density for continuous movements

Following Queue
- Density for continuous movement

SIDRA SOLUTIONS

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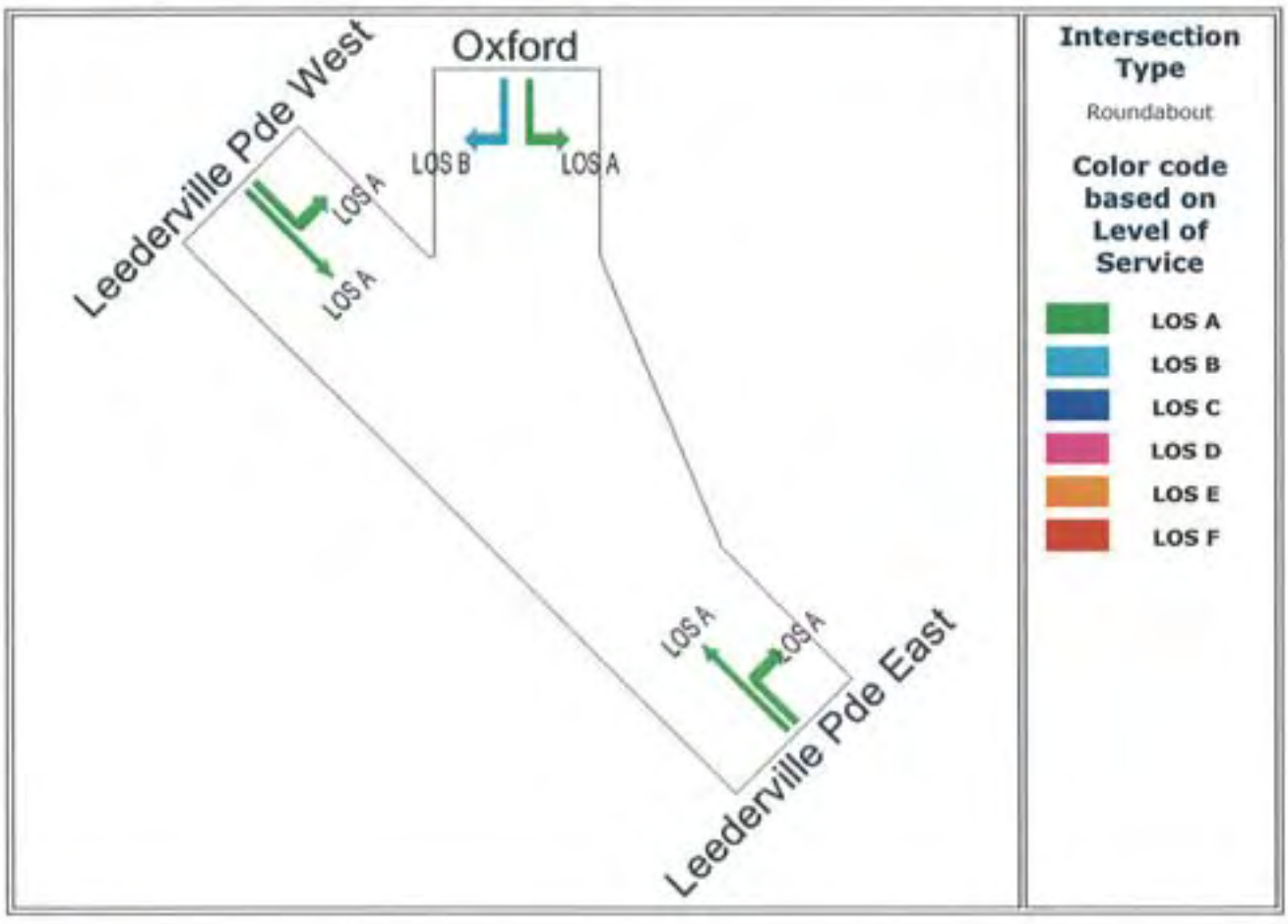
SIDRA INTERSECTION

Level of Service

Based on Delay (HCM method)

Oxford Street/Leederville Pde Roundabout

PM Peak



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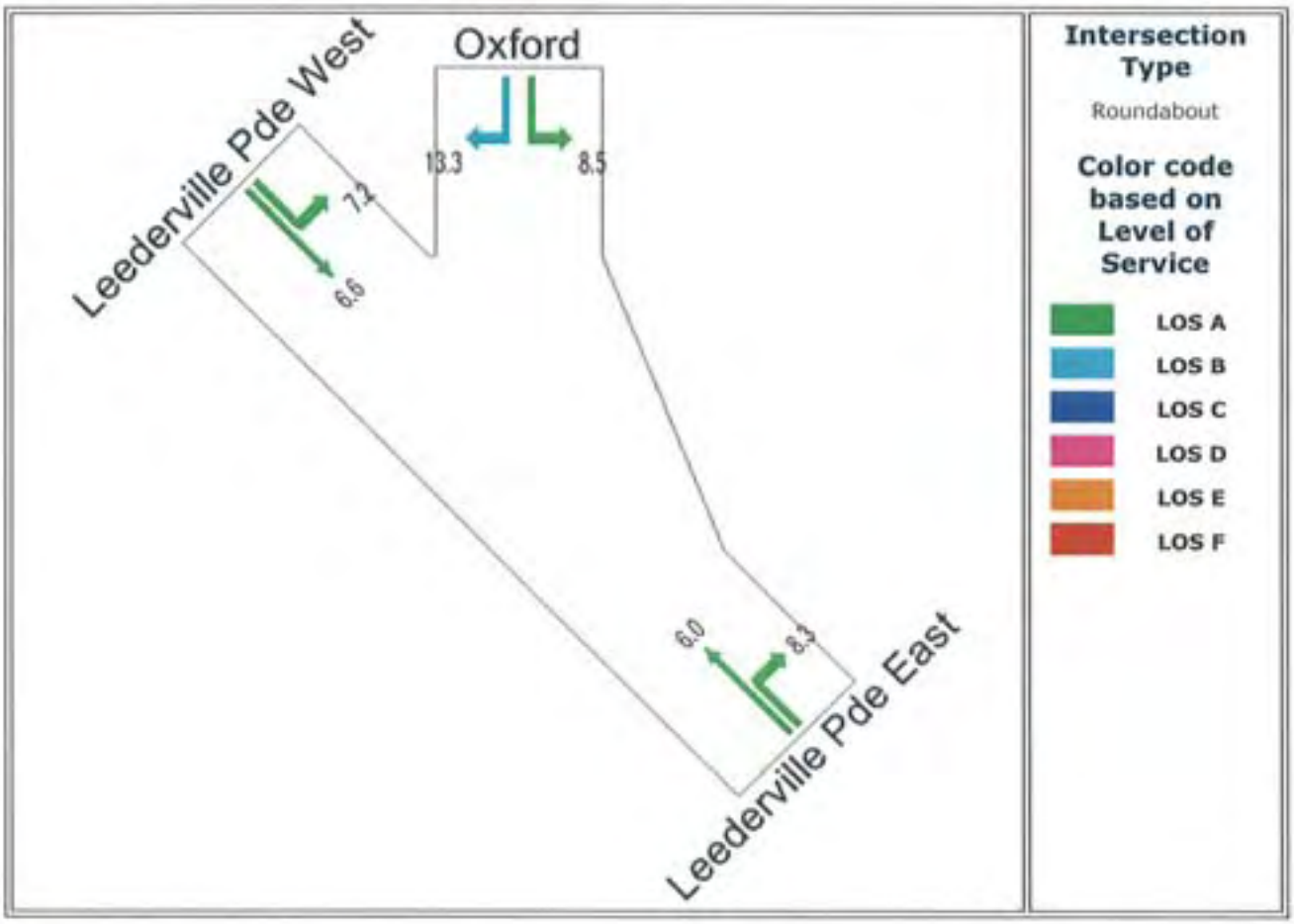
SIDRA INTERSECTION

Control Delay (Average)

Average control delay per vehicle (seconds)

Oxford Street/Leederville Pde Roundabout

PM Peak



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SIDRA INTERSECTION

Movement Summary

Oxford Street/Leederville Pde Roundabout

PM Peak

Roundabout

Vehicle Movements

Mov ID	Turn	Dem Flow (veh/h)	%HV	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (m)	Prop. Queued	Eff. Stop Rate	Aver Speed (km/h)
Leederville Pde East										
22	T	415	5.1	0.499	6.0	LOS A	38	0.49	0.54	42.5
23	R	187	2.1	0.500	8.3	LOS A	38	0.49	0.63	40.2
Approach		**603**	**4.1**	**0.499**	**6.8**	**LOS A**	**38**	**0.49**	**0.57**	**41.8**
Oxford										
7	L	385	2.1	0.590	8.5	LOS A	47	0.79	0.84	35.0
9	R	129	2.3	0.591	13.3	LOS B	47	0.79	0.90	32.8
Approach		**516**	**2.1**	**0.590**	**9.7**	**LOS A**	**47**	**0.79**	**0.86**	**34.4**
Leederville Pde West										
27	L	178	2.2	0.510	7.2	LOS A	36	0.55	0.64	41.3
28	T	394	5.1	0.510	6.6	LOS A	36	0.55	0.59	42.2
Approach		**572**	**4.2**	**0.510**	**6.7**	**LOS A**	**36**	**0.55**	**0.61**	**41.9**
All Vehicles		**1691**	**3.5**	**0.591**	**7.7**	**LOS A**	**47**	**0.60**	**0.67**	**39.2**

Symbols which may appear in this table:

Following Degree of Saturation
x = 1.00 for Short Lane with resulting Excess Flow
* x = 1.00 due to minimum capacity

Following LOS
- Based on density for continuous movements

Following Queue
- Density for continuous movement

SIDRA SOLUTIONS

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Appendix F

Planning and Building Policy Manual

	PERCENTAGE REDUCTION	ADJUSTMENT FACTOR	FACTORS TO BE SUCCESSFULLY JUSTIFIED BY THE APPLICANT TO THE TOWN OF VINCENT
1a or 1b	20 per cent 15 per cent	0.80 0.85	The proposed development is within 400 metres** of a rail station; or The proposed development is within 800 metres** of a rail station.
2	15 per cent	0.85	The proposed development is within 400 metres** of a bus stop/station.
3	20 per cent	0.80	The proposed development contains a mix of uses, where at least 45 percent of the gross floor area is residential.
4a or 4b or 4c or 4d	20 per cent 15 per cent 10 per cent 5 per cent	0.80 0.85 0.90 0.95	The proposed development is within 50 metres** of one or more existing public car parking place(s) with in excess of 50 car parking spaces; or The proposed development is within 400 metres** of one or more existing public car parking place(s) with in excess of a total of 75 car parking spaces; or The proposed development is within 400 metres** of one or more existing public car parking place(s) with in excess of a total of 50 car parking spaces; or The proposed development is within 400 metres** of one or more existing public car parking place(s) with in excess of a total of 25 car parking spaces.
5 or 5a	10 per cent 5 per cent	0.90 0.95	The proposed development provides 'end-of-trip' facilities* for bicycle users, in addition to the facilities specified in the Bicycle Parking Requirements Table; or Secure on-site and/or adjacent street bicycle parking (complying with the standards identified in Bikewest guidelines)***.
6	10 per cent	0.90	The proposed development is within a District Centre zone.

Note:
The calculated adjustment factor is applied to the car parking requirement provisions outlined in the Land Use Parking Requirement. The maximum adjustment factor, where all factors are justified to the maximum extent is 0.35 (0.80 x 0.85 x 0.80 x 0.80 x 0.90 x 0.90 = 0.352512).
If the resultant shortfall of parking is less than or equal to 0.5 bays, no parking bays or cash-in-lieu of parking is required for shortfall.

* See the Austroads (Part 14. Section 10) standards for bicycle end-of-trip facilities.

** This distance means the most direct route via a gazetted footpath not just the direct route.

*** Only relates to those uses, which have not been included in the bicycle parking requirements table.

Appendix G

Pedestrian and cyclist network

Pedestrian network

Examples of existing pedestrian network. Paths generally have a high standard:

Oxford Street

Newcastle Street

Vincent Street

Crossing from Leederville Pde dual-use path to Oxford St

Link from 'The Avenue' car park to Oxford Street – footpath is uninviting and lack of building frontage may present security issues. Standard of footpath is not high.

Perth Bicycle Network

Cyclist network

Examples of existing cyclist network and facilities:

Perth bicycle network connection at Leederville Parade

Bicycle lockers provided at pedestrian bridge access to train station

Bicycle parking along Oxford Street

Provision for bicycle parking at Leederville Tafe (Richmond Street)