DEPARTMENT OF PLANNING, INDUSTRY AND ENVIRONMENT

JULY 2019

PARKES SPECIAL ACTIVATION PRECINCT

ENVIRONMENTAL, HERITAGE AND SUSTAINABILITY SUMMARY REPORT

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Parkes Special Activation Precinct
Environmental, Heritage and Sustainability Summary Report

Department of Planning, Industry and Environment

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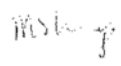
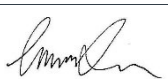
REV	DATE	DETAILS
A	29/04/2019	First draft
B	03/05/2019	Revised draft including DPE comments
C	03/06/2019	Final Draft
D	30/07/2019	Final

	NAME	DATE	SIGNATURE
Prepared by:	Madeleine Slingo	03 June 2019	
Reviewed by:	Emma Dean	30 July 2019	
Approved by:	Emma Dean	30 July 2019	

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ABBREVIATIONS

AEI	Area of Environmental Interest
AHIMS	Aboriginal Heritage Information Management System
ARTC	Australian Rail Track Corporation
AWS	Automatic Weather Station
DOI-W	Department of Industry – Water
DPIE	Department of Planning, Infrastructure and Environment
DPC	Department of Premier and Cabinet
EIS	Environmental Impact Statement
EPA	Environment Protection Authority
ESD	Environmental Sustainable Development Plan
GDE	Groundwater Dependant Ecosystem
ISCA	Infrastructure Sustainability Council of Australia
LEP, the	*Parkes Local Environmental Plan (LEP) 2013*
LGA	Local government area
MNES	Matters of National Environmental Significance
NCA	Noise Catchment Area
NSW	New South Wales
OEH	NSW Office of Environment and Heritage
PCT	Plant Community Type
RMS	Roads and Maritime Services
SAII	Serious and Irreversible Impact
SAP	Special Activation Precinct
SWL	Static Water Level

1 INTRODUCTION

1.1 OVERVIEW

Department of Planning, Industry and Environment (DPIE) has commissioned WSP to prepare an Environmental, Heritage and Sustainability Report for the Parkes Special Activation Precinct (SAP) within Parkes, NSW.

1.1.1 BACKGROUND TO PARKES SAP

The SAP is a joint Government Agency initiative, announced by the Deputy Premier, the Hon John Barilaro MP, to create a 20-year vision for job creation and regional development. The Department of Planning, Industry and Environment are leading the creation of the Parkes SAP.

Parkes is a location of State and regional significance and the SAP is an economic enabler that will address market failures and leverage catalyst opportunities. The SAPs are a place-based approach to 'activate' this strategic location.

The Parkes SAP was selected because of the economic opportunities associated with the construction of an Inland Rail from Brisbane to Melbourne and the existing east-west Sydney to Perth/Adelaide Rail corridor which cross at Parkes creating an opportunity for an Inland Port.

The Parkes SAP will lead to investment in common-use infrastructure, including roads infrastructure, water, electricity, telecommunication, gas systems and services, high speed internet and data connections and facilities, and other possible infrastructure or services.

A SAP contains five core components and this plan (government led studies) will inform fast track planning for the Parkes SAP and potential future infrastructure investment and government led development.

Figure 1.1 The five core components of a SAP (DPE, 2019)

1.1.2 LOCATION OF PARKES SAP

Parkes local government area (LGA) is located approximately 350 kilometres west of Sydney, in the Central West and Orana Region. The main townships and settlements in the LGA include Alectown, Bogan Gate, Cookamidgera, Parkes, Peak Hill, Trundle and Tullamore. Other major centres in the region include Condobolin, Cowra, Dubbo, Forbes and Orange.

The Parkes township has a stable population of approximately 11,500 people (ABS, 2016), with around 5,000 dwellings. An industrial estate (zoned IN1 - General Industrial) is located south of the town, adjoining the Newell Highway. The town is serviced by an existing local centre, mixed use areas that contain both commercial, business and retail use. A new hospital and associated health Precinct is located towards the southern end of the town. The Parkes Regional Airport is located east of town, with the Parkes National Logistics Hub located to the west.

The Central West and Orana Regional Plan 2036 identifies the following key features about Parkes:

- development and settlement is clustered around key corridors, including the twin centres of Parkes and Forbes
- Parkes, along with Dubbo, is a major freight hub particularly in the selling, processing, manufacturing and transporting of livestock and agricultural produce
- TransGrid's NSW Connection Opportunities identifies Parkes as having capacity for renewable energy generation; and
- existing regional mining operations (North Parkes Mines and Tomingley) near the Parkes township.

The establishment of a Parkes SAP is consistent with Parkes Shire Council's vision and strategic planning for the locality.

The Parkes SAP is located to the west of the Parkes township (see Figure 1.2). The Parkes SAP is strategically located at the intersection of:

- the Brisbane to Melbourne Inland Rail
- the Sydney to Perth/Adelaide Rail corridor
- is in close proximity to the junction of the Henry Parkes Way and Newell Highway.

This figure is an aerial photograph of the investigation area and surrounds. The investigation area is seen to the west of the township of Parkes, and roughly enclosed to the North by Henry Parkes Way, and to the east by Newell Highway.

The Parkes SAP area is predominantly occupied by agricultural land, with a solar energy facility located in the north-western corner and an existing quarry operation located in the south-eastern area of the SAP.

The existing primary industries in Parkes are focused around freight and logistics (SCT and Pacific National), agribusiness and mining. Parkes strategic location within Regional NSW provides the opportunity to capitalise on these industries, along with the potential to expand into warehousing, advanced food manufacturing and renewable energy uses.

Figure 1.2 Indicative location of Parkes SAP

1.1.3 PLANNING FRAMEWORK

Currently under the *Parkes Local Environmental Plan (LEP) 2012*, the Parkes SAP area is zoned (refer to Figure 1.3):

- RU1 – Primary Production
- SP1 – Special Activities
- SP2 – Infrastructure.

The land zoned SP1 – Special Activities has been identified as the Parkes National Logistics Hub. The Logistics Hub covers approximately 600 hectares. The land includes the Pacific National and SCT Logistics sites among other landholdings. The locality provides the opportunity to create an intermodal site serviced by rail and road connections.

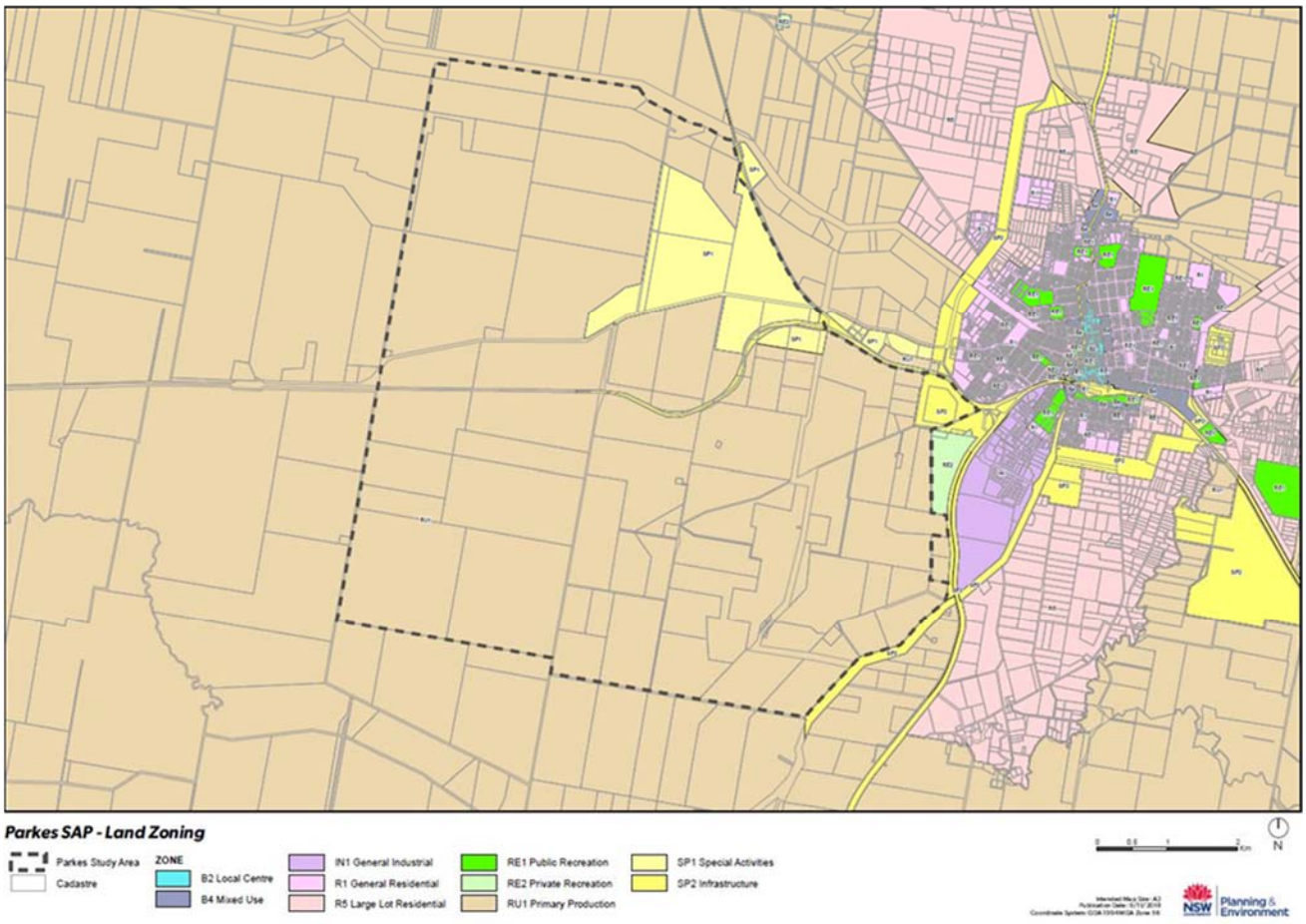


Figure 1.3 Zoning map

1.2 PURPOSE OF THIS REPORT

This Environment, Heritage and Sustainability Report provides a summary of the various environmental specialist areas that have been assessed for the project, namely:

- Environmental Sustainable Development (ESD) Plan (Appendix A)
- Air Quality and odour (Appendix B)
- Noise and Vibration (Appendix C)
- Hydrogeology (Appendix D)
- Geology, soils and contamination (Appendix E)
- Biodiversity (Appendix F)
- Bushfire (Appendix G)
- Aboriginal cultural heritage and historical heritage assessment (Appendix H).

This report has informed the streamlined planning process for fast-tracking future development of the SAP by considering the environment, heritage and sustainability opportunities and constraints for the Parkes SAP.

1.2.1 RELATIONSHIP TO THE SAP PROCESS

This summary report is part of a wider strategic, statutory and regulatory process to achieve planning outcomes for the Parkes SAP project. Figure 1.4 below displays where this report plays a role in the broader project context. As shown, this Environment, Heritage and Sustainability report and associated specialist assessments provide precinct analyses and recommendations for direct input into the Parkes SAP Master Plan.

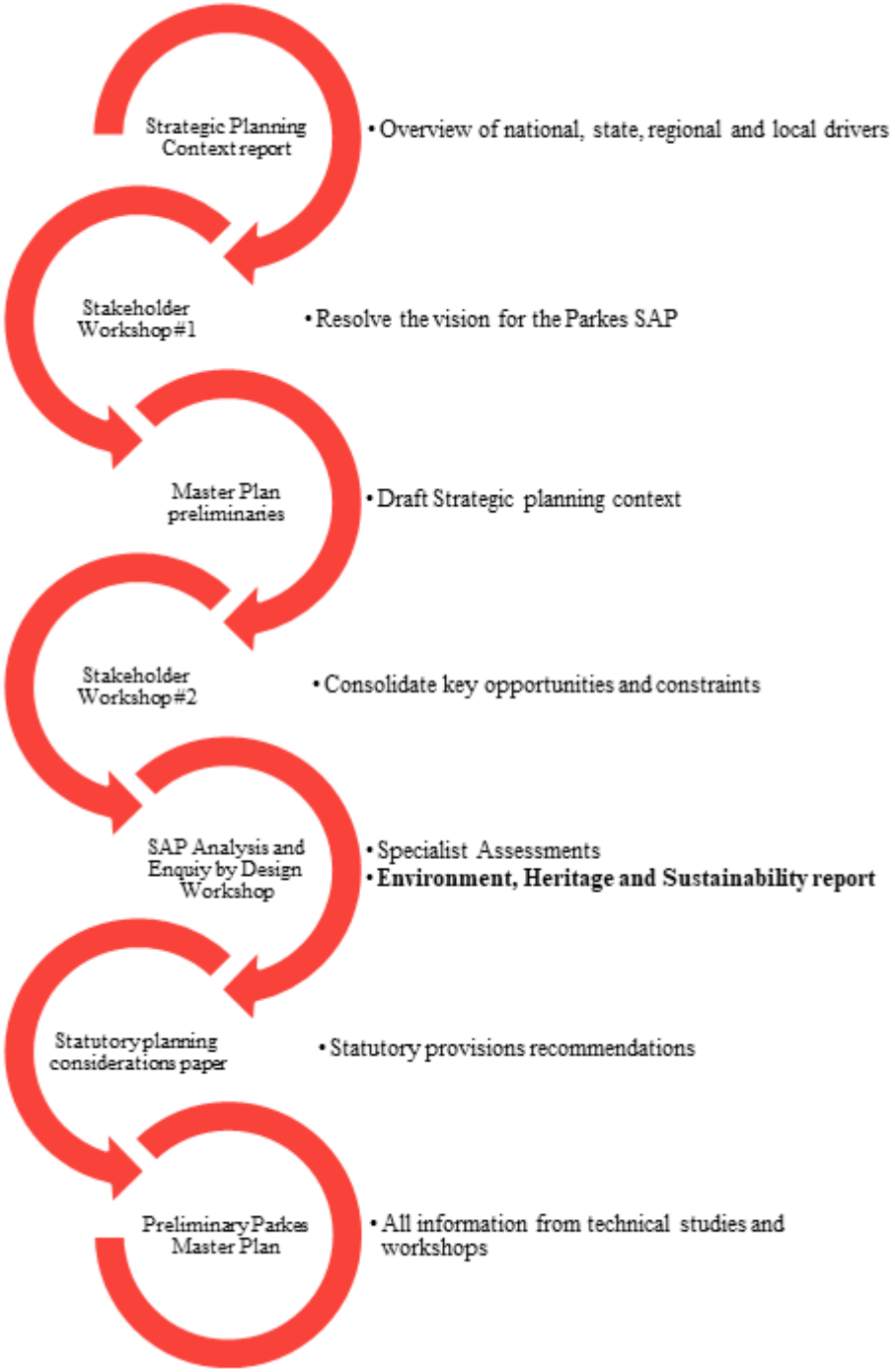


Figure 1.4 Flowchart of SAP Process, with this report noted in **bold**

1.3 STRUCTURE OF THIS REPORT

This report summarises the technical environmental studies undertaken as listed in Section 1.2. Below is a summary of each of the chapters with the technical reports provided as appendices to this report.

- Chapter 2 – provides a summary of the ESD Plan.
- Chapter 3 – provides an overview of the methodology and existing environment for each of the technical studies prepared to support the development of the Master Plan.
- Chapter 4 – provides a summary of the master planning process.
- Chapter 5 – provides a summary of the assessment of both the short listed scenarios and Master Plan for each technical report.
- Chapter 6 – provides a high level summary of each of the technical reports.

2 ENVIRONMENTAL SUSTAINABLE DEVELOPMENT (ESD)

This section summarises the ESD Plan that was prepared for the Parkes SAP and is provided in Appendix A. The ESD Plan is founded on a 'Preferred Future' for the Parkes SAP, which is based on a set of Sustainability Goals and Key Considerations developed through the Enquiry by Design process, that describe it as a successful SAP in the future. The goals and considerations of the ESD Plan are designed to guide the development of the Parkes SAP.

2.1 PURPOSE OF THE ESD PLAN

The ESD Plan aims to make recommendations for inclusion in the Master Plan for the Parkes SAP. The foundation for the delivery of the 'Preferred Future' for the Parkes SAP is the United Nations Industrial Development Organisation's (UNIDO) Eco Industrial Parks Framework. To support this foundation is the concept of a 'Circular Economy'. The circular economy principle was identified as the keystone to the 'Preferred Future' for the Parkes SAP, fundamental to delivery and binding together the sustainability goals, as outlined below.

2.2 METHODOLOGY

In completing the ESD Plan, various existing global, national, state and local climate change and sustainability framework was reviewed to ensure the project is aligned at the highest level. The preparation of the ESD Plan also took into account key stakeholders (e.g. local and state government departments) with an interest in the project.

Frameworks referenced include:

- the United Nations Sustainable Development Goals
- National Climate Resilience and Adaptation Strategy, Department of Environment and Energy
- the NSW Climate Change Policy Framework
- the NSW EPA Circular Economy Policy Statement
- Central West and Orana Regional Plans
- Parkes Shire 2030+ Community Strategic Plan
- Parkes Local Environmental Plan (LEP) 2012 and Parkes Development Control Plan (DCP)
- Department of the Environment and Energy National Carbon Offset Standard (NCOS)
- Green Building Council of Australia's (GBCA) Carbon Positive Roadmap.

The ESD Plan is founded on a 'Preferred Future' for the Parkes SAP, which is based on a set of sustainability goals and key considerations developed through the Enquiry by Design process, that describe it as a successful SAP in the future.

2.3 EXISTING ENVIRONMENT

The proposed SAP area is currently occupied predominantly by agricultural land, as well as an existing operational solar energy facility, quarry operation and intermodal terminals. Parkes Shire Council 'strives to be a leader in sustainability', through initiatives within the water, energy, vegetation and general development areas (Parkes Shire Council, 2019). The Council aims to reduce their carbon footprint through schemes such as:

- Integrated water infrastructure renewal projects: installation of solar systems and reduction of discharge and effluent at water and sewerage treatment plants.
- Council Solar Initiative: installation of solar systems at the five largest energy usage sites, as well as a program to engage local community members in personal solar systems.
- Rain Gardens: partnership with the Central West Catchment Authority to reduce flooding and improve stormwater quality through implementing water sensitive urban design.

Despite the programs in place across the LGA, the ESD Plan proposes a wholistic approach to sustainability specifically within the SAP area, including strategies for water and waste usage, as well as energy and carbon use practices.

2.4 SUMMARY OF ESD PLAN

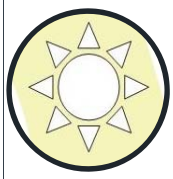
Through a series of workshops, the key stakeholders have worked together to define the 'Preferred Future' for the Parkes SAP which is represented as a suite of sustainability goals as shown in Figure 2.1 Below.

Figure 2.1 Sustainability goals for the 'Preferred Future' for the SAP (Source: dsquared consulting, Adelaide)

Table 2.1 provides a summary of the sustainability goals and key considerations outlined in the ESD Plan. The key considerations have been applied to the context of each of the sustainability goals to inform the recommendations on the options for infrastructure and policy approaches that can be included in the Master Plan. The key considerations reflect the main topics of discussion for each goal raised during the Enquiry by Design (EBD) workshop.

Table 2.1 Sustainability goals and key considerations

GOALS	KEY CONSIDERATIONS	ACTIONS AND OUTCOMES
 Climate resilience: a precinct resilient to climate change	— Green and blue infrastructure will contribute to the sap's resilience as more extreme weather events are experienced. — A Climate Adaptation Plan (CAP) is essential to categorize risks and implement resilience strategies. — The implementation of an integrated water cycle model which is informed by the cap. — Renewable energy serving individual sites as part of an embedded network/microgrid.	**Actions:** The SAP Masterplan will provide a secure water supply; a secure energy supply; climate resilient infrastructure; and blue & green infrastructure to reduce heat island effect.
 Green infrastructure: blue & green infrastructure reflecting connection to country	— A focus on blue and green infrastructure to increase resilience to climate change. — An environment that supports natural balance, expanding on existing natural areas. — A focus on reducing the heat island effect in human centric areas. — Flood water retention and reuse on an individual site scale and precinct scale. — Restoration of local natural habitat and connection with country.	**Actions**: the SAP Masterplan will provide green corridors, natural waterways, native green reserves and recreation spaces. **Outcomes enabled:** Flora & fauna habitat continuity, biodiversity, stormwater conveyance.
 Mobility: a low carbon, active and future ready mobility network.	— Efficiencies in the logistics network to reduce movement, handling and emissions. — A highway hub for truck servicing including provision for electric vehicle and hydrogen charging. — Planning for the future use of autonomous vehicles and drones. — Connectivity to neighbouring towns – on demand transport, shuttle buses, and public transport. — The use of recycled materials in the construction of transport infrastructure. — Cycle and walking paths within the precinct's green infrastructure.	**Actions:** the SAP Masterplan will provide efficient transport and logistics networks; a gateway transport hub; and a precinct shuttle bus service. **Outcomes enabled**: smart-tech communications for transport logistics; autonomous vehicle use; and next generation vehicle fuelling (electric/hydrogen/biofuel).

GOALS	KEY CONSIDERATIONS	ACTIONS AND OUTCOMES
 Assurance rating tools: a sustainability framework that delivers innovation and attracts investment.	— Standards above the national construction code — Sustainability governance including the eco industrial park framework to guide the implementation of world class industries and systems, and carbon neutral certification. — The development corporation or a private operator in charge of the embedded energy network, integrated water cycle, and resource circular economy.	**Actions:** the SAP Masterplan will provide UNIDO Eco Industrial Park Framework recognition; sustainability governance; and National Carbon Offset Standard (NCOS) Precincts Carbon Neutral Certification. **Outcomes enabled:** infrastructure rated with the Infrastructure Sustainability Council of Australia (ISCA) and buildings rated with the Green Building Council of Australia (GBCA).
 Emissions: industries collaborating to deliver a carbon neutral precinct.	— Individual business emission reporting and carbon offsetting — Potential for a carbon market with business to business trading of emissions. — Alignment of carbon neutral target with NSW policy (2050), National Policy and Paris Commitment Agreement.	**Actions**: the SAP Masterplan will provide a framework for carbon management and NCOS certification; and an industry support programme for carbon reduction. **Outcomes enabled**: NCOS precinct carbon neutral certification; carbon offset project and investment creation; and carbon neutral industries.
 Energy: harnessing innovation to deliver secure, affordable & low carbon energy.	— On-site renewable requirements for individual sites and buildings — Governance to coordinate energy focused research and development and to facilitate a circular economy approach. — The development corporation or a private operator in charge of the embedded energy network/microgrid. — Energy storage within the precinct for use across the embedded network/ microgrid. — Ongoing energy performance measurement through a smart grid.	**Actions:** the SAP Masterplan will provide electricity via a shared embedded network; piped natural gas; solar renewable energy; and smart delivery and management of systems. **Outcomes enabled**: renewable energy system deployment; energy generation and supply; hydrogen & alternative fuel use; and energy sharing.
 Water: a fully integrated water cycle, supporting the needs of the precinct and the environment.	— An integrated water cycle with rainwater capture, storm water harvesting, wastewater and greywater treatment and reuse. — A system to provide for the needs of the precinct whilst minimising negative impacts to the precinct or the environment. — Water modelling to include predicted climate change impacts.	**Actions**: the SAP Masterplan will provide a reliable water supply; alternative water sources for non-potable uses; sub-precinct rainwater storage and re-supply; precinct stormwater treatment; and a developed framework for water management.

GOALS	KEY CONSIDERATIONS	ACTIONS AND OUTCOMES
 Resource optimisation: a circular economy framework for resource efficiency.	— A centralised resource recovery facility – including hazardous waste, compost and recycling. — A waste to energy facility to dispose of waste that is not otherwise recoverable — An understanding of individual industry waste outputs within the precinct to facilitate the implementation of circular economy streams. — Continuous innovation to reduce the creation of waste within the precinct.	**Actions:** the SAP Masterplan will provide a circular economy business to business concierge; and waste/resource recovery services. **Outcomes enabled:** resource sharing; advanced re-manufacturing; co-located complimentary industries; energy from waste; and on-site resource extraction.

3 METHODOLOGY AND EXISTING ENVIRONMENT

3.1 OVERVIEW

3.1.1 TECHNICAL STUDIES UNDERTAKEN

There were seven technical studies undertaken for the Parkes SAP project, summarised in Sections 3.2 to 3.7:

- Air Quality and Odour Assessment, considering potential air quality challenges for the SAP.
- Operational Noise and Vibration Assessment, identifying potentially impacted sensitive receivers of existing and future noise impacts.
- Groundwater desktop study, characterising the groundwater systems with and surrounding the SAP.
- Preliminary Site Investigation, determining potential contamination sources that may impact on development associated with the SAP.
- Biodiversity Assessment report, providing an understanding of the baseline biodiversity values of the investigation area.
- Bushfire Constraints and Opportunities Report identifying any existing and proposed bushfire risk within the Parkes SAP.
- Aboriginal Cultural Heritage and Historic Heritage Assessment report; identifying and assessing heritage constraints relevant to the Parkes SAP.

3.1.2 INVESTIGATION AREA

The SAP investigation area identified in Figure 1.2 was composed for the purpose of the technical reports, as a basis for the specialist assessments. It is acknowledged that the final SAP boundary may be different.

3.2 AIR QUALITY AND ODOUR

This section summarises existing environment and proposed methodology for the Air Quality and Odour Assessment that was prepared for the Parkes SAP and is provided in Appendix B.

3.2.1 AIMS AND OBJECTIVES OF THE AIR QUALITY AND ODOUR EVALUATION

The Air Quality and Odour Assessment considers potential air quality challenges of the Parkes SAP and identifies planning, development and infrastructure opportunities that could be pursued. The purpose of the report is:

- to articulate the legislative requirements for air quality
- to establish the character of the existing local airshed
- to identify the current air emissions sources/industries
- to communicate the ambition for the Parkes SAP, in its response to air quality
- for each of the short-listed scenarios, provide a preliminary assessment of the key air quality considerations.

The objective of the assessment was:

- from an air quality perspective, determine a preferred SAP Master Plan
- provide pollutant isopleths, to assist in defining indicative development boundaries for different land uses; and
- for the final selected Master Plan, assess the potential air quality and odorous impacts associated with the Intensive Livestock Agriculture land use.

3.2.2 METHODOLOGY

The assessment has been prepared with reference to the following legislation, data and documents:

- *Protection of the Environment Operations Act 1997* (Schedule 1 – Scheduled activities).
- Protection of the Environment operations (clean air) regulation 2010.
- Approved methods for modelling and assessment of air quality in NSW (2016).
- Technical notes – assessment and management of odour from stationary sources in NSW (2006).
- National Environment Protection (Ambient Air Quality) Measure.
- National Pollution Inventory (http://www.npi.gov.au/npi-data/search-npi-data).
- Modelled Weather Research and Forecasting Model (WRF) meteorological data.
- Katestone Environmental (2004). Utility of odour intensity for the meat processing industry. Prepared for Meat and Livestock Australia.
- DEC (2006). Technical Framework – Assessment and management of odour from Stationary sources on NSW (page 39).
- Pickett and Hall (2014). Odour Dispersion modelling for a waste-to-energy cogeneration plant. ENVIRON14, Adelaide. South Australia.
- DEC (2006). Technical Frame – Assessment and management of odour from Stationary sources on NSW (page 39).
- Pacific Environment Limited (2015). Energy from waste facility – Air Quality and Greenhouse Gas Assessment. (Eastern Creek).

For the purposes of this high-level dispersion modelling exercise, CALPUFF was utilised. CALPUFF is a multi-layer, multi-species non-steady-state puff dispersion model, which can simulate the effects of time and space, as well as varying meteorological conditions on pollutant transport, transformation and removal.

3.2.3 EXISTING ENVIRONMENT

This section outlines the meteorological conditions around Parkes, sensitive receivers who may be impacted by a change in air quality and existing operational facilities within or surrounding the SAP investigation area.

3.2.3.1 PREVAILING WINDS AND METEOROLOGICAL CONDITIONS

The nearest Automatic Weather Station (AWS) to the Project area is located in the Parkes Regional Airport (615669 m E, 6333616 m S). The Parkes Airport AWS (Station ID: 065068) is located at an elevation of 322 m, approximately 8 km east of the SAP.

An annual wind rose plot for the period 1 January 2013 to 31 December 2018 at Parkes Regional Airport AWS is shown in Figure 3.1. Based on the available data, winds originate predominantly from the north-east (13% of the time) with lesser components from the north (9% of the time), north-northeast (10% of the time) and east-northeast (11% of the time). Winds are generally moderate to fast, with the highest wind speeds (>8 m/s) originating from the north. Calm conditions, which were defined as wind speeds less than 0.5 m/s, occur 9% of the time.

Parkes Airport AWS has warm temperate climate, with significant temperature variations between summer and winter. For the period 2013–2018, the average temperature for the year ranged from 8.1°C (July) to 25.6°C (January). For the period 2013–2018, Parkes Airport AWS received an average of 585 millimetres (mm) of rainfall per year. The wettest season is Spring, receiving 155 mm of rainfall, while the driest season is Summer, receiving 136 mm of rain. Parkes Airport AWS displays relative humidity levels that are consistently higher in the morning. Seasonally, relative humidity is highest in Winter and lowest in Summer.

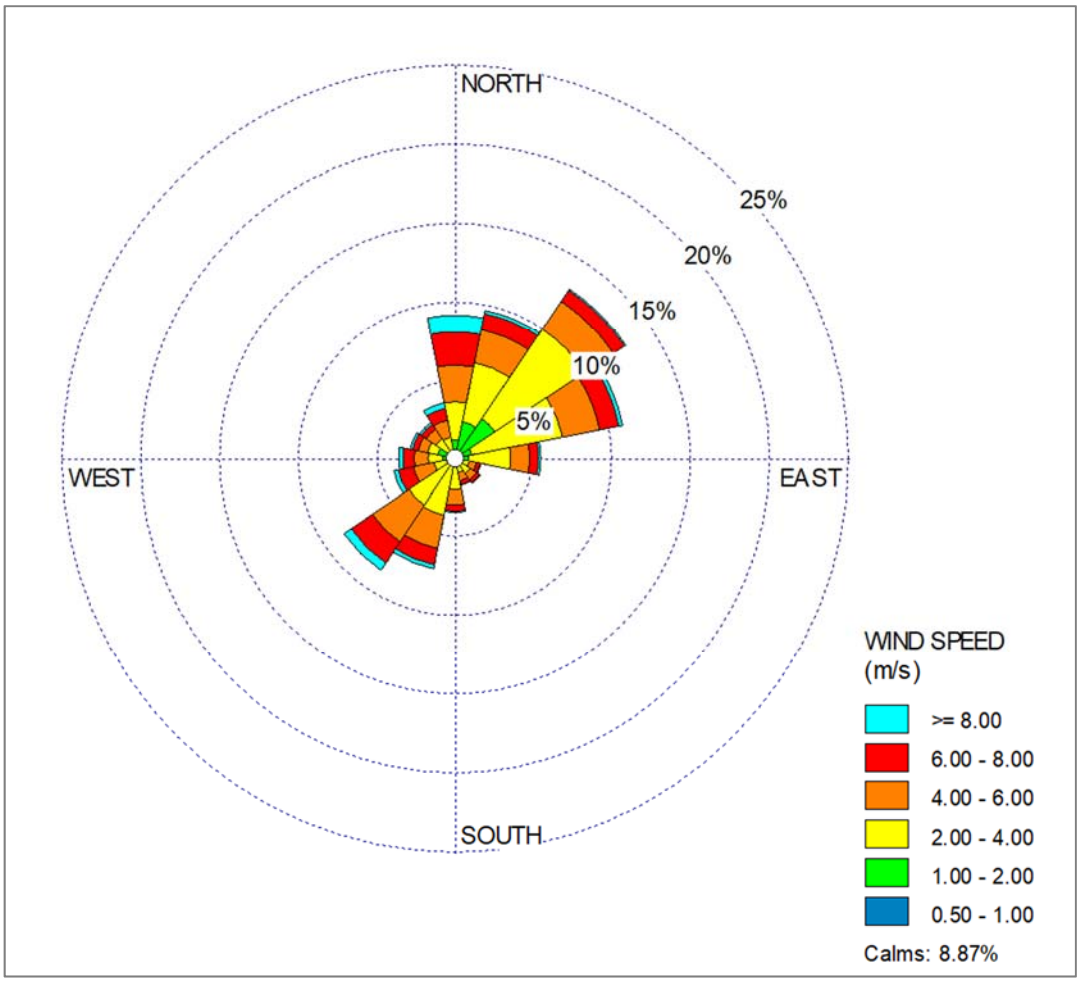


Figure 3.1 Annual wind rose for Parkes Airport for the period January 2013 – December 2018

3.2.3.2 SENSITIVE RECEIVERS

The NSW EPA '*Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (2016)*' describes a sensitive receiver as:

> *'A location where people are likely to work or reside this may include a dwelling, school, hospital, office or public recreational area. An air quality impact assessment should also consider the location of known or likely future sensitive receptors."*

The nearest external sensitive receivers are as follows, which are displayed on a map included in Appendix B:

- Cheney Park
- Commercial Receptors
- Lachlan Health Service Parkes Hospital
- Linfox Logistics Service
- Middleton Public School
- PCYC Parkes Youth Organisation
- Parkes Christian School
- Parkes Golf Course
- Parkes Waste Facility
- Residential properties
- Southern Cross Care Parkes Village Retirement Community.

3.2.3.3 EXISTING OPERATIONS IN PARKES SAP

The known or proposed industries located on or surrounding the SAP which have the potential to impact upon the local air shed are detailed below:

- the inland rail, intermodal terminal and national logistics Hub
- Parkes waste facility
- Westlime quarry
- Parkes waste water treatment plant
- pet food manufacturing facility.

The locality of these industries regarding the SAP, are illustrated in Figure 3.2.

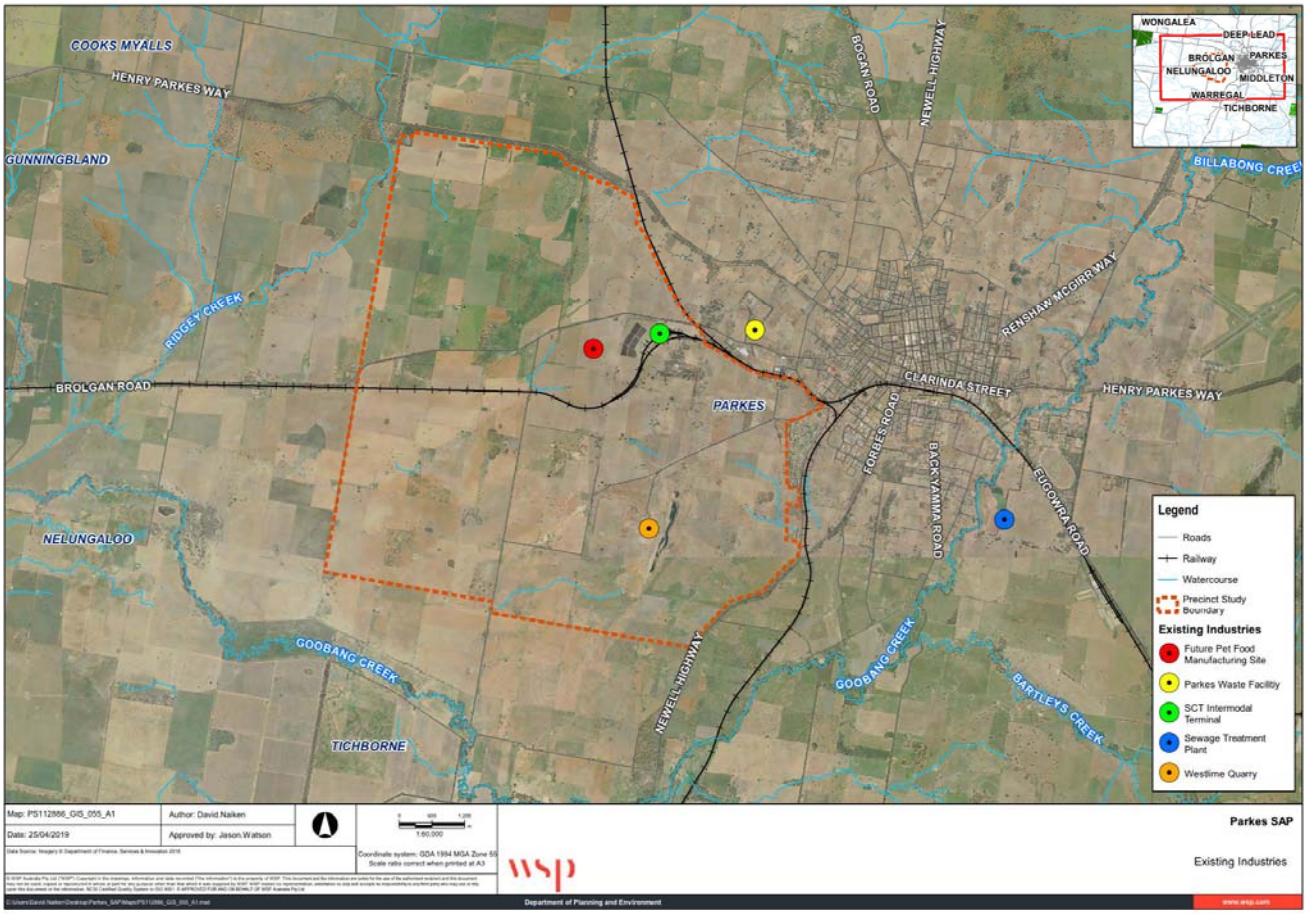


Figure 3.2 Existing industries within the Parkes SAP investigation area

3.3 NOISE AND VIBRATION

This section summarises the existing environment and methodology for the Noise and Vibration Assessment that was prepared for the Parkes SAP and is provided in Appendix C.

3.3.1 AIMS AND OBJECTIVES OF THE NOISE AND VIBRATION ASSESSMENT

The purpose of the noise and vibration assessment report is to detail the construction and operational noise and vibration assessment conducted at the Master Plan stage of the proposed SAP.

3.3.2 METHODOLOGY

The noise and vibration assessment included in Appendix C focuses on:

- identifying the location of the proposed SAP development area and potentially impacted sensitive receivers
- identifying the existing and approved future noise-generating sites within the SAP
- establishing the noise study area and determine the associated existing ambient noise environment
- establishing the noise and vibration assessment criteria and trigger levels applicable to the operation of the SAP
- qualitative construction noise and vibration assessment
- operational noise and vibration assessment, based on the selected master plan for the SAP. In addition, assessment findings for the three previously shortlisted development scenarios are also included in this report.

A noise model was created using SoundPLAN 8 modelling software to predict the noise generated during typical operation conditions for both standard and noise-enhancing meteorological conditions. The adopted prediction method for the model was the CONCAWE method. Key modelling parameters and assumptions are shown in Table 3.1.

Table 3.1 Operational noise modelling inputs and assumptions

PARAMETER	MODELLING INPUT
Ground absorption	Ground absorption factors are set to 0 for all roads, hardstand and 0.75 for grass / vegetation.
Terrain data	Terrain data have been provided by NSW DPIE (LiDAR) and NSW Land and Property Information.
Meteorological conditions	1 Standard conditions: Stability category D, 0.5 m/s wind from source to receiver. 2 Night: Stability category F, 2 m/s wind from noise source to receiver. Historical wind data indicates that the occurrence of light winds up to 3 m/s during stability categories A-D is not significant (<30%) and therefore is not considered
Buildings	Sensitive receivers are generally modelled as points only. A cluster of existing residential buildings to the northeast of the SAP has been included.
Assessed sensitive receivers	Existing land uses – quantitative assessment for residential receivers outside of the indicated SAP development areas Future land uses as part SAP – qualitative assessment only.
Receiver height	The receiver heights are set at 1.5 metres.
Location of noise sources	Across the entire indicated development areas of the SAP up to the external boundaries (for each scenario).
Modelled sound power levels	As described in Section 6.5 of Appendix C (noting limitations described below).
Assessment duration	15 minutes.

PARAMETER	MODELLING INPUT
Assumed hours of operations	It is assumed that all activities will occur at any time of day (day, evening, night).
Attention-drawing characteristics	It is assumed that received noise levels at sensitive receivers will be free from all attention-drawing characteristics that could attract a penalty as described in Section 4.2.4 of Appendix C.
Possible limitations	1 The sound power levels adopted in this assessment were based on information obtained from a limited literature review of previous assessments conducted by WSP or other consultants. 2 It should however be noted that the modelled scenarios are likely to represent worst case acoustic scenarios as they assume the entire indicated developable areas to be fully developed and noise-generating. 3 The modelled area sources assume an equally distributed sound power across the identified land parcels. This is considered an appropriate methodology considering the high level nature of the noise assessment. Further specific acoustic consideration of individual prominent noise generating items is recommended in future design stages (e.g. elevated exhaust stack, locomotive/truck movements).

To allow a cumulative impact assessment to include consideration of existing and future land uses, Parkes SAP has been modelled in conjunction with the existing and approved land uses within the SAP.

Sound power levels for the existing and approved land uses are modelled per discussed in Sections 2.2 and 2.3 of Appendix C. The modelled sound power levels corresponding with the respective development scenarios are summarised in Table 3.2. As the exact build form, site configuration, positioning of noise sources are not known at the Master Plan phase, noise sources representing the future developments have been modelled using area sources. Source sound power levels have been derived from noise reports for assumed similar land uses.

Table 3.2 Proposed land use sound power levels (based on likely activities in duration of 15 minutes)

PROPOSED FUTURE LAND USE	ASSUMED SOUND POWER LEVEL PER UNIT AREA (dBA/m^2)	DESCRIPTION
Regional enterprise, mixed enterprise	52	Generally dominated by on-site truck and forklift movements. Overall sound power level from external sources of 103 dBA over an area of approximately 576,000 m^2. Building area assumed to occupy approximately 20% of land area with an internal reverberation noise level of 85 dBA. Factory building of sheet metal building envelope construction.
Freight terminal	Per Pacific National Logistics Terminal as discussed in Section 2.3.4 of Appendix C.	
Protected cropping	48	Generally dominated by on-site truck and forklift movements. Overall sound power level from external sources of 103 dBA over an area of approximately 300,000 m^2.

PROPOSED FUTURE LAND USE	ASSUMED SOUND POWER LEVEL PER UNIT AREA (dBA/m^2)	DESCRIPTION
Intensive livestock agriculture	55	Significant noise sources include on-site truck movements, exhaust fans, forklift or similar. Overall sound power level from external sources of 106 dBA over an area of approximately 150,000 m^2.
Waste to energy and recycling	59	Significant noise sources include on-site truck movements, exhaust fans, forklift/loader or similar, condensers, transformers. Overall sound power level from external sources of 114 dBA over an area of approximately 300,000 m^2.
Commercial gateway	50	Significant noise sources likely to be building services plant equipment. Does not account for service station noise sources, which will separately assessed/discussed.
Airport (*Used in short listed scenario testing)*	47	Key mechanical plant items servicing the terminal or internal areas of an airport. It should be noted that while the noisiest equipment at an airport is likely to be the aircraft, noise associated with aircraft movements are covered by federal rather than state regulations and have been excluded from this assessment. The Noise Policy for Industry (NPfI) explicitly excludes noise associated with air transport corridors.

3.3.3 EXISTING ENVIRONMENT

WSP have conducted various unattended noise monitoring in the vicinity of the SAP, the results of which have provided data to inform the existing noise environment in the investigation area, from current operations. Figure 3.3 below displays a snapshot of existing and approved development within the SAP, as well as previous noise monitoring locations and identified sensitive receivers, noting any existing sensitive receivers within the SAP have been excluded from this assessment.

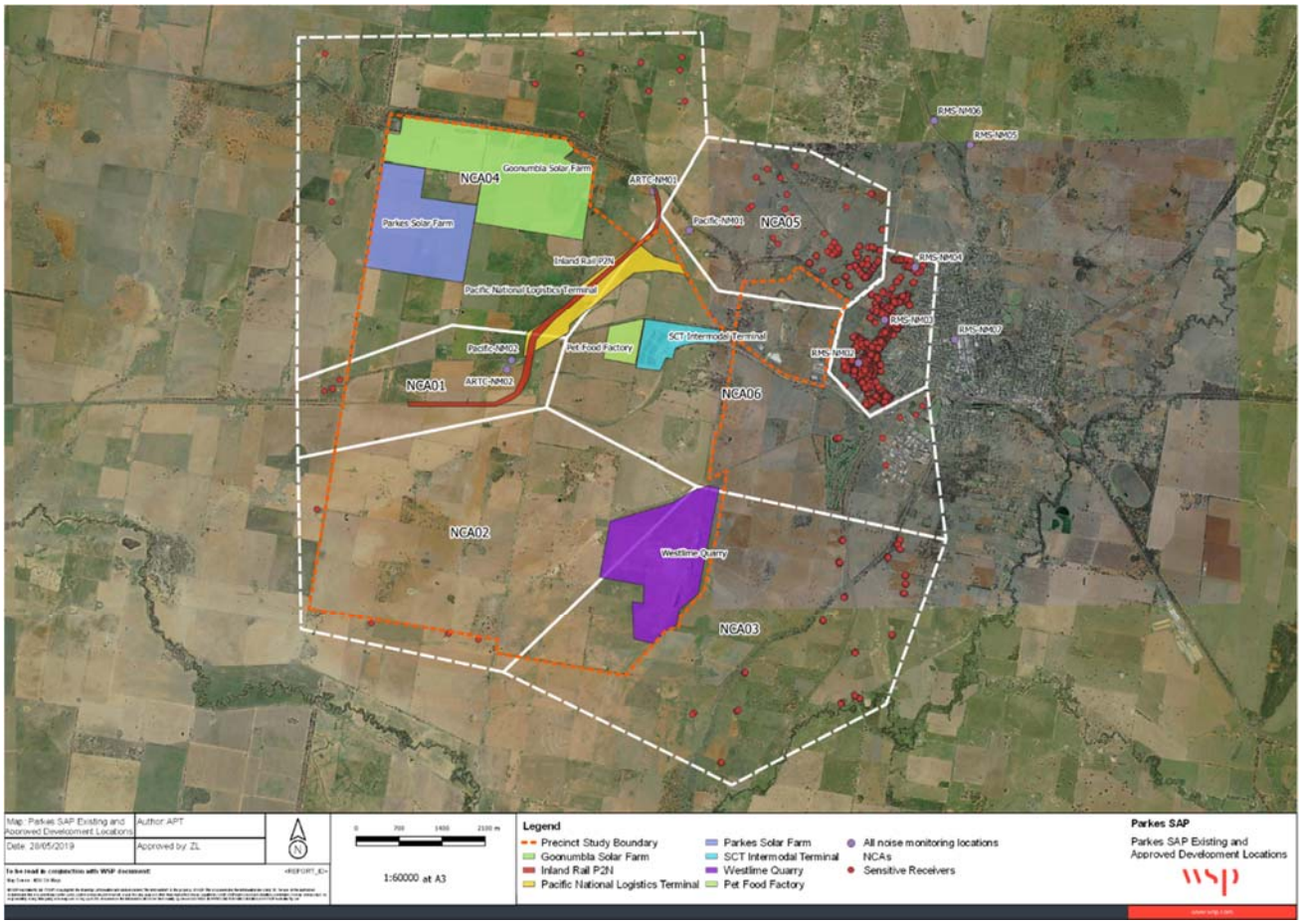


Figure 3.3 Existing and approved developments within the Parkes SAP

3.3.3.1 PACIFIC NATIONAL PARKES LOGISTICS TERMINAL

Noise logging was conducted for the Parkes Intermodal terminal between 29 November 2017 and 18 December 2017, the measured ambient noise level as presented in Pacific National's Parkes Intermodal facility are reported in Table 3.3.

Table 3.3 Unattended noise measurement results – Ambient (L_{eq}) and background noise (RBL) (Pacific National)

LOCATION	MEASURED NOISE LEVELS, DBA					
	Day 7am-6pm		Evening 6pm-10pm		Night 10pm-7am	
	$L_{eq,15min}$	RBL	$L_{eq,15min}$	RBL	$L_{eq,15min}$	RBL
PACIFIC-NM01	56	33	52	33	56	32
PACIFIC-NM02	53	28	52	26	45	24

3.3.3.2 ARTC INLAND RAIL PARKES TO NARROMINE

The Parkes to Narromine component of Inland Rail reported the following unattended measured noise levels at the identified representative receiver locations (refer to Table 3.4).

Table 3.4 Unattended noise measurement results – Ambient and background noise (Inland Rail – Parkes to Narromine)

LOCATION	MEASURED NOISE LEVELS, DBA					
	Day 7am-6pm		Evening 6pm-10pm		Night 10pm-7am	
	$L_{eq,15min}$	RBL	$L_{eq,15min}$	RBL	$L_{eq,15min}$	RBL
ARTC-NM01	55	35	52	34	56	32
ARTC-NM02	45	35	44	30	41	30

3.3.3.3 ROADS AND MARITIME PARKES BYPASS

Unattended noise monitoring results for Parkes Bypass are presented in Table 3.5.

Table 3.5 Unattended noise measurement results – Ambient and background noise (Parkes Bypass)

MEASUREMENT LOCATION	MEASURED NOISE LEVEL, dBA					
	Day 7am-6pm		Evening 6pm-10pm		Night 10pm-7am	
	$L_{eq(Day)}$	RBL	$L_{eq(Evening)}$	RBL	$L_{eq(Night)}$	RBL
RMS-NM01	52	33	49	31	40	30
RMS-NM02	54	39	52	37	47	31
RMS-NM03	58	41	56	38	50	32
RMS-NM04	56	37	48	31	48	30
RMS-NM05	61	40	60	32	57	30
RMS-NM06	51	31	48	30	47	30
RMS-NM07	66	51	65	45	61	35

3.3.4 PROJECT NOISE TRIGGER LEVEL

In assessing the noise impact of the proposed development on surrounding residential receivers, both the intrusiveness and amenity criterion must be considered. In most cases, only one criterion will become the limiting criterion and form the project noise trigger levels (PNTL) for the industrial source under assessment.

It is noted that, in order to standardise the time periods for the intrusiveness and amenity noise levels, the following conversion between $L_{eq\ period}$ and $L_{eq\ 15\ min}$ has been applied (as per Section 2.2 of the NSW NPfI):

$$\mathbf{L_{Aeq\ 15min} = L_{Aeq\ period} + 3\ dB}$$

A summary of all relevant criteria is presented in Table 3.6.

Table 3.6 Summary of Project Noise Trigger Levels (PNTL) (cumulative SAP noise levels)

RECEIVER LOCATION	ASSESSMENT/ RECEIVER TYPE	PROJECT NOISE TRIGGER LEVELS dBA $L_{eq\ 15\ min}$		
		Day[1]	Evening[1]	Night[1]
NCA1, NCA2, NCA4 Residential	*Intrusiveness*	*40*	*35*	*35*
	Amenity	*48*	*43*	*38*
	PNTL -Residential	**40**	**35**	**35**
NCA3 Residential	*Intrusiveness*	40	36	35
	Amenity	*48*	*43*	*38*
	PNTL -Residential	**40**	**36**	**35**
NCA5 Residential	*Intrusiveness*	40	38	37
	Amenity	*48*	*43*	*38*
	PNTL -Residential	**40**	**38**	**37**
NCA6 Residential	*Intrusiveness*	40	38	37
	Amenity	*48*	*43*	*38*
	PNTL -Residential	**40**	**38**	**37**
NCA6 Active recreation	**PNTL**	**53**		
NCA6 Industrial	**PNTL**	**68**		
Residential NCA7	*Intrusiveness*	46	43	37
	Amenity	*48*	*43*	*38*
	PNTL -Residential	**46**	**43**	**37**

(1) Day: the period from 7:00 am to 6:00 pm Monday to Saturday; or 8:00 am to 6:00 pm on Sundays and public holidays; evening: the period from 6:00 pm to 10:00pm; night: the remaining periods.

Chapter 4 of Appendix C provides a detailed description on the assessment criteria for the SAP.

3.4 HYDROGEOLOGY

This section summarises the methodology and existing environment for the Groundwater Desktop Study that was prepared for the Parkes SAP and is provided in Appendix D.

3.4.1 AIMS AND OBJECTIVES OF THE GROUNDWATER DESKTOP STUDY

The objective of the Groundwater desktop study is to characterise the groundwater system at the site through readily available desktop information on the geology, groundwater levels, groundwater quality and groundwater flow. In addition, this assessment will evaluate groundwater availability to provide information on the potential use of the groundwater as a resource.

To achieve this objective, research was undertaken into the following information available for the investigation area:

- groundwater availability and licensing
- existing subsurface and groundwater environment
- groundwater related environmental values (registered bore users and groundwater dependent ecosystems)
- possible groundwater systems to be utilised as future resources.

3.4.2 METHODOLOGY

A review of desktop material, relevant legislation and information on the existing environment was undertaken in undertaking the Groundwater Desktop Study.

The following data sources and legislation were utilised in undertaking this review:

- geological maps, Bureau of Meteorology's (BoM) Groundwater Dependent Ecosystem (GDE) Atlas and National Groundwater Information System (NGIS) database search for registered bores
- groundwater level and groundwater quality related to the investigation area and project buffer
- climatic data (rainfall and evapotranspiration) from the nearest available source to the investigation area
- *Australian and New Zealand Guidelines for Fresh and Marine Water Quality 2000 (ANZECC/ARMCANZ, 2000)*
- *Australian Drinking Water Guidelines (NHMRC, 2011).*
- *The Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act*)*
- *Water Act 1912*
- *Water Management Act 2000*
- The Water Sharing Plans
- The Lachlan Unregulated and Alluvial Water Sharing Plan
- The NSW Water Register
- The Aquifer Interference Policy.

3.4.3 EXISTING ENVIRONMENT

The following sections summarise the existing hydrogeological environment within the investigation area and its related investigation buffer. A 2 km radius buffer was applied to the investigation area to ensure a regional scale of understanding. The buffer extends approximately to Parkes township to the east, Goobang Creek to the south, and agricultural lots to the north and west.

3.4.3.1 GROUNDWATER AVAILABILITY

A search of the BoM's NGIS database registered groundwater bore database (BoM, 2019b) identified 19 registered bores within the investigation area and an additional 35 bores within the investigation buffer. The majority of the bores within the investigation area and the investigation buffer are used for monitoring purposes and household water supply, respectively. The remaining bores are used for household water supply, stock, manufacturing and industry, recreation and

culture and mining. The status of the identified bores within the investigation area is predominantly unknown with four bores listed as proposed.

Seven (7) registered bores within the investigation area can be classified as sensitive receptors. The remaining bores identified within the investigation area and buffer are licensed as 'monitoring' or are listed as abandoned or removed, and are therefore not classified as a sensitive receptor. In addition to the household water usage, borewater (groundwater) is currently utilised as a resource by Parkes Shire Council as part of the updated Parkes-Peak Hill Water Supply Scheme (Cardno, 2015).

Data obtained from WaterNSW (2019b) identified two additional bores within the investigation buffer (GW705014 and GW705019). These bores were the only bores identified within the investigation area and investigation buffer that contained yield values. Both bores are situated within the Lachlan Fractured Rock groundwater source and recorded yields of 0.18 l/s and 0.95 l/s, respectively. The Groundwater Desktop Study in Appendix D contains a detailed list of each registered groundwater bore within the investigation area.

It can be inferred from the available information that regional groundwater flow is generally towards the west. Locally, groundwater flow will generally follow the topography. Influences on flow within the water bearing zones of the Lachlan Unregulated and Alluvial will be related to the presence of bands (or lenses) of coarser sediments derived from alluvial sources. Paleochannels are present within the Lachlan alluvium and are typically associated with the Lachlan River further south within the Bland Catchment.

3.4.3.2 GROUNDWATER CHARACTERISTICS

There is limited available groundwater level information within the investigation area and its buffer zone. Three bores (GW013279, GW705014 and GW705019) were identified within the investigation buffer that contained static water level (SWL). Bore GW013279 reported a SWL in 1998 of 3.72 metres below ground level (mBGL). The bore is located at the southern boundary of the Project buffer zone, adjacent to Goobang Creek, within the Lachlan Unregulated and Alluvial groundwater source. The remaining two bores (GW705014 and GW705019), located proximal to the northern and north western boundary of the investigation area, within the Lachlan Fractured Rock groundwater source, reported SWL's of 46 mBGL and 80 mBGL, respectively. Additional information provided on the bore drilling log of GW705014 indicated that the water bearing zone was intersected at 58 mBGL. This illustrates that once the groundwater source within the Lachlan Fracture Rock is intersected, the groundwater level may rise within the bore (or opening), if unrestricted, to a higher elevation (potentiometric surface).

Groundwater dependent ecosystems (GDEs) are communities of plants, animals and other organisms whose extent and life processes are dependent on groundwater. Identified GDEs found within the investigation area and buffer from the BoM GDE Atlas (BoM 2019c) are listed below:

- no *aquatic* GDE within the Project boundary
- 1 *aquatic* GDE (Goobang Creek watercourse) within the investigation buffer
- 9 distinct *Terrestrial* vegetation GDEs within the investigation area
- 14 distinct *Terrestrial* vegetation GDEs within the investigation buffer.

All identified terrestrial GDEs are labelled as low potential (for groundwater interaction), based on regional studies. The identified aquatic GDE is labelled as moderate potential (for groundwater interaction), based on the National assessment.

3.5 GEOLOGY, SOILS AND CONTAMINATION

This section summarises the Preliminary Site Investigation (PSI) that was prepared for the Parkes SAP and is provided in Appendix E.

3.5.1 AIMS AND OBJECTIVES OF THE PRELIMINARY SITE INVESTIGATION

The objective of the PSI is to identify potential areas of environmental interest (AEI), including acid sulfate soils which will assist in identifying construction limitations/constraints within the investigation area with respect to contamination.

3.5.2 METHODOLOGY

Completion of the PSI involved a desktop review of the regional environmental setting and historical information. This included a review of:

- physical site setting information such as topography, geology, hydrology, salinity, hydrogeology, and potential sensitive receptors on or near the investigation area
- information available from Parkes Shire Council
- regulatory notices or records relating to potential contamination on the site issued by the NSW Environmental Protection Authority (EPA)
- historical and current aerial photographs for investigation area and surrounds
- review historical investigation reports for the investigation area (where available)
- an overview of neighbouring properties to identify the presence and proximity of sensitive receptors which could be significantly impacted upon by the project
- online search of the Department of Defence unexploded ordnance (UXO) database
- review of Division 10.7 certificates (previously Section 149 planning certificate) of major parcels of land within the investigation area
- review of various online databases, including:
  - Soil Landscapes, NSW Office of Environment and Heritage, 2018 (Brolgan Plain, Parkes Plain)
  - Australian Soil Resource Information System, 2019
  - Parkes 1:100,000 Geological Sheet accessed via Google Earth Pro
  - The Australian State of the Environment (SOE) *interactive hydrogeology map of Australia*
  - Department of Primary Industries registered groundwater bore database.

In addition to the above, a site coach tour was undertaken on 14 February 2019 which informed the details of site setting and current operations. No detailed site inspections formed part of this investigation.

3.5.3 EXISTING ENVIRONMENT

The investigation area is currently generally vacant and farming land with some detached residential dwellings located on rural properties scattered throughout the area. Agricultural activities are prevalent across the area, including many scattered farm dams. No natural waterways exist inside the investigation area with the closest waterways being Ridgey Creek which runs along the western boundary and Goobang Creek to south of the investigation area.

The investigation area topography varies across the investigation area but generally slopes to the west. Topographic grades of < 2% to 5% are anticipated across the project, with the higher grades situated around slopes and crests associated with the North Parkes volcanics.

The investigation area lies at an elevation ranging from approximately 263 metres relative to Australian Height Datum (mAHD) in the west to 351 mAHD in the east.

3.5.3.1 GEOLOGY

The majority of the investigation area is located above Quaternary to Tertiary aged material consisting of colluvial sheetwash and scree slopes as well as inactive alluvial plains.

Throughout the area there are also Silurian aged material which consists of the Mumbidgle Formation and the Bacobidgle Conglomerate comprising mudstones, lithic sandstone, polymictic conglomerate, sandstone and limestone lenses.

Further there are Ordovician aged formations including the Cotton Formation made up of siltstone, chert, sandstone, mart, minor limestone and conglomerate and the Goonumbla Volcanics containing andesitic lavas and breccias, volcaniclastic sandstone and conglomerate: commonly altered and adhered in Parkes Fault Zone.

3.5.3.2 SOIL

The project site covers a range of soil types that reflect the topography and the underlying geology of the region:

- In the east of the site (topographically up gradient) the dominant soil landscape is the Parks Soil Landscape which comprises soils developed on the foot slopes and side slopes of Ordovician (485 to 41 million years old) metasediments.
- The western half of the project site (topographically lower) is dominated by the Brolgan Plain Soil Landscape which is a level to gently undulating plan formed on Quaternary (up to 2.5 million years old) sediments nearer to the Goobang Creek.
- In the north of the study area is an isolated Ordovician Goonumbla volcanic rise. The soils associated with these volcanic are known as the Goonumbla Soil Landscape with generally shallow lithosols (otherwise known as rudosols and tenosols) on upper slopes and crests, and red podzolic soils (red and brown chromosols) on mid to lower slopes. These soils laterally grade into the surrounding alluvial soils.
- In the far west of the site are isolated instances of Daroobalgie Soil Landscape. These appear to be associated with possible depressions or drainage lines. This landscape is a Gilgai landscape with micro relief resulting in small rises and small depressions. The rises typically are very deep (>150 cm), moderately well-drained carbonate rich Red Brown Earths (Calcarosols and Brown Chromosols), while the depressions are typically Very deep (>150 cm), very poorly drained Grey Clays (otherwise known as Grey Vertosols).

The landscape limitations defined in the Parkes Plain include water erosion hazard and high run-off. The Brolgan Plain is noted as being a flood hazard, a foundation hazard and subject to localised seasonal water logging. Further, it is noted that the soil fertility is low to very low, the topsoils have a high erodibility and are generally unsuitable for structural earthworks. The region currently supports mixed agricultural enterprise. The areas is suited to a mixture of winter and summer crops including bread and durum wheat, barley, triticale, oats, canola, faba beans, lentils, lupins, chick peas, sorghum, mung beans and crops for hay (Lucerne etc.).

3.5.3.3 CONTAMINATION RISKS

The PSI has identified potentially contaminating activities within and adjacent to the investigation area. A major area of concern is the Westlime quarry and former mine site. This area has been identified as having tailings dams relating to previous gold extraction. The status of these dams is unknown as is the possible application of waste from the mine to the surrounding area. Former wool processing activity has been identified with disused evaporation ponds still present within Lot 4 DP 840130. A previous PSI report (EES, 2018) identified that portions of the bund walls had been destroyed which may have allowed effluent to escape from the pond system.

The majority of site is located within an area recorded as having a low probability for occurrence of acid sulfate soils. However, four minor pockets exist within the site boundaries that are listed as having a high probability for acid sulfate soils.

3.6 BIODIVERSITY

This section summarises the methodology and existing environment for the Biodiversity Assessment that was prepared for the Parkes SAP and is provided in Appendix F.

3.6.1 AIMS AND OBJECTIVES OF THE BIODIVERSITY ASSESSMENT REPORT

The stage 1 biodiversity assessment report provides an assessment of the biodiversity values of the investigation area in the context of the *Biodiversity Conservation Act 2016* (BC Act), as well as 'Matters of National Environmental Significance' (MNES) under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The purpose of the report is to inform ongoing masterplan evaluation and identify any existing data gaps.

3.6.2 METHODOLOGY

Preparation of this report involved background desktop research, on-site vegetation surveys (including paddock tree assessment) and on-site targeted threatened species surveys in accordance with the Biodiversity Assessment Method 2017 (BAM). Specific methodology details are provided further in Appendix F.

3.6.2.1 DESKTOP REVIEW

In order to identify threatened flora and fauna species, populations and ecological communities, Commonwealth listed Migratory species or critical habitat recorded previously or predicted to occur in the locality, a number of databases, spatial data and reports were reviewed, including:

- Bionet Atlas of NSW Wildlife, Office of Environment & Heritage (2019b).
- Atlas of Living Australia (2019).
- Protected Matters Search Tool, Department of the Environment and Energy (2019b).
- PlantNet Spatial Search, Royal Botanic Gardens (2019).
- NSW Department of Primary Industries Critical Habitat register, Department of Primary Industries (2019b).
- NSW Office of Environment and Heritage Critical Habitat register, Office of Environment and Heritage (2019d).
- Aerial photographic imagery (Land and Property Information, 2019a).
- State Vegetation Mapping Central West Lachlan Region VIS_ID 4682 (Office of Environment & Heritage 2019a).
- NSW Mitchell Landscapes (Land and Property Information, 2019b).
- Interim Biogeographic Regionalisation of Australia (IBRA version 7.0) (Thackway & Cresswell, 1995).

An assessment was also undertaken to identify the likelihood of occurrence of each threatened species, population and community (threatened biodiversity) identified with the potential to occur in the subject land. This was based on the habitat profile for each species and other habitat information available on the *Threatened Species Profile Database* (Office of Environment and Heritage, 2019f) and the *Species Profile and Threats Database* (Department of the Environment and Energy, 2019b).

3.6.2.2 VEGETATION SURVEYS

Vegetation surveys were undertaken by a team of ecologists between 25 February – 1 March and 11–15 March 2019, with the aim of collecting vegetation and threatened species data in accordance with BAM and relevant guidelines. Following analysis of existing vegetation data (maps and aerial photography), random meander surveys and field validation were undertaken to confirm vegetation types. Finally, comparison and ranking of the type and condition of different vegetation zones was completed through vegetation integrity plots and paddock tree assessments.

Additional seasonal surveys are proposed for Winter and Spring 2019.

3.6.2.3 THREATENED SPECIES SURVEY

Targeted threatened species surveys were designed based on the species identified as potentially occurring (candidate species) within the subject land. This included surveys of both terrestrial flora and fauna.

A combination of random meander surveys (Cropper, 1993) and parallel transects (current guidelines for NSW threatened plant surveys) were undertaken in areas of potential habitat of candidate flora species that were considered to have a moderate or higher likelihood of occurrence. The candidate flora species surveyed were as follows:

- Ausfeld's wattle (*Acacia ausfieldii*)
- A spear-grass (*Austrostipa metatoris*)
- A spear-grass (*Austrostipa wakoolica*)
- Small Scurf-pea (*Cullen parvum*)
- Pine Donkey Orchid (*Diuris tricolor*)
- Spike-Rush (*Eleocharis obicis*)
- Spiny Peppercress (*Lepidium aschersonii*)
- Winged Peppercress (*Lepidium monoplocoides*)
- Small Purple-pea (*Swainsona recta*)
- Silky Swainson-pea (*Swainsona sericea*)
- *Tylophora linearis.*

Fauna surveys comprised a combination of the following methods:

- habitat assessments, to assess the likelihood of occurrence
- opportunistic sightings
- targeted seasonal surveys, for threatened species identified as having a moderate to high likelihood of occurring within the subject land. These surveys included:
  - diurnal bird surveys
  - microchiropteran bat surveys
  - spotlighting and stag watches
  - call playback
  - herpetofauna active searches
  - koala SPOT assessments, to identify the presence of Koala usage within native vegetation
  - candidate fauna species and survey effort, for the Barking Owl, Glossy Black Cockatoo, Little Eagle, Masked Owl, Sloane's Froglet, Square-tailed Kite and Superb Parrot.

3.6.3 EXISTING ENVIRONMENT

The following section summarises the existing biodiversity within the Parkes SAP investigation area, including threatened ecological communities listed under the *Biodiversity Conservation Act 2016* (BC Act).

3.6.3.1 VEGETATION COMMUNITIES

Native vegetation was recorded to cover a total of 596.17 hectare within the surveyed areas of the subject land. Of this, a total of seven native vegetation PCTs were recorded. These are:

- PCT 70 – White Cypress Pine woodland on sandy loams in central NSW wheatbelt
- PCT 76 – Western Grey Box tall grassy woodland on alluvial loam and clay soils in the NSW South Western Slopes and Riverina Bioregions
- PCT 82 – Western Grey Box – Poplar Box – White Cypress Pine tall woodland on red loams mainly of the eastern Cobar Peneplain Bioregion
- PCT 201 – Fuzzy Box Woodland on alluvial brown loam soils mainly in the NSW South Western Slopes Bioregion
- PCT 250 – Derived tussock grassland of the central western plains and lower slopes of NSW

- PCT 267 – White Box – White Cypress Pine – Western Grey Box shrub/grass/forb woodland in the NSW South Western Slopes Bioregion
- PCT 276 – Yellow Box grassy tall woodland on alluvium or parna loams and clays on flats in NSW South Western Slopes Bioregion.

Native vegetation recorded within the subject land is considered to meet the final determination of three threatened ecological communities listed under the BC Act, all of which were determined to be in poor or moderate condition. These are:

- Inland Grey Box Woodland in the Riverina, NSW South Western Slopes, Cobar Peneplain, Nandewar and Brigalow Belt South Bioregions
- Fuzzy Box Woodland on alluvial Soils of the South Western Slopes, Darling Riverine Plains and Brigalow Belt South Bioregions
- White Box Yellow Box Blakely's Red Gum Woodland.

3.6.3.2 THREATENED FLORA

A total of 14 threatened flora species were identified by the BAM calculator as species credit species, of these 11 were considered candidate species based on having a having a moderate or higher likelihood of occurrence.

3.6.3.3 THREATENED FAUNA

The investigation area generally lacks important features for supporting a diverse range of fauna species. The only threatened species recorded were bird species: Little Eagle, Superb Parrot and Grey-crowned Babbler. These are species that are either highly mobile (Little Eagle and Superb Parrot), or able to persist with minimal cover and large enough to safely span vegetation gaps, as is the case with Grey-crowned Babbler.

3.6.3.4 BUSHFIRE RISK

A Bushfire Constraints and Opportunities Report was undertaken by Building Code and Bushfire Hazard Solutions (Appendix G). The investigation area is not currently mapped as being bushfire prone on Parkes Council bushfire prone land map and consequently the application of Planning for Bush Fire Protection (PBP) and Australian Standard 3959 'Construction of buildings in bushfire-prone areas' (AS3959) is not formally triggered however should be considered during the master plan process as it is a 20 year delivery program.

3.7 CULTURAL HERITAGE

This section summarises the existing environment and methodology for the Aboriginal Cultural Heritage and Historic Heritage Assessment (ACHHHA) report that was prepared for the Parkes SAP and is provided in Appendix H.

3.7.1 AIMS AND OBJECTIVES OF THE ABORIGINAL CULTURAL HERITAGE AND HISTORIC HERITAGE ASSESSMENT REPORT

The purpose of the Aboriginal Cultural Heritage and Historic Heritage investigation is to identify and assess heritage constraints relevant to the proposed works.

The Aboriginal archaeological assessment meets the following objectives, aligning with the *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (herein referred to as the Code of Practice):

- **Objective One**: Undertake background research on the investigation area to formulate a predicative model for site location within the investigation area.
- **Objective Two**: Identify and record objects or sites of Aboriginal heritage significance within the investigation area, as well as any landforms likely to contain further archaeological deposits.

- **Objective Three**: Assess the likely impacts of the proposed work to Aboriginal cultural heritage and provide management recommendations.

The Historic Heritage assessment applies the Heritage Council's *Historical Archaeology Code of Practice* (Heritage Council 2006) in the completion of a historical heritage assessment, including field investigations, to meet the following objectives:

- **Objective One: To identify whether historical heritage items or areas are, or are likely to be, present within the investigation area.**
- **Objective Two:** To assess the significance of any recorded historical heritage items or areas.
- **Objective Three**: Determine whether the proposal is likely to cause harm to recorded historical heritage items or areas.
- **Objective Four:** Provide management recommendations and options for mitigating impacts.

3.7.2 METHODOLOGY

Completion of the ACHHHA involved the following methodology:

- review of relevant legislation, including the *Burra Charter*, a standard of best practice in heritage conservation
- desktop database searches, to identify any potential previously-recorded heritage within the investigation area
- examination of previous archaeological studies undertaken in the investigation area
- formulation of a predictive model for site location; and
- field-based archaeological assessment, with sampling focused on areas that have not been previously surveyed.

Aboriginal community consultation was also conducted, in accordance with the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (ACHCRs) (Department of Environment, Climate Change and Water 2010b). This involved first identifying the Registered Aboriginal Parties (RAPs) who wish to be consulted, advertising the proposed works in the Parkes Champion Post newspaper and sending letter notifications to various relevant agencies. Following this, information about the project (works overview and survey methodology) was provided to the RAPs and information requested regarding Aboriginal cultural values. The Aboriginal communities involved in the assessment were representatives from the Wiradjuri Council of Elders and the Peak Hill Local Aboriginal Land Council.

3.7.3 EXISTING ENVIRONMENT

This section summarises the known Aboriginal and non-Aboriginal heritage that was identified within the investigation area, via desktop or field surveys.

3.7.3.1 ABORIGINAL HERITAGE

The database search of the Office of Environment and Heritage (OEH) Aboriginal Heritage Information Management System (AHIMS) identified previously-recorded heritage within the investigation area. There are 44 AHIMS sites recorded within or directly adjacent to the investigation area: 18 isolated artefacts, 15 scarred trees, four artefact scatters, one scarred tree and artefact scatter, one stone quarry and one location of relocated artefacts (accounting for four destroyed isolated finds).

The Aboriginal archaeological assessment recorded five new Aboriginal cultural heritage artefact sites, and located one scarred tree that had been previously recorded. The artefacts discovered are shown below in Table 3.7.

Table 3.7 Aboriginal cultural heritage sites recorded during the field survey

SITE NAME AND NUMBER	GPS COORDINATES (GDA94 ZONE 55)	FEATURE(S)	SURVEY UNIT	LANDFORM
Parkes SAP IF-1 (#43-3-0174)	601214 E / 6328876 N	Isolated artefact	1a	Flat plains
Parkes SAP IF-2 (#43-3-0173)	600520 E / 6330474 N	Isolated artefact	2a	Flat plains
Parkes SAP IF-3 (#43-3-0172)	601468 E / 6330887 N	Isolated artefact	2c	Flat plains
Parkes SAP IF-4 (#43-3-0171)	601382 E / 6335896 N	Isolated artefact	5a	Flat plains
Parkes SAP IF-5 (#43-3-0170)	599595 E / 6332829 N	Isolated artefact	3a	Flat plains

3.7.3.2 NON-ABORIGINAL HERITAGE

There were no non-Aboriginal historic sites recorded within the investigation area during the assessment. One previously recorded historic site, Brolgan Road-HS01 is located inside the investigation area, just north of Brolgan Road.

4 DEVELOPMENT OF THE MASTER PLAN

This chapter reviews the development of the Master Plan, including the scenario testing which was undertaken using results from the technical reports. The master planning process for the Parkes SAP included a series of workshops to test and refine a long list of seven scenarios to a short list of three scenarios to be tested further and taken through to an enquiry by design workshop to further develop a final Master Plan.

4.1 SCENARIO REVIEW AND SHORTLISTING

To assist in the assessment of the scenarios, the investigation area was broken into nine smaller land parcels (A to I) based on natural/man made boundaries such as major roads, rail lines, travelling stock route, property boundaries and existing uses. Table 4.1 identifies the typical land uses for each of the place types proposed for the SAP used in the short listing process.

Table 4.1 Parkes SAP place types and typical land uses

PLACE TYPE	TYPICAL LAND USES
Freight terminals	— Rail/road intermodal freight terminals e.g. PN, SCT — Rail siding — Rail provisioning, maintenance, refuelling, wagon — Maintenance — Container apron — Container storage — Container maintenance — Grain storage — Fuel storage — Freight forwarding companies e.g. Linfox, SCT; packing/unpacking and associated office — Truck parking.
Regional enterprise	— Advanced manufacturing e.g. food processing and packaging incl. grains, meat, plant, dairy, pet food etc. — Distribution centres e.g. supermarket chain, retailers etc. — Warehouse — Container maintenance — Truck fuelling, maintenance, truck parking, provisioning centre, sales — Mining services — Hazardous material storage — Large format wholesalers (e.g. mining, agricultural) — Customs facility — Related small enterprise/office.
Intensive livestock agriculture	— Abattoir and associated holding pens, feedlots, waste treatment — Poultry farm, hatchery — Piggery — Other intensive livestock growing/processing — Mushroom farm — Buffer.

PLACE TYPE	TYPICAL LAND USES
Energy (solar)	— Solar farm — Associated infrastructure.
Energy and Recycling	— Energy from waste plant – from small to large — Recycling — Landfill — Buffer.
Protected cropping	— Commercial greenhouses — Hydroponics — Aquaculture — Other value-add crops — Associated solar/energy.
Green infrastructure	— Protected vegetation — Offset planting areas, rehabilitation — Stormwater treatment wetlands etc. — Green/biodiversity corridor.
Airport	International standard airport runway, taxiways, terminal, hangar, operational areas, secure areas.

During workshop 2 the project team, including technical specialists, reviewed the seven scenarios to further test three short-listed scenarios. The three short listed scenarios included:

- Scenario 1 – lower development scale
- Scenario 3 – high development scale
- Scenario 6 – high development scale, including new airport.

Consistent across all three scenarios were:

- 690 ha of existing or approved solar farms in the north west corner of the investigation area
- general location of freight terminals following the existing main west rail line, the north west connector and the Melbourne to Brisbane Inland Rail line. The area of the freight terminals varies slightly from 306 ha in scenario one to 542 ha in scenario six.

It should be noted that Area D, a small part of Area C and the far south west corner of Area E in scenario six were not included in field surveys originally as they were outside of the investigation area.

4.1.1 SCENARIO ONE – LOWER DEVELOPMENT SCALE

In comparison to the alternative shortlisted scenarios, scenario one has the smallest developable area at 2,882 ha including an additional 231 ha of green infrastructure (refer to Figure 4.1). The regional enterprise and freight terminals are focussed on the Pacific National and SCT lands and parcels D and H closer to proposed Newell Highway bypass and the Parkes township.

An intensive livestock agriculture SAP sub-precinct has been identified within Parcel B to the west of the investigation area, along Brolgan Road, with an option for direct rail access via private terminal.

A 250 ha energy SAP sub-precinct off Coopers Road (Parcel E) comprising 50 ha Waste to Energy site has been identified in the south west corner of the study area, a private rail terminal access may be possible to this area if required. This scenario proposes no changes to the existing quarry operations (Area G) or surrounding parcels (I or the southern portion of parcel F).

A green infrastructure area has been proposed on elevated land separates parcel B and C and along the travelling stock route and road corridors or Coopers Road and Henry Parkes Way.

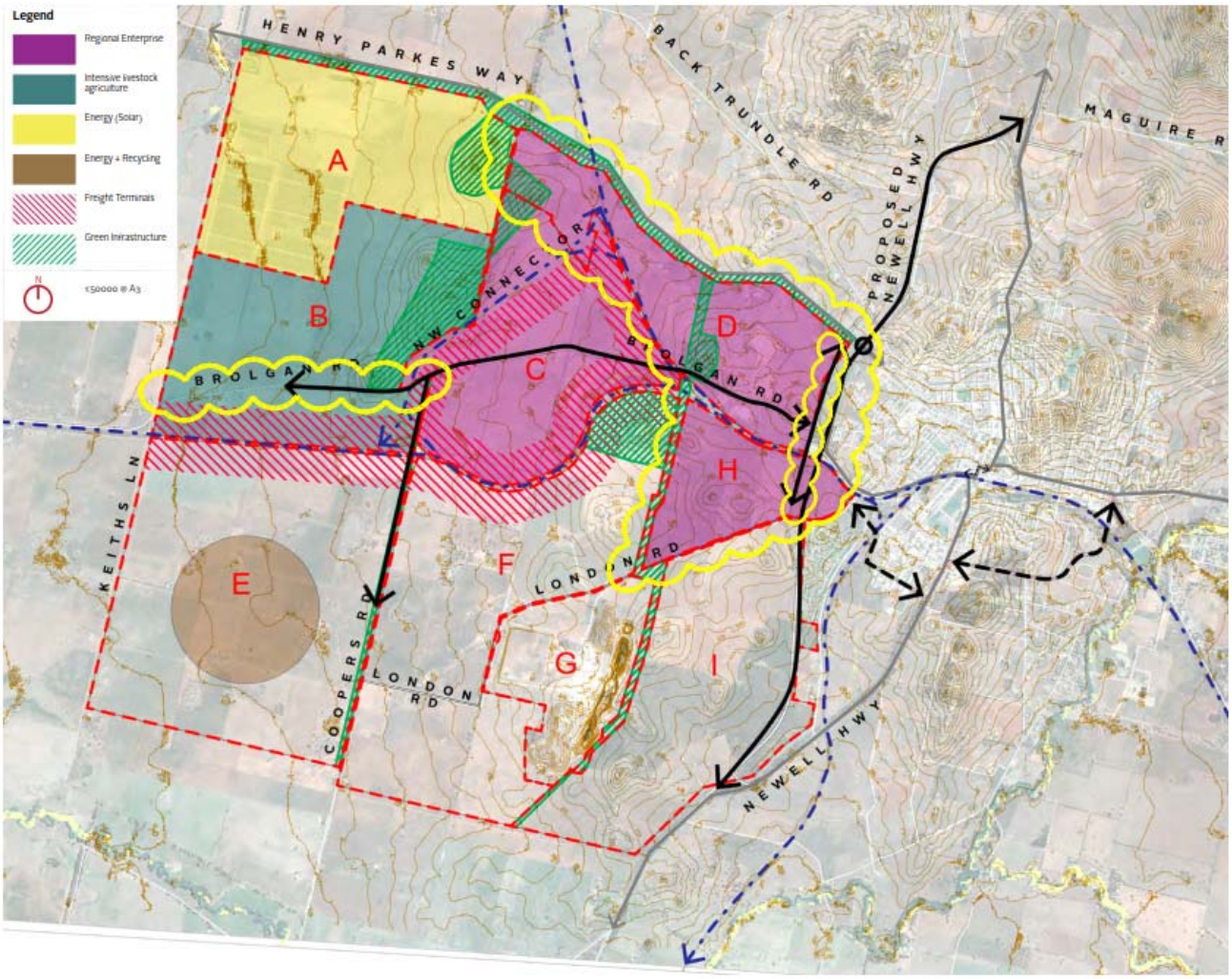


Figure 4.1 Scenario one

4.1.2 SCENARIO THREE – HIGH DEVELOPMENT SCALE

Scenario three has a total development area of 5,000 ha and includes 1,240 ha of green infrastructure particularly along the proposed Newell Highway bypass which may be used for carbon offset planning or biodiversity offsetting (refer to Figure 4.2).

The regional enterprise place type is concentrated to the north of the main west rail line with direct rail access and the potential for the third multi-user terminal.

South of the railway, parcel F is assigned to intensive livestock with potential for a private rail terminal on the south side of the line. The land use with parcel G buffers some of this area from the Parkes township. A major waste-to-energy use of some 900 ha with recycling is assigned to parcel E.

An enlarged transport network includes Keiths Lane and London Road joining in a loop with Brolgan Road.

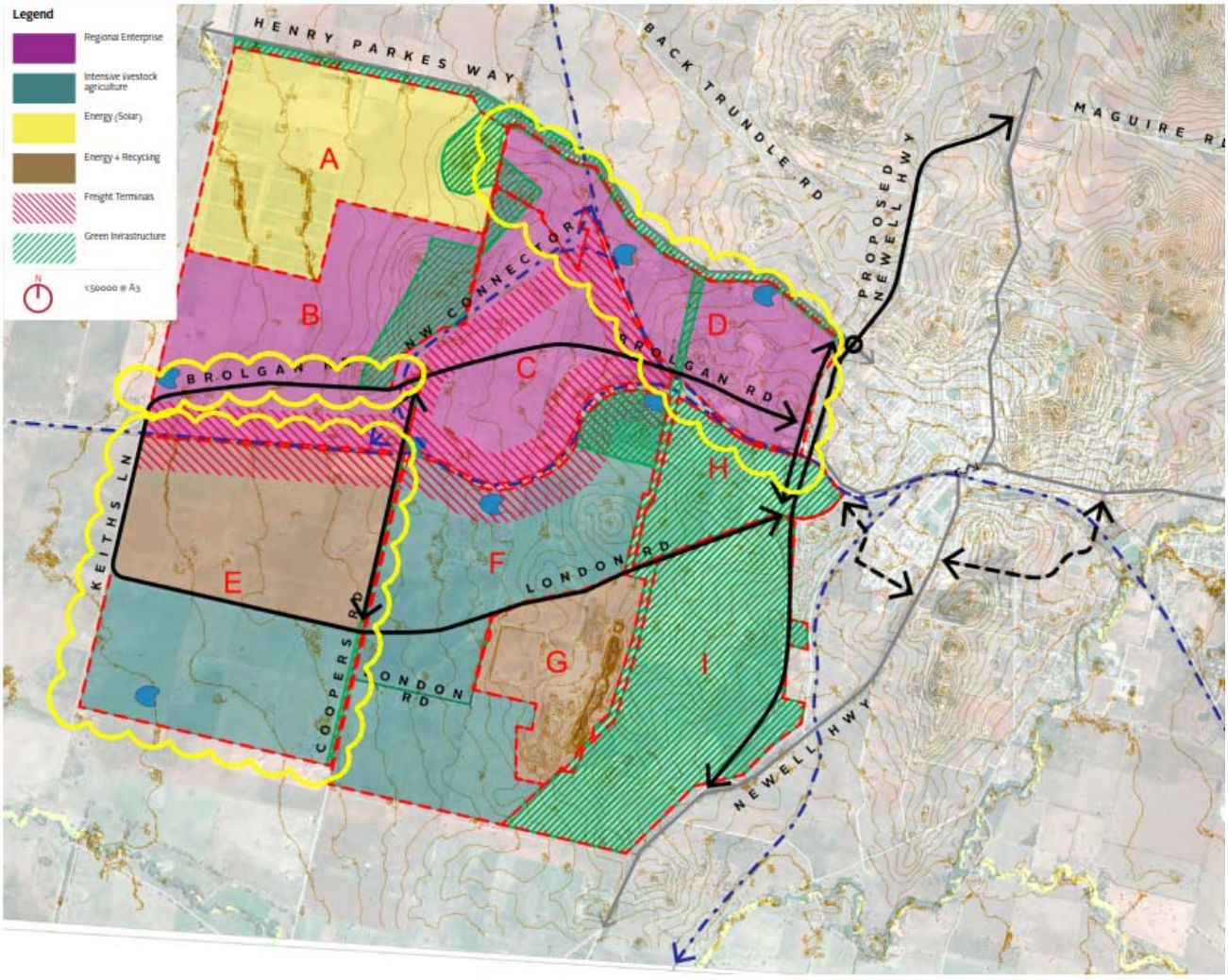


Figure 4.2 Scenario three

4.1.3 SCENARIO 6 – HIGH DEVELOPMENT SCALE, INCLUDING NEW AIRPORT

Scenario six is a high scale development which includes a new airport in the south west corner of the SAP within parcel E (refer to Figure 4.3). The total developable area of this scenario is 4,929 ha with an addition 334 ha of green infrastructure primarily along the high points between parcels B and C, road corridors and the travelling stock route.

This scenario has the highest amount of regional enterprise uses which extend around the airport on Parcel E and F.

Intensive livestock agriculture is located on parcel B and this is the only short listed scenario which includes almost 1000 ha of protected cropping to the west of the proposed Newell Highway bypass within parcels H and I.

This scenario includes a new transport network to the airport including a new route for London Road to Keiths Lane with connection to Brolgan Road via Coopers Road and Keiths Lane.

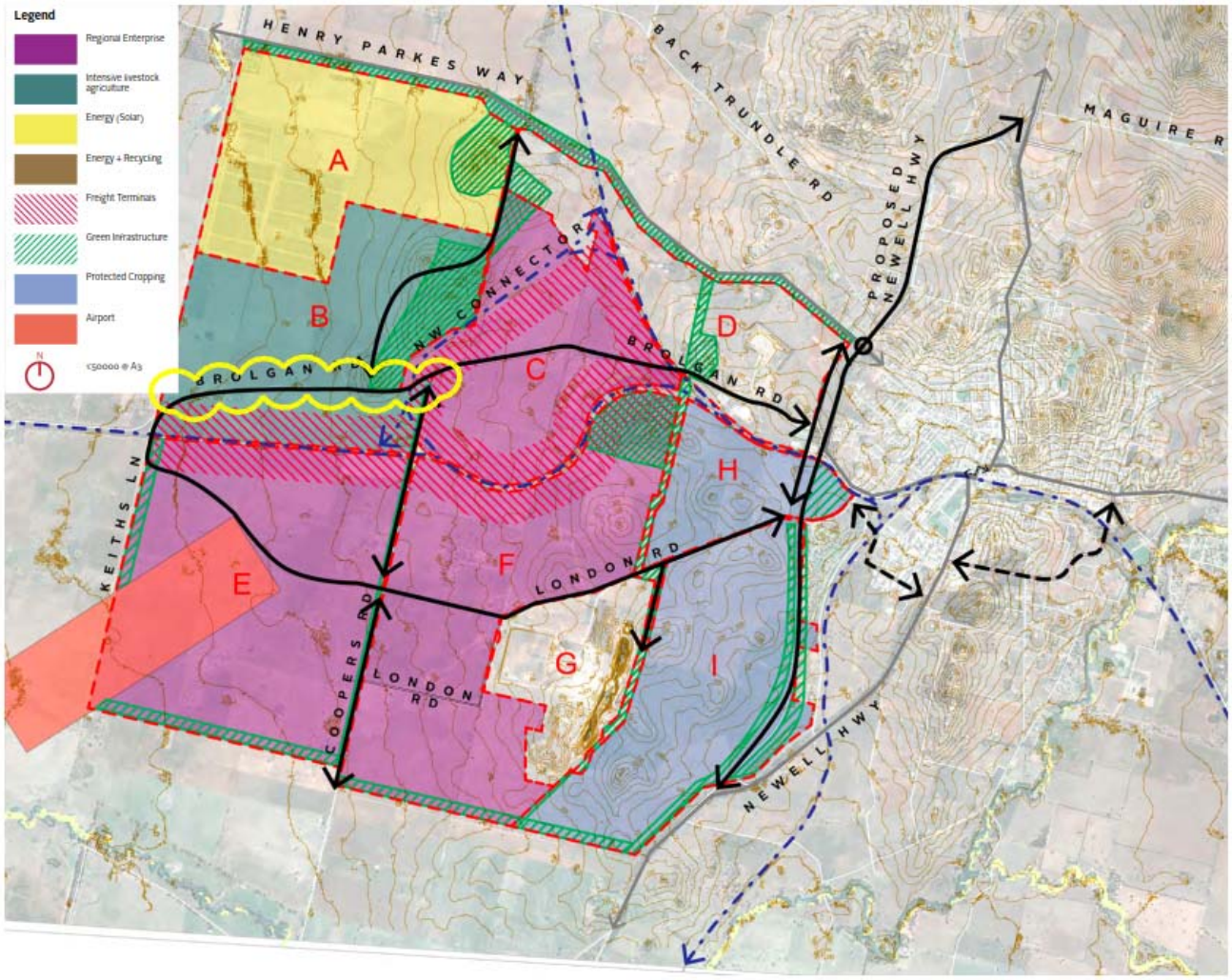


Figure 4.3 Scenario six

4.2 MASTER PLAN

Through an Enquiry by Design process the three short listed scenarios were refined to develop the final Master Plan (refer to Figure 4.4). This Master Plan was developed based on the following:

- existing rail infrastructure and industry including the solar farms in the north west corner and West Lime Quarry
- flood risks and flows
- biodiversity constraints and green corridors
- existing topography and local climate, considering the desktop assessment undertaken for this report (refer to section 3)
- known environmental constraints including noise and air dispersal patterns.

The final Master Plan includes the following SAP sub-precincts:

- Regional Enterprise located to the north of the Brolgan Road spine and servicing the freight corridors
- Intensive Livestock Agriculture located to the south and south west of the SAP t which may include industries such as abattoirs, feedlots etc
- Solar located in the north western corner comprising of existing and approved solar developments
- Resources and Recycling which includes the existing Parkes Shire Council waste facility, the existing West Lime operations and an area accessible to the freight corridor to the south of Brolgan Road which may include an energy from waste facility
- Commercial Gateway in the north east corner which is located to a number of sensitive receivers; and
- Mixed Enterprise which may include land uses such as retail, service station, takeaway food etc.

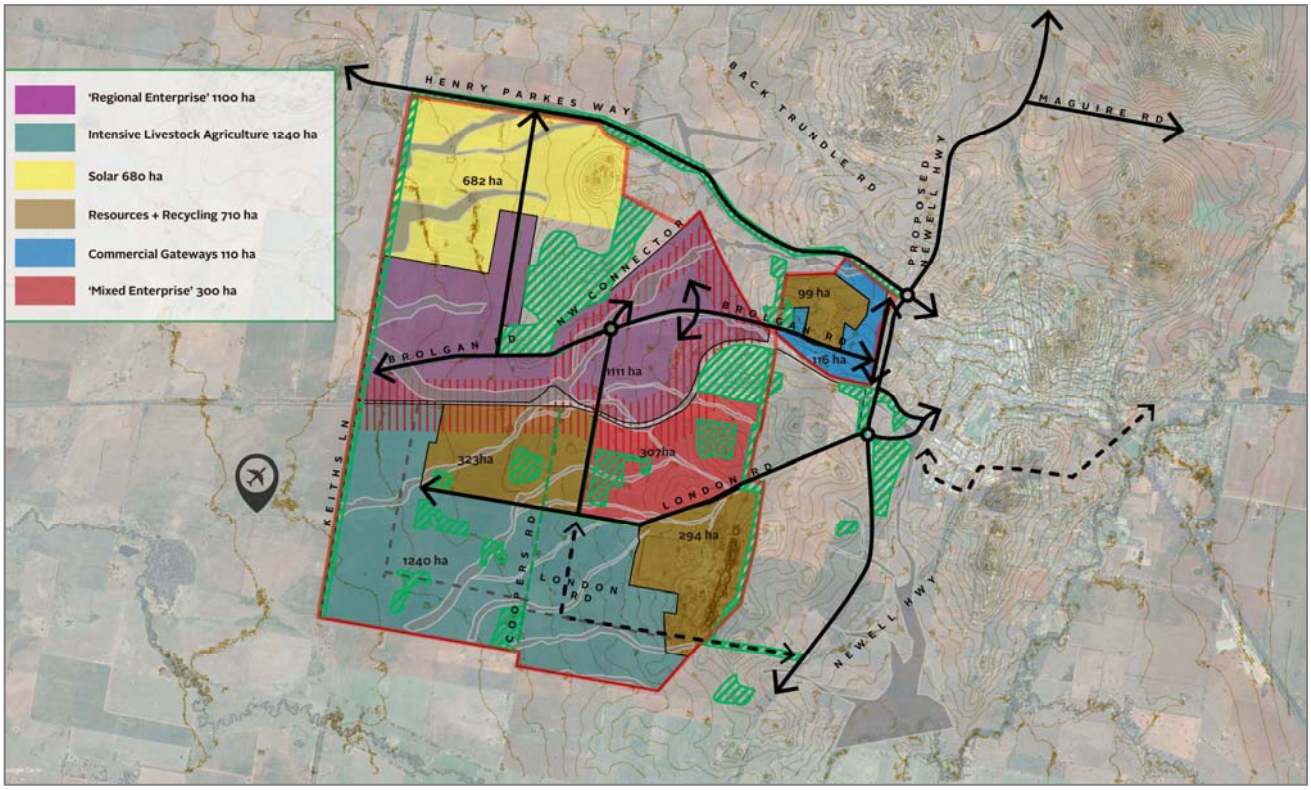


Figure 4.4 Parkes SAP – Master Plan scenario

5 SUMMARY OF THE TECHNICAL REPORTS FINDINGS

5.1 AIR QUALITY AND ODOUR

This section summarises the Air Quality and Odour Assessment that was prepared to test the scenarios for the Parkes SAP and is provided in Appendix B.

5.1.1 SCENARIO TESTING

Dispersion modelling was undertaken using CALPUFF to run simulations for the proposed SAP land uses for the following scenarios:

SCENARIO	DESCRIPTION
Scenario 1	Emissions of PM_{10} released from each relevant land use as a point source
	Emissions of Odour released from each relevant land use as a point source
Scenario 2	Emissions of PM_{10} released from each relevant land use as a point source
	Emissions of Odour released from each relevant land use as a point source
Scenario 3	Emissions of PM_{10} released from each relevant land use as a point source
	Emissions of Odour released from each relevant land use as a point source

5.1.1.1 SCENARIO ONE

The dispersion modelling indicates that for the sources and pollutants assessed, all incremental results were below the assessment criteria detailed in Section 4 of Appendix B.

The results of the modelling do however provide an indication of the dispersion pattern that could be expected from activates in these locations. The dispersion pattern for Scenario one indicated the following:

- For intensive agriculture, the dispersion pattern tracks to the north west and the south. There are five sensitive external receivers to the west of the intensive agriculture area for scenario one, which may be impacted when an abattoir (or other intensive agriculture land use) is operational.
- Regarding intensive agriculture, the EPA have inferred that a 1km buffer would be required around any intensive agricultural operation. Regarding scenario one, consideration should therefore be given to offsite receivers.
- For odour emissions from the Energy from Waste land use, the dispersion pattern tracks to the north west and the south. The contribution to the airshed of an operational waste to energy is not known, however the current scenario layout does provide a reasonable buffer.
- For particulate emissions from the Energy from Waste incinerator, the dispersion pattern is generally to the north.
- Regarding regional enterprise, in the location of the nominated stack, dispersion is generally uniform in all directions. An impact associated with a stack source of this nature will occur across Parkes, but based on the modelling results, there is no indication of an exceedance of the assessment criteria.

5.1.1.2 SCENARIO THREE – HIGH DEVELOPMENT SCALE

The dispersion modelling indicates that for the sources and pollutants assessed, all incremental results were below the assessment criteria detailed in Section 4 of Appendix B.

The results of the modelling do however provide an indication of the dispersion pattern that could be expected from activates in these locations. The dispersion pattern for scenario three indicated the following:

- For intensive agriculture, the dispersion pattern tracks to the north west and the south. There are a number of sensitive receivers to the west and south of the intensive agriculture area for scenario three, which may be impacted when an abattoir (or other intensive agriculture land use) is operational.
- Regarding intensive agriculture, the EPA have inferred that a 1km buffer would be required around any intensive agricultural operation. Regarding scenario three, consideration should therefore be given to offsite receivers.
- For odour emissions from the Waste to Energy land use, the dispersion pattern tracks to the north west and the south. The contribution to the airshed of an operational waste to energy is not known, however a buffer should be considered when locating a facility of this nature.
- For particulate emissions from the Waste to Energy incinerator, the dispersion pattern is generally to the north.
- Regarding regional enterprise, in the location of the nominated stack, dispersion is generally uniform in all directions. Any potential impact upon Parkes (however minimal), is not as significant as that potentially evident in scenario one.

5.1.1.3 SCENARIO SIX – HIGH DEVELOPMENT SCALE, INCLUDING NEW AIRPORT

The dispersion modelling indicates that for the sources and pollutants assessed, all incremental results were below the assessment criteria detailed in Section 4 of Appendix B.

The results of the modelling do however provide an indication of the dispersion pattern that could be expected from activates in these locations. The dispersion pattern for scenario one indicated the following:

- For intensive agriculture, the dispersion pattern tracks to the north west and the south. There are 5 sensitive external receivers to the west of the intensive agriculture area for scenario six, which may be impacted when an abattoir (or other intensive agriculture land use) is operational.
- Regarding intensive agriculture, the EPA have inferred that a 1km buffer would be required around any intensive agricultural operation. Regarding scenario six, consideration should therefore be given to offsite receivers.
- Regarding regional enterprise, in the location of the nominated stack, dispersion is generally uniform in all directions. Any potential impact upon Parkes (however minimal), is not as significant as that potentially evident in scenario one.

5.1.1.4 PREFERRED SCENARIO

When considering the above, and with regard to air quality, scenario one may provide a better outcome that the other scenarios considered. The logic includes:

- a buffer is present surrounding the energy from waste layout
- the intensive agriculture is located away from the Parkes township, and is buffered by the solar farm
- dependant on the final odour source locations, the dispersion pattern from intensive agriculture potentially will have limited impact on external sensitive receivers.

It is noted that for scenario 1, the eastern point of the regional enterprise land use carefully considers the industries present in this location. Stack emissions immediately adjacent to Parkes may need to be carefully considered.

5.1.2 MASTER PLAN CONCLUSION

As part of the Master Plan scenario assessment, emissions from a pet food manufacturing facility, an abattoir and a cattle feedlot were evaluated in the Intensive Livestock Agriculture land-use. Based on a review of the short listed scenarios and planning considerations, an energy from waste facility was not included in the modelling of the Master Plan. Whilst it is likely that an energy from waste facility would be permissible within the SAP, the approval of such a facility would require a development application and associated site specific air quality assessment. For this reason, no additional modelling of this activity was considered.

For the purposes of this study, dispersion modelling simulations using CALPUFF were undertaken for the proposed SAP land uses for the following scenarios:

SCENARIO	DESCRIPTION
Master Plan	Emissions of PM_{10} released from the intensive livestock agricultural land use
	Emissions of NO_2 released from the intensive livestock agricultural land use
	Emissions of odour released from the intensive livestock agricultural land use

The results of dispersion modelling for PM_{10} and NO_2 is illustrated in Figure 8.1 to Figure 8.4 of Appendix B. The dispersion modelling indicates that the predicted PM_{10} and NO_2 concentrations are below the assessment criteria detailed in Section 4 of Appendix B. However, odour is predicted to exceed the applicable criteria off-site (Figure 8.5 and 8.6 of Appendix B).

The results of the modelling provide an indication of the dispersion pattern that could be expected from activates in this location. The dispersion pattern for the Master Plan indicated the following:

- for short-term (24-hour average) PM_{10} concentrations, emissions from the boilers are predicted to disperse towards the north and north-east, with the highest PM_{10} concentrations predicted on-site
- for short term (1-hour average) NO_2 concentrations, emissions from the boilers are predicted to disperse towards the north and north-east, with the highest NO_2 concentrations predicted off-site
- for odour, impacts are predicted in all directions from the site. The highest odour impacts are predicted on-site, with the cattle feedlot pen surface the main contributing source to odour of the parameters modelled.

5.2 NOISE

5.2.1 SCENARIO TESTING

5.2.1.1 OPERATIONAL NOISE SOURCES AND ASSUMED NOISE LEVELS

To allow a cumulative impact assessment to included consideration of existing and future land uses, the three shortlisted scenarios were modelled in conjunction with the existing and approved land uses within the SAP to inform the master planning process. The predicted noise levels at the nearest receivers for a typical 15 minutes scenario are presented in Table 5.1.

Table 5.1 Predicted noise levels ($L_{Aeq\ 15\ min}$) at residential receivers – Parkes SAP on-site industrial noise

RECEIVER – NCA	PROJECT NOISE TRIGGER LEVEL (dB $L_{AEQ\ 15\ MIN}$)		PREDICTED NOISE LEVELS (dB $L_{Aeq\ 15\ min}$) AND ASSESSMENT					
			SCENARIO 1	EXCEEDANCE[1]	SCENARIO 3	EXCEEDANCE[1]	SCENARIO 6	EXCEEDANCE[1]
NCA1 residential 3 properties	Day	40	57 to 60	17 to 20	59 to 61	19 to 21	57 to 60	17 to 20
	Evening	35	57 to 60	22 to 25	59 to 61	24 to 26	57 to 60	22 to 25
	Night	35	57 to 60	22 to 25	59 to 61	24 to 26	57 to 60	22 to 25
	Night (enhancing)	35	61 to 63	26 to 28	Up to 64	Up to 29	61 to 63	26 to 28
NCA2 residential 4 properties	Day	40	Up to 58	Up to 18	Up to 62	Up to 22	Up to 57	Up to 17
	Evening	35	Up to 58	Up to 23	Up to 62	Up to 27	Up to 57	Up to 22
	Night	35	Up to 58	Up to 23	Up to 62	Up to 27	Up to 57	Up to 22
	Night (enhancing)	35	Up to 62	Up to 27	Up to 66	Up to 31	Up to 60	Up to 25
NCA3 residential 20 properties	Day	40	26 to 44	-14 to 4	40 to 52	-1 to 12	42 to 53	2 to 13
	Evening	36	26 to 44	-10 to 8	40 to 52	4 to 16	42 to 53	6 to 17
	Night	35	26 to 44	-9 to 9	40 to 52	5 to 17	42 to 53	7 to 18
	Night (enhancing)	35	29 to 48	-6 to 13	43 to 56	8 to 21	46 to 57	11 to 22
NCA4 residential 10 properties	Day	40	33 to 51	-7 to 11	33 to 50	-7 to 10	33 to 51	-7 to 11
	Evening	35	33 to 51	-2 to 16	33 to 50	-2 to 15	33 to 51	-2 to 16
	Night	35	33 to 51	-2 to 16	33 to 50	-2 to 15	33 to 51	-2 to 16
	Night (enhancing)	35	37 to 55	2 to 20	37 to 54	2 to 19	37 to 55	2 to 20

RECEIVER – NCA	PROJECT NOISE TRIGGER LEVEL (dB $L_{AEQ\ 15\ MIN}$)		PREDICTED NOISE LEVELS (dB $L_{Aeq\ 15\ min}$) AND ASSESSMENT					
			SCENARIO 1	EXCEEDANCE[1]	SCENARIO 3	EXCEEDANCE[1]	SCENARIO 6	EXCEEDANCE[1]
NCA5 residential 45 properties	Day	40	45 to 57	5 to 17	45 to 57	5 to 17	36 to 48	-4 to 8
	Evening	38	45 to 57	7 to 19	45 to 57	7 to 19	36 to 48	-2 to 10
	Night	37	45 to 57	8 to 20	45 to 57	8 to 20	36 to 48	-1 to 11
	Night (enhancing)	37	49 to 60	12 to 23	49 to 60	12 to 23	39 to 52	2 to 15
NCA6 residential 45 properties	Day	40	Up to 47	Up to 7	Up to 44	Up to 4	Up to 44	Up to 4
	Evening	38	Up to 47	Up to 9	Up to 44	Up to 6	Up to 44	Up to 6
	Night	37	Up to 47	Up to 10	Up to 44	Up to 7	Up to 44	Up to 7
	Night (enhancing)	37	Up to 51	Up to 14	Up to 48	Up to 11	Up to 48	Up to 11
NCA6 active recreation	When in use	53	Up to 57	Up to 4	Up to 54	1	Up to 54	1
NCA6 industrial	When in use	68	Up to 54	Complies	Up to 51	Complies	Up to 52	Complies
NCA7 residential >500 properties	Day	46	45 to 57	-1 to 11	44 to 54	-2 to 8	36 to 52	-10 to 6
	Evening	43	45 to 57	2 to 14	44 to 54	1 to 11	36 to 52	-7 to 9
	Night	37	45 to 57	8 to 20	44 to 54	7 to 17	36 to 52	-1 to 15
	Night (enhancing)	37	49 to 60	12 to 23	48 to 58	11 to 21	40 to 56	3 to 19

(1) A negative value indicates compliance, while a positive value indicate exceedance.

5.2.1.2 SUMMARY OF SHORT LISTED SCENARIOS

Based on the findings above, the level of noise impacts associated with each development scenario is summarised below (decreasing/improving level of noise impact):

- NCA1 – similar noise impact from all three scenarios
- NCA2 – scenario 3, scenario 1, scenario 6
- NCA3 – scenario 6, scenario 3, scenario 1
- NCA4 – similar noise impact from all three scenarios
- NCA5 – Similar noise impact from scenario 1 and scenario 3, scenario 6
- NCA6 – scenario 1, Similar noise impact from scenario 3 and scenario 6
- NCA7 – scenario 1, scenario 3, scenario 6.

From an acoustic perspective, there are different approaches that can be taken to determine which development scenario represents a better outcome. One approach that can be taken is possibly focusing on achieving a better acoustic outcome in NCAs with more receivers and NCAs that contain closely spaced receivers (i.e. NCA5, NCA6, NCA7). On this basis, scenario 6 appears to represent the most preferred scenario. This however represents a preliminary assessment, which is subjected to further refinement and assessment, as well as consideration for factors other than acoustics.

5.2.2 MASTER PLAN CONCLUSION

In addition to operational noise impacts discussed below, it should be noted that during construction, various activities will likely cause notable construction noise and vibration impacts at surrounding receivers. A construction noise and vibration management plan should be developed for the Parkes SAP.

5.2.2.1 ON-SITE INDUSTRIAL NOISE ASSESSMENT

For the Master Plan assessment, the SAP is being assessed as one development incorporating all possible maximum developable areas. In general, the following findings are made of the predicted noise impact due to on-site industrial noise associated with the SAP:

- The assessed development scenario is predicted to notably exceed the NPfI project noise trigger levels at all NCAs. It should however be noted that the modelled scenario is likely to represent a worst case acoustic scenario as they assume the entire indicated developable areas to be fully developed and noise-generating.
- NCA1: three isolated residential receivers as close as 100 metres to the west of the SAP.
  - most stringent NPfI trigger levels applicable
  - exceedance of the trigger levels by up to 16 to 25 dB (dependent on assessment periods).
- NCA2: four isolated residential receivers as close as 40 metres to the west and south of the SAP.
  - most stringent NPfI trigger levels applicable
  - exceedance of the trigger levels by up to 23 to 31 dB (dependent on assessment periods).
- NCA3: 20 isolated residential receivers to the east and southeast of the SAP (as close as 1230 metres from SAP)
  - most stringent NPfI trigger levels generally applicable
  - exceedance of the trigger levels by up to 8 to 17 dB (dependent on assessment periods).
- NCA4: 10 isolated residential properties to the west, northwest and north of the SAP (440 metres to 2 kilometres)
  - most stringent NPfI trigger levels generally applicable
  - exceedance of the trigger levels by up to 7 to 16 dB (dependent on assessment periods).

- NCA5: approximately 45 residential properties, including isolated and closely-spaced receivers to the northeast of the SAP, as close as 140 metres.
  - generally less stringent noise trigger levels during evening and night periods
  - exceedance of the trigger levels by up to 13 to 19 dB (dependent on assessment periods).
- NCA6: receivers to the east of the SAP comprising of approximately 45 closely-spaced residential properties about 850 metres away, existing industrial establishments about 600 metres away and a golf course (active recreation) directly adjoining the SAP.
  - predicted noise impact compliant at all residential receivers during day period
  - exceedances of up to 2 to 7 dB during evening and night periods
  - predicted noise impact compliant at the existing industrial premises and at the golf course.
- NCA7: >500 closely-grouped residential receivers on the western part of the Parkes town, 260 metres to the east of the SAP
  - notably less stringent noise trigger levels during the day and evening periods
  - exceedance of the trigger levels by up to 4 to 17 dB (dependent on assessment periods).

The predicted exceedances of the project trigger noise levels required consideration of mitigation strategies to reduce the likely noise impact per guidance provided in NPfI. Various combinations of mitigation are possible however from an acoustic perspective, a feasible and reasonable assessment of all options should be evaluated and they are typically investigated in the following order (decreasing preference):

1. land use planning and provision of appropriate buffer distances.
2. noise control at the noise source.
3. noise control along the noise transfer path.
4. noise control at the receiver.

Section 6.8 of Appendix C provides a detailed mitigation assessment to be considered during the development of the SAP. These mitigation measures should be incorporated into a future development standard for the SAP.

5.3 HYDROGEOLOGY

This section summarises the potential impacts to the groundwater receptors and groundwater source (s) identified in the Groundwater Desktop Study that was prepared for the Parkes SAP and is provided in Appendix D.

5.3.1 SAP SUB PRECINCT DEVELOPMENT

All the proposed sub-precinct land uses have the potential to impact groundwater receptors and the groundwater source through a decline in groundwater levels, quality and/or quantity. This may occur during both construction and operational phases of a project.

The degree of impact and level of severity to a groundwater receptor and the groundwater source(s) should be assessed during completion of the Masterplan and mitigation measures, if required, incorporated within a groundwater management strategy. Typically, impacts can be successfully managed in accordance to a groundwater management strategy.

5.3.2 GROUNDWATER RECEPTORS

Registered bores may be impacted by changes in groundwater use and supply with the implementation of using the groundwater source as a resource. Considering the Project encompasses multiple hydrogeological units across two Water Sharing Plans, the beneficial use of the local groundwater resource may be tailored and any future changes in its usage is unlikely to affect all users within the investigation area and buffer.

5.3.3 GROUNDWATER RESOURCE SUSTAINABILITY RISK

The NSW Department of Industry – Water (DOI-W) completed a risk assessment for the Lachlan water resource plan area GW10 (Lachlan alluvium), which incorporated historical and predictive data. Table 5.2 provides a summary of the risk assessment and provide a guide to the severity of potential risks associated with change in influencing factors of the groundwater system(s).

Table 5.2 Summary of risks for the Lachlan water resource plan area GW10: Lachlan alluvium (DoI-W, 2017a & 2018)

RISK ASSESSMENT	LACHLAN ALLUVIUM (SHALLOW)	LACHLAN ALLUVIUM (DEEP)
Local drawdown reducing groundwater access by consumptive users	High	High
Structural integrity of the groundwater system	Medium	Medium
Groundwater extraction inducing connection with poor quality aquifers	High	High
Climate change reducing recharge and groundwater availability	Low	Medium
Growth in local water utilities reducing groundwater availability	Medium	Medium
Growth in basic landholder rights reducing groundwater availability	Medium	High

5.4 GEOLOGY, SOILS AND CONTAMINATION

The geology, soils and contamination did not influence the development of the Master Plan however will inform the long term management of the SAP by the Development Corporation.

It is recommended that a detailed site investigation is undertaken at the Former Austop Wool Processing facility at Lot 4 DP 840130 by any future proponent and the Westlime site should there be any future change of use for this area.

All other potential impacts can be managed through a CEMP or development standards for the SAP.

5.5 BIODIVERSITY

This section summarises the Biodiversity Assessment that was prepared for the Parkes SAP and is provided in Appendix F in context on the short listed scenarios and the final Master Plan.

5.5.1 SCENARIO TESTING

All short listed scenarios retained a portion of high constrained vegetation in the north of the SAP, along road reserves and the travelling stock route. Table 5.3 identifies the native vegetation proposed to be retain within each of the short listed scenarios. Scenario 3 retained the highest amount of native vegetation whilst scenario 1 and 6 included similar amounts of vegetation to be retained.

Table 5.3 Extent of native vegetation within each short listed scenario.

	SCENARIO 1	SCENARIO 3	SCENARIO 6
PCT present within Green Infrastructure Zone (proposed for retention)	209.68 ha	284.96 ha	218.07 ha
PCT Present outside Green Infrastructure Zone (proposed for removal)	211.04 ha	323.85 ha	385.22 ha

5.5.2 MASTER PLAN CONCLUSION

During the Enquiry by Design workshop an avoidance hierarchy was developed to inform the final Master Plan. During the Enquiry by Design Workshop there was a focus on retaining biodiversity values wherever possible and the Master Plan was changed to reflect this. Where possible Tier 1 and 2 biodiversity constraints are to be avoided or minimised when needed to be removed for infrastructure (refer to Figure 5.1). Residual impacts to biodiversity values will require biodiversity offsetting in accordance with the NSW Biodiversity Offset Scheme and will be considered as part of a Biocertification of the Parkes SAP. Additional seasonal surveys are required to inform the Biocertification which will occur in Winter and Spring 2019.

Also of consideration was the need to provide connectivity opportunities across the SAP, including along Keiths Lane on the western boundary of the investigation area and during realignment of any road upgrade works. If a road is proposed to be upgraded, such as Coopers Road, it is recommended that a new road alignment be considered which would retain and allow for regeneration within the existing roadside vegetation which already provides connectivity for highly mobile species in the landscape.

There is also an opportunity to retain high constraint vegetation and subsequent connectivity values in the southern portion of the investigation area through a stepping stone approach. These larger areas of high constraint vegetation have now been considered for retention in the Master Plan with further consideration of biodiversity values proposed at a sub precinct level.

5.5.2.1 BIODIVERSITY AVOIDANCE HIERARCHY

The biodiversity values recorded within the investigation area have been ranked in terms of biodiversity constraint to assist with avoid and minimise impacts during the masterplan development phase. Biodiversity constraints (Figure 5.1) have been based on the following criteria:

TIER 1 – HIGH BIODIVERSITY CONSTRAINT

- Native vegetation patches of PCT that correspond to Threatened Ecological Communities listed under the EPBC Act.
- Native vegetation patches of PCT listed under the BC Act as serious and irreversible impact entities.
- All areas identified in PVPs, certifications or notification (including paddock trees).
- All hollow bearing trees.

TIER 2 – MEDIUM BIODIVERSITY CONSTRAINT

- Native vegetation patches of PCT that correspond to other Threatened Ecological Communities listed under the BC Act.
- Paddock trees recorded as Class 2 or Class 3 that require biodiversity offsets at an ecosystem credit level.

TIER 3 – OTHER

- Native vegetation patches of PCT that do not that correspond to Threatened Ecological Community listed under either BC Act and/or EPBC Act but qualify to require biodiversity offsets at an ecosystem credit level.
- All other paddock trees and paddock trees recorded as Class 1.

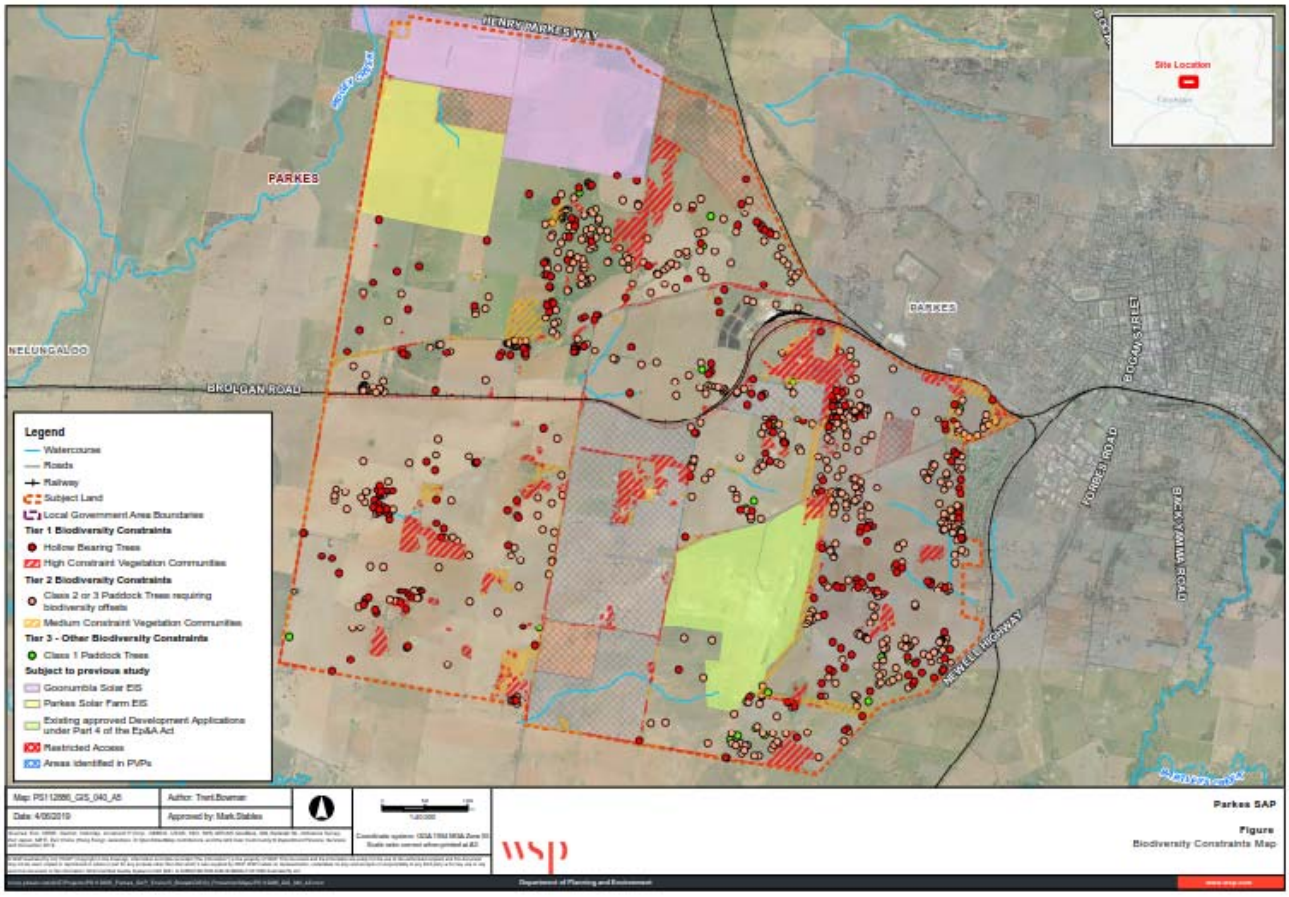


Figure 5.1 Biodiversity constraints map

BUSHFIRE CONSTRAINTS

When considering the 20-year delivery program, the characteristics of the Parkes SAP, the presence of Threatened Ecological Communities and the criteria for vegetation to be mapped as Category 1, 2 and 3 Vegetation, it is recommended that parts of the Parkes SAP is considered 'bushfire prone' land for the master planning process and subsequently the relevant specifications and requirements of Planning for Bushfire Protection should apply.

5.6 CULTURAL HERITAGE

5.6.1 SCENARIO TESTING

Of the three scenarios relating to impact footprint, impact scenario one will impact a minimum of three Aboriginal sites (#43-3-0171, #43-3-0170 and #43-3-0060). Scenario three will impact a minimum of 13 Aboriginal sites (#43-3-0170 to 0174, #43-3-0008 to 0012, #43-3-0016, #43-3-0017 and #43-3-0093). Scenario six will impact a minimum of six Aboriginal sites (#43-3-0170 to 0174 and #43-3-0093).

Scenario one provides the greatest opportunity for preserving Aboriginal cultural heritage sites inside the investigation area, with only three sites being impacted. The three sites consist of two isolated artefacts and one scarred tree. In addition, there are no impacts planned for Land Parcels F, G and I, meaning that the scarred trees recorded in these areas will avoided.

Of the high development scenarios, impact scenario 6 provides a better opportunity for preserving Aboriginal sites inside the investigation area with six sites being impacted, as opposed to impact scenario 3, where 13 sites would be impacted. Scenario 6 would be impacting five isolated artefacts and one scarred tree (which has been partially destroyed already). Scenario 3 would impact five isolated artefacts and eight scarred trees. However; impact scenario 6 also has the proposed airport extending beyond the investigation area in the south-western corner towards Goobang Creek. It is possible that, if assessed, there will be a moderate to high likelihood of further sites in this area.

5.6.2 MASTER PLAN CONCLUSION

In addition to the five Aboriginal cultural heritage artefacts discovered during the archaeological assessment, a number of other previously recorded sites within the investigation area (refer to Section 3.7.3). The long term management of these sites will be undertaken through an Aboriginal Cultural Heritage Management Plan agreed to by the RAPs, DPE and OEH.

Appropriate management of cultural heritage items is primarily determined based on their assessed significance as well as the likely impacts of the proposed development. The following management options are general principles, in terms of best practice and desired outcomes, rather than mitigation measures against individual site disturbance.

- **Avoid impact** by altering the development proposal or in this case by avoiding impact to a recorded Aboriginal site. If this can be done, then a suitable curtilage around the site must be provided to ensure its protection both during the short-term construction phase of development and in the long-term use of the area. If plans are altered, care must be taken to ensure that impacts do not occur to areas not previously assessed.
- **If impact is unavoidable** then Aboriginal sites will need to be disturbed. The approval pathway for this project has not been determined and direct impacts are currently unknown.

Appropriate management of non-Aboriginal heritage items is primarily determined based on their assessed significance as well as the likely impacts of the proposed development. In terms of best practice and desired outcomes, avoiding impact to any historical item is a preferred outcome, however, where a historical site has been assessed as having no heritage value, impacts to these items does not require any legislated mitigation.

One previously-identified historic heritage site is recorded inside the investigation area (Brolgan Road-HS01), though impact has already been determined through previous assessments for the Parkes Inland Container Terminal (OzArk 2018b and 2018c). Hence, there is no specific management of non-Aboriginal heritage required for the Parkes SAP.

6 SUMMARY

The SAP is a joint Government Agency initiative, announced by the Deputy Premier, the Hon John Barilaro MP, to create a 20-year vision for job creation and regional development. The Department of Planning, Industry and Environment are leading the creation of the Parkes SAP.

This Environment, Heritage and Sustainability Report provides a summary of the various specialist areas that have been assessed for the project, namely:

- Environmental Sustainable Development (ESD) Plan
- Air Quality and odour
- Noise and Vibration
- Hydrogeology
- Geology, soils and contamination
- Biodiversity
- Bushfire
- Cultural heritage.

All of the above assessments have been provided as appendices to this report.

The ESD Plan aims to make recommendations for inclusion in the Master Plan for the Parkes SAP. The foundation for the delivery of the 'Preferred Future' for the Parkes SAP is the United Nations Industrial Development Organisation's (UNIDO) Eco Industrial Parks Framework. To support this foundation is the concept of a 'Circular Economy'. The circular economy principle was identified as the keystone to the 'Preferred Future' for the Parkes SAP, fundamental to delivery and binding together the sustainability goals.

The air quality and odour evaluation identifies sensitive receivers and discusses dispersion modelling that was undertaken for the project, to review the impact against the standard assessment criteria. This modelling indicated that for pollutants assessed, all incremental results were below the assessment criteria.

The noise and vibration assessment has confirmed that construction of the Parkes SAP is expected to create noise and vibration impact on existing sensitive receivers. A construction noise and vibration management plan should be developed for the project (overall project as well as for specific sites) prior to commencement of works.

The groundwater desktop assessment indicates that multiple groundwater sources were identified within the investigation area. Both groundwater sources are likely to contain fresh – slightly saline quality water that is suitable for multiple beneficial uses including drinking water supply, irrigation and stock water supply, and represent extensive groundwater systems.

The Preliminary Site Investigation has identified potentially contaminating activities within and adjacent to the investigation area. A major area of concern is the Westlime quarry and former mine site. This area has been identified as having tailings dams relating to previous gold extraction. It is recommended that a detailed site investigation (DSI) is completed for the Parkes SAP. Other potential impacts associated with general agricultural activity during future development can be managed during construction through a construction environmental management plan (CEMP).

The Biodiversity Assessment has identified a portion of high constrained vegetation in the north of the SAP investigation area, as well as along existing roads including Henry Parkes Way, Coopers Road and Keiths Lane. An avoidance hierarchy was developed during the preparation of the Master Plan with the final impacts to be assessed through a Strategic Biocertification for the SAP.

The ACHHHA identified several Aboriginal sites which will required to be managed through an Aboriginal Cultural Heritage Management Plan based on the principles of mitigation, avoidance and management in consultation with the RAPs.

7 REFERENCES

NSW Department of Primary Industries – Office of Water (currently NSW DoI-W) (2017a), *Lachlan Alluvium Water Resource Plan - Groundwater (GW10) – Status and Issues Paper*, February 2017.

NSW Department of Industry – Water (2019), *Personal communications with Sue Hamilton, 19.03.2019.*

NSW Government, 2018, Parkes National Logistics Hub Prospectus.

Parkes Shire Council, <https://www.parkes.nsw.gov.au/environment/sustainable-living/sustainable-projects/>, date accessed: 19 April 2019.

APPENDIX A

ENVIRONMENTAL SUSTAINABLE DEVELOPMENT (ESD) PLAN

APPENDIX B

AIR QUALITY AND ODOUR ASSESSMENT

APPENDIX C

NOISE AND VIBRATION ASSESSMENT

APPENDIX D

GROUNDWATER DESKTOP STUDY

APPENDIX E

PRELIMINARY SITE INVESTIGATION

APPENDIX F

BIODIVERSITY ASSESSMENT REPORT

APPENDIX G

BUSHFIRE CONSTRAINTS AND OPPORTUNITIES REPORT

APPENDIX H

ABORIGINAL CULTURAL HERITAGE AND HISTORIC HERITAGE ASSESSMENT REPORT

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