PLANNING PROPOSAL
DANILENKO STREET, PARKES

PREPARED FOR
I & SB DEVELOPMENTS PTY LTD

MAY 2010

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LOTS 12 & 13 DP 1129852
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GEOLYSE

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ABBREVIATIONS

Abbreviation	Full Name
PP	Planning Proposal
LEP	Local Environmental Plan
DoP	Department of Planning
SEPP	State Environmental Planning Policy
DUAP	Department of Urban Affairs and Planning (precursor to DoP)
EPA	Environment Protection Authority
EP&A Act	*Environmental Planning & Assessment Act 1979*
NSW	New South Wales
RTA	Roads and Traffic Authority

Introduction

1.1 BACKGROUND

This report is a Planning Proposal (PP) prepared to support a proposed Local Environmental Plan (LEP). The proposed LEP aims to change the zoning of Lots 12 and 13 DP 1129852 on Danilenko Street, Parkes from 1(a) General Rural to 2(v) Urban and Village under *Parkes Local Environmental Plan 1990* (Parkes LEP).

1.2 SCOPE OF THIS REPORT

This report has been prepared in accordance with the NSW Department of Planning's (DoP) documents *A Guide to Preparing Local Environmental Plans* and *A Guide to Preparing Planning Proposals*. The latter document requires the PP to be provided in four (4) parts, being:

Part 1 – A statement of the objectives or intended outcomes of the proposed LEP;

Part 2 – An explanation of the provisions that are to be included in the proposed LEP;

Part 3 – The justification for those objectives, outcomes and provisions and the process for their implementation;

Part 4 – Details of the community consultation that is to be undertaken on the planning proposal (DoP 2009b).

1.3 REPORT STRUCTURE

This report is provided in the following structure:

- **Section 2** provides an overview of the site the subject of this PP and the development intent.
- **Section 3** contains a statement of the objective and/or intended outcomes of the proposed LEP.
- **Section 4** provides justification for the objectives, outcomes and provisions of the proposed LEP.
- **Section 5** provide details of the community consultation that would be undertaken on the planning proposal.

Overview

2.1 THE SUBJECT SITE

2.1.1 LOCATION

The site the subject of this report is comprised of Lots 12 and 13 DP 1129852. The site is located in the north east outskirts of Parkes, on Renshaw-McGirr Way, the arterial road connecting Parkes to Wellington (refer **Drawing No. 01A_TP01**).

As can be seen in the drawings attached to this report, the subject site abuts the existing north eastern extent of Parkes' residential zoned land.

2.1.2 SITE DESCRIPTION

The site has an overall area of 12.64ha with frontage to both Danilenko Street and Renshaw-McGirr Way (refer **Drawing No. 01A_TP02**). The land slopes generally from the north towards Renshaw-McGirr Way, with a fall of approximately 22m over the site.

2.1.3 TOPOGRAPHY & SOILS

King (1998a) identifies the site as being within the Parkes Soils Landscape. This soil landscape is characterised by narrow crests and gently inclined sideslopes with slope gradients between 2-5% (King 1998b).

In relation to urban land uses, the Parkes Soil Landscape has been identified as having:

> *Topsoils are unsuitable for structural earthworks. Subsoils are more suitable and some sub soils tested on this landscape have earthwork category ratings of B, C and D* (King 1998b).

The above mapping is undertaken at a broad scale. Existing residential development on the adjacent parcel of land illustrates structural earthworks can be undertaken. Soil testing would be undertaken at built form stage to determine slab types, however there is no indication that the site would be prohibitive to the future land use.

2.1.4 FLORA & FAUNA

An Ecological Assessment of the subject site was undertaken for the proposed rezoning my RPS Harper Somers O'Sullivan. It is attached at **Appendix A**.

The report notes that there were no threatened species of flora or fauna identified on the site, nor were there any endangered or threatened ecological communities on site. The report concludes that site does not contain any significant ecological constraints.

2.1.5 HERITAGE

A Cultural Heritage Impact Assessment was undertaken for the subject site by RPS Harper Somers O'Sullivan. It is attached at **Appendix B**.

No Aboriginal cultural heritage items and no European cultural heritage items were identified during the field investigation. Final sign off of the report from the Peak Hill Local Aboriginal Land Council (PHLALC) is still forthcoming. Based on preliminary advice from the LALC, the report concludes that the rezoning may proceed with regard the following:

- If it is suspected Aboriginal cultural heritage material has been encountered, work should cease immediately. The NSW Department of Environment, Climate Change and Water (DECCW) and PHLALC should be notified. Works should only recommence when an appropriate and approved management strategy has been agreed to by all of the relevant stakeholders.
- In the event that skeletal remains are uncovered, work is to stop in the vicinity immediately and the NSW Coroner's Office and NSW Police contacted. If skeletal remains are deemed to be of Aboriginal origin, a representative of the local Aboriginal Community (PHLALC) and the DECCW are to be contacted.
- If, during the course of clearing work, significant European cultural heritage material is uncovered work should cease in that area immediately. The NSW Heritage Branch should be notified and works only recommence when an appropriate and approved management strategy instigated.

2.1.6 BUSHFIRE

The subject site is not mapped as being bushfire prone on Council's Bushfire Prone Land Map.

2.1.7 FLOODING

The subject site is located some 1.5km from the nearest watercourse, being Goobang Creek. The subject site is not known to be affected by mainstream flooding.

2.1.8 CONTAMINATION

Two Preliminary Contamination Assessments have been undertaken for the subject site, both covering different areas of the site.

The initial report was prepared by Environmental & Earth Sciences in 2004 and covered the former Lot 607, which is similar to the now Lot 12 DP 1129852. This report is provided at **Appendix C**. The report noted the site had been previously used for an orchard and contained farm machinery and fuels/oils. Due to these previous land uses there was considered to be a low potential for contamination through the use of arsenate based pesticides and organochlorine pesticides. No evidence was found, such as oil or fuel staining, to indicate that TPH and PAH contamination was present. Sheep yards were found on site, however there was no evidence to suggest a sheep dip or shower had been present on site. The report concluded that the site was considered to be suitable for the proposed subdivision (E&ES 2004).

The second Preliminary Contamination Assessment was prepared by Envirowest Consulting Pty Ltd in 2009. It covered Lot 13 DP 1129852 and is attached at **Appendix D**. This assessment too was a desktop assessment and site inspection. The site history did not indicate any contaminating activities had been conducted on site. From the assessment it was determined that the site is suitable for the proposed residential land use.

2.1.9 STORMWATER & DRAINAGE

The site generally drains to the south/south-east into a table drain along Wellington Road which in turn drains to the east into a culvert under Wellington Road at the south eastern corner of the site. This culvert discharges into an open drainage channel that eventually discharges into the Goobang Creek further to the east of the site.

In the report *"Stormwater Planning and Analysis for Parkes Urban Area"* prepared by Connell Wagner for Parkes Shire Council there is a recommendation to construct a major stormwater main through the proposed development. This stormwater main would be constructed to convey flows from a large greenfield area above the development site to reduce the existing high frequency of flooding in the residential areas around Danilenko Street (south of the proposed subdivision). The report states:

A new detention basin was proposed in the upper catchment area to detain a significant percentage of the catchment runoff, with the remaining flows diverted to the north of the existing development areas.

The alignment of this stormwater main would follow the proposed road running west to south-east through the proposed subdivision.

2.2 DEVELOPMENT INTENT

2.2.1 OVERVIEW

It is proposed to rezone the subject site from 1(a) Rural (refer **Drawing No. 01A_TP04**) under Parkes LEP to 2(v) Urban and Village (refer **Drawing No. 01A_TP05**). As illustrated in **Drawing No. 01A_TP06**, it is proposed to subsequently subdivide the subject site into approximately 126 allotments for purpose of low density residential development.

2.2.2 STORMWATER

The proposed conceptual stormwater management system has been designed based on the existing site stormwater infrastructure and following management objectives:

- provide safe and efficient stormwater conveyance;
- integrate stormwater treatment into the built landscape;
- utilise stormwater harvesting to reduce peak flow rates and potable water demand;
- effectively control peak flow and runoff; and
- protect downstream drainage systems against construction and long term impacts.

The conceptual stormwater reticulation layout for the proposed subdivision is indicated in **Drawing No. 02A_E03**.

The conceptual stormwater management system for the site would involve use of internal roadways for overland flow paths together with a piped network for roof run-off and minor flows off the hardstand areas. The piped system would discharge into a newly constructed stormwater detention basin located in the south-eastern corner of the proposed subdivision. All outflow from this basin would be directed to the existing pipe culvert under Wellington Road.

A concept stormwater management plan was prepared by Civil Design and Modelling for an earlier version of the proposed subdivision and a copy of this report can be found in **Appendix E**. Whilst this report covers a slightly reduced site area compared to the current proposed subdivision the conceptual management of stormwater at the site would remain unchanged. The report indentified two scenarios for management of stormwater at the site and it is proposed to adopt Scenario 2. Scenario 2 involved the installation of an on-site detention basin and this basin was sized to retard post development peak runoff flows to pre development rates. Due to the increase in the area of the site from that modelled in the report the size and design of the detention basin will need to be reviewed to ensure post development peak flow rates are still contained to pre development rates. The area set aside for the stormwater detention basin was increased to allow for the anticipated increase in volume required for the basin.
All system components would be subject to further detailed assessment and design during the engineering design phase, based on the principles outlined above

2.2.3 UTILITIES

All necessary urban services are currently capable of being connected to the subject site. The provision of a reticulated water supply and sewer collection and disposal system is further discussed below

2.2.3.1 Water Supply

Drawing No. 02A_E02 illustrates the proposed potable water supply servicing arrangements for the development. The layout connects into the existing Council water reticulation network in Danilenko Street. At the time of writing this report results of a water pressure test of the available supply in the existing water main in Danilenko Street were not available and further assessment will be need to be undertaken following the results of these tests. Based on the proximity and elevation difference of the water supply tank that would supply the proposed subdivision it is expected that there will be adequate supply capacity and pressure to service the proposed development.

2.2.3.2 Sewerage Network

Drawing No 02A_E04 illustrates the proposed sewer reticulation network for the proposed subdivision. The layout of the proposed sewer reticulation network is based upon a series of gravity sewer mains draining to the south-east of the site and connecting to an existing sewer main at the southern end of Noonan Street.

Parkes Shire Council recently engaged Connell Wagner to undertaken an assessment of their entire sewer network for Parkes to determine the performance of the system for dry weather, wet weather, existing (2008) and future (2030) conditions. The report *Final Report – Volume 1: Parkes Sewerage System Modelling and Assessment – Parkes Shire Council* by Connell Wagner stated:

> *Generally, modelling results show the system performing relatively well:*
>
> - *Relatively low Rainfall Dependent Inflow/Infiltration (RDII) in all catchments.*
> - *Short peaky wet weather events attributed to fast acting infiltration.*
> - *No overflows occur during dry weather and low frequency and volume of wet weather overflows.*
> - *Any previous overflow issues largely reduced by previous trunk carrier duplication.*
> - *5 overflow events occur over the 14 year period under future (2030) conditions (4 overflows for the 2006 conditions), representing an existing flow containment standard of just under 1 in 2 years Average Recurrence Interval (ARI). Overflows occur in a number of different locations throughout the system.*

The report went on to recommend;

> *…the option of inflow/infiltration reduction by smoke testing was selected to achieve a flow containment standard of 1:5 year ARI Overflow Event.*

The future 2030 conditions did not include the proposed subdivision and therefore the sewerage load from the proposed subdivision would be additional to that modelled for the future 2030 conditions. Based on a total of 122 allotments the proposed subdivision represents an additional load of approximately 122 ET. Whilst the modelling by Connell Wagner indicated the existing sewer main, where it is proposed to connect the additional sewer network into, has adequate spare capacity there is a number of locations further downstream with limited spare capacity to take the additional load from the proposed development. Whilst the proposed works to reduce inflow/infiltration is likely to alleviate these "bottle necks" it is difficult to determine the final effect of the works. A more detailed assessment of the performance of the system following these works would need to be undertaken to determine any augmentation of sewers that may be required to accommodate the additional sewer load from the proposed subdivision.

2.2.4 TRAFFIC

A Traffic Study has been undertaken for the proposed land use change and future residential subdivision. It is provided in **Appendix F**. It evaluated the traffic generating potential of the proposed land use change and future subdivision of land situated between Danilenko Street and Renshaw-McGirr Way and assessed the impact of the traffic generated by the proposed subdivision on the surrounding road network in terms of traffic volume and intersection capacity.

The greatest percentage increase in daily traffic following the development of the future subdivision would occur on Danilenko Street with an increase in AADT of approximately 1,755%. The percentage increase in AADT on Renshaw-McGirr Way would be approximately 68%.

The greatest percentage increase in peak hour traffic following the development of the future subdivision would occur on Danilenko Street with an increase in traffic volume of approximately 1,117%. The percentage increase in peak hour traffic volume on Renshaw-McGirr Way would be approximately 45% and 4.5% to south-east and north-west of the proposed subdivision respectively.

Notwithstanding the substantial increase in daily and peak hour traffic volumes on both Danilenko Street and Renshaw-McGirr Way, the overall impact of the additional traffic generated by the future subdivision on the surrounding road network is limited and the classification of the surrounding roads would not change following the development of the future subdivision. The increase in traffic volume is capable of being dispersed and absorbed into the surrounding road network with minor impact on the existing and proposed traffic facilities.

The standard of the required intersections off Danilenko Street and Renshaw-McGirr Way was determined and the recommended intersections analysed utilising the SIDRA Intersection computer modelling software. The results of the analysis determined that the proposed intersection treatments would operate well below their capacity with minimal delay times and with an excellent Level of Service (A) for all turning movements

In completing the assessment of the impact of the traffic generated by the proposed subdivision, the following recommendations are made:

- The increase in AADT on the roads surrounding the development site would not change the classification of the roads under a functional road hierarchy.
- The proposed intersection off Danilenko Street is to be a standard urban Give way T intersection with no formal line-marking. The intersection would be designed and constructed in accordance with Parkes Shire Council requirements and be similar in design and layout to existing intersections off Danilenko Street.
- The proposed intersection off Renshaw-McGirr Way is to be a RTA standard BAR (Basic Right Turn) intersection in accordance with the RTA *Road Design Guide*. The intersection would be designed and constructed in accordance with the RTA requirements.

The design of all works shall be carried out to the appropriate standards and the requirements of Parkes Shire Council and the RTA.

Intent & Provisions

3.1 OBJECTIVE

The purpose of the PP is to facilitate general residential development, and associated public open space, on Lots 12 and 13 DP 1129852 – Danilenko Street and Renshaw-McGirr Way, Parkes.

There is a current lack of supply of residential land in East Parkes. This PP proposes to fill this void in the interim whilst the comprehensive LEP is being finalised.

3.2 EXPLANATION OF PROVISIONS

Amendment of the Parkes LEP zoning map in accordance with the proposed zoning map (see **Drawing No. 01A_TP05**). This includes rezoning of Lot 13 and part of Lot 12 (12.4 ha) DP 1129852 – Danilenko Street and Renshaw-McGirr Way, Parkes from 1(a) Rural to 2(v) Urban and Village, and part of Lot 12 (0.28 ha) to 6(a) Service Corridor Zone.

Justification

4.1 NEED FOR THE PLANNING PROPOSAL

1. Is the planning proposal a result of any strategic study or report?

Council has prepared a draft Land Use Strategy, which is yet to be finalised for public exhibition due to a break down in the relationship with the consultant preparing the strategy. Further, Parkes Shire Council has not been nominated by the DoP as a prior council to have its comprehensive LEP completed by 2011. In this regard, whilst council is moving forward with its strategy and comprehensive LEP, the completion of such is expected to take at least a few years.

Review of ABS data shows that contrary to shire wide data, Parkes Township has been growing with a 13.6% increase between 1991 and 2006. At this same time, the number of households has increased by 17.9%. This trend relates to falling household sizes. ABS Estimated Resident Population data indicates these trends will continue.

Table 4.1 – Parkes Township Population Trends and Projections

Year	Estimated Resident Population (ERP)	Occupied Dwelling Stock	Yield Rate Persons/Occupied Dwelling
1991	8,960	3,288	2.725
1996	10,220	3,720	2.746
2001	10,210	3,780	2.700
2006	10,180	3,877	2.632
2011	*10,805*	*4,123*	*2.621*
2016	*11,170*	*4,306*	*2.594*
2021	*11,535*	*4,488*	*2.570*
2026	*11,900*	*4,671*	*2.548*
2031	*12,265*	*4,854*	*2.527*

Note: italicised text indicates estimates based on previous trends

Based on the above trends, there will be an increase in demand for dwellings in the township. It is expected that with the growth of the Parkes Hub and North Parkes Mine there will be further demand for housing in Parkes. Based on these figures, it can be seen that there is an annual average demand for 39 additional dwellings. Given the mine and Hub growth, these figures are considered to be conservative.

Council has advised that in 2007, there was 57ha of vacant residential land within the Parkes Township. This equates to approximately 463 residential allotments, based on a gross residential density of 7.5 lots/ha. Assuming an annual demand of 39 dwellings, the existing residential supply would be taken up in 2017 (refer **Table G1**). Council's mapping of the existing residential land supply (refer **Plate 1** red hatched areas) shows that the vast majority of the vacant residential land is available in the west and the south of the township.

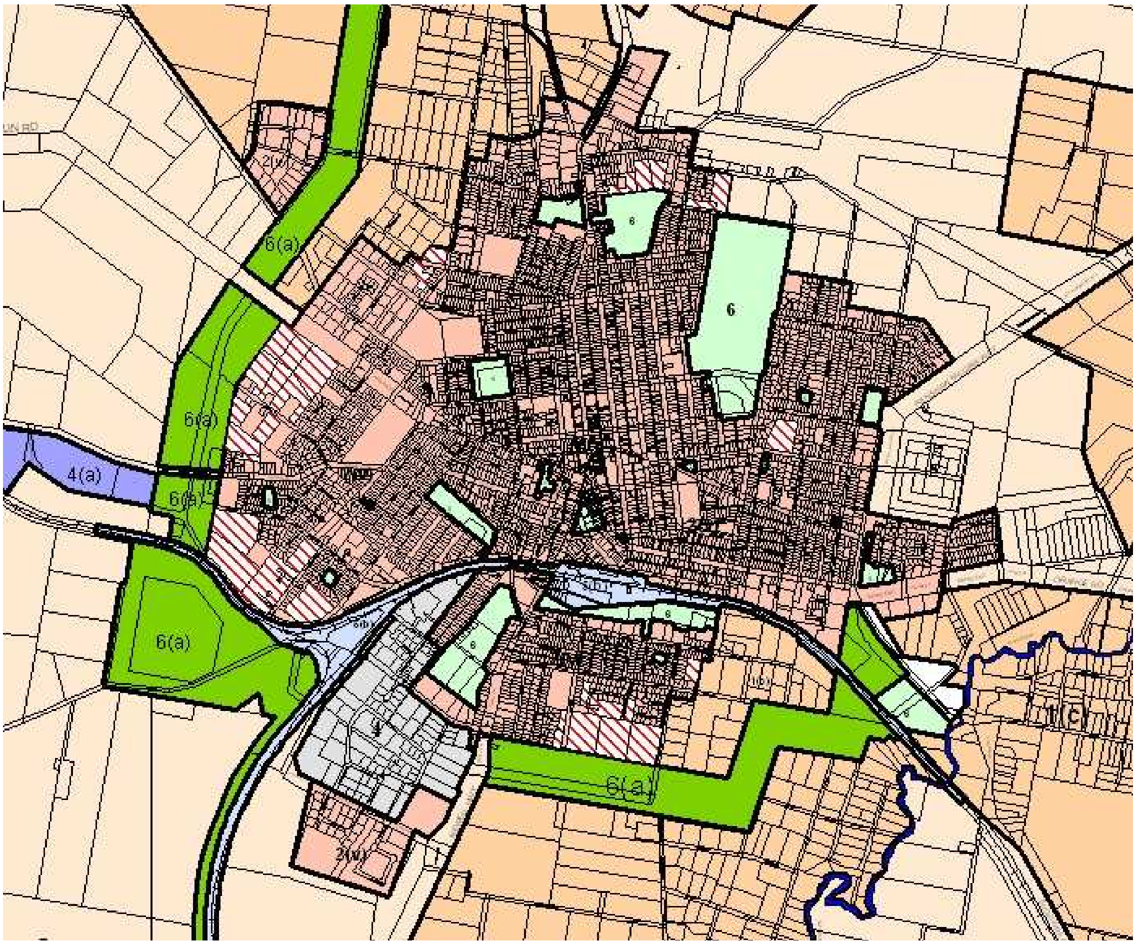


Plate 1: Vacant Residential Land as of 2007

Colloquial evidence (refer **Appendix H**) indicates that there is a demand for residential land in the East Parkes sector. This location is considered to have substantially greater residential amenity than the areas remaining in the western sector of the town. Development in this area is being stifled as there is now no supply remaining. Whilst there is supply remaining in western and southern Parkes, it does not provide for equitable alternative in supply. The western and southern areas of Parkes are considered to be less desirable areas of the town due to the flatter nature of the landscape, and proximity to the future bypass and existing rail yards.

With the potential additional 126 allotments provided by the subject site, this would extend residential land supply to 2021 as illustrated in **Table G.1**.

2. Is the planning proposal the best means of achieving the objectives or intended outcomes, or is there a better way?

As Parkes LGA has not been identified on the priority list of councils for completion of their comprehensive LEPs by 2011, this planning proposal is the best means of achieving the objectives and intended outcomes.

Ideally it would be preferential to facilitate this land use change via the comprehensive LEP process. However due to the likely timelines of the comprehensive LEP process, it is unlikely that the objectives and outcomes would be achieved in an acceptable timeframe. The lag in time before the comprehensive LEP is gazetted to provide additional supply in East Parkes would be substantial and result in upward pressure on land prices in this locality.

The key outcome of this PP is to provide residential land supply for East Parkes. The subject site is considered to be the most suitable to achieve this as:

- It is contiguous to the existing residential area.
- The developer would commence development of the site immediately following rezoning.
- The site has no constraints for such development.
- The site is readily serviceable.

The subject site would potentially provide for 126 residential allotments. Rezoning of this site would provide for an interim measure for residential land supply in this area until the comprehensive LEP is finalised to determine the complete extent of suitable residential land in this sector. It is noted that buffer is required between the Parkes Radio Telescope and development. However the subject site is well below the hill peaks that occur between the township and the telescope, which is understood to provide buffer to avoid adverse impact upon the functioning of the telescope.

3. Is there a net community benefit?

It is expected that the PP will result in a net community benefit. This is addressed further in **Appendix G**.

4.2 RELATIONSHIP TO STRATEGIC PLANNING FRAMEWORK

1. Is the planning proposal consistent with the objectives and actions contained within the applicable regional or sub-regional strategy (including the Sydney Metropolitan Strategy and exhibited draft strategies)?

Not applicable, as Parkes LGA does not have any applicable regional or sub-regional strategy.

2. Is the planning proposal consistent with the local council's Community Strategic Plan, or other local strategic plan?

As described in **Section 4.1**, Council is yet to finalise its draft Land Use Strategy. It is understood that the subject site forms part of an area identified within the strategy for future residential land use. On this basis, the PP is consistent with Council's draft strategic plan.

3. Is the planning proposal consistent with applicable state environmental planning policies?

There are no State Environmental Planning Policies (SEPPs) or draft SEPPs (at the time of writing) that would prohibit or restrict the PP, as outlined below.

SEPP 44 – Koala Habitat Protection

SEPP 44 aims to encourage the proper conservation and management of areas of natural vegetation that provide habitat for koalas to ensure a permanent free-living population over their present range and reverse the current trend of koala population decline.

If it is proposed to zone (or rezone) land that is a potential koala habitat or a core koala habitat otherwise than as environment protection, the Minister has the power to give a direction to prepare an environmental study.

As outlined in **Appendix A**, the subject site does not contain any trees that are listed as koala feed tree species, the site does not constitute potential koala habitat. Thus SEPP 44 does not require further consideration.

SEPP 55 – Remediation of Land

SEPP 55 aims to promote the remediation of contaminated land for the purpose of reducing the risk of harm to human health or any other aspect of the environment.

In preparing an environmental planning instrument, a planning authority is not to include in a particular zone (within the meaning of the instrument) any land specified in subclause (4) if the inclusion of the land in that zone would permit a change of use of the land, unless:

(a) the planning authority has considered whether the land is contaminated, and

(b) if the land is contaminated, the planning authority is satisfied that the land is suitable in its contaminated state (or will be suitable, after remediation) for all the purposes for which land in the zone concerned is permitted to be used, and

(c) if the land requires remediation to be made suitable for any purpose for which land in that zone is permitted to be used, the planning authority is satisfied that the land will be so remediated before the land is used for that purpose.

In accordance with DUAP & the EPA's (1998) *Managing Land Contamination Planning Guidelines*, Stage 1 – Preliminary Investigations have been undertaken for the subject site. The two (2) studies are contained in **Appendix C** and **Appendix D** and conclude that the land is suitable for the proposed land use.

SEPP (Rural Lands) 2008

The Rural Lands SEPP aims to (*inter alia*):

(a) to facilitate the orderly and economic use and development of rural lands for rural and related purposes,

(b) to identify the Rural Planning Principles and the Rural Subdivision Principles so as to assist in the proper management, development and protection of rural lands for the purpose of promoting the social, economic and environmental welfare of the State,

(c) to implement measures designed to reduce land use conflicts,

(d) to identify State significant agricultural land for the purpose of ensuring the ongoing viability of agriculture on that land, having regard to social, economic and environmental considerations,

When preparing a draft LEP, councils are required to consider the Rural Planning Principles, being:

(a) the promotion and protection of opportunities for current and potential productive and sustainable economic activities in rural areas,

(b) recognition of the importance of rural lands and agriculture and the changing nature of agriculture and of trends, demands and issues in agriculture in the area, region or State,

(c) recognition of the significance of rural land uses to the State and rural communities, including the social and economic benefits of rural land use and development,

(d) in planning for rural lands, to balance the social, economic and environmental interests of the community,

(e) the identification and protection of natural resources, having regard to maintaining biodiversity, the protection of native vegetation, the importance of water resources and avoiding constrained land,

(f) the provision of opportunities for rural lifestyle, settlement and housing that contribute to the social and economic welfare of rural communities,

(g) the consideration of impacts on services and infrastructure and appropriate location when providing for rural housing,

(h) ensuring consistency with any applicable regional strategy of the Department of Planning or any applicable local strategy endorsed by the Director-General.

The PP will not be consistent with the Rural Planning Principles outlined above as it will result in the loss of rural land. However in relation to (d), there is a demand for additional residential land in Parkes. The subject site provides a logical location for this urban expansion being located adjacent to the existing urban area and would have minimal impact on surrounding agricultural lands.

4. Is the planning proposal consistent with applicable Ministerial Directions (s. 117 directions)?

Direction No. 1.2 – Rural Zones

This direction applies when a relevant planning authority prepares a planning proposal that will affect land within an existing or proposed rural zone. The objective of the direction is to protect the agricultural production value of rural land.

A planning proposal must not rezone land from a rural zone to a residential, business, industrial, village or tourist zone unless the relevant planning authority can satisfy the Director-General of the Department of Planning that the provisions of the planning proposal that are inconsistent are:

- justified by a strategy which:
  - gives consideration to the objectives of this direction,
  - identifies the land which is the subject of the planning proposal (if the planning proposal relates to a particular site or sites), and
  - is approved by the Director-General of the Department of Planning, or
- justified by a study prepared in support of the planning proposal which gives consideration to the objectives of this direction, or (c) in accordance with the relevant Regional Strategy or Sub-Regional Strategy prepared by the Department of Planning which gives consideration to the objective of this direction, or
- is of minor significance.

The proposal demonstrates that whilst it would result in the loss of rural land, the site is a strategically positioned location for the expansion of the Parkes urban area and there is a demonstrated demand for expansion in this sector of the town. The site is positioned to ensure it does not cumulatively impact upon other land with agricultural production potential.

Direction No. 1.3 – Mining, Petroleum Production and Extractive Industries.

This direction applies when a relevant planning authority prepares a planning proposal that would have the effect of:

(b) restricting the potential development of resources of coal, other minerals, petroleum or extractive materials which are of State or regional significance by permitting a land use that is likely to be incompatible with such development.

The site is not known to contain any resources that are of state or regional significance.

Direction No. 1.5 – Rural Lands

This direction applies when a relevant planning authority prepares a planning proposal that will affect land within an existing or proposed rural or environment protection zone. The objectives of the direction are to:

(a) protect the agricultural production value of rural land,

(b) facilitate the orderly and economic development of rural lands for rural and related purposes.

A planning proposal must not be inconsistent with the Rural Planning Principles listed in *State Environmental Planning Policy (Rural Lands) 2008* unless it can satisfy the Director-General of the Department of Planning (or an officer of the Department nominated by the Director-General) that the provisions of the planning proposal that are inconsistent are:

- justified by a strategy which:
  - gives consideration to the objectives of this direction,
  - identifies the land which is the subject of the planning proposal (if the planning proposal relates to a particular site or sites, and
  - is approved by the Director-General of the Department of Planning and is in force, or
- is of minor significance.

The PP will not be consistent with the Rural Planning Principles listed in the Rural Lands SEPP. However as described throughout this report, the proposal would provide for needed expansion of the Parkes urban area in an orderly and logical manner, limiting impact on other agricultural land. The aim of this PP is to provide for an interim measure until Council's comprehensive LEP is finalised. It is understood that this PP would not conflict with the future planning of the area.

Direction No. 3.1 – Residential Zones

This direction applies when a relevant planning authority prepares a planning proposal that will affect land within an existing or proposed residential zone. The objectives of the direction are to:

(a) to encourage a variety and choice of housing types to provide for existing and future housing needs,

(b) to make efficient use of existing infrastructure and services and ensure that new housing has appropriate access to infrastructure and services, and

(c) to minimise the impact of residential development on the environment and resource lands.

Where this direction applies:

- A PP must include provisions that encourage the provision of housing that will:
  - broaden the choice of building types and locations available in the housing market, and
  - make more efficient use of existing infrastructure and services, and
  - reduce the consumption of land for housing and associated urban development on the urban fringe, and
  - be of good design.
- A PP must, in relation to land to which this direction applies:
  - contain a requirement that residential development is not permitted until land is adequately serviced (or arrangements satisfactory to the council, or other appropriate authority, have been made to service it), and
  - not contain provisions which will reduce the permissible residential density of land.

The PP is consistent with these requirements as outlined throughout this report.

Direction No. 3.4 – Integrating Land Use & Transport

This direction applies when a relevant planning authority prepares a planning proposal that will create, alter or remove a zone or a provision relating to urban land, including land zoned for residential, business, industrial, village or tourist purposes.

The objective of this direction is

to ensure that urban structures, building forms, land use locations, development designs, subdivision and street layouts achieve the following planning objectives:

(a) improving access to housing, jobs and services by walking, cycling and public transport, and

(b) increasing the choice of available transport and reducing dependence on cars, and

(c) *reducing travel demand including the number of trips generated by development and the distances travelled, especially by car, and*

(d) *supporting the efficient and viable operation of public transport services, and*

(e) *providing for the efficient movement of freight.*

A planning proposal must locate zones for urban purposes and include provisions that give effect to and are consistent with the aims, objectives and principles of:

- *Improving Transport Choice – Guidelines for planning and development* (DUAP 2001), and
- *The Right Place for Business and Services – Planning Policy* (DUAP 2001).

The PP is consistent with the principles within the above two (2) documents and the objectives of the direction.

Direction No. 6.2 – Reserving Land for Public Purposes

This direction applies when a relevant planning authority prepares a planning proposal. The objectives of this direction are:

(a) *to facilitate the provision of public services and facilities by reserving land for public purposes, and*

(b) *to facilitate the removal of reservations of land for public purposes where the land is no longer required for acquisition.*

When this direction is applicable, the following applies:

(4) *A planning proposal must not create, alter or reduce existing zonings or reservations of land for public purposes without the approval of the relevant public authority and the Director-General of the Department of Planning (or an officer of the Department nominated by the Director-General).*

(5) *When a Minister or public authority requests a relevant planning authority to reserve land for a public purpose in a planning proposal and the land would be required to be acquired under Division 3 of Part 2 of the Land Acquisition (Just Terms Compensation) Act 1991, the relevant planning authority must:*

(a) *reserve the land in accordance with the request, and*

(b) *include the land in a zone appropriate to its intended future use or a zone advised by the Director-General of the Department of Planning (or an officer of the Department nominated by the Director-General), and*

(c) *identify the relevant acquiring authority for the land.*

(6) *When a Minister or public authority requests a relevant planning authority to include provisions in a planning proposal relating to the use of any land reserved for a public purpose before that land is acquired, the relevant planning authority must:*

(a) *include the requested provisions, or*

(b) *take such other action as advised by the Director-General of the Department of Planning (or an officer of the Department nominated by the Director-General) with respect to the use of the land before it is acquired.*

(7) *When a Minister or public authority requests a relevant planning authority to include provisions in a planning proposal to rezone and/or remove a reservation of any land that is reserved for public purposes because the land is no longer designated by that public authority for acquisition, the relevant planning authority must rezone and/or remove the relevant reservation in accordance with the request.*

It is proposed to zone the south western corner of the subject site as open space. This portion of the site would act as a stormwater retention basin for the stormwater runoff from the site and surrounds. It would provide the dual function of an area of public open space outside of storm events. Council would be the relevant public authority for this area of land.

4.3 ENVIRONMENTAL, SOCIAL & ECONOMIC IMPACT

1. Is there any likelihood that critical habitats or threatened species, populations, ecological communities, or their habitats, will be adversely affected as a result of the proposal?

No, see **Appendix A**.

2. Are there any other likely environmental effects as a result of the planning proposal and how are they proposed to be managed?

No other likely environmental impacts, providing mitigation measures/recommendations are adhered to during any future construction.

3. How has the planning proposal adequately addressed any social and economic effects?

There are no known items or places of European or aboriginal cultural heritage. Therefore it is not envisaged that this planning proposal will have any adverse impacts on such items.

The planning proposal would provide a supply of land on the eastern side of Parkes which is now in short supply. Thus, it is likely to result in downward pressure on land prices in this area of the town.

Further, during construction the development would provide for employment opportunities for local construction contractors and other consultants, which would in turn stimulate the local economy.

No adverse economic impacts are anticipated.

4.4 STATE AND COMMONWEALTH INTERESTS

1. Is there adequate public infrastructure for the planning proposal?

Adequate infrastructure would be provided. Servicing infrastructure is outlined in **Section 2.2**.

Council's Engineers have assessed the PP and have provided the following comments:

> *Parkes Shire Council's Infrastructure Department has no objection to the proposed planning proposal to rezone the subject land, Lots 12 & 13 DP1129852 from rural to urban use. There are service upgrades required, to Council's water, sewer, stormwater and road networks, for the subject land to be utilised to its full residential potential, but it is expected that the details of these would be addressed and resolved within the development application process. It is assumed that the subdivision configurations provided are indicative only and provided to demonstrate the capability of the site for development.*

2. What are the views of State and Commonwealth Public Authorities consulted in accordance with the gateway determination, and have they resulted in any variations to the planning proposal?

The relevant State and Commonwealth public authorities would be consulted following the outcome of the gateway determination. Council would be responsible for carrying out this consultation in accordance with section 57 of the EP&A Act. Council, at its meeting of 18 May 2010 resolved to consult with the following agencies:

- NSW Roads and Traffic Authority (RTA)
- NSW Department of Environment, Climate Change and Water
- NSW Department of Health
- NSW Department of Education and Training
- NSW Industry and Investment
- CSIRO (as operators of the Parkes Observatory)
- Civil Aviation Safety Authority (CASA)
- Telstra
- Country Energy
- AGL

Consultation with the Western Region office of DoP has indicated support for the proposed land use change.

Preliminary consultation was undertaken with the NSW RTA regarding a proposed subdivision of the subject site. The RTA provided the following comments on 7 August 2009:

> *It is preferred that all access to the proposed subdivision is other than MR233* [Renshaw-McGirr Way]. *Should access to MR233 be required, the RTA would recommend that a minimum intersection treatment would be Auxiliary Right and Left Turn (AUR/AUL) lanes.*
>
> *It is also recommended that there be no direct access to MR233 from individual lots.*

A copy of the RTA's advice is attached at **Appendix J**.

Community Consultation

5.1 OVERVIEW OF CONSULTATION

Pursuant to *A Guide to Preparing Local Environmental Plans*, Council has determined that the PP would be classified as a Low Impact Planning Proposal. In this regard, Council intends to exhibit the PP for a period of 14 days.

Community Consultation would be undertaken in accordance with the *A Guide to Preparing Local Environmental Plans* document.

References

Environmental & Earth Sciences (E&ES) 2004, *Preliminary Site Investigation, proposed subdivision of Lot 607 Renshaw-McGirr Way, Parkes, New South Wales Report No. 404069*, Environmental & Earth Sciences.

King, D.P. 1998a, *Soil Landscapes of the Forbes 1:250 000 Sheet Map*, Department of Land and Water Conservation, Sydney.

King, D.P. 1998b, *Soil Landscapes of the Forbes 1:250 000 Sheet Report*, Department of Land and Water Conservation, Sydney.

NSW Department of Planning (DoP). 2009a, *A Guide to Preparing Local Environmental Plans*, DoP, Sydney.

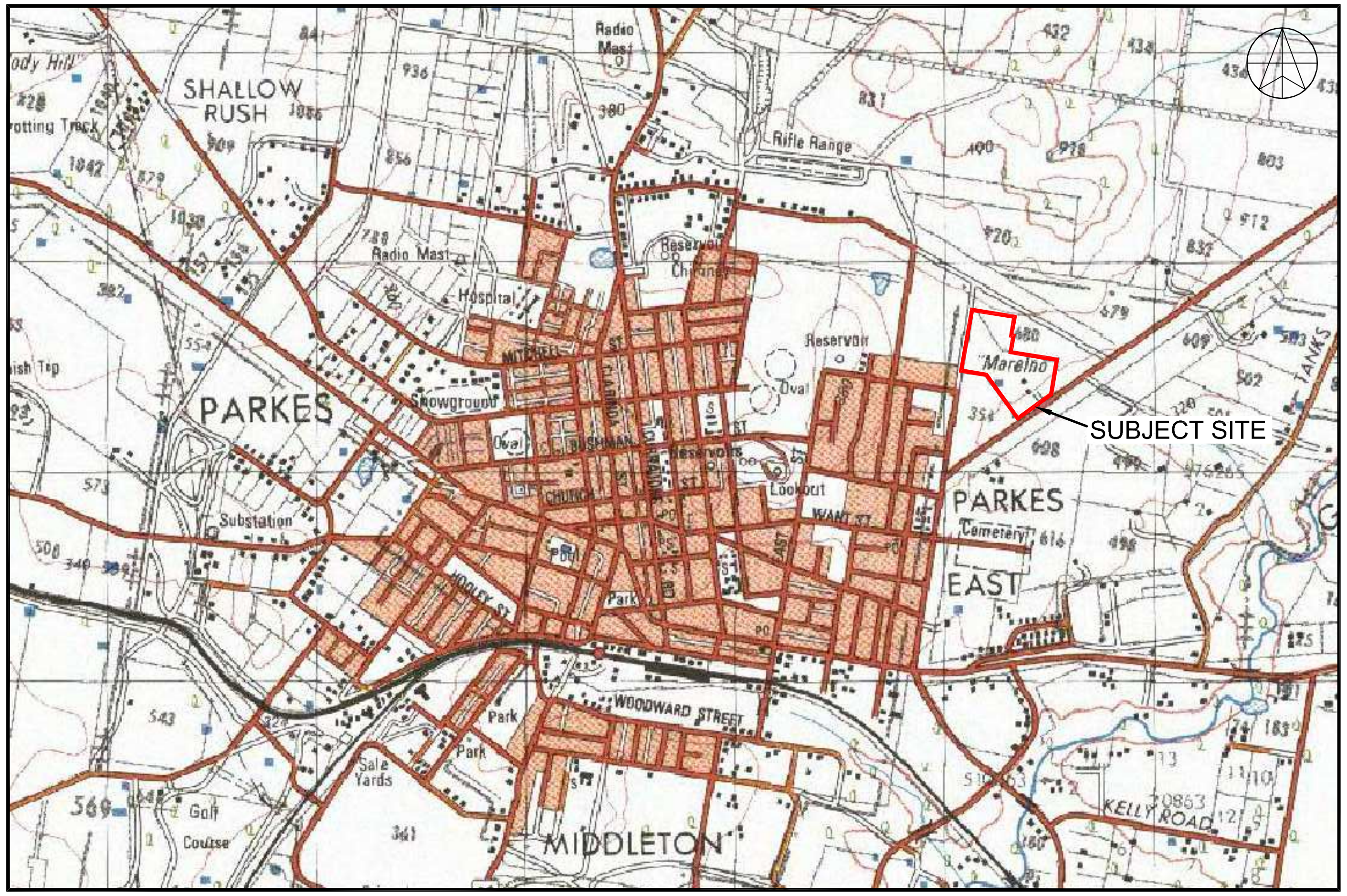
NSW Department of Planning (DoP). 2009b, *A Guide to Preparing Planning Proposals*, DoP, Sydney.

NSW Department of Planning (DoP). 2009c, *Draft Centres Policy: Planning for Retail and Commercial Development*, DoP, Sydney.

Drawings

PLANNING PROPOSAL
DANILENKO STREET, PARKES NSW
I & SB DEVELOPMENT PTY LTD

SCHEDULE OF DRAWINGS			
SHEET	TITLE	REV.	DATE
01A_TP01	TITLE SHEET, DRAWING LIST & SITE LOCALITY	A	09/12/2009
01A_TP02	SUBJECT SITE PLAN	A	09/12/2009
01A_TP03	AERIAL PHOTOGRAPH	A	09/12/2009
01A_TP04	EXISTING ZONING	A	09/12/2009
01A_TP05	PROPOSED ZONING	A	09/12/2009
01A_TP06	PROPOSED LOT LAYOUT	A	09/12/2009



SITE LOCALITY
NOT TO SCALE

No	DATE	DRAFTING CHECK	PM CHECK	DETAILS
A	09/12/09	LRP	EJB	ISSUED TO CLIENT

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PROJECT
PLANNING PROPOSAL
DANILENKO ST & RENSHAW McGIRR WAY, PARKES

FILE REFERENCE: O:\Projects\Transfer\Out\CAD\108060__01A__TP01-TP06.dwg

APPROVAL AUTHORITY
PARKES SHIRE COUNCIL
2 CECILE STREET
PARKES NSW 2870

NSW GOVERNMENT | Planning

CLIENT
I & SB DEVELOPMENTS PTY LTD

DRAWING
TITLE SHEET, DRAWING LIST & SITE LOCATION

PROJECT NUMBER: 108060 DRAWING NUMBER: 01A_TP01 REV. A

SOURCE: TOPOVIEW RASTER VIEWER

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No	DATE	DRAFTING CHECK	PM CHECK	DETAILS
A	09/12/09	LRP	EJB	ISSUED TO CLIENT

PROJECT
PLANNING PROPOSAL
DANILENKO ST & RENSHAW McGIRR WAY,
PARKES

FILE REFERENCE: O:\Projects\Transfer\Out\CAD\108060_01A_TP01-TP06.dwg

APPROVAL AUTHORITY
PARKES SHIRE COUNCIL
2 CECILE STREET
PARKES NSW 2870

NSW GOVERNMENT Planning

CLIENT
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DRAWING
SUBJECT SITE PLAN

PROJECT NUMBER: 108060 DRAWING NUMBER: 01A_TP02 REV. A

SOURCE: ARNDELL SURVEYING

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A	09/12/09	LRP	EJB	ISSUED TO CLIENT

PROJECT
PLANNING PROPOSAL
DANILENKO ST & RENSHAW McGIRR WAY, PARKES

FILE REFERENCE: O:\Projects\Transfer\Out\CAD\108060_01A_TP01-TP06.dwg

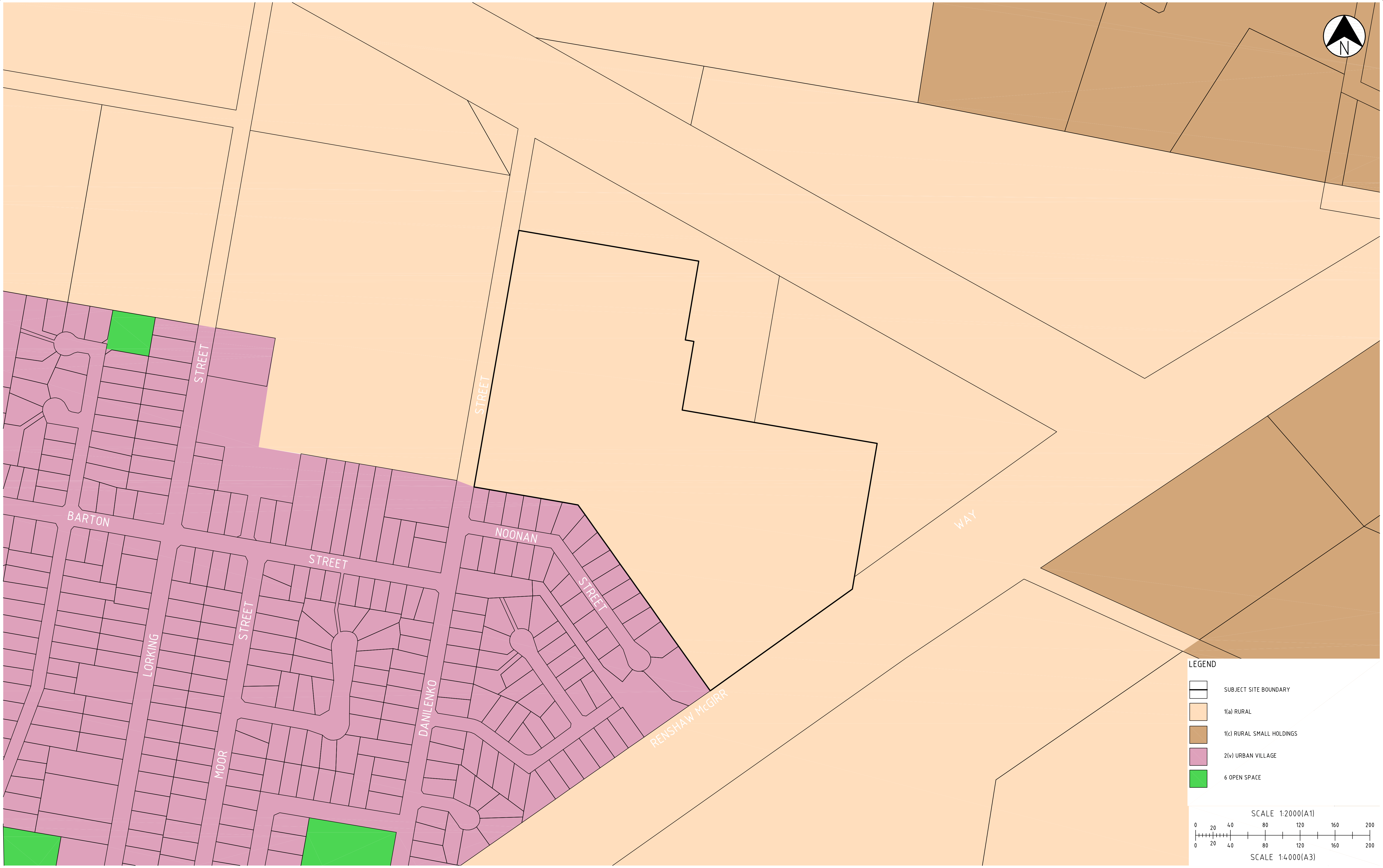
APPROVAL AUTHORITY
PARKES SHIRE COUNCIL
2 CECILE STREET
PARKES NSW 2870
NSW GOVERNMENT Planning

CLIENT
I & SB DEVELOPMENTS PTY LTD

DRAWING
AERIAL PHOTOGRAPH

PROJECT NUMBER: 108060 DRAWING NUMBER: 01A_TP03 REV. A

SOURCE: http://imagery.maps.nsw.gov.au/



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A	09/12/09	LRP	EJB	ISSUED TO CLIENT

PROJECT

PLANNING PROPOSAL
DANILENKO ST & RENSHAW McGIRR WAY,
PARKES

FILE REFERENCE: O:\Projects\Transfer\Out\CAD\108060_01A_TP01-TP06.dwg

APPROVAL AUTHORITY

PARKES SHIRE COUNCIL
2 CECILE STREET
PARKES NSW 2870

NSW GOVERNMENT Planning

CLIENT

I & SB DEVELOPMENTS
PTY LTD

DRAWING

EXISTING ZONING

PROJECT NUMBER: 108060 DRAWING NUMBER: 01A_TP04 REV. A

SOURCE: http://imagery.maps.nsw.gov.au/

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A	09/12/09	LRP	EJB	ISSUED TO CLIENT

PROJECT

PLANNING PROPOSAL
DANILENKO ST & RENSHAW McGIRR WAY, PARKES

FILE REFERENCE: O:\Projects\Transfer\Out\CAD\108060_01A_TP01-TP06.dwg

APPROVAL AUTHORITY

PARKES SHIRE COUNCIL
2 CECILE STREET
PARKES NSW 2870

NSW GOVERNMENT | Planning

CLIENT

I & SB DEVELOPMENTS PTY LTD

DRAWING

PROPOSED ZONING

PROJECT NUMBER: 108060 DRAWING NUMBER: 01A_TP05 REV. A

SOURCE: http://imagery.maps.nsw.gov.au/, ARNDELL SURVEYING

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A	09/12/09	LRP	EJB	ISSUED TO CLIENT

PROJECT

PLANNING PROPOSAL
DANILENKO ST & RENSHAW McGIRR WAY, PARKES

FILE REFERENCE: O:\Projects\Transfer\Out\CAD\108060_01A_TP01-TP06.dwg

APPROVAL AUTHORITY

PARKES SHIRE COUNCIL
2 CECILE STREET
PARKES NSW 2870

NSW GOVERNMENT Planning

CLIENT

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DRAWING

PROPOSED LOT LAYOUT

PROJECT NUMBER: 108060 DRAWING NUMBER: 01A_TP06 REV. A

SOURCE: ARNDELL SURVEYING

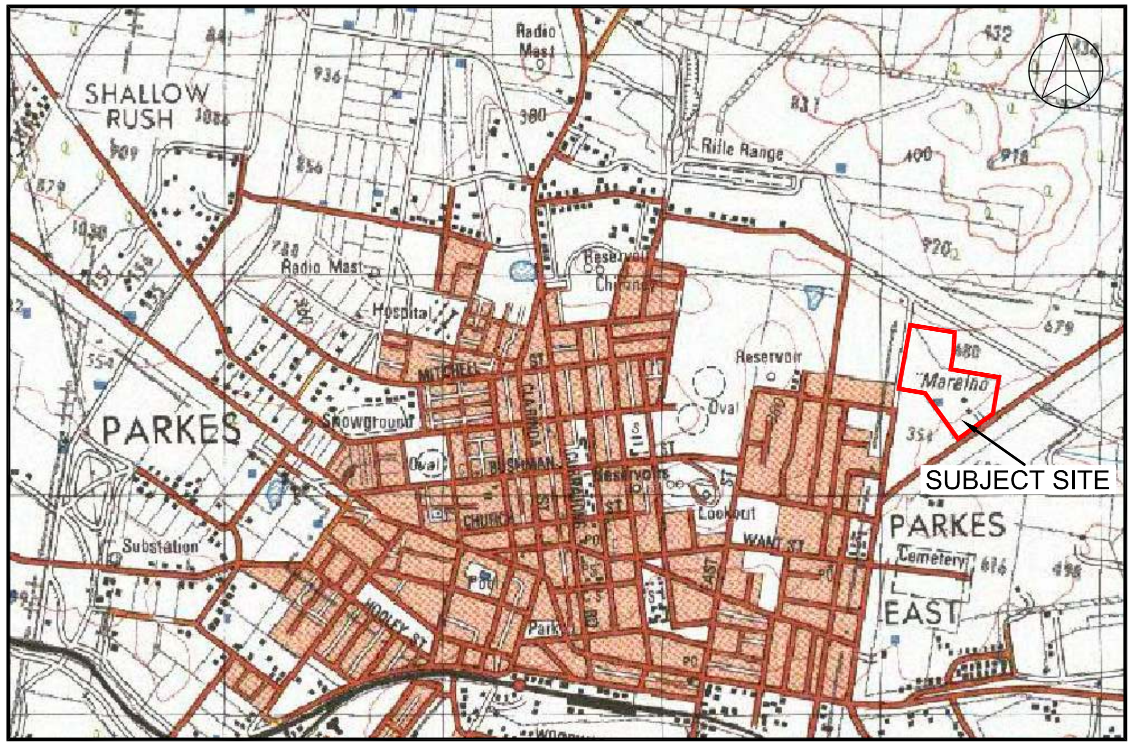
PROPOSED SUBDIVISION LOT 607 DP750179

DENILENKO ST & WELLINGTON RD, PARKES, NSW

I & SB HOMES

CONCEPT SERVICING PLANS

SCHEDULE OF DRAWINGS			
SHEET	TITLE	REV.	DATE
01A_E01	TITLE SHEET, DRAWING LIST & SITE LOCALITY	A	08/12/2009
01A_E02	CONCEPT WATER RETICULATION PLAN	A	08/12/2009
01A_E03	CONCEPT STORMWATER RETICULATION PLAN	A	08/12/2009
01A_E04	CONCEPT SEWER RETICULATION PLAN	A	08/12/2009



SITE LOCALITY
NOT TO SCALE

No	DATE	DRAFTING CHECK	PM CHECK	DETAILS
A	08/12/09			ISSUED TO CLIENT

CHECKED/APPROVED	NAME	DATE
APPROVED	-	.
SURVEY	ARNDELL SURVEYING	.
DESIGNER	PPO	08/12/09
DRAFTING	LRP	08/12/09

APPROVAL AUTHORITY
PARKES SHIRE COUNCIL
ADMINISTRATION CENTRE
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CLIENT
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PROJECT
PROPOSED SUBDIVISION
LOT 607 DP750179

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DRAWING: TITLE SHEET, DRAWING LIST & SITE LOCALITY

PERMANENT MARK: N/A	RL: N/A	DATUM: A.H.D.
PROJECT NUMBER: 108060	DRAWING SHEET: 02A_E01	ORIGINAL A1
AUTOCAD FILE: 108060_02A_E01-E04.dwg	12D/CIVILCAD FILE: N/A	REVISION A
STATUS: FOR REVIEW	SHEET E01 OF E04	

NOTE:

THIS PLAN IS FOR REZONING APPLICATION PURPOSES ONLY AND IS SUBJECT TO FINAL SURVEY AND THE APPROVAL OF COUNCIL.

LEGEND:

- PROPOSED WATER MAIN
- PROPOSED WATER HYDRANT LOCATION
- EXISTING WATER MAIN
- CONTOUR INTERVAL 0.5m
- SITE BOUNDARY

NOTES:

1. HYDRANT SPACING TO BE 75m UNLESS SHOWN OTHERWISE.
2. WATERMAINS TO HAVE MINIMUM 600mm COVER.
3. INTERNAL MAINS TO BE CLASS 20 UPVC RRJ AND FITTINGS TO BE DUCTILE IRON (DICL K9) ALL TRUNK MAINS TO BE DUCTILE IRON CEMENT LINED.
4. THRUST BLOCKS TO BE PLACED AT TEES, BENDS, DEAD ENDS & VALVES IN ACCORDANCE WITH PARKES SHIRE COUNCIL STANDARDS.
5. HYDRANTS & STOP VALVES TO BE CONSTRUCTED IN ACCORDANCE WITH PARKES SHIRE COUNCIL STANDARDS.

SCALE 1:1000(A1)

0 10 20 40 60 80 100

SCALE 1:2000(A3)

No	DATE	DRAFTING CHECK	PM CHECK	DETAILS
A	08/12/09			ISSUED TO CLIENT

CHECKED/APPROVED	NAME	DATE
APPROVED	-	-
SURVEY	ARNDELL SURVEYING	-
DESIGNER	PPO	08/12/09
DRAFTING	LRP	08/12/09

APPROVAL AUTHORITY

PARKES SHIRE COUNCIL
ADMINISTRATION CENTRE
2 CECILE STREET
PARKES NSW 2870

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PROJECT
PROPOSED SUBDIVISION
LOT 607 DP750179

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DRAWING
CONCEPT WATER RETICULATION PLAN

PERMANENT MARK: N/A	RL: N/A	DATUM: A.H.D.	
PROJECT NUMBER: 108060	DRAWING SHEET: 02A_E02	ORIGINAL A1	
AUTOCAD FILE: 108060_02A_E01-E04.dwg	12D/CIVILCAD FILE: N/A	REVISION A	
STATUS: FOR REVIEW	SHEET E02 OF E04		

NOTE:
THIS PLAN IS FOR REZONING APPLICATION PURPOSES ONLY AND IS SUBJECT TO FINAL SURVEY AND THE APPROVAL OF COUNCIL.

LEGEND:
- PROPOSED STORMWATER MAIN
- EXISTING STORMWATER MAIN
- PROPOSED COUNCIL STORMWATER MAIN
- CONTOUR INTERVAL 0.5m
- SITE BOUNDARY

STORMWATER NOTES:

1. ALL STORMWATER MAINS SHALL BE DESIGNED TO CATER FOR 1 IN 5 YEAR AVERAGE RECURRANCE INTERVAL DESIGN STORM.
2. INTERALLOTMENT DRAINAGE LINES TO BE RRJ UPVC. ALL OTHER LINES TO BE MINIMUM 375mm DIAMETER CLASS 2 RRJ RCP.
3. ALL STORMWATER PITS & PIPEWORK TO BE CONSTRUCTED IN ACCORDANCE WITH PARKES SHIRE COUNCIL STANDARDS.
5. ALL INTERNAL STORMWATER MAINS TO BE CONSTRUCTED IN ACCORDANCE WITH AS3500.3-1990 - NATIONAL PLUMBING AND DRAINAGE CODE - STORMWATER DRAINAGE.

SCALE 1:1000(A1)

0 10 20 40 60 80 100

SCALE 1:2000(A3)

No	DATE	DRAFTING CHECK	PM CHECK	DETAILS
A	08/12/09			ISSUED TO CLIENT

CHECKED/APPROVED	NAME	DATE
APPROVED	-	.
SURVEY	ARNDELL SURVEYING	.
DESIGNER	PPO	08/12/09
DRAFTING	LRP	08/12/09

APPROVAL AUTHORITY
PARKES SHIRE COUNCIL
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LOT 607 DP750179

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DRAWING
CONCEPT STORMWATER RETICULATION PLAN

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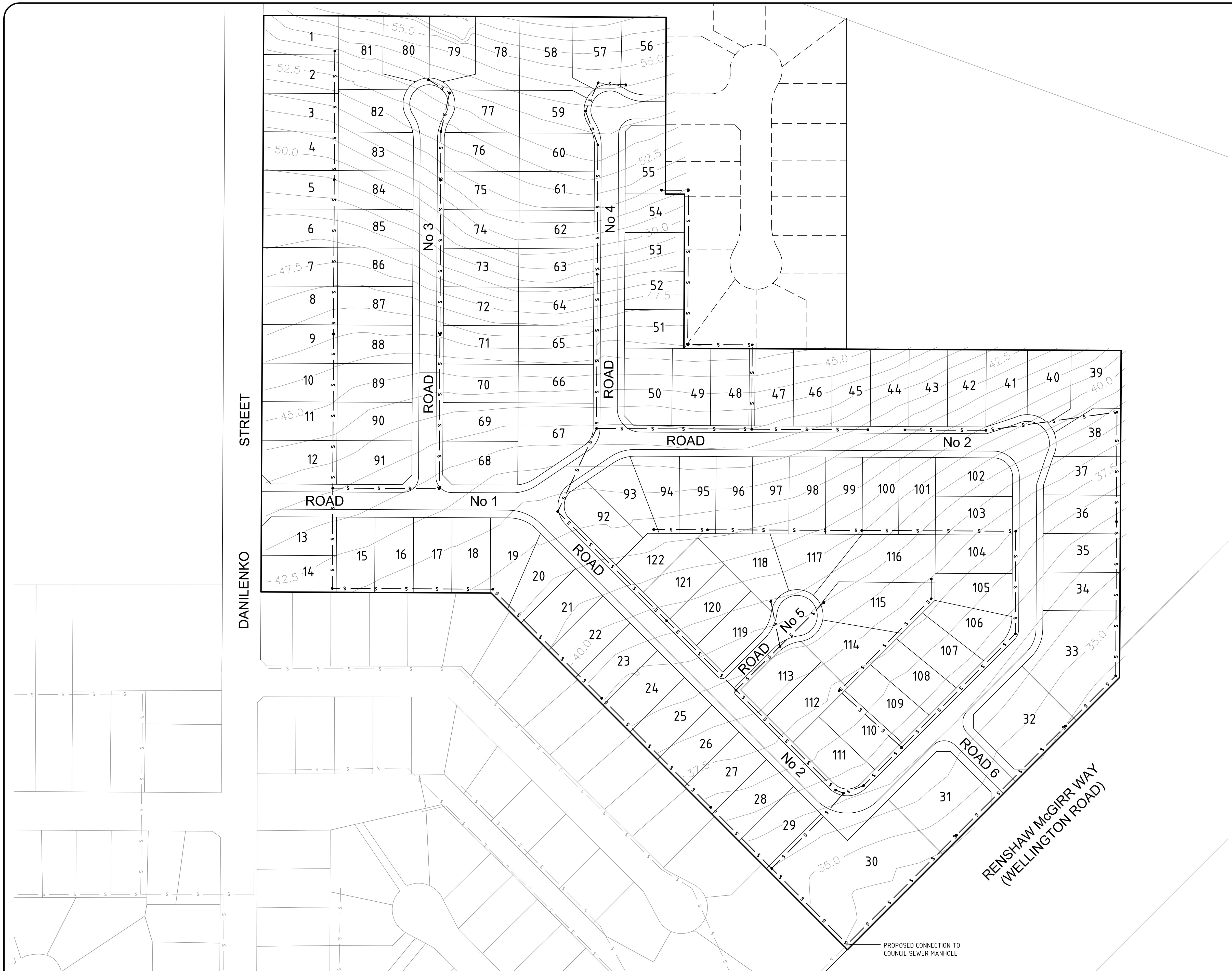

NOTE:
THIS PLAN IS FOR REZONING APPLICATION PURPOSES ONLY AND IS SUBJECT TO FINAL SURVEY AND THE APPROVAL OF COUNCIL.

LEGEND:

- PROPOSED SEWER MAIN
- EXISTING SEWER MAIN
- CONTOUR INTERVAL 0.5m
- SITE BOUNDARY

SEWER NOTES:

1. ALL SEWER MAINS SHALL BE CLASS SNB RRJ UPVC PIPE MAX. 3m LENGTHS OR RRJ VC PIPE.
2. CONSTRUCTION OF SEWER MAINS & MANHOLES SHALL BE CARRIED OUT IN ACCORDANCE WITH PARKES SHIRE COUNCIL STANDARDS.
3. MANHOLES TO BE CONSTRUCTED TO PUBLIC WORKS STANDARD DRAWINGS ST.500B & ST.501A.
4. DEAD ENDS & JUNCTIONS TO BE SEALED WITH 150mm DIAMETER RRJ SPIGOT ACCESS COUPLING WITH SCREWED CAP or RRJ VC PLUGS & CLIPS.
5. RISERS & SIDELINES TO BE CONSTRUCTED TO PUBLIC WORKS STANDARD DRAWING ST.503D.
6. MANHOLES SHALL BE LOCATED AT CHANGES OF GRADE, DEFLECTION & LINE INSTERSECTIONS & AT ALL DEAD ENDS EXCEEDING 30m IN LENGTH.
7. MAXIMUM SPACING OF MANHOLES SHALL BE:

PIPE SIZE (mm)	MANHOLE SPACING (m)
150	80
225	100
300	120
>375	150

SCALE 1:1000(A1)

0 10 20 40 60 80 100

SCALE 1:2000(A3)

No	DATE	DRAFTING CHECK	PM CHECK	DETAILS
A	08/12/09			ISSUED TO CLIENT

CHECKED/APPROVED	NAME	DATE
APPROVED	-	.
SURVEY	ARNDELL SURVEYING	.
DESIGNER	PPO	08/12/09
DRAFTING	LRP	08/12/09

APPROVAL AUTHORITY

PARKES SHIRE COUNCIL
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CLIENT
I & SB HOMES

PROJECT
PROPOSED SUBDIVISION
LOT 607 DP750179

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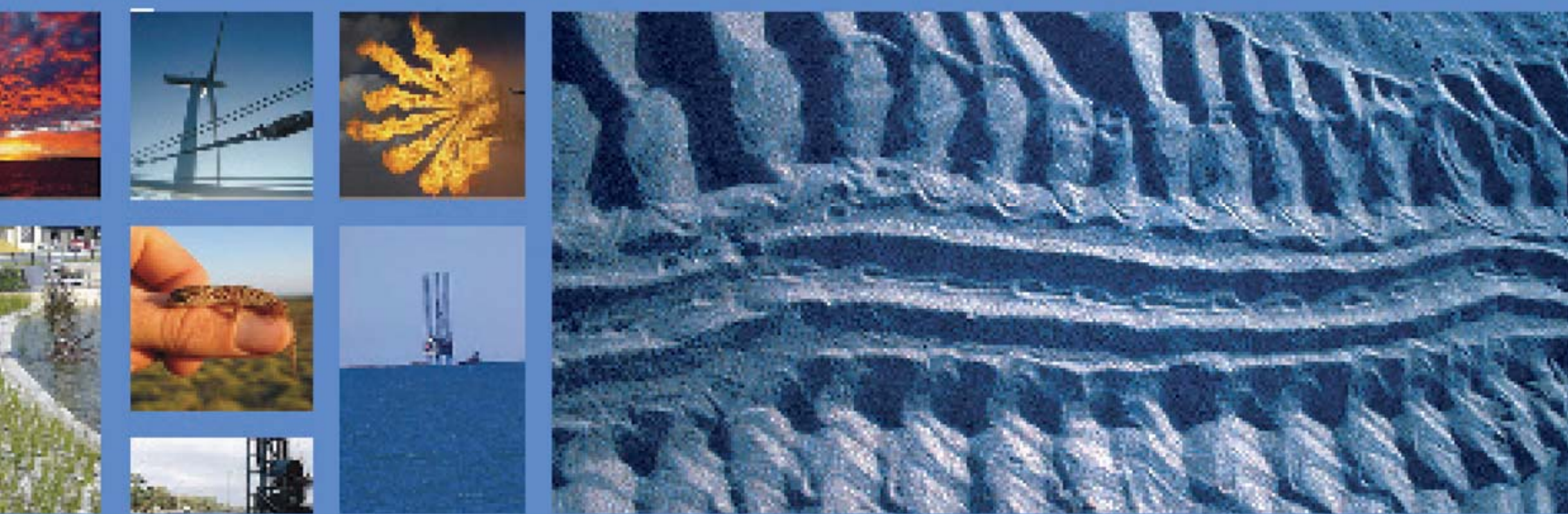
DRAWING
CONCEPT SEWER RETICULATION PLAN

PERMANENT MARK: N/A | RL: N/A | DATUM: A.H.D.
PROJECT NUMBER: 108060 | DRAWING SHEET: 02A_E04 | ORIGINAL A1
AUTOCAD FILE: 108060_02A_E01-E04.dwg | 12D/CIVILCAD FILE: N/A | REVISION A
STATUS: FOR REVIEW | SHEET E04 OF E04

Appendix A

FLORA & FAUNA

Ecological Assessment
For
Proposed Residential Land
At
Parkes, NSW



www.rpshso.com.au

Ecological Assessment
for
Proposed Residential Land
at
Parkes, NSW

Prepared by:

RPS Harper Somers O'Sullivan Pty Ltd

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Broadmeadow NSW 2292
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Prepared for:

I & SB Developments
C/- Geolyse Pty Ltd
PO Box 1963
Orange NSW 2800

Job No: 26152
Date: November 2009

Document Status

Version	*Purpose of Document*	*Orig*	*Review*	*Review Date*	*Format Review*	*Approval*	*Issue Date*
DRAFT	*Draft for Client Review*	*AR*	*CA*	*2-11-09*	*JH 3-11-09*	*C Anderson*	*3-11-09*
Final	*Final for Submission*	*MD*	*MD*	*30-11-09*	*JH 1-12-09*	*M. Doherty*	*1-12-09*

Disclaimers

EXECUTIVE SUMMARY

INTRODUCTION

RPS Harper Somers O'Sullivan (RPS HSO) was engaged by I & SB Developments to undertake an Ecological Assessment Report (EAR) over two parcels of land, Lots 12 & 13 DP 1129852, at Parkes, NSW from hereon in referred to as "the site".

This report is an Ecological Assessment to deal specifically with the suite of onsite ecological attributes to inform medium to long-term strategic planning over the site, such that potential constraints within the site might be given due consideration during the planning process.

This report aims to investigate the occurrence of any ecological constraints or opportunities associated with lands within the site. The report examines the likelihood of any proposal to have a significant effect on any threatened species, populations or ecological communities listed within the *Threatened Species Conservation Act 1995* (TSC Act) pursuant to the relevant requirements of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Assessment is also made with regard to those threatened entities listed federally under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

VEGETATION

Two different areas of the site were investigated as to their vegetation occurrences, being the demolished house area and the vacant paddock. Two different vegetation community types were noted within the site, being:

- Cleared Open Pasture; and
- Planted Trees and Shrubs (from remnant house garden).

The paddock which makes up the bulk of the site is largely characterised by Cleared Open Pasture, which is mostly composed of introduced grasses and exotic herbaceous weeds. There are widely spaced occurrences of occasional shrubs in very low numbers spread throughout the cleared area. Within the centre of the site was a large gully, filled with discarded building materials, and several varieties of shrubs.

The trees and shrubs associated with the demolished house all appear to be planted, as evidenced by their age, proximity to demolished dwelling site and by the absence of any other trees within the site. These species are predominantly introduced with the exception of a few natives including *Acacia pendula* (Weeping Myall).

Due to the degraded and highly modified nature of onsite vegetation, natural vegetation communities are not distinguishable within the site. No suitable habitat for threatened flora species was noted with the site.

FAUNA

A number of threatened fauna species were identified as occurring in the general area (DECC 2009), though none have been recorded occurring on the site. Fauna within the site was limited to common open country avifauna.

Fauna habitat within the site is limited to open grassland, scattered shrubs and building waste materials. No threatened fauna was observed during surveys on the site.

CONCLUSION

Flora and fauna surveys within the site identified no threatened flora or fauna species occurring within the bounds. Two broad vegetation types were delineated within the site, neither of which was consistent with any Endangered Ecological Community (EEC) or Threatened Ecological Community (TEC).

The vacant paddock in the north western area of the site is largely characterised by previously cultivated land exhibiting a sustained history of pastoral activity such that few native elements or natural structure exists. The south eastern area of the site is predominately regrowth vegetation existing around the remains of a demolished building. Although some of the vegetation species growing around this area are native individuals, they are all considered to be planted and as such do not represent a native vegetation community. Vegetation within the site was assessed for its potential to represent locally occurring EEC's but there is insufficient elements existing to identify a naturally occurring community due to the degraded and highly modified nature of the site.

As such the site is considered not to contain any significant ecological constraints, which may represent restriction upon strategic planning moving forward.

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APPENDICES

1.0 INTRODUCTION

RPS Harper Somers O'Sullivan (RPS HSO) was engaged by I & SB Developments to undertake an Ecological Assessment over two parcels of land at Parkes, being Lots 12 & 13 DP 1129852. (Figure 1-1)

This report is an Ecological Assessment that deals specifically with the suite of onsite ecological attributes to inform medium to long-term strategic planning over the site, such that any potential constraints within the site might be given due consideration during the planning process.

This report aims to investigate the occurrence of any ecological constraints or opportunities associated with lands within the site. The report examines the likelihood of any proposal to have a significant effect on any threatened species, populations or ecological communities listed within the *Threatened Species Conservation Act 1995* (TSC Act) pursuant to the relevant requirements of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Assessment is also made with regard to those threatened entities listed federally under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

Locality – Lot 12 and Lot 13 DP 1129852, Parkes, NSW

LGA – Parkes

Area – The total area of the site is approximately 12.641 hectares (Lot 12: 10.72ha, Lot 13: 1.921ha)

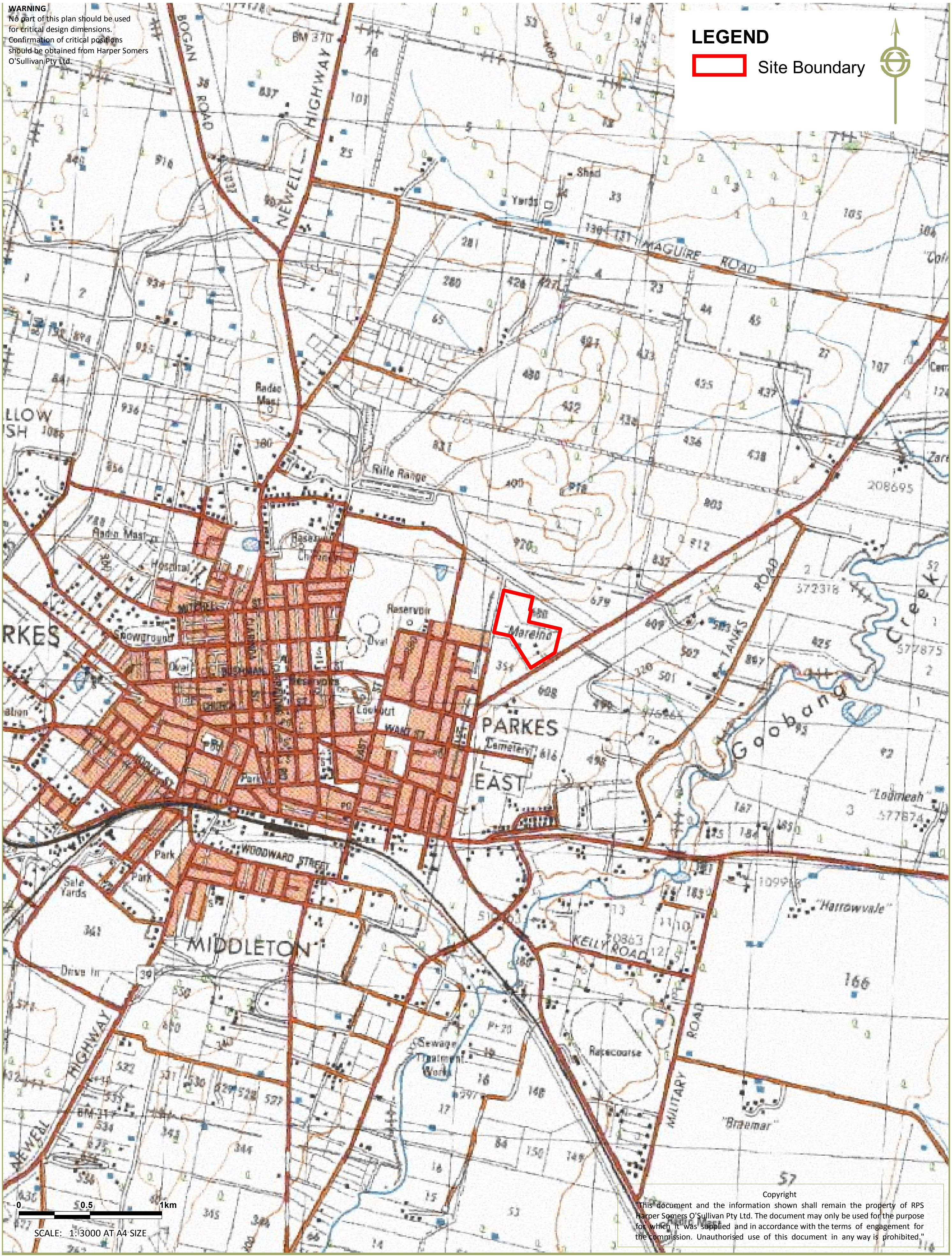
Zoning – 1(a) Rural

Boundaries – The site is bound on the west by Danilenko St, the south by an existing residential area, the west by Renshaw McGirr Way, and the north by private rural property.

Current Land Use – The majority of the site is currently being used for a mixture of pasture and cultivation practices. Sheep were recorded on site during surveys.

Topography – The site consists of gently sloping cleared lands which slope towards the south-east corner of the block. A reasonably large gully is located within the central area of the site.

WARNING
No part of this plan should be used for critical design dimensions. Confirmation of critical positions should be obtained from Harper Somers O'Sullivan Pty Ltd.



TITLE: FIGURE 1-1 SITE LOCATION	LOCATION: PARKES NSW	DATUM: DATUM PROJECTION: MGA ZONE 54 (GDA 94)	DATE: 29/10/2009 PURPOSE: ECOLOGICAL ASSESSMENT	LAYOUT REF: 26152 Fig 1-1 Site Location VERSION (PLAN BY): A-A4 (SC:MD)

CLIENT: I & SB DEVELOPMENTS
JOB REF: 26152

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1.1 Description of the Proposal

The overarching proposal for the site is to redevelop the two parcels of land into a residential area.

The purpose of this report is to assess and map the ecological attributes of the site, such that this information can be utilised during any subsequent strategic planning for the land.

1.2 Scope of the Study

The scope of this ecological assessment report is to:

- undertake desktop research to identify the potential for threatened species, populations and endangered ecological communities to occur within the subject site;
- identify vascular plant species found on the site
- identify and map existing vegetation communities;
- assess the status of identified plant species and vegetation communities under relevant legislation;
- identify existing habitat types on land adjacent to the site and assess habitat potential for threatened species, populations, or ecological communities known from the proximate area; and
- through preliminary research identify threatened fauna occurring in the locality, which might have potential to occur within the site.

Whilst survey work has been undertaken wholly within the bounds of the site, consideration has been afforded to areas off the site in order to appreciate the environmental context of the subject site.

The purpose of this report is to:

- Document and map the findings from the field work and identify potential ecological constraints within the subject site;
- ensure planning, management and development decisions are based on sound scientific information and advice by documenting the presence of any biodiversity components or potential significant impacts that may exist on the subject site;

- provide information to enable compliance with applicable assessment requirements contained within the *TSC Act (1995), EP&A Act (1979)*, the Commonwealth *EPBC Act (1999);*

- any other relevant state, regional and local environmental planning instruments such as SEPP 44 Koala Habitat Protection, *Native Vegetation Act 2003* and the *Water Management Act 2000*; and

- enable the provision and analysis of ecological data that is comparable with data for other sites within the region to ensure continuity and consistency for survey and results.

1.3 Qualifications and Licensing

1.3.1 Qualifications

This report was written by Allan Richardson BEnvSc (Hons) and Shaun Corry of RPS Harper Somers O'Sullivan Pty Ltd (RPS HSO). The academic qualifications and professional experience of RPS HSO consultants involved in the project are documented in Appendix 1.

1.3.2 Licensing

Research was conducted under the following licences:

- NSW National Parks and Wildlife Service Scientific Investigation Licence S10300 (Valid 30 November 2009);

- Animal Research Authority (Trim File No: 01/1142) issued by NSW Agriculture (Valid 12 March 2010);

- Animal Care and Ethics Committee Certificate of Approval (Trim File No: 01/1142) issued by NSW Agriculture (Valid 12 March 2010); and

- Certificate of Accreditation of a Corporation as an Animal Research Establishment (Trim File No: 01/1522 & Ref No: AW2001/014) issued by NSW Agriculture (Valid 26 May 2010).

1.4 Certification

As the principal author, I, Allan Richardson, make the following certification:

> The results presented in the report are, in the opinion of the principal author and certifier, a true and accurate account of the species recorded, or considered likely to occur within the site;
>
> Commonwealth, state and local government policies and guidelines formed the basis of project surveying methodology, or where the survey work has been undertaken with specified departures from industry standard guidelines, details of which are discussed and justified in Section 2; and
>
> All research workers have complied with relevant laws and codes relating to the conduct of flora and fauna research, including the *Animal Research Act 1995*, *National Parks and Wildlife Act 1974* and the *Australian Code of Practice for the Care and Use of Animals for Scientific Purposes*.

Signature of Principal Author and Certifier:

Allan Richardson
Ecologist
RPS Harper Somers O'Sullivan Pty Ltd
November 2009

2.0 METHODOLOGY

Due to the relatively small size of the site and the lack of natural vegetation communities present within, only one day and an evening were required to undertake field investigation works and these were conducted on the 3rd and 4th of September 2009. During the field works, targeted threatened flora surveys were undertaken in addition to opportunistic fauna observations and habitat assessment.

RPS HSO has undertaken numerous assessments of this nature within the region and wider NSW. Considerable local knowledge and experience supports an excellent understanding of the key ecological issues for this locality, and in particular the management strategies required to appropriately address and accommodate these issues in accordance with the requirements of determining authorities.

2.1 Desktop Assessment

Assessments relied on a number of information sources including previous reporting by RPS HSO in this locality and information held on government databases and archives. Data gathered during preliminary assessments was used to assist in identifying distributions, suitable habitats and known records of threatened species so that field investigations could more efficiently focus survey effort. Assessment information sources included:

1. Aerial Photograph Interpretation (API) and literature reviews to determine the broad categorisation of vegetation within the locality;

2. Review of fauna and flora records contained in the DECC Wildlife Atlas (DECC 2009);

3. DEWHA *EPBC Act 1999* Protected Matters Search (DEWHA 2009);

4. Birdata (web version of Birds Australia's New Atlas of Australian Birds);

5. A review of GIS data including (but not limited to) aerial photography and topographic maps;

6. Department of Environment and Climate Change (DECC) database of Threatened Species, Populations and Ecological Communities; and

7. Collective knowledge gained from a history of field work in the area.

2.2 Flora Survey

2.2.1 Vegetation Mapping

Currently no Regional Vegetation mapping describes vegetation communities occurring within the site. Onsite investigations of vegetation occurring within the site were undertaken using the following methodologies:

- Identification of vegetation community type(s) present (dominant species) via undertaking flora surveys and identification.
- Consideration was given to the potential for the derived vegetation communities to constitute 'Endangered Ecological Communities' (EEC) as listed within the *TSC Act (1995)* and the *EPBC Act (1999)*.
- Map the type and general extent of the community(s) present into definable map units where appropriate.

2.2.2 Significant Flora Survey

A list of potentially occurring significant flora species from the locality (10km radius) was compiled, which included threatened species (Endangered or Vulnerable), populations and EECs listed under the *TSC Act (1995)*, those species / populations / communities listed under the *EPBC Act (1999)*, Rare or Threatened Australian Plants (ROTAP) listed flora species (Briggs and Leigh 1996), as well as any other species deemed to be of local importance.

Any such species identified were considered for potential occurrence on the site, and field survey effort appropriately focussed where necessary.

2.3 Habitat Survey

An assessment of the relative habitat value present in the site was undertaken. This assessment focused primarily on the identification of specific habitat types and resources favoured by known threatened species from the region. The assessment considered the potential value of the site (and surrounds) for all major guilds of native flora and fauna.

Habitat assessment was based on the specific habitat requirements of each threatened fauna species in regards to home range, feeding, roosting, breeding, movement patterns and corridor requirements. Consideration was given to contributing factors including topography, soil, light and hydrology for threatened flora and assemblages.

2.4 Fauna Survey

A list of potentially occurring significant fauna species from the locality (10km radius) was compiled, which included threatened species (Endangered or Vulnerable) under the *TSC Act (1995)*, those species listed under the *EPBC Act (1999*) as well as any other species deemed to be of local importance including threatened populations.

The fauna survey methodology initially consisted of the production of an Expected Fauna Species List for the area (Appendix 3) and an assessment of the potential use of the site by threatened fauna species (as listed under the *TSC Act 1995* and / or *EPBC Act 1999*) identified from a 10 km radius the vicinity of the site. This was achieved by undertaking literature and database reviews followed by confirmation through field surveys, and any additional species observed were noted on the list. Investigations also took into account the occurrence of potential fauna habitat resources surrounding the site in the general locality and movements of locally occurring species during the survey period.

2.4.1 Avifauna Survey

The presence of avifauna on the site was undertaken via targeted observations during the site inspection. Birds were identified by direct observation, by recognition of calls or through recognition of distinctive features such as nests, feathers, and owl regurgitation pellets etc. The potential for threatened avifauna to use the site was also assessed by identification of habitat attributes occurring within the site and their capacity to support threatened species that are known to occur in the wider locality.

2.4.2 Herpetofauna Survey

Opportunistic amphibian and reptile searches were conducted during the site inspection. Scattered debris across the subject area was lifted and inspected as possible habitat for Herpetofauna species. Known occurrences of threatened herpetofauna species from the region were taken into account during assessment of the site habitat, to determine the potential for the site to support such species.

2.4.3 Secondary Indications and Incidental Observations

Opportunistic sightings of secondary indications (scratches, scats, diggings, tracks etc.) of resident fauna were noted. Such indicators included:

- Distinctive scats and scents left by mammals;
- Nests made by various guilds of birds;
- Potential whitewash, regurgitation pellets and prey remains from Owls;

- Skeletal material of vertebrate fauna;
- The calls of fauna;
- Footprints left by mammals; and
- Fruit remains indicative of past feeding by seed and fruit eating fauna such as cockatoos, parrots, fruit-doves and flying-foxes.

Any other incidental observations of fauna were recorded during all phases of the site inspection.

2.5 Survey Limitations

Timing limitations are often encountered during ecological surveys due to the seasonality of activity and cryptic nature of a number of flora and fauna species being studied. There is a range of common, albeit cryptic plant species that have a brief flowering period and hence small ‘window’ of effective ‘detectability’. In addition, the seasonality of surveys also places limits on the number of flora species identified in the site. Therefore, some threatened species not detected cannot be discounted due to seasonality and other factors, and are therefore addressed in terms of their potential for occurrence within the site based on ecological factors such as known habitat requirements.

The collated threatened flora and fauna species records provided by the NPWS for the region are known to vary in accuracy and reliability. Traditionally this is due to the reliability of information provided to the NPWS for collation and/or the need to protect specific threatened species locations. For the purposes of this assessment this information has been considered to have an accuracy of ± 1km.

Threatened flora and fauna records within the region were predominantly sourced from the DECC Atlas of Wildlife Database and a DEWHA Protected Matters Search. Other sources such as Birdata were also utilised. Similar limitations are known to exist with regards to these data sources and their accuracy.

3.0 RESULTS

The prevailing weather conditions during the survey period are presented in Table 3-1 below.

Table 3-1: Prevailing Weather Conditions

	24 September 2009
Temperature	7 - 19 °C
Wind	WSW 17km/h
Cloud	80%
Rain (24 hrs to 9:00am)	0mm
Sun Rise	06:41
Sun Set	19:11
Moon Rise	19:17
Moon Set	06:12

3.1 Flora Survey

3.1.1 Vegetation Community Mapping

Aerial photo interpretation and detailed field surveys delineated two vegetation communities within the site (refer to Figure 3-1). These vegetation communities consisted of:

- Cleared Open Pasture; and
- Planted Trees and Shrubs (remnant house garden).

The Cleared Open Pasture assemblage consists of areas that are open and exhibit no trees and few shrubs. These areas exhibit evidence of sustained pastoral land-use with a low diversity of herbaceous native species. This community occurs over the majority of the site and is predominantly composed of pasture and weed species.

The Planted Trees and Shrubs community occurs in a small segregated area in the south eastern area of the site. Although this community contains native plant species, they exists as regrowth remnants of planted individuals and do not constitute a native vegetation community.

3.1.2 General Flora Survey

The following section provides a brief description of each of the communities and the floristic structure of each. A complete flora list is included in Appendix 2.

Cleared Open Pasture

Plate 1 – Typical Structure of Cleared Open Pasture within the Site

Description: This community is found across the vast majority of the site. This community consists of areas that are open and exhibit no trees and few shrubs. Weeds exist in high numbers throughout this community with only a small number of native species present.

Upper-storey: Nil

Mid-storey: Nil

Under-storey: to 0.5m, 90-100% PFC. Including *Avena fatua* (Wild Oats), *Hordeum leporineum* (Barley Grass), *Lolium perrenne* (Perrenial Ryegrass), *Malva parviflora* (Small Flowered Mallow) and *Medicago polymorpha* (Burr Medic)

Vines / Climbers: Nil

Planted Trees and Shrubs (Remnant House Garden)

Plate 2 – Typical structure of the Planted Trees and Shrubs (Remnant House Garden) community within the site

Description: This community was found in the south eastern part of the site and consists of a number of introduced shrubs and planted shrubs/trees currently coppicing from repeated clearing. The ground cover is dominated by introduced grasses and herbaceous weeds.

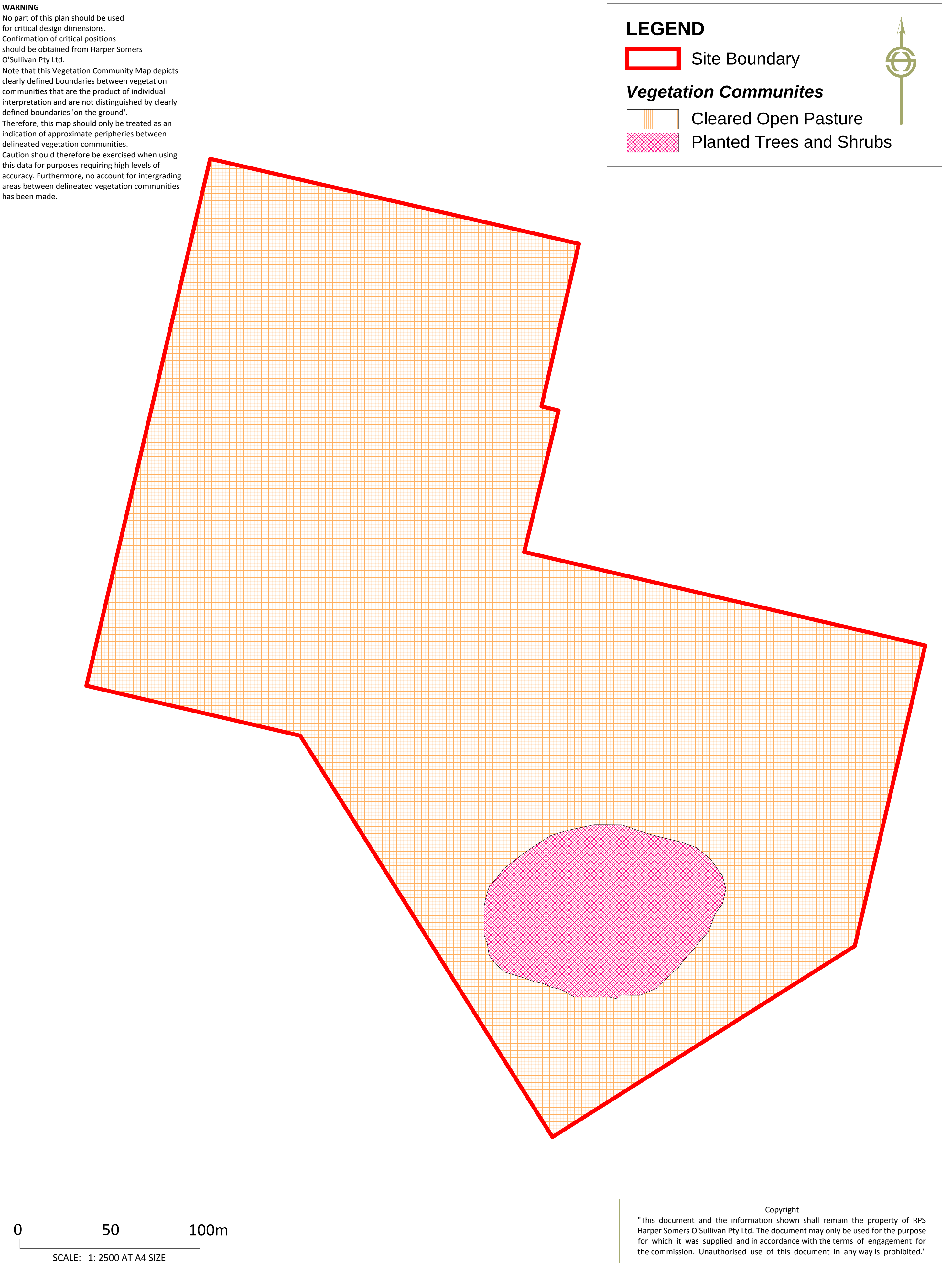
Upper-storey: Nil

Mid-storey: to 2.5m, 5-10% PFC, *Acacia baileyana* (Cootamundra Wattle), *Acacia pendula* (Boree or Weeping Myall), *Brachychiton populneus* (Kurrajong), *Cinnamomum camphora* (Camphor Laurel) and *Lycium ferocissimum* (African Boxthorn).

Under-storey: to 0.5m, 30%-50% PFC. Species including: *Carthamus lanatus* (Saffron Thistle), *Malva parviflora* (Small Flowered Mallow), *Silybum marianum* (Variegated Thistle), *Sisymbrium irio* (London Rocket), *Sisymbrium officinale* (Hedge Mustard), *Sonchus oleraceus* (Common Sow-thistle).

Vines / Climbers: *Einadia nutans* subsp. *nutans* (Climbing Saltbush).

WARNING
No part of this plan should be used for critical design dimensions. Confirmation of critical positions should be obtained from Harper Somers O'Sullivan Pty Ltd.
Note that this Vegetation Community Map depicts clearly defined boundaries between vegetation communities that are the product of individual interpretation and are not distinguished by clearly defined boundaries 'on the ground'.
Therefore, this map should only be treated as an indication of approximate peripheries between delineated vegetation communities.
Caution should therefore be exercised when using this data for purposes requiring high levels of accuracy. Furthermore, no account for intergrading areas between delineated vegetation communities has been made.



TITLE: FIGURE 3-1 VEGETATION MAP
LOCATION: PARKES NSW
DATUM: DATUM
PROJECTION: MGA ZONE 54 (GDA 94)
DATE: 29/10/2009
PURPOSE: ECOLOGICAL ASSESSMENT
LAYOUT REF: 26152 Figure 3-1 A-A4
VERSION (PLAN BY): A-A4 (SC:MD)

CLIENT: I & SB DEVELOPMENTS
JOB REF: 26152

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3.1.3 Regionally Significant Flora Species within the Parkes LGA

No regionally significant flora species were found to occur in the site.

3.1.4 Significant Flora

The results of a desktop search (DECC 2009) indicated that one TSC Act listed threatened flora species has been previously recorded within 10km of the site and / or has potential habitat within the site. This species is *Swainsona sericea* (Silky Swainson-pea) and was recorded approximately 6km west of the site.

No threatened flora species were detected within the site.

No ROTAP species listed by Briggs and Leigh (1996) were recorded within the site.

3.2 Fauna

Habitat within the site was assessed for its potential to support native flora and fauna species including threatened fauna, for which records occur within the wider locality.

Seven species listed as threatened under the *Threatened Species Conservation Act 1995* were recorded as occurring within 10km radius from the site. These are listed as follows:

- *Pyrrholaemus saggitatus* (Speckled Warbler)
- *Climacteris picumnus victoriae* (Brown Treecreeper)
- *Stagonopleura guttata* (Diamond Firetail)
- *Melanodryas cucullata cucullata* (Hooded Robin)
- *Pomatostomus temporalis temporalis* (Grey-crowned Babbler)
- *Polytelis swainsonii* (Superb Parrot)
- *Phascolarctos cinereus* (Koala)

No threatened species under the *Threatened Species Conservation Act 1995* were recorded on site during field surveys.

3.2.1 Habitat

Fauna habitat within the site is scattered shrubs and building waste materials. Within the site, a lot of disused building supplies including old sheds, corrugated iron, and various piles of metal scraps were present representing potential habitat for a suite of herpetofauna. Otherwise understorey habitat is limited in its capacity to represent habitat opportunities for native fauna.

The lack of trees within the site precludes the use of the site by arboreal mammals, bats or woodland birds for shelter and breeding purposes. Flowering shrubs within the planted areas may provide marginal seasonal foraging habitat opportunities for nectivorous and insectivorous birds but it is unlikely that the resources on site would sustain a population.

3.2.2 Avifauna Survey

Bird species recorded within the vicinity of the proposed development were limited to common open country species. These included but are not limited to *Gymnorhina tibicen* (Australian Magpie), Cactua rosiecapilla (Galah), *Psephotus haematonotus* (Red-rumped Parrot) and *Vanellus miles* (Masked Lapwing).

3.2.3 Herpetofauna Survey

Incidental surveys were conducted for amphibians and reptiles within the proposed development area. No threatened or regionally significant fauna species were recorded during the field investigations.

3.2.4 Secondary Indications and Incidental Observations

No secondary indications and incidental observations of note were recorded on site.

3.3 Corridors and Habitat Linkages

In its current state, the site does not constitute a corridor, nor does it provide habitat linkages to other areas.

4.0 THREATENED SPECIES AND COMMUNITIES ASSESSMENT

4.1 Identification of Subject Species and Communities

Threatened flora and fauna species (listed under the *TSC Act 1995* and/or the *EPBC Act 1999*) that have been gazetted and recorded within a 10 km radius of the site have been considered within this assessment (DECC 2009). Endangered Ecological Communities (EEC's) known from the broader area have also been addressed. Each species / community is considered for its potential to occur on the site and the likely level of significance within the locality. This assessment deals with each species / community separately and identifies the ecological parameters of significance which might be associated with onsite habitat opportunities.

Those species / communities that have been identified as having either a moderate or greater chance of occurring within the site or that have been recorded on the site during field investigations have been subject to a preliminary assessment of significance (Table 4-1). Those species where any potential impact exists are discussed further in Section 6.

This assessment deals with the following heads of consideration in tabulated form (refer to Table 4-1 overleaf):

'Species / Community'/ Population – Lists each threatened species / EEC's known from the vicinity. The status of each threatened species under the *TSC Act (1995)* and the *Commonwealth EPBC Act (1999)* are also provided.

'Habitat Description' – Provides a brief account of the species / community/ population and the preferred habitat attributes required for the existence / survival of each species / community.

'Chance of Occurrence on Site' – Assesses the likelihood of each species / community to occur along or within the immediate vicinity of the site in terms of the aforementioned habitat description and taking into account local habitat preferences, results of current field investigations, data gained from various sources (such as Atlas of NSW Wildlife) and previously gained knowledge via fieldwork undertaken within other ecological assessments in the locality.

'Likely Level of Impacts from Proposal' – Assesses the likely level / significance of habitat on site for each species / community/ in regard to local occurrences and requirements. This assessment is largely based on the chance of occurrence of each species / community on site with due recognition to other parameters such as home range, habitat utilisation, connectivity etc.

4.2 Key Threatening Processes

No KTP's listed in Schedule 3 of the *TSC Act (1995)* are associated with this assessment due to the lack of proposed activities for the site.

Table 4-1: Threatened Species and Communities Considered and Assessment of Potential Impacts

Species / Community	Habitat Description	Chance of Occurrence On Site	Likely Level of Impact
Plants			
Swainsona sericea Silky Swainson-pea	Found in Natural Temperate Grassland and Snow Gum Woodland. Silky Swainson-pea has been recorded from the Northern Tablelands to the Southern Tablelands and further inland on the slopes and plains.	**Low –** This species was not recorded within the site during fieldwork. This species is considered unlikely to occur within the site due to the absence of suitable habitat.	**Low** – On site habitat is not considered suitable.
Austrostipa metatoris **(V, V*)**	Occurs in the Murray Valley, from the central-western slopes to the far south-western plains. Grows in sandy areas of the Murray Valley; habitats include sandhills, sandridges, undulating plains and flat open mallee country, with red to red-brown clay-loam to sandy-loam soils.	**Low –** This species was not recorded within the site during fieldwork. This species is considered unlikely to occur within the site due to the absence of suitable habitat.	**Low** – On site habitat is not considered suitable.
Austrostipa wakoolica **(E, E*)**	Confined to the floodplains of the Murray River tributaries of central-western and south-western NSW. Grows on floodplains of the Murray River tributaries, in open woodland on grey, silty clay or sandy loam soils; habitats include the edges of a lignum swamp with box and mallee; creek banks in grey, silty clay; mallee and lignum sandy-loam flat; open Cypress Pine forest on low sandy range; and a low, rocky rise.	**Low –** This species was not recorded within the site during fieldwork. This species is considered unlikely to occur within the site due to the absence of suitable habitat.	**Low** – On site habitat is not considered suitable.
Diurius tricolour Tricolour Diuris **(V, V*)**	*Diuris tricolor* (formerly known as *Diuris sheaffiana*) is a terrestrial species sporadically distributed on the western slopes of NSW, extending from south of Narrandera all the way to the far north of NSW. In the east of its range it is usually encountered on sandy soils in dry sclerophyll forests characterised by grassy understorey strata supporting herbaceous bulbine species.	**Low –** This species was not recorded within the site during fieldwork. This species is considered unlikely to occur within the site due to the absence of suitable habitat.	**Low** – On site habitat is not considered suitable.
Tylophora linearis **(V, E*)**	Slender, almost hairless twiner with a clear sap. Grows in dry scrub and open forest. Recorded from low-altitude sedimentary flats in dry woodlands.	**Low** - This species was not recorded within the site during fieldwork. This species is considered unlikely to occur within the site due to the absence of suitable habitat.	**Low** – On site habitat is not considered suitable.
Avifauna			
Xanthomyza phrygia Regent Honeyeater **(E, E*)**	Nomadic Honeyeater that disperses to non-breeding areas, including the coast, in winter, where flowering trees are sought. Stronghold is west of the great divide and it appears that movements to the coast only occur when foraging resources fail in the west and, to some extent, the Central to Lower Hunter Valley.	**Low** – This species was not recorded within the site during fieldwork. This species is unlikely to occur within the site due to the limited extent of onsite woodland habitat.	**Low** – Due to the limitations upon habitat within the site it is considered unlikely that the site would be of significance to this species.
Lathamus discolor Swift Parrot **(E, E*)**	On the mainland this species frequents Eucalypt forests and woodlands with large trees having high nectar production during winter. Mainland winter foraging sites often vary from year to year as a consequence of varying eucalypt blossoming cycles. Preferred winter flowering species in NSW include *Corymbia maculata* (Spotted Gum), *Eucalyptus fibrosa* (Broad-leaved Ironbark), *E. crebra* (Narrow-Leaved Ironabrk), *E. sideroxylon* (Mugga Ironbark), *E. albens* (White Box) and *E. tereticornis* (Forest Red Gum).	**Low** – This species was not recorded within the site during fieldwork. This species is unlikely to occur within the site due to the limited extent of onsite woodland habitat.	**Low** – Due to the limitations upon habitat within the site it is considered unlikely that the site would be of significance to this species.
Polytelis swainsonii Superb Parrot **(V,V*)**	The Superb Parrot is found throughout eastern inland NSW. This species inhabit Box-Gum, Box-Cypress-pine and Boree Woodlands and River Red Gum Forest.	**Low** – This species was not recorded within the site during fieldwork. This species is unlikely to occur within the site due to the limited extent of onsite woodland habitat.	**Low** – Due to the limitations upon habitat within the site it is considered unlikely that the site would be of significance to this species.
Chthonicola sagittata Speckled Warbler **(V)**	Occupies Eucalypt and Cypress woodlands in drier coastal areas and on the western slopes of the Great Dividing Range. Appears unable to persist in districts where no forested fragments larger than 100ha remain.	**Low** – The well-developed understory strata, which is required by this species for foraging and nesting/ shelter opportunities, is absent from the site. The scattered vegetation that is present on site is too fragmented and small for this species to successfully persist.	**Low** – Due to the limitations upon habitat within the site it is considered unlikely that the site would be of significance to this species.
Pomatostomus temporalis	Occupies open forests and woodlands, *Acacia* shrubland and adjoining farmland. They feed on terrestrial invertebrates and	**Low** – This conspicuous species and its bulky nests were not observed within the site or adjacent lands during field investigations. The lack of suitable	**Low** – Due to the limitations upon habitat and absence of individuals within the site it is considered unlikely that the site would be of significance to this species.

Species / Community	Habitat Description	Chance of Occurrence On Site	Likely Level of Impact
Grey-crowned Babbler **(V)**	insects on lower trunks and branches. They prefer wooded areas with an intact ground cover.	vegetation within the site also suggests that it is unlikely that this species would occur within site boundaries.	
Climacteris picumnus Brown Treecreeper **(V)**	Frequents drier forests and woodlands, particularly open woodland lacking a dense understorey. Also found in grasslands in proximity to wooded areas where there are sufficient logs, stumps and dead trees nearby. Feeds on invertebrate larvae and small insects, particularly ants. Utilises hollows for roosting/nesting. Appears not to persist in remnants less than 200ha.	**Low** – Preferred habitat does not exist due to the limitations on woodland habitat, including a lack of woodland debris, hollow trees, spatial extent and links to significant tracts of suitable habitat.	**Low** – Due to the limitations upon habitat within the site it is considered unlikely that the site would be of significance to this species.
Melanodryas cucullata Hooded Robin **(V)**	Primarily known from Eucalypt forest, woodland and scrub, although has been known to use cleared paddocks with regrowth or stumps in close proximity to wooded areas. Favours areas with sparse shrub cover and fallen timber. Appears unable to persist in remnants less than 100-200ha.	**Low** – Preferred habitat does not exist due to the limitations on woodland habitat, including a lack of structural complexity, spatial extent and links to significant tracts of suitable habitat.	**Low** – Due to the limitations upon habitat within the site it is considered unlikely that the site would be of significance to this species.
Stagonopleura guttata Diamond Firetail **(V)**	Small Finch occupying open woodlands, open forest and mallee. Often found along rivers and in lightly wooded farmland. Diamond Firetails feed on the ground, predominantly on grass seed, as well as on green plants and insects.	**Low** – Preferred habitat does not exist due to the limitations on woodland habitat, including a lack of structural complexity for shelter and onsite water.	**Low** – Due to the limitations upon habitat within the site it is considered unlikely that the site would be of significance to this species.
Mammals			
Phascolarctos cinereus Koala **(V)**	Occurs in forests and woodlands where it requires suitable feed trees (particular *Eucalyptus* spp.) and habitat linkages. Will occasionally cross open areas, although it becomes more vulnerable to predator attack and road mortality during these excursions.	**Low –** Suitable and preferred habitat does not occur within the site boundaries due to limitations on wooded habitat, lack of feed trees and the lack of significant tracts of suitable linking habitat..	**Low** – Due to the lack of suitable habitat within the site it is considered unlikely that the site would be of significance to this species.
Endangered Ecological Communities			
White Box – Yellow Box – Blakely's Red Gum Grassy Woodland	White Box Yellow Box Blakely's Red Gum Woodland (commonly referred to as Box-Gum Woodland) is an open woodland community (sometimes occurring as a forest formation), in which the most obvious species are one or more of the following: *Eucalyptus albens* (White Box), *E. melliodora* (Yellow Box) and *E. blakelyi* (Blakely's Red Gum). Intact sites contain a high diversity of plant species, including the main tree species, additional tree species, some shrub species, several climbing plant species, many grasses and a very high diversity of herbs. The community also includes a range of mammal, bird, reptile, frog and invertebrate fauna species. Intact stands that contain diverse upper and mid-storeys and groundlayers are rare.	**Low –** No vegetation communities are present on site that are commensurate with this TEC.	**Low –** As this TEC was not recorded within the site, it is considered unlikely to be affected by any proposal.
Acacia pendula Weeping Myall Woodlands	This ecological community is scattered across the eastern parts of the alluvial plains of the Murray-Darling river system. Typically, it occurs on red-brown earths and heavy textured grey and brown alluvial soils within a climatic belt receiving between 375 and 500 mm mean annual rainfall. The structure of the community varies from low woodland and low open woodland to low sparse woodland or open shrubland, depending on site quality and disturbance history. The tree layer grows up to a height of about 10 metres and invariably includes *Acacia pendula* (Weeping Myall or Boree) as one of the dominant species or the only tree species present. The understorey includes an open layer of chenopod shrubs and other woody plant species and an open to continuous groundcover of grasses and herbs.	**Low –** Although *Acacia pendula* occurs within the site, they exist solely as regrowth remnants of planted individuals. No other elements of this community occur within the site. It is therefore considered unlikely that this vegetation community occurs within the site.	**Low** – The highly modified and degraded nature of vegetation within the site and the subsequent lack of significant components of this community disqualify the occurrence of this EEC and the site's potential to represent a significant vegetation community.

Key: **(V) =** Vulnerable Species listed under *Threatened Species Conservation Act 1995* (TSC Act 1995).

(E) = Endangered Species listed under *TSC Act 1995*.

(EP) = Listed as an Endangered Population under the *TSC Act 1995.*

(V*) = Vulnerable Species listed under *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act 1999).

(CE*) = Critically Endangered Species listed under *EPBC Act 1999.*

(M*) = Listed as a Migratory species under the *EPBC Act 1999.*

5.0 CONSIDERATIONS UNDER THE EPBC ACT 1999

Considerations have been made under the Commonwealth *EPBC Act (1999*). An EPBC Act Protected Matters Search was undertaken within the Department of the Environment, Water, Heritage and the Arts (DEWHA 2009) on-line database to generate a list of those matters of National Environmental Significance (NES) from the area, which may have the potential to occur within the site. This data, combined with other local knowledge and records, was utilised to assess whether the type of activity proposed on the site will have, or is likely to have a significant impact upon a matter of (NES), or on the environment of Commonwealth land*.

* The site is not land owned by the Commonwealth, and hence this portion of the Act is not applicable. The matters of NES and site-specific responses are listed below.

- World Heritage areas:

The site is not a World Heritage area, and is not in close proximity to any such area.

- Wetlands protected by international treaty (the RAMSAR convention):

The site is not part of any RAMSAR Wetland area, and is not in close proximity to any such area.

- Nationally listed threatened species and ecological communities:

A total of nine nationally listed threatened species and two nationally listed threatened ecological communities (TEC) under the *EPBC Act (1999)* were listed as being relevant within the proximate region of the subject site as follows:

Fauna

- *Lathamus discolor* — Swift Parrot
- *Nyctophilus timoriensis* — Eastern Long-eared Bat
- *Polytelis swainsonii* — Superb Parrot
- *Rostratula australis* — Australian Painted Snipe
- *Xanthomyza phrygia* — Regent Honeyeater

Flora

- *Austrostipa metatoris*
- *Austrostipa wakoolica*
- *Diuris tricolour* — Tricolour Diuris
- *Tylophora linearis*

Ecological Communities

- Weeping Myall Woodlands
- White Box-Yellow Box-Blakely's Red Gum Grassy Woodland and Derived Native Grassland

The potential for the site to represent significant habitat for the individuals or local populations for the above species has been assessed under the provisions of the *EPA Act (1979)*. This assessment generally concluded that it is considered unlikely the site might represent significant habitat attributes, which might be important to the maintenance of local and migratory threatened entities, due to the degraded and modified nature of the site. Likewise, it is considered that same level of significance for onsite attributes exists at the Commonwealth level. As such, the site is not likely to be subject to a controlled action in relation to any of these matters of National Environmental Significance. Thus referral to the DEWHA is unlikely to be considered necessary as part of the carrying out of strategic planning for the site in the future.

- A total of eight Nationally listed migratory species were identified from DEWHA search (2009):

• *Haliaeetus leucogaster*	White-bellied Sea Eagle
• *Hirundapus caudactus*	White-throated Needletail
• *Merops ornatus*	Rainbow Bee-eater
• *Xanthomyza phrygia*	Regent Honeyeater
• *Ardea alba*	Great Egret
• *Ardea ibis*	Cattle Egret
• *Rostratula benghalensis s. lat.*	Painted Snipe
• *Apus pacificus*	Fork-tailed Swift

The proposal is not likely to cause any significant impact to those migratory species potentially occurring in the vicinity of the site.

- All nuclear actions:

No type of nuclear activity is proposed for the site.

- of commonwealth marine areas:

The proposed activity on the site will not have a significantly adverse effect on any Commonwealth marine area.

Summary Statement:

Based on the above, it is considered that the strategic planning and development of the site is unlikely to have a significant impact on any matters of NES under the *EPBC Act (1999)*; hence referral to the DEWHA about such matters in the future is unlikely to be necessary.

6.0 CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

RPS Harper Somers O'Sullivan (RPS HSO) was engaged by I & SB Developments to undertake an Ecological Assessment over two properties, Lot 12 and 13 DP1129852, at Parkes, NSW.

The vacant paddock in the north western area of the site is largely characterised by previously cultivated land exhibiting a sustained history of pastoral activity such that few native elements or natural structure exists. The south eastern area of the site is predominately regrowth vegetation existing around the remains of a demolished building. Although some of the vegetation species growing around this area are native individuals, they are all considered to be planted individuals and as such do not represent a native vegetation community. Vegetation within the site was assessed for its potential to represent locally occurring EEC's but there is insufficient elements existing to identify a naturally occurring community due to the degraded and highly modified nature of the site.

As such the site is considered not to contain any significant ecological constraints, which may represent restriction upon strategic planning moving forward.

6.2 Recommendations

The following recommendations have been outlined to provide ecological guidelines and site management strategies that may be incorporated into any strategic planning to minimise any impacts upon the local environment and associated threatened flora and fauna habitat within the wider area. Following the recommendations will actually assist in improving the ecological status of the lands and degraded riparian system present.

- Measures be implemented to prevent the erosion of soil during construction, such that downstream drainage systems be protected from sedimentation; and

- That any planting required for substrate stability and / or landscaped plantings employ locally occurring native species, or similar species to those removed, where possible.

7.0 BIBLIOGRAPHY

Atlas of NSW Wildlife (April 2009). New South Wales National Parks and Wildlife Service – *Flora and Fauna Database*.

Briggs, J. D. and Leigh, J. H. (1996). *Rare or Threatened Australian Plants*. CSIRO, Collingwood, Victoria.

Department of Environment and Climate Change (2009).Threatened fauna and flora search on NSW Wildlife Atlas, accessed 10th June 2009

Department of Environment, Water, Heritage and the Arts (2009). Matters of National Significance Search, accessed 10th June 2009.

NPWS – NSW National Parks and Wildlife Service (2000). *Vegetation Survey*, *Classification and Mapping, Lower Hunter and Central Coast Region, Version 1.2.* Lower Hunter and Central Coast Regional Environmental Management Strategy, Thornton, NSW.

Robinson, L. (2003). *Field Guide to the Native Plants of Sydney (3rd edn.).* Kangaroo Press Pty. Ltd., New South Wales.

APPENDIX 1

Personnel CV's

Curriculum Vitae

Name:	Allan Richardson
Office:	RPS Harper Somers O'Sullivan
Position in Company:	Ecologist
Qualifications / Awards	B.Env.Sc. (Environmental Management) B.Env.Sc. (Hons) (Biology) – Migratory Wading Bird Study 2002 Hunter Environmental Institute Scholarship Waterways Authority Boating Licence OH&S Induction Training (Green Card) NSW Driver's Licence (Class C) NPWS Scientific Licence NSW Animal Ethics Research Authority St John Ambulance Senior First Aid Certificate
Memberships:	Hunter Bird Observers Club Victorian Wader Study Group

Areas of Expertise:

- Ornithological Surveys and Research
- Targeted and general Terrestrial flora and fauna surveys
- Threatened Flora & Fauna Assessment, Reporting and Legislation
- GPS Survey and GIS Mapping Projects
- High Level Nature Photography
- Tertiary and General Ecological Tutoring, Demonstrating and Presenting

Recent Experience Includes:

Allan Richardson has broad range of Ecological Assessment reporting experience underpinned by over 27 years of ecological field experience. Over four and a half years of project experience has primarily included a range of flora and fauna assessment disciplines as required by a wide range of corporate and domestic client requirements. Allan has a strong grounding in threatened species ecology in both coastal and western NSW regional areas, with specialist migratory wader studies expertise in Central NSW and Roebuck Bay in North Western Australia.

Allan's wide ranging interest across different ecological disciplines, has been a central part of important threatened species projects, including, the Critically Endangered North Rothbury Persoonia, Hunter Estuary Green and Golden Bell Frog populations, Migratory Wader habitat usage surveys, seasonal Swift Parrot movements and specialised Avifauna Wind Farm Surveys on the east and west coast. Allan's broad ecological experience also represents an important part of RPS HSO's threatened flora and vegetation community mapping, targeted fauna survey works and threatened species habitat assessments over both small and large spatial areas for a range of client needs. His depth of experience and a strong knowledge of Australian fauna and regional vegetation contribute strongly to RPS HSO's ability to meet the consultation and regulatory needs of the development community.

Curriculum Vitae

Name:	Shaun Corry
Office:	RPS Harper Somers O'Sullivan
Position in Company:	Ecologist
Qualifications / Memberships:	Dip Conservation and Land Mgt NSW Driver's Licence (Class C) Waterways Authority Boating Licence OH&S Induction Training (Green Card) NPWS Scientific Investigation Licence NSW Animal Ethics Research Authority

Areas of Expertise:

- Flora and fauna identification and habitat assessment
- Targeted threatened flora and fauna surveys
- Delineation and mapping of vegetation communities
- Endangered Ecological Community (EEC) assessment
- Experience with GPS/GIS for project design and mapping
- Conducting Field Surveys for Flora, Fauna and Habitat Identification
- Report Preparation including Fauna & Flora Assessments
- Ecological Monitoring and Reporting
- Bushfire Threat Assessment & Management reporting
- Understanding of environmental legislation

Recent Experience Includes:

Shaun has a broad range of Ecological Assessment reporting experience and ecological field experience. Experience within the consulting industry has primarily included a wide range of flora assessment disciplines as required by a wide range of public and private clients. Shaun has a strong grounding in threatened flora species, endangered ecological communities and populations throughout NSW. Shaun has undertaken flora and fauna surveys including targeted surveys for threatened flora species within the Blue Mountains, Hunter, Central Coast, Mid North Coast and Southern Queenland.

APPENDIX 2

Flora Species List

Flora Species List

The following list includes all species of vascular plants observed on site during fieldwork. It should be noted that such a list couldn't be considered comprehensive, but rather indicative of the flora present on the site. It can take many years of flora surveys to record all of the plant species occurring within any area, especially plant species that are only apparent in some seasons such as Orchids.

A number of species cannot always be accurately identified during a brief survey, generally due to a lack of suitable flowering and / or fruiting material. Any such species are identified as accurately as possible, and are indicated in the list as indicated:

- specimens that could only be identified to genus level are indicated by the generic name followed by the abbreviation "sp.", indicating an unidentified species of that genus;
- specimens for which identification of the genus was uncertain are indicated by a question mark ("?") placed in front of the generic, which is followed by the abbreviation "sp." and;
- specimens that could be accurately identified to genus level, but could be identified to species level with only a degree of certainty are indicated by a ("?") placed in front of the epithet.

Authorities for the scientific names are not provided in the list. These follow the references outlined below.

Harden, G. (ed) (2000). *Flora of New South Wales, Volume 1*. Revised edition. UNSW, Kensington, NSW.

Harden, G. (ed) (2002). *Flora of New South Wales, Volume 2*. Revised edition. UNSW, Kensington, NSW.

Harden, G. (ed) (1992). *Flora of New South Wales, Volume 3.* UNSW, Kensington, NSW.

Harden, G. (ed) (1993). *Flora of New South Wales, Volume 4*. UNSW, Kensington, NSW.

Names of families and higher taxa follow a modified Cronquist System (1981). Introduced species are indicated by an asterisk "*".

Threatened species listed under the Threatened Species Conservation Act 1995 (*TSC Act 1995*) or the Environmental Protection of Biodiversity and Conservation (*EPBC Act 1999*) and / or Rare or Threatened Australian Plant (ROTAP) listed species are indicated in **bold font** and marked as:

(V) = Vulnerable Species listed under the TSC Act
(E) = Endangered Species listed under the TSC Act
(EE) = Species listed under the Commonwealth EPBC Act 1999 as Vulnerable
(R) = *ROTAP as per Briggs and Leigh (1996)*cies listed under the Commonwealth EPBC Act 1999 as Endangered

Scientific Name	**Common Name**
CLASS MAGNOLIOPSIDA (Flowering Plants)	
SUB-CLASS MAGNOLIIDAE	
Asteraceae	
*Arctotheca calendula**	Capeweed
*Carthamus lanatus**	Saffron Thistle
*Silybum marianum**	Variegated Thistle
*Sonchus oleraceus**	Common Sow-thistle
Vittadinia cuneata var. cuneata	Fuzzweed
Boraginaceae	
*Echium plantagineum**	Paterson's Curse
Brassicaceae	
*Capsella bursa-pastoris**	Shepherds purse
Rapistrum rugosum	Turnip Weed, Giant Mustard
Sisymbrium irio	London Rocket
*Sisymbrium officinale**	Hedge Mustard
Chenopodiaceae	
Einadia nutans subsp. *nutans*	Climbing Saltbush
Cucurbitaceae	
Cucumis myriocarpus	Paddy Melon
Fabaceae/faboideae	
Indigofera basedowii	-
*Medicago polymorpha**	Burr Medic
*Medicago truncatula**	Barrel Medic
Fabaceae/mimosoideae	
Acacia baileyana	Cootamundra Wattle
Acacia pendula	Boree or Weeping Myall
Fumariaceae	
Fumaria bastardii	Bastards Fumitory
Geraniaceae	
*Erodium cicutarium**	Common Storksbill
Lamiaceae	
Salvia verbenaca	Vervain
Lauraceae	
*Cinnamomum camphora**	Camphor Laurel
Malvaceae	
Malva parviflora	Small Flowered Mallow
Myrtaceae	
Eucalyptus sideroxylon	Red Ironbark
Oxalidaceae	
*Oxalis corniculata**	Yellow Wood Sorrel
Solanaceae	
*Lycium ferocissimum**	African Boxthorn

Scientific Name	Common Name
Sterculiaceae	
Brachychiton populneus	Kurrajong
SUB-CLASS LILIIDAE (Monocotyledons)	
Asphodelaceae	
*Asphodelus fistulosus**	Onion Weed
Papaveraceae	
Papaver hybridum	Rough Poppy
Papaver somniferum subsp. setigerum	Popy
Poaceae	
Austrodanthonia eriantha	-
Austrostipa aristiglumis	Plains Grass
*Avena fatua**	Wild Oats
Bromus diandrus	Great Brome
*Hordeum leporineum**	Barley Grass
*Lolium perrenne**	Perennial Ryegrass
*Phalaris aquatica**	Phalaris
Triticum aestivum	Common Wheat

APPENDIX 3

Expected Fauna Species List

Below is a list of fauna species that could be *reasonably* expected to be found within the site at some occurrence. Such an approach has been taken given the unlikelihood to record *all* potentially occurring species within an area during formal fauna surveys (due to seasonality, climatic limitations, crypticism etc).

Family sequencing and taxonomy follow for each fauna class:

Birds – Christidis and Boles (1994).

Herpetofauna - Cogger (1996).

Mammals - Strahan (ed) (1995) and Churchill (1998).

✓ **-** Species observed or indicated by scats, tracks etc. on site during this investigation.

* **-** Indicates an introduced species

KNOWN AND EXPECTED FAUNA SPECIES LIST

Below is a list of fauna species that could be *reasonably* expected to be found within the study area at some occurrence. Such an approach has been taken given the low probability of recording *all* potentially occurring species within an area during formal fauna surveys (due to seasonality, climatic limitations, crypticism etc).

Family sequencing and taxonomy follow for each fauna class:

Birds – Christidis and Boles (2009).

Herpetofauna - Cogger (1996).

Mammals - Van Dyck and Strahan (ed) (2008) and Churchill (1998)..

Appendix Key:

✓ **=** Species Detected
* **=** Introduced species
(E) = Species listed under NSW TSC Act 1995 as Endangered.
(V) = Species listed under NSW TSC Act 1995 as Vulnerable.
(V*) = Species listed under the Commonwealth EPBC Act 1999 as Vulnerable
(E*) = Species listed under the Commonwealth EPBC Act 1999 as Endangered
(M*) = Species listed under the Commonwealth EPBC Act as Migratory
(C) = Species listed under CAMBA
(J) = Species listed under JAMBA

Data Source: **1 =** Species recorded during this survey within or in the vicinity of the site

KNOWN AND EXPECTED BIRD LIST

Family Name	Scientific Name	Common Name	1
Casuariidae (Emu)	*Dromaius novaehollandiae*	Emu	
Phasianidae (True Quails, Pheasants and Fowls)	*Coturnix pectoralis*	Stubble Quail	
	Coturnix ypsilophora	Brown Quail	
	Excalfactoria chinensis	King Quail	
	Pavo cristatus	Indian Peafowl	
Anatidae (Swans, Geese and Ducks)	*Dendrocygna eytoni*	Plumed Whistling-Duck (M*)	
	Dendrocygna arcuata	Wandering Whistling-Duck (M*)	
	Oxyura australis	**Blue-billed Duck (V, M*)**	
	Stictonetta naevosa	**Freckled Duck (V, M*)**	
	Biziura lobata	Musk Duck (M*)	
	Cygnus atratus	Black Swan (M*)	
	Tadorna tadornoides	Australian Shelduck (M*)	
	Chenonetta jubata	Australian Wood Duck (M*)	
	Anas platyrhynchos	*Northern Mallard (M*)	
	Anas superciliosa	Pacific Black Duck (M*)	
	Anas rhynchotis	Australasian Shoveler (M*)	
	Anas gracilis	Grey Teal (M*)	
	Anas castanea	Chestnut Teal (M*)	
	Malacorhynchus membranaceus	Pink-eared Duck (M*)	
	Aytha australis	Hardhead (M*)	
Podicipedidae (Grebes)	*Tachybaptus novaehollandiae*	Australasian Grebe	
	Poliocephalus poliocephalus	Hoary-headed Grebe	
	Podiceps cristatus	Great Crested Grebe	
Anhingidae (Darters)	*Anhinga novaehollandiae*	Australasian Darter	
Phalacrocoracidae (Cormorants)	*Phalacrocorax carbo*	Great Cormorant	
	Microcarbo melanoleucos	Little Pied Cormorant	
	Phalacrocorax sulcirostris	Little Black Cormorant	
	Phalacrocorax varius	Pied Cormorant	
Pelecanide (Pelicans)	*Pelecanus conspicillatus*	Australian Pelican	
Ardeidae	*Ardea pacifica*	White-necked Heron	

Family Name	Scientific Name	Common Name	1
(Herons, Bitterns and Egrets)			
	Egretta novaehollandiae	White-faced Heron	
	Ardea ibis	Cattle Egret (C,J, M*)	
	Egretta garzetta	Little Egret (J)	
	Ardea modesta	Eastern Great Egret (C,J, M*)	
	Ardea intermedia	Intermediate Egret	
	Nycticorax caledonicus	Nankeen Night Heron	
	Ixobrychus dubius	Australian Little Bittern	
	Butorides striatus	Striated Heron	
	Ixobrychus flavicollis	**Black Bittern (V)**	
	Botaurus poiciloptilus	**Australasian Bittern (V)**	
Threskiornithidae (Ibises and Spoonbills)	*Plegadis falcinellus*	Glossy Ibis (C, M*)	
	Threskiornis molucca	Australian White Ibis	
	Threskiornis spinicollis	Straw-necked Ibis	
	Platalea flavipes	Yellow-billed Spoonbill	
	Platalea regia	Royal Spoonbill	
Ciconiidae (Storks)	***Ephippiorhynchus asiaticus***	**Black-necked Stork (E)**	
Accipitridae (Hawks, Kites and Eagles)			
	Elanus axillaris	Black-shouldered Kite (M*)	✓
	Hamirostra melanosternon	**Black-breasted Buzzard (V, M*)**	
	Lophoictinia isura	**Square-tailed Kite (V, M*)**	
	Milvus migrans	Black Kite (M*)	
	Haliastur sphenurus	Whistling Kite (M*)	
	Circus assimilis	Spotted Harrier (M*)	
	Circus approximans	Swamp Harrier (M*)	
	Accipiter fasciatus	Brown Goshawk (M*)	
	Accipiter novaehollandiae	Grey Goshawk (M*)	
	Accipiter cirrhocephalus	Collared Sparrowhawk (M*)	
	Aquila audax	Wedge-tailed Eagle (M*)	✓
	Hieraaetus morphnoides	Little Eagle (M*)	
Falconidae (Falcons)	*Falco berigora*	Brown Falcon (M*)	
	Falco longipennis	Australian Hobby (M*)	
	Falco subniger	Black Falcon (M*)	
	Falco peregrinus	Peregrine Falcon (M*)	✓
	Falco cenchroides	Nankeen Kestrel (M*)	✓
Gruidae	*Grus rubicunda*	Brolga (M*)	

Family Name	Scientific Name	Common Name	1
(Cranes)			
Rallidae (Crakes, Rails and Gallinules)	*Gallinula philippensis*	Buff-banded Rail	
	Lewinia pectoralis	Lewin's Rail	
	Porzana pusilla	Baillon's Crake	
	Porzana fluminea	Australian Spotted Crake	
	Porzana tabuensis	Spotless Crake	
	Porphyrio porphyrio	Purple Swamphen	
	Gallinula tenebrosa	Dusky Moorhen	
	Tribonyx ventralis	Black-tailed Native-hen	
	Fulica atra	Eurasian Coot	
Otididae (Bustards)	*Ardeotis australis*	Australian Bustard	
Burhinidae (Stone-curlews))	***Burhinus grallarius***	**Bush Stone-curlew (E)**	
Turnicidae (Button-Quails)	*Turnix velox*	Little Button-quail	
	Turnix varius	Painted Button-quail	
	Turnix pyrhothorax	Red-chested Button-quail	
	Turnix maculosus	**Red-backed Button-quail (V)**	
	Pedionomus torquatus	**Plains Wanderer (E, V*)**	
Scolopacidae (Snipe, Godwits, Curlews, Sandpipers, Stints & Phalaropes)	*Gallinago hardwickii*	Latham's Snipe (M*,C)	
	Limosa limosa	**Black-tailed Godwit (V, M*,C)**	
	Limosa lapponica	Bar-tailed Godwit (M*,C)	
	Numenius madagascariensis	Eastern Curlew (M*,C)	
	Numenius minutes	Little Curlew (M*)	
	Tringa stagnatilis	Marsh Sandpiper (M*,C)	
	Tringa nebularia	Common Greenshank (M*,C)	
	Tringa glareola	Wood Sandpiper (M*,C)	
	Tringa brevipes	Grey-tailed Tattler (M*,C)	
	Calidris ruficollis	Red-necked Stint (M*,C)	
	Calidris subminuta	Long-toed Stint (M*,C)	
	Calidris melanotos	Pectoral Sandpiper (M*)	
	Calidris acuminata	Sharp-tailed Sandpiper (M*,C)	
	Calidris ferruginea	Curlew Sandpiper (M*,C)	
	Tryngites subruficollis	Buff-breasted Sandpiper (M*)	
	Philomachus pugnax	Ruff (M*,C)	
Rostratulidae	***Rostratula australis***	**Australian Painted Snipe (M*, E*,**	

Family Name	Scientific Name	Common Name	1
(Painted Snipe)		**V*,C)**	
Recurvirostridae (Stilts & Avocets)	*Himantopus himantopus*	Black-winged Stilt (M*)	
	Recurvirostra novaehollandiae	Red-necked Avocet (M*)	
Charadriidae (Lapwings, Plovers and Dottrels)	*Charadrius ruficapillus*	Red-capped Plover (M*)	
	Erythrogonys cinctus	Red-kneed Dotterel (M*)	
	Elseyornis melanops	Black-fronted Dotterel (M*)	
	Vanellus tricolor	Banded Lapwing (M*)	
	Vanellus miles	Masked Lapwing (M*)	✓
Laridae (Gulls and Terns)	*Chroicoephalus novaehollandiae*	Silver Gull	
	Chlidonias hybridus	Whiskered Tern	
Columbidae (Pigeons and Doves)	*Chalcophaps indica*	Emerald Dove	
	**Columba livia*	Rock Dove	
	Geopelia humeralis	Bar-shouldered Dove	
	Geopelia striata	Peaceful Dove	✓
	Ocyphaps lophotes	Crested Pigeon	
	Phaps chalcoptera	Common Bronzewing	✓
	**Streptopelia chinensis*	Spotted Dove	
Cacatuidae (Cockatoos)	***Calyptorhynchus lathami***	**Glossy Black-Cockatoo (V)**	
	Calyptrohynchus funereus	Yellow-tailed Black-Cockatoo	
	Lophochroa leadbeateri	**Major Mitchell's Cockatoo (V)**	
	Eolophus roseicapillus	Galah	✓
	Cacatua tenuirostris	Long-billed Corella	
	Cacatua sanguinea	Little Corella	✓
	Cacatua galerita	Sulphur-crested Cockatoo	
Psittacidae (Parrots)	*Alisterus scapularis*	Australian King Parrot	
	Lathamus discolor	**Swift Parrot (E, E*)**	
	Neophema pulchella	**Turquoise Parrot (V)**	
	Platycercus elegans	Crimson Rosella	✓
	Platycercus eximius	Eastern Rosella	✓
	Psephotus haematonotus	Red-rumped Parrot	✓
	Trichoglossus haematodus	Rainbow Lorikeet	
	Trichoglossus chlorolepidotus	Scaly-breasted Lorikeet	
	Glossopsitta concina	Musk Lorikeet	
	Glossopsitta pusilla	Little Lorikeet	

Family Name	Scientific Name	Common Name	1
Cuculidae (Old World Cuckoos)	*Cacomantis flabelliformis*	Fan-tailed Cuckoo	
	Cacomantis variolosus	Brush Cuckoo	
	Chalcites basalis	Horsfield's Bronze-Cuckoo	
	Chalcites lucidus	Shining Bronze-Cuckoo	
	Cacomantis pallidus	Pallid Cuckoo	
Strigidae (Hawk Owls)	***Ninox strenua***	**Powerful Owl (V)**	
	Ninox connivens	**Barking Owl (V)**	
	Ninox boobook	Southern Boobook	
Tytonidae (Barn Owls)	*Tyto javanica*	Eastern Barn Owl	
	Tyto novaehollandiae	**Masked Owl (V)**	
Podargidae (Frogmouths)	*Podargus strigoides*	Tawny Frogmouth	
Caprimulgidae (Nightjars)	*Eurostopodus mystacalis*	White-throated Nightjar	
	Eurostopodus argus	Spotted Nightjar	
Aegothelidae (Owlet-nightjars)	*Aegotheles cristatus*	Australian Owlet-nightjar	
Apodidae (Typical Swifts)	*Hirundapus caudacutus*	White-throated Needletail (M*,C)	
	Apus pacificus	Fork-tailed Swift (M*,C)	
Halcyonidae (Kingfishers and Kookaburras)	*Dacelo novaeguineae*	Laughing Kookaburra	✓
	Todiramphus sanctus	Sacred Kingfisher	
	Todiramphus macleayii	Forest Kingfisher	
Meropidae (Bee-eaters)	*Merops ornatus*	Rainbow Bee-eater (M*)	
Coraciidae (Typical Rollers)	*Eurystomus orientalis*	Dollarbird	
Menuridae (Lyrebirds)	*Menura novaehollandiae*	Superb Lyrebird	
Climacteridae (Australo-Papuan Treecreepers)	*Cormobates leucophaea*	White-throated Treecreeper	
	Climacteris picumnus	**Brown Treecreeper (V)**	
Maluridae (Fairy-Wrens and Emu-Wrens)	*Malurus cyaneus*	Superb Fairy-wren	✓
	Malurus lamberti	Variegated Fairy-wren	

Family Name	Scientific Name	Common Name	1
	Stipiturus malachurus	Southern Emu-wren (M*)	
Pardalotidae (Pardalotes, Scrubwrens, Thornbills)	*Pardalotus punctatus*	Spotted Pardalote	✓
	Paradalotus striatus	Striated Pardalote	✓
	Sericornis frontalis	White-browed Scrubwren	
	Chthonicola sagittata	**Speckled Warbler (V)**	✓
	Gerygone albogularis	White-throated Gerygone	
	Acanthiza apicalis	Inland Thornbill	✓
	Acanthiza pusilla	Brown Thornbill	
	Acanthiza reguloides	Buff-rumped Thornbill	
	Acanthiza chrysorrhoa	Yellow-rumped Thornbill	✓
	Acanthiza nana	Yellow Thornbill	✓
	Acanthiza lineata	Striated Thornbill	
	Acanthiza uropygialis	Chestnut-rumped Thornbill	
	Calamanthus pyrrhopygia	Chestnut-rumped Heathwren	
Meliphagidae (Honeyeaters)	*Anthochaera carunculata*	Red Wattlebird	
	Plectrhyncha lanceolata	Striped Honeyeater	✓
	Anthochaera chrysoptera	Little Wattlebird	
	Philemon corniculatus	Noisy Friarbird	✓
	Philemon citerogularis	Little Friarbird	✓
	Anthochaera phrygia	**Regent Honeyeater (E, E*)**	
	Manorina melanophrys	Bell Miner	
	Manorina flavigula	Yellow-throated Miner	✓
	Manorina melanocephala	Noisy Miner	
	Meliphaga lewinii	Lewin's Honeyeater	
	Lichenostomus chrysops	Yellow-faced Honeyeater	
	Lichenostomus melanops	Yellow-tufted Honeyeater	
	Lichenostomus fuscus	Fuscous Honeyeater	
	Lichenostomus penicillatus	White-plumed Honeyeater	✓
	Lichenostomus virescens	Singing Honeyeater	✓
	Melithreptus affinis	Black-headed Honeyeater	✓
	Melithreptus brevirostris	Brown-headed Honeyeater	
	Melithreptus lunatus	White-naped Honeyeater	
	Melithreptus gularis	**Black-chinned Honeyeater (V)**	
	Entomyzon cyanotis	Blue-faced Honeyeater	✓
	Lichmera indistincta	Brown Honeyeater	
	Phylidonyris novaehollandiae	New Holland Honeyeater	
	Phylidonyris niger	White-cheeked Honeyeater	

Family Name	Scientific Name	Common Name	1
	Philidonyris pyrrhopterus	Crescent Honeyeater	
	Acanthorhynchus tenuirostris	Eastern Spinebill	
	Grantiella picta	**Painted Honeyeater (V)**	
	Myzomela sanguinolenta	Scarlet Honeyeater	
	Epthianura albifrons	White-fronted Chat	
Eopsaltriidae (Robins)	*Microeca fascinans*	Jacky Winter	✓
	Petroica boodang	Scarlet Robin	
	Petroica phoenicea	Flame Robin	
	Petroica goodenovii	Red-capped Robin	✓
	Petroica rosea	Rose Robin	
	Eopsaltria australis	Eastern Yellow Robin	✓
	Melanodryas cucullata	**Hooded Robin (V)**	
Pomatostomidae (Australo-Papuan Babblers)	***Pomatostomus temporalis***	**Grey-crowned Babbler (V)**	✓
	Pomatostomus superciliosus	White-browed Babbler	✓
Cinclosomidae (Quail-thrushes and allies)	*Psophodes olivaceus*	Eastern Whipbird	
	Cinclosoma punctatum	Spotted Quail-thrush	
Neosittidae (Sittellas)	*Daphoenositta chrysoptera*	Varied Sittella	✓
Pachycephalidae (Whistlers, Shrike-tit, Shrike-thrushes)	*Falcunculus frontatus*	Crested Shrike-tit	
	Pachycephala pectoralis	Golden Whistler	
	Pachycephala rufiventris	Rufous Whistler	✓
	Colluricincla harmonica	Grey Shrike-thrush	✓
Dicruridae (Monarchs, Fantails and Drongo)	*Monarcha melanopsis*	Black-faced Monarch	
	Carterornis leucotis	**White-eared Monarch (V)**	
	Myiagra cyanoleuca	Satin Flycatcher	
	Myiagra rubecula	Leaden Flycatcher	
	Myiagra inquieta	Restless Flycatcher	
	Grallina cyanoleuca	Magpie-lark	
	Rhipidura rufifrons	Rufous Fantail	
	Rhipidura albiscarpa	Grey Fantail	✓
	Rhipidura leucophyrs	Willie Wagtail	✓

Family Name	Scientific Name	Common Name	1
	Dicrurus bracteatus	Spangled Drongo	
Campephagidae (Cuckoo-shrikes and Trillers)	*Coracina novaehollandiae*	Black-faced Cuckoo-shrike	
	Coracina papuensis	White-bellied Cuckoo-shrike	
	Coracina tenuirostris	Cicadabird	
	Lalage sueurii	White-winged Triller	✓
Oriolidae (Orioles and Figbird)	*Oriolus sagittatus*	Olive-backed Oriole	
	Sphecotheres vieilloti	Australasian Figbird	
Artamidae (Woodswallows, Butcherbirds, Currawongs)	*Artamus leucorynchus*	White-breasted Woodswallow	✓
	Artamus cyanopterus	Dusky Woodswallow	
	Cracticus torquatus	Grey Butcherbird	✓
	Cracticus nigrogularis	Pied Butcherbird	✓
	Cracticus tibicen	Australian Magpie	✓
	Strepera graculina	Pied Currawong	✓
Corvidae (Crows and allies)	*Corvus coronoides*	Australian Raven	✓
	Corvus mellori	Little Raven	✓
Cororacidae (Mud-nesters)	*Corcorax melanorhamphos*	White-winged Chough	✓
Ptilinorhynchidae (Bowerbirds)	*Ptilonorhynchus violaceus*	Satin Bowerbird	
Motacillidae (Old World Wagtails,Pipits)	*Anthus novaeseelandiae*	Australasian (Richard's) Pipit	
	Mirafra javanica	Horsefields Bushlark	✓
	Alauda arvensis	Eurasian Skyark	
	Motacilla tschutschensis	Yellow Wagtail (C)	
Passeridae (Sparrows, Weaverbirds, Waxbills)	**Passer domesticus*	House Sparrow	✓
	Taeniopygia guttata	Zebra Finch	
	Stagonopleura guttata	**Diamond Firetail (V)**	✓
	Taeniopygia bichenovii	Double-barred Finch	✓
	Neochmia temporalis	Red-browed Finch	
	Lonchura castaneothorax	Chestnut-breasted Mannikin	
Dicaeidae (Flowerpeckers)	*Dicaeum hirundinaceum*	Mistletoebird	
Hirundinidae	*Cheramoeca leucosterna*	White-Backed Swallow	

Family Name	Scientific Name	Common Name	1
(Swallows and Martins)			
	Hirundo neoxena	Welcome Swallow	✓
	Petrochelidon nigricans	Tree Martin	
	Petrochelidon ariel	Fairy Martin	
Sylviidae (Old World Warblers)	*Acrocephalus australis*	Australian Reed Warbler	✓
	Cincloramphus mathewsi	Rufous Songlark	✓
	Cisticola exilis	Golden-headed Cisticola	
	Megalurus gramineus	Little Grassbird	
	Megalurus timorensis	Tawny Grassbird	
Zosteropidae (White-eyes)	*Zosterops lateralis*	Silvereye	✓
Sturnidae (Starlings and allies)	*Sturnus vulgaris*	*Common Starling	✓
	Sturnus tristis	*Common Mynah	

KNOWN AND EXPECTED MAMMAL LIST

Family Name	Scientific Name	Common Name	1
Tachyglossidae (Echidnas)	*Tachyglossus aculeatus*	Short-beaked Echidna	
Family Ornithorhynchidae (Platypus)	*Ornythorhynchus anatinus*	Platypus	
Dasyuridae (Dasyurids)	*Antechinus flavipes*	Yellow-footed Antechinus	
	Antechinus stuartii	Brown Antechinus	
	Dasyurus maculatus	**Spotted-tailed Quoll (V, V*)**	
	Antechinomys laniger	**Kultarr (E)**	
	Planigale tenuirostris	Narrow-nosed Planigale	
	Sminthopsis murina	Common Dunnart	
	Sminthopsis crassicaudata	Fat-tailed Dunnart	
	Sminthopsis macroura	**Stripe-faced Dunnart (V)**	
Phascolarctidae (Koala)	***Phascolarctos cinereus***	**Koala (V)**	
Vombatidae (Wombats)	*Vombatus ursinus*	Common Wombat	
Petauridae (Wrist-winged Gliders)	*Petaurus breviceps*	Sugar Glider	
	Petaurus norfolcensis	**Squirrel Glider (V)**	
Pseudocheiridae (Ringtail Possums, Greater Glider)	*Pseudocheirus peregrinus*	Common Ringtail Possum	
Acrobatidae (Feathertail Glider)	*Acrobates pygmaeus*	Feathertail Glider	
Phalangeridae (Brushtail Possums and Cuscuses)	*Trichosurus vulpecula*	Common Brushtail Possum	
Macropodidae (Wallabies and Kangaroos)	*Macropus fuliginosus*	Western Grey Kangaroo	
	Macropus giganteus	Eastern Grey Kangaroo	
	Macropus rufus	Red Kangaroo	
	Macropus robustus	Common Wallaroo	
	Macropus rufogriseus	Red-necked Wallaby	
	Petrogale penicillata	**Brush-tailed Rock-Wallaby (E, V*)**	
	Wallabia bicolor	Swamp Wallaby	

Family Name	Scientific Name	Common Name	1
Pteropodidae (Flying-foxes, Blossom-bats)	***Pteropus poliocephalus***	**Grey-headed Flying-fox (V, V*)**	
	Pteropus scapulatus	Little Red Flying-fox	
Rhinolophidae (Horseshoe-bats)	*Rhinolophus megaphyllus*	Eastern Horseshoe-bat	
Emballonuridae (Sheathtail-bats)	***Saccolaimus flaviventris***	**Yellow-bellied Sheathtail-bat (V)**	
	Mormopterus sp.1	Little Freetail-bat	
	Mormopterus sp.2	Eastern Freetail-bat	
	Tadarida australis	White-striped Freetail-bat	
Vespertilionidae (Vespertilionid Bats)	***Miniopterus australis***	**Little Bentwing-bat (V)**	
	Miniopterus schreibersii	**Common Bentwing-bat (V)**	
	Nyctophilus geoffroyi	Lesser Long-eared Bat	
	Nyctophilus gouldii	Gould’s Long-eared Bat	
	Chalinolobus dwyeri	**Large-eared Pied Bat (V, V*)**	
	Chalinolobus gouldii	Gould’s Wattled Bat	
	Chalinolobus morio	Chocolate Wattled Bat	
	Falsistrellus tasmaniensis	**Eastern Falsistrelle (V)**	
	Myotis adversus	**Large-footed Myotis (V)**	
	Scoteanax rueppellii	**Greater Broad-nosed Bat (V)**	
	Scotorepens greyii	Little Broad-nosed Bat	
	Scotorepens orion	Eastern Broad-nosed Bat	
	Vespadelus darlingtoni	Large Forest Bat	
	Vespadelus regulus	Southern Forest Bat	
	Vespadelus pumilus	Eastern Forest Bat	
	Vespadelus vulturnus	Little Forest Bat	
Muridae (Murids)	*Hydromys chrysogaster*	Water Rat	
	**Mus domesticus*	House Mouse	
	**Rattus norvegicus*	Brown Rat	
	**Rattus rattus*	Black Rat	
Canidae (Dogs)	**Canis familiaris*	Dog	
	Canis familiaris dingo	Dingo	
	**Vulpes vulpes*	Red Fox	
Felidae (Cats)	**Felis catus*	Feral Cat	

Family Name	Scientific Name	Common Name	1
Leporidae (Rabbit and Hare)	**Oryctolagus cuniculus*	European Rabbit	
	**Lepus capensis*	Brown Hare	
Equidae (Horse and Donkey)	**Equus caballus*	Horse	
Suidae (Pigs)	**Sus scrofa*	Pig	
Bovidae (Horned Ruminants)	**Bos taurus*	Cow	
	**Capra hircus*	Goat	

KNOWN AND EXPECTED REPTILE LIST

Family Name	Scientific Name	Common Name	1
Gekkonidae (Geckoes)	*Christinus marmoratus*	Marbled gecko	
	Diplodactylus byrnei	Gibber Gecko	
	Diplodactylus conspicillatus	Fat-tailed Gecko	
	Diplodactylus damaeus	Beaded Gecko	
	Diplodactylus steindachneri	Box-patterned Gecko	
	Diplodactylus stenodactylus	Sand Plain Gecko	
	Diplodactylus tessellatus	Tessellated Gecko	
	Diplodactylus vittatus	Wood Gecko	
	Gehyra dubia	Northern Dtella	
	Gehyra variegata	Common Dtella	
	Heteronotia binoei	Prickly Gecko	
	Nephrurus levis	Smooth Knob-tailed Gecko	
	Oedura marmorata	Marbled Velvet Gecko	
	Oedura monilis	Ocellated Velvet Gecko	
	Oedura rhombifer	Northern Velvet Gecko	
	Oedura robusta	Robust Velvet Gecko	
	Oedura lesueurii	Lesueur's Velvet Gecko	
	Oedura tryoni	Southern Spotted Velvet Gecko	
	Rhynchoedura ornata	Beaked Gecko	
	Saltuarius wyberba	Granite Leaf-tailed Gecko	
	Strophurus ciliaris	Northern Spiny-tailed Gecko	
	Strophurus elderi	Jewelled Gecko	
	Strophurus intermedius	Southern Spiny-tailed Gecko	
	Strophurus williamsi	Eastern Spiny-tailed Gecko	
	Underwoodisaurus milii	Thick-tailed Gecko	
	Underwoodisaurus sphyrurus	Granite Thick-tailed Gecko	
Pygopodidae (Legless Lizards)	*Aprasia inaurita*	Mallee Worm-lizard	
	Aprasia parapulchella	Pink-tailed Worm-lizard	
	Lialis burtonis	Burton's Snake Lizard	
	Pygopus lepidopus	Common Scaly-foot	
	Delma australis	Marble-headed Snake-lizard	
	Delma butleri	Spinifex Snake-lizard	
	Delma impar	Striped Snake-lizard	
	Delma plebeia	Leaden Delma	

Family Name	Scientific Name	Common Name	1
	Delma inornata	Plain Snake-Lizard	
	Delma tincta	Painted Snake Lizard	
	Lialis burtonis	Burton's Snake-Lizard	
	Pygopus lepidopodus	Common Scaly-foot	
	Pygopus schraderi	Eastern Hooded Scaly-Foot	
Varanidae (Monitors)	*Varanus gouldii*	Sand Goanna	
	Varanus tristis	Freckled Monitor	
	Varanus varius	Lace Monitor	
Agamidae (Dragons)	*Amphibolurus burnsi*	Burns' Dragon	
	Amphibolurus muricatus	Jacky Lizard	
	Amphibolurus nobbi	Nobbi	
	Ctenophorus pictus	Painted Dragon	
	Ctenophorus decresii	Tawny Rock Dragon	
	Ctenophorus fordi	Mallee Dragon	
	Ctenophorus nuchalis	Central Netted Dragon	
	Diporiphora australis	Tommy Roundhead	
	Physignathus lesuerii	Eastern Water Dragon	
	Pogona barbata	Eastern Bearded Dragon	
	Pogona vitticeps	Central Bearded Dragon	
	Rankinia diemensis	Mountain Dragon	
	Tympanocryptis tetrapophora	Four-pored Earless Dragon	
Scincidae (Skinks)	*Acritoscincus platynotum*	Red-throated Skink	
	Anomalopus leuckartii	Eastern Worm-skink	
	Anomalopus mackayi	Mackay's Worm-skink	
	Carlia foliorum	Litter Skink	
	Carlia tetradactyla	Southern Rainbow Skink	
	Carlia vivax	Tussock Rainbow Skink	
	Cryptoblepharus carnabyi	Carnaby's Wall Skink	
	Cryptoblepharus virgatus	Cream-striped Wall Skink	
	Ctenotus allotropis		
	Ctenotus atlas		
	Ctenotus brachyonyx		
	Ctenotus brooksi		
	Ctenotus ingrami		
	Ctenotus leonhardii		
	Ctenotus olympicus		
	Ctenotus orientalis		

Family Name	Scientific Name	Common Name	1
	Ctenotus pantherinus		
	Ctenotus regius		
	Ctenotus robustus		
	Ctenotus schomburgkii		
	Ctenotus strauchii		
	Ctenotus taeniolatus	Copper-tailed Skink	
	Cyclodomorphus melanops	Spinifex Slender Blue-tongue	
	Cyclodomorphus venustus	Saltbush Slender Blue-tongue	
	Egernia cunninghamii	Cunningham's Skink	
	Egernia inornata	Desert Skink	
	Egernia margaretae	Centralian Rock-skink	
	Egernia modesta	Modest Tree Skink	
	Egernia striolata	Tree Skink	
	Egernia saxatilis	Black Rock Skink	
	Egernia stokesii	Gidgee Skink	
	Egernia whitii	White's Skink	
	Egernia sp.	Mount Kaputar Rock-Skink	
	Eremiascincus fasciolatus	Narrow-banded Sand Swimmer	
	Eremiascincus richardsonii	Broad-banded Sand Swimmer	
	Eulamprus heatwolei	Yellow-bellied Water Skink	
	Eulamprus quoyii	Eastern Water Skink	
	Eulamprus tenuis	Greater Bar-sided Skink	
	Hemiergis decresiensis		
	Lampropholis amicula	Friendly Sun-skink	
	Lampropholis caligula	Barrington Sun-skink	
	Lampropholis delicata	Grass Skink	
	Lampropholis guichenoti	Grass Sun-Skink	
	Lerista bougainvillii	Southern Lerista	
	Lerista labialis	Pink Lerista	
	Lerista muelleri	Three-toed Lerista	
	Lerista punctatovittata	Spotted Lerista	
	Lerista xanthura	Yellow-tailed Lerista	
	Menetia greyii	Dwarf Skink	
	Morethia adelaidensis	Chenopod Morethia	
	Morethia boulengeri	Boulenger's Morethia	
	Morethia obscura	Dull Morethia	
	Proablepharus kinghorni	Kinghorn's Skink	

Family Name	Scientific Name	Common Name	1
	Pseudomoia pagenstecheri	Grassland Tussock-Skink	
	Pseudomoia entrecasteauxii	Woodland Tussock Skink	
	Saiphos equalis	Three-Toed Skink	
	Tiliqua multifasciata	Centralian Blue-tongue	
	Tiliqua nigrolutea	Southern Blue-tongue	
	Tiliqua occipitalis	Western Blue-tongue	
	Tiliqua rugosa	Shingleback Lizard	
	Tiliqua scincoides	Eastern Blue-tongue	
Typhlopidae (Blind Snakes)	*Ramphotyphlops affinis*	Small-headed Blind-snake	
	Ramphotyphlops australis	Southern Blind Snake	
	Ramphotyphlops batillus		
	Ramphotyphlops bituberculatus	Prong-snouted Blind Snake	
	Ramphotyphlops endoterus		
	Ramphotyphlops ligatus		
	Ramphotyphlops nigrescens	Black Blind Snake	
	Ramphotyphlops proximus		
	Ramphotyphlops weidii	Brown-snouted Blind Snake	
Boidae (Pythons)	*Antaresia maculosa*	Spotted Python	
	Antaresia stmsoni	Stimson's Python	
	Aspidites ramsayi	Woma	
	Morelia spilota	Carpet Python	
Colubridae (Tree Snakes)	*Boiga irregularis*	Brown Tree Snake	
	Dendralaphis punctulata	Green Tree Snake	
Elapidae (Venomous Snakes)	*Acanthopis antarcticus*	Death Adder	
	Austrelaps ramsayi	Highlands Copperhead	
	Brachyurophis australis	Australian Coral Snake	
	Brachyurophis fasciolatus	Narrow-banded Shovel-nosed Snake	
	Denisonia devisi	De Vis' Banded Snake	
	Demansia psammophis	Yellow-faced Whip Snake	
	Demansia torquate	Collared Whipsnake	
	Denisonia devisi	De Vis' Banded Snake	
	Dyrsdalia coronoides	White-Lipped Snake	
	Echiopsis curta	Bardick	
	Furina diadema	Red-naped Snake	

Family Name	Scientific Name	Common Name	1
	Furina dunmalli	Dunmall's Snake	
	Hemiaspis damelii	Grey Snake	
	Hoplocephalus bitorquatus	**Pale-headed Snake (V)**	
	Notechis scutatus	Eastern Tiger Snake	
	Oxyuranus microlepidotus	Inland Taipan	
	Pseudechis australis	Mulga Snake	
	Pseudechis guttatus	Blue-Bellied Black Snake	
	Pseudechis porphyriacus	Red-bellied Black Snake	
	Pseudonaja modesta	Ringed Brown Snake	
	Pseudonaja nuchalis	Western Brown Sanke	
	Pseudonaja textilis	Eastern Brown Snake	
	Rhinoplocephalus nigrescens	Eastern Small-eyed Snake	
	Suta dwyeri	Dwyer's Black-Headed Snake	
	Suta flagellum	**Little Whip-Snake (V)**	
	Suta nigriceps	Short-tailed Snake	
	Suta spectablis	Mallee Black-headed Snke	
	Suta suta	Curl Snake	
	Vermicella annulata	Bandy Bandy	
Chelidae (Tortoises)	*Chelodina expansa*	Broad-shelled Turtle	
	Chelodina longicollis	Long-necked Tortoise	
	Elseya bellii	Bell's Turtle	
	Emydura macquarii	Macquarie Turtle	

KNOWN AND EXPECTED FROG LIST

Family Name	Scientific Name	Common Name	1
Hylidae (Tree Frogs)	*Cyclorana novaehollandiae*	Wide-mouthed Frog	
	Cyclorana platycephala	Waterholding Frog	
	Cyclorana verrucosa	Warty Collared Frog	
	Litoria alboguttata	Striped Burrowing Frog	
	Litoria caerulea	Green Tree Frog	
	Litoria castanea	**Yellow-Spotted Bell Frog (E)**	
	Litoria fallax	Eastern Dwarf Tree Frog	
	Litoria latopalmata	Broad-palmed Frog	
	Litoria lesueuri	Lesueur's Frog	
	Litoria nasuta	Rocket Frog	
	Litoria peronii	Peron's Tree Frog	
	Litoria raniformis	Green Swamp Frog	
	Litoria rubella	Red Eyed Tree Frog	
	Litoria verreauxii	Verreaux's Frog	
Myobatrachidae (Ground Frogs)			
	Crinia deserticola	Desert Froglet	
	Crinia parinsignifera	Eastern Froglet	
	Crinia signifera	Common Froglet	
	Crinia sloanei	Sloan's Froglet	
	Limnodynastes dumerilli	Eastern Banjo Frog	
	Limnodynastes ornatus	Ornate Burrowing Frog	
	Limnodynastes fletcheri	Long-thumbed Frog	
	Limnodynastes interioris	Giant Pobblebonk	
	Limnodynastes peronii	Striped Marsh Frog	
	Limnodynastes salmini	Pink-striped Frog	
	Limnodynastes tasmaniensis	Spotted Grass Frog	
	Limnodynastes terraereginae	Northern Pobblebonk	
	Neobatrachus pictus	Mallee Spadefoot	
	Neobatrachus sudelli	Painted Spadefoot	
	Notaden bennettii	Crucifix Toad	
	Pseudophryne bibronii	Brown Toadlet	
	Uperoleia capitulata	Lumpy Toadlet	
	Uperoleia laevigata	Smooth Toadlet	
	Uperoleia rugosa	Wrinkled Toadlet	
	Uperoleia tyleri	Tyler's Toadlet	

Appendix B

HERITAGE

Cultural Heritage Impact Assessment
For
Lots 12 & 13 DP 1129852
Renshaw McGirr Way, Parkes NSW

Prepared by:

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Disclaimers

EXECUTIVE SUMMARY

RPS Harper Somers O'Sullivan Pty Ltd (RPS HSO) has been commissioned by Geolyse Pty Ltd to assess the potential for Aboriginal and European cultural heritage of Lots 12 & 13 DP 1129852 adjacent to Renshaw McGirr Way, Parkes in order to support a rezoning application for residential purposes. The study area is comprised of two parcels of land totalling approximately 12.64 hectares; Lot 12 is 10.72 hectares in area and Lot 13 is 1.921 hectares in area.

The Study Area is located on a level to gently sloping plain predominantly comprised of abandoned wheat crops, ground surface weeds and scattered garden shrub species associated with a demolished residential dwelling. To the north the area was not used for wheat cultivation and contained native grasses and weeds mostly used for sheep grazing purposes. Extensive grazing and pastoral activities in the past have lead to the exposure of B Horizon soils in the Study Area. The area contained no drainage lines with the closest being Goobang Creek situated one kilometre east. The level character of the landform and location of fresh water creeks near to Study Area would have provided for good transitory access routes through to these resource zones.

This assessment comprises a detailed review and analysis of previous archaeological reports for the area, a summary of environmental data, results from a search of the Aboriginal Heritage Information Management System (AHIMS) and a detailed site survey. The assessment has been conducted in accordance with the National Parks and Wildlife Act of 1974 (NPW Act) and meets all of the requirements of the NPWS Standards and Guidelines Kit (1997). The Peak Hill Local Aboriginal Land Council (PHLALC) was contacted and present during the survey. This report reflects their comments and views (Appendix 6).

The archaeological pedestrian survey was conducted on Wednesday 28th October 2009 in partnership with Shani Hando, Sites Officer for PHLALC. The field investigation was divided into four survey units (Figure 7-1), with each area being traversed in evenly spaced transects. The Study Area comprised of a level plain area in the form of a valley depression, increasing to a lower sloped landscape towards the north. Survey unit 1 identified the ruins of a demolished house and shed surrounded by abandoned wheat crops which were also seen in survey unit 2 & 4. Survey unit 3 was situated on the lower slope and comprised wholly an existing rural house yard and adjacent sheep grazing paddock. Ground surface visibility for the Study Area was considered low and was limited by vegetation cover. Areas that featured exposed soils were investigated for archaeological material but generally they were characterised by rock shatters and conglomerate gravels.

No Aboriginal cultural heritage items and no European cultural heritage items were identified during the field investigation.

It is recommended that the rezoning may proceed with regard the following:

ABORIGINAL CUTLURAL HERITAGE

Recommendation 1

If it is suspected Aboriginal cultural heritage material has been encountered, work should cease immediately. The NSW Department of Environment, Climate Change and Water (DECCW) and PHLALC should be notified. Works should only recommence when an appropriate and approved management strategy has been agreed to by all of the relevant stakeholders.

Recommendation 2

In the event that skeletal remains are uncovered, work is to stop in the vicinity immediately and the NSW Coroner's Office and NSW Police contacted. If skeletal remains are deemed to be of Aboriginal origin, a representative of the local Aboriginal Community (PHLALC) and the DECCW are to be contacted.

EUROPEAN CULTURAL HERITAGE

Recommendation 3

If, during the course of clearing work, significant European cultural heritage material is uncovered work should cease in that area immediately. The NSW Heritage Branch should be notified and works only recommence when an appropriate and approved management strategy instigated.

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1.0 INTRODUCTION

RPS Harper Somers O'Sullivan Pty Ltd (RPS HSO) has been commissioned by Geolyse Pty Ltd to assess the potential for Aboriginal and European cultural heritage of Lots 12 & 13 DP 1129852, situated adjacent to Renshaw McGirr Way, Parkes, in order to support a rezoning application for residential purposes. This report will form part of a residential rezoning application to council.

1.1 The Study Area

The study area comprises Lots 12 & 13 DP 1129852 at Renshaw McGirr Way, Parkes. The site area is approximately 12.64 hectares; Lot 12 is 10.72 hectares in area and Lot 13 is 1.921 hectares in area.

The study area is bounded by Danilenko Street a gravelled access road to the west and Renshaw McGirr Way bordering to the east. The south west boundary is defined by existing urban residential dwellings.

The location of the study area can be found in Figure 1-1.

1.2 Background

The proposed rezoning of the subject land aims to accommodate the continued growth of the Parkes shire.

Lot 12 once supported a house and associated shed on small land acreage. The property ran a small wheat farming operation which comprised Lot 12 in entirety. As the time of the survey, the residential dwelling and shed had been demolished and all that remained were piles of rubble and scattered garden bushes. A small shed approximately $2m^2$ in the vicinity of the demolished house remains.

TITLE:	FIGURE 1-1 STUDY AREA	LOCATION:	PARKES NSW	DATUM:	DATUM
				PROJECTION:	MGA ZONE 54 (GDA 94)
DATE:	24/11/2009	PURPOSE:	ARCHAEOLOGICAL ASSESSMENT		
LAYOUT REF:	26152\10 Drafting\Arch \26152 Fig 1-1 A-A4	VERSION (PLAN BY):	A-A4 (LS)		

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RPS HARPER SOMERS O'SULLIVAN

1.3 Legislative Context

It is incumbent on any land manager to adhere to legislative requirements that protect both Aboriginal cultural heritage and European cultural heritage in NSW. Appendix 1 details the various relevant legislative Acts.

1.4 Scope of Assessment

This Cultural Heritage Impact Assessment (CHIA) has incorporated a desk top review and a pedestrian survey of the Study Area. The objective was to determine through a desk top review if there was likelihood for Aboriginal and European historic sites to occur and to assess this through a field survey assessment.

This archaeological report for Aboriginal cultural heritage impact assessment is written in accordance with the National Parks and Wildlife Act of 1974 (NPW Act) and meets all of the requirements of the NPWS Standards and Guidelines Kit (1997). A review of the documentary evidence includes a search of the Department of Environment, Climate Change and Water (DECCW) Aboriginal Heritage Information Management System (AHIMS) database (Appendix 2).

In relation to European heritage the report was written with guidelines detailed in the NSW Heritage Manual (1994) issued by the NSW Heritage and the Burra Charter (rev. ed 1999).

1.5 Aboriginal Community Consultation

The Peak Hill Local Aboriginal Land Council (PHLALC) C.E.O Cherie Keed was contacted and advised of the upcoming archaeological field survey proposed for Lots 12 & 13 DP 1129852 Renshaw McGirr Way, Parkes. The field survey was scheduled for and conducted on Wednesday 28th October, 2009 by Philippa Sokol, Archaeologist for RPS HSO in partnership with Shani Hando, Sites Officer representative for Peak Hill LALC.

A copy of this report will be sent to the PHLALC for review and comment.

The Consultation Log detailing the correspondence pertaining to this report can be found in Appendix 3.

1.6 Limitations

The desk top review was limited to all available documents directly concerning the Study Area. The pedestrian survey covered all landform types existing in the Study Area with existing dirt access tracks providing good visibility. Away from these areas visibility could be considered as low to nil with dense weeds, ground cover, remnant wheat plants and wild oats obscuring. Snakes were also an added concern, particularly in areas containing thick, long grass.

1.7 Authorship

This RPS HSO report was written by Philippa Sokol and reviewed by Darrell Rigby, all of RPS HSO.

1.8 Acknowledgements

RPS HSO would like to acknowledge the following people who assisted in the Cultural Heritage Impact Assessment.

Name	Company
Cherie Keed	CEO, Peak Hill Local Aboriginal Land Council
Shani Hando	Sites Officer, Peak Hill Local Aboriginal Land Council
Erika Barton	Geolyse Pty Ltd

1.9 Abbreviations

- Aboriginal Heritage Information Management System — AHIMS
- Department of Environment, Climate Change and Water — DECCW
- Local Environmental Plan — LEP
- NSW National Parks and Wildlife Service — NPWS
- Parkes Shire Council — PSC
- Peak Hill Local Aboriginal Land Council — PHLALC
- Potential Archaeological Deposit — PAD
- RPS Harper Somers O'Sullivan — RPS HSO

2.0 ENVIRONMENTAL CONTEXT

The environmental context of an area is researched by archaeologists in order to obtain data relevant to the regional area and the specific Study Area. Environmental factors assessed include local geology and soils, topography, hydrology, climatic conditions, and the availability of flora and fauna resources. This information is then utilised to predict what the past local environment was like. Interactions between people and their environment are important in predicting the formation of the archaeological record and its preservation.

2.1 Geology and Soils

The Study Area comprises a landscape of undulating low hills and level plains containing red-brown soils. This soil landscape group is extensive in the central west and south west slopes and plains and includes a large portion of the states major cropping areas. Intermediate parent materials are dominant in the area and include shales, metamorphics, granodiorites, some sandstones and some intermediate volcanic, with a wide range of alluvium derived from these parent rocks (Charman & Murphy, 1991: 132). The Parkes soil landscape is associated with subhumid to semi-arid climates and comprises hard pedal red duplex soils (red-brown earths). Some occurrences of red and yellow podzolic soils have been noted in the Parkes regional area. These soils are a texture contrast with light A horizon soils overlaying heavier textured B horizons. The B horizons are characterised by a moderate angular blocky structure and can be friable when moist (Charman & Murphy, 1991: 117).

The Parkes soils are highly erodible to wind and water once the top layer of soil has been removed. The red-brown earth soils are variable in their suitability for construction purposes. The soils have a high clay content which means they will hold water quite well and will not expand greatly on wetting. If a gravel layer is present this may prevent the soils from holding water and if soils contain high salt concentrations this can be associated with tunnel and gully erosion (Charman & Murphy, 1991: 142).

The geology, detailed above, indicates that the study area potentially lacks suitable raw material resources available for stone tool manufacture. Quarrying of raw materials most likely occurred in other areas where suitable raw material was available. The fertility of the Parkes geological landscape is generally low, which results in a low diversity of flora and fauna resources. However, with the presence of both a creek and a lake to the east of the Study Area, there is a significant increase in the potential for greater diversity of resources.

2.2 Topography and Hydrology

The topography of the Parkes landscape comprises a combination of undulating low hills and level plains. The Study Area incorporates a level plain and lower sloped landscape which forms the footslope of a hill situated to the north. The hill to the north features a broad crest with the highest point of elevation approximately 80 metres higher than the study area itself and contains scattered open woodland. A drainage channel extends from the north east corner of the hill in a north east direction and forms a tributary to Goobang Creek.

The hydrology of the Study Area is defined by Goobang Creek which lies approximately 1 kilometre east and runs in a north east and south west direction. Approximately 3.5 kilometres to the north east of the Study Area, Billabong Creek intercepts Goobang Creek from the east providing for an ample supply of freshwater from two water sources. Goobang Creek is identified as an extensive water channel as it extends beyond the boundaries of the Parkes town centre and would have provided for continuous water supplies for the majority and perhaps the entirety of the year.

The topography and hydrology suggest that the local environment would have been favourable to past Aboriginal occupation and transitory activity through the study area with freshwater available from the nearby creek contributing to a diverse local habitat providing a variety of food and other exploitable resources.

2.3 Climate

Approximately 18,000 years ago climatic conditions began to change affecting the movement and behaviour of past human populations in their environments. During this time, notably at the start of the Holocene (11,477 years ago), the melting of the ice sheets in the Northern Hemisphere and Antarctica caused the sea levels to rise, with a corresponding increase in rainfall and temperature. The change in climatic conditions reached its peak about 6,000 years ago (Short, 2000:19-21). Up until 1,500 years ago, temperatures decreased slightly and then stabilised about 1,000 years ago, which is similar to the temperature currently experienced. Consequently, the climate in the locality of the Study Area for the past 1,000 years would be much the same as present day providing a year round habitable environment.

The climatic conditions will impact upon the soils, vegetation and the potential occupation of an area. They may also affect the durability of associated cultural materials. The area has a warm temperate to very hot and dry climate which periodically encounters high and low pressure systems. In the summer months the area will experience onshore winds with hot and humid weather. In the winter months the offshore winds will produce cool to mild and drier weather with frosts developing in low lying areas (Australian Bureau of Meteorology, 2009). Average temperatures throughout the year can range between 4.0 degrees Celsius in July and 32.3 degrees Celsius in January. Summer season are the wettest and produce a maximum rainfall of 58.3mm in January and a minimum of 41.6mm in April (Australian Bureau of Meteorology, 2009). These regional temperatures would be suitable for occupation for the majority of the year, with appropriate shelter required during the summer months cool months and periodic wet periods.

2.4 Flora and Fauna

The common vegetation communities recorded in the Study Area and surrounding region includes a dominant ground cover of introduced grasses, herbaceous weeds as well as wheat plants, a number of shrub species such as wattle, kurrajong and camphor laurel. The Study Area contained no mature trees or evidence of new growth saplings.

Fauna species in the Study Area should be consistent with resources found in inland areas in a close proximity to rivers and creek lines. Faunal species observed in the region include various birds such as magpie, galah and common parrot. The local environment would also be capable of supporting Koala colonies, a number of reptile species, mammal species, kangaroos and wallaby's. The close locality of Goobang creek would be capable of supporting a combination of freshwater and amphibian species.

As a result of the continual land clearing and subsequent vegetation regrowth of newer species in the Study Area, the flora and fauna resources that would have been available for foraging in the past have now become limited at this location.

2.5 Condition of the Study Area

The Study Area is situated on a level to gently sloping landscape north east of the Parkes town centre. The current vegetation of Lot 12 comprises ground cover weeds, abandoned wheat crops and remnant garden shrubs. Lot 13 comprises a portion of a rural house yard in the north west and the paddock adjacent to the house yard contains a paddock is used for sheep grazing. Vegetation is predominantly native grasses and weeds with a few wheat plants that have migrated across from Lot 12. The vegetation community as a whole shows evidence of re-growth caused from high disturbance and landform modification.

Ground surface across the Study Area has been affected by previous and ongoing pastoral activities. Construction work associated with the residential development in the north west has also been subject to varying levels of disturbance and landform modification.

2.6 Discussion

At a regional and a local level the Parkes environment would have been suitable to have sustained extensive pre contact Aboriginal occupation in the area. A range of resources including fresh water, fauna, flora and raw materials were probably available in the local area. Access to raw materials for stone stool manufacture were most likely sourced from other areas where the raw material is more suitable for this process.

Previous pastoral activities, land clearing, development and the varied environmental conditions could have displaced cultural materials. In eroded environments resulting from extensive land clearing and previous pastoral activities, site integrity is likely to be affected, but this does not rule out the possibility that there may be *in situ* cultural material if suitable conditions exist. These include intact A horizon soils and permanent creek lines combined with flora and fauna reserves.

3.0 ABORIGINAL PREHISTORY

3.1 Ethnography

The ethnographic information used to interpret the archaeological record is often biased and may be deeply prejudiced particularly in relation to lifestyle, social practices, community interactions, religion and other facets of Aboriginal life (L'Oste-Brown et al 1998). It is important to recognise this possible bias when using early European accounts that describe the lifestyles of Aboriginal people, particularly the interpretation of their daily life and beliefs. Nonetheless, some of these ethnographic records can provide important information and insight on local Aboriginal customs and cultural materials evidenced during the early years of European settlement.

3.2 The Traditional Owners

The Study Area is located on the south western slopes of NSW and area that is traditionally Wiradjuri country. Wiradjuri is thought to mean 'people of the three rivers', the rivers being identified as the Macquarie, Lachlan and Murrumbidgee (HO & DUAP, 1996). The Wiradjuri are still one of the largest Aboriginal groups in Australia, both in population and area of country. Their traditional land covers a vast area of NSW stretching from Nyngan to Albury, and Bathurst to Hay. The Wiradjuri nation has several different speech dialects (Matthews, 1898).

Currently, the major Wiradjuri groups live in Condobolin, Peak Hill, Narrandera and Griffith. Our study area is closest to Peak Hill. Evidence of the Wiradjuri Nation is best represented by the common place names of Dubbo, Cowra, Narrandera and Cootamundra which have a Wiradjuri origin (McDonald, 1998).

3.3 Implements for Gathering Food and Weapons

As an addition to using plants for food, the Wiradjuri would also have used them to provide raw materials for utilitarian items, decorative items and medicines with some species providing more than one resource. Grass stalks could be used for weaving or basketry. Large trees provided bark and fibres which were used for tools and containers, whilst resinous saps from Grass Trees for example were an adhesive used in the hafting process. Bark fibres were twisted into twine which could then be woven into traps, containers or baskets and a variety of wooden tools were used as well.

3.4 Foods and Useful Plants

The Wiradjuri used many native plants and animals. One source detailing this type of information is from early explorers journals. This particular passage from John Oxley in 1817 details an Aboriginal man who had climbed a tree to catch an opossum;

> 'he kept calling loudly, as we supposed for some of his companions to come to his assistance; in the mean time he threw down to us the game he had procured (a ring-tailed opossum), making signs for us to take it up'........he again covered up the opossums in the hot ashes. When they were apparently well done, they laid them, the snake ....'

Almost 20 years later Thomas Mitchell (1835) exuberantly tells of Aboriginals gathering honey;

> 'We were now in a land flowing with honey, for our friendly guides, with their new tomahawks, extracted it in abundance from the hollow branches of the trees, and it seemed that, in the proper season, they could find it almost everywhere. To such inexpert clowns, as they probably thought us, the honey and the bees were inaccessible, and indeed invisible, save only when the natives cut the former out, and brought it to us in little sheets of bark, thus displaying a degree of ingenuity and skill in supplying wants which we, with all our science, could not hope to attain...'

Other than the above, there is little detailed information available concerning Aboriginal use of plants and animals in the area. However, it is reasonable to assume that staple foods were obtained from kangaroo, possums, snakes, lizards, insects and birds (including eggs).

3.5 Campsites and Shelters

Gunyahs or bark huts were usually made from the broad leafed paperbark, box or stringybark trees and were erected mostly by women. They were generally located close to a reliable fresh water source or opportunistically situated on trade routes. Resources gathered within an area may have been reserved to be traded with members from neighbouring tribes for items not readily available to them.

3.6 Clothing

Summer weather and the milder days of Autumn and Spring required little in the way of protective clothing. Winter however saw the use of animal skins for both clothing and as blankets. The Wiradjuri people exploited all the resources available seasonally throughout their rangeland including using the by-products of their hunting activities, such as the skins from Opossum, Koala and Kangaroo for cloaks and the like.

3.7 Aboriginal History after European Contact

The first record of Europeans visiting the Parkes region was in 1815 by George Evans under direction from Governor Macquarie. The aim of the exploration team was to find a passage into the interior of NSW in order to expand the sheep and grazing industry generally.

Evans crossed the Lachlan River and traced the Macquarie River until December 18th, 1813 noting rich tracts of well watered land clear of timber. During this expedition, Evans also noted an abundance of kangaroos and emus, and the river abounded with fine fish: Oxley (1817) recounts that Evans saw only six Aboriginals during the whole time of his travels these being two women and four children, although on his return he observed many fires in the neighbourhood of the mountains.

In 1817, also under the Governor Macquarie's orders, Oxley led an expedition to follow the Lachlan River with George Evans as his second in command in order to act as a guide to the new area which he had found two years previously.

Oxley made several observations of the Wiradjuri people during his expedition;

> 'The natives have been reconnoitring us: we have several times heard them, but have been unable to see them. At sunset their fires were seen about two miles to the south-west', (Oxley 1817).

In the Parkes region on August 15th 1817, Oxley described nine Aboriginals who had joined the baggage horses party which were some miles behind Oxley's party;

> '...... with nine natives, who had joined them on the road: they were entirely unarmed, and there was but one mogo, or stone hatchet, among them; we had reason to suppose that their women and children were at no great distance, as they were observed to hide themselves when the men were first seen. The greater part of them had either seen or heard of white men,

> as they were neither alarmed nor astonished at what they saw. I should think that the loss of the front upper tooth is not common to every tribe, as several of these men retained it, although others were without it; the wearing a stick, or bone, through the cartilage of the nose, appeared common to all of them'.

John Oxley returned from his expedition in 1817 and died in 1828. In his place Thomas Mitchell was appointed the role of Surveyor General of New South Wales. Mitchell undertook four major exploration expeditions of NSW and during his second and third expeditions, he passed through the Central West region.

The intention of Mitchell's second expedition was to explore the Bogan River including as much of the Darling river as possible. Early on in the expedition, Mitchell's party camped near the Goobang creek, a few miles away from the present location of the Parkes Radio Telescope.

> 'The natives whom we met here were fine-looking men, enjoying contentment and happiness within the precincts of their native woods...... The first native who came up to me was a fine specimen of man in an independent state of nature. He had nothing artificial about him save the badge of mourning for the dead, a white band (his was very white) around his brow. His manner was grave, his eye keen and intelligent, and as our people were encamping he seemed to watch the moment when they wanted fire, and presented a burning stick which one of the natives had brought.... At a distance their gins sat at fires, and we heard the domestic sound of squalling children' (Mitchell, April 11, 1835).

4.0 EUROPEAN HISTORY

Parkes was originally founded in 1853 as the settlement of Currajong, so named for the abundance of kurrajong trees in the local area. In 1873 the town was renamed to Parkes in honour of Sir Henry Parkes, otherwise known as the "Father of the Federation" in Australia.

In earlier times squatters made the rich farmlands around Parkes their home even though squatting was illegal in the area. In 1836, Governor Darling allowed settlement in the region to occur issuing a “license to depasture” to those who applied. Uptake was slow, with the first official license granted to Thomas Kite at ‘Burrawang’ in 1839, who in 1840 applied for and received another license for ‘Goobang’, the site that Mitchell had passed through a few years earlier.

The Land Act of 1847 allowed settlers to take up a 14 year lease on lands with the added benefit that valuation would include improvements made by the leaseholder on the property which up until that time was excluded. In 1848 the first leases were taken up in what is now the Parkes area covering four major stations which included; Goobang, (38,400 acres) and Burrawang (38,400 acres) both of which were owned by Thomas Kite, and Coradgery with an area of 23,040 acres and Gunningbland which comprised 16,000 acres. In 1847 Thomas Bolton’s Bald Hills Station, also situated along Goobang Creek was the nearest existing settlement to what is now Parkes approximately 1½ miles south east of the present township.

Wheat and sheep farming were the primary agricultural activities conducted with the first wheat crop sown in 1865 and successfully harvested. In 1865 the first wheat crop in the Parkes district was successfully grown.

Gold had already been discovered in and around Forbes and was being mined by 1861. The depletion of the goldfields around Forbes by 1862 led some prospectors to head further north where a rich vein was found near Currajong. With the discovery of gold came many people seeking their fortune resulting in the town of Currajong rapidly expanding eventually boasting a school, a post office about 40 business of various enterprises and a church. After the gold rush the town stabilised, largely supported by pastoralists and a remnant mining population (Parkes Early History).

4.1 European Cultural Heritage

4.1.1 Registered Historic Items

The State Heritage database is maintained by the NSW Heritage Office and lists all items that have been identified as of heritage value on Regional Environment Plans and Local Environment Plans throughout NSW.

The State Heritage Register lists those places which are of State Significance which have been listed by the NSW Heritage Office under the NSW Heritage Act. In contrast the NSW State Heritage Inventory contains items considered by Local Councils and State Government Agencies to be of heritage value.

4.1.1.1 Items Listed under the Register of National Estate

One item in the Parkes town centre was given national significance through listing under the Register of National Estate.

Table 4-1: Register of National Estate item.

Item Name	Address	Reference
Parkes Courthouse Group	Court Street, Parkes	Parkes Courthouse Group Link

4.1.1.2 Items Listed under the NSW Heritage Register

Fifteen items in the local and broader Parkes region have been given state significance through listing under the NSW Heritage Branch. Two of these items were listed under the NSW Heritage Act and the remaining thirteen have been listed by Local Government and State Government. The following table details the heritage listed items.

Table 4-2: NSW Heritage Register items.

Item Name	Address	Heritage Listing
Parkes Post Office	39 Currajong Street, Parkes	NSW Heritage Act
Parkes Railway Station Group	Parkes-Broken Hill railway	NSW Heritage Act
Bogan Gate Railway Station Group	Bogan Gate, Parkes	Local Council & State Government
Courthouse Group	Currajong Street, Parkes	Local Council & State Government
National Bank	230 Dalton Street, Parkes	Local Council & State Government
Parkes Fire Station	Court Street, Parkes	Local Council & State Government
Parkes Footbridge	At Station, Parkes	Local Council & State Government
Parkes Station Group	Parkes	Local Council & State Government
Peak Hill District Hospital	Newell Highway, Peak Hill	Local Council & State Government
Peak Hill Fire Station	130 Caswell Street, Peak Hill	Local Council & State Government

Police Station	Hill Street, Parkes	Local Council & State Government
Showground Pavilion	Ward Street, Parkes	Local Council & State Government
St George Anglican Church	15 Church Street, Parkes	Local Council & State Government
St James Roman Catholic Church	Narra Street, Peak Hill	Local Council & State Government

4.1.1.3 Parkes Shire Council Local Environmental Plan (LEP)

Parkes Shire Council LEP (Schedule 1) lists those items considered of significance at the local, state and national level. There are no sites in proximity to or in the Study Area.

5.0 ABORIGINAL ARCHAEOLOGICAL CONTEXT

This chapter presents a review of documentary and physical evidence pertaining to Aboriginal archaeology of the region and in particular the Study Area. Such information is considered as it provides context and accuracy to predictions made about the potential for archaeological remains within the Study Area.

5.1 Aboriginal Heritage Information Management System

A search was undertaken of the DECCW Aboriginal Heritage Information Management System (AHIMS) for an area encompassed by coordinates Easting 601442 to 621442 and Northing 6323735 to 6343735 (MGA Zone 56).

The AHIMS results indicate that Scarred Trees (n=23) are the most frequent site type found in the locality, followed by Artefact Scatters (n=3); Scarred Tree Group (n=2), Carved Tree (n=1); and Isolated Find (n=1).

Table 5-1 lists site type and frequency.
Figure 5-1 provides the location of the AHIMS sites.

Table 5-1: AHIMS site type and frequency

Site Type	Frequency in Search Area
Artefact Scatter	3
Carved Tree	1
Isolated Finds	1
Scarred Tree Group	2
Scarred Tree	23
Total	**30**

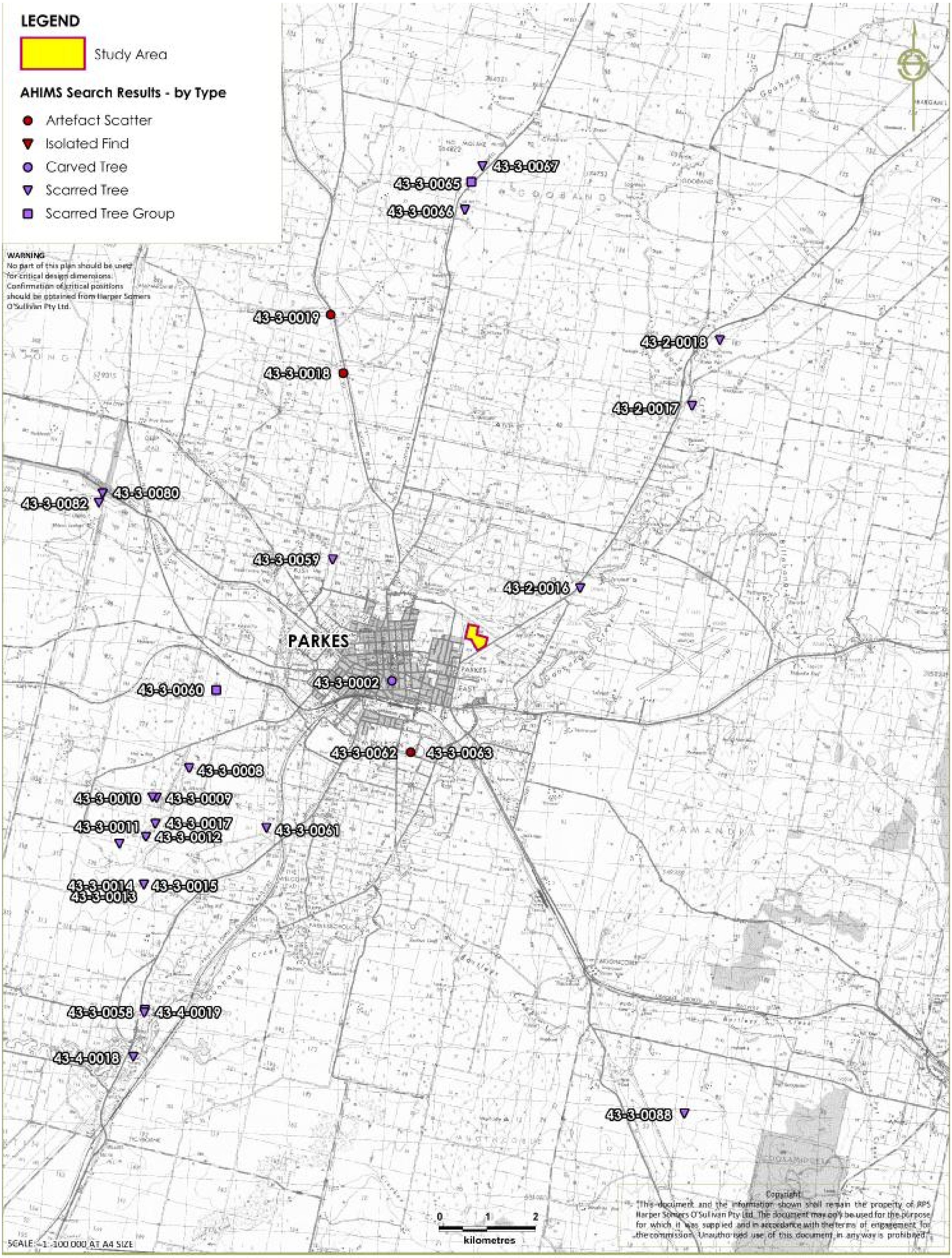
A complete list of results from the AHIMS search can be found in Appendix 2.
A glossary of Aboriginal site types can be found in Appendix 4.

5.2 Regional Archaeological Context

The Department of Environment, Climate Change and Water (DECCW) have produced a regional overview of the south western slopes bioregion, incorporating the Study Area, which offers information about the Wiradjuri people who were the traditional ancestral community of the south western slopes region.

The south western slopes are traditionally recognised as Wiradjuri country. The Wiradjuri make up the largest language group in NSW. Presence of the Wiradjuri people is more common in the north along the Macquarie and Lachlan Rivers but is less in the south along the Murrumbidgee. Evidence of this occupation can be seen today in surviving carved tree populations that are numerous in the northern part of the traditional Wiradjuri country but with only three of these surviving near the Murrumbidgee; the reason for this unknown.

The identity of the Wiradjuri people of the south western slopes bioregion has remained strong to the present day with the interaction of family groups and marriage within the Wiradjuri community contributing to this strength. Today the major Wiradjuri groups currently live in Condobolin, Peak Hill, Narrandera and Griffith, with significant populations at Wagga Wagga and Leeton and smaller groups at West Wyalong, Parkes, Forbes, Cootamundra and Young (HO & DUAP, 1996).



TITLE:	FIGURE 5-1: AHIMS SEARCH RESULTS	LOCATION:	LOTS 12 & 13 DP 1129852, PARKES	DATUM: PROJECTION:	MGA ZONE 54 (GDA 94)	DATE: PURPOSE:	27/10/2009 ARCH ASSESSMENT

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5.3 Local Archaeological Context

A number of archaeological surveys and reports have been produced for the Parkes region. This section details the most relevant investigations to the Study Area. The following information will assist with predictive modelling to help identify potential archaeological sites and allows for planning and management recommendations to be made with confidence. The following archaeological reports are summarised in descending chronological order.

Bell. 1979. Aboriginal Carved Trees in NSW – A Survey Report.

A field survey was undertaken from January to April 1980, as part of the second stage of the Aboriginal craved tree survey. It followed on from the survey conducted in 1979. The surveys were divided into two stages. The survey was funded by a grant made to the NSW National Parkes and Wildlife Service (NPWS) by the Australian Heritage Commission. The survey aimed to locate and record carved trees in NSW. The commission planned to compile a register in order to identify sites of significance, to protect sites of significance, to guide planners and developers and educate the public.

Stage 1 of the Aboriginal carved tree survey involved the investigation of known carved trees in the region, establish the location and complete an audit so that recommendations for their protection and preservation could be made. The 1979 field survey went for 11 weeks with 117 sites investigated, containing 76 individual trees. The sites location, site plan, environmental description and sketch of each carving was recorded and submitted to the NPWS register.

Stage 2 of the Aboriginal carved tree survey aimed to locate and record all known carved trees from the area not covered in the previous survey. The area surveyed covered a large portion of north and north east NSW and a slightly reduced area in the NSW south coast region. Sites were located by their current database recordings; others were known by the property name and by enquiring with the local shire council. During the field survey 95 carved tree sites were investigated and 44 individual trees were located and recorded. 14 rural museums were visited, four of these museums contained carved trees; those at Armidale, Gundagai, Muswellbrook and Walcha.

The Stage 1 and Stage 2 surveys were completed in just over six months. During this time 205 carved tree sites were investigated and 120 individual trees were located and recorded. Many sites investigated could not be located due to inadequate information on their geographical locations. During the surveys 30 Aboriginal communities were visited and in general they highlighted that carved trees in NSW have a contemporary importance to Aborigines which is likely to increase with the continuing revival of awareness in their cultural heritage.

Recommendations from the two surveys were developed to support a protection programme for carved trees. The programme sought to protect the trees from:

- Insect infestation including boring insects and the building of nests;
- Wood decay;
- Trees falling over and branches breaking off;
- Shedding of bark;
- Regrowth of bark over cravings;
- Disturbance by animals;
- Disturbance by roadwork's, construction etc; and
- Bushfires.

As part of the craved tree protection programme the Service were intent to employ one or more conservators to provide specialist advice on the protection and preservation of carved trees.

Witter, 1987. An Archaeological Assessment of the London - Victoria Gold Project.

This study was conducted to support the London – Victoria mine lease to recommend areas of clearance for mining to proceed. The London – Victoria mine lease covers a rough area of 1km x 0.50 km. The site was located at about 4 kilometres south west of Parkes, NSW and approximately 6 kilometres south west of the current Study Area.

The geology of the site is predominantly of Ordovician rocks that contain a large amount of reef quartz. Previous vegetation was predicted to have been eucalypt woodlands, but since cultivation of the land most of this has been removed.

The field survey was initially conducted in an area that received the most mining disturbance in the past. A vehicle was used to detect ground surface exposures. Road tracks offered the best clearance and had 50-100% visibility. The remainder of the mining lease proposed for disturbance was surveyed by vehicle which stopped to allow for investigation of trees and exposures. Visibility in this area was no more than 20%.

Results of the field survey found no Aboriginal camp sites. At least seven trees had Aboriginal type scars. Some were assumed as accidental damage but others in the north were identified as genuine.

Witter recommended that the development of the London – Victoria Mine by BHP go ahead as planned. Witter recommended recording all scarred trees and in doing so determine if there are any individuals in the region who have oral traditions regarding the mining area that could accompany the recording.

Dallas. 1988. London – Victoria Gold Project Archaeological Study.

An archaeological assessment was carried out on behalf of BHP Engineering Pty Ltd who wished to conduct a baseline environmental study for a development application for a joint venture by BHP Gold Mines Ltd and Alkane Exploration N.L. The joint venture proposed to develop a small open cut gold mine the London – Victoria Gold Mine at Parkes, NSW.

Scarred tree sites that were recorded by Witter in 1987 were audited and formally recorded by Dallas January 1988. Ten scarred trees were located, LV1 – 11 (LV10 was excluded from the final list as further assessment recognised the scar as recent and European). LV9 required additional protective measures and advice on this was being provided by Peak Hill Local Aboriginal Land Council.

Dallas recommended in the case of LV9 that it remain *in situ*, removal of timber debris from base and upper branches, and sprayed with insecticide.

Brayshaw. 1993. Water Supply Pipeline to proposed North Parkes, NSW – Archaeological Survey for Aboriginal Sites.

An archaeological assessment was conducted for proposed pipeline to be constructed between the Lachlan River east of Forbes north to the proposed North Parkes mine. South of Parkes, the route is approximately 27 kilometres long and north 21 kilometres, three kilometres of the route through the Parkes township was not included in the survey. This survey was conducted to survey the northern section of the route only as the southern sectioned followed an existing pipeline route. Brayshaw conducted sampled inspections along this part of the route as it was constructed in 1967, prior to legislation requiring archaeological impact assessments. This was to determine whether a full archaeological assessment would be required.

The survey identified two open sites and one isolated find, the sites were not predicted to be impacted upon by construction of the pipeline. Brayshaw recommended that a more intensive survey of the southern route was not warranted. Construction should avoid large trees given the large number of scarred trees known to exist in the region.

NSW National Parkes & Wildlife Service. 1998. Goobang National Park – Cultural Heritage Assessment.

The Goobang project was conducted to provide detailed input to the park's Draft Plan of Management. The project area is situated in the Central West of NSW and compromises over 42,000 acres and is approximately 50km from north to south. The park is located on the western edge of the central western slopes approximately 31km from Parkes.

The project included an archaeological survey which covered a total of 2102.1 hectares done on foot. The survey coverage was severely affected by the low ground surface visibility conditions. The survey yielded 30 open camp sites, one set of axe grinding grooves, 28 scarred trees and one historic hut. 928 stone artefacts and 1 possible worked glass artefact were recorded.

It was recommended for known open sites and associated archaeological deposits that widening of the existing tracks and trails be avoided and a monitoring program should be considered at Sites 20 and 26. Any works likely to impact on surface or sub surface archaeological material must be preceded by a Review of Environmental Factors. A monitoring program was to be established to assess the ongoing condition of a sample of scarred trees in the park. All known scarred trees were to be taken into account during any fire management planning or hazard reduction. The axe grinding grooves on Ten Mile Creek are highly significant both scientifically and culturally and it was recommended they should be monitored for vandalism and erosion. Monitoring was considered essential as the site is located close to an area of public access. The stone arrangement site is fragile and therefore was to be monitored to assess the effect of natural erosion or visitor impact. Finally, it was recommended that further archaeological survey be undertaken in the Curumbenya Ranges and on the western base of the Hervey Ranges escarpment in order to provide a more representative sample of the south eastern section of the reserve, and to better assess whether shelters with art and deposits are located in this area.

5.4 Literature Review Discussion

The archaeological reports detailed in section 5.3 Local Archaeological Context and results of the AHIMS search found that the most commonly occurring site type associated with the Parkes region is Scarred Trees (n.25), with artefact scatters occurring in three instances. This supports the ethnographic evidence (Section 3) that the Aboriginal population readily exploited and relied on the natural landscape as a consistent and plentiful resource.

The results of surveys have provided useful indicators of site location, particularly the large amount of scarred trees identified in the region by Bell, 1979. The large number of scarred tree and carved tree sites in the Parkes region implies the area had been exploited for extensive periods by Aboriginal people and that further investigation into the area may uncover patterns of Aboriginal land use and occupation.

6.0 PREDICTIVE MODEL FOR THE STUDY AREA

6.1 Predictive Modelling

A predictive model is created to form an educated estimate of the potential for an archaeological site to occur. It involves reviewing existing literature and consulting site databases to determine basic patterns of site distribution and correlating this distribution with the associated environment. The use of land systems and environmental factors in predictive modelling is based upon the assumption that these factors provided constraints that influenced land use patterns by past populations resulting in different spatial distributions and types of sites in the archaeological record. Predictive models can be used as a basis for the planning and management of Aboriginal European heritage, and for formulating survey strategies to include areas of maximum archaeological potential.

The summary of environmental data (Section 2) and previous archaeological work (Section 4 and Section 5) was used to create a predictive model for sites in the Study Area.

6.2 Predictive Model for Aboriginal Archaeology in the Study Area

6.2.1 Site Types and Location

The climate information indicates that the area was suitable for habitation year round. The AHIMS records that scarred tree sites regularly occur in the Parkes region and in the locality of the Study Area. The lack of scarred trees and artefact sites recorded may be reflections on the lack of old mature trees and available raw material in the area for stone tool procurement or site degradation processes where occupation areas have been exposed to disturbance by pastoral activities.

6.2.2 Site Aspect

The aspect of the site is oriented towards the south and the Parkes city centre with a lower slope rising progressively north of the Study Area. The aspect is very open with a broad depression in the south. As this is such a wide area the landscape would provide little shelter from environmental conditions such as strong winds, heavy rains, hot dry summers and cool winter nights.

6.2.3 Slope

The terrain of the Study Area comprises a level plain in the south and increases to a lower slope in the north. The Study Area contains no drainage lines. The level plain is the start of a broad valley depression that continues south covering the Parkes town centre. Archaeological investigations in the vicinity of the study area have identified a preference for sites to be located on lower slopes in close proximity to local creek lines. A number of scar tree sites have been found associated with Goobang Creek and Bock Creek.

6.2.4 Distance from Water

The Study Area is located to the immediate west of Goobang Creek and further to the north east the creek is intersected by Billabong Creek. Fresh water should be obtainable along these creeks throughout the year. Fresh water may have been available on a seasonal basis from associated drainage lines and tributaries.

6.2.5 Food

Within a one kilometre to the east a dominant creek line is present; Goobang Creek. This creek line has been an area of much Aboriginal cultural activity in the past and would provide for ample supplies of fresh water and local resources. In the north east, the creek forms tributaries into Billabong creek and Bock creek. Flora and fauna resources of both terrestrial and freshwater would be available in the region and for a majority of the year, including along the banks of the creeks.

6.2.6 Summary

The area presents as range of resources typical of the regional environment that would have been used and exploited by past Aboriginal populations. The AHIMS results demonstrate the regular use of the natural landscape of the Parkes locality as evidenced by the number of scarred tree sites. The lower sloped landscape, wide level plain depression and proximity of creek lines to the Study Area would have provided for a good transitory access route to resource zones. Local fresh water and terrestrial environments would have made the Study Area potentially desirable for campsites and as a locality for gathering a variety of flora and fauna species.

6.3 Predictive Model for European heritage in the Study Area

The results of database searches (Register of National Estate, NSW Heritage Office) and the Parkes Shire Council LEP (Section 4.1) and additional historical research provide a concept of the types of sites and activities that could have been carried out in the Study Area.

The area presented a rich environment for pastoral activities and animal grazing. The early occupants were most likely farmers of small herds of sheep and cattle, and wheat growers. The discovery of gold near Forbes made a short term addition to the regional economy with many of the early settlers arriving to take advantage of the mining boom. When the gold resources depleted, the miners moved out and local sheep and wheat properties remained. Both of these industries combined contributed to the Parkes shire as it is today.

It is the cultural remains of pastoral activities and perhaps gold mining that are most likely to occur in the Study Area which may include stock yards, implements and structures and potentially built structures from the early years of settlement.

In determining the value of sites from a heritage perspective, The Heritage Branch Assessment Criteria was used (Refer Appendix 5).

7.0 FIELD SURVEY

The archaeological pedestrian survey of the Parkes Study Area was conducted on 28th October 2009 in moderate to warm weather with clear skies and a mild breeze. Team members included Shani Hando (PHLALC) together with Philippa Sokol, Archaeologist, RPS HSO. At the time of the survey the Study Area was considered vacant land except for Lot 13 which incorporated portions of a residential house yard and paddocks containing livestock.

No Aboriginal cultural heritage items were identified within the Study Area. Scattered rocks were noted throughout but were unsuitable for stone tool manufacture. Most of the scattered rocks are of altered sandstones which have been enriched with iron. These iron stone rocks are difficult to knapp. One site (midden) was found outside the study area and was recorded in accordance with the DECCW requirements.

In relation to European cultural heritage items in the Study Area; the south eastern sector (Survey Unit 1) contained a demolished house and shed in the form of piles of rubble surrounded by remnant garden species. Investigations of these items found them to contain no significance for European archaeological heritage.

7.1 Methodology

The survey was conducted on foot in equal parallel transects. To ensure effective coverage of the area all landform units were inspected equally. The south east and south west parts of the Study Area are low lying level plains and bounded in the south by an existing residential subdivision. From here the land rises into a low slope landform unit contributing to the hill formation in the north. Systematic coverage of these portions of the Study Area provided the basis for an assessment of the probability of Aboriginal cultural heritage sites occurring.

7.2 Landforms

The study area has been divided into four landform units for comparative purposes and predictive modelling. A map specifying the four survey units identified at the field assessment is detailed at Figure 7-1.

7.3 Survey Units

7.3.1 Survey Unit 1 – Lot 12 south east paddock with demolished house and shed.

The level plain area incorporates the entirety of survey unit 1 (SU1) (Plate 1) of the Study Area. SU1 is highly disturbed resulting in previous pastoral activities, demolished rubble of a residential dwelling and associated shed and various introduced plant species that have now become overgrown (Plate 2). Portions of a driveway still exist and contains a mixture of road base and conglomerate gravel (Plate 3). Surrounding the remains, the area is very flat and contains evidence of past pastoral activities by existing crop furrows and remaining rows of wheat (Plate 4). The southern portion of SU1 is a strip of land adjacent to the fence line of the residential estate. This area had been subject to disturbance by the subdivision development.

7.3.2 Survey Unit 2 – Lot 12 south west paddock.

Survey unit 2 (SU2) incorporates a portion of land that was once associated with the disused house and shed in SU1. This area contains the level plain landscape in the southern portion that gradually increases towards a lower sloped landscape in the north. There is no evidence of a built landscape in SU2 and the entire area is vegetated.

The entirety of the area was densely vegetated and comprised of surface weeds and randomly growing wheat (Plate 5). The vegetation of the area is very dense and it was difficult to discern much ground surface visibility, except in the areas immediately north of the residential subdivision that is situated to the south. No items of archaeological potential were identified in this area. In the north portion of the area a small group of dead shrubs exist amongst wheat plants and is likely to have spread from the discarded house yard in SU1 (Plate 6).

7.3.3 Survey Unit 3 – Lot 13 DP1129852

Survey unit 3 (SU3) is contained wholly within Lot 13 and incorporates the house yard extent of a rural residence and the portion of the adjacent paddock. This area is part of the lower sloped landscape. Wheat plants were sparse in this area with much of the vegetation dominated by native grasses and weeds providing moderate surface visibility in the area. Stone material in the area was comprised of scattered pebbles and broken rocks and nothing of close resemblance to stone artefacts (Plate 7). The majority of land in the area of the house yard has been subject to high levels of disturbance and modification from construction works for the house and garden (Plate 8). Current use of the paddock adjacent to the house yard is for pastoral activities as evidenced by grazing sheep at the time of the field investigation.

7.3.4 Survey Unit 4 – Lot 12 north east paddock.

Survey unit 4 (SU4) incorporates a portion of land that was once associated with the disused house and shed in SU1. SU4 incorporates the lower sloped landscape in the north decreasing to a level plain in the south. This area was densely vegetated with wheat and significant levels of high disturbance as evident by remaining crop furrows. Snakes were an extra concern in SU4 and the survey team conducted the survey transects with caution (Plate 9). Previous pastoral activities have contributed to the modification of the landscape. Ground surface visibility was very low with only a few minor areas of increased exposure similar to what was seen in SU3. These areas were inspected for the potential of archaeological items but the only material present were small rock shatters and pebbles (Plate 10).

TITLE: FIGURE 7-1 SURVEY UNITS

LOCATION: PARKES NSW

DATUM: DATUM
PROJECTION: MGA ZONE 54 (GDA 94)

DATE: 24/11/2009
PURPOSE: ARCHAEOLOGICAL ASSESSMENT

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VERSION (PLAN BY): A-A4 (LS)

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7.4 Effective Coverage

The amount of ground surface observed varies depending on factors such as soil disturbance and vegetation cover. The visibility rating and effective coverage for the Study Area was generally considered good and effective coverage for the area was between 85% and 90%. Visibility was such that pebbles and gravel were visible in low vegetation and exposures but was limited when vegetation became long and dense.

7.5 Survey Results – Aboriginal Archaeology

On conclusion of the field survey both members of the survey team (RPS HSO Archaeologist and the PHLALC Sites Officer) agreed that the area had been subject to varying degrees of disturbance and landscape modification. The Study Area comprised of a demolished house and shed, abandoned wheat crops and pastoral activity involving sheep grazing. Lot 12 incorporated the demolished residential dwellings and abandoned wheat crops and Lot 13 incorporated a portion of an existing house yard and adjacent paddock containing grazing sheep.

The vegetation of the Study Area was predominantly dense and ground surface visibility was generally considered low. Exposed areas were inspected for items of archaeological significance but no items were identified.

No items of Aboriginal or European archaeological significance were sited during the filed investigation.

7.6 Survey Results – European Historic

The Parkes region has had a strong settlement history and was initially settled as a wheat and sheep farming district and since then has thrived as a prosperous community. During the course of the field survey the Study Area was inspected for potential items of European history. Piles of domestic waste were observed in survey unit 1; these pieces appear to be of modern design containing metal sheeting, corrugated iron, wire etc.

No evidence resembling the early Parkes settlement history or other items of European cultural historical significance was observed during the field investigation.

8.0 ARCHAEOLOGICAL POTENTIAL

The following section considers the likelihood of Aboriginal and historical archaeological sites occurring across the study area and assigns a probability factor: nil; low; medium; and high.

8.1 Aboriginal Archaeological Potential

It is considered with regards to Aboriginal heritage the overall archaeological potential of the Study Area is considered to be nil to low.

Survey unit 1 in the south east portion is comprised of Lot 12 and has been excessively disturbed from historical practices. This area contained remnants of a residential dwelling and a probable shed as well as piles of sheet metal and corrugated iron. Domestic vegetation also occurs across the area and over time has grown wild. Beyond the confines of the previous residences, wheat cultivation was a common practice and this is evidenced by remaining crop furrows.

Archaeological potential for this area is nil to low.

Survey unit 2 in the west portion is a paddock associated with the previous residence in survey unit 1 and contained in Lot 12. This area is covered in abandoned wheat plants and still contains the crop furrows from when cultivation was thriving. North of this survey unit is a group of dead shrubs bushes likely to have spread from the demolished house yard.

Given the prolonged disturbance to this area the archaeological potential is considered nil to low.

Survey unit 3 in the north west portion is comprised of Lot 13 and incorporates a paddock section of an existing residence. The area is covered by native grasses and weeds making visibility through this area much clearer. This area is in use for sheep grazing and repeated action by the sheep will only add to the current disturbance.

Archaeological potential for this area is nil to low.

Survey unit 4 in the north east portion and contained within Lot 12. In the south some minor scatters of the demolished building were noted. The wheat crop was the most dense in this area offering very low visibility. The occurrence of snakes was also a concern for the survey team as surface visibility was limited to very small patches of clear ground. As this area was also a paddock associated with the previous residence the evidence of crop furrows and ground disturbance was apparent.

Archaeological potential for this area is nil to low.

8.2 European Archaeological Potential

The Study Area contained nil potential for items of European cultural significance.

9.0 ABORIGINAL ARCHAEOLOGY SIGNIFICANCE ASSESSMENT

The term 'archaeological significance' (also referred to as scientific significance) is a value allocated to Aboriginal or European heritage sites by archaeologists to help determine appropriate management strategies and mitigation recommendations for their ongoing care and management.

9.1 Archaeological Significance

The Study Area is highly disturbed and has been excessively exploited for pastoral activities and an existing rural residential development. These factors informed the decision to classify the Study Area as having nil to low archaeological significance.

In general the following can be stated:

- Survey unit 1, the level plain area containing the demolished residential waste and disused crop furrows can be considered to have nil to low significance.
- Survey units 2 and 4 can be considered to have nil to low significance. These units are densely vegetated by native weeds and wheat plants and still contain exiting crop furrows.
- Survey unit 3 is considered to have nil to low significance. This survey unit incorporates a modified portion of rural residential subdivision and an associated paddock that is currently used for sheep grazing.

9.2 Cultural Significance

This can only be determined by Aboriginal community. This section is to be completed once community feedback has been received with the responses to be located in Appendix 8.

9.3 European Historical Significance Assessment

The history of the Study Area involving the demolished house and shed, and modern pastoral activities have not been listed on the Parkes Shire Council Local Environmental Plan (LEP) list of local and regional heritage items.

The following NSW Heritage Criteria is used to assess the significance of the demolished residential dwelling.

<u>*NSW Heritage Branch Significance Assessment Criterion*</u>

Criterion (a)
An item is important in the course, or pattern, of NSW's cultural or natural history (or the cultural or natural history of the local area);
The remnants of demolished residential items and pastoral activities of the area do not satisfy this criterion.

Criterion (b)
An item has strong or special association with the life or works of a person, or group of persons, of importance in NSW's cultural or natural history (or the cultural or natural history of the local area);
The remnants of demolished residential items and pastoral activities of the area do not satisfy this criterion.

Criterion (c)
An item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW (or the local area);
The remnants of demolished residential items and pastoral activities of the area do not satisfy this criterion.

Criterion (d)
An item has strong or special association with a particular community or cultural group in NSW (or the local area) for social, cultural or spiritual reasons;
The past pastoral activities of the Study Area and the region of Parkes have a particular economic association within the community but not significant on a local or state level, therefore does not satisfy this criterion.

Criterion (e)
An item has potential to yield information that will contribute to an understanding of NSW's cultural or natural history (or the cultural or natural history of the local area);
The remnants of demolished residential items and pastoral activities of the area do not satisfy this criterion.

Criterion (f)
An item possesses uncommon, rare or endangered aspects of NSW's cultural or natural history (or the cultural or natural history of the local area);
The remnants of demolished residential items and pastoral activities of the area do not satisfy this criterion.

Criterion (g)
An item is important in demonstrating the principal characteristics of a class of NSW's; cultural or natural places; or cultural or natural environments, or a class of the local area's cultural or natural places; or cultural or natural environments.

The remnants of demolished residential items and pastoral activities of the area do not satisfy this criterion.

The remnant dwelling and yard environments do not satisfy any of the above discussed criteria and therefore there are no European heritage constraints to the proposed development.

10.0 IMPACT ASSESSMENT

The results of the detailed survey and review of environmental and archaeological data indicates that the Study Area has very little archaeological potential.

10.1 Proposed Development

The proposed development for the Study Area will incorporate the rezoning application for a residential subdivision.

The proposed subdivision development for residential allotments will cause a significant surface and sub-surface impact of the land surface across the Study Area. Given previous pastoral activities the current soil profile has been extensively disturbed.

The area would have been suitable for Aboriginal occupation in the past but subsequent land use practices such as pastoral activities have severely curtailed potentially remaining archaeological material. The field survey identified no items of Aboriginal archaeological significance.

The proposed rezoning and residential activity across the Study Area will not impact upon any Aboriginal cultural heritage sites.

No items of historical significance were identified in the Study Area during the field survey. The remaining items of a demolished residence and possible shed were assessed against the NSW Heritage Branch criteria and it is considered that the items have no heritage significance and can be removed if necessary.

11.0 RECOMMENDATIONS

The management recommendations that stem from this archaeological assessment are based on the legislation designed to address the impact of development upon sites of cultural significance.

11.1 Aboriginal Archaeological Management

No Aboriginal cultural heritage sites were located during the survey of the Study Area, however in general during the course of construction work**:**

Recommendation 1

If it is suspected Aboriginal cultural heritage material has been encountered, work should cease immediately. The NSW Department of Environment, Climate Change and Water (DECCW) and PHLALC should be notified. Works should only recommence when an appropriate and approved management strategy has been agreed to by all of the relevant stakeholders.

Recommendation 2

In the event that skeletal remains are uncovered, work is to stop in the vicinity immediately and the NSW Coroner's Office and NSW Police contacted. If skeletal remains are deemed to be of Aboriginal origin, a representative of the local Aboriginal Community (PHLALC) and the DECCW are to be contacted.

11.2 European Heritage

No European cultural heritage sites were located during the survey of the Study Area. During the course of construction work**;**

Recommendation 3

If, during the course of clearing work, significant European cultural heritage material is uncovered work should cease in that area immediately. The NSW Heritage Branch should be notified and works only recommence when an appropriate and approved management strategy instigated.

12.0 REFERENCES

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13.0 PLATES

Plate 1: View looking west of the level plain area across SU1.

Plate 2: View facing west of SU1 with demolished house and shed.

Plate 3: Road base and conglomerate gravel on driveway remains.

Plate 4: Previous pastoral activities as evidenced by remaining crop furrows.

Plate 5: View facing Danilenko Street showing dense wheat vegetation.

Plate 6: North of SU2 facing north east with dead shrubs surrounded by wheat plants.

Plate 7: View of scattered pebbles and broken rocks in SU3.

Plate 8: Previous disturbance and modification works in the house yard of SU3.

Plate 9: View facing east in SU4. Area is densely vegetated with very low ground surface visibility.

APPENDIX 1

Legislative Requirements

SUMMARY OF STATUTORY CONTROLS

The following overview of the legal framework is provided solely for information purposes for the client, it should not be interpreted as legal advice. RPS Harper Somers O'Sullivan will not be liable for any actions taken by any person, body or group as a result of this general overview, and recommend that specific legal advice be obtained from a qualified legal practitioner prior to any action being taken as a result of the summary below.

COMMONWEALTH

Aboriginal and Torres Strait Islander Heritage Protection Act 1984 (ATSIHP Act), Amendment 2006

The purpose of this Act is to preserve and protect all heritage places of particular significance to Aboriginal and Torres Strait Islander people. This Act applies to all sites and objects across Australia and in Australian waters (s4).

It would appear that the intention of this Act is to provide national baseline protection for Aboriginal places and objects where State legislation is absent. It is not to exclude or limit State laws (s7(1)). Should State legislation cover a matter already covered in the Commonwealth legislation, and a person contravenes that matter, that person may be prosecuted under either Act, but not both (s7(3)).

The Act provides for the preservation and protection of all Aboriginal objects and places from injury and/or desecration. A place is construed to be injured or desecrated if it is not treated consistently with the manner of Aboriginal tradition or is or likely to be adversely affected (s3).

THE AUSTRALIAN HERITAGE COMMISSION ACT 1975

The Australian Heritage Commission Act 1975 established the Australian Heritage Commission which assesses places to be included in the National Estate and maintains a register of those places. Places maintained in the register are those which are significant in terms of their association with particular community or social groups and they may be included for social, cultural or spiritual reasons. The Act does not include specific protective clauses.

The Australian Heritage Council Act 2003 together with The Environment Protection and Biodiversity Conservation Act 1999 (Amended) includes a National Heritage List of places of National heritage significance, maintains a Commonwealth Heritage List of heritage places owned or managed by the Commonwealth and ongoing management of the Register of the National Estate.

STATE

It is incumbent on any land manager to adhere to legislative requirements that protect Aboriginal culture heritage in NSW. The relevant legislation includes but is not limited to:

National Parks & Wildlife Act 1974 (NPW Act), Amended 2001.

The DECC issued their Interim Community Consultation Requirements in January 2005 to replace all previous consultation guidelines that related to Part 6 of the NPW Act 1974. The requirement of the guidelines is for the proponent, or consultant for the proponent, to contact the Local Aboriginal Land Council(s), Registrar of Aboriginal Owners, Native Title Services, local councils and the DECC, to request contact information for any/all potential Aboriginal people/groups with an ancestral interest in the cultural heritage of the project area.

The NPW Act provides statutory protection for all Aboriginal relics (not being a handicraft made for sale), with penalties levied for breaches of the Act. Part 6 of this Act is the relevant part concerned Aboriginal objects and places, with the Section 86 and Section 90 being the most pertinent:

Section 91: Under Section 91 of the Act it stipulates that a person who is aware of unregistered Aboriginal sites must report these to the DECC, regardless of the land status (Freehold, leasehold, Crown land).

Section 90: "A person who, without first obtaining the consent of the Director-General, knowingly destroys, defaces or damages, or knowingly causes or permits the destruction or defacement of or damage to, an Aboriginal object or Aboriginal place is guilty of an offence against this Act." Under s.5 of the Act "object" means any deposit, object or material evidence (not being a handicraft made for sale) relating to Aboriginal habitation of the area. This applies to habitation both prior to and concurrent with the occupation of that area by persons of non Aboriginal extraction, and includes Aboriginal remains.

Section 87: Preliminary Research Permits issued under Section 87 of the Act, allow the permit holder to conduct investigations of areas considered to be potential sites for the purpose of research, and also for conservation work associated with known sites.

Impact Permits issued under Section 90 of the Act are for salvaging sites prior to ground disturbance works associated with construction. Any disturbance, damage or destruction of Aboriginal sites, known or unknown, is considered to contravene the NPW Act (1974) and the DECC will pursue the person/company responsible.

Penalties under these two sections are currently 50 penalty units, or 6 months in gaol, or both for an individual and 200 penalty units for a corporation. The DECC record all S.87 and S.90 permits issued in order to manage Aboriginal sites and ensure representative samples of sites are left in situ for future generations. In order to achieve this, the DECC need to be made aware of all Aboriginal sites located in NSW.

Section 86: This section of the Act states that "A person, other than the Director-General or a person authorised by the Director-General in that behalf, who:

(a) disturbs or excavates any land, or causes any land to be disturbed or excavated, for the purpose of discovering an Aboriginal object,

(b) disturbs or moves on any land an Aboriginal object that is the property of the Crown, other than an Aboriginal object that is in the custody or under the control of the Australian Museum Trust,

(c) takes possession of an Aboriginal object that is in a national park, historic site, state conservation area, regional park, nature reserve, karst conservation reserve or Aboriginal area,

(d) removes an Aboriginal object from a national park, historic site, state conservation area, regional park, nature reserve, karst conservation reserve or Aboriginal area, or

(e) erects or maintains, in a national park, historic site, state conservation area, regional park, nature reserve, karst conservation reserve or Aboriginal area, a building or structure for the safe custody, storage or exhibition of any Aboriginal object,

except in accordance with the terms and conditions of an unrevoked permit issued to the person under section 87, being terms and conditions having force and effect at the time the act or thing to which the permit relates is done, is guilty of an offence against this Act."

Section 84: Aboriginal places of traditional significance (that may or may not contain archaeological material) are given protection under Section 84 of the NPW Act. To be an Aboriginal place for the purposes of this Act, this is a place that, in the opinion of the Minister, is or was of special significance with respect to Aboriginal culture.

ENVIRONMENTAL PLANNING & ASSESSMENT ACT 1979 (EP&A ACT)

This Act regulates a system of environmental planning and assessment for New South Wales. Land use planning requires that environmental impacts are considered, including the impact on cultural heritage and specifically Aboriginal heritage. Within the EP&A Acts, Parts III, IV, and V relate to Aboriginal heritage.

Part III regulates the preparation of planning policies and plans. Part IV governs the manner in which consent authorities determine development applications and outlines those that require an environmental impact statement. Part V regulates government agencies that act as determining authorities for activities conducted by that agency or by authority from the agency. The National Parks & Wildlife Service is a Part V authority under the EP&A Act.

In brief, the NPW Act provides protection for Aboriginal objects or places, while the EP&A Act ensures that Aboriginal cultural heritage is properly assessed in land use planning and development.

Part 3A of the EPA relates to major projects, and if applicable, obviates the need to conform to other specific legislation. In particular, s75U of the EPA Act explicitly removes the need to apply for s87 or s90 permits under the NPW Act. This means that although Aboriginal cultural heritage is considered during the planning process, a permit is not required to disturb or destroy an Aboriginal object or place. However, the Director-General of Planning must nonetheless consult with other government agencies, including DECC and National Parks & Wildlife, prior to any decision being made.

THE HERITAGE ACT 1977

This Act protects the natural and cultural history of NSW with emphasis on non-Aboriginal cultural heritage through protection provisions and the establishment of a Heritage Council. Although Aboriginal heritage sites and objects are primarily protected by the National Parks & Wildlife Act 1974 (NPW Act), Amended 2001, if an Aboriginal site, object or place is of great significance, it may be protected by a heritage order issued by the Minister subject to advice by the Heritage Council.

Other legislation of relevance to Aboriginal cultural heritage in NSW includes the NSW Local Government Act (1993). Local planning instruments also contain provisions relating to Aboriginal heritage and development conditions of consent.

APPENDIX 2

AHIMS Registered Sites

AHIMS Aboriginal Heritage Information Management System

Department of Environment & Climate Change NSW

List of Sites (List - Short)

Parkes Area

Grid Reference Type = AGD (Australian Geodetic Datum), Zone = 55, Easting From = 601442, Easting to = 621442, Northing From = 6323735, Northing to = 6343735, Requestor like 8307%, Service ID = 27750, Feature Search Type = AHIMS Features

Site ID	Site Name	Datum	Zone	Easting	Northing	Context	Site Features	Site Types (recorded prior to June 2001	Recording (Primary)	Reports (Catalogue Number)	State Arch. Box No (for office use only)
43-2-0016	Tottenham Road;	AGD	55	613400	6334700	Open Site	TRE : -	Scarred Tree	**Bluff**		NRS/17798/1/281
		Status Valid									
		Primary Contact							Permit(s)		
43-2-0017	Kirrabee Lodge;	AGD	55	615500	6338600	Open Site	TRE : -	Scarred Tree	**Bluff**		NRS/17798/1/281
		Status Valid									
		Primary Contact							Permit(s)		
43-2-0018	Goobang Creek;	AGD	55	616000	6340000	Open Site	TRE : -	Scarred Tree	**Bluff**		NRS/17798/1/281
		Status Valid									
		Primary Contact							Permit(s)		
43-3-0002	Parkes;	AGD	55	609622	6332556	Open Site	TRE : -	Carved Tree	**ASRSYS**	65	NRS/17798/1/281
		Status Valid									
		Primary Contact							Permit(s)		
43-3-0008	LV 1;	AGD	55	605530	6330507	Open Site	TRE : -	Scarred Tree	**Mary Dallas Consulting Archaeologists**	1327, 1411	NRS/17798/1/281
		Status Valid									
		Primary Contact							Permit(s)		
43-3-0009	LV 2;	AGD	55	604896	6329861	Open Site	TRE : -	Scarred Tree	**Mary Dallas Consulting Archaeologists**	1327, 1411	NRS/17798/1/281
		Status Valid									
		Primary Contact							Permit(s)		
43-3-0010	LV 3;	AGD	55	604805	6329860	Open Site	TRE : -	Scarred Tree	**Mary Dallas Consulting Archaeologists**	1327, 1411	NRS/17798/1/281
		Status Valid									
		Primary Contact							Permit(s)		
43-3-0011	LV 4;	AGD	55	604721	6329037	Open Site	TRE : -	Scarred Tree	**Mary Dallas Consulting Archaeologists**	1327, 1411	NRS/17798/1/281
		Status Valid									
		Primary Contact							Permit(s)		

List of Sites (List - Short)

Parkes Area

Grid Reference Type = AGD (Australian Geodetic Datum), Zone = 55, Easting From = 601442, Easting to = 621442, Northing From = 6323735, Northing to = 6343735, Requestor like 8307%, Service ID = 27750, Feature Search Type = AHIMS Features

Site ID	Site Name	Datum	Zone	Easting	Northing	Context	Site Features	Site Types (recorded prior to June 2001	Recording (Primary)	Reports (Catalogue Number)	State Arch. Box No (for office use only)
43-3-0012	LV 5;	AGD	55	604721	6329037	Open Site	TRE : -	Scarred Tree	**Mary Dallas Consulting Archaeologists**	1327, 1411	NRS/17798/1/281
		Status	Valid								
		Primary Contact							Permit(s)		
43-3-0013	LV 6;	AGD	55	604731	6328032	Open Site	TRE : -	Scarred Tree	**Mary Dallas Consulting Archaeologists**	1327, 1411	NRS/17798/1/281
		Status	Valid								
		Primary Contact							Permit(s)		
43-3-0014	LV 7;	AGD	55	604731	6328032	Open Site	TRE : -	Scarred Tree	**Mary Dallas Consulting Archaeologists**	1327, 1411	NRS/17798/1/281
		Status	Valid								
		Primary Contact							Permit(s)		
43-3-0015	LV 8;	AGD	55	604731	6328032	Open Site	TRE : -	Scarred Tree	**Mary Dallas Consulting Archaeologists**	1327, 1411	NRS/17798/1/281
		Status	Valid								
		Primary Contact							Permit(s)		
43-3-0016	LV 9;	AGD	55	604175	6328849	Open Site	TRE : -	Scarred Tree	**Mary Dallas Consulting Archaeologists**	1327, 1411	NRS/17798/1/281
		Status	Valid								
		Primary Contact							Permit(s)		
43-3-0017	LV 11;	AGD	55	604902	6329313	Open Site	TRE : -	Scarred Tree	**Mary Dallas Consulting Archaeologists**	1327, 1411	NRS/17798/1/281
		Status	Valid								
		Primary Contact							Permit(s)		
43-3-0018	site 1;	AGD	55	608250	6338870	Open Site	AFT : -	Open Camp Site	**Brayshaw**	2584, 98332	NRS/17798/1/281
		Status	Valid								
		Primary Contact							Permit(s)		
43-3-0019	site 2;	AGD	55	607920	6340060	Open Site	AFT : -	Open Camp Site	**Brayshaw**	2584, 98332	NRS/17798/1/281
		Status	Valid								
		Primary Contact							Permit(s)		

List of Sites (List - Short)

Parkes Area

Grid Reference Type = AGD (Australian Geodetic Datum), Zone = 55, Easting From = 601442, Easting to = 621442, Northing From = 6323735, Northing to = 6343735, Requestor like 8307%, Service ID = 27750, Feature Search Type = AHIMS Features

Site ID	Site Name	Datum	Zone	Easting	Northing	Context	Site Features	Site Types (recorded prior to June 2001	Recording (Primary)	Reports (Catalogue Number)	State Arch. Box No (for office use only)
43-3-0058	MD49	AGD	55	604900	6325440	Open Site	TRE : -	None	Navin Officer Heritage Consultants Pty Ltd		NRS/17798/1/282
		Status	Valid								
		Primary Contact							Permit(s)		
43-3-0059	PH3-1	AGD	55	608250	6335000	Open Site	TRE : -	None	Comber	98880	NRS/17798/1/282
		Status	Valid								
		Primary Contact							Permit(s)		
43-3-0060	PH2	AGD	55	606000	6332150	Open Site	TRE : 3	None	Comber	98880	NRS/17798/1/282
		Status	Valid								
		Primary Contact							Permit(s)		
43-3-0061	PH1-1	AGD	55	607200	6329350	Open Site	TRE : 1	None	Comber	98880	NRS/17798/1/282
		Status	Valid								
		Primary Contact							Permit(s)		
43-3-0062	Parkes 1	AGD	55	610100	6331100	Open Site	AFT : 2	None	Comber		NRS/17798/1/282
		Status	Valid								
		Primary Contact							Permit(s)		
43-3-0063	Parkes 2- IF	AGD	55	610250	6331100	Open Site	AFT : 1	None	Comber		NRS/17798/1/282
		Status	Valid								
		Primary Contact							Permit(s)		
43-3-0065	PST-3	AGD	55	610672	6342979	Open Site	TRE : 4	None	Appleton		
		Status	Valid								
		Primary Contact							Permit(s)		
43-3-0066	PST-4	AGD	55	610564	6342392	Open Site	TRE : 1	None	Appleton		
		Status	Valid								
		Primary Contact							Permit(s)		

List of Sites (List - Short)

Parkes Area

Grid Reference Type = AGD (Australian Geodetic Datum), Zone = 55, Easting From = 601442, Easting to = 621442, Northing From = 6323735, Northing to = 6343735, Requestor like 8307%, Service ID = 27750, Feature Search Type = AHIMS Features

Site ID	Site Name	Datum	Zone	Easting	Northing	Context	Site Features	Site Types (recorded prior to June 2001	Recording (Primary)	Reports (Catalogue Number)	State Arch. Box No (for office use only)
43-3-0067	PST 2	AGD	55	610880	6343315	Open Site	TRE : -	None	**Appleton**		
		Status	Valid								
		Primary Contact							Permit(s)		
43-3-0080	Parkes P1	GDA	55	603525	6336275	Open Site	TRE : -	None	**Navin Officer Heritage Consultants Pty Ltd**		
		Status	Valid								
		Primary Contact		Navin Officer Heritage Consultants Pty Ltd					Permit(s)		
43-3-0082	P2.	GDA	55	603464	6336084	Open Site	TRE : 1	None	**Navin Officer Heritage Consultants Pty Ltd**		
		Status	Valid								
		Primary Contact		Navin Officer Heritage Consultants Pty Ltd					Permit(s)		
43-3-0089	Parked Manildra-Scarred Tree 1	GDA	55	616299	6324129	Open Site	TRE : -	None	**OzArk Cultural Heritage Management**		
		Status	Valid								
		Primary Contact							Permit(s)		
43-4-0018	MD 33	AGD	55	604720	6324450	Open Site	TRE : -	Scarred Tree	**Officer**		NRS/17798/1/282
		Status	Valid								
		Primary Contact							Permit(s)		
43-4-0019	MD 50	AGD	55	604900	6325380	Open Site	TRE : -	Scarred Tree	**Officer**		NRS/17798/1/282
		Status	Valid								
		Primary Contact							Permit(s)		

APPENDIX 3

Aboriginal Consultation Log

Date	Description	Contact Method	Outcome
21/09/09	RPS HSO Laraine Nelson (Archaeologist) to Peak Hill Local Aboriginal Land Council (PHLALC) requesting Site Officer for proposed survey on either 23/09/09 or 24/09/09.	Email	No response from PHLALC.
22/09/09	RPS HSO contacted PHLALC and notified of the upcoming survey at Parkes. RPS HSO informed that dates have changed but final dates not yet confirmed.	Phone	PHLALC expressed a Sites Officer would be available when survey is due. PHLALC said OK to email PHLALC CEO the information.
23/09/09	RPS HSO contacted Cherie Keed CEO PHLALC to inform of proposed field survey and location and approximate date.	Email	No response from PHLALC.
19/10/09	RPS HSO contacted Cherie Keed CEO PHLALC with date and details for the field survey fro Wednesday 28th October.	Email	A couple of days later RPS HSO was able to get hold of Cherie Keed. Cherie Keed confirmed the survey date and the site officer who will be representing the work.
22/10/09	RPS HSO informed PHLALC of sites officer insurance requirements for the survey (change of survey time) and invoice details for completion of work.	Email	PHLALC sent through valid insurances via fax.
28/10/09	Philippa Sokol RPS HSO Archaeologist contacted PHLALC Sites Officer to double check that they are aware of the survey being postponed from 10:00am to 10:30am.	Phone	Sites Officer answered and confirmed they will meet RPS at 10:30am.
03/12/09	RPS HSO Administration posted hard copy of the CHIA Report and accompanying letter to PHLALC for review and comment.	Mail	Awaiting comments from PHLALC.
16/12/09	Anna Nardis RPS HSO called PHLALC reception and Cherie Keed (PHLALC CEO) mobile for report comments.	Phone	Left voice mail on Cherie Keed mobile and no answer at land council reception.
18/12/09	Anna Nardis RPS HSO called reception PHLALC for report comments.	Phone	PHLALC reception answered and RPS HSO was informed Cherie Keed on holidays and returning 6th January 2010. Cherie Keed mobile was called but mobile did not

			answer.
21/12/09	Anna Nardis RPS HSO called reception PHLALC to see if anyone else can sign off on the report.	Phone	RPS HSO was informed that Cherie Keed is the only person to sign off on reports.
05/01/2010	Philippa Sokol RPS HSO contacted PHLALC to add extension to closing date for report comments.	Email	Awaiting a response from Cherie Keed CEO PHLALC.
08/01/2010	Anna Nardis RPS HSO called reception PHLALC for report comments and chase up sent from RPS HSO on 5/1/10.	Phone	PHLALC reception phone was not answered and Cherie Keed mobile did not answer.
11/01/2010	Anna Nardis RPS HSO called reception PHLALC reception and Cherie Keed (PHLALC CEO) mobile for report comments.	Phone	PHLALC reception phone was not answered and Cherie Keed mobile did not answer.

APPENDIX 4

Glossary of Site Types

GLOSSARY OF SITE TYPES

The following is a brief description of most Aboriginal site types.

Artefact Scatters

Artefact scatters are defined by the presence of two or more stone artefacts in close association (i.e. within fifty metres of each other). An artefact scatter may consist solely of surface material exposed by erosion, or may contain sub-surface deposit of varying depth. Associated features may include hearths or stone-lined fireplaces, and heat treatment pits.

Artefact scatters may represent:

- Camp sites: involving short or long-term habitation, manufacture and maintenance of stone or wooden tools, raw material management, tool storage and food preparation and consumption;
- Hunting or gathering activities;
- Activities spatially separated from camp sites (e.g. tool manufacture or maintenance); or
- Transient movement through the landscape.

The detection of artefact scatters depends upon conditions of surface visibility, including vegetation cover, ground disturbance and recent sediment deposition. Unfavourable conditions obscure artefact scatters and prevent their detection during surface surveys.

Bora Grounds

Bora grounds are a ceremonial site associated with initiations. They are usually comprise two circular depressions in the earth, and may be edged with stone. Bora grounds generally occur on soft sediments in river valleys, although they may also be located on high, rocky ground in association with stone arrangements.

Burials

Human remains were often placed in hollow trees, caves or sand deposits and may have been marked by carved or scarred trees. Burials have been identified eroding out of sand deposits or creek banks, or when disturbed by development. The probability of detecting burials during archaeological fieldwork is extremely low.

Culturally Modified Trees

Culturally modified trees include scarred and carved trees. Scarred trees are caused by the removal of bark for use in manufacturing canoes, containers, shields or shelters. Notches were also carved in trees to permit easier climbing. Scarred trees are only likely to be present on mature trees remaining from original vegetation. Carved trees, the easiest to identify, are caused by the removal of bark to create a working surface on which engravings are incised. Carved trees were used as markers for ceremonial and symbolic purposes, including burials. Although, carved trees were relatively common in NSW in the early 20th century, vegetation removal has rendered this site type extremely rare. Modified trees, where bark was removed for often domestic use are less easily identified. Criteria for identifying modified trees include: the age of the tree; type of tree (the bark of many trees is not suitable, also introduced species would be unlikely subjects); axe marks (with the need to determine the type of axe - stone or steel – though Aborigines after settlement did use steel); shape of the scar (natural or humanly scarred); height of the scar above the ground (reasonable working height with consideration given to subsequent growth).

Fish Traps

Fish traps comprised arrangements of stone, branches and/or wickerwork placed in watercourses, estuaries and along coasts to trap or permit the easier capture of sea-life.

Grinding Grooves

Grinding grooves are elongated narrow depressions in soft rocks (particularly sedimentary), generally associated with watercourses, that are created by the shaping and sharpening of ground-edge implements. To produce a sharp edge the axe blank (or re-worked axe) was honed on a natural stone surface near a source of water. The water was required for lubricating the grinding process. Axe grinding grooves can be identified by features such as a narrow short groove, with greatest depth near the groove centre. The grooves also display a patina developed through friction between stone surfaces. Generally a series of grooves are found as a result of the repetitive process.

Isolated Finds

Isolated finds occur where only one artefact is visible in a survey area. These finds are not found in apparent association with other evidence for prehistoric activity or occupation. Isolated finds occur anywhere and may represent loss, deliberate discard or abandonment of an artefact, or may be the remains of a dispersed artefact scatter. Numerous isolated finds have been recorded within the study area. An isolated find may flag the occurrence of other less visible artefacts in the vicinity or may indicate disturbance or relocation after the original discard.

Middens

Shell middens comprise deposits of shell remaining from consumption and are common in coastal regions and along watercourses. Middens vary in size, preservation and content, although they often contain artefacts made from stone, bone or shell, charcoal, and the remains of terrestrial or aquatic fauna that formed an additional component of Aboriginal diet. Middens can provide significant information on land-use patterns, diet, chronology of occupation and environmental conditions.

Mythological / Traditional Sites

Mythological and traditional sites of significance to Aboriginal people may occur in any location, although they are often associated with natural landscape features. They include sites associated with dreaming stories, massacre sites, traditional camp sites and contact sites. Consultation with the local Aboriginal community is essential for identifying these sites.

Rock Shelters with Art and / or Occupation Deposit

Rock shelters occur where geological formations suitable for habitation or use are present, such as rock overhangs, shelters or caves. Rock shelter sites generally contain artefacts, food remains and/or rock art and may include sites with areas of potential archaeological deposit, where evidence of rock-art or human occupation is expected but not visible. The geological composition of the study area greatly increases the likelihood for rock shelters to occur.

Stone Arrangements

Stone arrangements include lines, circles, mounds, or other patterns of stone arranged by Aboriginal people. These may be associated with bora grounds, ceremonial sites, mythological or sacred sites. Stone arrangements are more likely to occur on hill tops and elevated terrace crests that contain stone outcrops or surface stone, where impact from recent land use practices has been minimal.

Stone Quarries

A stone quarry is a place at which stone resource exploitation has occurred. Quarry sites are only located where the exposed stone material is suitable for use either for ceremonial purposes (e.g. ochre) or for artefact manufacture.

APPENDIX 5

NSW Heritage Branch Significance Criteria

Heritage Council of New South Wales

Heritage Act 1977

CRITERIA FOR LISTING ON THE STATE HERITAGE REGISTER

The State Heritage Register is established under Part 3A of the Heritage Act (as amended in 1998) for listing of items of environmental heritage[1] which are of state heritage significance[2].

To be assessed for listing on the State Heritage Register an item will, in the opinion of the Heritage Council of NSW, meet one or more of the following criteria[3]:

a) an item is important in the course, or pattern, of NSW's cultural or natural history;

b) an item has strong or special association with the life or works of a person, or group of persons, of importance in NSW's cultural or natural history;

c) an item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW;

d) an item has strong or special association with a particular community or cultural group in NSW for social, cultural or spiritual reasons;

e) an item has potential to yield information that will contribute to an understanding of NSW's cultural or natural history;

f) an item possesses uncommon, rare or endangered aspects of NSW's cultural or natural history;

g) an item is important in demonstrating the principal characteristics of a class of NSW's
- cultural or natural places; or
- cultural or natural environments.

An item is not to be excluded from the Register on the ground that items with similar characteristics have already been listed on the Register.

---

[1] ***environmental heritage*** means those places, buildings, works, relics, moveable objects, and precincts, of state or local heritage significance (section 4, *Heritage Act, 1977*).

[2] ***state heritage significance***, in relation to a place, building, work, relic, moveable object or precinct, means significance to the State in relation to the historical, scientific cultural, social, archaeological, architectural, natural or aesthetic value of the item (section 4A(1), *Heritage Act, 1977*).

[3] Guidelines for the application of these criteria may be published by the NSW Heritage Office.

APPENDIX 6

Aboriginal Community Comments

Appendix C

LOT 12 PRELIMINARY SITE INVESTIGATION

Preliminary Site Investigation, proposed subdivision of Lot 607, Renshaw-McGirr Way, Parkes, New South Wales

Report No 404069

Report to K & H Construction Services

October 2004

Environmental & Earth Sciences NSW

Sydney
PO Box 380
North Sydney NSW 2059
Australia
Ph: 61 2 9922 1777
Fax: 61 2 9922 1010

Mudgee
PO Box 1196
Mudgee NSW 2850
Australia
Ph: 61 2 6372 4222
Fax: 61 2 6372 4233

Canberra
PO Box 1434
Wodon ACT 2606
Australia
Ph: 61 2 6288 4566
Fax: 61 2 6288 4569

ACN 109 404 006 Glaeba (02) Pty Ltd trading as

Environmental & Earth Sciences

NSW

Contaminant Soil Science & Hydrogeology

7 October 2004

K & H Construction Services Pty Ltd
19A May Street
Parkes NSW 2870

Attention: **John Kennedy**

Dear John,

Re: Preliminary Site Investigation, proposed subdivision of Lot 607, Renshaw-McGirr Way, Parkes, NSW.

Environmental & Earth Sciences Pty Ltd is pleased to present a copy of our report No. 404069 titled *Preliminary Site Investigation, proposed subdivision of Lot 607, Renshaw-McGirr Way, Parkes, NSW.*

If you have, any problems concerning this letter or would like to discuss any issues, please do not hesitate to call the undersigned on 02 6372 4222.

Yours sincerely
Environmental & Earth Sciences Pty Ltd

p.p. **Amie Blackman**
Environmental Scientist
rep04/404069.doc

p.p. **Internal Reviewer**
Stuart Brisbane
Senior Soil Scientist

Phone: (02) 9922 1777
Fax: (02) 9922 1010
PO Box 380
North Sydney NSW 2059

Soil is the Foundation of Life
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Phone: (02) 6372 4222
Fax: (02) 6372 4233
Lot 2, Byron Place
PO Box 1196
Mudgee NSW 2850

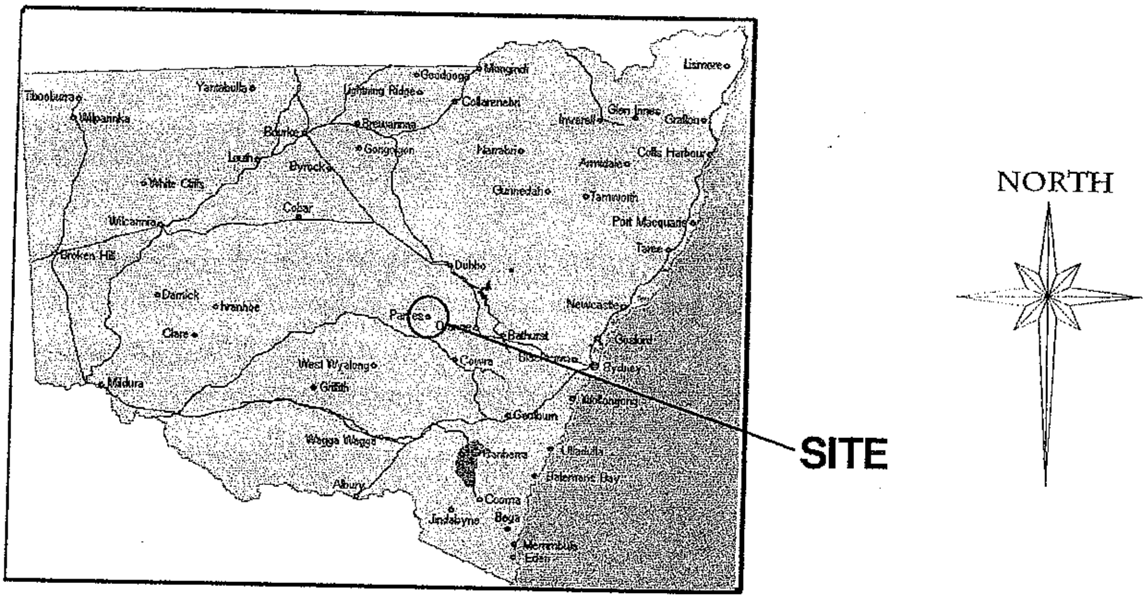
TABLE OF CONTENTS

1.0 INTRODUCTION

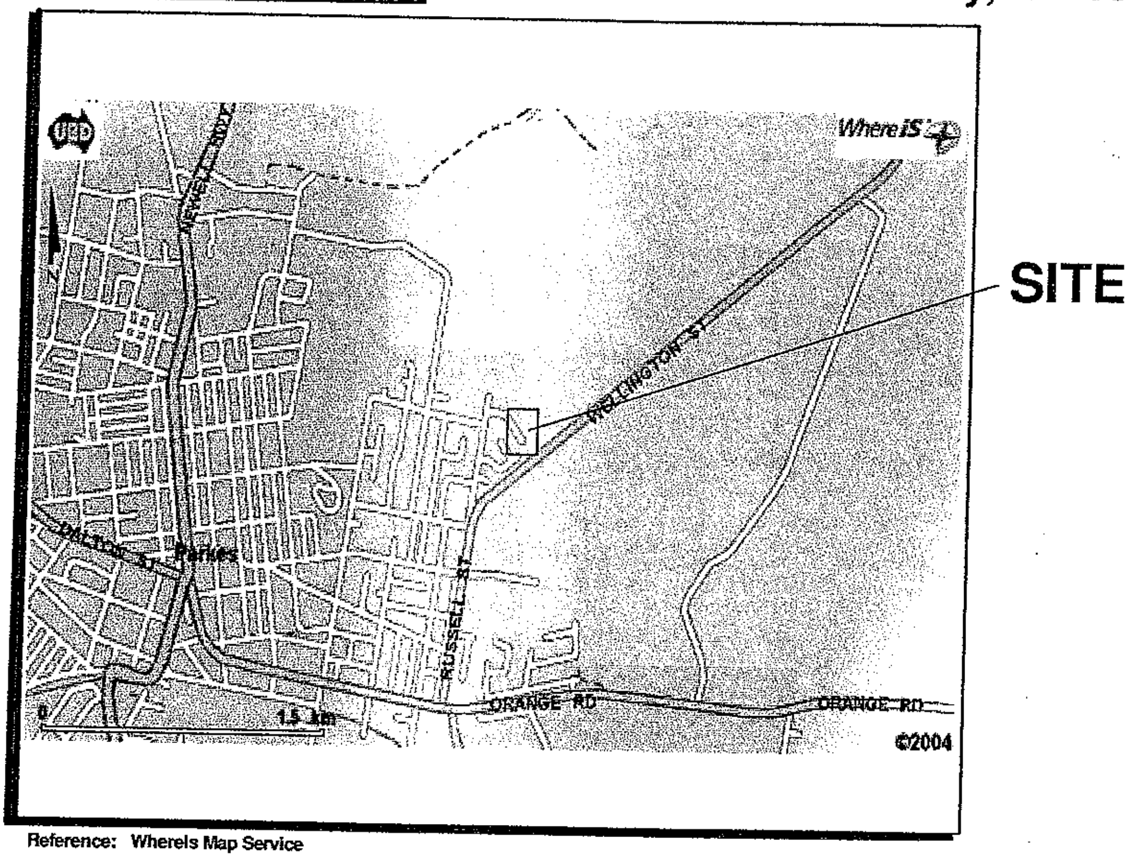
Environmental & Earth Sciences NSW was requested by John Kennedy of K & H Constructions Services to assess the potential for contamination for the proposed subdivision of the site known as Lot 607, Renshaw-McGirr Way, Parkes, NSW. See Figure 1 for site location.

The investigation was undertaken in accordance with a Stage I site investigation, as stated in the NSW EPA *Contaminated Sites: Guidelines for consultants reporting on contaminated sites* (1997).

Environmental & Earth Sciences NSW is not responsible for variations due to alterations of site conditions or chemistry since the time of inspection, for example, through illegal dumping.



Site Location: Lot 607 Renshaw-McGirr Way, Parkes



Reference: WhereIs Map Service

Client: K & H Construction		Job No. 404069
Title: Locality Plan	Drawn by: TRJ Project Manager: AB	Fig. 1
Location: Lot 607 Renshaw-McGirr Way, Parkes, NSW	Approved:	Date: 6 Oct.2004

Job No. 404069 Revision: ....

2.0 OBJECTIVE

The objectives of this investigation were to estimate the extent of contamination (if any) caused by site activities, past or present, and to any further works or remedial works required for the proposed development.

The scope of works included a site inspection, historical review and issue of letter report.

3.0 HISTORICAL REVIEW

It is understood that the site had been cleared of remnant vegetation since 1923 and has since been used for agricultural and residential purposes. However, historical records (land title documents) indicate that a killing yard was located in the north western corner of the site in 1923.

Two aerial photographs taken during the period 1965 to 1983 were studied as part of the historical review. A list of the photographs is presented below in Table 1.

TABLE 1

AERIAL PHOTOGRAPHS

Year	Run	Map No	Series
1965	3-4	1342	Parkes
1983	2	3296	Parkes

The 1965 aerial photograph showed that the site was located on the outskirts of the Parkes township in a rural subdivision. The site consisted of a number of grazing/cropping paddocks and what appeared to be a small orchard. However given the scale of the photograph, it was difficult to distinguish the age and type of trees present. A residence was observed off Renshaw-McGirr Way which was surrounded by a number of large trees. No sheds or associated yards could be found across the site and no disturbed soil or excavation/tipping activities could be delineated from the aerial photograph.

In the 1983 aerial photograph the orchard had been removed and it appeared a small shed had been built at the rear of the residence. No sheep or cattle yards could be observed near the shed. All surrounding paddocks were still cleared and appeared to be used for grazing and cropping. As in the 1965 aerial photograph, no indication in the 1983 photograph could be seen to indicate that the site may have been previously contaminated from either the importation of fill and/or waste materials.

4.0 FIELD INVESTIGATIONS

On 15 September 2004, Environmental and Earth Sciences conducted a site inspection at the site. The site was bounded by Renshaw-McGirr Way (also known as Wellington Road) to the east and Danilenko Street to the west. Residential lots were observed to the immediate north and south of the site. The site and surrounding features observed at the time of inspection are presented in Figure 2.

The western portion of the site was relatively flat with an estimated slope to the south of <5%. The eastern portion was slightly steeper, falling away to the south east with slope of approximately 8%. Groundcover was approximately 95% and consisted of improved pasture and broadleaf weeds. The pasture appeared to be healthy, however bare patches were observed in the north and south-western corners of the western portion of the site. It is believed that these were due to trampling by cattle and horses as feeders/waterers were located in these areas. As such, the bare soil patches are not considered a contamination concern.

The site had been cleared of most native tree vegetation, although some young trees were present along the fence lines. It is understood that the site has been previously cultivated which explains the lack of remnant vegetation. All trees and shrub vegetation on and directly surrounding the site was observed to be in healthy condition at the time of inspection.

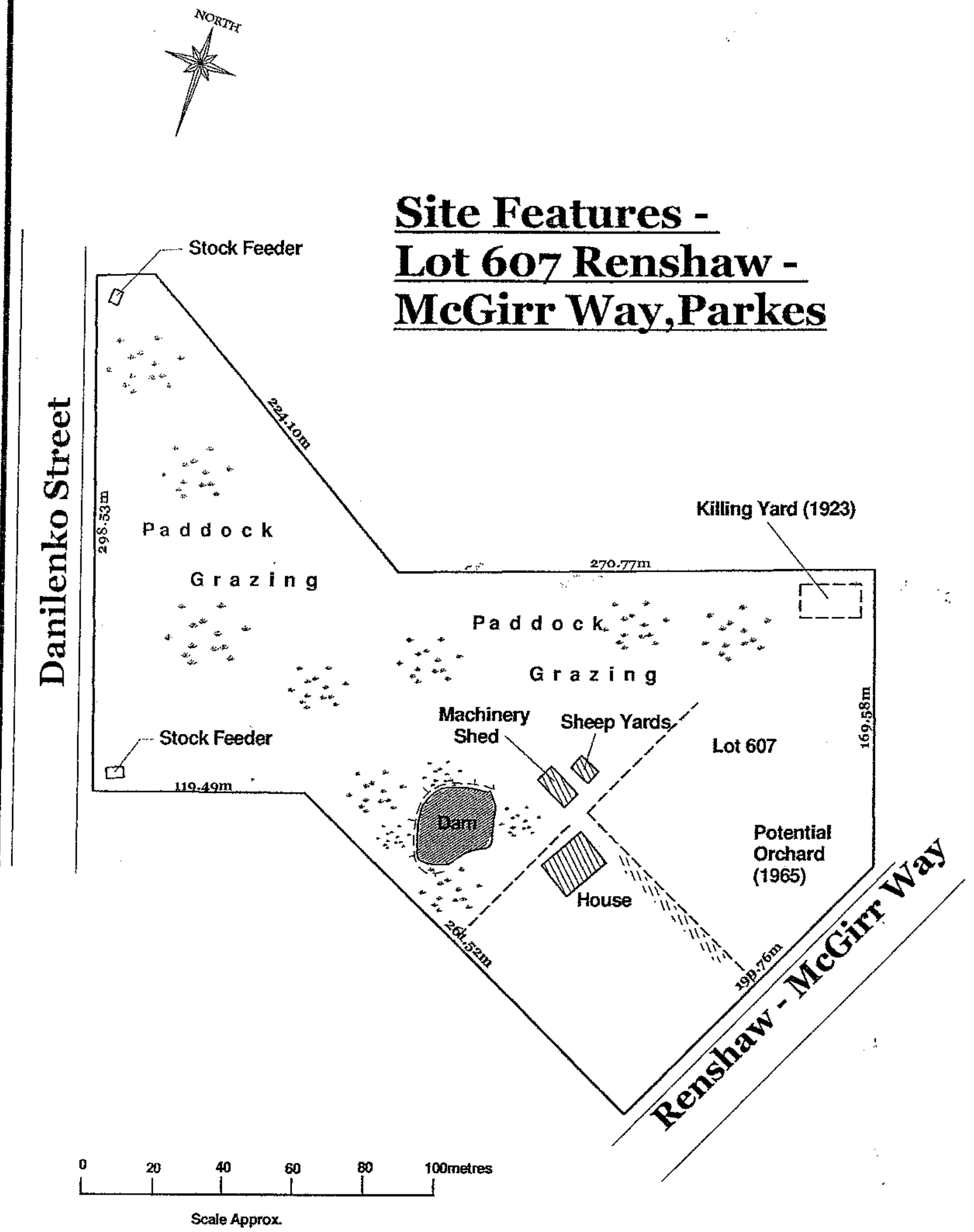
Surface soils consisted of reddish brown clay loam which was slightly moist and indicative of the soils within the local region. Surface cobbles and occasional brick pieces were observed in the western portion of the site, however no other evidence of contaminated fill was associated with this material. No visual or olfactory evidence of contamination was encountered in this area surrounding grazing paddocks.

At the time of the inspection most of the site was currently being used for grazing horses and cattle, except for the residence and associated sheds towards the south of the site which had access from Renshaw-McGirr Way. No evidence of the past killing yard could be found to indicate that contamination was present associated with past slaughtering activities.

The residence consisted of a single storey dwelling located in south eastern corner of the site (Figure 2) which was surrounded by mature trees. Nearby the residence was a machinery shed and large dam. The machinery shed was constructed of corrugated iron and was partially open at one end. Adjacent to the shed to the west were a small set of sheep yards which contained a race and portable cradle with hardstand floor. The yards were observed to be in a dilapidated condition and appeared to be unused for some time. No sheep dips or sheep showers were found during the walkover however the area around the shed and yards was considerably overgrown

In addition, old machinery, corrugated iron water tanks and drums were present within the house yard.

Site Features - Lot 607 Renshaw - McGirr Way, Parkes



Job No. 404069 Revision:

Client:	K & H Construction	Job No. 404069	
Title:	Site Features	Drawn by: TRJ Project Manager: AB	Fig. 2
Location:	Lot 607 Renshaw-McGirr Way, Parkes, NSW	Approved:	Date: 6 Oct.2004

5.0 DISCUSSION

Potential contamination across the site would be expected to be low to moderate considering that the site had been used for grazing, cropping and an orchard. As a result, the potential chemicals of concern are:

— heavy metals and organochlorines which may have been used for pesticides in the orchard;

— total petroleum hydrocarbons (TPH) and polycyclic aromatic hydrocarbons (PAH) associated with spilt lubricating fluids/fuels, used in the farm machinery; and

— heavy metals and organochlorines associated with sheep dipping activities.

Previous Environmental & Earth Sciences studies and experience have shown that broad scale application of arsenic based compounds and organochlorines used as pesticides in orchards did not significantly affect the soil (Reference 1). However, pesticide filling and washdown points can be areas of high contaminant concentrations and these areas should be targeted during any investigation. No such filling or wash points were apparent such as a bore or stand pipe to suggests that this could be a concern across the site.

No major oil/fuel staining or contamination was visible around the old machinery or drums to indicate potential contamination from TPHs and PAHs.

While sheep yards were noted during the investigation, a sheep dip or sheep shower was not observed. It is therefore unlikely that contamination is present from previous sheep dipping activities.

6.0 CONCLUSION

Environmental & Earth Sciences NSW was requested by John Kennedy of K & H Constructions Services to assess the potential for contamination of the site known as Lot 607, Renshaw-McGirr Way, Parkes, NSW.

No evidence of killing yards, the catalyst for this investigation, was noted during the site inspection.

The site was once used for an orchard and also contained farm machinery and fuel/oils. As such the site has a low potential to be contaminated through the use of arsenate based pesticides and organochlorine pesticides. However past experience with such sites has shown that broad scale application of pesticides in the past did not significantly affect the soil (Reference 4). Also no evidence could be found such as oil or fuel staining to indicate that TPH or PAH contamination was present.

Although sheep yard were found on-site no evidence could be detected to suggests that a sheep dip or shower were once used on-site.

The site may therefore be considered suitable for the proposed development however, this conclusion is based on a visual inspection only with no sampling or analysis. As such, it is recommended that if potential contamination is discovered during development works, a detailed investigation be conducted by an environmental scientist.

7.0 LIMITATIONS

The work presented in this report is Environmental & Earth Sciences NSW's response to the specific scope of work, planned with and approved by K & H Construction Services. Professional advice and opinion provided in this report no. 404069 is for K & H Construction Services requesting the work only, in accordance with the agreed scope of work and is not to be relied on by any other third party for any and all purposes except with the prior written consent of Environmental & Earth Sciences NSW (which consent may or may not be given at its discretion).

Advice and interpretation is provided on the basis that subsequent site work will be undertaken by Environmental & Earth Sciences NSW. Should other parties be engaged to implement recommendations made by Environmental & Earth Sciences, or undertake further environmental work on site, Environmental and Earth Sciences is not responsible for how the information in this report is used by those other parties or any other party including statutory appointed environmental auditors.

A report is provided inclusive of all documentation sections, tables, figures and appendices and should not be provided or copied in part without all supporting documentation for any reason, because misinterpretation may occur.

Undertaking an environmental site assessment (ESA) or validation study will reduce exposure to the risk of the presence of contaminated soil and/or groundwater. However no ESA or validation study can completely eliminate the risk. Even a rigorous professional assessment and/or sampling program may not detect all contaminated areas within a site. Contaminants may be present in areas that were not surveyed or sampled, or may migrate to areas which did not contain evidence of impact when investigated. Contaminant analysis cannot cover every type of contaminant that could possibly be present. Samples are analysed for contaminants considered likely to be present based on available information regarding past activities at the site. When combined with field observations, field measurements and professional judgement, this approach maximises the probability of identifying contaminated soil and/or groundwater. However, it may not identify contaminants present in unexpected locations and/or originating from unexpected sources such as buried or illegally dumped waste materials. Although Environmental & Earth Sciences has assessed the site using a recognised statistical approach, it must be acknowledged that it is possible that undiscovered contaminated soil and/or groundwater could be present beneath the site.

Site assessments and validation studies identify actual sub-surface conditions only at those points where samples are taken, when they are taken. Data obtained from the sampling and subsequent laboratory analyses are interpreted by geologists, engineers or scientists and opinions are presented regarding the overall sub-surface conditions, the nature and extent of contaminated soil and/or groundwater, the likely impact on any proposed development and appropriate remediation measures. Actual conditions between sampling locations may differ from those inferred because no professional, no matter how qualified, and no sub-surface exploration program, no matter how comprehensive, can reveal what is hidden below the ground surface. The actual interface between materials may be far more gradual or abrupt than an assessment indicates. Actual conditions in areas not sampled may differ from that predicted. Nothing can be done to prevent the unanticipated. However, steps can be taken to help minimise the impact. For this reason, site owners should retain the services of Environmental & Earth Sciences NSW throughout the development stage of the project in order to identify variances, maintain consistency in how data is interpreted, conduct additional tests that may be necessary and to recommend solutions to problems encountered on site. Failure to do so will mean that advice in this report cannot be relied upon by any party.

The investigation and remediation of contaminated sites is a field in which legislation and interpretation of legislation by government departments is changing rapidly. Whilst every attempt is made by Environmental & Earth Sciences NSW to keep up to date with changes to policy and procedures and the interpretation of the changes, our interpretation of the investigation findings should not be taken to be that of the relevant authority. When approval from a statutory authority is required for a project, that approval should be directly sought.

Sub-surface conditions can change by natural processes and site activities. This report presents the conditions assessed at the time the investigation/validation study was undertaken. Consequently, project decisions should not be based on environmental site assessment or validation data that may have been affected by time. The consultant should be requested to advise if additional testing is required.

This site has been assessed/validated for a particular proposed or existing land use based on the limitations of the scope of works. No warranty or guarantee is made in regard to any other use, only to the depth tested. Fill, soil, groundwater and rock to the depth tested on the site may be fit for the specified use, but may not be suitable for classification as clean fill, if disposed of off site. No party can rely upon this report to classify material for offsite disposal unless it is clearly stated that offsite disposal classification has been undertaken.

Disclaimer

The preparation of this report has been undertaken for the purpose of providing the results of a preliminary investigation of the proposed subdivision of Lot 607, Renshaw-McGirr Way, Parkes, NSW and it is not intended that this report should be used for any other purpose. This report is provided on the condition that Environmental & Earth Sciences NSW disclaims all liability to any person or entity other than K & H Construction Services in respect of anything done or omitted to be done and of the consequence of anything done or omitted to be done by any such person in reliance, whether in whole or in part, of the contents of this report. Furthermore, Environmental & Earth Sciences disclaims all liability to K & H Construction Services in respect of anything done or omitted to be done and of the consequence of anything done or omitted to be done by any such person in reliance, whether in whole or any part of the contents of this report and according to Environmental & Earth Sciences general terms and conditions and specials terms and conditions for contaminated sites.

8.0 REFERENCES

1. Australian and New Zealand Environment and Conservation Council/National Health and Medical Research Council (1992) — *Australian and New Zealand guidelines for the assessment and management of contaminated sites.*
2. King, D. P. (1988), — *Soil Landscapes of the Forbes 1:250 000 Sheet Report.* Department of Land and Water Conservation, Sydney.
3. NSW Environment Protection Authority (1997) — *Guidelines for consultants reporting on contaminated sites.*
4. Stuckey & Valley (1998). *Organochlorine pesticide concentration and surface soils of Western Sydney former market gardens.*

Appendix D

LOT 13 PRELIMINARY SITE INVESTIGATION

Preliminary contamination assessment

Lot 13 DP1129852 Danilenko Street, Parkes NSW

Ref: R9289c
Date: 21 October 2009

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Environmental
Geotechnical
Hygienist
Auditing
Services

Prepared by:	Envirowest Consulting Pty Ltd 24 William Street Orange NSW 2800
Client:	I & SB Developments Pty Ltd c/- Geolyse Pty Ltd PO Box 1963 Orange NSW 2800
Assessor:	Leah Desborough BNatRes (Hons) Environmental Scientist
Authorising Officer:	Greg Madafiglio PhD Senior Environmental Scientist
Interested authorities:	Parkes Shire Council
Report number:	R9289c
Date:	21 October 2009

Executive summary

Background
A change in land-use is proposed for Lot 13 DP1129852, Danilenko Street, Parkes. The land-use will change from rural to residential. Parkes Shire Council have requested a preliminary contamination investigation to determine suitability for the proposed residential land-use.

Objectives of the investigation
A preliminary site investigation of Lot 13 DP1129852, Danilenko Street, Parkes was conducted in accordance with the contaminated land management planning guidelines State Environmental Planning Policy No. 55 (SEPP 55) to determine the soil contamination status of the site and suitability for residential land-use.

Investigation and conclusions
An inspection of the site was made on 1 October 2009. The site is in a rural setting on the outskirts of the city of Parkes. It has an area of 1.921 hectares. Surface cover on the site consisted of pasture species, brassica species, clover and Paterson's curse.

Land-use on the site has been rural for the past 80 years. Rural land-use consisted of grazing and cropping.

The contamination status of the site was assessed from a desktop study and site inspection. No soil samples were collected for laboratory analysis.

Several soil and timber stockpiles were identified on the site on the day of inspection. The stockpiles are from on-site excavations.

Several 200L drums and tyres are located on the site along fence lines and have been used as tree guards.

Abandoned wooden stock yards consisting of a loading ramp and pen are located in the adjacent lot along the north western boundary of the investigation area. No stock dips are located in this area.

Site history did not indicate contaminating activities on the site. No evidence of contamination was detected in the site inspection. There is no evidence of mines, sheep dips, orchards or contaminating industrial activities on the site from the review of site history or site walkover.

Recommendations
The site is considered suitable for residential land-use from the desktop study and site inspection.

Soil and timber stockpiles, fill and tree guards should be removed from the site and appropriately disposed prior to the start of development works.

Contents

1. Scope of work

Envirowest Consulting Pty Ltd was commissioned by Geolyse Pty Ltd on behalf of I & SB Developments Pty Ltd, to undertake a preliminary contamination investigation, in accordance with the contaminated land management planning guidelines State Environmental Planning Policy No. 55 (SEPP 55) to determine the soil contamination status of Lot 13 DP1129852, Danilenko Street, Parkes NSW. The objective was to identify past potentially contaminating activities, identify potential contamination types, discuss the site condition and assess the need for further investigation.

2. Introduction

A change in land-use is proposed for Lot 13 DP1129852, Danilenko Street, Parkes. The land-use will change from rural to residential. The site is currently vacant with sheep grazed in the south eastern corner. Former land-use of the site was agricultural for stock grazing and cropping. Parkes Shire Council have requested a preliminary contamination investigation to determine suitability for residential land-use.

A desktop study and a review of the available history were undertaken of the site. A walkover and site inspection for evidence of contamination from past activities was conducted on 1 October 2009. No soil samples were collected for laboratory analysis.

3. Site identification

Address	Lot 13 DP1129852 Danilenko Street Parkes NSW
Owner(s)	I & SB Developments Pty Ltd
Deposited plans	Lot 13 DP1129852
Australian Map Grid	UTM Zone 55H, E611358m, N633885m
Locality map	Figure 1
Aerial photograph	Figure 2
Site plan	Figure 3
Photograph(s)	Figure 4
Area	Approximately 1.921ha

4. Site history

4.1 Zoning

The zoning of the site is 1(a) rural. The proposed zoning is 2(v) urban and village.

4.2 Land-use

The site is currently vacant. The south eastern corner of the site contained grazing sheep. Former land-use was as agriculture for grazing and cropping.

4.3 Summary of council records

No information on contamination on the site was available from Parkes Shire Council

4.4 Sources of information
Site inspection 31 October 2009 by Leah Desborough
Parkes Shire Council records
Topographic map of area (Parkes 1:50,000 CMA of NSW)
NSW EPA records of public notices under the CLM Act 1997
Review of aerial photographs 1965, 1983, 2006 and 2008
Previous report on part of the site by Environmental & Earth Sciences

4.5 Chronological list of site uses
The site is expected to have been cleared in 1923 and has been used for agriculture, consisting of grazing and cropping, since this time.

No orchards, mines, sheep dips or contaminating industrial activities are known to have been located on the site from the site inspection and site history.

4.6 Buildings and infrastructure
No buildings were located on the day of inspection. No buildings were observed on the historical aerial photographs reviewed.

Several stock fences were located across the site.

One stock watering trough is located in the eastern section of the site.

4.7 Chemicals associated with site use
Herbicides would have been applied in general farm management and these are not persistent in the soil. No other chemical or contaminant is expected to have been applied in general farm management.

4.8 Relevant complaint history
Nil

4.9 Contaminated site register
The site is not listed on the NSW EPA register of contaminated sites.

4.10 Previous investigations
A Preliminary Site Investigation of neighbouring Lot 607 Renshaw-McGirr Way, Parkes NSW was undertaken by Environmental and Earth Sciences in October 2004. Lot 607 has since been subdivided and small sections included in the investigation form part of the subject site. The investigation concluded the site was suitable for the residential development based on the historical review and site inspection.

4.11 Neighbouring land-use
North – Rural-residential, rural
South – Rural, residential
East – Rural, rural residential
West – Danilenko Street, Rural

4.12 Integrity assessment
The site history was obtained from a site inspection and history review. The information is consistent with the current site condition and to the best of the assessor's knowledge is accurate.

5. Site condition and environment
5.1 Surface cover
Surface cover on the site consisted of pasture species including of clover, wild oats and barley grass. Some broad-leaved species were identified including Paterson's curse and brassica.

5.2 Topography
The lot consists of a gently inclined mid-slope with an inclination of 4%. The site has a predominantly southerly aspect.

5.3 Soils and geology
The site is within the Parkes Soil Landscape (King 1998). The site is dominated by red earths comprising topsoil of a dull reddish brown sandy loam and subsoil of reddish brown sandy clay loam. The soil landscape has low fertility and is susceptible to erosion. Vegetation cover was good on the site and no erosion was observed.

The geological unit is Cotton Formation, Burrandong Creek Member and Parkes Volcanics. Parent rock ranges from sedimentary sequences of siltstones, chert, conglomerates, sandstones and limestones to volcanic sandstones and intermediate volcanic (King 1998).

5.4 Water
5.4.1 Surface water
Surface water flows to the south and south east into Goobang Creek located approximately 2km from the site.

5.4.2 Groundwater
No bores are known to be located on the site. A search of the NSW Natural Resource Atlas identified one bore within 500m of the site. The bore is located approximately 440m across slope and east of the site. The bore was constructed to 54m in 2003 and had a standing water level of 33m. No other bores are located within 500m of the site.

5.5 Evidence of contamination checklist

Site layout showing industrial processes	None present
Sewer and service plans	None known
Manufacturing processes	None known
Underground tanks	None known
Product spills and loss history	None known, no pesticide mixing or storage areas on the site
Discharges to land, water and air	None known
Disposal locations, presence of drums, wastes and fill materials	Drums and tyres located along fence lines and were used as tree guards.
Soil staining	Nil

Visible signs of plant stress, bare areas	Nil
Odours	Nil
Ruins	Nil
Other	-

6. Sampling analysis plan and sampling methodology

No soil samples collected

7. Results and discussion

7.1 Historical review

It is expected the site was cleared of native vegetation in 1923 at the same time as land to the south and south east.

The 1965 aerial photograph shows that the site is located on the north east outskirts of Parkes in a rural area. The site consisted of grazing and cropping paddocks. A road (Danilenko Street) is located along the western boundary of the site.

The topographic map for the area is based on 1973 aerial photography with field revision in 1977. A road (Danilenko Street) is located along the western boundary of the site. No other topographical features such as dams, roads or buildings are depicted on the site.

The 1983 aerial photograph shows that the site is located on the north east outskirts of Parkes in a rural area. Land-use appears to be grazing. The fence along the south west boundary is identifiable as are several trees or shrubs along the fence line. A building is located to the north west in the adjoining lot.

The 2006 aerial photograph does not identify any new features on the site. The fence along the south west boundary is identifiable as are several trees or shrubs along the fence line. The fence in the south eastern section is identifiable.

The 2008 aerial photograph shows that part of the site in the north has been impacted by fill expected to be from the construction of a new dwelling in the adjacent lot to the north. The majority of the trees and shrubs along the south western boundary have been removed. The fences along the south west boundary and in the south eastern section of the site are identifiable.

7.2 Site inspection

Several stockpiles were observed on the site. A small soil stockpile was identified in the northern section of the site (Figure 3). The stockpile was in close proximity to the effluent absorption trench associated with the rural-residential lot to the north and may have been residual soil from trench construction.

Three stockpiles were identified which contained tree and shrub branches and pieces of timber (Figure 3). Trees and shrubs identified in the 2006 aerial photograph had been removed on the day of inspection and are expected to be the content of these stockpiles.

Several tyres and 200L drums with the base and tops removed are located along the south western boundary (Figure 3). These tyres and drums are expected to have been imported to the site empty and were used as tree guards.

The fill identified in the 2008 aerial photograph in the north of the site has been placed to form a level vehicle parking/turning/driveway for the lot to the north (Figure 3). The fill is expected to have come from on-site during levelling of the pad for the dwelling.

Yards consisting of a loading ramp and holding pen are located along the northern boundary in the adjoining lot (Figure 3). The yards are expected to have been used for loading and unloading of stock on the site. No chemical use is expected to have been associated with the yards.

The on-site effluent management system for the dwelling to the north is approximately 6m from the boundary for the subject site (Figure 3). It is expected the 6m buffer will be sufficient to prevent off-site impacts of the absorption system.

The site history and inspection did not indicate contaminating activities occurring on the site therefore sampling was not undertaken and is not recommended.

8. Site characterisation

8.1 Environmental contamination

No soil contamination is expected from the historical review or site inspection.

8.2 Chemical degradation production

Not applicable as no contamination is expected.

8.3 Exposed population

Not applicable as no contamination is expected.

9. Conclusions and recommendations

9.1 Summary

An inspection of the site was made on 1 October 2009. The site is in a rural setting on the outskirts of the city of Parkes. It has an area of 1.921 hectares. Surface cover on the site consisted of pasture species, brassica species, clover and Paterson's curse.

Land-use on the site has been rural for the past 80 years. Rural land-use consisted of grazing and cropping.

The contamination status of the site was assessed from a desktop study and site inspection. No soil samples were collected for laboratory analysis.

Several soil and timber stockpiles were identified on the site on the day of inspection. The stockpiles are expected to contain material sourced from on-site or from the adjacent rural-residential lot to the north.

Several 200L drums and tyres are located on the site along fence lines and are expected to have been used as tree guards.

Site history did not indicate contaminating activities on the site. No evidence of contamination was detected in the site inspection. There is no evidence of mines, sheep dips, orchards or contaminating industrial activities on the site from the review of site history or site walkover.

9.2 Assumptions in reaching the conclusions

An accurate history has been obtained and typical past farming practices were adopted.

9.3 Suitability for proposed use of the site

The site is suitable for residential land-use based on the findings of this investigation.

9.4 Limitations and constraints on the use of the site

No constraints are recommended.

9.5 Recommendation for further work

Soil and timber stockpiles, fill and tree guards should be removed from the site and appropriately disposed prior to the start of development works.

If potential contamination is discovered during site works, a soil sampling and analysis investigation should be undertaken by a suitably qualified person.

10. Report limitations and intellectual property

This report has been prepared for the use of the client to achieve the objectives given the clients requirements. The level of confidence of the conclusion reached is governed by the scope of the investigation and the availability and quality of existing data. Where limitations or uncertainties are known, they are identified in the report. No liability can be accepted for failure to identify conditions or issues which arise in the future and which could not reasonably have been predicted using the scope of the investigation and the information obtained.

The investigation identifies the actual subsurface conditions only at those points where samples are taken, when they are taken. Data derived through sampling and subsequent laboratory testing is interpreted by geologists, engineers or scientists who then render an opinion about overall subsurface conditions, the nature and extent of the contamination, its likely impact on the proposed development and appropriate remediation measures. Actual conditions may differ from those inferred to exist, because no professional, no matter how well qualified, and no sub-surface exploration program, no matter how comprehensive, can reveal what is hidden by earth, rock or time. The actual interface between materials may be far more gradual or abrupt than a report indicates. Actual conditions in areas not sampled may differ from predictions. It is thus important to understand the limitations of the investigation and recognise that we are not responsible for these limitations.

This report, including data contained and its findings and conclusions, remains the intellectual property of Envirowest Consulting Pty Ltd. A licence to use the report for the specific purpose identified is granted for the persons identified in that section after full payment for the services involved in preparation of the report. This report should not be used by persons or for purposes other than those stated, and should not be reproduced without the permission of Envirowest Consulting Pty Ltd.

11. References

Environment Protection Authority (1995) *Contaminated sites: Sampling Design Guidelines* (NSW Environment Protection Authority, Chatswood)

Environment Protection Authority (2002) *Draft Contaminated Sites: Guidelines for the NSW Site Auditors Scheme* (NSW Environment Protection Authority, Chatswood)

King DP (1998) *Soil Landscapes of the Forbes 1:250,000 Sheet Report* (Department of Land & Water Conservation, Sydney)

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Figures

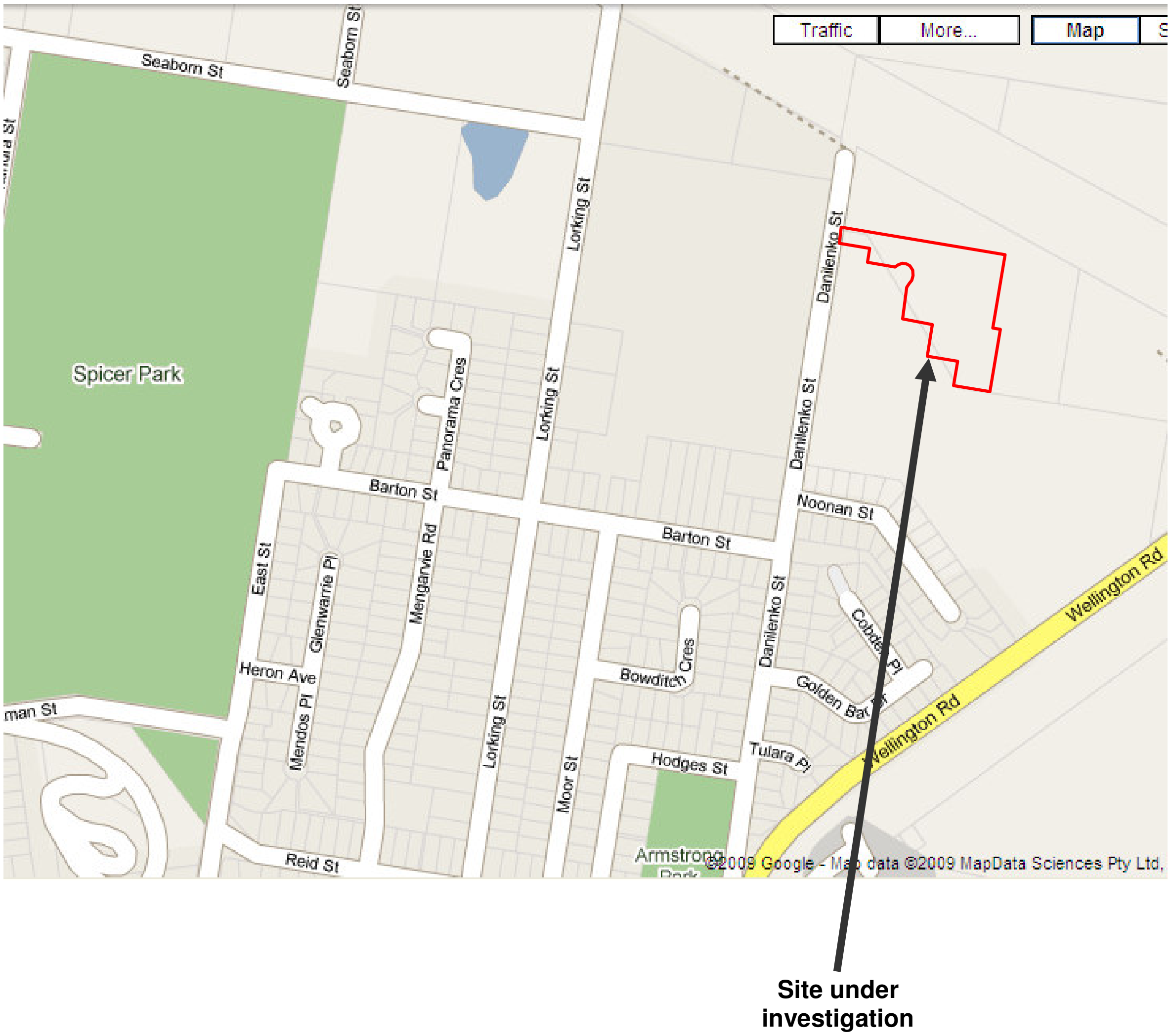


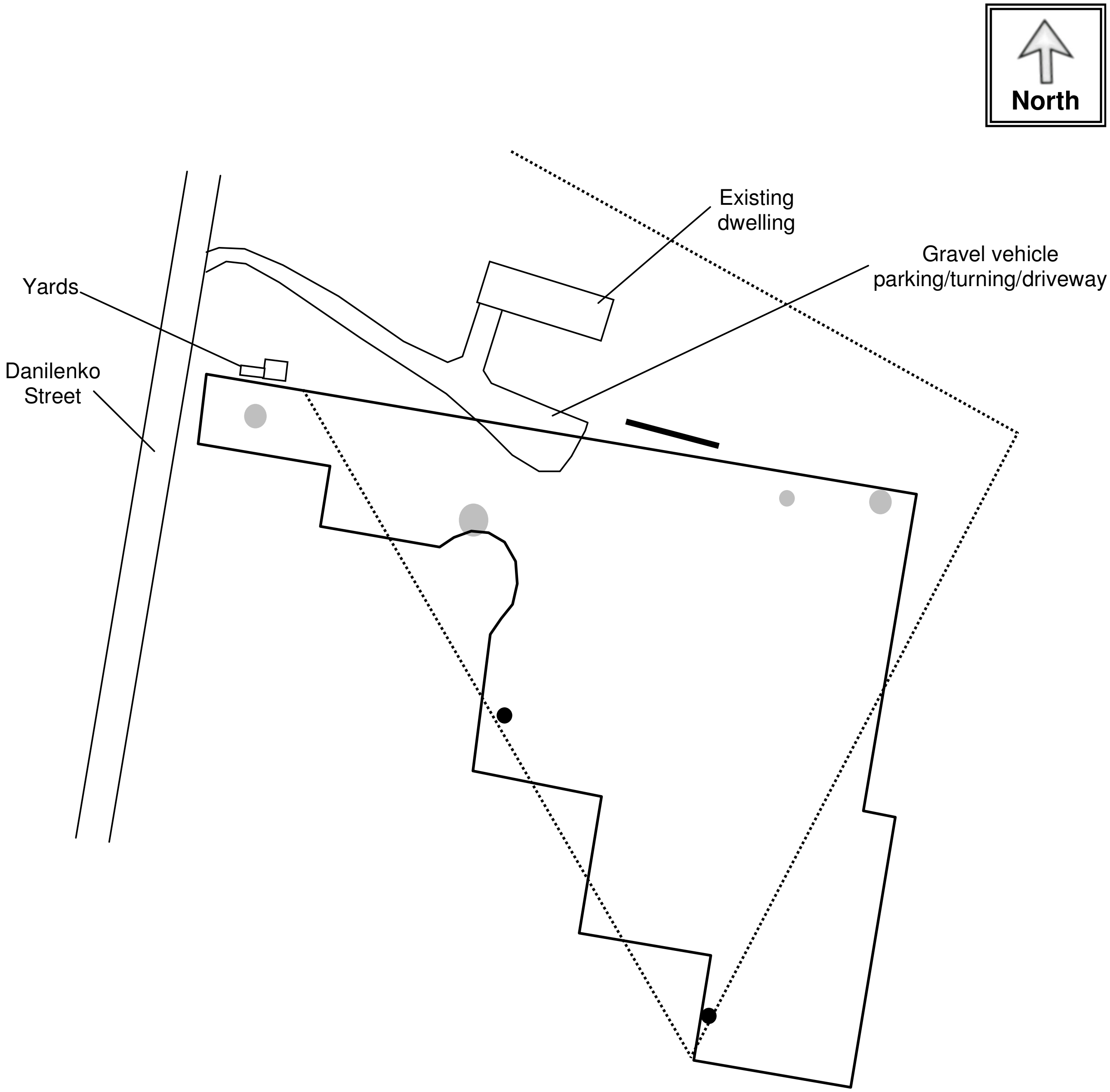
Figure 1: Locality map	
Lot 13 Danilenko Street, Parkes NSW	
	Envirowest Consulting Pty Ltd
Job – R9289c	Drawn by: LD / Date: 15/10/2009

Figure 2: Aerial photograph of the site

Lot 13 Danilenko Street, Parkes NSW

Envirowest Consulting Pty Ltd

Job – R9289c | Drawn by: LD | Date: 15/10/2009



Legend

- Lot boundary
- Existing fence
- Stockpile
- Tree guards
- Absorption trench

Approximate Scale 1: 1800

0 18 36 72m

Figure 3. Site plan		
Lot 13 Danilenko Street, Parkes NSW		
	Envirowest Consulting Pty Ltd	
Job – R9246-4c	Drawn by: LD	Date: 15/10/2009

Figure 4. Photographs of the site taken 8 April 2008

Photograph taken from the northern boundary of the lot looking south

Photograph taken from the western boundary looking east

Timber stockpile in north eastern section of lot

Absorption trench on adjacent lot to north

Appendix E

CONCEPT STORMWATER MANAGEMENT PLAN

PROPOSED SUBDIVISION
LOT 607, DP 750179
DENILENKO STREET AND WELLINGTON ROAD
PARKES NSW
FOR Mr. I DICHNAJ

CONCEPT STORMWATER MANAGEMENT PLAN

November 2004

Prepared by:

Civil Design and Modelling

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Civil Design and Modelling

CONTENTS

Civil Design and Modelling

PROPOSED SUBDIVISION – GOLDENBAR ESTATE
DENILENKO STREET/WELLINGTON ROAD, PARKES NSW
CONCEPT STORMWATER MANAGEMENT

Purpose

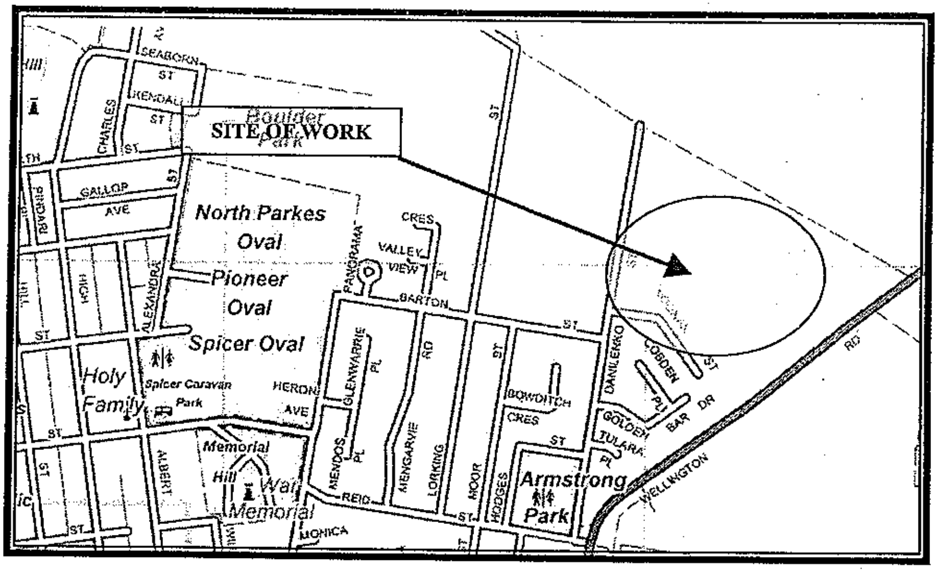
This Report is provided to determine the strategies involved in managing the increased stormwater run-off

Introduction

The proposed subdivision comprises 106 lots of residential blocks situated between Denilenko Street and the Wellington Road, Parkes.

The development site is currently rural grasslands on the eastern side of the town boundaries. Currently zoned as "rural", the developer is proposing to seek a rezoning from council in order to develop into residential area.

Locality Sketch



STORMWATER MANAGEMENT

Philosophy

Stormwater management involves the routing of runoff from severe storm events to minimise the impact upon developments, people, natural drainage courses and erosion and degradation of soil and vegetation.

Generally two storm events are considered, 1in5yr Average Return Interval (ARI) and a 1in100yr ARI. The 1in5yr storm is attempted to be captured in underground drainage systems, whereas with the 1in100yr event, we look at the potential overland flow route.

This stormwater management report deals with the calculations undertaken to determine the discharges involved in both storm events and the likely impact upon the proposed development. These discharges are used in sizing of pipe networks and determination of overland flow routing.

In this particular case, the 1in5yr pipe network was not sized in detail, as the major concern at present is the routing of the Major flood event. The issue of on-site detention of stormwater was also investigated in order to minimise the impact on existing drainage network.

Existing Drainage Network

Currently a stormwater system runs off Noonan Street to the southern side of the proposed new development. This includes a pipe network system discharging into a significant drainage channel, which flows east, underneath Wellington Road through a 2 cell 525mm dia RCPC.

The 2 cell pipe culvert is located at a low point of Wellington road in a natural drainage stream. Water then flows east to Billabong Creek.

The existing site generally falls southeast at an average slope of 3%. Currently discharge from the site is to a tabledrain along the western side of the Wellington Road, finding its way to the above mentioned 2 cell 525mm dia culvert.

Rainfall Data

- Intensity Frequency Data (IFD) for Parkes NSW were developed as per Australian Rainfall and Run-off (AR&R).
- Storm Duration: 20min
- Intensity: 113mm/hr (1in100yr)
- Catchment area: 10.73ha

General Outcome

Interallotment Drainage:

Interallotment drainage is required to service all Lots that do not drain freely to the proposed road network. This includes Lots 15 – 31, 77-85 and 98-100.

- Drainage Pits to be 600 x 600mm, 100mm thick concrete walls with depressed grated lid.
- Minimum pipe to be used is 225mm PVC.
- Minimum grade is 1.0%.

Road Drainage

The new road will run downward following the existing land, generally at a 3% grade, a low point being induced at the southern extent of the development. Roadways will be sealed and kerbed on both sides.

An underground pipe network will be developed to cater for a 1in5yr storm event, whilst a major 1in100yr event will adequately catered for in the road cross sectional area.

Routing of overland flow will be to the southern corner of the develop, discharging to the existing.

1 in 5yr Event

At this concept stage of development, detailed analysis of the 1in5yr event has not been undertaken

1 in 100yr

Analysis of discharges which may be expected from a 1in100 year were calculated in order to determine the routing of the increased stormwater runoff due to the development. It was considered that the existing culvert, which is carrying stormwater underneath Wellington Road, is currently running at or close to capacity and that in large storm events the road is overtopped. Therefore investigation of options that do not impact on the existing system were looked at.

For this event two distinct scenarios were investigated;

1. Capturing discharge in an open channel and piping underneath Wellington Road through a separate culvert.
2. Onsite detention of stormwater, allowing discharges similar to current levels into the downstream system.

Results

For a 1in100yr storm of 20min duration the following data was calculated;

Land Use	Intensity (mm/hr)	Discharge (m^3/s)
Pasture	112.86	0.6677
Developed	112.86	2.0031

Summary for Subcatchment 1: Catch1

Runoff = 0.6677 m³/s @ 0.33 hrs, Volume= 0.808 M, Depth= 8 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-5.00 hrs, dt= 0.01 hrs
Rainfall Duration=20 min, Inten=113 mm/hr

Area (ha)	C	Description
10.7300	0.20	

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
20.0	500.0		0.42		**Direct Entry, Direct**

Summary for Subcatchment 1: Catch1

Runoff = 2.0031 m³/s @ 0.33 hrs, Volume= 2.425 M, Depth= 23 mm

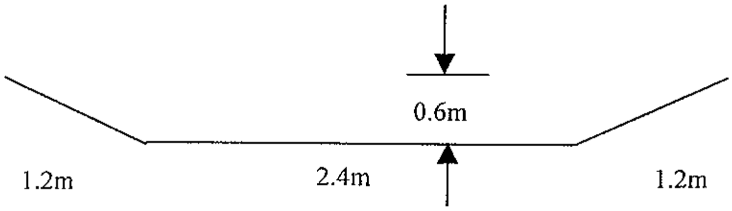
Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-5.00 hrs, dt= 0.01 hrs
Rainfall Duration=20 min, Inten=113 mm/hr

Area (ha)	C	Description
10.7300	0.60	

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m³/s)	Description
20.0	500.0		0.42		**Direct Entry, Direct**

Scenario 1 : Separate Culvert

Runoff and pipe system discharge to a grassed swale of the following dimensions;



This was then routed to a culvert under Wellington Road, designed to take the entire discharge and not allow any topping of the road.

Calculations provided the following results;

Summary for Pond 4P: Culvert

[57] Hint: Peaked at 333.675 m (Flood elevation advised)

Inflow Area =	10.7300 ha, Inflow Depth = 23 mm		
Inflow =	1.9843 m³/s @	0.34 hrs, Volume=	2.425 M
Outflow =	1.9843 m³/s @	0.34 hrs, Volume=	2.425 M, Atten= 0%, Lag= 0.0 min
Primary =	1.9843 m³/s @	0.34 hrs, Volume=	2.425 M

Routing by Stor-Ind method, Time Span= 0.00-5.00 hrs, dt= 0.01 hrs
Peak Elev= 333.675 m @ 0.34 hrs
Plug-Flow detention time= 0.0 min calculated for 2.425 M (100% of inflow)
Center-of-Mass det. time= (not calculated: outflow precedes inflow)

#	Routing	Invert	Outlet Devices
1	Primary	333.100 m	**1.20 m x 0.60 m x 15.00 m long Box** Box, 30-75° wingwalls, square crown, Ke= 0.400 Outlet Invert= 332.800 m S= 0.0200 m/m n= 0.012 Cc= 0.900
2	Primary	333.100 m	**1.20 m x 0.60 m x 15.00 m long Box2** Box, 30-75° wingwalls, square crown, Ke= 0.400 Outlet Invert= 332.800 m S= 0.0200 m/m n= 0.012 Cc= 0.900

Primary OutFlow Max=1.9783 m³/s @ 0.34 hrs HW=333.673 m (Free Discharge)
1=Box (Inlet Controls 0.9892 m³/s @ 1.44 m/s)
2=Box2 (Inlet Controls 0.9892 m³/s @ 1.44 m/s)

Summary data above indicates that once water is contained within the nominated channel, it will be discharging at approx. 2m^3/s. In order to prevent overtopping of the road a 2 cell 1.2m x 0.6m would be the most suitable culvert to take the resultant flow.

Civil Design and Modelling

Scenario 2 : On-site Detention

A detention pond is used to slow the discharge rate into the downstream drainage system. Water is held in a pond and, only allowed to discharge at a moderate rate, in effect taking longer to get rid of the runoff, allowing downstream flooding to dissipate.

Total runoff required to be stored in a Major (1in100yr) event is approx 2.26Ml (around 93% of the total runoff). A pond of sufficient capacity (2.45Ml) can be adequately constructed within the SE corner of the development. (See Drawing CDM-DUC-04-001)

Discharge from this pond may be controlled by a single 375mmm pipe at a maximum rate of 0.27 m^3/s, which will minimise impact on the downstream drainage.

Summary calculations;

Summary for Pond 2: Detention Pond

Inflow Area =	10.7300 ha, Inflow Depth = 23 mm		
Inflow =	2.0031 m^3/s @ 0.33 hrs, Volume=	2.425 M	
Outflow =	0.2716 m^3/s @ 0.62 hrs, Volume=	2.260 M,	Atten= 86%, Lag= 17.4 min
Primary =	0.2716 m^3/s @ 0.62 hrs, Volume=	2.260 M	

Routing by Stor-Ind method, Time Span= 0.00-5.00 hrs, dt= 0.01 hrs
Peak Elev= 335.288 m @ 0.62 hrs Surf.Area= 0.1813 ha Storage= 2.063 M
Plug-Flow detention time= 85.0 min calculated for 2.260 M (93% of inflow)
Center-of-Mass det. time= 83.9 min (103.9 - 20.0)

#	Invert	Avail.Storage	Storage Description
1	334.000 m	2.456 M	**35.00 mW x 40.00 mL x 1.50 mH Prismatoid Z=2.0**

#	Routing	Invert	Outlet Devices
1	Primary	334.000 m	**375 mm x 20.00 m long Culvert** RCP, mitered to conform to fill, Ke= 0.700 Outlet Invert= 333.200 m S= 0.0400 m/m n= 0.012 Cc= 0.900

Primary OutFlow Max=0.2716 m^3/s @ 0.62 hrs HW=335.287 m (Free Discharge)
└1=**Culvert** (Inlet Controls 0.2716 m^3/s @ 2.46 m/s)

Conclusion

By the construction of a new residential development upon this site an increase in runoff from storm events can be expected. Two scenarios have been examined, the relative pros and cons of each may be noted as;

Issue	Piped Under Road	Detention Basin
Number of Lots	108	106
Impacts on Downstream	Yes	No
Reduces Discharge to D/S	No	Yes
Discharge to downstream	2.00 m^3/s	0.271 m^3/s
Discharge Velocity (max)	1.44 m/s	2.46 m/s
Drainage Easement	6m wide (300m^2)	2780m^2
Culvert	2/1.2 x 0.6 m RCBC	375mm RCPC
Earthworks	500 m^3	1300m^3
Road opening	Yes	No
Erosion Control		
Stream	Yes (major)	Yes (minor)
Channel	Yes	No
Culvert outlet	Yes	Yes

Both options are able to cater for the design storm event in different ways.

Scenario 1 provides adequate drainage get discharge the water under Wellington Road and away from the development, it will require significant stream, culvert and erosion control works both across, and beyond the Wellington Road.

Scenario 2 contains the runoff within the development and will have minimal effect on the downstream waterway.

Recommendation

Whilst it is possibly more costly in to the developer in that the detention pond will reduce the number of Lots available to develop, it is considered that the installation of an On-site Detention Pond be incorporated in the development.

This is mainly due to the reduced of impact it will have upon the downstream drainage system.

Mark Patis
Director
Civil Design and Modelling
25th November 2004

APPENDIX 1 –

Calculation Results

Catchment Summary

a) Undeveloped

Summary for Subcatchment 1: Catch1

Runoff = 0.6677 m^3/s @ 0.33 hrs, Volume= 0.808 Ml, Depth= 8 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-5.00 hrs, dt= 0.01 hrs
Rainfall Duration=20 min, Inten=113 mm/hr

Area (ha)	C	Description
10.7300	0.20	

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m^3/s)	Description
20.0	500.0		0.42		**Direct Entry, Direct**

b) Developed

Summary for Subcatchment 1: Catch1

Runoff = 2.0031 m^3/s @ 0.33 hrs, Volume= 2.425 Ml, Depth= 23 mm

Runoff by Rational method, Rise/Fall=1.0/1.0 xTc, Time Span= 0.00-5.00 hrs, dt= 0.01 hrs
Rainfall Duration=20 min, Inten=113 mm/hr

Area (ha)	C	Description
10.7300	0.60	

Tc (min)	Length (meters)	Slope (m/m)	Velocity (m/sec)	Capacity (m^3/s)	Description
20.0	500.0		0.42		**Direct Entry, Direct**

Scenario 1 – Piped Under Road

Summary for Pond 4P: Culvert

[57] Hint: Peaked at 333.675 m (Flood elevation advised)

Inflow Area =		10.7300 ha,	Inflow Depth = 23 mm		
Inflow	=	1.9843 m^3/s @	0.34 hrs,	Volume=	2.425 M
Outflow	=	1.9843 m^3/s @	0.34 hrs,	Volume=	2.425 M, Atten= 0%, Lag= 0.0 min
Primary	=	1.9843 m^3/s @	0.34 hrs,	Volume=	2.425 M

Routing by Stor-Ind method, Time Span= 0.00-5.00 hrs, dt= 0.01 hrs
Peak Elev= 333.675 m @ 0.34 hrs
Plug-Flow detention time= 0.0 min calculated for 2.425 M (100% of inflow)
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Primary OutFlow Max=1.9783 m^3/s @ 0.34 hrs HW=333.673 m (Free Discharge)
—**1=Box** (Inlet Controls 0.9892 m^3/s @ 1.44 m/s)
—**2=Box2** (Inlet Controls 0.9892 m^3/s @ 1.44 m/s)

Scenario 2 – Detention Pond

Summary for Pond 2: Detention Pond

Inflow Area =		10.7300 ha,	Inflow Depth = 23 mm		
Inflow	=	2.0031 m^3/s @	0.33 hrs,	Volume=	2.425 M
Outflow	=	0.2716 m^3/s @	0.62 hrs,	Volume=	2.260 M, Atten= 86%, Lag= 17.4 min
Primary	=	0.2716 m^3/s @	0.62 hrs,	Volume=	2.260 M

Routing by Stor-Ind method, Time Span= 0.00-5.00 hrs, dt= 0.01 hrs
Peak Elev= 335.288 m @ 0.62 hrs Surf.Area= 0.1813 ha Storage= 2.063 M
Plug-Flow detention time= 85.0 min calculated for 2.260 M (93% of inflow)
Center-of-Mass det. time= 83.9 min (103.9 - 20.0)

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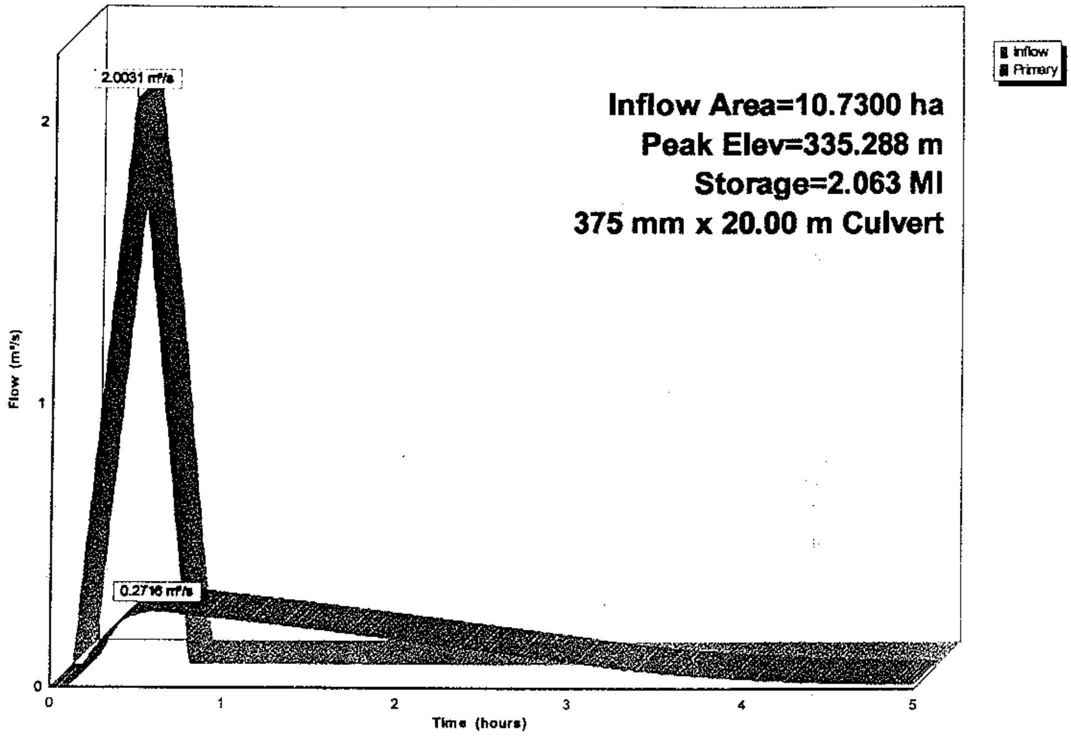
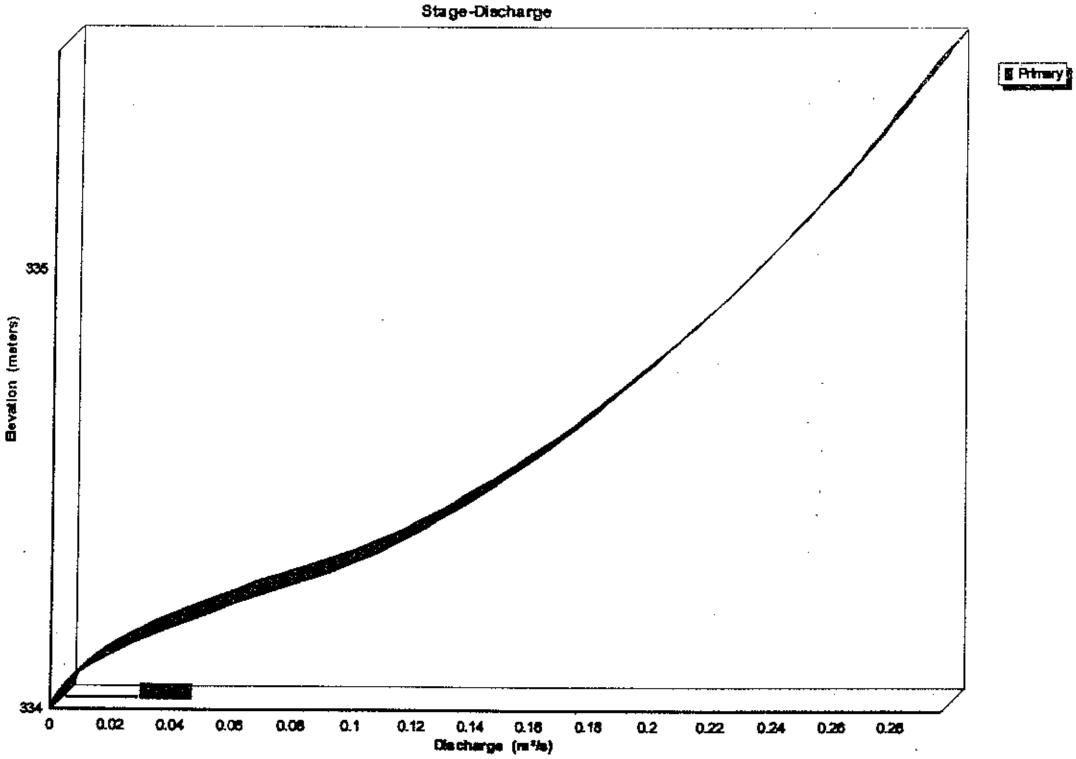
Primary OutFlow Max=0.2716 m^3/s @ 0.62 hrs HW=335.287 m (Free Discharge)
—**1=Culvert** (Inlet Controls 0.2716 m^3/s @ 2.46 m/s)

Hydrograph



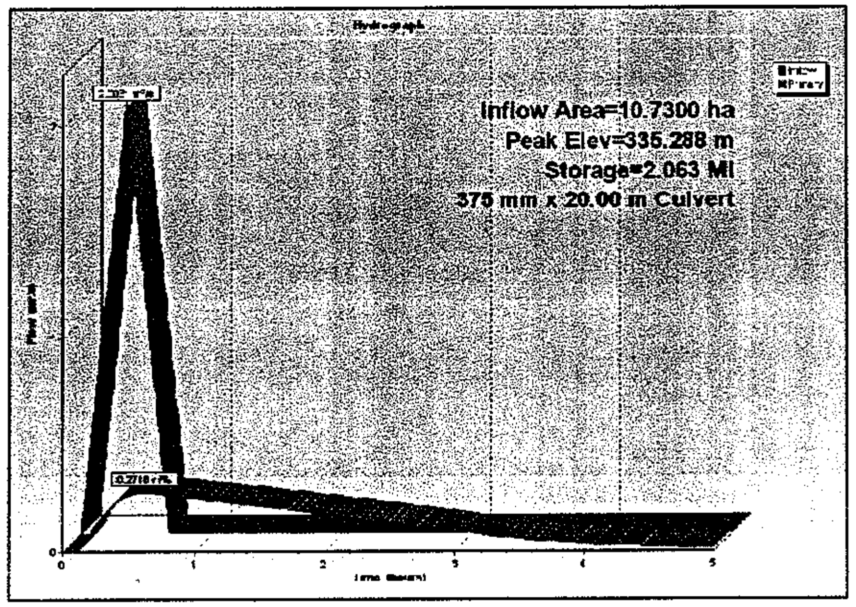
Stage-Discharge



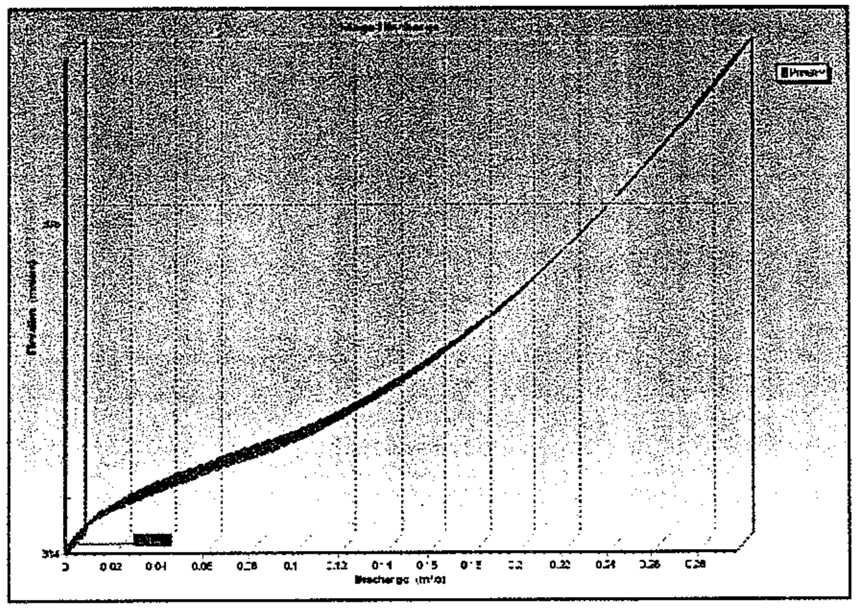
APPENDIX 2 –

Detention Pond Detail

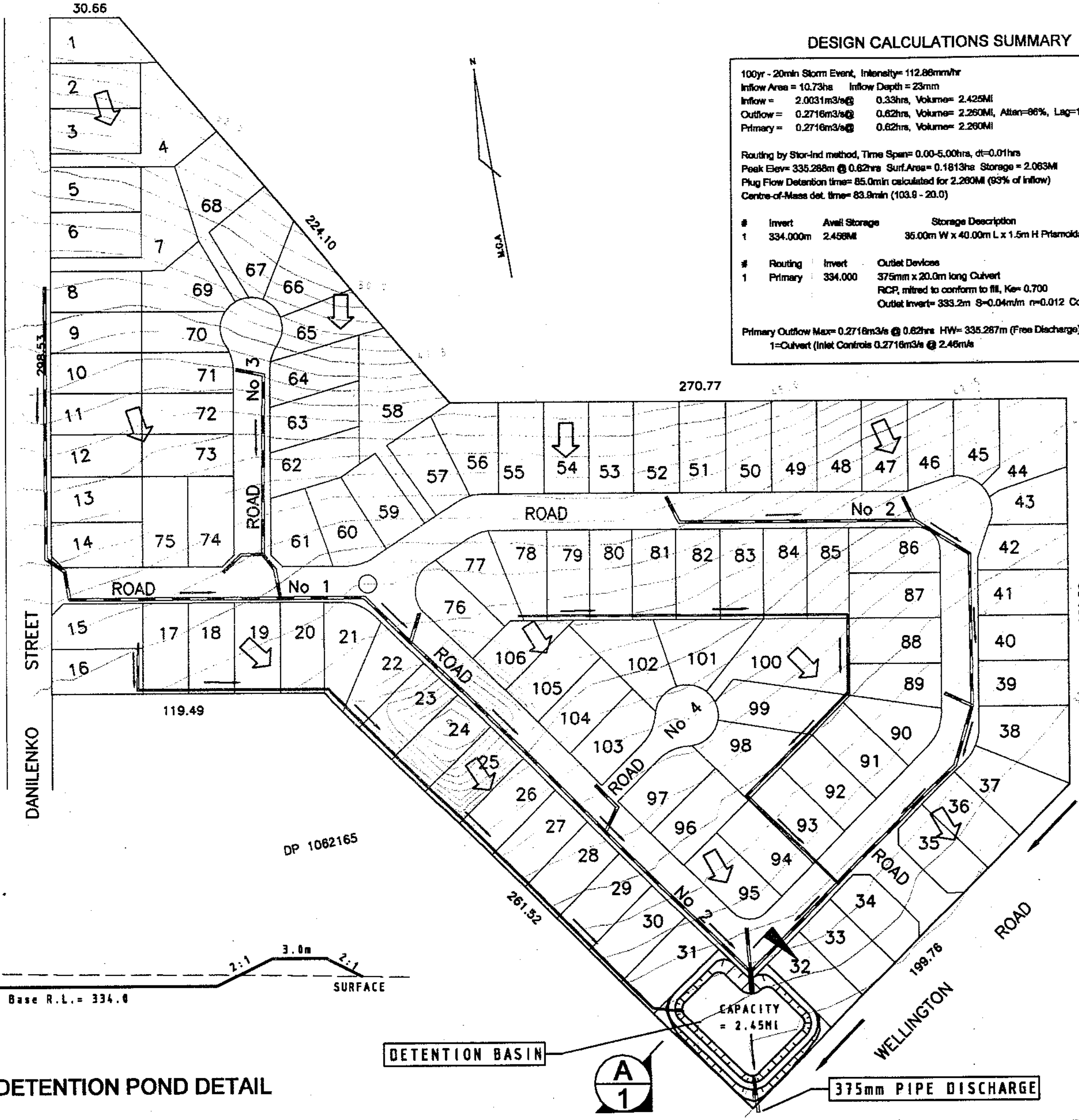
CDM-DUC-04-001

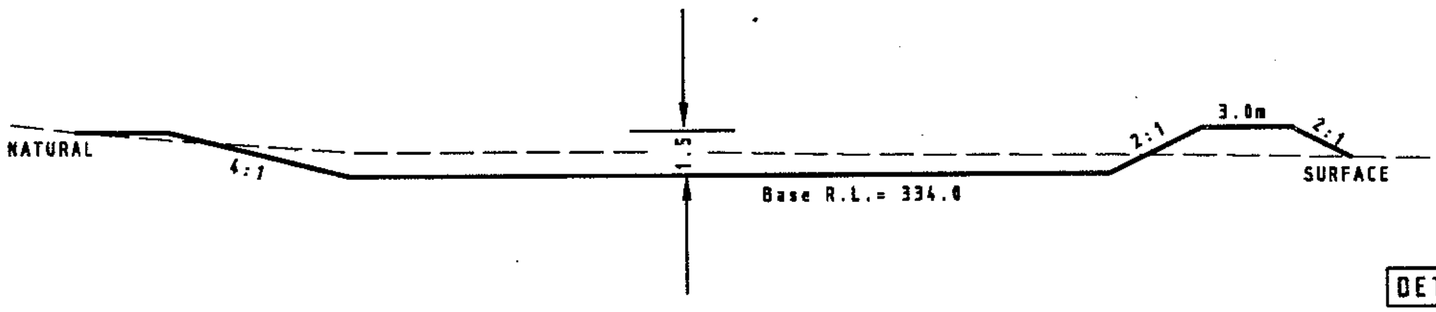


DESIGN HYDROGRAPH



STAGE DISCHARGE GRAPH





SECTION A - DETENTION POND DETAIL

DESIGN CALCULATIONS SUMMARY

100yr - 20min Storm Event, Intensity= 112.86mm/hr
Inflow Area = 10.73ha   Inflow Depth = 23mm
Inflow = 2.0031m3/s@ 0.33hrs, Volume= 2.425Ml
Outflow = 0.2716m3/s@ 0.62hrs, Volume= 2.260Ml, Atten=86%, Lag=17.4min
Primary = 0.2716m3/s@ 0.62hrs, Volume= 2.260Ml

Routing by Stor-Ind method, Time Span= 0.00-5.00hrs, dt=0.01hrs
Peak Elev= 335.288m @ 0.62hrs Surf.Area= 0.1813ha Storage = 2.063Ml
Plug Flow Detention time= 85.0min calculated for 2.260Ml (93% of inflow)
Centre-of-Mass det. time= 83.9min (103.9 - 20.0)

#	Invert	Avail Storage	Storage Description
1	334.000m	2.458Ml	35.00m W x 40.00m L x 1.5m H Prismoidal Z=2.0

#	Routing	Invert	Outlet Devices
1	Primary	334.000	375mm x 20.0m long Culvert RCP, mitred to conform to fill, Ke= 0.700 Outlet Invert= 333.2m S=0.04m/m n=0.012 Cc=0.900

Primary Outflow Max= 0.2716m3/s @ 0.62hrs HW= 335.287m (Free Discharge)
1=Culvert (Inlet Controls 0.2716m3/s @ 2.46m/s

REV.	DESCRIPTION	DATE
A	ISSUED FOR REVIEW	24/11/04

SCALES: 40 0 40 80 120 160
REDUCTION RATIO: 1:2000

DATUM: Assumed
SURVEYED BY: A. ARNDELL (Registered Surveyor)
DRAWN: M.R. Patis
CHECKED:
PASSED:
MOSS DIR: ../projects/Arndell/Goldesbar
DESIGN FILE:
DRAW FILE:

LEGEND
Existing Overland Flow
Pipe Network
Flow Direction

PREPARED BY:
cdm
Civil Design and Modelling Consultants
Civil Design and Modelling Consultants Pty Ltd
ACN 072 108 888
PO Box 1033
PARKES NSW 2870
Ph: 02-68634337
Fax: 02-68634338
civdes@bigpond.net.au

PROPOSED SUBDIVISION - LOT 607, DP750179
DENILENKO STREET AND WELLINGTON ROAD, PARKES
FOR Mr. I DUCHNAI
CONCEPT STORMWATER MANAGEMENT

CAD FILE	DRG. SIZE	PLOT DATE	JOB NUMBER	DWG NUMBER	STATUS	REVISION	SHEET	OF
	A3	$DATE$			P	A	1	1

Appendix F

TRAFFIC IMPACT ASSESSMENT

Traffic Impact Study
Lots 12 & 13 DP 1129852 Danilenko Street, Parkes

Prepared For

I & SB Developments Pty Ltd

January 2010

GEOLYSE

Postal Address PO Box 1963, Orange NSW 2800
Location 154 Peisley Street, Orange NSW 2800
Telephone 02 6393 5000 **Facsimile** 02 6393 5050 **Email** orange@geolyse.com **Web Site** www.geolyse.com

TRAFFIC IMPACT STUDY

TO ACCOMPANY A PLANNING PROPOSAL

RESIDENTIAL LAND USE OF LOTS 11 & 12 DP 1129852
DANILENKO STREET & RENSHAW-MCGIRR WAY, PARKES

PREPARED FOR:

I & SB DEVELOPMENTS PTY LTD

JANUARY 2010

GEOLYSE

POSTAL ADDRESS PO BOX 1963 ORANGE NSW 2800
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EMAIL ORANGE@GEOLYSE.COM **WEB SITE** WWW.GEOLYSE.COM

Report Title:	*Traffic Impact Study*
Project:	*Residential Land Use of Lots 11 & 12 DP 1129852To Accompany a Planning Proposal*
Client:	*I & SB Developments Pty Ltd*
Report Ref.:	*108060_REO_002_Traffic.docx*
Status:	*Final*
Issued:	*14 January 2010*

Geolyse Pty Ltd and the authors responsible for the preparation and compilation of this report declare that we do not have, nor expect to have a beneficial interest in the study area of this project and will not benefit from any of the recommendations outlined in this report.

The preparation of this report has been in accordance with the project brief provided by the client and has relied upon the information, data and results provided or collected from the sources and under the conditions outlined in the report.

All information contained within this report are prepared for the exclusive use of I & SB Developments Pty Ltd to accompany this report for the land described herein and are not to be used for any other purpose or by any other person or entity. No reliance should be placed on the information contained in this report for any purposes apart from those stated therein.

Geolyse Pty Ltd accepts no responsibility for any loss, damage suffered or inconveniences arising from, any person or entity using the plans or information in this study for purposes other than those stated above.

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APPENDIX C
SIDRA Results

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Introduction

1.1 BACKGROUND

Geolyse Pty Ltd has been commissioned by I & SB Developments Pty Ltd to prepare a Traffic Impact Study (TIS) to accompany a Planning Proposal (PP) for a proposed land use change from rural to residential, situated between Danilenko Street and Renshaw-McGirr Way, Parkes. An indicative future residential subdivision layout is provided in the Drawings attached to the PP report.

This report has been prepared in accordance with the NSW Road and Traffic Authority's (RTA) *Guide to Traffic Generating Developments* (GTGD).

1.2 SITE LOCATION

The subject site is located between Danilenko Street and Renshaw McGirr Way, on the north-eastern edge of Parkes.

The land is described as Lots 11 & 12 DP 1129852 and comprises an area of approximately 12.68 hectares. The subject land is indicated in the Drawings attached the PP report. The site is located approximately 2km to the northeast of Parkes CBD. Renshaw McGirr Way is a classified road (Main Road 233) which links Parkes to Wellington.

The land is currently zoned 1(a) Rural under the *Parkes Local Environmental Plan 1990* (Parkes LEP). However it is proposed to amend this zoning to 2(v) Urban Village to enable future residential subdivision.

The land is currently vacant, has a gentle slope from north to the south-east and has been substantially cleared. Existing trees are only sparsely scattered with a small clump of trees centred in the southern area of the land.

Residential land adjoins the southern boundary of the land with rural grazing land surrounding the remaining three sides of the land.

1.3 LAND USE CHANGE

It is proposed to rezone the land from a rural land use to residential. Ultimately it is proposed to subdivide the site into 122 residential lots together with an associated road network to access these lots on the subject site. The subdivision would also include a dry stormwater basin situated in the south-eastern corner of the site to manage stormwater discharges from the site.

Access to the development would be provided via a two new access points, with one constructed off Renshaw-McGirr Way along with a second access point constructed off Danilenko Street.

1.4 TRAFFIC STUDY METHODOLOGY

This report has been prepared based on the intended ultimate residential subdivision of the subject site.

Under *State Environmental Planning Policy (Infrastructure) 2007* (SEPP Infrastructure), the development of the subdivision would be classified as traffic generating development by virtue of being a subdivision with 50 or more allotments with direct access to an arterial road. Therefore a Traffic Study has been prepared to assist in the assessment of the impacts of the proposed land use change.

This report investigates the impact of the development of the subdivision on the surrounding road network. The report will determine if additional traffic management facilities are required to safely and efficiently control the movement of all vehicular traffic to and from the site.

The establishment of the proposed subdivision would generate an increase in the number and type of traffic movements on the roads surrounding the development site. The provision of safe and efficient means of access to and from the proposed subdivision is be necessary to ensure the satisfactory operation of the subdivision.

This Traffic Study will address the existing traffic volumes on the roads surrounding the development site and estimate the increase in traffic volume associated with the subdivision. The potential impacts of the additional traffic will be assessed and methods of alleviating the potential impacts and accommodating the requirements of the additional traffic will be determined.

The methodology for preparing the Traffic Study is outlined below.

- Review of the existing traffic data held by Parkes Shire Council and the RTA for the roads surrounding the development site.
- Determine the traffic generation potential of the subdivision and calculation of the peak daily and peak hour traffic volumes to be added to the existing traffic volumes on the roads surrounding the development site.
- Assessment of the impact of the additional traffic generated by the subdivision on the surrounding road network. Traffic impacts will be assessed in terms of:
  - road capacity;
  - road safety; and
  - access requirements.
- Determination of intersection requirements to ensure safe and efficient access between the subdivision and the adjacent road network.
- Determination of a schedule of required works that may be necessary to alleviate the potential impacts caused to the surrounding road network by the development of the subdivision.

In summary, this Traffic Study will assess the existing traffic movements on the roads surrounding the subdivision, the expected traffic volumes generated by the development of the subdivision, the effect of the generated traffic on the existing roads and determine a safe and economic means of controlling traffic movements to and from the proposed subdivision.

Legislative Framework

2.1 INFRASTRUCTURE SEPP

The Infrastructure SEPP classifies developments based upon their potential to generate additional traffic onto the surrounding road network.

The proposed development is defined as ’subdivision of land’. The subdivision of land, which has access to a classified road (or access to a road that connects to a classified road if access is within 90m of connection to the classified road) and the total number of allotments is 50 or greater, is listed in Column 3 of Schedule 3 of the SEPP. The proposed subdivision would have direct access to a classified road (Renshaw-McGirr Way - MR 233) and contain over 50 allotments.

Such listed developments require referral to the RTA by the consent authority. The consent authority is required to take into consideration any submission that the RTA provides in response to the notice of the development. In addition the consent authority must consider, pursuant to clause 104(3) of SEPP (Infrastructure), the accessibility of the site concerned and any potential traffic safety, road congestion or parking implications of the development.

Whilst this Traffic Study does not accompany a DA, it has been prepared to provide Council and/or the RTA with sufficient information to consider the impacts of the proposed land use change. It examines the existing traffic conditions and the potential impact of the traffic generated by the subdivision on the surrounding road network.

Existing Traffic Conditions

3.1 ROAD NETWORK HIERARCHY

The RTA (1984) proposes four basic road classes as the basis for the functional hierarchy of a road network. A functional classification take into account the relative balance of the traffic mobility function and amenity/access functions of streets and roads and defines the purpose of a road within the context of an urban area.

The four road classes are arterial, sub-arterial, collector and local roads and are defined below.

- **Arterial Roads:** Roads whose main function is to carry through traffic from one region to another forming the principal means of communication for major traffic movements.
- **Sub-Arterial Roads:** Those roads which supplement the arterial roads in providing for through traffic movement to an individually determined limit that is sensitive to both roadway characteristics and adjoining land uses.
- **Collector Roads:** Roads that distribute traffic between the arterial roads and the local street system and provide access to adjoining property.
- **Local Roads:** Subdivisional roads whose main traffic function is to provide access to adjoining property.

Parkes Shire Council does not have a documented road hierarchy breakdown for the roads within its shire. Based on discussions with Council staff, site inspections and an assessment of the road structure within the township of Parkes, Danilenko Street can be classified as a Collector Road under the road hierarchy outlined above.

Renshaw-McGirr Way is a classified road (Main Road 233) linking Parkes with Wellington and can be classified as an Arterial Road under the road hierarchy above.

3.2 EXISTING ROADWAY CONDITIONS

The site fronts both Danilenko Street to the west and Renshaw-McGirr Way to the east. Danilenko Street runs for approximately 500m south of the subject site where it intersects with both Renshaw-McGirr Way running further south and Reid Street running west.

Danilenko Street along the frontage of the subject site and to its northern end consists of unsealed gravel carriageway approximately 7m wide with no kerb and gutter.

From the south-western corner of the subject site to its southern end Danilenko Street consists of a bitumen sealed carriageway approximately 12m wide with 150mm upright kerb and gutter on both sides. Whilst not line marked, the sealed section of Danilenko Street adequately caters for a travel lane in both directions and a parallel parking lane on both sides of the road.

It is assumed that the gravel section of Danilenko Street would be upgraded to match the bitumen sealed southern end of the street as part of the future subdivision.

Danilenko Street has a sign posted speed limit of 50km/hr.

Plate 1 is a view of the unsealed section of Danilenko Street adjacent to the subject site (visible to the left of the plate) looking south towards the existing residential area.

Plate 2 is a view of Danilenko Street to the south of the subject site within the existing residential area.

Renshaw-McGirr Way consists of a bitumen sealed dual carriageway approximately 6m wide with a painted centreline but no edge lines or kerb and gutter. Due to the lack of sealed shoulders combined with the narrow width the road exhibited a significant amount of edge fretting and minor rutting of the unsealed shoulder.

Renshaw-McGirr Way has a sign posted speed limit of 80km/hr along the frontage of the subject site.

Renshaw-McGirr Way widens to approximately 8m, just prior to its intersection with Danilenko Street, to become a 2 lane road with bitumen sealed and edge line marked shoulders with a posted speed limit of 50km/hr. A 40 km/hr School Zone speed limit exists immediately south of the intersection with Danilenko and Reid Streets and applies between 8.00am to 9.30am and 2.30pm to 4.00pm each day.

Plate 3 is a view of the Renshaw-McGirr Way looking north with the subject site just visible to the left of the plate.

Plate 4 is a view of Renshaw-McGirr Way looking south with the subject site visible to the right of the plate.

Plate 5 is a view of the Renshaw-McGirr Way looking north with the intersection with Danilenko Street and Reid Street visible to the left of the plate.

Plate 6 is a view of Renshaw-McGirr Way looking south at the intersection with Danilenko Street and Reid Street.

3.3 EXISTING ROADWAY CAPACITY

The provision of roads within an urban area provides four main functions:

- to cater for moving vehicles;
- to cater for parked vehicles;
- to cater for pedestrians and bicycle traffic; and
- to allow for development and to provide access to adjoining property.

In carrying out the above functions, a road must also be capable of handling the traffic demands placed on it. Roads have varying capacities dependent on the function they are performing. The United States Highway Capacity Manual defines capacity as follows:

> *Capacity is the maximum number of vehicles which has a reasonable expectation of passing over a given section of a lane or roadway in one direction (or in both directions for a two-lane or three-lane highway) during a given time period under prevailing roadway and traffic conditions.*

The physical characteristics of a roadway such as lane width, alignment, frequency of intersections etc make up the prevailing roadway conditions.

Based upon its capacity and a driver's expectations of the operational characteristics of a traffic stream is a qualitative measure denoted as the level of service of a road.

Level of service definitions combine such factors as speed, travel time, safety, convenience and traffic interruptions and fall into six levels of service categories ranging from A down to F.

The *AUSTROADS Guide to Traffic Engineering Practice* describes Level of Service A as:

> *A condition of a 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.*

The categories are graduated from Level of Service A down through six levels to Level of Service F that is a zone of forced flow. The amount of traffic approaching the point under consideration exceeds that which can pass it. Flow breakdowns occur and queuing and delays result.

Based on the physical configuration of Danilenko Street and Wellington Road, observations of traffic movements and the methodology outlined in Part 2 *Roadway Capacity* of *AUSTROADS Guide to Traffic Engineering Practice*, the existing Level of Service can be determined as:

- Danilenko Street – Level of Service A with a two way capacity of 1,800 vehicles per hour.
- Renshaw-McGirr Way- Level of Service A with a two way capacity of 1,800 vehicles per hour.

3.4 EXISTING ANNUAL AVERAGE DAILY TRAFFIC

Annual Average Daily Traffic (AADT) is defined as the total volume of traffic passing a roadside observation point over a period of a year divided by the number of days in the year.

Site specific traffic data was not collected on individual roads surrounding the development site for the purposes of preparing this Traffic Study. Existing traffic data was sought from Council and the RTA.

Parkes Shire Council has recently carried out traffic counts on both Danilenko Street and Renshaw-McGirr Way and the traffic data provided by Council is contained in **Appendix A.**

The Roads and Traffic Authority (RTA) have also carried out traffic counts on Renshaw-McGirr Way in 2005 and the data obtained from the RTA is contained in **Appendix B.**

The available traffic counts together with the location of the counters is summarised in **Table 3.1**.

Table 3.1 - Daily Traffic Volume

Site	Road	Survey Year	Source	Daily Traffic Volume
1	Danilenko Street 150m North of Reid Street	2009	Parkes Shire Council	805
2	Renshaw-McGirr Way100m South of Banks Crossing Bridge	2009	Parkes Shire Council	193
3	Renshaw-McGirr Way East of Danilenko Street	2005	RTA	616

The traffic counter location for Danilenko Street is approximately 450m to the south of the subject site and is located immediately north of the school situated at the southern end of Danilenko Street. It is acknowledged that the recording station for Danilenko Street is a considerable distance from the proposed subdivision site and in close proximity to the school and therefore not representative of the traffic volume adjacent to the proposed subdivision.

Danilenko Street ends at a “dead end” a short distance north of the subject site and currently there are only two farm houses which have access off Danilenko Street north of the subject site. The RTA’s *Guide to Traffic Generating Developments* publishes data on the traffic generating potential for various land uses including residential dwelling houses. The RTA’s guide gives a daily traffic generation rate of nine (9) vehicle trips per dwelling for residential dwelling houses. This rate is based on surveys conducted in areas where new subdivisions are being built and could underestimate the traffic generation from the two existing farmhouses. Using a conservative estimate of an average of 20 trips per day (per residence) the existing AADT on Danilenko Street adjacent to the subject site can be estimated as 40 vehicles per day.

The Council traffic counter location for Renshaw-McGirr Way is approximately 7km north of the subject site and considered non-representative due to its remote location from the site.

The RTA traffic counter location for Renshaw-McGirr Way is in close proximity to the proposed subdivision and would be representative of the traffic flow at the site. Assuming a growth rate of 2% per annum the current (Year 2009) traffic volume on Renshaw-McGirr Way adjacent to the subject site can be calculated as 667 vehicles per day.

The estimated Year 2009 AADT on the roads surrounding the proposed subdivision is indicated in **Table 3.2.**

Table 3.2 - Estimated Year 2009 AADT Traffic Data

Road	Estimated Year 2009 AADT
Danilenko Street	40
Renshaw-McGirr Way	667

3.5 EXISTING PEAK HOUR TRAFFIC VOLUMES

As stated previously no site specific traffic counts were undertaken on the roads surrounding the proposed subdivision and the traffic data provided by Council for Danilenko Street was deemed non-representative of traffic volumes adjacent to the proposed subdivision. Therefore, an estimate will need to be made of the peak hour traffic volume on Danilenko Street adjacent to the site.

In the absence of site specific traffic counts, an accepted RTA procedure used to determine an estimated peak hour traffic volume is to multiply AADT traffic volume by 15%. This factor is for general use on urban roads. The RTA's GTGD gives a rate of 0.85 vehicle trips per dwelling for estimating the weekday peak hour vehicles trips. This rate is for urban residential dwellings and could underestimate the traffic generation of the two existing farmhouses at the end of Danilenko Street. Using the suggested rate of 15% of AADT and the estimated AADT of 40 vehicles per day (refer to **Section 3.4** for details) the existing peak hour traffic volume on Danilenko Street can be calculated as six (6) vehicle trips per hour.

The traffic counts undertaken by the RTA on Renshaw-McGirr Way include hourly traffic counts for both the eastbound (ultimately northbound) and westbound (ultimately southbound directions) and a copy of this data is included in **Appendix B**. Based on this traffic data the peak hour traffic volume of 81 vehicles per hour occurred on Wednesday between 5.00pm to 6.00pm. Assuming a growth rate of 2% per annum the current (Year 2009) peak hour traffic volume on Renshaw-McGirr Way adjacent to the proposed subdivision can be calculated as 88 vehicles per hour.

The estimated Year 2009 peak hour traffic volume on the roads surrounding the proposed subdivision is indicated in **Table 3.3**.

Table 3.3 - Estimated Year 2009 Peak Hour Traffic Volume

Road	Estimated Year 2009 Peak Hour Traffic Volume
Danilenko Street	6
Renshaw-McGirr Way	88

Traffic Impact of the Proposed Development

4.1 TRAFFIC GENERATION OF THE PROPOSED DEVELOPMENT

The RTA's GTGD publishes data on the traffic generating potential of various developments ranging from residential subdivisions, commercial premises, retail premises, and industrial developments.

The RTA Guide gives a traffic generation rate of 9.0 daily vehicle trips per dwelling and a peak of 0.85 vehicle trips per dwelling for the weekday peak hour.

The future subdivision would contain a total of 122 residential lots. Allowing for a small proportion of dual occupancy homes a potential maximum of 130 dwellings will be assumed for the purposes of calculating the traffic generation of the development.

Based on the RTA generation rates and the total number of potential dwellings in the future subdivision the AADT and peak hourly traffic generated by the development can be calculated as:

Annual Average Daily Traffic: **1170 vehicles per day**

Peak Hourly Traffic (Weekday): **111 vehicles per hour**

4.2 TRAFFIC DISTRIBUTION

The RTA guide suggests that "…about 25% of trips are internal to the subdivision, involving local shopping, schools and local visits" (RTA 2002:3-2). Due to the small size of the subdivision and lack of proposed facilities such shops it will be assumed that all trips are external to the subdivision.

The subdivision has two access points, one to the east onto Renshaw-McGirr Way and one to the west onto Danilenko Street.

Renshaw-McGirr Way runs south to connect to the southern and western areas of the Parkes Township. To the north Renshaw-McGirr Way travels out of town linking Parkes with Wellington and beyond. Approximately 600m south-west of the subject site Reid Street runs west off Renshaw-McGirr Way and is a major feeder to the north and west of the township of Parkes.

Danilenko Street runs south and joins onto Renshaw-McGirr Way approximately 500m from the subject site. Approximately 120m south of the subject site Barton Street run west off Danilenko Street and is a major feeder to the north and west of the township of Parkes.

Based on the connectivity of the surrounding street network it is considered that traffic generated by the future subdivision would exit and enter the site based on the location of the source/destination of the trip. That is traffic would utilise the access point that is closest to the source/destination of the trip. Considering the lot layout of the future subdivision it is assumed that the split of traffic generated from the future subdivision would be 60% and 40% respectively between the Danilenko Street and Renshaw-McGirr Way access points.

It is assumed that all traffic utilising the Danilenko Street access point to the proposed subdivision would have origins and destinations to the south of Danilenko Street. It is assumed that 90% of traffic utilising the Renshaw-McGirr Way access point to the proposed subdivision would have origins and destination to the south-west with the remaining 10% having origins and destination to the north-east.

4.3 IMPACT OF THE GENERATED TRAFFIC

The impact of the traffic generated by the proposed future subdivision development on the surrounding road network will be assessed in terms of traffic volume and intersection capacity/access requirements.

The impact of the increased AADT and peak hour traffic volume on Renshaw-McGirr Way and Danilenko Street in the vicinity of the development will be assessed.

The operational capacity and efficiency of the proposed new intersections to access the site off Renshaw-McGirr Way and Danilenko Street will be also be assessed.

4.3.1 TRAFFIC VOLUME

The expected peak hour traffic volume of 111 trips per hour generated by the future subdivision would impact on the existing traffic volumes on Renshaw-McGirr Way and Danilenko Street. A comparison of the estimated nominal existing peak hour traffic volumes on Renshaw-McGirr Way and Danilenko Street with the total estimated traffic volume on the subject roads following the development of the subdivision is indicated in **Table 4.1**.

Table 4.1 - Comparison of Existing and Post Development Peak Hour Traffic Volumes

Road	Existing Nominal Peak Hour Volume (veh/hr)	Post Development Peak Hour Volume (veh/hr)	% Increase
Renshaw-McGirr Way south-east of the Proposed subdivision	88	128	45%
Renshaw-McGirr Way north-west of the Proposed subdivision	88	92	4.5%
Danilenko Street	6	73	1,117%

As expected the greatest percentage increase in peak hour traffic following the development of the future subdivision would occur on Danilenko Street with an increase in traffic volume of approximately 1,117%. The percentage increase on Renshaw-McGirr Way would be approximately 10% and 83% for the south-east and north-west bound directions respectively.

Whilst the percentage increase in the peak hour traffic volume on Danilenko Street appears extremely excessive at 1,117%, reference to **Section 3** of this Report indicates that Danilenko Street has a capacity of 1,800 vehicles per hour and is operating at a Level of Service A with a very low existing peak hour traffic volume of six (6) vehicles per hour. The post development traffic volume of 73 vehicles per hour is still very low and represents approximately 4% of the capacity of the road. Therefore the additional peak hour traffic generated by the proposed subdivision would have no significant effect on the Level of Service of Danilenko Street.

Reference to **Section 3** of this Report indicates that Renshaw-McGirr Way has a capacity of 1,800 vehicles per hour and is operating at a Level of Service A with a low existing peak hour traffic volume of 88 vehicles per hour. The maximum post development traffic volume of 128 vehicles per hour south-east of the proposed subdivision is still quite low and represents approximately 7% of the capacity of the road. Therefore the additional peak hour traffic generated by the future subdivision would have no significant effect on the Level of Service of Renshaw-McGirr Way.

Hence the additional peak hour traffic generated by the future subdivision is easily accommodated by the existing road network.

The expected additional daily traffic volume of 1,170 vehicles per day generated by the proposed subdivision would impact on the existing AADT traffic volumes on Renshaw-McGirr Way and Danilenko Street. A comparison of the existing AADT traffic volumes on Renshaw-McGirr Way and Danilenko Street with the estimated future AADT traffic volumes on the subject roads following the development of the proposed subdivision is indicated in **Table 4.2**.

Table 4.2 - Comparison of Existing and Post Development AADT

Road	Existing AADT (veh/day)	Post Development AADT (veh/day)	% Increase
Wellington Road	616	1037	68%
Danilenko Street	40	742	1,755%

As expected the greatest percentage increase in daily traffic following the development of the future subdivision would occur on Danilenko Street with an increase in traffic volume of approximately 1,755%. The percentage increase of daily traffic on Renshaw-McGirr Way would be approximately 68%.

Whilst the percentage increase in the daily traffic volume on Danilenko Street appears extremely excessive at 1,755% it should be noted that this is primarily due to the extremely low existing daily traffic volume of 40 vehicles per day. In fact the predicted post development daily traffic volume 742 vehicles per day is also quite low and as indicated earlier the future subdivision would have no significant effect on the current Level of Service of Danilenko Street.

The percentage increase in the daily traffic volume on Renshaw-McGirr Way also appears excessive at 68% but once again the predicted post development daily traffic volume 1,037 vehicles per day is still quite low and as indicated earlier the future subdivision would have no significant effect on the current Level of Service of Wellington Road.

4.3.2 INTERSECTION EVALUATION

4.3.2.1 Required Entry Treatment

Due to the relatively low traffic volumes on Danilenko Street a standard urban Give way T intersection is proposed with no formal line-marking. The intersection would be designed and constructed in accordance with Parkes Shire Council requirements and be similar in design and layout to existing intersections off Danilenko Street.

As Renshaw-McGirr Way is an RTA-controlled road, it would be required to comply with the design requirements of the RTA Road Design Guide (RDG). Figure 4.5.12 of the RTA RDG specifies the recommended intersection types for rural roads based on ‘turning’ and ‘approaching/opposing’ traffic flows.

Given the number of opposing vehicles (44 vehicles per hour) during the peak hour and the number of turning vehicles into the site at this time (estimated at 4 right turn movements) the RTA RDG indicates a BAR (Basic Right Turn) intersection is recommended. The final design and layout of the intersection would be subject to the approval of the RTA.

4.3.2.2 Delays and Queues

An assessment of the proposed intersection treatments for both Danilenko Street and Renshaw-McGirr Way has been undertaken utilising the SIDRA Intersection computer modelling software.

SIDRA Intersection is a computerised traffic evaluation tool which is used in the assessment and design of intersection treatments in terms of capacity and operation. The program provides outputs which include delays, queue lengths, total capacities, travel times, and average speeds. SIDRA Intersection is the preferred intersection analysis tool of the RTA and many Local Government Authorities.

As part of the intersection analysis, the SIDRA Intersection model provides an "Average Control Delay" for each approach of the intersection. This control delay is the average delay per vehicle over the peak hour as a result of the intersection and is grouped into six bands labelled A through to F (with 'A' being best and 'F' being over capacity), termed Level of Service (LOS). The overall LOS for a 'Give Way' intersection is the LOS result for the worst case turning movement.

A summary of the assumptions and input values used for the SIDRA analysis of each intersection is indicated in **Table 4.3**:

Table 4.3 - Summary of SIDRA Input Data

Input Description	Danilenko Street Intersection	Renshaw-McGirr Way Intersection
Through Road Base Traffic Volume	6 veh/hr	88 veh/hr
Total vehicles entering/leaving the site	67 veh/hr	44 veh/hr
Control Type	Give Way	Give Way
Lane widths assumed	3.5m	3.0/3.5m
Approach length on through road	200m	500m
Approach length in Subdivision	150m	50m
Approach & exit cruise speed on through road	50kph	80kph
Approach & exit cruise speed in subdivision	50kph	40kph
Heavy Vehicle percentage	0%	15% on Wellington Rd

Based on the above assumptions, a SIDRA Intersection model of a basic "two-lane two-way T-intersection" (i.e. one lane in each direction on each leg) was modelled for each intersection. The outputs from this assessment are summarised in **Table 4.4** & **Table 4.5**. A full print out of the SIDRA output can be found in **Appendix C**.

Table 4.4 – Summary of SIDRA Output Results for Danilenko Street

Intersection Leg	Average Delay (seconds)	Level of Service (A-F)	Largest 95% Queue Length (vehicles)
Danilenko Street South	6.2	A	0.2
Danilenko Street North	3.7	A	0.0
Subdivision Street	6.5	A	0.0

Table 4.5 – Summary of SIDRA Output Results for Renshaw-McGirr Way

Intersection Leg	Average Delay (seconds)	Level of Service (A-F)	Largest 95% Queue Length (vehicles)
Renshaw-McGirr Way South	8.1	A	0.0
Renshaw-McGirr Way North	5.1	A	0.1
Subdivision Street	6.6	A	0.0

As can be seen from the above summaries, the proposed intersections would operate well below their capacity with minimal delay times and with an excellent Level of Service (A) for all turning movements.

Please note the average delay shown above includes the average geometric delay which is the delay experienced by a vehicle going through (negotiating) the intersection in the absence of any other vehicles.

Conclusion

5.1 CONCLUSIONS AND RECOMMENDATIONS

This Traffic Study has evaluated the traffic generating potential of the proposed land use change and future subdivision of land situated between Danilenko Street and Renshaw-McGirr Way and assessed the impact of the traffic generated by the proposed subdivision on the surrounding road network in terms of traffic volume and intersection capacity.

The greatest percentage increase in daily traffic following the development of the future subdivision would occur on Danilenko Street with an increase in AADT of approximately 1,755%. The percentage increase in AADT on Renshaw-McGirr Way would be approximately 68%.

The greatest percentage increase in peak hour traffic following the development of the future subdivision would occur on Danilenko Street with an increase in traffic volume of approximately 1,117%. The percentage increase in peak hour traffic volume on Renshaw-McGirr Way would be approximately 45% and 4.5% to south-east and north-west of the proposed subdivision respectively.

Notwithstanding the substantial increase in daily and peak hour traffic volumes on both Danilenko Street and Renshaw-McGirr Way, the overall impact of the additional traffic generated by the future subdivision on the surrounding road network is limited and the classification of the surrounding roads would not change following the development of the future subdivision. The increase in traffic volume is capable of being dispersed and absorbed into the surrounding road network with minor impact on the existing and proposed traffic facilities.

The standard of the required intersections off Danilenko Street and Renshaw-McGirr Way was determined and the recommended intersections analysed utilising the SIDRA Intersection computer modelling software. The results of the analysis determined that the proposed intersection treatments would operate well below their capacity with minimal delay times and with an excellent Level of Service (A) for all turning movements

In completing the assessment of the impact of the traffic generated by the proposed subdivision, the following recommendations are made:

- The increase in AADT on the roads surrounding the development site would not change the classification of the roads under a functional road hierarchy.
- The proposed intersection off Danilenko Street is to be a standard urban Give way T intersection with no formal line-marking. The intersection would be designed and constructed in accordance with Parkes Shire Council requirements and be similar in design and layout to existing intersections off Danilenko Street.
- The proposed intersection off Renshaw-McGirr Way is to be a RTA standard BAR (Basic Right Turn) intersection in accordance with the RTA *Road Design Guide*. The intersection would be designed and constructed in accordance with the RTA requirements.
- The design of all works shall be carried out to the appropriate standards and the requirements of Parkes Shire Council and the RTA.

References

AUSTROADS 1988, *Guide to Traffic Engineering Practice. Part 2. Roadway Capacity*

AUSTROADS 1988, *Guide to Traffic Engineering Practice. Part 3. Traffic Studies.*

AUSTROADS 1988, *Guide to Traffic Engineering Practice. Part 5. Intersections at Grade.*

AUSTROADS 1988, *Guide to Traffic Engineering Practice. Part 10 Local Area Traffic Management.*

Ogden, K.W. and Bennett, D.W. (Eds) 1984, *Traffic Engineering Practice. Third Edition.* Dept of Civil Engineering Monash University.

Roads and Traffic Authority of NSW. 1991, *Road Design Guide Section 4 - Intersections at Grade*.

Roads and Traffic Authority (RTA). 2002, *Guide to Traffic Generating Developments*, Version 2.2, Roads and Traffic Authority, Sydney.

Plates

Plate 1: View of Danilenko Street adjacent to the subject site

Plate 2: View of Danilenko Street south of the subject site

Plate 3: View of Renshaw-McGirr Way looking north

Plate 4: View of Renshaw-McGirr Way Looking South

Plate 5: View of Renshaw-McGirr Way looking north

Plate 6: View of Renshaw-McGirr Way Looking South from the intersection with Danilenko St

Appendix A

COUNCIL TRAFFIC DATA

MetroCount Traffic Executive
Weekly Vehicle Counts (Virtual Week)

VirtWeeklyVehicle-19 -- English (ENA)

Datasets:

Site:	**[Danilenko Street] D - Danilenko Street 150m North of Reed Street - M. Swindle & A. Yeo**
Direction:	7 - North bound A>B, South bound B>A., **Lane:** 0
Survey Duration:	16:00 Friday, 19 September 2008 => 14:16 Friday, 3 October 2008
File:	G:\Infrastructure\MetrocountV314\Parkes Town Streets\Danilenko Street 03Oct2008.EC0 (Plus)
Identifier:	W914KEWW MC56-L5 [MC55] (c)Microcom 19Oct04
Algorithm:	Factory default
Data type:	Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time:	**16:00 Friday, 19 September 2008 => 14:16 Friday, 3 October 2008**
Included classes:	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Speed range:	10 - 160 km/h.
Direction:	North, East, South, West (bound)
Separation:	All - (Headway)
Name:	Factory default profile
Scheme:	Vehicle classification (ARX)
Units:	Metric (meter, kilometer, m/s, km/h, kg, tonne)
In profile:	Vehicles = 11207 / 11254 (99.58%)

Weekly Vehicle Counts (Virtual Week)

VirtWeeklyVehicle-19

Site:	Danilenko Street.0SN
Description:	**D - Danilenko Street 150m North of Reed Street - M. Swindle & A. Yeo**
Filter time:	**16:00 Friday, 19 September 2008 => 14:16 Friday, 3 October 2008**
Scheme:	Vehicle classification (ARX)
Filter:	Cls(1 2 3 4 5 6 7 8 9 10 11 12) Dir(NESW) Sp(10,160) Headway(>0)

	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Averages 1 - 5	Averages 1 - 7
Hour									
0000-0100	4.5	1.5	1.0	0.5	3.0	4.5	9.0	2.1	3.4
0100-0200	2.0	0.5	2.0	3.0	3.5	4.5	1.0	2.2	2.4
0200-0300	0.5	0.0	0.0	0.0	0.0	2.5	3.5	0.1	0.9
0300-0400	0.0	1.5	0.5	0.5	1.5	2.5	4.5	0.8	1.6
0400-0500	2.0	1.5	1.0	1.5	3.0	1.5	5.0	1.8	2.2
0500-0600	8.5	6.5	6.5	7.0	9.0	4.5	4.0	7.5	6.6
0600-0700	27.5	18.5	24.0	18.5	22.0	15.0	8.5	22.1	19.1
0700-0800	51.5	45.5	46.0	55.5	49.0	22.0	14.0	49.5	40.5
0800-0900	**68.0<**	**65.0<**	**59.0<**	**71.5<**	**68.0<**	25.5	24.0	**66.3<**	**54.4<**
0900-1000	50.0	43.0	58.0	52.0	65.5	39.5	44.0	53.7	50.3
1000-1100	42.0	43.0	55.5	37.5	48.5	61.0	52.0	45.3	48.5
1100-1200	54.0	35.5	42.5	41.5	45.0	**66.5<**	**60.0<**	43.7	49.3
1200-1300	54.0	53.5	52.5	53.5	56.5	61.5	57.0	54.0	55.5
1300-1400	61.0	69.5	52.5	51.0	56.0	70.0	**61.5<**	58.0	60.2
1400-1500	42.0	45.5	50.5	46.5	31.0	70.5	45.5	43.1	47.4
1500-1600	64.5	61.5	64.0	70.0	92.0	71.0	54.5	68.0	66.4
1600-1700	79.0	70.5	84.0	**86.5<**	**101.0<**	72.0	55.5	84.2	78.4
1700-1800	**94.0<**	**81.0<**	**95.5<**	77.0	84.0	**72.0<**	58.5	**86.3<**	**80.3<**
1800-1900	41.5	49.5	62.5	66.5	74.5	48.0	41.5	58.9	54.9
1900-2000	29.0	30.0	32.5	34.5	41.5	24.5	26.5	33.5	31.2
2000-2100	16.5	18.5	20.0	29.5	24.5	20.5	12.5	21.8	20.3
2100-2200	11.0	18.5	13.0	18.0	20.0	12.5	10.5	16.1	14.8
2200-2300	5.5	6.0	10.0	13.0	16.0	20.0	8.0	10.1	11.2
2300-2400	2.5	3.0	3.5	5.0	8.5	11.5	5.0	4.5	5.6
Totals									
0700-1900	701.5	663.0	722.5	709.0	771.0	679.5	568.0	711.0	686.0
0600-2200	785.5	748.5	812.0	809.5	879.0	752.0	626.0	804.5	771.4
0600-0000	793.5	757.5	825.5	827.5	903.5	783.5	639.0	819.1	788.2
0000-0000	811.0	769.0	836.5	840.0	923.5	803.5	666.0	833.6	805.2
AM Peak	0800	0800	0800	0800	0800	1100	1100		
	68.0	65.0	59.0	71.5	68.0	66.5	60.0		
PM Peak	1700	1700	1700	1600	1600	1700	1300		
	94.0	81.0	95.5	86.5	101.0	72.0	61.5		

*** - No data.**

MetroCount Traffic Executive
Weekly Vehicle Counts (Virtual Week)

VirtWeeklyVehicle-20 -- English (ENA)

Datasets:

Site:	**[Wellington Road] C - 100m South of Banks Crossing Bridge M.Swindle & A. Yeo.**
Direction:	7 - North bound A>B, South bound B>A., **Lane:** 0
Survey Duration:	11:00 Tuesday, 30 June 2009 => 14:38 Tuesday, 14 July 2009
File:	G:\Infrastructure\MetrocountV314\Main Roads\MR 0233 Wellington Road 14Jul2009.EC0 (Plus)
Identifier:	AE48CJQG MC56-L5 [MC55] (c)Microcom 19Oct04
Algorithm:	Factory default
Data type:	Axle sensors - Paired (Class/Speed/Count)

Profile:

Filter time:	**11:00 Tuesday, 30 June 2009 => 14:38 Tuesday, 14 July 2009**
Included classes:	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Speed range:	10 - 160 km/h.
Direction:	North, East, South, West (bound)
Separation:	All - (Headway)
Name:	Factory default profile
Scheme:	Vehicle classification (ARX)
Units:	Metric (meter, kilometer, m/s, km/h, kg, tonne)
In profile:	Vehicles = 2746 / 2749 (99.89%)

Weekly Vehicle Counts (Virtual Week)

VirtWeeklyVehicle-20
Site: Wellington Road.0SN
Description: **C - 100m South of Banks Crossing Bridge M.Swindle & A. Yeo.**
Filter time: **11:00 Tuesday, 30 June 2009 => 14:38 Tuesday, 14 July 2009**
Scheme: Vehicle classification (ARX)
Filter: Cls(1 2 3 4 5 6 7 8 9 10 11 12) Dir(NESW) Sp(10,160) Headway(>0)

Hour	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Averages 1 - 5	Averages 1 - 7
0000-0100	0.0	1.5	0.0	0.0	0.0	0.0	0.5	0.3	0.3
0100-0200	1.0	0.0	0.0	0.5	1.0	0.0	0.0	0.5	0.4
0200-0300	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.1
0300-0400	0.0	0.0	0.5	1.0	0.0	1.0	0.0	0.3	0.4
0400-0500	2.0	0.0	1.0	0.5	0.0	0.0	0.0	0.7	0.5
0500-0600	1.0	1.0	7.0	2.5	1.0	0.0	0.5	2.5	1.9
0600-0700	2.5	5.0	6.5	5.5	2.0	2.0	0.5	4.3	3.4
0700-0800	7.5	7.0	18.0	20.0	13.0	5.0	1.5	13.1	10.3
0800-0900	**15.5<**	**15.0<**	**24.0<**	**24.0<**	**17.0<**	4.5	10.0	**19.1<**	**15.7<**
0900-1000	9.0	12.0	15.0	23.0	14.5	**17.0<**	12.5	14.7	14.7
1000-1100	8.5	9.5	19.0	22.0	12.0	9.5	**24.5<**	14.2	15.0
1100-1200	12.5	10.0	16.0	14.5	7.5	11.5	16.5	11.9	12.5
1200-1300	8.5	10.3	20.0	11.5	8.0	12.0	11.0	11.5	11.5
1300-1400	7.0	11.3	17.5	20.5	12.0	8.5	16.0	13.5	13.1
1400-1500	11.5	11.7	14.5	**21.5<**	12.5	15.0	13.0	14.1	14.1
1500-1600	10.5	18.0	24.5	18.5	12.0	**17.0<**	14.5	16.7	16.4
1600-1700	12.5	25.0	**31.5<**	10.5	**18.5<**	9.5	20.5	**19.6<**	**18.3<**
1700-1800	**14.5<**	**27.0<**	23.5	11.0	15.0	8.0	**26.5<**	18.2	17.9
1800-1900	8.5	19.5	21.5	7.5	7.5	3.5	8.5	12.9	10.9
1900-2000	6.5	8.5	8.0	7.5	10.0	4.0	4.5	8.1	7.0
2000-2100	2.5	4.0	4.0	4.5	3.5	1.0	3.5	3.7	3.3
2100-2200	2.5	1.5	7.0	3.5	1.5	0.5	1.5	3.2	2.6
2200-2300	0.5	1.5	3.5	0.5	1.0	0.5	2.0	1.4	1.4
2300-2400	0.0	1.0	2.0	0.5	1.0	1.5	0.0	0.9	0.9

Totals	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Averages 1 - 5	Averages 1 - 7
0700-1900	126.0	176.3	245.0	204.5	149.5	121.0	175.0	179.5	170.5
0600-2200	140.0	195.3	270.5	225.5	166.5	128.5	185.0	198.8	186.8
0600-0000	140.5	197.8	276.0	226.5	168.5	130.5	187.0	201.1	189.0
0000-0000	144.5	200.3	284.5	231.0	170.5	132.5	188.0	205.4	192.5
AM Peak	0800	0800	0800	0800	0800	0900	1000		
	15.5	15.0	24.0	24.0	17.0	17.0	24.5		
PM Peak	1700	1700	1600	1400	1600	1500	1700		
	14.5	27.0	31.5	21.5	18.5	17.0	26.5		

*** - No data.**

Appendix B

RTA TRAFFIC DATA

HOURLY TRAFFIC VOLUMES SAMPLE Week 43, Monday 24/10/2005 Station No. 93.694.E

WELLINGTON RD,MR233 PARKES-E OF DANILENKO ST

HOUR	MON	TUE	WED	THU	FRI	SAT	SUN	WEEKDAYS			WEEKEND (+HOLIDAYS)			WHOLE WEEK		
comm.	24/10	25/10	26/10	27/10	28/10	29/10	30/10	TOTAL	MEAN	%	TOTAL	MEAN	%	TOTAL	MEAN	%
0	0	1	0	2	0	1	3	3	1	0.19	4	2	0.76	7	1	0.33
1	0	0	0	0	0	0	0	0	0	0.00	0	0	0.00	0	0	0.00
2	0	0	1	1	0	2	0	2	0	0.12	2	1	0.38	4	1	0.19
3	0	0	1	0	0	0	0	1	0	0.06	0	0	0.00	1	0	0.05
4	0	0	2	0	0	2	1	2	0	0.12	3	2	0.57	5	1	0.23
5	1	2	1	4	3	3	1	11	2	0.68	4	2	0.76	15	2	0.70
6	11	8	9	15	13	7	3	56	11	3.46	10	5	1.91	66	9	3.08
7	14	24	18	23	19	8	2	98	20	6.06	10	5	1.91	108	15	5.04
8	7	15	17	23	16	14	8	78	16	4.82	22	11	4.20	100	14	4.67
9	20	18	20	18	33	27	15	109	22	6.74	42	21	8.02	151	22	7.05
10	21	8	18	18	15	20	12	80	16	4.94	32	16	6.11	112	16	5.23
11	13	16	23	16	21	22	16	89	18	5.50	38	19	7.25	127	18	5.93
12	20	20	18	13	18	24	13	89	18	5.50	37	19	7.06	126	18	5.88
13	19	19	21	23	24	23	25	106	21	6.55	48	24	9.16	154	22	7.19
14	23	20	20	19	27	26	14	109	22	6.74	40	20	7.63	149	21	6.96
15	22	28	31	31	23	18	25	135	27	8.34	43	22	8.21	178	25	8.31
16	31	42	35	35	30	24	20	173	35	10.69	44	22	8.40	217	31	10.13
17	27	38	27	44	38	16	21	174	35	10.75	37	19	7.06	211	30	9.85
18	22	20	15	19	34	27	18	110	22	6.80	45	23	8.59	155	22	7.24
19	12	8	12	20	10	15	7	62	12	3.83	22	11	4.20	84	12	3.92
20	6	11	10	7	16	6	11	50	10	3.09	17	9	3.24	67	10	3.13
21	9	9	10	10	8	9	2	46	9	2.84	11	6	2.10	57	8	2.66
22	6	6	5	2	5	3	5	24	5	1.48	8	4	1.53	32	5	1.49
23	3	1	0	3	4	4	1	11	2	0.68	5	3	0.95	16	2	0.75
DAY TOT	287	314	314	346	357	301	223	1618	324	100.00	524	262	100.00	2142	306	100.00
MAX	31	42	35	44	38	27	25	AWT =	324		AWE =	262		ADT =	306	

HOURLY TRAFFIC VOLUMES SAMPLE Week 43, Monday 24/10/2005 Station No. 93.694.W

WELLINGTON RD,MR233 PARKES-E OF DANILENKO ST

HOUR	MON	TUE	WED	THU	FRI	SAT	SUN	WEEKDAYS			WEEKEND (+HOLIDAYS)			WHOLE WEEK		
comm.	24/10	25/10	26/10	27/10	28/10	29/10	30/10	TOTAL	MEAN	%	TOTAL	MEAN	%	TOTAL	MEAN	%
0	0	1	1	1	0	1	5	3	1	0.18	6	3	1.13	9	1	0.41
1	0	0	0	0	0	1	1	0	0	0.00	2	1	0.38	2	0	0.09
2	0	0	0	0	0	0	0	0	0	0.00	0	0	0.00	0	0	0.00
3	0	0	1	0	0	0	0	1	0	0.06	0	0	0.00	1	0	0.05
4	0	1	0	0	1	1	1	2	0	0.12	2	1	0.38	4	1	0.18
5	3	2	4	3	3	2	2	15	3	0.91	4	2	0.75	19	3	0.88
6	5	6	10	8	10	4	1	39	8	2.38	5	3	0.94	44	6	2.03
7	26	30	32	30	21	12	4	139	28	8.47	16	8	3.02	155	22	7.14
8	32	35	24	36	35	29	7	162	32	9.87	36	18	6.79	198	28	9.12
9	25	24	16	14	26	31	16	105	21	6.40	47	24	8.87	152	22	7.00
10	21	10	22	15	23	26	23	91	18	5.55	49	25	9.25	140	20	6.45
11	17	19	26	22	20	16	16	104	21	6.34	32	16	6.04	136	19	6.26
12	20	15	21	20	25	18	14	101	20	6.15	32	16	6.04	133	19	6.13
13	18	13	14	17	16	21	16	78	16	4.75	37	19	6.98	115	16	5.30
14	25	27	21	23	26	16	20	122	24	7.43	36	18	6.79	158	23	7.28
15	19	22	24	21	20	26	19	106	21	6.46	45	23	8.49	151	22	6.96
16	32	34	31	37	38	22	15	172	34	10.48	37	19	6.98	209	30	9.63
17	24	32	25	27	23	20	24	131	26	7.98	44	22	8.30	175	25	8.06
18	21	23	20	30	18	10	19	112	22	6.83	29	15	5.47	141	20	6.49
19	15	18	7	7	16	16	10	63	13	3.84	26	13	4.91	89	13	4.10
20	9	5	11	15	11	3	7	51	10	3.11	10	5	1.89	61	9	2.81
21	6	3	3	4	2	9	4	18	4	1.10	13	7	2.45	31	4	1.43
22	2	1	4	0	5	8	3	12	2	0.73	11	6	2.08	23	3	1.06
23	4	1	4	2	3	9	2	14	3	0.85	11	6	2.08	25	4	1.15
DAY TOT	324	322	321	332	342	301	229	1641	328	100.00	530	265	100.00	2171	310	100.00
MAX	32	35	32	37	38	31	24	AWT =	328		AWE =	265		ADT =	310	

Appendix C

SIDRA RESULTS

DETAILED OUTPUT

New Site
Giveway / Yield (Two-Way)

Movements

Movement Capacity Parameters
Site:Denilenko Street AM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

Mov ID	Demand Flow veh/h	HV %	Opposing Movement Flow veh/h	Opposing Movement HV %	Adjust. Flow pcu/h	Total Cap. veh/h	Prac. Deg. Satn xp	Prac. Spare Cap. %	Lane Util %	Deg. Satn x
South: Denilenko St South										
11 T	1	0.0	0			181	0.80	****	100	0.006
12 R	7	0.0	36+	0.0	36	1264	0.80	****	100	0.006
East: New Road										
1 L	60	0.0	5	0.0	5	1174	0.80	1465	100	0.051*
3 R	1	0.0	13	0.0	13	20	0.80	1500	100	0.050
North: Denilenko Street North										
4 L	1	0.0	0			322	0.80	****	100	0.003
5 T	5	0.0	0			1612	0.80	****	100	0.003

* Maximum degree of saturation
\+ Percentage of exiting flow included in total opposing flow

Movement Performance
Site:Denilenko Street AM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

Mov ID	Total Delay (veh-h/h)	Total Delay (pers-h/h)	Aver. Delay (sec)	Eff. Stop Rate	Total Stops	Perf. Index	Tot.Trav. Distance (veh-km/h)	Tot.Trav. Time (veh-h/h)	Aver. Speed (km/h)
South: Denilenko St South									
11 T	0.00	0.00	0.1	0.00	0.0	0.01	0.5	0.0	48.2
12 R	0.01	0.02	6.9	0.63	4.4	0.13	4.0	0.1	42.6
East: New Road									
1 L	0.11	0.13	6.4	0.59	35.7	1.07	34.6	0.8	43.2
3 R	0.00	0.00	6.9	0.67	0.7	0.02	0.6	0.0	42.8
North: Denilenko Street North									
4 L	0.00	0.00	8.5	1.01	1.0	0.02	0.6	0.0	41.7
5 T	0.00	0.00	0.0	0.00	0.0	0.05	2.7	0.1	50.0

Fuel Consumption, Emissions and Cost (Total)
Site:Denilenko Street AM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

Mov ID	Cost Total $/h	Fuel Total L/h	CO2 Total kg/h	CO Total kg/h	HC Total kg/h	NOX Total kg/h
South: Denilenko St South						
11 T	0.32	0.0	0.1	0.00	0.000	0.000
12 R	2.91	0.4	1.0	0.07	0.002	0.002

3 R	0.41	0.1	0.1	0.01	0.000	0.000
	25.02	3.5	8.7	0.62	0.015	0.018
North: Denilenko Street North						
4 L	0.44	0.1	0.1	0.01	0.000	0.000
5 T	1.58	0.2	0.5	0.02	0.001	0.001
	2.01	0.3	0.6	0.03	0.001	0.001
INTERSECTION:	30.25	4.2	10.4	0.72	0.017	0.022

Fuel Consumption, Emissions and Cost (Rate)
Site:Denilenko Street AM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

Mov ID	Cost Rate $/km	Fuel Rate L/100km	CO2 Rate g/km	CO Rate g/km	HC Rate g/km	NOX Rate g/km
South: Denilenko St South						
11 T	0.62	7.6	191.0	7.81	0.286	0.319
12 R	0.72	10.1	253.0	18.43	0.428	0.537
	0.71	9.8	246.0	17.23	0.412	0.513
East: New Road						
1 L	0.71	9.9	247.6	17.56	0.415	0.520
3 R	0.72	10.1	252.1	18.33	0.427	0.535
	0.71	9.9	247.6	17.57	0.415	0.521
North: Denilenko Street North						
4 L	0.73	9.9	248.2	17.30	0.416	0.514
5 T	0.59	7.1	178.7	6.13	0.260	0.281
	0.62	7.7	191.4	8.16	0.288	0.324
INTERSECTION:	0.70	9.7	243.2	16.82	0.405	0.505

Intersection Negotiation Data
Site:Denilenko Street AM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

From Approach	To Approach	Turn	Negn Radius m	Negn Speed km/h	Negn Dist. m	Appr. Dist. m	Downstream Distance m	Downstream Distance User Spec?
South: Denilenko St South								
	East	Right	7.0	17.6	11.0	500	72	No
	North	Thru	S	50.0	10.3	500	72	No
East: New Road								
	South	Left	10.0	20.2	15.7	500	76	No
	North	Right	7.0	17.6	11.0	500	72	No
North: Denilenko Street North								
	South	Thru	S	50.0	10.3	500	77	No
	East	Left	10.0	20.2	15.7	500	77	No

Downstream distance is distance travelled from the stopline until exit cruise speed is reached (includes negotiation distance). Acceleration distance is weighted for light and heavy vehicles. The same distance applies for both stopped and unstopped vehicles.

Give-Way Sign Controlled Intersection

Mov ID	App. Speeds Cruise	App. Speeds Negn	Exit Speeds Negn	Exit Speeds Cruise	Queue Move-up 1st Grn	Queue Move-up 2nd Grn	Av. Section Spd Running	Av. Section Spd Overall	Geom Delay sec
South: Denilenko St South									
11 T	50.0	50.0	50.0	50.0			48.2	48.2	0.0
12 R	50.0	17.6	17.6	50.0			42.6	42.6	6.8
East: New Road									
1 L	50.0	20.2	20.2	50.0			43.2	43.2	6.4
3 R	50.0	17.6	17.6	50.0			42.8	42.8	6.8
North: Denilenko Street North									
4 L	50.0	20.2	20.2	50.0			41.7	41.7	8.5
5 T	50.0	50.0	50.0	50.0			50.0	50.0	0.0

"Running Speed" is the average speed excluding stopped periods.

Gap Acceptance Parameters
Site:Denilenko Street AM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

Mov ID	Mov Type	Opng Flow pcu/h	Critical Gap Hdwy sec	Critical Gap Dist m	Foll-up Headway sec	Entry HV Equiv	Intra Bunch Hdwy sec	Propn Bnchd
South: Denilenko St South								
12 R	Normal	36+	4.50	28.0	2.50	2.00	0.90	0.002
East: New Road								
1 L	Normal	5	5.00	69.4	3.00	2.00	1.80	0.001
3 R	Normal	13	5.00	45.2	3.00	2.00	0.90	0.001
North: Denilenko Street North								
No opposed movements on this approach.								

Values in this table are adjusted for heavy vehicles in the entry stream.
+ Percentage of exiting flow included in total opposing flow

Lanes

Lane Performance
Site:Denilenko Street AM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

Lane No.	Flow veh/h	Cap veh/h	Deg. Satn x	Aver. Delay sec	Eff. Stop Rate	Queue 95% Back veh	Queue 95% Back m	Lane Length m
South: Denilenko St South								
1 TR	8	1445	0.006	6.1	0.56	0.0	0.2	200.0
East: New Road								
1 LR	61	1194	0.051	6.4	0.60	0.2	1.6	150.0
North: Denilenko Street North								
1 LT	6	1934	0.003	1.4	0.17	0.0	0.0	200.0

Give-Way Sign Controlled Intersection

Lane No.	Dem Flow (veh/h) Lef	Thru	Rig	Tot	Min Cap veh/h	Tot Cap veh/h	Deg. Satn x	Lane Util %
South: Denilenko St South								
1 TR	0	1	7	8	8	1445	0.006	100
East: New Road								
1 LR	60	0	1	61	60	1194	0.051	100
North: Denilenko Street North								
1 LT	1	5	0	6	6	1934	0.003	100

The capacity value for priority and continuous movements is obtained by adjusting the basic saturation flow for heavy vehicle and turning vehicle effects. Saturation flow scale applies if specified.

Lane, Approach and Intersection Performance
Site:Denilenko Street AM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

Lane No.	Demand Flow (veh/h) L	T	R	Tot	%HV	Adj. Basic Satf.	Eff Grn (sec) 1st	2nd	Deg Sat x	Aver. Delay sec	Longest Queue m	Shrt Lane m
South: Denilenko St South												
1 TR		1	7	8	0				0.006	6.1	0	200
	0	1	7	8	0				0.006	6.1	0	
East: New Road												
1 LR	60		1	61	0				0.051	6.4	2	150
	60	0	1	61	0				0.051	6.4	2	
North: Denilenko Street North												
1 LT	1	5		6	0				0.003	1.4	0	200
	1	5	0	6	0				0.003	1.4		

ALL VEHICLES	Total Flow	% HV	Max X	Aver. Delay	Max Queue
	75	0	0.051	6.0	2

Peak flow period = 60 minutes.

Queue values in this table are 95% queue (metres)
Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Driver Characteristics
Site:Denilenko Street AM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

Lane No.	Satn Speed km/h	Satn Flow veh/h	Satn Hdwy sec	Satn Spacing m	Average Queue Space m	Driver Response Time sec
South: Denilenko St South						
1 TR	NA - Major Road Movement					
East: New Road						
1 LR	20.1	1200	3.00	16.77	7.00	1.75

Lane Delays
Site:Denilenko Street AM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

Lane No.	Deg. Satn x	Delay (seconds/veh) Stop-line 1st d1	Stop-line 2nd d2	Delay Total dSL	Acc. Dec. dn	Queuing Total dq	Queuing MvUp dqm	Stopd (Idle) di	Geom dig	Control dic
South: Denilenko St South										
1 TR	0.006	0.1	0.0	0.1	0.4	0.0	0.0	0.0	6.0	6.1
East: New Road										
1 LR	0.051	0.0	0.0	0.0	0.1	0.0	0.0	0.0	6.4	6.4
North: Denilenko Street North										
1 LT	0.003	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	1.4

dn is average stop-start delay for all vehicles queued and unqueued

Lane Queues (Vehicles)
Site:Denilenko Street AM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

Lane No.	Deg. Satn x	Ovrfl. Queue No	Back of Queue (veh) Nb1	Nb2	Nb	95%	Queue Stor. Ratio	Prob. Block %	P'ile Block %	Cyc-Av. Queue Nc	95%
South: Denilenko St South											
1 TR	0.006	0.0	0.0	0.0	0.0	0.0	0.00	0.0	100.0	0.0	0.0
East: New Road											
1 LR	0.051	0.0	0.1	0.0	0.1	0.2	0.01	0.0	100.0	0.0	0.0
North: Denilenko Street North											
1 LT	0.003	0.0	0.0	0.0	0.0	0.0	0.00	0.0	100.0	0.0	0.0

Lane Queues (Distance)
Site:Denilenko Street AM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

Lane No.	Deg. Satn x	Ovrfl. Queue No	Back of Queue (m) Nb1	Nb2	Nb	95%	Queue Stor. Ratio	Prob. Block %	P'ile Block %	Cyc-Av. Queue Nc	95%
South: Denilenko St South											
1 TR	0.006	0.0	0.1	0.0	0.1	0.2	0.00	0.0	100.0	0.0	0.0
East: New Road											
1 LR	0.051	0.0	0.5	0.0	0.5	1.6	0.01	0.0	100.0	0.0	0.0
North: Denilenko Street North											
1 LT	0.003	0.0	0.0	0.0	0.0	0.0	0.00	0.0	100.0	0.0	0.0

Lane Queue Percentiles (Vehicles)
Site:Denilenko Street AM Peak

Intersection ID: 1

No.	x	50%	70%	85%	90%	95%	98%
South: Denilenko St South							
1 TR	0.006	0.0	0.0	0.0	0.0	0.0	0.0
East: New Road							
1 LR	0.051	0.1	0.1	0.2	0.2	0.2	0.3
North: Denilenko Street North							
1 LT	0.003	0.0	0.0	0.0	0.0	0.0	0.0

Lane Queue Percentiles (Distance)
Site:Denilenko Street AM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

Lane No.	Deg. Satn x	Percentile (metres) 50%	70%	85%	90%	95%	98%
South: Denilenko St South							
1 TR	0.006	0.1	0.1	0.1	0.2	0.2	0.2
East: New Road							
1 LR	0.051	0.5	0.7	1.1	1.3	1.6	1.9
North: Denilenko Street North							
1 LT	0.003	0.0	0.0	0.0	0.0	0.0	0.0

Lane Stops
Site:Denilenko Street AM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

Lane No.	Deg. Satn x	-- Effective Stop Rate -- he1	he2	Geom. hig	Overall h	Total Stops H	Queue Move-up Rate hqm	Total Queue Move-ups Hqm	Prop. Queued pq
South: Denilenko St South									
1 TR	0.006	0.02	0.00	0.53	0.56	4.4	0.00	0.0	0.11
East: New Road									
1 LR	0.051	0.00	0.00	0.59	0.60	36.3	0.00	0.0	0.03
North: Denilenko Street North									
1 LT	0.003	0.00	0.00	0.17	0.17	1.0	0.00	0.0	0.00

hig is the average value for all movements in a shared lane
hqm is average queue move-up rate for all vehicles queued and unqueued

Flow Rates and Demand Analysis

Movement Definitions and Flow Rates (O-D)
Site:Denilenko Street AM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

From Approach	To Approach	Mov ID	Turn	Flow Rate LV	HV	Flow Scale Fixed	Var	Peak Flow Factor

```
           North         3   Right     1     0    1.00   1.00     1.00
 -----------------------------------------------------------------------
 North: Denilenko Street North
           South         5   Thru      5     0    1.00   1.00     1.00
           East          4   Left      1     0    1.00   1.00     1.00
 -----------------------------------------------------------------------
Unit Time for Volumes =  60 minutes
Peak Flow Period =  60 minutes
Flow Rates include effects of Flow Scale and Peak Flow Factor
```

Flow Rates (Separate Light and Heavy Vehicles)
Site:Denilenko Street AM Peak

```
Intersection ID: 1
Give-Way Sign Controlled Intersection

-----------------------------------------------
  Mov          Left       Through       Right
  ID        ---------    ---------    ---------
             LV    HV     LV    HV     LV    HV
-----------------------------------------------
Demand flows in veh/h as used by the program
South: Denilenko St South
   11 T       0     0      1     0      0     0
   12 R       0     0      0     0      7     0
-----------------------------------------------
East: New Road
    1 L      60     0      0     0      0     0
    3 R       0     0      0     0      1     0
-----------------------------------------------
North: Denilenko Street North
    4 L       1     0      0     0      0     0
    5 T       0     0      5     0      0     0
-----------------------------------------------
Unit Time for Volumes =  60 minutes
Peak Flow Period =  60 minutes
Flow Rates include effects of Flow Scale and Peak Flow Factor
```

Flow Rates (Total Vehicles and Percent Heavy)
Site:Denilenko Street AM Peak

```
Intersection ID: 1
Give-Way Sign Controlled Intersection

--------------------------------------------------
  Mov          Left        Through        Right
  ID        ----------    ----------    ----------
            Total  %HV    Total  %HV    Total  %HV
--------------------------------------------------
Demand flows in veh/h as used by the program
South: Denilenko St South
   11 T        0   0.0       1   0.0       0   0.0
   12 R        0   0.0       0   0.0       7   0.0
--------------------------------------------------
East: New Road
    1 L       60   0.0       0   0.0       0   0.0
    3 R        0   0.0       0   0.0       1   0.0
--------------------------------------------------
North: Denilenko Street North
    4 L        1   0.0       0   0.0       0   0.0
    5 T        0   0.0       5   0.0       0   0.0
--------------------------------------------------
Unit Time for Volumes =  60 minutes
Peak Flow Period =  60 minutes
Flow Rates include effects of Flow Scale and Peak Flow Factor
```

Other

Model Settings
Site:Denilenko Street AM Peak

```
* Basic Parameters:
  Intersection Type: Unsignalised - Give Way
  Driving on the left-hand side of the road
  Input data specified in Metric units
  Model Defaults: RTA NSW
  Peak Flow Period (for performance): 60 minutes
  Unit time (for volumes): 60 minutes.
  SIDRA Standard Delay model used
  SIDRA Standard Queue model used
  Level of Service based on: Delay (RTA NSW)
  Queue percentile: 95%
```

Parameters Used in Cost Calculations
Site:Denilenko Street AM Peak

```
Intersection ID: 1
Give-Way Sign Controlled Intersection


   Pump price of fuel ($/L)                =     1.200
   Fuel resource cost factor               =      0.50
   Ratio of running cost to fuel cost      =       3.0
   Average income ($/h)                    =     32.00
   Time value factor                       =      0.60
   Light vehicle mass (1000 kg)            =       1.4
   Heavy vehicle mass (1000 kg)            =      11.0
   Light vehicle idle fuel rate (L/h)      =     1.350
   Heavy vehicle idle fuel rate (L/h)      =     2.000
```

Diagnostics
Site:Denilenko Street AM Peak

New Site
Giveway / Yield (Two-Way)

Movements

Movement Capacity Parameters
Site:Denilenko Street PM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

Mov ID	Demand Flow veh/h	HV %	Opposing Movement Flow veh/h	HV %	Adjust. Flow pcu/h	Total Cap. veh/h	Prac. Deg. Satn xp	Prac. Spare Cap. %	Lane Util %	Deg. Satn x
South: Denilenko St South										
11 T	5	0.0	0			113	0.80	1708	100	0.044*
12 R	60	0.0	6+	0.0	6	1350	0.80	1700	100	0.044*
East: New Road										
1 L	7	0.0	1	0.0	1	1040	0.80	****	100	0.007
3 R	1	0.0	66	0.0	66	149	0.80	****	100	0.007
North: Denilenko Street North										
4 L	1	0.0	0			951	0.80	****	100	0.001
5 T	1	0.0	0			951	0.80	****	100	0.001

* Maximum degree of saturation
\+ Percentage of exiting flow included in total opposing flow

Movement Performance
Site:Denilenko Street PM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

Mov ID	Total Delay (veh-h/h)	Total Delay (pers-h/h)	Aver. Delay (sec)	Eff. Stop Rate	Total Stops	Perf. Index	Tot.Trav. Distance (veh-km/h)	Tot.Trav. Time (veh-h/h)	Aver. Speed (km/h)
South: Denilenko St South									
11 T	0.00	0.00	0.0	0.00	0.0	0.06	2.6	0.1	49.4
12 R	0.11	0.13	6.7	0.65	38.8	1.08	34.4	0.8	42.9
East: New Road									
1 L	0.01	0.02	6.4	0.60	4.2	0.12	4.0	0.1	43.3
3 R	0.00	0.00	6.8	0.68	0.7	0.02	0.6	0.0	42.9
North: Denilenko Street North									
4 L	0.00	0.00	7.3	0.79	0.8	0.02	0.6	0.0	42.6
5 T	0.00	0.00	0.0	0.00	0.0	0.01	0.5	0.0	50.0

Fuel Consumption, Emissions and Cost (Total)
Site:Denilenko Street PM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

Mov ID	Cost Total $/h	Fuel Total L/h	CO2 Total kg/h	CO Total kg/h	HC Total kg/h	NOX Total kg/h
South: Denilenko St South						
11 T	1.53	0.2	0.5	0.02	0.001	0.001
12 R	24.71	3.5	8.7	0.63	0.015	0.018

3 R	0.41	0.1	0.1	0.01	0.000	0.000
	3.28	0.5	1.1	0.08	0.002	0.002
North: Denilenko Street North						
4 L	0.42	0.1	0.1	0.01	0.000	0.000
5 T	0.31	0.0	0.1	0.00	0.000	0.000
	0.73	0.1	0.2	0.01	0.000	0.000
INTERSECTION:	30.25	4.2	10.5	0.74	0.018	0.022

Fuel Consumption, Emissions and Cost (Rate)
Site:Denilenko Street PM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

Mov ID	Cost Rate $/km	Fuel Rate L/100km	CO2 Rate g/km	CO Rate g/km	HC Rate g/km	NOX Rate g/km
South: Denilenko St South						
11 T	0.60	7.3	182.9	6.70	0.269	0.294
12 R	0.72	10.1	252.1	18.35	0.426	0.535
	0.71	9.9	247.3	17.54	0.416	0.519
East: New Road						
1 L	0.71	9.9	247.1	17.50	0.414	0.519
3 R	0.72	10.1	251.8	18.30	0.426	0.534
	0.71	9.9	247.7	17.60	0.415	0.521
North: Denilenko Street North						
4 L	0.72	9.9	247.6	17.40	0.414	0.516
5 T	0.59	7.1	178.7	6.13	0.260	0.281
	0.66	8.6	215.0	12.07	0.341	0.405
INTERSECTION:	0.71	9.9	246.5	17.41	0.414	0.516

Intersection Negotiation Data
Site:Denilenko Street PM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

From Approach	To Approach	Turn	Negn Radius m	Negn Speed km/h	Negn Dist. m	Appr. Dist. m	Downstream Distance m	Downstream Distance User Spec?
South: Denilenko St South								
	East	Right	7.0	17.6	11.0	500	72	No
	North	Thru	S	50.0	10.3	500	72	No
East: New Road								
	South	Left	10.0	20.2	15.7	500	76	No
	North	Right	7.0	17.6	11.0	500	72	No
North: Denilenko Street North								
	South	Thru	S	50.0	10.3	500	75	No
	East	Left	10.0	20.2	15.7	500	75	No

Downstream distance is distance travelled from the stopline until exit cruise speed is reached (includes negotiation distance). Acceleration distance is weighted for light and heavy vehicles. The same distance applies for both stopped and unstopped vehicles.

Give-Way Sign Controlled Intersection

Mov ID	App. Speeds Cruise	App. Speeds Negn	Exit Speeds Negn	Exit Speeds Cruise	Queue Move-up 1st Grn	Queue Move-up 2nd Grn	Av. Section Spd Running	Av. Section Spd Overall	Geom Delay sec
South: Denilenko St South									
11 T	50.0	50.0	50.0	50.0			49.4	49.4	0.0
12 R	50.0	17.6	17.6	50.0			42.9	42.9	6.7
East: New Road									
1 L	50.0	20.2	20.2	50.0			43.3	43.3	6.4
3 R	50.0	17.6	17.6	50.0			42.9	42.9	6.8
North: Denilenko Street North									
4 L	50.0	20.2	20.2	50.0			42.6	42.6	7.3
5 T	50.0	50.0	50.0	50.0			50.0	50.0	0.0

"Running Speed" is the average speed excluding stopped periods.

Gap Acceptance Parameters
Site:Denilenko Street PM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

Mov ID	Mov Type	Opng Flow pcu/h	Critical Gap Hdwy sec	Critical Gap Dist m	Foll-up Headway sec	Entry HV Equiv	Intra Bunch Hdwy sec	Propn Bnchd
South: Denilenko St South								
12 R	Normal	6+	4.50	29.4	2.50	2.00	0.90	0.000
East: New Road								
1 L	Normal	1	5.00	69.4	3.00	2.00	1.80	0.000
3 R	Normal	66	5.00	28.5	3.00	2.00	0.90	0.003
North: Denilenko Street North								
No opposed movements on this approach.								

Values in this table are adjusted for heavy vehicles in the entry stream.
\+ Percentage of exiting flow included in total opposing flow

Lanes

Lane Performance
Site:Denilenko Street PM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

Lane No.	Flow veh/h	Cap veh/h	Deg. Satn x	Aver. Delay sec	Eff. Stop Rate	Queue 95% Back veh	Queue 95% Back m	Lane Length m
South: Denilenko St South								
1 TR	65	1463	0.044	6.2	0.60	0.2	1.6	200.0
East: New Road								
1 LR	8	1189	0.007	6.5	0.61	0.0	0.2	150.0
North: Denilenko Street North								
1 LT	2	1902	0.001	3.7	0.40	0.0	0.0	200.0

Give-Way Sign Controlled Intersection

Lane No.	Dem Flow (veh/h) Lef	Thru	Rig	Tot	Min Cap veh/h	Tot Cap veh/h	Deg. Satn x	Lane Util %
South: Denilenko St South								
1 TR	0	5	60	65	60	1463	0.044	100
East: New Road								
1 LR	7	0	1	8	8	1189	0.007	100
North: Denilenko Street North								
1 LT	1	1	0	2	2	1902	0.001	100

The capacity value for priority and continuous movements is obtained by adjusting the basic saturation flow for heavy vehicle and turning vehicle effects. Saturation flow scale applies if specified.

Lane, Approach and Intersection Performance
Site:Denilenko Street PM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

Lane No.	Demand Flow (veh/h) L	T	R	Tot	%HV	Adj. Basic Satf.	Eff Grn (sec) 1st	2nd	Deg Sat x	Aver. Delay sec	Longest Queue m	Shrt Lane m
South: Denilenko St South												
1 TR		5	60	65	0				0.044	6.2	2	200
	0	5	60	65	0				0.044	6.2	2	
East: New Road												
1 LR	7		1	8	0				0.007	6.5	0	150
	7	0	1	8	0				0.007	6.5	0	
North: Denilenko Street North												
1 LT	1	1		2	0				0.001	3.7	0	200
	1	1	0	2	0				0.001	3.7		

ALL VEHICLES	Total Flow	% HV	Max X	Aver. Delay	Max Queue
	75	0	0.044	6.2	2

Peak flow period = 60 minutes.

Queue values in this table are 95% queue (metres)
Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Driver Characteristics
Site:Denilenko Street PM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

Lane No.	Satn Speed km/h	Satn Flow veh/h	Satn Hdwy sec	Satn Spacing m	Average Queue Space m	Driver Response Time sec
South: Denilenko St South						
1 TR	NA - Major Road Movement					
East: New Road						
1 LR	19.8	1200	3.00	16.54	7.00	1.73

Lane Delays
Site:Denilenko Street PM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

Lane No.	Deg. Satn x	Stop-line Delay 1st d1	2nd d2	Total dSL	Acc. Dec. dn	Queuing Total dq	MvUp dqm	Stopd (Idle) di	Geom dig	Control dic
South: Denilenko St South										
1 TR	0.044	0.0	0.0	0.0	0.1	0.0	0.0	0.0	6.2	6.2
East: New Road										
1 LR	0.007	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6.5	6.5
North: Denilenko Street North										
1 LT	0.001	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.7	3.7

Delay (seconds/veh)

dn is average stop-start delay for all vehicles queued and unqueued

Lane Queues (Vehicles)
Site:Denilenko Street PM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

Lane No.	Deg. Satn x	Ovrfl. Queue No	Back of Queue (veh) Nb1	Nb2	Nb	95%	Queue Stor. Ratio	Prob. Block %	P'ile Block %	Cyc-Av. Queue Nc	95%
South: Denilenko St South											
1 TR	0.044	0.0	0.1	0.0	0.1	0.2	0.01	0.0	100.0	0.0	0.0
East: New Road											
1 LR	0.007	0.0	0.0	0.0	0.0	0.0	0.00	0.0	100.0	0.0	0.0
North: Denilenko Street North											
1 LT	0.001	0.0	0.0	0.0	0.0	0.0	0.00	0.0	100.0	0.0	0.0

Lane Queues (Distance)
Site:Denilenko Street PM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

Lane No.	Deg. Satn x	Ovrfl. Queue No	Back of Queue (m) Nb1	Nb2	Nb	95%	Queue Stor. Ratio	Prob. Block %	P'ile Block %	Cyc-Av. Queue Nc	95%
South: Denilenko St South											
1 TR	0.044	0.0	0.5	0.0	0.5	1.6	0.01	0.0	100.0	0.0	0.0
East: New Road											
1 LR	0.007	0.0	0.1	0.0	0.1	0.2	0.00	0.0	100.0	0.0	0.0
North: Denilenko Street North											
1 LT	0.001	0.0	0.0	0.0	0.0	0.0	0.00	0.0	100.0	0.0	0.0

Lane Queue Percentiles (Vehicles)
Site:Denilenko Street PM Peak

Intersection ID: 1

Lane No.	Deg. Satn x	50%	70%	85%	90%	95%	98%
South: Denilenko St South							
1 TR	0.044	0.1	0.1	0.2	0.2	0.2	0.3
East: New Road							
1 LR	0.007	0.0	0.0	0.0	0.0	0.0	0.0
North: Denilenko Street North							
1 LT	0.001	0.0	0.0	0.0	0.0	0.0	0.0

Lane Queue Percentiles (Distance)
Site:Denilenko Street PM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

Lane	Deg. Satn	Percentile (metres)					
No.	x	50%	70%	85%	90%	95%	98%
South: Denilenko St South							
1 TR	0.044	0.5	0.7	1.1	1.3	1.6	1.9
East: New Road							
1 LR	0.007	0.1	0.1	0.1	0.2	0.2	0.2
North: Denilenko Street North							
1 LT	0.001	0.0	0.0	0.0	0.0	0.0	0.0

Lane Stops
Site:Denilenko Street PM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

Lane	Deg. Satn	-- Effective Stop Rate --				Total Stops	Queue Move-up Rate	Total Queue Move-ups	Prop. Queued
No.	x	he1	he2	Geom. hig	Overall h	H	hqm	Hqm	pq
South: Denilenko St South									
1 TR	0.044	0.00	0.00	0.59	0.60	38.8	0.00	0.0	0.04
East: New Road									
1 LR	0.007	0.00	0.00	0.61	0.61	4.9	0.00	0.0	0.01
North: Denilenko Street North									
1 LT	0.001	0.00	0.00	0.40	0.40	0.8	0.00	0.0	0.00

hig is the average value for all movements in a shared lane
hqm is average queue move-up rate for all vehicles queued and unqueued

Flow Rates and Demand Analysis

Movement Definitions and Flow Rates (O-D)
Site:Denilenko Street PM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

From Approach	To Approach	Mov ID	Turn	Flow Rate LV	Flow Rate HV	Flow Scale Fixed	Flow Scale Var	Peak Flow Factor

```
          North         3   Right     1     0    1.00   1.00      1.00
-----------------------------------------------------------------------
 North: Denilenko Street North
          South         5   Thru      1     0    1.00   1.00      1.00
          East          4   Left      1     0    1.00   1.00      1.00
-----------------------------------------------------------------------
Unit Time for Volumes =  60 minutes
Peak Flow Period =  60 minutes
Flow Rates include effects of Flow Scale and Peak Flow Factor
```

Flow Rates (Separate Light and Heavy Vehicles)
Site:Denilenko Street PM Peak

```
Intersection ID: 1
Give-Way Sign Controlled Intersection

-----------------------------------------------
  Mov          Left       Through       Right
  ID        ---------    ---------    ---------
             LV    HV     LV    HV     LV    HV
-----------------------------------------------
Demand flows in veh/h as used by the program
South: Denilenko St South
   11 T       0     0      5     0      0     0
   12 R       0     0      0     0     60     0
-----------------------------------------------
East: New Road
    1 L       7     0      0     0      0     0
    3 R       0     0      0     0      1     0
-----------------------------------------------
North: Denilenko Street North
    4 L       1     0      0     0      0     0
    5 T       0     0      1     0      0     0
-----------------------------------------------
Unit Time for Volumes =  60 minutes
Peak Flow Period =  60 minutes
Flow Rates include effects of Flow Scale and Peak Flow Factor
```

Flow Rates (Total Vehicles and Percent Heavy)
Site:Denilenko Street PM Peak

```
Intersection ID: 1
Give-Way Sign Controlled Intersection

--------------------------------------------------
  Mov          Left        Through        Right
  ID        ----------    ----------    ----------
            Total  %HV    Total  %HV    Total  %HV
--------------------------------------------------
Demand flows in veh/h as used by the program
South: Denilenko St South
   11 T        0   0.0       5   0.0       0   0.0
   12 R        0   0.0       0   0.0      60   0.0
--------------------------------------------------
East: New Road
    1 L        7   0.0       0   0.0       0   0.0
    3 R        0   0.0       0   0.0       1   0.0
--------------------------------------------------
North: Denilenko Street North
    4 L        1   0.0       0   0.0       0   0.0
    5 T        0   0.0       1   0.0       0   0.0
--------------------------------------------------
Unit Time for Volumes =  60 minutes
Peak Flow Period =  60 minutes
Flow Rates include effects of Flow Scale and Peak Flow Factor
```

Other

Model Settings
Site:Denilenko Street PM Peak

```
* Basic Parameters:
  Intersection Type: Unsignalised - Give Way
  Driving on the left-hand side of the road
  Input data specified in Metric units
  Model Defaults: RTA NSW
  Peak Flow Period (for performance): 60 minutes
  Unit time (for volumes): 60 minutes.
  SIDRA Standard Delay model used
  SIDRA Standard Queue model used
  Level of Service based on: Delay (RTA NSW)
  Queue percentile: 95%
```

Parameters Used in Cost Calculations
Site:Denilenko Street PM Peak

```
Intersection ID: 1
Give-Way Sign Controlled Intersection


   Pump price of fuel ($/L)                   =     1.200
   Fuel resource cost factor                  =      0.50
   Ratio of running cost to fuel cost         =       3.0
   Average income ($/h)                       =     32.00
   Time value factor                          =      0.60
   Light vehicle mass (1000 kg)               =       1.4
   Heavy vehicle mass (1000 kg)               =      11.0
   Light vehicle idle fuel rate (L/h)         =     1.350
   Heavy vehicle idle fuel rate (L/h)         =     2.000
```

Diagnostics
Site:Denilenko Street PM Peak

DETAILED OUTPUT

Site: Wellington Road AM Peak

New Site
Giveway / Yield (Two-Way)

Movements

Movement Capacity Parameters
Site:Wellington Road AM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

Mov ID	Demand Flow veh/h	HV %	Opposing Movement Flow veh/h	HV %	Adjust. Flow pcu/h	Total Cap. veh/h	Prac. Deg. Satn xp	Prac. Spare Cap. %	Lane Util %	Deg. Satn x
South: Wellington Road South										
1 L	4	0.0	0			247	0.80	4840	100	0.016
2 T	25	15.0	0			1541	0.80	4831	100	0.016
North: Wellington Road North										
8 T	39	15.0	0			1721	0.80	3430	100	0.023
9 R	1	0.0	29	12.9	31	44	0.80	3420	100	0.023
West: New Street										
10 L	3	0.0	27+	13.9	29	74	0.80	1873	100	0.041*
12 R	36	0.0	67+	14.3	73	891	0.80	1880	100	0.040

* Maximum degree of saturation
\+ Percentage of exiting flow included in total opposing flow

Movement Performance
Site:Wellington Road AM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

Mov ID	Total Delay (veh-h/h)	Total Delay (pers-h/h)	Aver. Delay (sec)	Eff. Stop Rate	Total Stops	Perf. Index	Tot.Trav. Distance (veh-km/h)	Tot.Trav. Time (veh-h/h)	Aver. Speed (km/h)
South: Wellington Road South									
1 L	0.02	0.02	15.0	1.46	5.8	0.08	2.4	0.0	50.4
2 T	0.03	0.03	3.8	0.26	6.5	0.24	14.0	0.2	68.0
North: Wellington Road North									
8 T	0.04	0.05	3.9	0.26	10.0	0.41	22.3	0.3	66.0
9 R	0.01	0.01	18.5	1.77	1.8	0.02	0.6	0.0	46.9
West: New Street									
10 L	0.01	0.01	6.4	0.52	1.6	0.07	2.0	0.1	39.5
12 R	0.06	0.08	6.4	0.60	21.5	0.84	24.4	0.6	39.5

Fuel Consumption, Emissions and Cost (Total)
Site:Wellington Road AM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

Mov ID	Cost Total $/h	Fuel Total L/h	CO2 Total kg/h	CO Total kg/h	HC Total kg/h	NOX Total kg/h
South: Wellington Road South						
1 L	1.46	0.2	0.5	0.02	0.001	0.001
2 T	7.05	1.3	3.2	0.05	0.003	0.005

9 R	0.40	0.1	0.1	0.01	0.000	0.000
	12.10	2.2	5.5	0.13	0.006	0.009
West: New Street						
10 L	1.73	0.3	0.8	0.08	0.001	0.002
12 R	20.73	3.6	9.1	0.94	0.017	0.023
	22.46	3.9	9.8	1.01	0.018	0.025
INTERSECTION:	43.06	7.6	19.0	1.22	0.029	0.040

Fuel Consumption, Emissions and Cost (Rate)
Site:Wellington Road AM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

Mov ID	Cost Rate $/km	Fuel Rate L/100km	CO2 Rate g/km	CO Rate g/km	HC Rate g/km	NOX Rate g/km
South: Wellington Road South						
1 L	0.61	8.5	213.7	10.21	0.346	0.475
2 T	0.50	9.0	226.9	3.59	0.246	0.347
	0.52	9.0	225.0	4.55	0.260	0.365
North: Wellington Road North						
8 T	0.53	9.6	240.9	5.70	0.272	0.398
9 R	0.65	9.0	224.9	11.57	0.372	0.502
	0.53	9.6	240.5	5.85	0.275	0.401
West: New Street						
10 L	0.85	14.8	369.9	37.98	0.685	0.942
12 R	0.85	14.9	372.3	38.40	0.690	0.952
	0.85	14.9	372.1	38.37	0.690	0.951
INTERSECTION:	0.66	11.5	289.5	18.59	0.438	0.613

Intersection Negotiation Data
Site:Wellington Road AM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

From Approach	To Approach	Turn	Negn Radius m	Negn Speed km/h	Negn Dist. m	Appr. Dist. m	Downstream Distance m	Downstream Distance User Spec?
South: Wellington Road South								
	North	Thru	S	50.0	10.3	500	89	No
	West	Left	10.0	20.2	15.7	500	62	No
North: Wellington Road North								
	South	Thru	S	50.0	10.3	500	88	No
	West	Right	6.5	17.1	10.2	500	71	No
West: New Street								
	South	Right	6.5	17.1	10.2	500	176	No
	North	Left	10.0	20.2	15.7	500	182	No

Downstream distance is distance travelled from the stopline until exit cruise speed is reached (includes negotiation distance). Acceleration distance is weighted for light and heavy vehicles. The same distance applies for both stopped and unstopped vehicles.

Give-Way Sign Controlled Intersection

Mov ID	App. Speeds Cruise	App. Speeds Negn	Exit Speeds Negn	Exit Speeds Cruise	Queue Move-up 1st Grn	Queue Move-up 2nd Grn	Av. Section Spd Running	Av. Section Spd Overall	Geom Delay sec
South: Wellington Road South									
1 L	80.0	20.2	20.2	40.0			50.4	50.4	15.0
2 T	80.0	50.0	50.0	50.0			68.0	68.0	3.8
North: Wellington Road North									
8 T	80.0	50.0	50.0	50.0			66.0	66.0	3.8
9 R	80.0	17.1	17.1	40.0			47.3	46.9	18.4
West: New Street									
10 L	40.0	20.2	20.2	80.0			39.5	39.5	6.0
12 R	40.0	17.1	17.1	80.0			39.5	39.5	6.1

"Running Speed" is the average speed excluding stopped periods.

Gap Acceptance Parameters
Site:Wellington Road AM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

Mov ID	Mov Type	Opng Flow pcu/h	Critical Gap Hdwy sec	Critical Gap Dist m	Foll-up Headway sec	Entry HV Equiv	Intra Bunch Hdwy sec	Propn Bnchd
South: Wellington Road South								
No opposed movements on this approach.								
North: Wellington Road North								
9 R	Normal	31	4.00	51.0	2.50	2.00	1.80P	0.003
West: New Street								
10 L	Normal	29+	5.00	63.7	3.00	2.00	1.80	0.003
12 R	Normal	73+	5.50	73.0	3.50	2.00	0.90	0.004

Values in this table are adjusted for heavy vehicles in the entry stream.
\+ Percentage of exiting flow included in total opposing flow
Priority sharing is implied for some movements (Follow-up Headway plus Intra-bunch Headway is larger than the Critical Gap).

Lanes

Lane Performance
Site:Wellington Road AM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

Lane No.	Flow veh/h	Cap veh/h	Deg. Satn x	Aver. Delay sec	Eff. Stop Rate	Queue 95% Back veh	Queue 95% Back m	Lane Length m
South: Wellington Road South								
1 LT	29	1787	0.016	5.4	0.42	0.0	0.0	500.0
North: Wellington Road North								
1 TR	40	1765	0.023	4.3	0.29	0.1	0.9	500.0
West: New Street								
1 LR	39	965	0.040	6.4	0.59	0.2	1.2	50.0

Intersection ID: 1
Give-Way Sign Controlled Intersection

Lane No.	Dem Flow (veh/h) Lef	Thru	Rig	Tot	Min Cap veh/h	Tot Cap veh/h	Deg. Satn x	Lane Util %
South: Wellington Road South								
1 LT	4	25	0	29	29	1787	0.016	100
North: Wellington Road North								
1 TR	0	39	1	40	40	1765	0.023	100
West: New Street								
1 LR	3	0	36	39	39	965	0.040	100

The capacity value for priority and continuous movements is obtained by adjusting the basic saturation flow for heavy vehicle and turning vehicle effects. Saturation flow scale applies if specified.

Lane, Approach and Intersection Performance
Site:Wellington Road AM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

Lane No.	Demand Flow (veh/h) L	T	R	Tot	%HV	Adj. Basic Satf.	Eff Grn (sec) 1st	2nd	Deg Sat x	Aver. Delay sec	Longest Queue m	Shrt Lane m
South: Wellington Road South												
1 LT	4	25		29	13				0.016	5.4	0	500
	4	25	0	29	13				0.016	5.4		
North: Wellington Road North												
1 TR		39	1	40	15				0.023	4.3	1	500
	0	39	1	40	15				0.023	4.3	1	
West: New Street												
1 LR	3		36	39	0				0.040	6.4	1	50
	3	0	36	39	0				0.040	6.4	1	

ALL VEHICLES	Total Flow	% HV	Max X	Aver. Delay	Max Queue
	108	9	0.041	5.4	1

Peak flow period = 60 minutes.

Queue values in this table are 95% queue (metres)
Note: Basic Saturation Flows are not adjusted at roundabouts or sign-controlled intersections and apply only to continuous lanes.

Driver Characteristics
Site:Wellington Road AM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

Lane No.	Satn Speed km/h	Satn Flow veh/h	Satn Hdwy sec	Satn Spacing m	Average Queue Space m	Driver Response Time sec
South: Wellington Road South						
1 LT	NA - Major Road Movement					
North: Wellington Road North						

Saturation Flow and Saturation Headway are derived from follow-up headway.

Lane Delays
Site:Wellington Road AM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

Lane No.	Deg. Satn x	Stop-line Delay 1st d1	Stop-line Delay 2nd d2	Stop-line Delay Total dSL	Acc. Dec. dn	Queuing Total dq	Queuing MvUp dqm	Stopd (Idle) di	Geom dig	Control dic
South: Wellington Road South										
1 LT	0.016	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.4	5.4
North: Wellington Road North										
1 TR	0.023	0.1	0.0	0.1	0.7	0.0	0.0	0.0	4.2	4.3
West: New Street										
1 LR	0.040	0.4	0.0	0.4	0.6	0.0	0.0	0.0	6.1	6.4

Delay (seconds/veh)

dn is average stop-start delay for all vehicles queued and unqueued

Lane Queues (Vehicles)
Site:Wellington Road AM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

Lane No.	Deg. Satn x	Ovrfl. Queue No	Back of Queue (veh) Nb1	Nb2	Nb	95%	Queue Stor. Ratio	Prob. Block %	P'ile Block %	Cyc-Av. Queue Nc	95%
South: Wellington Road South											
1 LT	0.016	0.0	0.0	0.0	0.0	0.0	0.00	0.0	100.0	0.0	0.0
North: Wellington Road North											
1 TR	0.023	0.0	0.0	0.0	0.0	0.1	0.00	0.0	100.0	0.0	0.0
West: New Street											
1 LR	0.040	0.0	0.1	0.0	0.1	0.2	0.02	0.0	100.0	0.0	0.0

Lane Queues (Distance)
Site:Wellington Road AM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

Lane No.	Deg. Satn x	Ovrfl. Queue No	Back of Queue (m) Nb1	Nb2	Nb	95%	Queue Stor. Ratio	Prob. Block %	P'ile Block %	Cyc-Av. Queue Nc	95%
South: Wellington Road South											
1 LT	0.016	0.0	0.0	0.0	0.0	0.0	0.00	0.0	100.0	0.0	0.0
North: Wellington Road North											
1 TR	0.023	0.0	0.3	0.0	0.3	0.9	0.00	0.0	100.0	0.0	0.0
West: New Street											
1 LR	0.040	0.0	0.4	0.0	0.4	1.2	0.02	0.0	100.0	0.0	0.1

Lane Queue Percentiles (Vehicles)
Site:Wellington Road AM Peak

Lane No.	Deg. Satn x	Percentile (veh) 50%	70%	85%	90%	95%	98%
South: Wellington Road South							
1 LT	0.016	0.0	0.0	0.0	0.0	0.0	0.0
North: Wellington Road North							
1 TR	0.023	0.0	0.1	0.1	0.1	0.1	0.1
West: New Street							
1 LR	0.040	0.1	0.1	0.1	0.1	0.2	0.2

Lane Queue Percentiles (Distance)
Site:Wellington Road AM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

Lane No.	Deg. Satn x	Percentile (metres) 50%	70%	85%	90%	95%	98%
South: Wellington Road South							
1 LT	0.016	0.0	0.0	0.0	0.0	0.0	0.0
North: Wellington Road North							
1 TR	0.023	0.3	0.4	0.6	0.8	0.9	1.1
West: New Street							
1 LR	0.040	0.4	0.5	0.8	0.9	1.2	1.4

Lane Stops
Site:Wellington Road AM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

Lane No.	Deg. Satn x	-- Effective Stop Rate -- he1	he2	Geom. hig	Overall h	Total Stops H	Queue Move-up Rate hqm	Total Queue Move-ups Hqm	Prop. Queued pq
South: Wellington Road South									
1 LT	0.016	0.00	0.00	0.42	0.42	12.3	0.00	0.0	0.00
North: Wellington Road North									
1 TR	0.023	0.00	0.00	0.29	0.29	11.7	0.00	0.0	0.09
West: New Street									
1 LR	0.040	0.06	0.00	0.53	0.59	23.1	0.00	0.0	0.16

hig is the average value for all movements in a shared lane
hqm is average queue move-up rate for all vehicles queued and unqueued

Flow Rates and Demand Analysis

Movement Definitions and Flow Rates (O-D)
Site:Wellington Road AM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

```
-----------------------------------------------------------------------
 North: Wellington Road North
           South          8   Thru      33     6    1.00   1.00     1.00
           West           9   Right      1     0    1.00   1.00     1.00
-----------------------------------------------------------------------
 West: New Street
           South         12   Right     36     0    1.00   1.00     1.00
           North         10   Left       3     0    1.00   1.00     1.00
-----------------------------------------------------------------------
Unit Time for Volumes =  60 minutes
Peak Flow Period =  60 minutes
Flow Rates include effects of Flow Scale and Peak Flow Factor
```

Flow Rates (Separate Light and Heavy Vehicles)
Site:Wellington Road AM Peak

```
Intersection ID: 1
Give-Way Sign Controlled Intersection

-----------------------------------------------
  Mov          Left       Through       Right
  ID        ---------   ---------   ---------
             LV    HV     LV    HV     LV    HV
-----------------------------------------------
Demand flows in veh/h as used by the program
South: Wellington Road South
    1 L       4     0      0     0      0     0
    2 T       0     0     21     4      0     0
-----------------------------------------------
North: Wellington Road North
    8 T       0     0     33     6      0     0
    9 R       0     0      0     0      1     0
-----------------------------------------------
West: New Street
   10 L       3     0      0     0      0     0
   12 R       0     0      0     0     36     0
-----------------------------------------------
Unit Time for Volumes =  60 minutes
Peak Flow Period =  60 minutes
Flow Rates include effects of Flow Scale and Peak Flow Factor
```

Flow Rates (Total Vehicles and Percent Heavy)
Site:Wellington Road AM Peak

```
Intersection ID: 1
Give-Way Sign Controlled Intersection

--------------------------------------------------
  Mov          Left        Through        Right
  ID        ----------    ----------    ----------
            Total  %HV    Total  %HV    Total  %HV
--------------------------------------------------
Demand flows in veh/h as used by the program
South: Wellington Road South
    1 L        4   0.0        0   0.0       0   0.0
    2 T        0   0.0       25  15.0       0   0.0
--------------------------------------------------
North: Wellington Road North
    8 T        0   0.0       39  15.0       0   0.0
    9 R        0   0.0        0   0.0       1   0.0
--------------------------------------------------
West: New Street
   10 L        3   0.0        0   0.0       0   0.0
   12 R        0   0.0        0   0.0      36   0.0
--------------------------------------------------
Unit Time for Volumes =  60 minutes
Peak Flow Period =  60 minutes
Flow Rates include effects of Flow Scale and Peak Flow Factor
```

Other

```
Intersection ID: 1
Give-Way Sign Controlled Intersection

* Basic Parameters:
  Intersection Type: Unsignalised - Give Way
  Driving on the left-hand side of the road
  Input data specified in Metric units
  Model Defaults: RTA NSW
  Peak Flow Period (for performance): 60 minutes
  Unit time (for volumes): 60 minutes.
  SIDRA Standard Delay model used
  SIDRA Standard Queue model used
  Level of Service based on: Delay (RTA NSW)
  Queue percentile: 95%
```

Parameters Used in Cost Calculations
Site:Wellington Road AM Peak

```
Intersection ID: 1
Give-Way Sign Controlled Intersection


   Pump price of fuel ($/L)                 =     1.200
   Fuel resource cost factor                =      0.50
   Ratio of running cost to fuel cost       =       3.0
   Average income ($/h)                     =     32.00
   Time value factor                        =      0.60
   Light vehicle mass (1000 kg)             =       1.4
   Heavy vehicle mass (1000 kg)             =      11.0
   Light vehicle idle fuel rate (L/h)       =     1.350
   Heavy vehicle idle fuel rate (L/h)       =     2.000
```

Diagnostics
Site:Wellington Road AM Peak

DETAILED OUTPUT

New Site
Giveway / Yield (Two-Way)

Movements

Movement Capacity Parameters
Site:Wellington Road PM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

Mov ID	Demand Flow veh/h	HV %	Opposing Movement Flow veh/h	Opposing Movement HV %	Adjust. Flow pcu/h	Total Cap. veh/h	Prac. Deg. Satn xp	Prac. Spare Cap. %	Lane Util %	Deg. Satn x
South: Wellington Road South										
1 L	36	0.0	0			776	0.80	1624	100	0.046*
2 T	48	15.0	0			1034	0.80	1623	100	0.046*
North: Wellington Road North										
8 T	40	15.0	0			1617	0.80	3134	100	0.025
9 R	3	0.0	84	8.6	87	121	0.80	3127	100	0.025
West: New Street										
10 L	1	0.0	66+	10.9	70	189	0.80	****	100	0.005
12 R	4	0.0	109+	12.1	117	754	0.80	****	100	0.005

* Maximum degree of saturation
\+ Percentage of exiting flow included in total opposing flow

Movement Performance
Site:Wellington Road PM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

Mov ID	Total Delay (veh-h/h)	Total Delay (pers-h/h)	Aver. Delay (sec)	Eff. Stop Rate	Total Stops	Perf. Index	Tot.Trav. Distance (veh-km/h)	Tot.Trav. Time (veh-h/h)	Aver. Speed (km/h)
South: Wellington Road South									
1 L	0.13	0.16	13.1	1.14	41.0	0.62	20.8	0.4	53.4
2 T	0.06	0.07	4.3	0.25	12.1	0.45	25.9	0.4	69.0
North: Wellington Road North									
8 T	0.05	0.05	4.1	0.23	9.0	0.42	22.7	0.4	64.8
9 R	0.02	0.02	18.2	1.60	4.8	0.07	1.8	0.0	47.6
West: New Street									
10 L	0.00	0.00	6.5	0.52	0.5	0.02	0.7	0.0	39.3
12 R	0.01	0.01	6.6	0.59	2.4	0.09	2.7	0.1	39.4

Fuel Consumption, Emissions and Cost (Total)
Site:Wellington Road PM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

Mov ID	Cost Total $/h	Fuel Total L/h	CO2 Total kg/h	CO Total kg/h	HC Total kg/h	NOX Total kg/h
South: Wellington Road South						
1 L	12.12	1.8	4.4	0.21	0.007	0.010
2 T	12.98	2.4	5.9	0.09	0.006	0.009

Mov ID	Cost	Fuel	CO2	CO	HC	NOX
9 R	1.17	0.2	0.4	0.02	0.001	0.001
	13.42	2.4	6.1	0.19	0.007	0.011
West: New Street						
10 L	0.58	0.1	0.3	0.03	0.000	0.001
12 R	2.31	0.4	1.0	0.10	0.002	0.003
	2.89	0.5	1.3	0.13	0.002	0.003
INTERSECTION:	41.41	7.0	17.7	0.62	0.023	0.033

Fuel Consumption, Emissions and Cost (Rate)
Site:Wellington Road PM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

Mov ID	Cost Rate $/km	Fuel Rate L/100km	CO2 Rate g/km	CO Rate g/km	HC Rate g/km	NOX Rate g/km
South: Wellington Road South						
1 L	0.58	8.4	211.1	10.15	0.340	0.479
2 T	0.50	9.1	229.0	3.51	0.246	0.350
	0.54	8.8	221.0	6.46	0.288	0.408
North: Wellington Road North						
8 T	0.54	10.0	250.8	7.35	0.292	0.441
9 R	0.65	9.0	225.1	11.85	0.374	0.508
	0.55	9.9	248.9	7.68	0.298	0.446
West: New Street						
10 L	0.85	14.8	370.6	38.06	0.686	0.943
12 R	0.85	14.9	372.8	38.45	0.691	0.953
	0.85	14.9	372.3	38.37	0.690	0.951
INTERSECTION:	0.56	9.4	237.0	8.31	0.310	0.445

Intersection Negotiation Data
Site:Wellington Road PM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

From Approach	To Approach	Turn	Negn Radius m	Negn Speed km/h	Negn Dist. m	Appr. Dist. m	Downstream Distance m	Downstream Distance User Spec?
South: Wellington Road South								
	North	Thru	S	50.0	10.3	500	91	No
	West	Left	10.0	20.2	15.7	500	48	No
North: Wellington Road North								
	South	Thru	S	50.0	10.3	500	89	No
	West	Right	6.5	17.1	10.2	500	67	No
West: New Street								
	South	Right	6.5	17.1	10.2	500	176	No
	North	Left	10.0	20.2	15.7	500	181	No

Downstream distance is distance travelled from the stopline until exit cruise speed is reached (includes negotiation distance). Acceleration distance is weighted for light and heavy vehicles. The same distance applies for both stopped and unstopped vehicles.

Give-Way Sign Controlled Intersection

Mov ID	App. Speeds Cruise	App. Speeds Negn	Exit Speeds Negn	Exit Speeds Cruise	Queue Move-up 1st Grn	Queue Move-up 2nd Grn	Av. Section Spd Running	Av. Section Spd Overall	Geom Delay sec
South: Wellington Road South									
1 L	80.0	20.2	20.2	40.0			53.4	53.4	13.1
2 T	80.0	50.0	50.0	50.0			69.0	69.0	4.3
North: Wellington Road North									
8 T	80.0	50.0	50.0	50.0			64.8	64.8	3.8
9 R	80.0	17.1	17.1	40.0			48.5	47.6	17.9
West: New Street									
10 L	40.0	20.2	20.2	80.0			39.3	39.3	6.0
12 R	40.0	17.1	17.1	80.0			39.4	39.4	6.1

"Running Speed" is the average speed excluding stopped periods.

Gap Acceptance Parameters
Site:Wellington Road PM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

Mov ID	Mov Type	Opng Flow pcu/h	Critical Gap Hdwy sec	Critical Gap Dist m	Foll-up Headway sec	Entry HV Equiv	Intra Bunch Hdwy sec	Propn Bnchd
South: Wellington Road South								
No opposed movements on this approach.								
North: Wellington Road North								
9 R	Normal	87	4.00	41.3	2.50	2.00	1.80P	0.009
West: New Street								
10 L	Normal	70+	5.00	51.7	3.00	2.00	1.80	0.007
12 R	Normal	117+	5.50	62.3	3.50	2.00	0.90	0.006

Values in this table are adjusted for heavy vehicles in the entry stream.
+ Percentage of exiting flow included in total opposing flow
Priority sharing is implied for some movements (Follow-up Headway plus
Intra-bunch Headway is larger than the Critical Gap).

Lanes

Lane Performance
Site:Wellington Road PM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

Lane No.	Flow veh/h	Cap veh/h	Deg. Satn x	Aver. Delay sec	Eff. Stop Rate	Queue 95% Back veh	Queue 95% Back m	Lane Length m
South: Wellington Road South								
1 LT	84	1810	0.046	8.1	0.63	0.0	0.0	500.0
North: Wellington Road North								
1 TR	43	1738	0.025	5.1	0.32	0.1	1.1	500.0
West: New Street								
1 LR	5	943	0.005	6.6	0.58	0.0	0.2	50.0

```
Intersection ID: 1
Give-Way Sign Controlled Intersection

----------------------------------------------------
 Lane     Dem Flow (veh/h)     Min   Tot   Deg. Lane
 No.    -------------------    Cap   Cap   Satn Util
         Lef Thru  Rig  Tot   veh/h veh/h   x     %
----------------------------------------------------
 South: Wellington Road South
 1 LT     36   48    0   84     84  1810  0.046  100
----------------------------------------------------
 North: Wellington Road North
 1 TR      0   40    3   43     43  1738  0.025  100
----------------------------------------------------
 West: New Street
 1 LR      1    0    4    5      5   943  0.005  100
----------------------------------------------------

  The capacity value for priority and continuous movements is obtained by
  adjusting the basic saturation flow for heavy vehicle and turning vehicle
  effects.  Saturation flow scale applies if specified.
```

Lane, Approach and Intersection Performance
Site:Wellington Road PM Peak

```
Intersection ID: 1
Give-Way Sign Controlled Intersection

--------------------------------------------------------------------------------
 Lane   Demand Flow (veh/h)       Adj.  Eff Grn   Deg   Aver. Longest Shrt
 No.   --------------------  %HV  Basic  (sec)    Sat   Delay  Queue  Lane
          L    T    R   Tot       Satf. 1st 2nd    x     sec     m      m
--------------------------------------------------------------------------------
 South: Wellington Road South
1 LT     36   48        84    9                 0.046    8.1     0   500
        ------------------------------------------------------------------------
         36   48    0   84    9                 0.046    8.1
--------------------------------------------------------------------------------
 North: Wellington Road North
1 TR          40    3   43   14                 0.025    5.1     1   500
        ------------------------------------------------------------------------
          0   40    3   43   14                 0.025    5.1     1
--------------------------------------------------------------------------------
 West: New Street
1 LR      1         4    5    0                 0.005    6.6     0    50
        ------------------------------------------------------------------------
          1    0    4    5    0                 0.005    6.6     0
================================================================================
 ALL VEHICLES          Total   %                  Max   Aver.   Max
                       Flow   HV                   X    Delay  Queue
                        132   10                0.046    7.0     1
================================================================================
Peak flow period = 60 minutes.

Queue values in this table are 95% queue (metres)
Note: Basic Saturation Flows are not adjusted at roundabouts or sign-
      controlled intersections and apply only to continuous lanes.
```

Driver Characteristics
Site:Wellington Road PM Peak

```
Intersection ID: 1
Give-Way Sign Controlled Intersection

--------------------------------------------------------
                                        Average  Driver
 Lane   Satn    Satn    Satn    Satn     Queue  Response
 No.    Speed   Flow    Hdwy   Spacing   Space    Time
        km/h    veh/h   sec       m        m      sec
--------------------------------------------------------
 South: Wellington Road South
 1 LT   NA - Major Road Movement
--------------------------------------------------------
 North: Wellington Road North
```

Saturation Flow and Saturation Headway are derived from follow-up headway.

Lane Delays
Site:Wellington Road PM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

Lane No.	Deg. Satn x	Stop-line Delay 1st d1	Stop-line Delay 2nd d2	Stop-line Delay Total dSL	Acc. Dec. dn	Queuing Total dq	Queuing MvUp dqm	Stopd (Idle) di	Geom dig	Control dic
South: Wellington Road South										
1 LT	0.046	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8.1	8.1
North: Wellington Road North										
1 TR	0.025	0.2	0.0	0.2	1.2	0.1	0.0	0.1	4.8	5.1
West: New Street										
1 LR	0.005	0.5	0.0	0.5	0.7	0.0	0.0	0.0	6.1	6.6

Delay (seconds/veh)

dn is average stop-start delay for all vehicles queued and unqueued

Lane Queues (Vehicles)
Site:Wellington Road PM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

Lane No.	Deg. Satn x	Ovrfl. Queue No	Back of Queue (veh) Nb1	Nb2	Nb	95%	Queue Stor. Ratio	Prob. Block %	P'ile Block %	Cyc-Av. Queue Nc	95%
South: Wellington Road South											
1 LT	0.046	0.0	0.0	0.0	0.0	0.0	0.00	0.0	100.0	0.0	0.0
North: Wellington Road North											
1 TR	0.025	0.0	0.0	0.0	0.0	0.1	0.00	0.0	100.0	0.0	0.0
West: New Street											
1 LR	0.005	0.0	0.0	0.0	0.0	0.0	0.00	0.0	100.0	0.0	0.0

Lane Queues (Distance)
Site:Wellington Road PM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

Lane No.	Deg. Satn x	Ovrfl. Queue No	Back of Queue (m) Nb1	Nb2	Nb	95%	Queue Stor. Ratio	Prob. Block %	P'ile Block %	Cyc-Av. Queue Nc	95%
South: Wellington Road South											
1 LT	0.046	0.0	0.0	0.0	0.0	0.0	0.00	0.0	100.0	0.0	0.0
North: Wellington Road North											
1 TR	0.025	0.0	0.3	0.0	0.3	1.1	0.00	0.0	100.0	0.0	0.1
West: New Street											
1 LR	0.005	0.0	0.0	0.0	0.0	0.2	0.00	0.0	100.0	0.0	0.0

Lane Queue Percentiles (Vehicles)
Site:Wellington Road PM Peak

Lane No.	Deg. Satn x	Percentile (veh) 50%	70%	85%	90%	95%	98%
South: Wellington Road South							
1 LT	0.046	0.0	0.0	0.0	0.0	0.0	0.0
North: Wellington Road North							
1 TR	0.025	0.0	0.1	0.1	0.1	0.1	0.2
West: New Street							
1 LR	0.005	0.0	0.0	0.0	0.0	0.0	0.0

Lane Queue Percentiles (Distance)
Site:Wellington Road PM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

Lane No.	Deg. Satn x	Percentile (metres) 50%	70%	85%	90%	95%	98%
South: Wellington Road South							
1 LT	0.046	0.0	0.0	0.0	0.0	0.0	0.0
North: Wellington Road North							
1 TR	0.025	0.3	0.5	0.7	0.8	1.1	1.2
West: New Street							
1 LR	0.005	0.0	0.1	0.1	0.1	0.2	0.2

Lane Stops
Site:Wellington Road PM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

Lane No.	Deg. Satn x	-- Effective Stop Rate -- he1	he2	Geom. hig	Overall h	Total Stops H	Queue Move-up Rate hqm	Total Queue Move-ups Hqm	Prop. Queued pq
South: Wellington Road South									
1 LT	0.046	0.00	0.00	0.63	0.63	53.1	0.00	0.0	0.00
North: Wellington Road North									
1 TR	0.025	0.00	0.00	0.32	0.32	13.8	0.00	0.0	0.17
West: New Street									
1 LR	0.005	0.08	0.00	0.50	0.58	2.9	0.00	0.0	0.20

hig is the average value for all movements in a shared lane
hqm is average queue move-up rate for all vehicles queued and unqueued

Flow Rates and Demand Analysis

Movement Definitions and Flow Rates (O-D)
Site:Wellington Road PM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

North: Wellington Road North							
	South	8	Thru	34	6	1.00	1.00	1.00
	West	9	Right	3	0	1.00	1.00	1.00
West: New Street							
	South	12	Right	4	0	1.00	1.00	1.00
	North	10	Left	1	0	1.00	1.00	1.00

Unit Time for Volumes = 60 minutes
Peak Flow Period = 60 minutes
Flow Rates include effects of Flow Scale and Peak Flow Factor

Flow Rates (Separate Light and Heavy Vehicles)
Site:Wellington Road PM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

Mov ID	Left		Through		Right	
	LV	HV	LV	HV	LV	HV
Demand flows in veh/h as used by the program						
South: Wellington Road South						
1 L	36	0	0	0	0	0
2 T	0	0	41	7	0	0
North: Wellington Road North						
8 T	0	0	34	6	0	0
9 R	0	0	0	0	3	0
West: New Street						
10 L	1	0	0	0	0	0
12 R	0	0	0	0	4	0

Unit Time for Volumes = 60 minutes
Peak Flow Period = 60 minutes
Flow Rates include effects of Flow Scale and Peak Flow Factor

Flow Rates (Total Vehicles and Percent Heavy)
Site:Wellington Road PM Peak

Intersection ID: 1
Give-Way Sign Controlled Intersection

Mov ID	Left		Through		Right	
	Total	%HV	Total	%HV	Total	%HV
Demand flows in veh/h as used by the program						
South: Wellington Road South						
1 L	36	0.0	0	0.0	0	0.0
2 T	0	0.0	48	15.0	0	0.0
North: Wellington Road North						
8 T	0	0.0	40	15.0	0	0.0
9 R	0	0.0	0	0.0	3	0.0
West: New Street						
10 L	1	0.0	0	0.0	0	0.0
12 R	0	0.0	0	0.0	4	0.0

Unit Time for Volumes = 60 minutes
Peak Flow Period = 60 minutes
Flow Rates include effects of Flow Scale and Peak Flow Factor

Other

```
Intersection ID: 1
Give-Way Sign Controlled Intersection

* Basic Parameters:
  Intersection Type: Unsignalised - Give Way
  Driving on the left-hand side of the road
  Input data specified in Metric units
  Model Defaults: RTA NSW
  Peak Flow Period (for performance): 60 minutes
  Unit time (for volumes): 60 minutes.
  SIDRA Standard Delay model used
  SIDRA Standard Queue model used
  Level of Service based on: Delay (RTA NSW)
  Queue percentile: 95%
```

Parameters Used in Cost Calculations
Site:Wellington Road PM Peak

```
Intersection ID: 1
Give-Way Sign Controlled Intersection


   Pump price of fuel ($/L)                =     1.200
   Fuel resource cost factor               =      0.50
   Ratio of running cost to fuel cost      =       3.0
   Average income ($/h)                    =     32.00
   Time value factor                       =      0.60
   Light vehicle mass (1000 kg)            =       1.4
   Heavy vehicle mass (1000 kg)            =      11.0
   Light vehicle idle fuel rate (L/h)      =     1.350
   Heavy vehicle idle fuel rate (L/h)      =     2.000
```

Diagnostics
Site:Wellington Road PM Peak

Appendix G

STATISTICS

Table G.1 – Parkes Township Residential Land Supply & Demand

Year	Demand	Existing Supply	Supply with Rezoning
2006		463	-
2007	39	424	-
2008	39	385	-
2009	39	346	-
2010	39	307	-
2011	39	268	394
2012	39	229	355
2013	39	190	316
2014	39	151	277
2015	39	112	238
2016	39	73	199
2017	**39**	**34**	160
2018	39	-5	121
2019	39	-44	82
2020	39	-83	43
2021	**39**	**-122**	**4**
2022	39	-161	-35
2023	39	-200	-74
2024	39	-239	-113
2025	39	-278	-152
2026	39	-317	-191
2027	39	-356	-230
2028	39	-395	-269
2029	39	-434	-308
2030	39	-473	-347

Appendix H

LETTERS SUPPORTING EAST PARKES

Real Estate Agents, Stock & Station Agents,
Auctioneers, Business Agents,
Property Managers, Valuations

203 Clarinda Street
Parkes NSW 2870
Telephone **02 6862 1900**
Facsimile 02 6862 4841
Web www.raywhite.com

Ray White
PARKES

17th March 2006

Parkes Shire Council
Cecile St
Parkes NSW 2870

Attention: Allan McCormack
General Manager

Dear Sir,

In 2004 we wrote to council to highlight the issue of the lack of vacant land for sale in the East Parkes area. East Parkes is definitely the preferred area of most of our clients currently looking to build new homes in Parkes.

We request as a matter of urgency that council review it's 'in fill' policy regarding other land in other areas. I understand council prefer that land currently zoned for subdivision be developed, before land in east Parkes is re-zoned. This policy in my opinion is harmful to the building industry in Parkes and is inhibiting the exciting future of East Parkes. Simply waiting for people to change their opinions and build in an area they initially thought was unappealing, is not happening. Our clients are waiting for land to become available in East Parkes instead of buying other blocks.

We acknowledge that there are blocks for sale on the southern and western sides of town, however, you should know that it is difficult to sell these blocks due to lack of interest in these area's rather than lack of interest in building new homes. Many of our clients are unwilling to build their new homes in these areas for fear of over capitalising.

I have a waiting list of people wanting to build in East Parkes. Should council rezone land for development in East Parkes, we would have instant sales and in turn, more work for our builders.

Please do not hesitate to contact me to discuss.

Regards,

Tracie Robertson
Property Sales

G Hunter & Co Pty Limited

"real estate - the key to your future"

16 March 2006

Ref\Index\Sales\Noonan

General Manager
Parkes Shire Council
2 Cecile Street
PARKES NSW 2870

Dear Sir

RE RESIDENTIAL LAND DEVELOPMENT, EAST PARKES

This is a follow up to a letter addressed to Parkes Shire Council in November 2004, in which we pointed out the lack of supply of residential building blocks in east Parkes yet there is a strong demand there.

I & S B Developments have approximately 10 hectares which joins their Noonan Street development. They have been very active in attempting to have the land rezoned from rural to residential.

We think that this rezoning needs to be urgently looked at and effected, as the lack of residential land available in east Parkes is having a detrimental effect on the growth of this section of Parkes.

If you should require any further information, please do not hesitate to contact our office.

Yours faithfully
G HUNTER & CO PTY LIMITED

Per. K Spence

TERRY HUNTER

th.krs

17 March 2006

Parkes Shire Council
General Manager
Mr Allan McCormack

CONCERNED BUILDERS OF PARKES

Dear Mr McCormack,

For the past 18 months we have been told that a development application for the land above Noonan St has been submitted to Council for rezoning with the intention of a prestige development to follow. We are now advised that a further delay is occurring. As builders of this township, we are concerned that a development of this nature is not in place **now**.

We request that the Parkes Shire Council support I&SB Developments Pty Ltd and Dawn Fardell MP in securing the spot rezoning of Lot 607 Wellington road Parkes as a matter of urgency.

Our jobs with all associated trades and suppliers are now threatened. We trust the Council will act accordingly.

For replies please contact:
Darren Lydford
P.O. Box 414
Parkes NSW 2870
ezyroll@westserv.net.au

Name:	Signature:	Date
DARREN LYDFORD	[illegible]	19/3/06
Darren Heraghty	[illegible]	20/3/06
MICHAEL BAXTER	[illegible]	20/3/06
JOHN CORNELISSEN	John Cornelissen	20/3/06
Peter Massey	Peter Massey	20/3/06
Andrew Thomas	A Thomas	20/3/06
MICHAEL RATTENBURY	M Rattenbury	20/3/06.
PETER THOMAS	P.J. Thomas	20/3/06.

Name:	Signature:	Date
MICK CASEY		20/3/06.
BRIAN PIERCY		20/3/06.
E.K. POTTS		20.3.06
DAVID POTTS.		20/3/06
SCOTT THOMSON.		20/3/06.
MAURICE WAKEMAN		20-3-06.
DC & RL KNIGHTS P/L		20 3 06
John CARR Handi Steel		20.3.06
Gary Potts		20/3/06
Craig Condon		20/3/06
JOHN SULLIVAN		20/3/06
FRAN HAY (HAYS HARDWARE)		20-03-06.
GREG HAY (HAY TIMBER FRAME & TRUSS)		20-03-06
Barry Heraghty		20/3/06
RODNEY BARNES		20/3/06
MICK HARRIS		20/3/06.
HANK CORNELISSEN		20/3/2006
GREG PRIOR		20/3/06
Bernie Cusack		20/3/06
JOHN KENNEDY		20/3/06.
A Cunningham & Sons		20/3/06.

Licensed Real Estate Agents,
Auctioneers and
Property Managers

247 Clarinda Street
Parkes NSW 2870

Facsimile 02 6862 3366
Email rwparkes@bigpond.com
Internet www.randw.com.au/parkes
Telephone 02 6863 8888

Richardson & Wrench
Parkes

15 March 2006

Alan McCormack
General Manager
Parkes Shire Council
2 Cecile Street
Parkes NSW 2870

Dear Mr McCormack,

Re: East Parkes Sub-division

We feel that there is a need for a new sub-division of residential blocks on the Eastern side of town.

We have experienced an increase in demand from prospective land purchasers who are looking for residential blocks on the Eastern side of town. The majority of prospective buyers want to build large modern homes in a newer estate, and in a sought after location. Due to the lack of blocks available in this area we believe that opening up a new residential sub-division in East Parkes would be warranted.

We would like to thank you for your time and consideration in this matter.

Yours Faithfully
Richardson & Wrench – Parkes

Per:

Geoff O'Donoghue
Licensee

Real Estate Agents, Auctioneers and Property Managers

Anderson
FIRST NATIONAL REAL ESTATE

25 Court Street, Parkes NSW 2870
Telephone: (02) 6862 6400 Facsimile: (02) 6862 6300
www.andersonfn.com.au

17 March 2006

General Manager
Parkes Shire Council
2 Cecile Street
PARKES NSW 2870

Dear Sir,

Re: Residential Land Development, East Parkes

I have been asked to give my observations regarding the proposal to rezone areas adjacent to Noonan Street. I am happy to offer my professional opinion as to the potential demand and marketability of property in the subject area:

As Parkes' newest estate agency, I am very aware of the demand for building blocks within the town. The eastern side has traditionally been popular and since opening my business in January, I have noted that this trend continues.

This area is well known for prestige home development. If Council was to consider rezoning, my belief is that the area would enjoy the same popularity as neighbouring Noonan Street.

I trust that this information will assist Council in its future decision making.

Yours Faithfully
ANDERSON FIRST NATIONAL

Brian Anderson
Principal

Correspondence:
Quarter Acre Pty Ltd trading ABN 54 113 099 988. ACN 113 099 988.
email: mail@andersonfn.com.au

HAY'S HARDWARE

A MEMBER OF THE MITRE 10 GROUP
ABN 39 002 450 973

Alan McCormack
General Manager
Parkes Shire Council
2 Cecile Street
PARKES NSW 2870

20TH MARCH 2006

Dear Mr McCormack,

I am a small investor and supplier of building materials in the Parkes area. Being in constant contact through our two businesses HAY TIMBER FRAME & TRUSS CO and HAY'S HARDWARE with local building contractors it has come to my attention that there is a desperate lack of prestige building blocks in desirable areas of Parkes.

Developments to the East and North East of Parkes seem to be more desirable and quieter area than the developments on the Western side. Through conversations with trade people and local investors we hear all to often the Western development areas are to close to the rail infrastructure and the proposed heavy vehicle by-pass.

As a concerned business person and resident I strongly feel that the lack of prestige block could impede the growth of Parkes as an important inland development.

I await your reply.

Yours sincerely

Gy Hay.

Greg Hay.
Manager.

PO Box 761 Lot 48, Saleyards Road, Parkes NSW 2870
Phone: 02 6862 6600 Fax: 02 6862 1660 Email: hays@bigpond.net.au

Court Street Health Centre
3 Court Street, Parkes NSW 2870
Dr. Jawad Albandar
Provider Number:231127AK
Phone: 02 6862 1699
Fax: 02 6863 4625

18th April 2006

Parkes Shire Council
General Manager

Dear Mr McCormack,

I am writing this letter on behalf of both my family and my colleague Dr. Kamil Huzaia. My colleague and I have been practicing in Parkes for approximately 2 years. We have both decided to build in Parkes and have been looking for land that suits our family requirements ie we are seeking two blocks that will enable our families to be neighbours. To date we have been unsuccessful in finding suitable land.

Recently, we contacted Mr. Ivan Duchnaj of I & S B Developments Pty. Ltd. Mr Duchnaj has land to our liking in East Parkes, however, has advised that he has had problems in securing rezoning of this land. As two Doctors with families who want to stay in Parkes, we are writing to Council to seek advice on what can be done to enable our families to purchase and build on the land in East Parkes as soon as possible.

Yours sincerely,

Dr. Jawad Albandar

Dr. Kamil Huzaia

Appendix I

NET COMMUNITY BENEFIT TEST

EVALUATION CRITERIA (extract from the DoP's (2009c:25) *Draft Centres Policy: Planning for Retail & Commercial Development*):

1. **Will the LEP be compatible with agreed State and regional strategic direction for development in the area (e.g. land release, strategic corridors, development within 800 metres of a transit node)?**

   There is no agreed State and Regional strategic direction for Parkes. The PP is however consistent with Council's draft Land Use Strategy.

2. **Is the LEP located in a global/regional city, strategic centre or corridor nominated within the Metropolitan Strategy or other regional/subregional strategy?**

   No.

3. **Is the LEP likely to create a precedent or create or change the expectations of the landowner or other landholders?**

   No. The LEP is understood to be consistent with Council's draft Land Use Strategy.

4. **Have the cumulative effects of other spot rezoning proposals in the locality been considered? What was the outcome of these considerations?**

   There are no known spot rezoning proposals in the locality.

5. **Will the LEP facilitate a permanent employment generating activity or result in a loss of employment lands?**

   The proposed LEP would contribute to residential land supply in Parkes, of which there is a shortage of supply in this area of Parkes. The draft LEP itself would not facilitate any permanent employment generating activity. However it would not result in a loss of employment lands, beyond the current agricultural potential of the subject site, which is not significant.

6. **Will the LEP impact upon the supply of residential land and therefore housing supply and affordability?**

   The proposed LEP would contribute to the residential land supply in Parkes. This area of Parkes is the market-preferred location for residential growth. It is understood that there is a shortage of supply of such attractive vacant residential land in Parkes Township. Allowed to continue this would stifle the growth of the town, especially with the availability of low cost rural residential allotments.

   It follows that a shortage of supply of such attractive vacant land creates upward pressure on prices and thus reduces affordability of such residential accommodation in this locality of Parkes.

   The proposed LEP would therefore seek to fulfil the demand for such residential land and thus improving housing affordability in that locality.

7. **Is the existing public infrastructure (roads, rail, utilities) capable of servicing the proposed site? Is there good pedestrian and cycling access? Is public transport currently available or is there infrastructure capacity to support future public transport?**

   <u>Roads and Access</u>

   Yes, see **Appendix F**

   <u>Stormwater</u>

   Yes, see **Appendix E**

Sewer

Yes, see **Section 2.2.3.2**

Utilities

Yes, see **Section 2.2.3**

8. **Will the proposal result in changes to the car distances travelled by customers, employees and suppliers? If so, what are the likely impacts in terms of greenhouse gas emissions, operating costs and road safety?**

   As outlined in (7) above, the shortage of attractive residential land is encouraging greater demand for rural residential development. The proposed LEP would provide additional residential land adjacent to the existing Parkes Township resulting in reduced car distances travelled compared to the consequential expanding rural residential development.

9. **Are there significant Government investments in infrastructure or services in the area whose patronage will be affected by the proposal? If so, what is the expected impact?**

   No.

10. **Will the proposal impact on land that the Government has identified a need to protect (e.g. land with high biodiversity values) or have other environmental impacts? Is the land constrained by environmental factors such as flooding?**

    No there are no physical characteristics that would significantly constrain the proposed development.

11. **Will the LEP be compatible/complementary with surrounding land uses? What is the impact on amenity in the location and wider community? Will the public domain improve?**

    The subject site adjoins existing residential development. Thus the proposed LEP would be both compatible and complementary to the surrounding land uses. The proposed LEP would not impact adversely on local amenity or amenity of the wider community. Further it would not adversely impact upon the public domain.

12. **Will the proposal increase choice and competition by increasing the number of retail and commercial premises operating in the area?**

    Not applicable.

13. **If a stand-alone proposal and not a centre, does the proposal have the potential to develop into a centre in the future?**

    Not applicable.

14. **What are the public interest reasons for preparing the draft plan? What are the implications of not proceeding at that time?**

    There is a reported shortage of attractive residential land in the north east of Parkes. It is understood that as a consequence of this lack of supply prospective purchasers are taking up low cost rural residential land instead. These trends result in higher land prices for the land in demand and increased costs to society through incidental take up of rural residential land and thus sprawl of residential development with its associated servicing costs.

    By not proceeding at this time, these trends would continue to be exacerbated until such a time as the new comprehensive LEP is gazetted. Which at this point in time is an unknown timeframe.

Appendix J

RTA ADVICE

RTA

File 353.5395 09/12-1; C09/841

The General Manager
Parkes Shire Council
PO Box 337
PARKES NSW 2870

1 0 AUG 2009

Dear Sir

Pre-DA Advice for 125 Lot Subdivision, Renshaw McGirr Way (MR233) Parkes

I refer to correspondence from Thomas Casey dated 24 July 2009 requesting Pre-DA advice for a proposed subdivision of Lot 607 DP 750179 and Part Lot 1 DP 827514. Mr Casey has requested advice from the Roads and Traffic Authority (RTA) regarding access requirements on Renshaw McGirr Way (MR233) for a proposed 125 lot subdivision.

It is preferred that all access to the proposed subdivision is other than MR233. Should access to MR233 be required, the RTA would recommend that a minimum intersection treatment would be Auxiliary Right and Left Turn (AUR/AUL) lanes.

It is also recommended that there be no direct access to MR233 from individual lots.

A copy of this letter has been forwarded to Mr Casey for his information. Should you require further information, please contact Fiona Nobes on (02) 6861 1688.

Yours faithfully

Tony Hendry
Road Safety and Traffic Manager
Western

7 AUG 2009

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