CONTENTS

FIGURES

TABLES

APPENDICES

REFERENCES

Adelaide & Mt Lofty Ranges NRMB *Shorebird Conservation and Management* July 2009

Australian Water Environments *Floodplain Mapping for the Gawler River* 2008

Coast Protection Board *Policy Document* 2002

Connell Wagner *Air Quality Technical Report* 2008

Connor Holmes *Centres Planning* March 2009a

Connor Holmes *Social Analysis* March 2009b

Connor Holmes *Demographic Analysis* March 2009c

Connor Holmes *Affordable Housing* March 2009d

Connor Holmes *Buckland Park Development Application* May 2007

Cooe *Marine and Coastal Assessment* 2008

Cooe (a) *Letter regarding the marine environment* 2009

Cooe (b) *Email June 2009*

Department of Education and Children's Services – Letter to Department of Planning and Local Government 29 January 2009

Department of Education and Children's Services - Mr Vince Dimasi and Mr Roger Lowe – meeting with proponent 9 June 2009

Department of Planning and Local Government *Planning the Adelaide We All Want – Progressing the 20 Year Plan for Greater Adelaide* July 2009

Dr Bob Anderson *Flora Technical Report* 2008

Dr Bob Anderson *Fauna Technical Report* 2008(b)

Dr Craig Williams – email dated 27 June 2009

EPIC Energy – email from Mr Peter Sardelis dated 9 June 2009

ETSA Utilities – email from Mr Neil Godson dated 25 June 2009

Golders and Associates *Preliminary Acid Sulphate Soil Investigation* 2008

Native Vegetation Council Website – accessed 28 September 2009

Native Vegetation Council *Guidelines for Native Vegetation Significant Environmental Benefit Policy for the Clearance of Scattered Paddock Trees* August 2007

Parson Brinkerhoff *Climate Change and Sustainability Analysis* 2009

Parsons Brinkerhoff – *Memorandum Noise Assessment* July 2009(a)

Parsons Brinkerhoff – *Traffic Impact Assessment* 2009 (b)

Playford City Council – personal communication Mr Paul Johnson 30 September 2009

Rodenburg Davey and Associates Pty Ltd *Environment Management Plan for a Recycled Organic Resource Centre at Buckland Park* August 2003

Sansom Institute *Mosquitoes at Buckland Park* October 2008

Sinclair Knight Merz *Groundwater Monitoring* February 2009

Sinclair Knight Merz (a) *Response to EIS Comments* July 2009

South Australian Government *Planning Strategy for Metropolitan Adelaide* 2007

Tesltra – letter dated 16 January 2009

Tweed Shire Council *Tweed Shire Development Control Plan 2008*

Professor Peter Newman - Public Letter to Jennifer Westacott dated November 2004

Walker Corporation *Buckland Park EIS* March 2009

Wallbridge and Gilbert *Stormwater Management, Water, Waste Water and Recycled Water Technical Pape*r 2008

GLOSSARY

"Australian Height Datum" means the datum of mean sea level as determined by the National Levelling adjustment in 1971 and adopted by the National Mapping Council of Australia at its 29th meeting as the datum to which all vertical control for mapping is to be referred.

1.0 INTRODUCTION

This Response Report has been prepared by Walker Corporation, as proponent of the Buckland Park proposal.

It addresses the issues and matters raised by agencies and the community during the process of:

- Preparing the proposal.
- Preparing the Buckland Park Environmental Impact Statement (EIS).
- Community consultation undertaken by Walker.
- Agency and community consultation undertaken by the Department of Planning and Local Government (the Department) in accordance with the *Development Act 1993.*
- Community consultation undertaken by Playford City Council (the Council)
- Agency review of an initial Response Report.

1.1 The Process

The Minister for Urban Development and Planning has declared the Buckland Park site a major development area.

In accordance with Section 46B(2 – 14) of the *Development Act 1993,* an Environmental Impact Statement (EIS) for the Buckland Park proposal was submitted to the South Australian government on 20 March 2009.

Between 4 May 2009 and 15 June 2009, the EIS was publicly exhibited and consultation with public authorities undertaken in accordance with Section 46B(5) and (6) of the *Development Act 1993*.

Prior to lodgement of the EIS, the Department of Planning and Local Government (Dept. of Planning) referred technical reports prepared on our behalf of the proponent as part of the proposal's environmental assessment to government agencies for comment.

At that time, we also made the technical reports available to Playford City Council for comment, although this is not required by the *Development Act 1993.*

This report responds to the issues and matters raised during the preliminary comment period and the formal public exhibition and agency consultation.

It is prepared in accordance with Section 46B(8) of the *Development Act 1993*.

This report will be considered by the Minister for Planning who will prepare an assessment report in accordance with Section 46B(9) of the *Development Act 1993*.

The assessment report will be referred to the Governor to assist him in determining wether the proposal should be approved, approved with conditions, or rejected in accordance with Section 48 of the *Development Act 1993*.

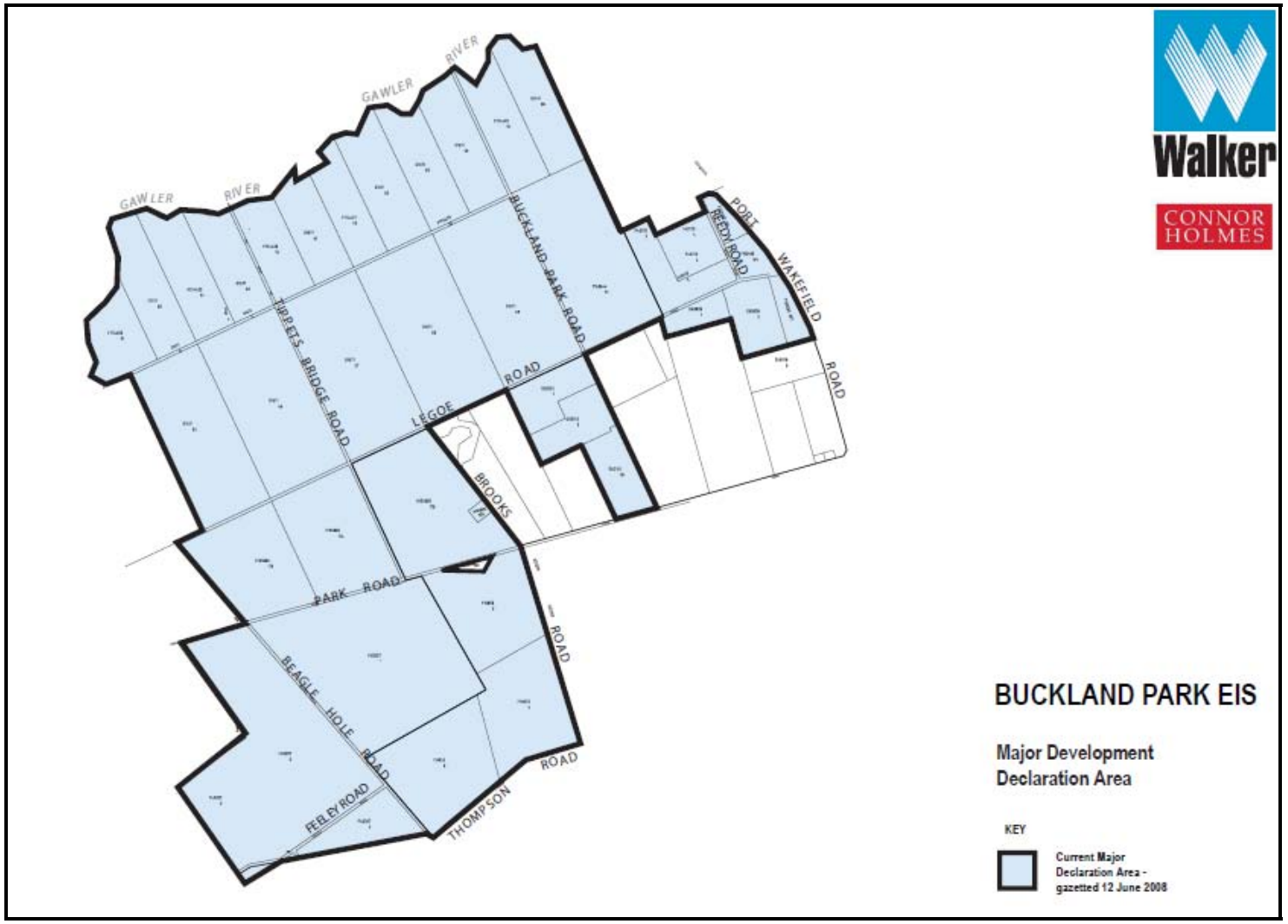


Figure 1.1: The Major Development Declaration Area

1.2 The Site

The Buckland Park site (the site) is located in metropolitan Adelaide's northern region, within the City of Playford. It is on Port Wakefield Road, west of Virginia. It is around 32 kilometres north of the Adelaide CBD and 14 kilometres west of Elizabeth.

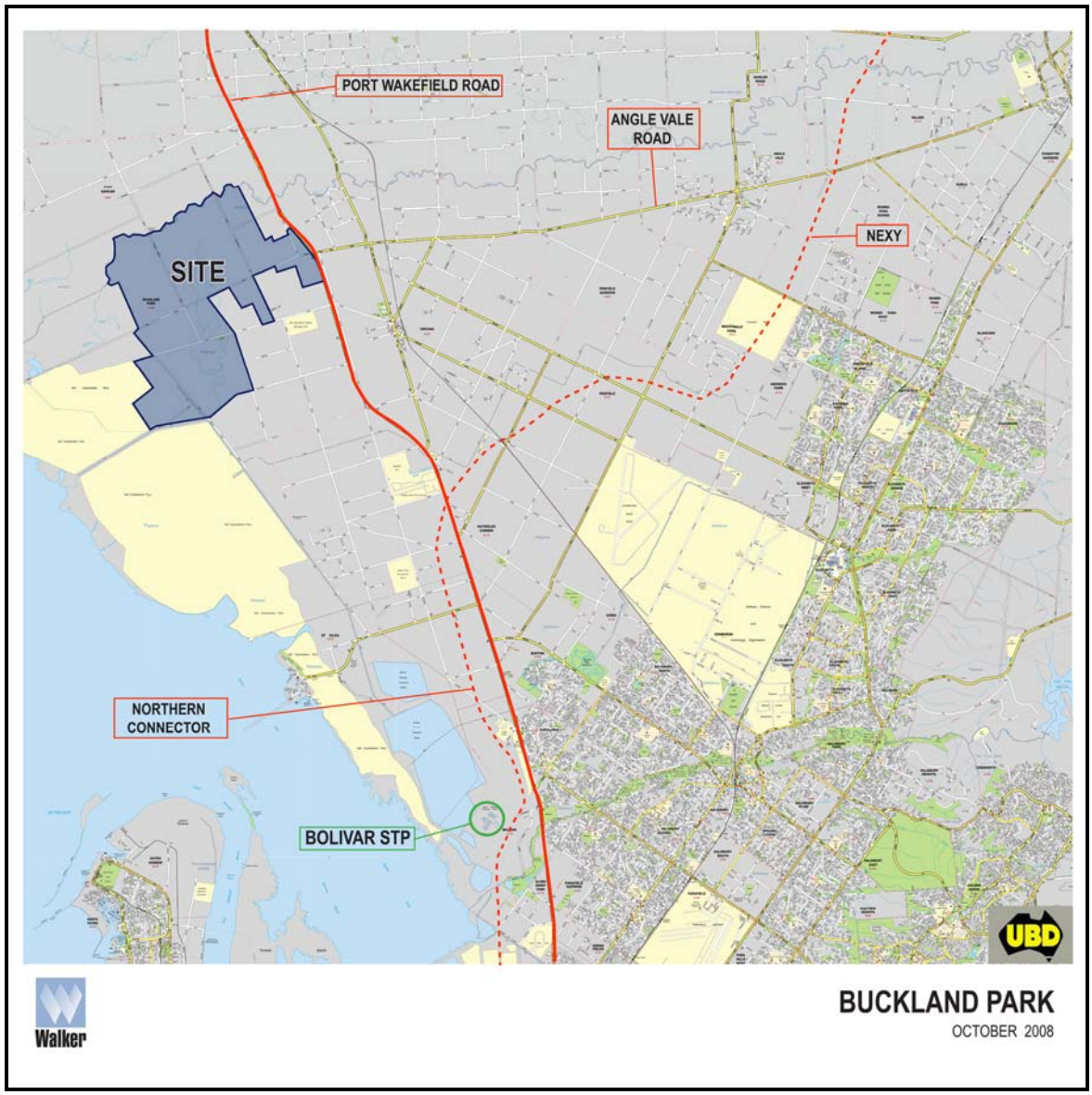


Figure 1.2: Buckland Park Locality Map

The site comprises approximately 1,340 hectares used for agriculture since European occupation, primarily low intensity grazing. The northern and southern parts of the site contain areas of remnant native vegetation. Some made, and unmade public roads cross the site.

The site is 6 km across, from its south west corner to its north east corner. It is flat, with the south-west corner at 2–3 m AHD, reaching 10–12 AHD at its north-east corner.

Thompson Creek traverses the southern portion of the site, from north to south. It has two reaches.

There are several glass houses in poor condition located in the site's central area. Perpetual Holdings Pty Ltd operate a substantial glass house enterprise within the site, at the corner of Brooks Road and Park Road.

There is a small allotment of Crown Land within the site. It has been excluded from the site area, and is not incorporated into any of the built elements accommodated in the Masterplan.

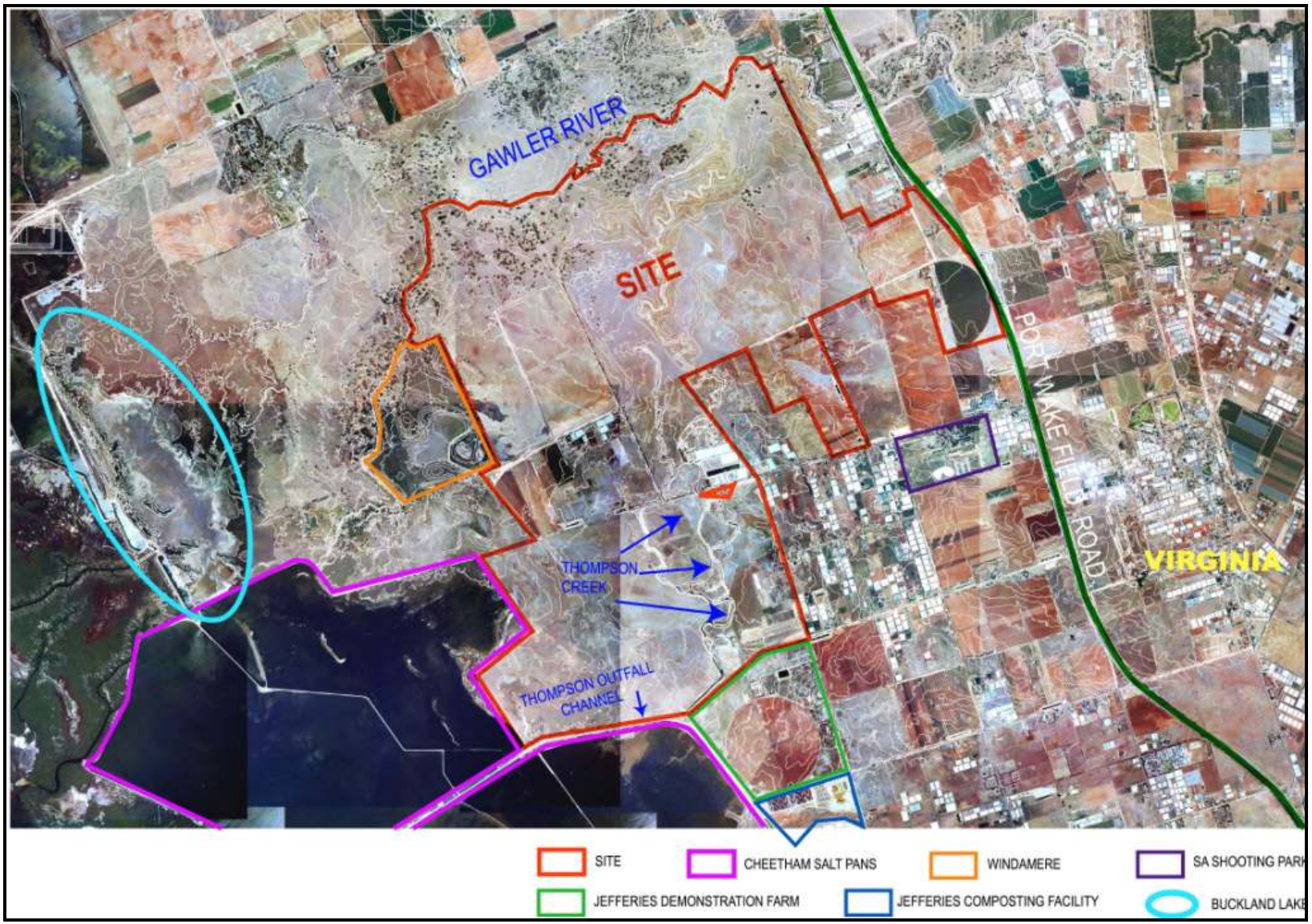


Figure 1.3: The site and its local context

1.3 The Proposal

The parameters for the Buckland Park proposal (the Proposal) were set by the Minister for Urban Development and Planning in his amended declaration of the site as a Major Development Area. In his declaration, the Minister agreed to assess the following components:

- Land division creating more than one additional allotment and associated works and activities.
- Development associated with the establishment and operation of a shopping centre of up to 8,000 m^2 of gross leasable floor area and associated community uses, including any related ancillary development, including signage.
- Development of a display village including any related ancillary development, including signage.

Land Division

A superlot land division is proposed across the entire site, which corresponds to stages of the proposal.

The superlots will be divided again into allotments for residential, open space, public roads and other uses over a time period, projected to be 25 years.

The detailed land division of each superlot will be guided by the Buckland Park Masterplan (the Masterplan).

The Masterplan accommodates:

- Residential areas capable of accommodating approximately 12,000 dwellings, in a range of forms and densities, and in distinct neighbourhoods.
- A road hierarchy comprising a main entry boulevarde, arterial, sub-arterial, distributor, and collector roads, designed to connect centres and housing, and accommodate regional and local bus routes. Local roads are not shown on the Masterplan, as they will be the subject of detailed design.
- A district centre, four neighbourhood centres (one temporary) and local centres located on bus routes, and in close proximity to the residential or employment areas they will serve. One neighbourhood centre will be temporary.
- Employment, commercial and mixed use precincts accessible to the principle roads shown in the road hierarchy and adjoining horticulture land outside the site boundaries.
- Stormwater and floodwater management systems.
- Open space capable of providing passive and active recreation facilities, and incorporating stormwater and flood management systems and significant indigenous vegetation.

- Four primary schools and two secondary schools located within centres and on bus routes.
- Separation of sensitive uses from existing non residential activities in the locality.

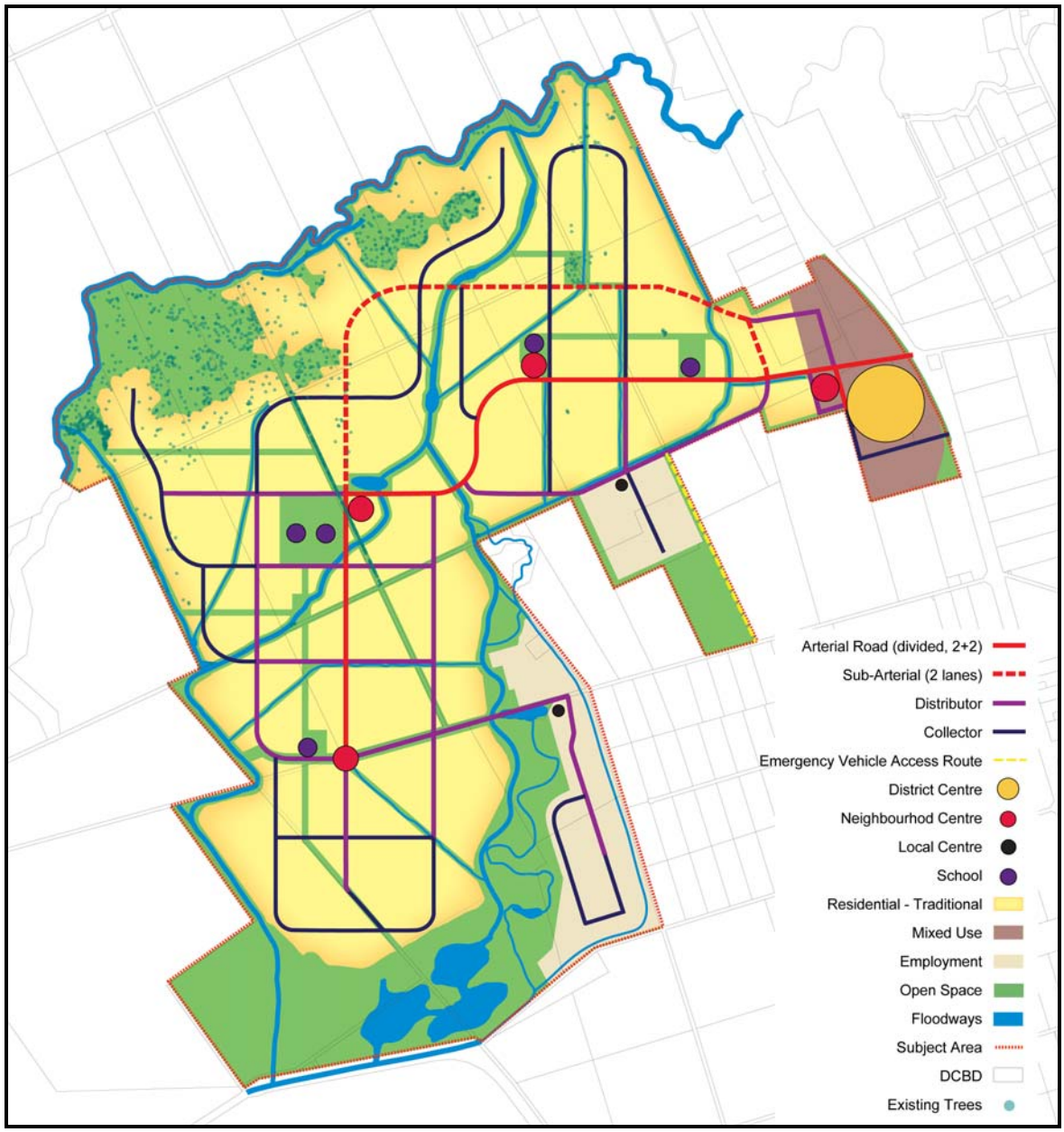


Figure 1.4: Buckland Park Masterplan
Source: Connor Holmes

The proposal will be implemented in stages over a period of 25 years, as illustrated below. The first residents are expected in 2013. By 2036, it is projected the site will accommodate a population of 33,000, and a workforce of 10,687 people.

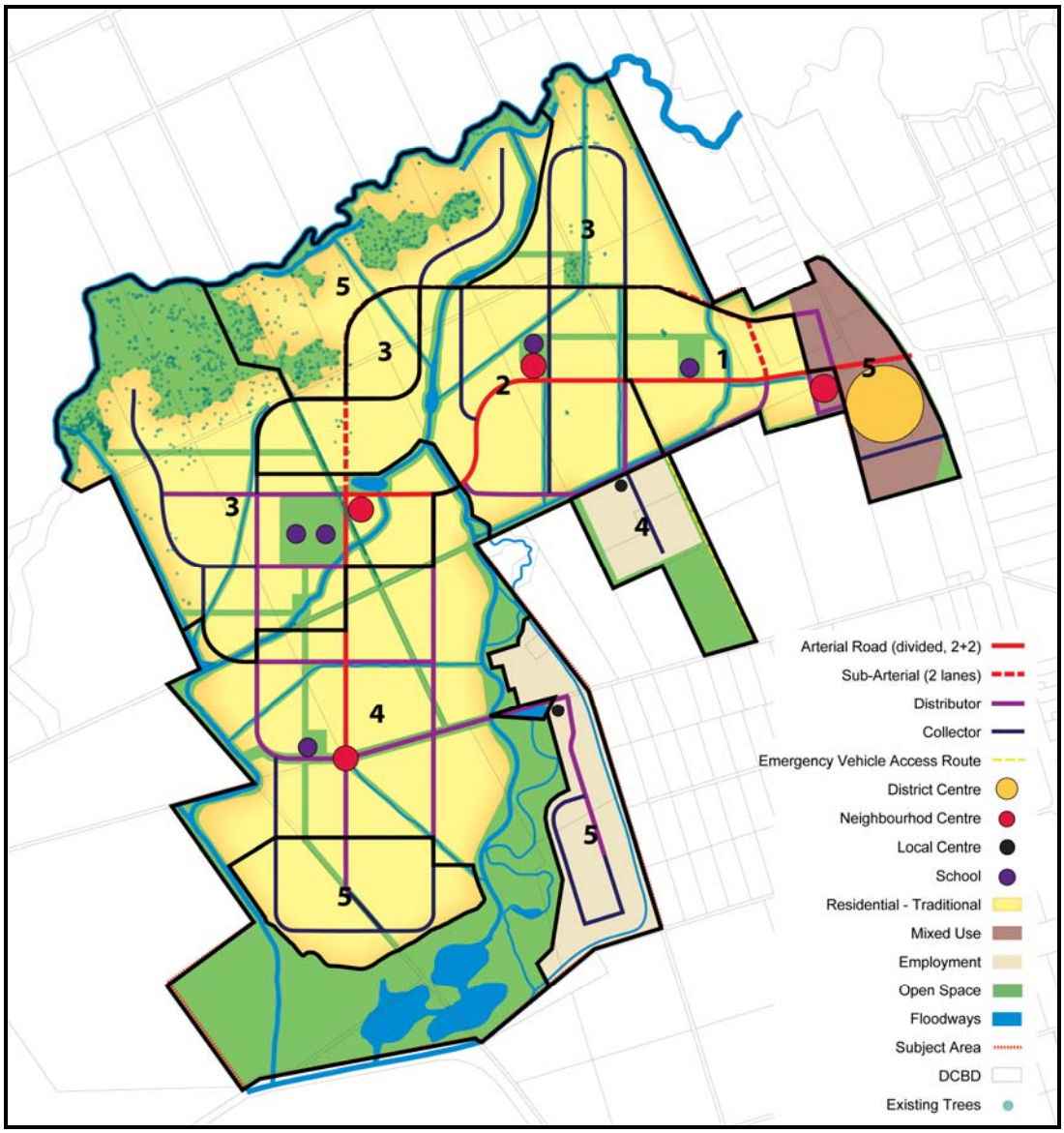


Figure 1.5: Proposal Staging
Source: Connor Holmes

Stages are projected to occur in the following time frame.

- Stage 1 projected for 2010 to 2016
- Stage 2 projected for 2017 to 2021
- Stage 3 projected for 2022 to 2026
- Stage 4 projected for 2027 to 2031
- Stage 5 projected for 2032 to 2036.

A detailed land division of Stage 1 has been prepared. It is guided by the Stage 1 Layout Plan which accommodates:

- A range of housing types, including a 15% component of Affordable Housing.
- New public roads to connect the allotments to the public road network. The first stage of the Masterplan's main entry boulevarde is included.
- The closure in part of Legoe Road, and approval is sought in this EIS for that closure.
- A primary school site located on the main entry boulevarde to facilitate car and bus access, and open space containing pedestrian and bike paths.
- Land within the primary school site can accommodate a sports field, which could be shared with the primary school.
- A Neighbourhood Centre site located at Stage 1's entry point, on the main entry boulevarde to facilitate car and bus access.
- Two parks located within residential neighbourhoods.
- Balance lots which will accommodate roads and housing allotments in conjunction with future construction stages.
- Linear open space to accommodate stormwater infrastructure, landscaped outlooks to homes, and pedestrian and bike paths.

Stage 1 has a total area of 63.23 ha.

Figure 1.6: Stage 1 Layout Plan – As Proposed
Source: Connor Holmes

Approval is sought for all works and activities associated with the Superlot and Stage 1 land division, whether those works are within the site or external to it. Such works may include, but will not be limited to, any or all of the following:

- Constructing infrastructure required to service the allotments, such as:
  - roads, traffic management devices, street signs and related signage and street furniture,
  - footpaths, pedestrian trails, cycleways, shared-use paths and related signage,
  - stormwater and flood management systems,
  - effluent treatment system,
  - water supply system,
  - gas, power and telecommunications networks.
- Undertaking landscaping and planting works within roads and open spaces.
- Undertaking earthmoving works and creating temporary stockpiles of moved earth.
- Constructing fences on allotment boundaries.
- Establishing construction infrastructure such as equipment compounds, amenities for the construction workforce, temporary access roads, directional signage and the like.
- Clearing native vegetation as required to undertake any of the above.

Neighbourhood Centre

The proposal includes a Neighbourhood Centre within Stage 1. The Neighbourhood Centre will be constructed in two phases. The first phase will be commissioned to coincide with the occupation of the first dwellings. It will include:

- A small supermarket for convenience shopping. Suitable lease agreements will be negotiated with potential tenants, in the event a supermarket is not financially viable at opening.
- A community space equipped with office and meeting facilities – a community worker will be based in the space.
- Six specialty shops suitable for a café, private medical and dental surgeries and other small businesses. We will negotiate with suitable potential tenants, in the event a supermarket is not be financial viable at opening.
- A sales and display centre operated by us.
- Landscaping, including an entry statement and children's playground.
- 200 car parking spaces.
- Signs, including the entry statement and business identification signs.

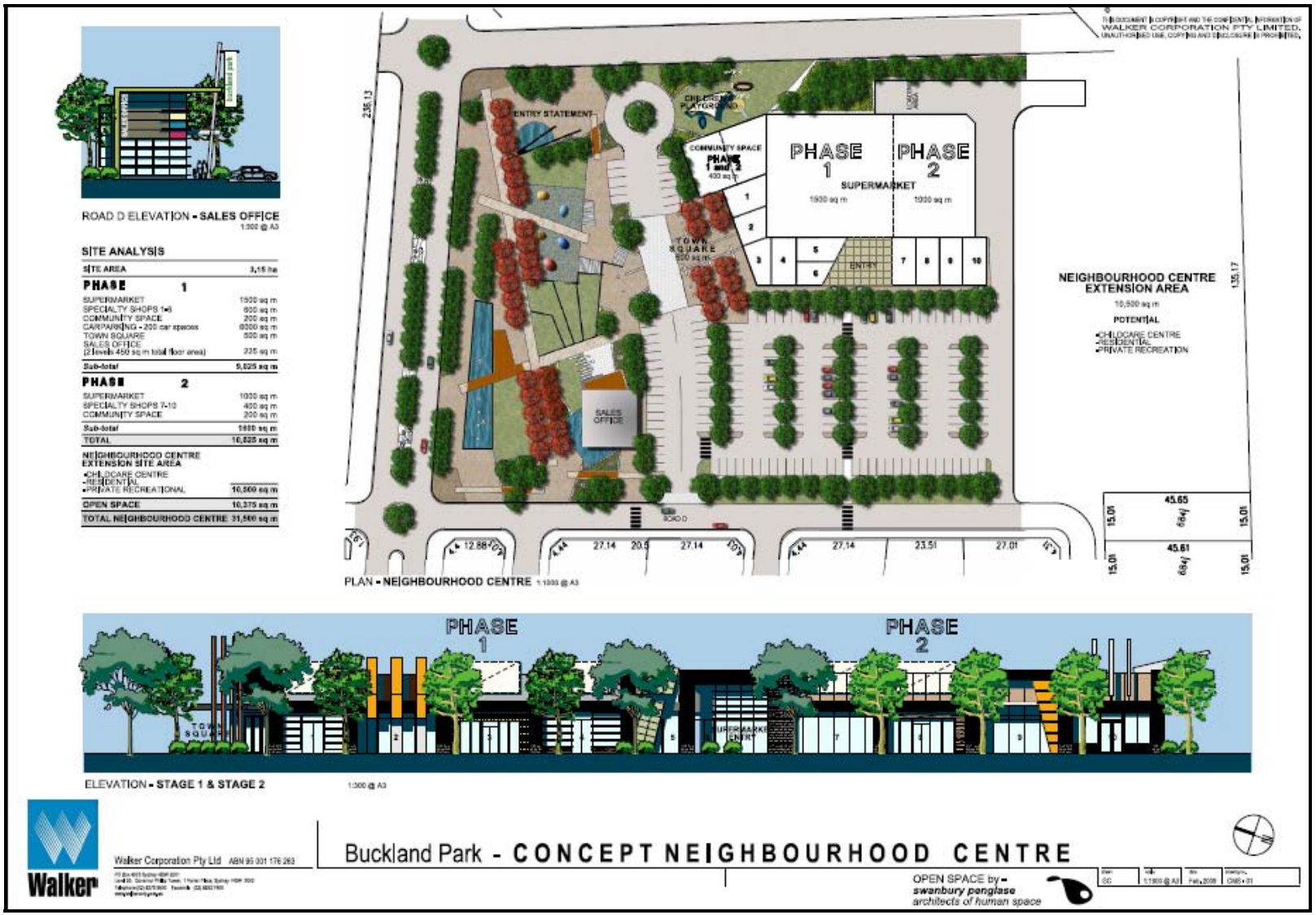


Figure 1.7: Concept Neighbourhood Centre Plan
Source: Walker

The second phase will be constructed when demand for additional facilities is generated by new residents occupying Stage 1, or during later phases. It will include additional community space, additional supermarket space and four additional specialty shops.

Within the Neighbourhood Centre, an "extension area" has been included for other private facilities, for example, a childcare centre, recreation facilities, a hotel, offices, or housing.

Approval is not sought for the uses and activities which will occupy the extension area. These will be the subject of future development applications to Playford City Council, subject to the proposal receiving approval.

The Stage 1 Neighbourhood Centre is not part of the proposal's ultimate centre hierarchy. When the adjoining district centre is commissioned, the Neighbourhood Centre will be redundant.

At that time, the Neighbourhood Centre buildings will be either:

- Removed and the site redeveloped, or
- Refurbished for another use, ancillary to the district centre, or
- Incorporated into the district centre.

Table 1.1: Stage 1 Neighbourhood Centre Site Area

Component	Site Area		
	Phase 1 (m^2)	Phase 2 (m^2)	Total (m^2)
Neighbourhood Centre – Buildings			
Supermarket	1,500	1,000	2,500
Specialty Shops	600 (6 shops)	400 (4 shops)	1,000
Community Space	200	200	400
Sales Office (2 storey)	225	0	225
Sub Total	2,525	1,600	4,125
Carpark – 200 max. x 30m^2	6,000	0	6,000
Town Square	500	0	500
Sub Total	6,500	0	6,500
Total	9,025	1,600	10,625
Neighbourhood Centre – Extension Area			
Potential – private recreation or private service (e.g. childcare centre, commercial) or residential.	N/A	N/A	10,500
Total			10,500
Neighbourhood Centre – Open Space			
Landscape entry statement, water feature, landscaping, child's playground	N/A	N/A	10,375
Total			10,375
TOTAL NEIGHBOURHOOD CENTRE			31,500m^2

The Display Village

A display village is proposed within Stage 1, located adjacent to the neighbourhood centre. It is planned to accommodate thirty two display dwellings, constructed progressively with the construction of Stage 1, and beyond into future stages.

The timing for construction and the design of the display dwellings will be negotiated with house builders wishing to display their homes, subject to the proposal receiving approval.

The display village allotment layout has been designed to ensure display homes and sites can be sold as homes when no longer required for display. It incorporates a proportion of allotments suitable for the display of houses suitable for the proposal's Affordable Housing component.

The sales office within the neighbourhood centre is proposed as an administration centre for house allotment sales, and to display marketing information and particular suppliers of building elements.

Individual builders may choose to operate some office functions from within their display home, for example, in garages equipped for the purpose.

Within the proposed display village, individual builders will also be offered the opportunity to install signage.

Sufficient parking for the display village is proposed within the neighbourhood centre.

Figure 1.8: Display Village Location
Source: Walker Corporation

2.0 COMMUNITY CONSULTATION

2.1 Consultation Undertaken

Walker Consultation

Prior to commencement of the statutory consultation process identified within Section 46B (5) and (6) of the *Development Act 1993,* we undertook a community engagement process within communities in the site's locality.

The purpose and approach we adopted to our community engagement is described below.

The community engagement focused on communities within the site's locality, and broader region, including:

- Within Playford local government area (LGA), particularly Virginia and Angle Vale.
- Within the Mallala LGA to the north of the Gawler River, particularly Two Wells.
- Within the Salisbury LGA to the south.

Recognition was given various interested stakeholders within these communities including:

- Property owners.
- Residents.
- Business and service owners and providers.
- Workers.
- Community and sporting groups and associations.
- Councilors.

The primary purpose of the community engagement process was to inform members of the above communities and stakeholder groups about the proposal, including:

- Its size, layout and staging.
- Planning for facilities, including the range of housing styles, retail, commercial and community facilities, recreation and sporting amenities and facilities.
- Local employment opportunities both pre and post construction.
- Connectivity with surrounding townships including road and transport networks.
- Management of environmental factors including native flora and fauna, groundwater, and storm and flood mitigation.
- The provision of water, transport and other utilities.

The community engagement process was not intended to explicitly seek comments and feedback on the proposal. That was the purpose of the formal community engagement undertaken by the Dept. of Planning.

Rather, our community engagement process sought to inform interested parties about the EIS and the process for making formal comment.

Based on discussions and advice received from Virginia Horticultural Centre (VHC) and the City of Playford staff, a series of information 'drop-in' sessions were held, where interested community members could find out about the proposal by:

- Viewing display material.
- Talking one on one with key members of our EIS project team.

The display material is at *Appendix 1*.

The information sessions were held at three locations, which were convenient and accessible to the local community to maximize potential for interaction:

- Virginia Shopping Centre - two 4 hour sessions on a Saturday afternoon and Thursday evening.
- Angle Vale Shopping Centre - one session of 3 hours on a Wednesday afternoon.
- Two Wells Community Hall - one session of 4 hours on a Tuesday evening.

Figure 2.1: 28 March 2009 – Virginia Shopping Centre

Figure 2.2: 31 March 2009 – Two Wells Community Hall

Figure 2.3: 1 April 2009 – Angle Vale Shopping Centre

Figure 2.4: 2 April 2009 – Virginia Shopping Centre

The information sessions were advertised by:

- articles and advertisements in local papers including The Messenger (Salisbury), The Bunyip (Gawler) and Ripe (VHC bi-monthly newsletter);
- letters to key stakeholder groups including:
  - Residents' associations.
  - Business associations.
  - Horticultural groups.
  - Sporting and community groups.
- Letter box drop to property owners adjoining or close to the site's boundary.
- Posters in public places in Virginia, Two Wells and Angle Vale.

Approximately 240 people visited the displays over the four sessions. All the people attending were local residents and business people. Two councilors introduced themselves, one from Mallala District council, and one from Playford.

We kept notes of the comments, questions and concerns raised by the community during the information sessions.

The atmosphere of the community sessions was positive and productive with many visitors asking when the proposal would begin and offering positive suggestions. Notes from the information displays are at *Appendix 2*.

Information displays and handouts provided information on how to make submissions. However, a very low number of submissions where received from the local community.

For example, comments and questions included:

- A transition to Year 12 school would be good. There are plenty of child care centres, but all the kids are growing up and more schools will be needed.
- It will be good for my business on Angle Vale Road/Port Gawler Road/Port Wakefield Road.
- I live near Jefferies, and I don't smell anything.
- My boys will be the right age to buy houses there.
- How much will the houses cost?
- How big will the lots be?
- When will they come on the market?
- When will the district centre open?
- Where will the other shops be?
- Will there be a retirement village and nursing home?

Other community members sought information, regarding the site, the proposal and its location relative to their properties.

Planning for transport and utilities was an important issue, with comments made on existing services, and questions asked about potential benefits to their homes and lifestyle.

There was concern regarding;

- Management and/or potential exacerbation of flood events in the area.
- Impacts on local houses, businesses, agriculture and horticulture.
- Planning for development around Virginia
- Impacts on the area's rural character.

District Council of Mallala councilors were briefed by planners from Connor Holmes on 16 March 2009.

City of Playford councilors were briefed by planners from Connor Holmes, Walker staff and engineers from Wallbridge and Gilbert on 3 occasions during the proposal's preparation:

- 27 March 2007
- 29 May 2007
- 16 September 2008

The issues raised during these briefings were discussed in the EIS at page 14-35.

Mallala and Playford Councilors received letters advising them of the community information days.

We created an email address to allow the public to send questions and comments directly to us.

- bucklandpark@walkercorporation.com.au.

The email addressed was included in press releases, letters, flyers and display material.

The EIS and its supporting documentation were placed on a website accessible to the general public. Its address is www.bucklandpark.com.au.

All letters, emails and personal communications, their nature and any action taken in response were registered.

Enquiries were received from local businesses, community members in the area and other businesses within the region.

- Some sought general information, which was provided as appropriate.
- A local horticulturalist sought advice on their business's future.
- A builder expressed interest in establishing display homes in the display village.

- A real estate agent expressed interest selling future house sites.
- A local resident wished to apply for the position of community worker.
- An adjoining business raised concerns regarding changed flood conditions on their site.
- The same business also expressed interest in supplying landscape materials to the proposal during construction.
- An adjoining business requested detailed planning of the proposal's future stages provides adequate buffers to allow their business to continue operating.
- An adjoining horticulturalist expressed concern that crop spraying may be affected.
- An adjoining business advised the provision of a landscaped mound on their property would assist in ensuring the proposal and the business could successfully co-habitate.

The Department's Consultation

Between 4 May 2009 and 15 June 2009, the EIS was publicly exhibited and consultation with public authorities undertaken in accordance with Section 46B(5) and (6) of the *Development Act 1993*.

The Dept. of Planning convened a public meeting at the Virginia Horticulture Centre on 13 May 2009. Departmental staff presented the assessment process, and explained how submissions could be made.

Walker staff presented the proposal, and its consultant team answered questions from the public. Approximately 40 people attended the meeting.

The Dept. of Planning received written submissions from government agencies and the community during the exhibition period.

During assessment of the Response Report, additional comments were received from agencies. They have been addressed in this final Response Report.

Table 2.1: Summary of formal submissions

GOVERNMENT AGENCY	
1	Adelaide and Mt Lofty Ranges Natural Resources Management Board
2	Department of Health
3	Department of Infrastructure, Energy and Transport – Aviation
4	Department of Education and Children's Services x 2
5	Environment Protection Authority and Zero Waste
6	Department of Families and Communities
7	South Australian Tourism
8	Department of Land, Water and Biodiversity Conservation – Flood Hazard
9	Department of Land, Water and Biodiversity Conservation – Planning
10	Department of Further Education, Employment, Science and Technology
11	Department of Primary Industry and Resources - Agriculture
12	Department of Premier and Cabinet
13	Department of Environment and Heritage
14	State Emergency Services`
15	Department of Transport, Energy and Infrastructure
16	SA Water x 2
17	Native Vegetation Council
18	Office of Recreation and Sport
19	Department of Trade and Economic Development
LOCAL GOVERNMENT AGENCY	
1	Playford City Council
2	Mallala District Council
3	Gawler River Flood Management Authority
INFRASTRUCTURE AGENCY	
1	Epic Energy – Stage 1 road closure
2	Electranet – Stage 1 road closure
3	SA Water - Stage 1 road closure
4	Playford City Council - Stage 1 road closure
5	ETSA – Stage 1 road closure
COMMUNITY	
1	Mr Tonks
2	Mr Marschall
3	Mrs Ailion
4	Mr and Mrs Letcher
5	Mrs Picard
6	Local resident
7	Mr Reilly

LOCAL BUSINESS	
1	Gawler River Quails
2	SA Potatoes
3	Lewis Horticulture
4	Jefferies
SPECIAL INTEREST GROUP	
1	Mr Parnell (MLC), The Greens
2	Mr Jennings, The Friends of Parafield Airport
3	Mr Kirkegaard, The Friends of Gulf St Vincent
4	Ms Hazebrook, Planning Institute of Australia – SA Division
5	Mr Grund, Butterfly Conservation SA Inc
TOTAL SUBMISSIONS - 43	

Playford City Council's Consultation

Playford City Council hosted a public meeting on 2 June 2009. Council sent letters to 2,000 households in its area, and placed advertisements in the local paper.

Council set up conversation circles, focused on various issues. A Council staff member recorded comments from attendees who participated in their circle.

Walker's display material was used at the meeting. 130 community members attended.

3.0 THE RESULTS

3.1 Who Responded?

Table 3.1: Who responded?

WHO	HOW MANY	
Local and State Government		
With comments	18	42%
Without comment (Tourism SA)	1	2%
Confirming information in EIS (SA Water, PIRSA Agriculture, Dept. of Trade and Economic Development)	3	7%
Sub total	*22*	*51%*
Stage 1 Road Closure - Local and State Government		
With comments	2	5%
Without comments (Epic Energy, Electranet, SA Water)	3	7%
Sub total	*5*	*12%*
Community Members		
Directly adjoining the site	1	2%
Located elsewhere in the region or Adelaide	6	14%
Sub total	*7*	*16%*
Local Businesses		
In the site's locale	4	9%
Sub total	*4*	*9%*
Special Interest Groups		
With a focus on the Proposal and local area	0	0%
With a focus on general issues	5	12%
Sub total	*5*	*12%*
TOTAL SUBMISSIONS	43	100%

3.2 Issues Raised

The issues raised during consultation fall into the following categories:

- Flood and stormwater
- Emergency access
- Water
- Regional strategic planning
- Detailed planning
- Infrastructure
- Services
- Environment
- Coastal environment
- Community and social
- Biodiversity
- Transport
- Sustainability
- The interface with local businesses and residents
- Place names
- Stage 1 road closures
- Mosquitoes
- Aviation

The issues raised in community meetings and information days were similar to those in the submissions.

4.0 THE RESPONSE

4.1 Flood and Stormwater

Comments on this issue were received in the following formal submissions.

- Playford City Council
- Adelaide and Mt Lofty Ranges Natural Resources Management Board
- Gawler River Flood Management Authority
- State Emergency Services
- Environment Protection Authority
- Department of Water, Land and Biodiversity Conservation
- Department of Health
- Department of Premier and Cabinet
- Department of Environment and Heritage
- Department of Transport, Energy and Infrastructure
- Mr Marscall
- Mrs Picard
- Lewis Horticulture
- Jefferies Pty Ltd
- Gawler River Quails
- Mr Parnell, the Greens
- Ms Hazebrook, Planning Institute of Australia
- Mr Kirkegaard, Friends of Gulf St Vincent

It was raised in community meeting or community information days.

Introduction

An integrated approach to water management has driven the proposal and Masterplan design. Wallbridge and Gilbert's integrated approach to water infrastructure, creating a water utilities strategy balances storm and flood water, potable water, recycled water and waste water.

The Masterplan and Wallbridge and Gilbert's storm and flood water management strategy establishes the structure for incorporation of WSUD principles (Page 24). It will guide detailed stormwater management designs for each of the proposal's future stages. Accordingly, Wallbridge and Gilbert have included the following elements:

- Gross Pollutant Traps and Trash racks
- Swales
- Wetlands
- Ponds

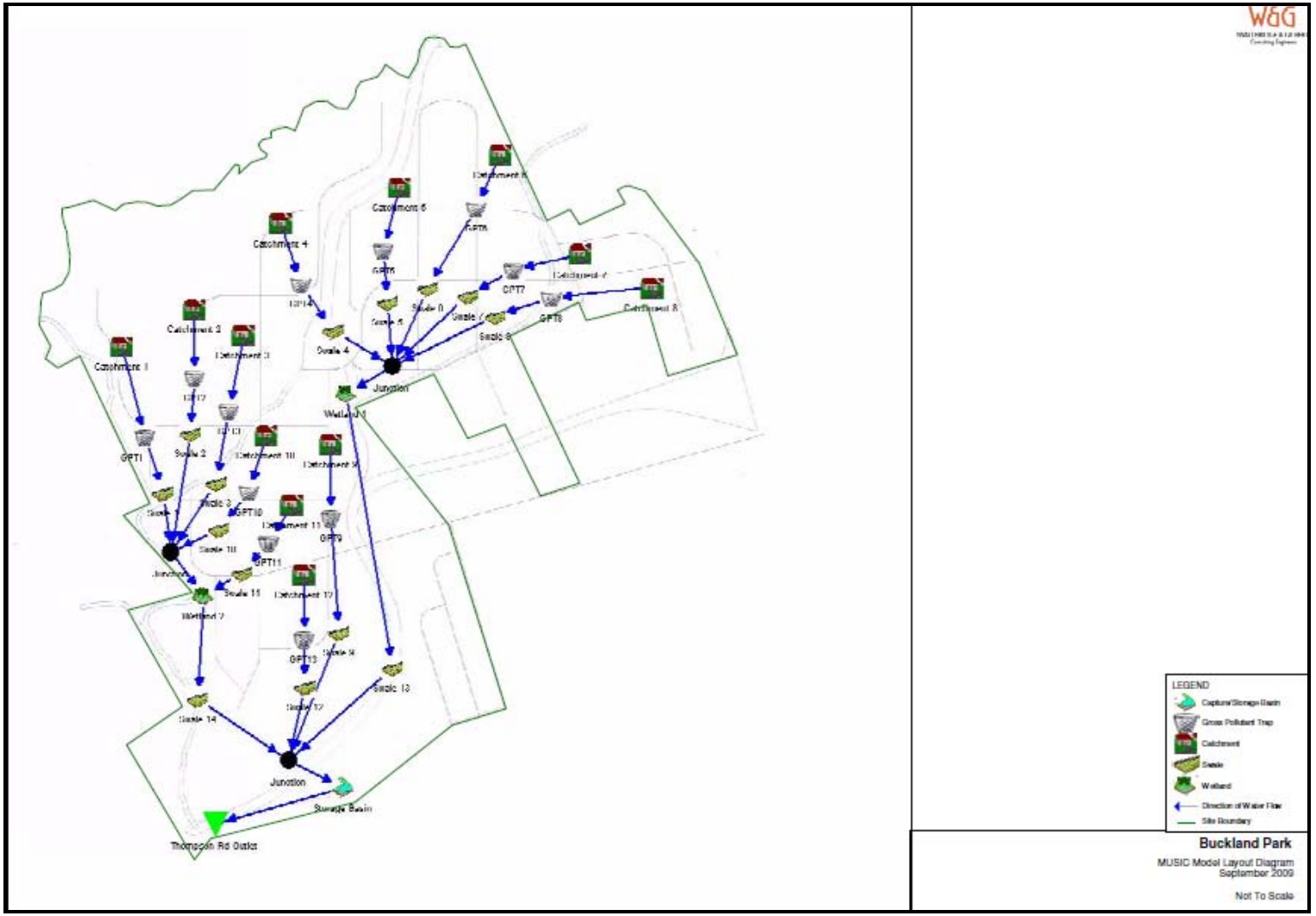


Figure 4.1: MUSIC Model Layout
Source: Wallbridge and Gilbert

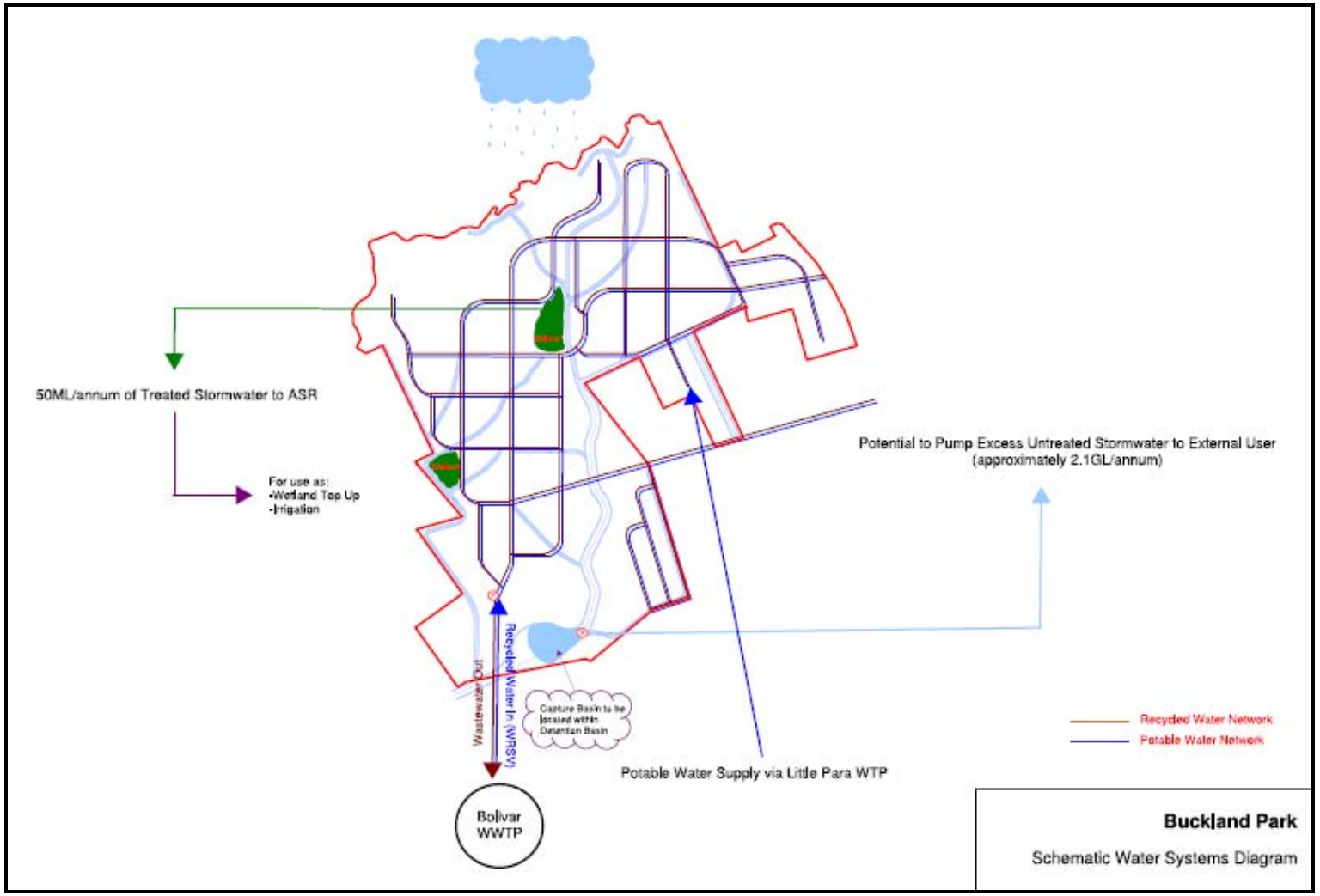


Figure 4.2: Proposed approach to total water cycle management

Source: Wallbridge and Gilbert

Sea Level Rise

As appropriate for any long term proposal, allowance must be made for future sea level rise in the assessment of groundwater, flood and stormwater management.

Wallbridge and Gilbert and Sinclair Knight Merz applied government and accepted predictions in their assessment of ground water impacts, flooding and stormwater.

Table 4.1: Sea Level Rise Predictions

DATE	RISE
To 2050	0.3 metres
2050 to 2100	0.7 metres
Total	1 metre

Source: Playford (City) Council Development Plan and Coast Protection Board

The potential risk of tidal surge via the Thompson Outfall Channel, exacerbated by sea level rise was identified by Wallbridge and Gilbert.

Wallbridge and Gilbert's analysis is summarised Chapter 7.1.2 of the EIS, and presented in full in their technical report at Appendix 18.

They concluded a minimum site level of 4.0m AHD was required to protect proposed residential areas from tidal surge events, with finished floor levels of 4.25m AHD.

The site slopes from 10 – 12 m AHD in its north eastern corner, to 2 – 3 m AHD in its south west corner. The majority of the site is above 4.0m AHD, and therefore will not be impacted.

The majority of the site area below 4.0m AHD has been incorporated in the Masterplan's open space areas. Only a small part is included in the Masterplan's residential areas.

It is only this small part which will require fill to meet the required minimum site and finished floor levels. Providing fill in these areas is technically possible and feasible.

Parsons Brinkerhoff prepared a sustainability analysis which considered the green house gas implications of the earthworks required the site. It is at Appendix 16 to the EIS.

Sinclair Knight Merz modelled potential impacts on groundwater. They found there is little discernable change between current ground water levels and future ground water levels accounting for sea level rise, apart from groundwater level rises along the coast related to sea level rise. Without the proposal their model predicts no change in groundwater levels at the site.

For "major coastal developments" the Coast Protection Board states, in addition to the 1.0 metre allowance for sea level rise to 2100, the full ranges of possible climate change on sea level effects be considered.

However, the proposal not a "*major coastal development*" as the site is not located within any area defined as coastal in accordance with the *Development Act 1993,* its Regulations, the *Coastal Protection Act 1972* or its Regulations.

The site is located kilometres from the coastline, and it is therefore considered unlikely that the sea would reach the site under any sea level rise scenario.

Table 4.2: Distances to the coastline

	MINIMUM DISTANCE	MAXIMUM DISTANCE
Coastline to site's western boundary	2.5 kilometres	4 kilometres

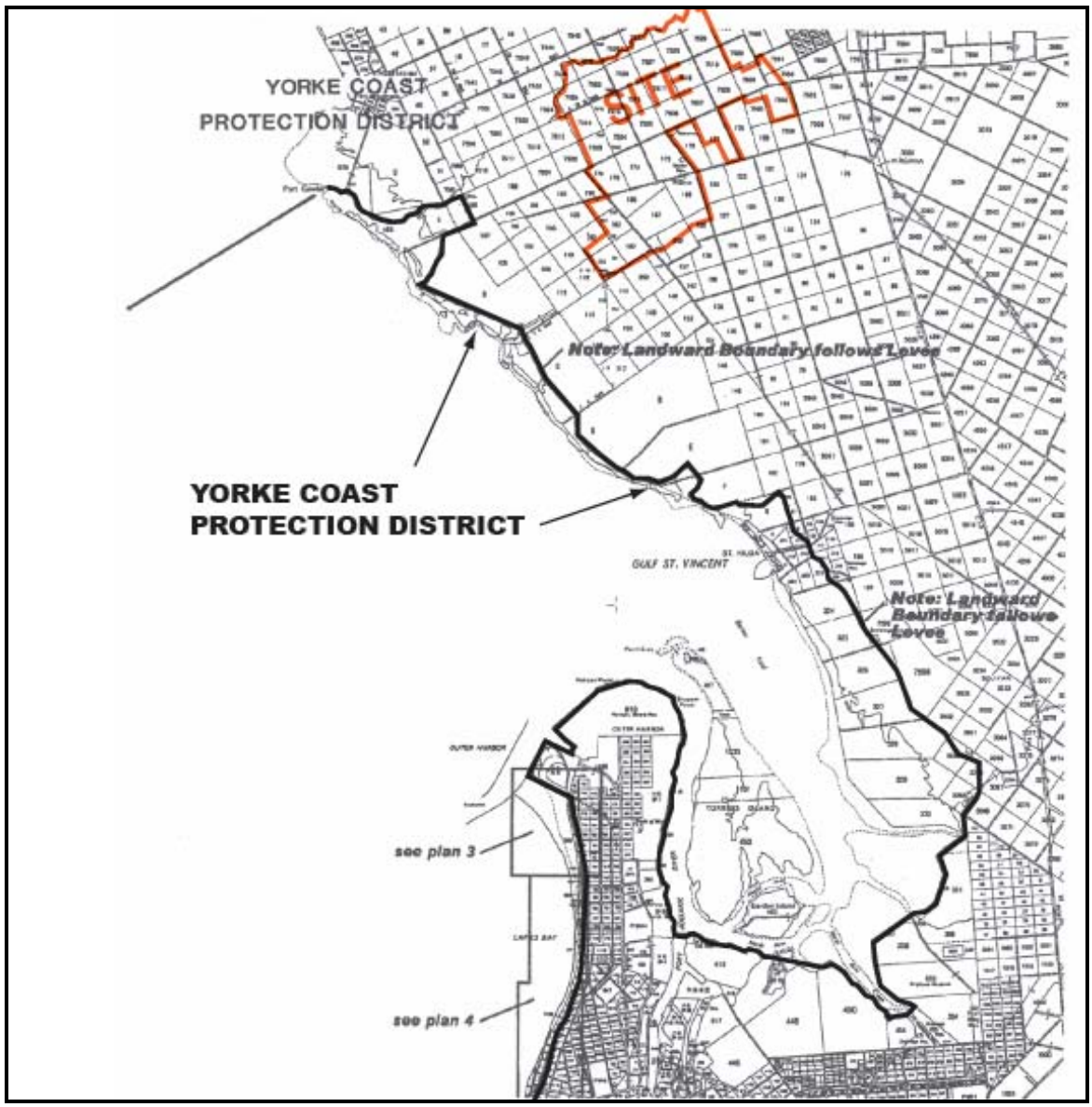


Figure 4.3: Definition of coast in the region
Source: Coastal Protection (Metropolitan) Regulations 2000

The statutory definitions of "coast" are reproduced below.

"*Coastal land*" is defined in the *Development Regulations:*

Schedule 8—Referrals and concurrences

1—Interpretation

(1) In this Schedule coastal land means—

(a) land situated in a zone or area defined in the relevant Development Plan where the name of the zone or area includes the word "Coast" or "Coastal", or which indicates or suggests in some other way that the zone or area is situated on the coast;

(b) if paragraph (a) does not apply—

(i) land that is situated in an area that, in the opinion of the relevant authority, comprises a township or an urban area and that is within 100 metres of the coast measured mean high water mark on the sea shore at spring tide; or

(ii) land that is situated in an area that, in the opinion of the relevant authority, comprises rural land and that is within 500 metres landward of the coast from mean high water mark on the sea shore at spring tide,

if there is no zone or area of a kind referred to in paragraph (a) between the land and the coast;

an area 3 nautical miles seaward of mean high water mark on the sea shore at spring tide;

The *Coastal Protection Act 1972* defines the "*coast"* as follows:

4—Interpretation

In this Act, unless the contrary intention appears—

coast means all land that is—

(a) within the mean high water mark and the mean low water mark on the seashore at spring tides; or

(b) above and within one hundred metres of that mean high water mark; or

(c) below and within three nautical miles of that mean low water mark; or

(d) within any estuary, inlet, river, creek, bay or lake and subject to the ebb and flow of the tide; or

(e) declared by regulation to constitute part of the coast for the purposes of this Act;

Wallbridge and Gilbert applied the *Floodplain Mapping for the Gawler River Technical Report* prepared by Australian Water Environments (AWE) and adopted by the Gawler River Flood Plain Management Authority (GRFMA).

AWE's flood plain mapping has been accepted by government as a definitive description of flooding in the region.

AWE concluded, the coincidence of extreme sea levels and large peak flood flows is expected to be very rare. Recent studies have identified that floods and peak tailwater conditions are essentially independent in the vicinity of the study area. (page 22)

Stormwater and Flooding

Flood and storm water management channels

Currently flood water breaks out of the Gawler River in several locations and sheets over the site.

A storm and flood water management strategy has been prepared which will contain flood breakouts from the Gawler River in open landscaped channels through the site. Water will travel down the channels, facilitated by gravity and the site's natural slope, to the Thompson Outfall Channel in the site's south west corner. This form of channel will slow the velocity of water, and will provide natural water treatment prior to discharge into the marine environment.

The large flood path which runs parallel to Park Road to site's south, will be directed into a channel where it enters the site in two locations.

The storm and flood water management strategy is consistent with Water Sensitive Urban Design (WSUD) principles, and reduces the need for concrete pipes, which are expensive to install and maintain.

The strategy has been designed to mimic natural conditions as much as possible.

The storm and flood water channels are designed capture water, up to the volume generated during a 1:100 ARI flood event water, confining it within the channels thereby reducing the area of the site affected by flooding.

The site therefore does not have to be built up to protect new neighbourhoods and precincts from flooding, except in a small section at the southern end of the Masterplan's mixed use precinct on Port Wakefield Road.

All works required for the strategy are contained within the site, and work on the Gawler River, Turretfield Flood Control Dam and South Para Reservoir Spillway is not required. Indeed, these works are already constructed.

Flood mapping was prepared for a 1:100 ARI flood event, pre-development and with the proposed management channels in place.

Modelling predicts the strategy will not alter flood conditions east of the site.

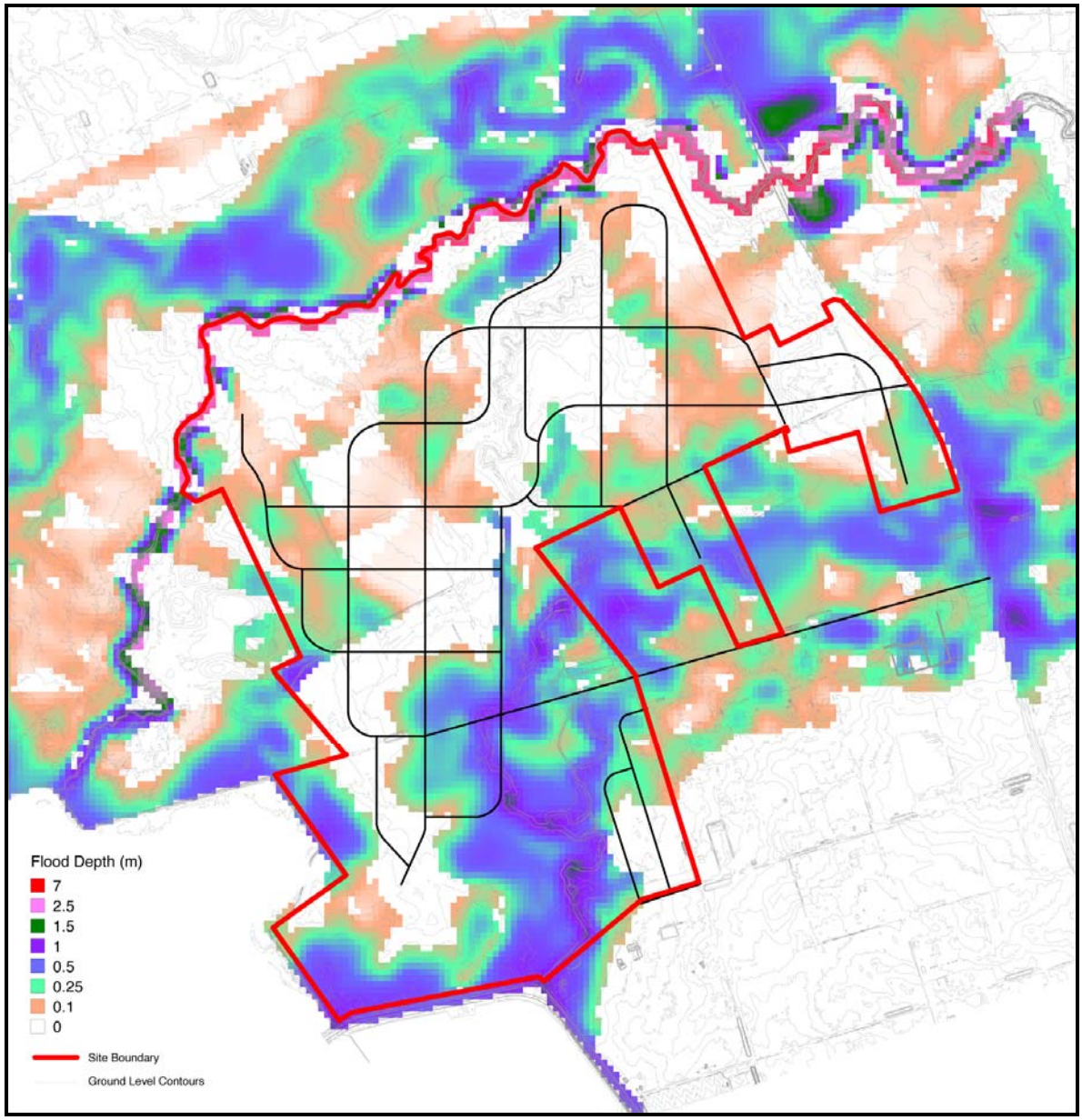


Figure 4.4: 1:00 Average Recurrence Flood Pre-Development
Source: Australian Water Environments

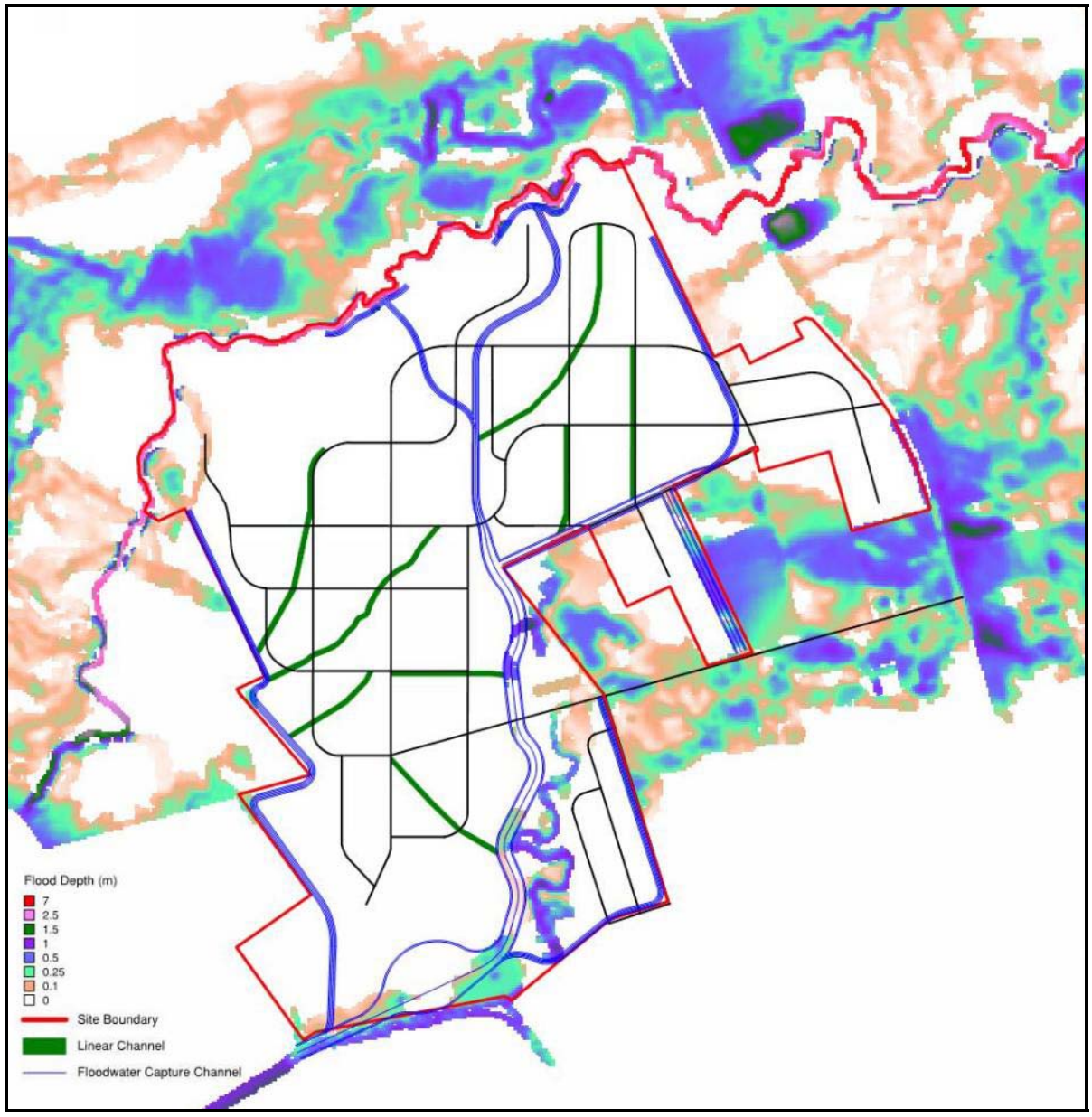


Figure 4.5: 1:00 Average Recurrence Flood Post-Development
Source: Australian Water Environments adapted by Wallbridge and Gilbert

What are the channels like?

The storm and flood management channels will take the form of open, landscaped channels, winding their way through the Masterplan's open space. They can accommodate pedestrian and bicycle ways and some indigenous planting, such as samphire, in the site's southern area.

They will have low flow channels at their base to convey a storm event up to the 1 in 1 year ARI. This low flow area will be densely vegetated to encourage natural storm water treatment.

The channels' upper portion will be shallow and wide to accommodate up to a 1:100 ARI flood event. It can be landscaped or revegetated as part of the proposal's landscaping and open space areas.

As the channels will be used for both flood water and storm water some remobilisation of pollutants in the channels may occur.

They are distinct from swales, which will be provided along roads, for example, to allow storm water to penetrate into the soil as a component of WSUD.

The large southern channel is within a large area of open space, as shown in the Masterplan

How frequently will there be water in the channels?

The storm and flood water management channels will convey water when it rains on the site, or in the case of a flood event, when it rains in the Gawler River catchment to such an extent as to cause flooding.

The storm and flood water management channels will be available to convey flood and stormwater, no matter how frequently rain falls, or the Gawler River floods.

This is accommodated in the strategy, which has been designed to work at any frequency of event, and has the capacity to contain volumes of water generated by floods of magnitudes up to a 1:100 ARI flood event.

AWE have estimated the frequency of breakouts for the Gawler River, based on the channel capacity and by completing a partial flow series analysis for the Gawler River. AWE's analysis is at Appendix Three.

Their analysis used historical data for the Gawler River at Virginia Park Gauging Station. It therefore does not allow for the impacts of the flood control dam, but given the small flow rates involved this is not considered to be an unreasonable approach. (The flood control works are expected to be more effective for larger flow rates).

This is also a conservative approach, which will likely over estimate the frequency.

The estimated flow rates for the 1, 2 and 5 year ARI events were as follows:

- 1 yr ARI flow – 2,000 ML/d
- yr ARI flow – 3,000 ML/d
- yr ARI flow – 6,000 ML/d

Breakouts to the south could be expected from the 2 year ARI flood event in some of the river's sections, but in the main the channel capacity appears to meet a 5 year ARI standard (assuming it is not blocked).

There is a short section of river to the far west that could be expected to over top its banks on an annual basis.

Funding

The construction and landscaping of storm and flood water management channels will be the responsibility of the proponent. This infrastructure will ultimately be handed to Playford City Council. Therefore, their detailed design, construction, hand over and maintenance will be managed via the governance arrangements described at Section 4.4. The channels will be wide landscaped areas, they will not be built structures such as concrete drains.

Open space and storm and flood management

There is ample space within the Masterplan's open space areas for the storm and flood management facilities, recreation uses, and biodiversity management. The *Development Act 1993*'s requirement for 12.5% of the site to be dedicated as open space will be met.

Flood Hazard Mapping

Within the channels, particularly the larger one in the site's southern area, water during a 1:100 ARI flood event will be moving quite quickly.

The flood water within the channels will be greater in depth than uncontained flood waters sheeting across open pastures.

However, flood waters will be contained in designated channels, facilitating the provision of road crossings, while protecting large areas of the site.

The natural falls across the site will slow the moving water.

Wallbridge and Gilbert concluded the channels will adequately convey the flood waters without increasing the depth of the water off site.

Australian Water Environments (AWE) prepared a flood hazard map for the channels. It is at Appendix Three.

The Playford (City) Development Plan includes a flood hazard map for the Gawler River, dated 1993. The Development Plan Amendment process has commenced to update the Development Plan to include new hazard mapping prepared by AWE (2008) on behalf of the Gawler River Floodplain Management Authority (GRFMA).

Playford City Council has endorsed a 'Statement of Intent'. However, the DPA process is being undertaken in conjunction with Mallala, Gawler and Barossa councils to ensure a consistent approach over the Gawler River's region (personal communication Mr Paul Johnson).

Accordingly, a single 'Statement of Intent' endorsed by all Councils will shortly be submitted to the state government for assessment.

Subject to the proposal's approval by the Governor this DPA process could be amended to include the updated flood hazard map at Figure 4.6, or a new DPA process could be commenced.

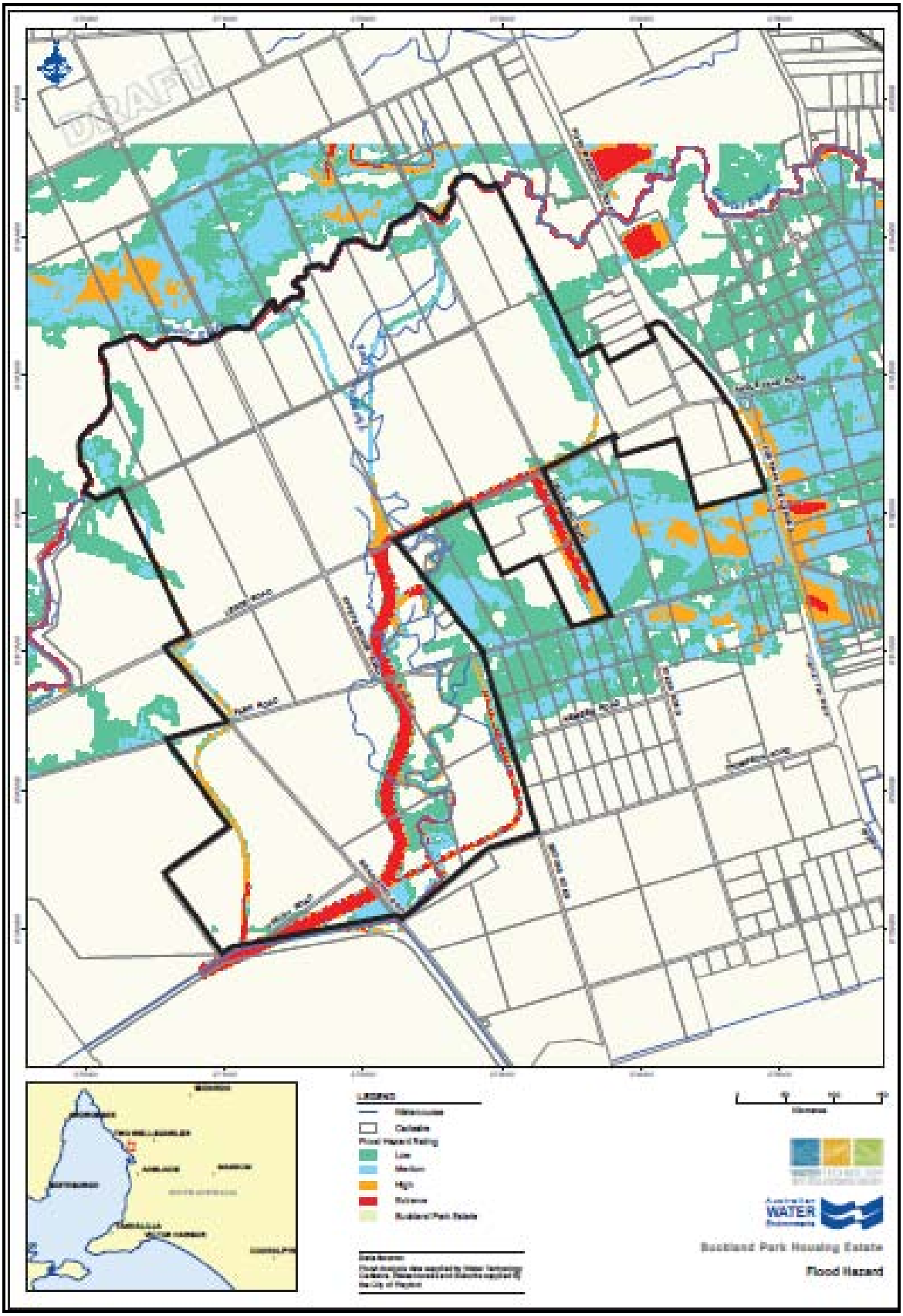


Figure 4.6: Hazard Mapping for proposed channels
Source: Australian Water Environments

Potential Blockages in the Gawler River

Wallbridge and Gilbert modelled the impact of fallen trees in the Gawler River, and found *the risk of a blockage occurring in the Gawler River downstream of Port Wakefield Road has little to no impact on an increase in flood risk in the 100 year ARI event.*

Two wetlands

Two wetlands are proposed in the site's north and central areas for treatment of the storm water flows generated by the site's northern portion.

As the wetlands are off line, they will have high flow diversions so flows exceeding the 1 in 1 year storm event will not enter the wetland. This will minimise the risk of remobilisation of pollutants within the wetland system.

The wetlands have been sized to effectively treat a maximum of a 1 in 1 year peak storm event.

It is a WSUD principle that the ideal storm event to efficiently treat the maximum volume of water is the 1 in 3 month storm event.

However, it is recognised by the Institute of Engineers Australia that treatment of the 1 in 3 month storm equates to treating 93% of the annual runoff of a catchment area.

Treatment of storm events of the order of a 1 in 25 year storm event would require a large amount of land to adequately detain the water to allow treatment to occur and provide very little additional volumetric treatment at excessive cost.

The detention basin

A 250,000m^3 detention basin is part of the stormwater management strategy. It is conceptually located in the site's south, near the Thompson Outfall Channel entry point. It includes a secondary capacity for the capture of stormwater for treatment and re-use, see Figures 4.1 and 4.2. It is anticipated the capture basin will require a volume of 100,000m^3 (Wallbridge and Gilbert).

The detention basin would not be lined as it will only be used to detain the water for the short period of time required to achieve a discharged rate which matches pre developed state, in accordance with the Playford (City) Development Plan's requirements. It is not a retention basin.

However, it is probable the secondary capture will be lined as water will be detained there for a period of days. Please see discussion below on ground water.

Specific details on the 250,000m^3 stormwater storage facility, including, liners, wall design, water inlet design, water outlet design, maintenance details to prevent water blocking or silting up and hence reducing its capacity will be prepared as part of its detailed design.

Temporary detention basins

Temporary stormwater detention basins will be required during construction to protect water ways from soil and erosion. These have not been identified in the EIS. They will be fully detailed in the Construction Environmental Management and Monitoring Plan (CEMMP) for each of the proposal's stages and will be the subject of further approval.

Adjoining Businesses, Virginia and the locality

Lewis Nursery adjoins the site to the south. As can be seen from the figures below, the Lewis Nursery is affected by flooding under existing conditions.

The proposal does not include placing any channels or drains across the Lewis Nursery. Nor does it propose draining any storm or flood water into the Nursery.

The storm and flood water management strategy is contained within the site.

The proposed storm and flood water management will simply collect and channel flood flows where they enter the site, and direct them safely to the Thompson Outfall Channel.

Port Wakefield Road is located up stream of the site. Changes to the site's landform will therefore not reduce the capacity of water to cross Port Wakefield Road.

Gawler River Quails are located on the northern side of the Gawler River, up stream of the site. Flood conditions will therefore not be affected on their site.

During community consultation the potential for exacerbated flood conditions in Virginia and the locality was raised.

As noted above, the proposed storm and flood water management strategy is not predicted to affect the flow of the Gawler River. It aims only to capture flood flows which enter the site and direct them to the Thompson Outfall Channel, mimicking the current situation.

It is proposed to contain flood waters in channels within and through the site. It is not proposed to divert, or detain flood water with levee banks or the like.

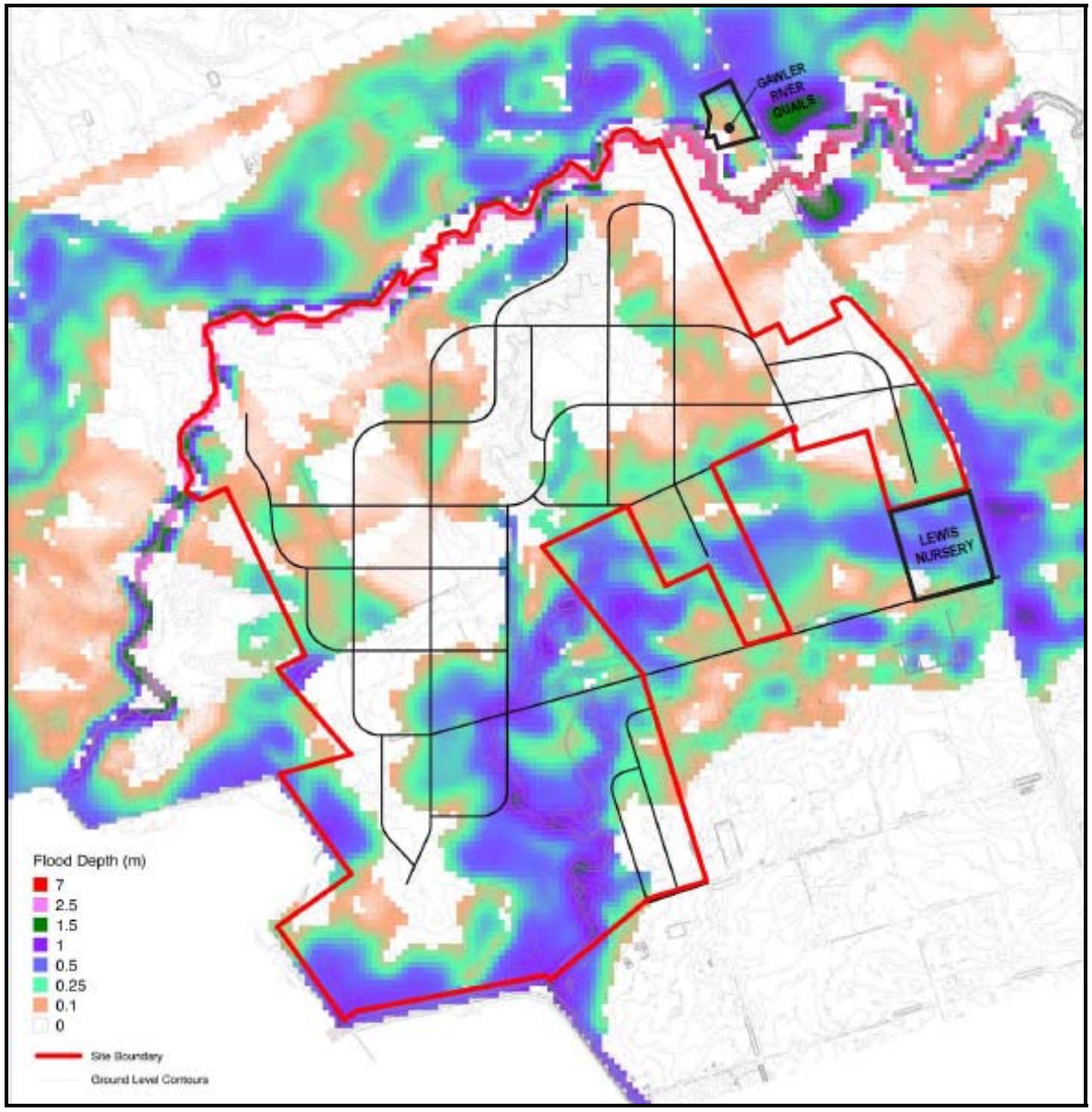


Figure 4.7: Lewis Nursery and Gawler River Quails Pre-Development
Source: Australian Water Environments

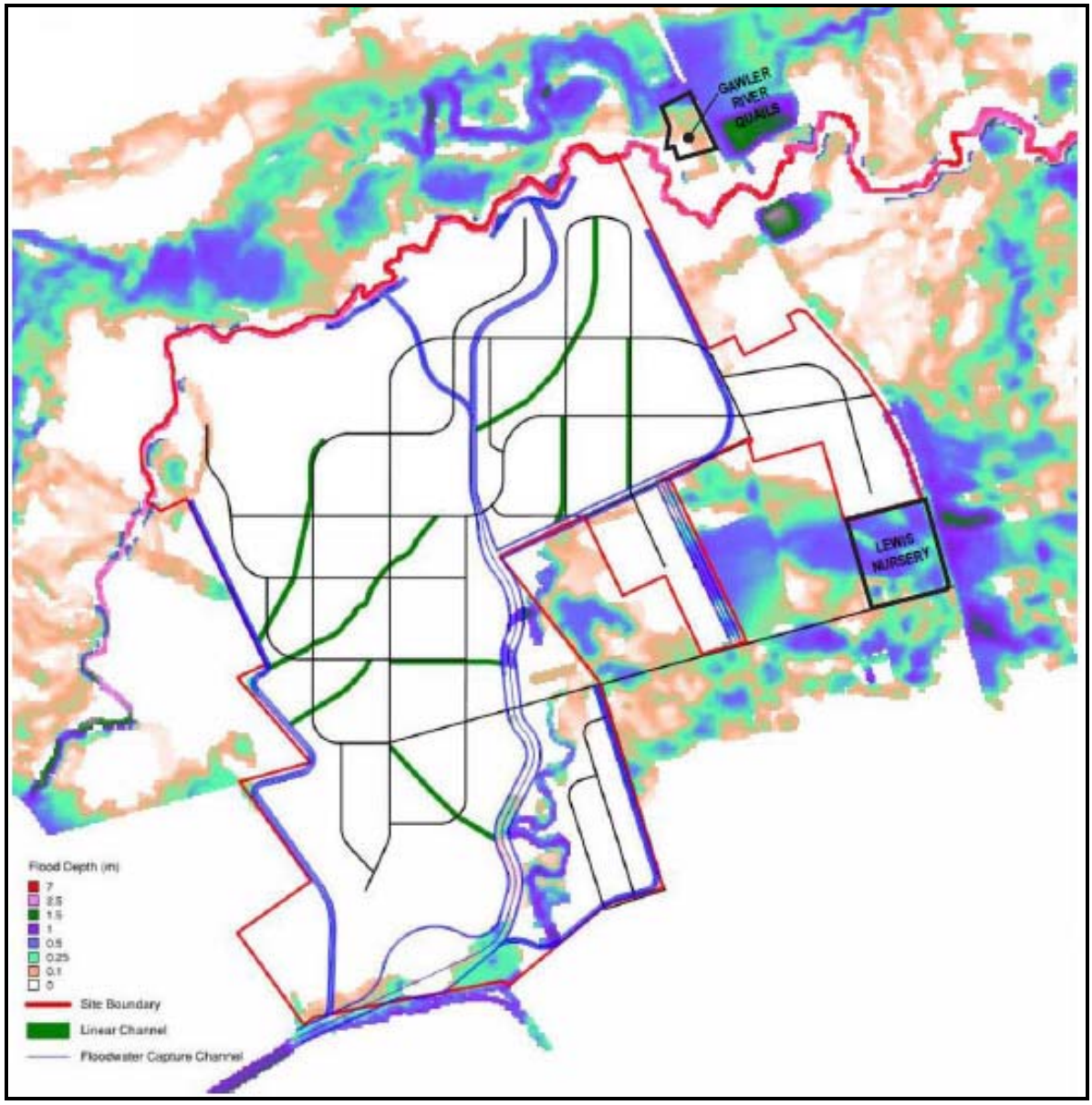


Figure 4.8: Lewis Nursery and Gawler River Quails Post-Development

Source: Australian Water Environments adapted by Wallbridge and Gilbert

Water Borne Disease

Containing flood and storm water to channels will inhibit the potential for water borne diseases and infection affecting the proposal's residents. Residential neighbourhoods and other built areas will remain dry, protected from storm and flood water by the channels. Flood water will not enter homes or gardens.

Residents will rely on piped potable water, which will be carried out within their homes. Potable water will come safely from Little Para Reservoir via pipes, regardless of flooding in or near the site.

Section 4.6 of this report discusses the reliability of electricity supply to the proposed vacuum sewer system during flood events.

Mosquitoes

The channels are designed to convey water using gravity and the site's natural slope, they are not water features. It is therefore unlikely water will sit in them long enough for mosquitoes to breed.

The channels will be regularly flushed with storm water runoff which will reduce the incidence of standing water.

Appropriately designed waterways that minimize the opportunities for pooling of water after storm events are also typically part of any WSUD consideration, which will be applied during detailed design of each of the proposal's stages.

Ongoing Monitoring

The EPA recommends monitoring and reporting of stormwater quality to ensure relevant water quality criteria in the Environment Protection *Water Quality Policy 2003* (WQEPP) are met prior to:

- Discharge to the Gulf St Vincent via the Thompson Outfall Channel.
- Storage in the aquifer.

Should the proposal be approved, EPA recommends the inclusion of conditions requiring regular and event-based monitoring of any water discharges to any ASR scheme and the Thompson Outfall Channel.

Management Plans will be prepared for the maintenance and of channels, wetlands and detention basins and detailed WSUD facilities to ensure they are capable of improving water quality. This will be during detailed design and approval of each of the proposal's stages.

Arrangements for storm and flood water management infrastructure will be made with Playford City Council through the governance arrangements described in Section 4.4.

Natural Watercourses

The Gawler River is a perched river system, it is higher than the site and adjoining flood plain. Therefore the site's storm water does not enter the river, and flood water from the river flows away from the river.

The proposed storm and flood water management strategy aims to mimic the site's natural hydrology. Flood waters will be managed only after they have left the river and entered the site. Stormwater which falls on the site will be managed on the site.

The strategy aims to allow water to flow in the Gawler River to the Buckland Park Lake system downstream as it does now.

The site's hydrogeology and hydrogeology direct water away from the Gawler River to the south west. The Gawler River is a perched river system, therefore stormwater runoff from the site does not drain to the river, or the Buckland Park Lake system, as they are effectively located upstream.

Stormwater runoff drains to the Thompson Outfall Channel in the site's south west corner. As the storm and flood water management strategy seeks to mimic the site's existing hydrology, this situation will continue, and urban runoff will not be directed to the Gawler River or Buckland Park Lake System.

In the site's north and north west corner the river's flood plain has been incorporated into the Masterplan's open space and its vegetation will be rehabilitated.

Thompson Creek is separate from the proposed storm and flood water management strategy, which comprises new a system of new channels. The creek's capacity will therefore not impact on the management of storm or flood water.

Thompson Creek has been identified as having significant flora. The storm and flood water management strategy was therefore amended during its preparation to avoid its eastern reach.

The eastern reach will be rehabilitated and revegetated and included in the Masterplan's open space areas. Best riparian management practices will be applied.

It can be seen from Figures 4.4 and 4.5, the Gawler River and Thompson Creek areas will still receive flood waters post development.

Any work undertaken in the Gawler River or Thompson Creek's eastern reach will be for rehabilitation purposes only. Therefore it would:

- Maintain a stable grade of the stream bed.
- Stabilise the watercourse and/or return it to a more natural ecosystem.
- Consider the need for floodplain areas.
- Not be for aesthetic purposes.
- Not increase erosion up or down stream.

- Not increase flooding up or downstream.
- Not increase water tables or salinity.
- Cause detrimental impacts on water dependant ecosystems, eg habitat destruction, alteration of flows or structures affecting migration.
- Cause alteration to natural flow regimes.
- Cause loss of upstream or downstream connectivity of ecosystems.

Adelaide and Mount Lofty Ranges Natural Resource Management Plan

Appendix B: Water Allocation and Management: Guidelines Surface and watercourse waters

- *Minimise changes to the natural variability of stream flow.*

  No changes are proposed to the natural variability of the stream flow in the Gawler River. Thompson Creek is already highly modified from its natural condition, by decades of horticultural activity accompanied by drainage modifications, and the construction of Cheetham salt pans in the 1970's which cut of its connection to the Gulf St Vincent and removed its estuarine section. It is therefore anticipated the proposal will not impact on natural flows in the creek, as these do not exist.

Appendix D: Principles for Riparian and Floodplain Management Guidelines:

- *Protection of refuge areas and maintenance of water connections along watercourses must be given priority due to the highly variable flow patterns.*
- *Riparian zone management planning should be undertaken in the context of catchment planning so as to address catchment side issues that impact on riparian zones.*
- *All riparian and floodplain management must recognise that biophysical processes are maintained by connections of different riparian habitats along watercourses and between watercourses and their floodplains.*

  No natural watercourse connections are affected by the proposal. Gawler River's and Thompson Creek's eastern reach's riparian corridors will be rehabilitated in accordance with Vegetation Management Plans.

Appendix E: Principles for Wetland Management: Guidelines

- *Artificial wetlands should be pursued to improve water quality provided this does not adversely affect ecologically sustainable management of natural ecosystems.*

Two wetlands are proposed, which will not be connected to any natural water systems.

Safety and water quality in artificial water features

The Department of Health has offered to provide further input on the water quality required in any permanent water features on the site, for example the two wetlands, the capture basin or any landscape features. They will address safety and water quality.

This offer will be taken up during the detailed design of these items.

Water Sensitive Urban Design (WSUD)

The Adelaide and Mt Lofty Ranges Natural Resources Board noted the proposal will be an exciting opportunity to try out WSUD principles.

The Board is very supportive of the inclusion of WSUD principles in the Masterplan as an approach for stormwater management.

The storm and flood water management strategy sets the framework for inclusion of WSUD principles in detailed design. Detailed design of landscaped areas, both public and private and storm water management systems and civil works will incorporate WSUD principles.

Consistent with WSUD principles which seek to reduce water demand, the integrated approach adopted by Wallbridge and Gilbert aims to reduce of potable water use by:

- Capturing up to 80% of storm water for treatment and reuse, and to reduce the volume of discharge into the Gulf St Vincent.
- Recycling of effluent and return of that recycled water for non-potable applications.
- Treating storm water by use of wetlands, swales and the like prior to its discharge into the aquifer or Gulf St Vincent.
- Detaining storm water to reduce the rate of discharge to meet the requirements of the Playford (City) Development Plan.

As recommended by the Adelaide and Mt Lofty Ranges Natural Resources Board, WSUD principles from the available WSD BDP module can be incorporated into new zones as part of any Development Plan Amendment prepared subject to the governor's approval of the project.

Wallbridge and Gilbert prepared a conceptual MUSIC model to demonstrate the required water quality outcomes can be achieved within the proposal and on the site, within its physical and environmental context.

The modelling was undertaken based on the WSUD framework incorporated into the Masterplan's design, and included some assumptions about the ultimate detailed design.

Detailed physical investigations will be undertaken to inform further modelling and assessment storm water treatment nodes during each of the proposal's stages. Civil designs will be prepared and approved prior to any construction commencing.

This will be undertaken with the involvement of the EPA and Playford City Council in accordance with the governance arrangements described in Section 4.4. Designs will be subject to Playford City Council's approval.

These will be informed by the framework for stormwater management provided and included in the proposal.

Groundwater

Ground water height

Depth to groundwater across the site varies from around 8 – 10 metres in the north-east of the site to less than 2 m in the south-west.

Problems associated with waterlogging and salinity are most likely to occur in areas where the depth to groundwater is less than 2 m below ground level.

Accordingly, most of the area with the highest ground water, in the site's south, south west and along Thompson Creek's corridor has been incorporated into the Masterplan's open space.

Groundwater flow is predominantly from the north-east to the south-west.

Ground water changes

During the EIS's preparation Sinclair Knight Merz prepared a groundwater flow model encompassing the site and surrounds to investigate the effects of the modification of the water balance as a consequence of the proposal.

They considered future ground levels if the current situation continues, and the proposal does not proceed. They found there is little discernable change between current ground water levels and future ground water levels, apart from groundwater level rises along the coast related to sea level rise. Without the proposal their model predicts no change in groundwater levels at the site.

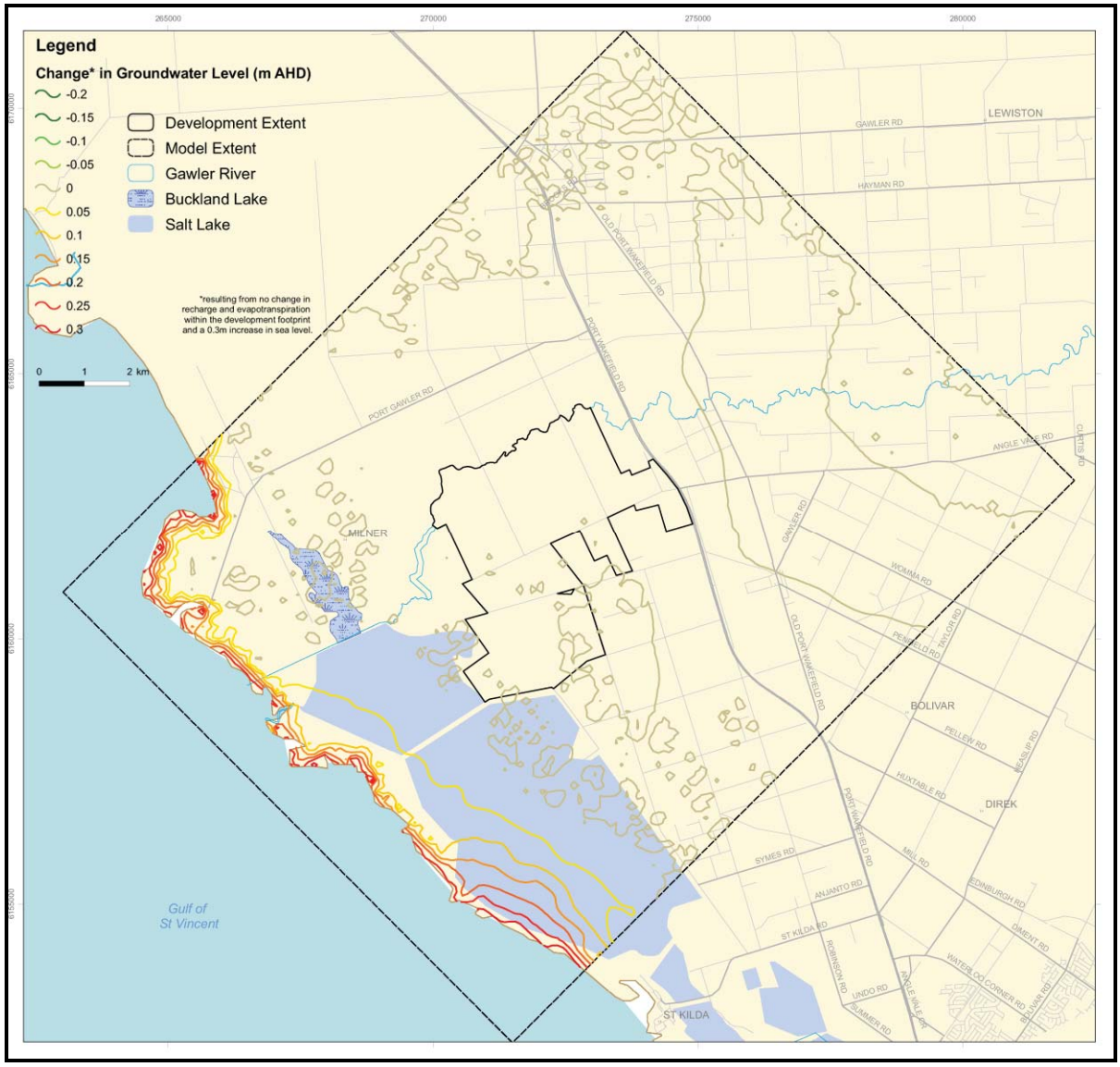


Figure 4.9: Ground Water Changes without the proposal
Source: Sinclair Knight Merz (2009a)

Sinclair Knight Merz assumed paving much of the site's surface will result in a net reduction in total recharge and evapotranspiration to the site.

This is predicted to cause a minor fall in groundwater levels beneath the site, with the largest falls located adjacent to the Gawler River, as shown in Figure 4.10.

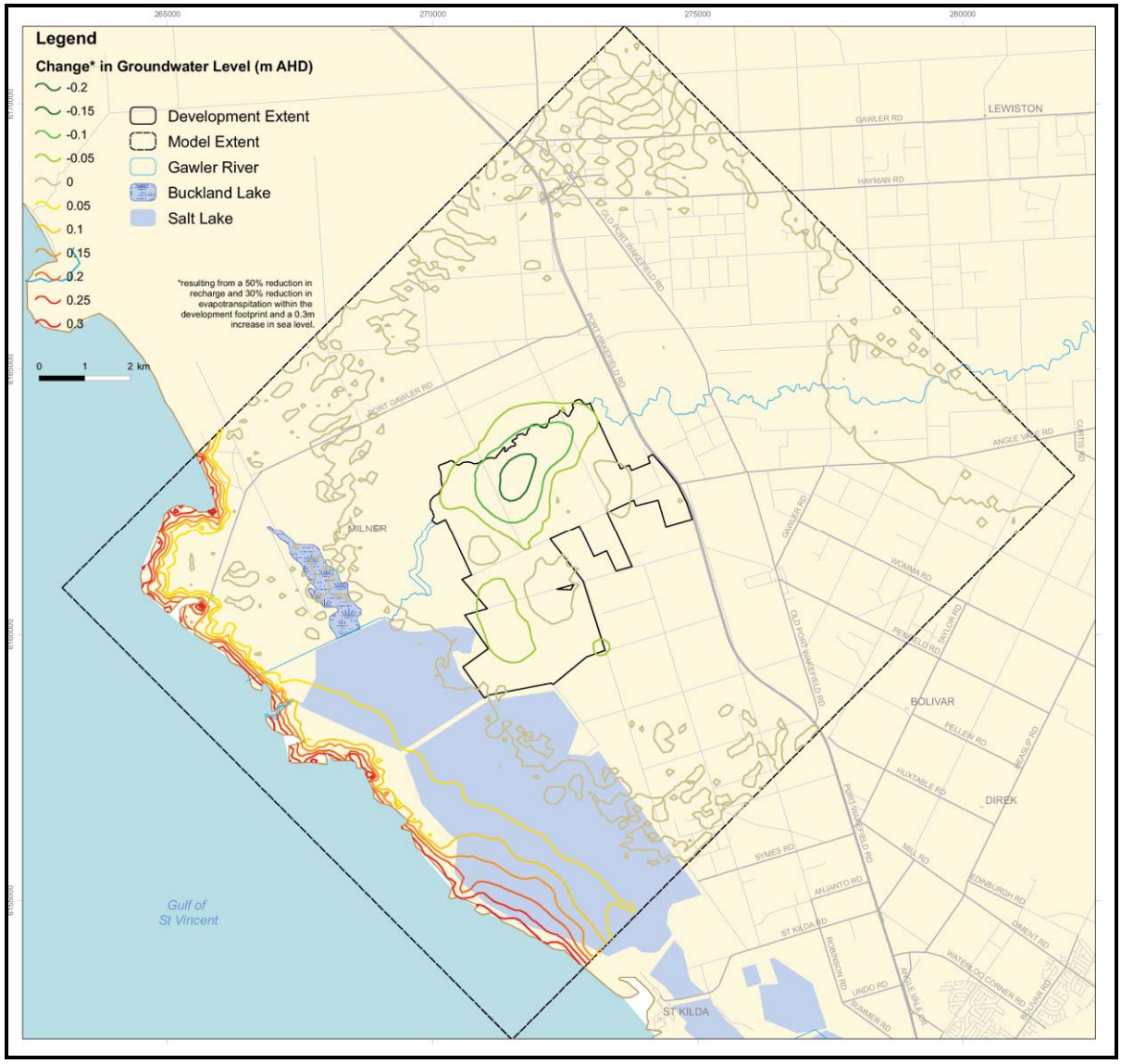


Figure 4.10: Ground Water Changes With the Proposal
Source: Sinclair Knight Merz (2009a)

Ground water and the detention basin

Ground water levels beneath the site are predicted to fall as a result of the proposal, however, localised changes may occur around the detention basin, and the capture basin it will contain.

Sinclair Knight Merz's analytical modelling for stormwater retention indicates, for a lined detention basin holding water above the watertable with a maximum water retention of 72 hours, at the margin a rise of 0.12m is predicted.

This groundwater level rise attenuates with distance resulting in a 0.08m rise 200m from the basin's margin, with the limit of groundwater level rise indicated at 500m radius from the margin.

Although the location of the basin is in the site's south where groundwater levels are shallow, a rise of 0.12m is not considered significant.

It is probable the capture basin within the detention basin in the site's south will be lined. All linings, however, leak to some degree. The location of the detention basin in respect of the watertable will determine whether the detention basin receives groundwater or, conversely, leaks stormwater to the groundwater system.

The watertable is currently approximately 2m below the ground where the detention basin is conceptually located in the site's south. Excavation for the basin may result in the highly saline groundwater being intercepted.

This will eventually leak into the basin resulting in mixing of low salinity stormwater with high salinity groundwater. Over time this will result in the stratification of water within the basin with more dense saline water lying in the bottom of the basin with less dense, low salinity stormwater forming a layer on top.

A detention basin that has been raised above the surface level with fill will still leak to some degree contributing to elevated groundwater levels beneath it.

Analytical modelling shows that a lined detention basin with a maximum detention time of 72 hours and a leakage rate of 0.5 mm/day will contribute to a rise of 0.12 m at the margin of the basin with raised groundwater levels attenuating with distance with no change in groundwater level predicted at 500m from the margin.

Any leakage from the detention basin will be low salinity stormwater and will therefore dilute the local groundwater in the area surrounding the basin. The relatively small rise in groundwater levels is not predicted to significantly increase the risk of dryland salinity surrounding the basin.

The same elevated watertables also prevent the acidification of PASS by preventing these soils from oxidising.

The most cost-effective ground water management solution is to leave the soil and groundwater undisturbed. If detention basins are constructed their design and construction should be carefully managed to achieve this aim.

Further geotechnical and groundwater investigations will be undertaken to establish the criteria against which detention basins will be designed.

The investigations to date have identified site conditions, which will more properly be managed during the detailed design phase.

The CEMMP and civil design can address those issues.

The minor predicted groundwater falls will also mitigate any potential localised ground water impacts.

Nutrients

SKM found "*The observations of the most recent groundwater monitoring event are that the site is not considered to be a source of any significant nutrient impacts to the underlying groundwater and what impacts have been identified are either the result of off-site influences or regional groundwater quality.*

Given the concentrations observed at the hydraulically down gradient site boundaries, the proximity of the site to the receiving marine environment and the previously observed low groundwater velocity it is considered that these observed impacts will most likely attenuate beyond the boundary of the site and therefore not pose a significant risk to the receiving marine environment nor compromise the environment improvement, nutrient reduction, works undertaken by SA Water. Accordingly no remedial intervention is warranted." (SKM 2009)

The site is not considered a source of nutrients in the groundwater. It is therefore anticipated any monitoring of ground water nutrients would be undertaken by the SA EPA as part of a regional approach to water quality management.

Disposal of groundwater from the site is not proposed. Notwithstanding this, the observations made in terms of the concentrations at the hydraulically down gradient site boundaries, the proximity of the site to the receiving marine environment and the previously observed low groundwater velocity, the migration of any nutrients in groundwater from the site and the corresponding risk of impact to the receiving marine environment is considered to be low.

A full investigation was undertaken by Sinclair Knight Merz (2009) on this issue. It was attached to the EIS at Appendix 19.

Localised ground water management schemes

Sinclair Knight Merz predict the proposal will result in existing ground water levels being lowered beneath the site. This will mitigate potential localised groundwater impacts on construction activities and permanent infrastructure.

Prior to construction of each of the proposal's stages, ground water conditions will be established by detailed hydrogeological and geotechnical investigations, specifically focused on the stage being designed.

Hydrogeological investigations will inform engineering designs for permanent infrastructure and buildings, and construction activities. Permanent and temporary ground water management facilities will be designed if required.

Permanent infrastructure designs will need to address hydrogeological conditions. Examples of permanent infrastructure are:

- Storm and flood water management channels and pipes.
- Two wetlands for treating stormwater prior to its storage in the aquifer.

- A 250,000 m^3 stormwater detention basin, with its capture basin capacity located the site's south.
- Pipes and facilities to supply potable and recycled water, and carry sewage.

The design of these facilities will aim to minimise potential groundwater seepage into channels, basins, tainting captured stormwater reducing its potential for reuse.

The design of these facilities will aim to minimise sewage, stormwater, or potable and recycled water does not leak into the groundwater, creating ground water mounds and increasing flows of nutrient enriched groundwater into natural water bodies.

Temporary infrastructure required to facilitate construction will need to address hydrogeological conditions. For example, ground water extraction may be required as part of earthworks such as deep trenching. The extracted groundwater would be retained in ponds. It is likely to be of high salinity, and therefore unsuitable discharge to either the Gawler River or the coast under the *Natural Resources Management Act 2004*.

Civil designs and CEMMPs will be assessed by government prior to permission being given for construction to commence.

A key component of the assessment will be monitoring and maintenance regimes applying to any permanent ground water management facilities, and responsibilities for that maintenance. Installation of permanent facilities will be undertaken by the developer. Designs, specifications and monitoring will be a matter addressed by the governance arrangements described at Section 4.4.

The installation, monitoring and maintenance of temporary facilities required to allow construction will be the responsibility of the developer.

SKM identified viable permanent and temporary ground water management facilities, which can be installed as part of buildings and infrastructure, or during construction. SKM considered existing ground water conditions on the site and its environs, potential impacts on the proposal, and potential impacts on groundwater.

Potential management measures include:

- *Locating temporary and permanent ground water retention ponds, stormwater retention ponds, wetlands and water features to reduce potential impacts on, or from, groundwater, riverine and coastal environments.*

  The two proposed stormwater treatment wetlands are to be located in the site's northern and central areas, where ground water is lower, reducing the potential for impacts.

The channels are relatively flat, particularly the main capture channel which is as flat as 0.05% in some parts. The channels have been kept relatively shallow, up to a maximum of 2.0 metres, to keep invert as high as possible and to minimise the risk of ground water intrusion (Wallbridge and Gilbert).

- *Lining temporary and permanent ground water retention ponds, stormwater retention ponds, wetlands and water features.*

  The stormwater capture basin in the site's south will be probably be lined, this will be determined during the preparation of detailed civil engineering designs.

- *Where ground water mounding occurs under permanent or temporary ground or stormwater retention ponds, small scale salt groundwater lowering schemes can be used to mitigate mounding. These schemes could involve using spear points to collect water and distributes the collected high salinity water to a disposal basin. They may not be needed if deep rooted perennial vegetation can be established in the fresh water lens under stormwater channels, mitigating the impact of lateral movement of saline groundwater.*

  Engineering designs for built elements will consider requirements for de-watering and details will be included with construction documentation.

- *Groundwater drainage is an option to protect in-ground infrastructure, for example sewer and potable water infrastructure. The installation of a drainage network through an area would prevent the watertable from rising above the level of the drains. This would require the construction of a disposal basin for drainage.*

  Designs for in ground infrastructure will be prepared in consultation with the relevant agencies, and will meet their requirements and specifications. If groundwater drainage is required, it will be included in those designs.

Sinclair Knight Merz (2009a) examined several methods for watertable management in the longer term including:

- Recharge management;
- Small scale spear point systems for local groundwater management; and,
- Deep drainage.

Overall groundwater levels are predicted to fall as a result of paving across a large area of the site. This will reduce the amount of rainfall that recharges the aquifer. Recharge management can be used to control groundwater levels to prevent the watertable from rising above current levels. Long-term groundwater monitoring and the use of highly efficient watering technologies and plants will control the amount of recharge that passes through to the watertable.

Where water features are constructed some leakage may occur from the surface water to the groundwater through the base of the water feature. This may cause the development of a local groundwater mound.

The groundwater mound will be relatively small in radius and will not cause significant regional impacts. If recharge management does not successfully control the mound development it may be necessary to install a local-scale de-watering scheme.

The location of any water features will be chosen considering ground water conditions.

A small scale spear point system may be suitable for managing the effects of a local watertable rise such as may be experienced surrounding channels or detention basins. Shallow, narrow gauge bores are drilled surrounding the feature that is leaking surface water to the watertable and these spear points are pumped at a low rate thereby preventing a rising watertable.

This technique is also the likely method to be adopted during the construction phase of the project to allow excavations in areas of shallow groundwater. The water collected is pumped to the ocean or to a disposal site for evaporation.

The construction of deep drains, either open or buried pipe drains, represents one means of maintaining water levels at the level of the drains. The drains intercept the groundwater and water levels are maintained at the level of the drain via pumping from a sump. The water collected is pumped to the ocean or to a disposal site for evaporation.

If possible the water produced from either deep drainage or a groundwater interception scheme should be disposed of to the ocean. However, in some areas of the site groundwater is highly saline and may be deemed by the Environmental Protection Authority or the Department of Water, Land and Biodiversity Conservation s too saline for disposal to the sea. In this case the salt must be disposed of via evaporative concentration.

Uniquely, the site is situated adjacent to the Cheeltham Salt evaporation ponds. There is an opportunity to utilise the already existing evaporation ponds for the disposal of groundwater. If water volumes or chemistry prove unsuitable, then another evaporative disposal basin will need to be found away from the site. As similar groundwater conditions exist throughout the region it is unlikely that a suitable site for a disposal basin exists within close proximity to the development site.

One possible solution to this matter involves reinjection of the saline water back into the source aquifer.

Regardless of the method of groundwater disposal if required, approval will be required from the Environment Protection Authority and the Department of Water Land and Biodiversity Conservation discharge water as a water affecting activity under the *Environmental Protection Act 1993* and the *Natural Resource Management Act 2004*.

This will require a separate formal application and permit and is the preparation of an Construction Management Plan.

Detailed hydrogeological and geotechnical investigations will be undertaken for each of the proposal's stages. Requirements for ground water disposal if any will be identified and appropriately addressed in that stage's Construction Management Plan.

However, it is considered unlikely an active groundwater disposal scheme will be required, but if it was a separate application, with an environmental management plan would be made.

Urban salinity

SKM concluded potential urban salinity is not an impact which precludes any part of the proposal proceeding, subject to the implementation of appropriate urban salinity management measures.

These measures can be efficiently implemented in the proposal, which will planned and designed fully informed of geotechnical and hydrogeological conditions, unlike existing urban areas where solutions must be retro fitted.

Properly designed and constructed buildings and infrastructure are unlikely to require post construction remediation.

SKM have recommended practical measures which can be implemented in engineering designs.

Fundamentally, the approach is to minimise groundwater recharge. This can be achieved in the following ways.

- *Applying Water Sensitive Urban Design principles to landscape design.*

  For example, choose plants which are Australian native, indigenous, drought tolerant, or with greater root depth.

  Irrigation systems in public areas should be on timers, so the volume of water dispensed is matched to plant requirements. Timers should have manual overrides to ensure watering doesn't occur after rain for example. Soil moisture monitoring should be part of any automated system.

  These measures can be achieved in the public and private domain through the application of finalised Design Guidelines. The design and specification of irrigation systems in the public domain will be approved by Playford City Council.

  WSUD principles have been incorporated into the Masterplan's stormwater management strategy described in the EIS and Wallbridge and Gilbert's technical report.

  The strategy provides the framework for the progressive implementation of WSUD principles into the detailed design of each of the proposal's stages.

  The reticulation of recycled water will allow residents to water private gardens, however, with the implementation of guidelines which require drought tolerant, native and indigenous plantings, it is anticipated requirements for garden watering will be less than in Adelaide's existing urban areas.

- *Treating household effluent in an off site treatment plant.*

  The proposal includes the treatment of household effluent off site, at the Bolivar Waste Water Treatment Plant.

- *Preventing stormwater pooling.*

  The Masterplan's stormwater management strategy aims to collect and channel stormwater through a series of concrete pipes, and open stormwater channels to an appropriately designed basin in the south western corner of the site. This will minimise pooling of stormwater in the site.

  The channels are designed to convey water using gravity and the site's natural slope, they are not water features.

  The channels will be regularly flushed with storm water runoff which will reduce the incidence of standing water.

  Appropriately designed waterways that minimize the opportunities for pooling of water after storm events are also typically part of any WSUD considerations, which will be applied during detailed design of each of the proposal's stages.

Perched ground water may lead to salinity issues. It has been identified as an issue in elsewhere in the region, and could be an issue on the site.

The creation of perched ground water can be prevented by installing subsurface drainage where required. Drainage water intercepted will be of significantly lower salinity than the local groundwater and as such disposal is likely to be permitted into drainage networks such as Thompson Creek or the Gawler River.

A water disposal basin for shallow subsurface drainage water will not be required.

Where detailed hydrogeological investigations identify the creation of perched groundwater may be an issue, detailed engineering designs will incorporate subsurface drainage.

Shallow ground water may lead to salinity issues. Shallow ground water can be managed by using fill to raise ground level above the ground water. Requirements for fill will be indentified in detailed hydrological investigations in that area, which will be used to inform the design of earthworks.

This approach may be required in the site's south and south west, however, a significant portion of the potentially impacted part of the site has been incorporated into the Masterplan's open space areas.

Buildings and infrastructure can be constructed of salt resistant materials, such as marine grade concrete and damp proof coursing. Golders and Associates (Golders) concluded saline water (greater than 5,000 mg/L) within 4 m of the surface should be considered in the design and specification of asphaltic concrete pavements and in-ground structures with regard to the grade of concrete and reinforcement specifications.

Adjoining properties

Jefferies, Lewis Nurseries and SA Potatoes expressed concerns regarding rising groundwater levels.

Sinclair Knight Merz's modelling indicates that overall, the proposal will actually produce a net fall in groundwater levels.

However, a detention basin, including a smaller capture basin is proposed in the site's south, near the Jefferies' site.

The analytical modelling for stormwater retention indicates, for a lined detention basin holding water above the watertable with a maximum water retention of 72 hours, at the margin a rise of 0.12m is predicted.

This groundwater level rise attenuates with distance resulting in a 0.08m rise 200m from the basin's margin, with the limit of groundwater level rise indicated at 500m radius from the margin.

Although the location of the basin is in the site's south where groundwater levels are shallow, a rise of 0.12m is not considered significant.

Jefferies' boundary is approximately 200metres from the basin margin. The rise in groundwater level at their boundary is therefore in the order of 0.08m.

The watertable in this area is in the order of 1m to 1.5m below ground level.

A rise of this magnitude will not significantly impact the adjacent low lying areas of Jefferies' site.

The depth to water on Jefferies' site increases with distance from the basin to 2.5m to 3m and the small changes in groundwater level predicted at this distance would have little impact and would be transient, rising and falling as water was temporarily stored in the detention basin.

The detention basin is yet to be designed in detail. As part of that design work, its location will be finalised, and potential impacts on the Jefferies' site will be avoided.

It is important to note, Sinclair Knight Merz considered the potential impacts on the Jefferies' site assuming current ground water heights. The potential impacts described above are therefore a worst case scenario.

Overall the proposal is predicted to lower ground water beneath the site, thereby reducing the diameter of the detention and capture basin's influence on ground water.

Recharge assumptions

Sinclair Knight Merz noted recharge beneath the site will be reduced due to the presence of paved areas (2009).

The effect of paving on the net recharge to the groundwater system is a function of many variables including rainfall, depth to water table, evaporation from paved surfaces, evapotranspiration from unpaved areas, and runoff.

There is limited information available for most of these factors, so it is necessary to make assumptions regarding the amount of recharge reduction.

Sinclair Knight Merz assumed recharge under paved areas is negligible, and recharge is proportional to the area not paved or built on.

They reviewed the Masterplan, and estimated approximately 50% of the site's surface will ultimately be paved.

This is assumed to have the effect of reducing recharge beneath the site by 50%.

Similarly, paved areas will result in the loss of areas of evapotranspiration.

The site is currently covered by limited vegetation, such as grazing grasses and shrubland.

Household gardens, even highly water efficient ones, will lead to increased transpirational losses.

There will be no evapotranspiration losses from the approximately 50% of the site which will be paved.

However, in the unpaved areas, evapotranspiration is likely to increase.

An estimated reduction by 30% of the maximum evapotranspiration rate is considered reasonable.

Rural Solutions by Chris Henschke & Stuart Wright

The EPA identified rising groundwater levels within three wells located within or adjacent to the site's boundaries, and noted these trends are contrary to those identified in the Sinclair Knight Merz study.

The EPA cited *Rural Solutions* by Henschke & Wright (2007).

Henschke & Wright identify rising groundwater within wells PTG080, PTA100 and PTA108. Sinclair Knight Merz completed hydrographs for wells completed within the same aquifer.

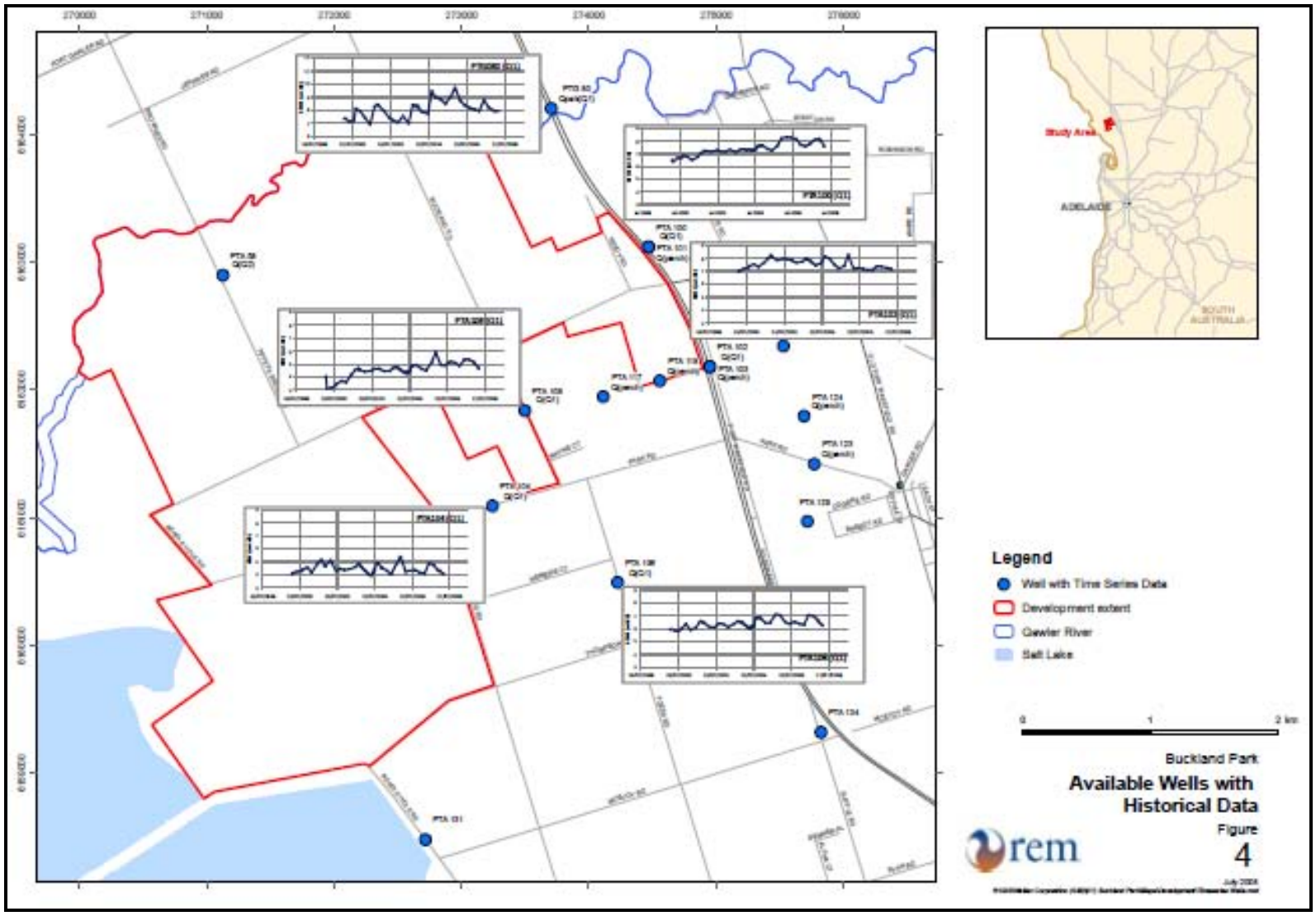


Figure 4.11: Wells used by Henschke & Wright and Sinclair Knight Merz
Source: *Sinclair Knight Merz (2009a)*

It is demonstrated groundwater levels in the wells identified by Henschke & Wright are rising, except PTG080 which has been falling since 2004.

However, it also shows that other wells within the same vicinity are not rising and display stable water levels; for example PTA102, PTA104 & PTA106.

This disparity between groundwater level responses indicates local conditions are having an effect on some wells.

Henschke & Wright note, for long term hydrographs for wells completed in the Q1 aquifer there is a generally falling trend to 2006. Rising trends are identified, but these trends are contrary to rainfall trends and:

> *"...indicate additional inputs from other sources (irrigation, stormwater, wastewater, leaky dams/ponds etc.)."*

This conclusion is in accordance with the findings of SKM. Specifically at PTG080 the response is likely to be as a result of increased winter rains in 2001 and 2004 and a major flood along the Gawler River in November 2005 resulting in increased recharge to the site and corresponding rises in groundwater levels.

PTA100 and PTA108 are associated with agricultural properties and irrigation. Henscke & Wright (2007) observe:

> *"...in some areas shallow gravel sumps are fed by PVC pipes emanating from greenhouses and this can cause local groundwater mounds to develop."*

It is probable similar activity is occurring in the vicinity of these two wells, with irrigation and greenhouses located within their vicinity identifiable from aerial photography.

Rising groundwater trends are identified as a response to local conditions or activity.

It is highly likely that the introduction of strictly managed groundwater rules will result in a reduction and probable reversal of the upward trends observed in selected bores.

Biodiversity

Sinclair Knight Merz (a) considered the potential impact of changing ground water conditions on river red gums located in the site's north. Their modelling demonstrates there will be no net rise in groundwater levels and it is likely that there will be a net fall.

The decline in groundwater levels beneath the river red gums is predicted to be a maximum of 0.2m. The depth to groundwater within this zone is between 6m to 10m.

Therefore, 0.2m is considered a modest fall and well within the natural limits of variation for the ecosystem. It is unlikely that such a drop in water level will have a significant impact on old-growth river red gums

4.2 Access During a Flood Event

All the Masterplan's principle, connecting, internal roads will be flood free to a standard of 1:100 year ARI flood event. There are 11 locations where they intersect with storm or floodwater management channels.

In these locations bridges or fords will be provided, depending on the level of flood hazard applicable to the channel. The diagram below shows the potential locations of crossings, and the level of hazard at each one.

The detailed civil engineering designs of each of the proposal's stages will be provided for assessment prior to commencement of construction, and will include designs for the 11 channel crossings.

This will allow people to travel freely across the site in any direction to reach any facility during a flood event.

A flood free to a standard of a 1:100 ARI flood event route for access from the site to Port Wakefield Road, south of the section affected by flooding has been identified.

It shows a connection out of the site to Thompson Road to the south. It will be included in the detailed design of the relevant stages.

The storm and flood water management strategy has been designed to ensure the District Centre and associated mixed use precinct will not be affected by 1:100 ARI flood event. This achieved by the inclusion of flood channels and some fill in the Masterplan's mixed use precinct adjoining Port Wakefield Road.

Therefore any emergency services located in the District Centre or mixed use precinct will not be affected by a 1:100 ARI event, and emergency response vehicles will be able to reach any part of the site via the flood free road network.

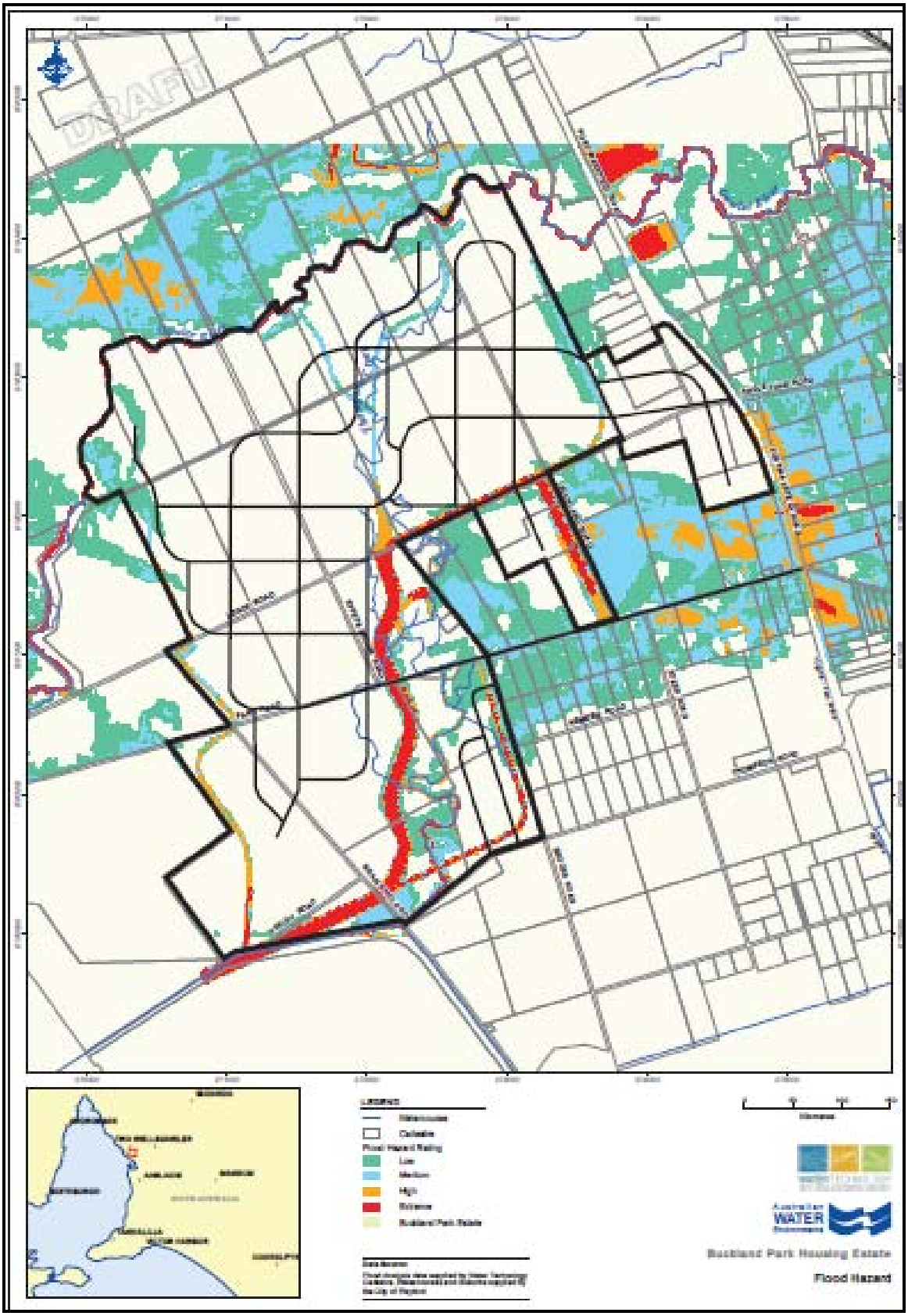


Figure 4.12: Road Layout with Channel Hazard Mapping
Source: AWE adapted by Walker Corporation

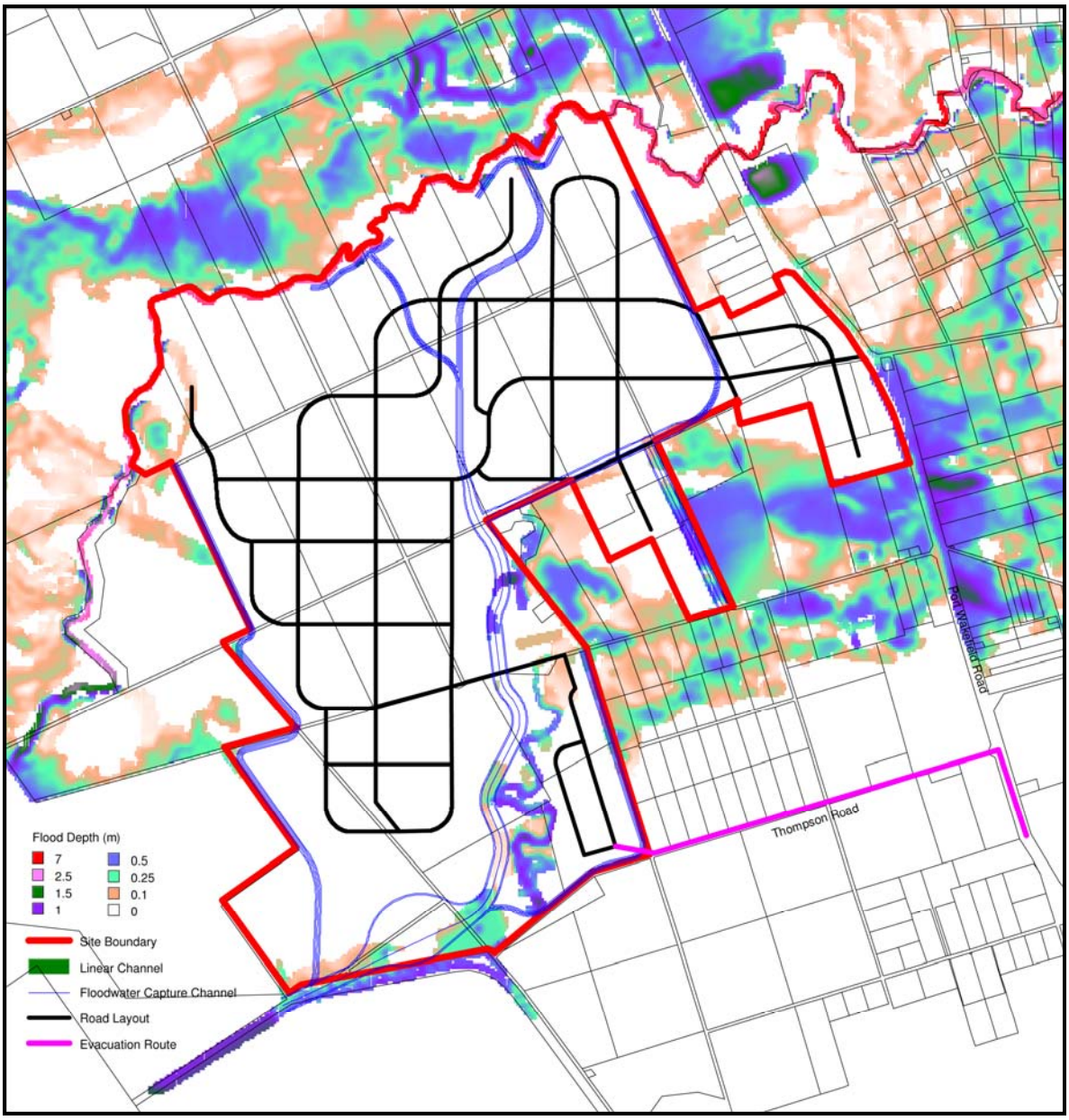


Figure 4.13: Southern Flood Free Access Route
Source: Wallbridge and Gilbert

AWE modelled the expected impacts of a 1:100 year ARI event on Port Wakefield Road. This It is at Appendix Three.

The 1:100 year ARI event was chosen as this is the worst case. During other events, such as the 1:50 and 1:20 year ARI event, the results would be lesser.

Also the peak of the 1:100 year ARI event was modelled. During the non-peak periods of the length of road with water on it, height, velocity and risk categories would be lower than described below.

Water could be expected to cover the road for nearly three days during the 1:100 year ARI flood event.

At the peak of the flood there could be a continuous length of 800 metres where water is over the road. Of this, 500 metres is predicted to be in the 100 to 250 mm depth range, with the remaining 300 metres expected to be less than 100mm. The absolute maximum depth expected over the Port Wakefield Road for the 1:100 year ARI flood event is expected to be around 250 mm.

The hazard rating is medium across the carriage way but high to extreme on either side (due to the depth of water either side of the carriageway).

Whilst the hazard rating is medium, velocities are relatively low. The largest maximum velocity across the carriage way for the duration of the flood is expected to be around 0.7 m/s with an average maximum of around 0.45 m/s.

In its submission, the State Emergency Service sought information on alternate access, *in the event of flood waters preventing Port Wakefield Road to be used.* As noted above, an alternate route to the south will be provided, well before the proposal's population reaches its ultimate 33,000 people.

AWE considered the issue of *flood waters preventing Port Wakefield to be used* during the peak of a 1:100 year event.

Again it is noted, the affects of water on Port Wakefield Road would be less during non-peak periods, and in lesser flood events.

AWE concluded emergency vehicles and four wheel drives would be able to gain safe access to and from the site during the peak of a 1:100 year ARI events to attend a birth, serious illness, accident, fire or a criminal event.

However, the carriageway must be clearly delineated and not damaged extensively from the inundation process.

Two wheel drive vehicles should also be able to travel through this flood water, provided access is managed and controlled, although flow depths are at the upper limit recommended these vehicles.

It is recommended an flood access plan be prepared in consultation with the State Emergency Service (SES), SA Police (SAPOL) the Department of Transport, Energy and Infrastructure (DTEI) and Playford City Council.

The plan will benefit:

- Existing communities in the locality which rely on Port Wakefield Road for access.
- Intra state traffic and interstate traffic on Port Wakefield Road (a National Highway) and therefore also the Adelaide economy.
- The proposal.

The plan would include the following elements:

- The road surface on the affected 800 metres of Port Wakefield Road should be reviewed to ensure it is of a standard capable of withstanding flood inundation, and any required improvements implemented.

- The road carriage along the affected 800 metres of Port Wakefield Road should be clearly delineated, for example with marked posts which inform drivers and authorities of the water height on the road, and barrier fencing higher than 250mm along the edge of the carriage way.

- A procedure for managing and controlling access along the affected 800 metres of Port Wakefield Road by non-emergency service vehicles should be prepared. This component would likely be implemented by SAPOL.

  It would be required for a maximum of only 3 days at any flood event.

  During those days it would only be required for limited periods, for example in the mornings and evenings to allow people to get to work or school.

  When management and control is not provided, and probably during the flood peak, the affected length of Port Wakefield Road would be closed to all but emergency vehicles.

There is adequate lead time for the preparation and implementation of the recommended flood access plan, as the proposal's first residents are not projected to arrive until around 2013.

However, the Gawler River Floodplain Management Authority (GRFMA) advise, *even with the Bruce Eastwick Flood Control Dam and modifications to the South Para Reservoir dam and spillway, there will still be 3,500 properties at risk of damage in a 1 in 100 flood, that includes the towns of Virginia, Angle Vale, Two Wells and Gawler.*

The government may therefore consider implementing the flood access plan sooner than 2013 to address existing issues.

The need for a flood access plan would finish at around 2024 when a flood free access route can be provided to the site's south.

The proposal's residents will not be isolated, and new properties within the site will not be subject to flooding and its associated damage, as they will be protected by the channels included as part of the storm and flood water management strategy.

It is therefore unlikely there will be risks to emergency personnel associated for example, with boat or helicopter rescue of residents at risk of being inundated.

The site will not be isolated during a flood. During the worst flood conditions, emergency vehicles will still be able to access the site, and residents will be able to leave by car with proper control and management through the affected length of Port Wakefield Road.

During the later stages of the proposal's implementation, there will be facilities and services within the site which will be accessible via a flood free road network, reducing resident's need to leave the site.

Notwithstanding this, they will be able to leave via Port Wakefield, or the southern flood free route.

4.3 Potable Water, Recycled Water and Sewer Infrastructure

Recycled Water

It is proposed to capture up to 80% of the site's stormwater for re-use. Only 20% of the site's storm water will be discharged into the Gulf St Vincent.

Some of the captured stormwater will stored in the aquifer beneath the site, however, it has limited capacity as described by REM in their report, at Appendix 10 to the EIS.

The remaining captured stormwater can be treated and stored off site and returned for use within the proposal, or be available for another.

Water management has a high level of public interest. Playford Council has invested in wetlands and water harvesting projects to ensure its water viability.

Playford Council has noted it:

> *…..will be difficult to harvest and store stormwater for use in the public realm, particularly during the summer months, given the sites' high water table and salinity.*
>
> *This does not meet Council's expectations for waterproofing urban growth, and promoting a self sufficient maintenance of extensive areas of open space.*

However, the EIS describes feasible and practical measures for capturing up to 80% of the proposal's stormwater for treatment and reuse, these were prepared and considered within the context of geotechnical, groundwater and aquifer investigations attached to the EIS at Appendices 7, 9 and 10. The methods of harvesting stormwater were described in Wallbridge and Gilbert's technical report attached to the EIS at Appendix 18.

A limited amount of treated stormwater can be stored in the aquifer beneath the site for reuse in parks and open space. More stormwater will be captured in a basin to be provided in the site's south. It will likely be lined to address high ground water in that location.

A regional view must be taken, as suggested by Council. The site will produce large volumes of stormwater, and there are many users in the region who need large volumes of water, particularly in the summer months.

Water is an important commodity in Adelaide, it is anticipated there will be many possible users, including Council, horticultural activities, or even as an environmental resource for Buckland Park Lake as suggested by the Department of Environment and Heritage and the Adelaide and Mt Lofty Ranges Natural Resources Board.

Waste water will be piped to the Bolivar WWTP for treatment, prior to being returned to the site as recycled water for non-potable use. SA Water developed feasible and practical options for the provision of mains for recycled water to the site. However, the EIS does not include details of the reticulated network, this will be designed as part of any land division's technical design.

Recycled water will therefore be available to water gardens and public open space. Combined with appropriate planting and species, this will promote self sustaining open space.

Recycled water from Bolivar will only be used for applications appropriate to its quality in accordance with statutory guidelines designed to protect public health.

An efficient approach to water sustainability is proposed. A community wide scheme, such as the one proposed which seeks to capture up to 80% of the site's stormwater for treatment and re-use in a coordinated manner, and supply each allotment with reticulated recycled water.

Individual householders may choose to install rain water tanks in their homes, however, reductions in the use of potable water do not depend on everyone choosing this option, which could have sustainability implications associated with the manufacture and maintenance of potentially 12,000 small tanks.

The timing for connection of allotments to recycled water infrastructure is dependant on the demand generated within the site, or the number of occupied dwellings. However, reticulated pipes will be provided to each new allotment from Stage 1 on in preparation for connection to the recycled main when provided.

Aquifer Storage Recharge (ASR)

It was found the aquifer beneath the site had limited capacity. It is therefore proposed to store only a maximum of 50 mega litres per annum of treated stormwater in the aquifer beneath the site.

This water will be recovered to irrigate open space.

The proposed ASR scheme will require a formal application and licence under the *Environment Protection Act 1993*.

The system will be installed and licensed by the proponent. Its ongoing operation will be discussed with Playford Council in accordance with the governance arrangements described in Section 4.4.

The ASR scheme is separate to any other ground water management.

PIA has noted, "*concerns about the sustainability of the aquifers for water storage and re-use have not been adequately addressed*". However, they did not explain what these concerns are, let alone how they were inadequately addressed. Therefore it is not possible to respond to this comment.

Needless to say, the aquifer and its existing users were investigated in REM's report at Appendix 10 to the EIS, and it was concluded the aquifer beneath the site had limited capacity, particularly if existing users were not to be affected.

The proposal includes use of the aquifer's limited capacity beneath site for storing treated stormwater for re-use irrigating open space.

It is not proposed to draw more water out of the aquifer than is put in.

Assumptions regarding water demand and waste water generation

Wallbridge and Gilbert estimated the proposal's water demand from SA Water's current figures for potable and non potable water at Mawson Lakes.

Water demand from non-residential users and schools was estimated at a rate equal to a residential home. For non-residential premises this is a conservative estimate in most cases.

SA Water estimated the water demand, and they used this information to formulate options for the potable water network. SA Water's full report is at Appendix D of Wallbridge and Gilbert's report.

Assumptions regarding wastewater generation were based on residential flow rates.

For non-residential areas and schools this is indeed, a conservative estimate.

For the purposes predicting demand when the proposal is fully implemented and occupied in 2036, it is considered the estimates provide a reasonable guide to the magnitude water required and waste water generated.

Potable Water

Chapter 7.2 of the EIS includes feasible and practical options for the provision of potable water to the proposal, both in the early phases of implementation, and when occupation is complete, projected to be in 2036. These options were prepared by SA Water.

The PIA noted, "*a significant amount of water will be required from the Murray River which contradicts the State Planning Strategy*."

Potable water will be required for Adelaide's growing population, no matter where in the metropolitan region they are housed. This issue is therefore not a consequence of this proposal.

However, measures such as the use of recycled water for non-potable applications, and the capture of stormwater for re-use are particular to this proposal, and will make a large and meaningful contribution to reductions in potable water use sought by the government and the community as a whole.

Sewer

The site's waste water will be sent to Bolivar WWTP, providing the raw material for the creation of the recycled water. Utilising an established piece of major infrastructure is an efficient use of the community's resources, and more sustainable than the creation of new facilities. The WWTP is well located, buffered from established suburbs.

The site is well located within the Bolivar WWTP's catchment to facilitate its efficient use.

The Environment Protection Authority (EPA) has noted the treatment of waste water off site alleviates potential impacts on new homes associated with noise, odour, storage and overflow issues.

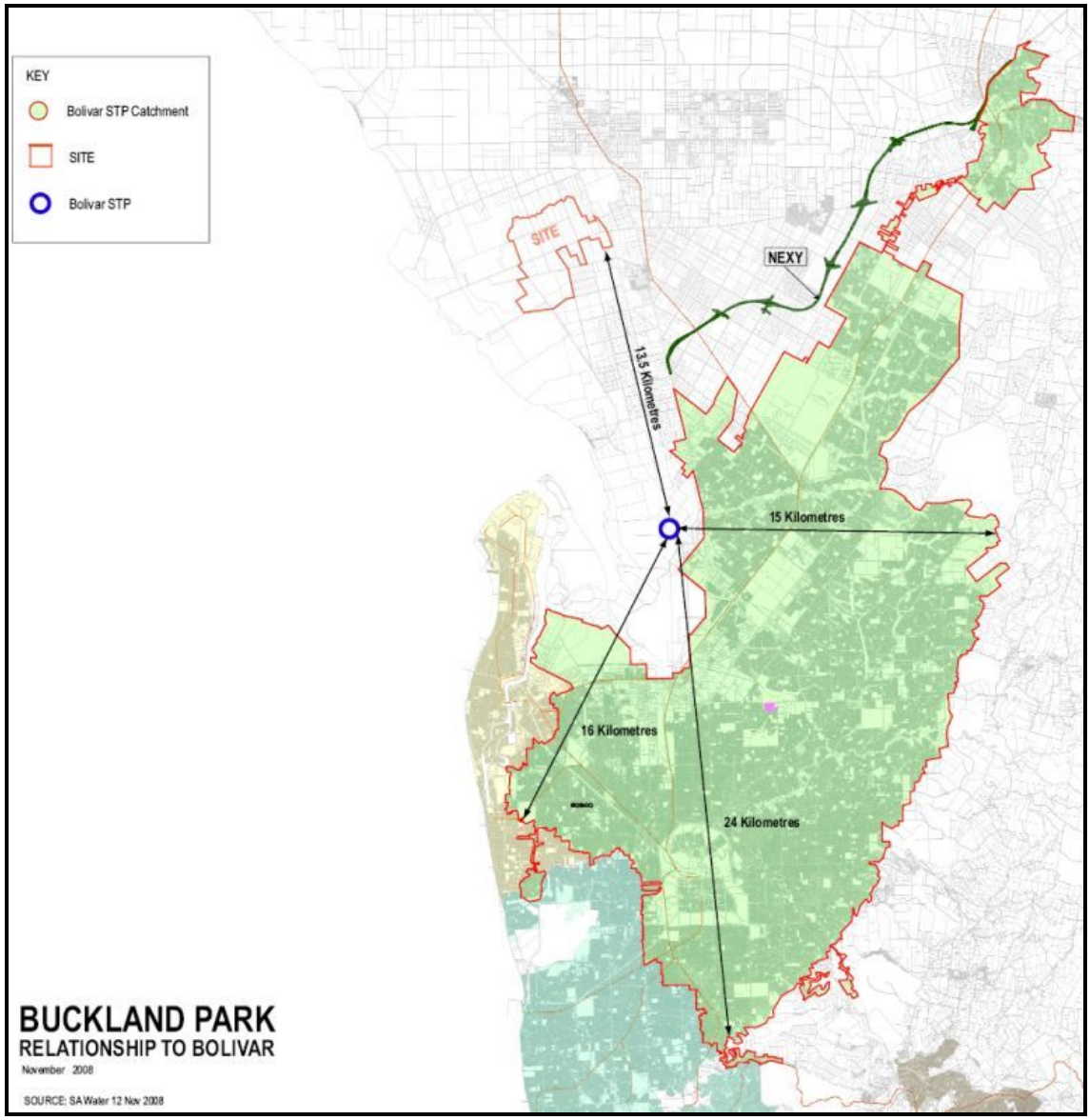


Figure 4.14: Site with Bolivar
Source: SA Water adapted by Walker Corporation

Costs and Maintenance

New infrastructure is much less likely to leak than old infrastructure in existing areas.

The recycled water system will be designed and constructed in accordance with SA Water and Water Supply Association of Australia Standards.

Potential sewer pipes breakages, leaks and spillages will be covered in an *Emergency Response* and *Contingency Plan* prepared as a part of SA Water's requirements for commissioning a Waste Management System for the operation and maintenance of their systems.

This report will also outline the required contingencies in the case of pump malfunction and emergency storage times within the system.

The cost of installing and maintaining new potable water, recycled water and sewer infrastructure is a matter to be considered by SA Water. SA Water will be responsible for maintaining potable water infrastructure.

Playford Council does not have any role in maintaining potable water, recycled water or sewer infrastructure, so therefore there will be no cost burden for Council associated with the installation, monitoring or maintenance of this infrastructure.

Acid Sulphate Soils

If identified as required, the CEMMP for each of the proposal's future stages will include an Acid Sulphate Soil management plan.

It will be informed by detailed geotechnical investigations of each stage, and will include procedures for monitoring and responses during construction, as well as facilities required during construction for management. It will be implemented during construction. Please also see section 4.19.

Current Availability of Water

The Natural Resources Board has advised the Northern Adelaide Plains Prescribed Wells Area is currently over allocated.

They advise the site enjoys water licenses totaling 200ML, which if returned to the government would assist in addressing the issue of over allocation. Subject to the governor approving the proposal, the timing and funding of the licenses' return could be negotiated with government to assist.

Wallbridge and Gilbert's integrated water balancing scheme does not rely on access to this water. However, it may be useful within the proposal's early stages, for watering the public domain, prior to the arrival of recycled water to the site.

The site does not enjoy licences for Bolivar recycled water, even though the Western Reticulation Service Virginia (WRSV) pipeline passes through the site.

It is understood water from the WSRV is fully allocated, particularly in the summer months, to horticultural users beyond the site's boundaries.

SA Water notes the WRSV pipelines pass through the site along public roads which the EIS identifies for future closure as part of the proposal.

Tippets Bridge Road is currently an unmade road, incorporated into a private grazing paddock.

The proposal Masterplan plan shows the Tippets Bridge Road reservation as a linear open space corridor. The WSRV pipeline would not have to be relocated to accommodate this use, and indeed, it may be unnecessary to close Tippets Bridge Road.

Park Road is an unmade road, but is an "open" trafficable road.

The proposal Masterplan plan shows the Park Road reservation as an important part of the proposed road hierarchy. It is therefore anticipated the WSRV will be able to remain in that alignment.

However, required road closures will be detailed at each of the proposal's future stages, and the requirements of the *Roads (Opening and Closing) Act* will be followed, including notifying SA Water.

SA Water have advised they will take ownership of WSRV infrastructure in 2018. SA Water will therefore be the responsible agency, not a private entity, at the time this matter requires resolution.

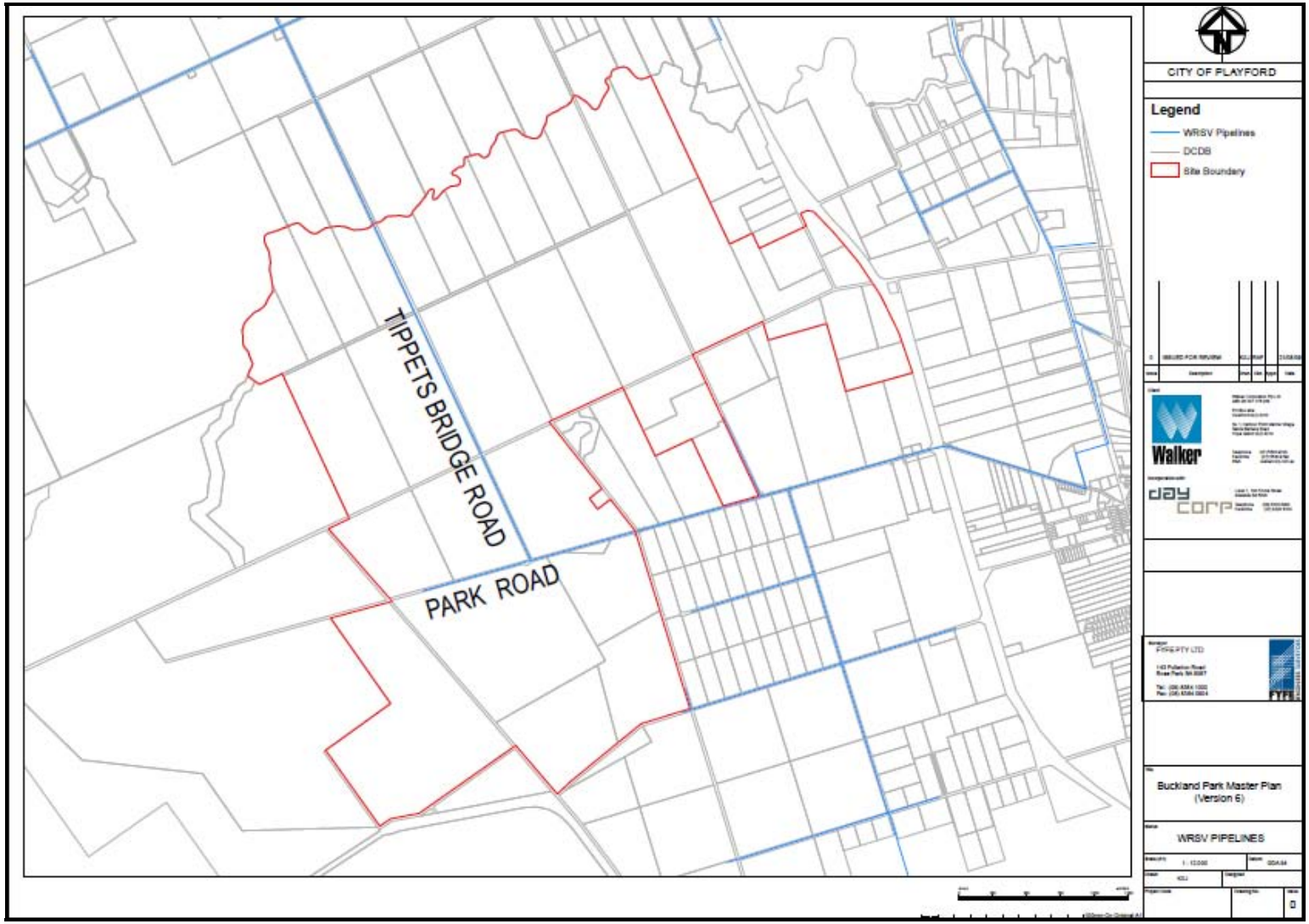


Figure 4.15: WSRV, Public Roads and the Site
Source: Walker Corporation

The Adelaide and Mt Lofty Ranges Regional NRM Plan

The Plan includes the following targets:

- *75% of stormwater used.*

  The 80% target for storm water reuse by 2036 matches the NRM's target for the same time.

- *100% of wastewater reused*

  It is proposed to send waste water to Bolivar WWTP for treatment to a quality suitable to return to the site for non-potable applications.

- *Reduce annual average cost of flood damage*

  The proposed flood water management strategy will protect new buildings and structures from damage.

- *Sustainable development of groundwater resources*

  It is proposed to store some of the site's own stormwater in the aquifer for reuse. It is not proposed to draw on existing ground water resources

- *Maintain productive capacity of agriculture at current levels.*

  PIRSA have concluded the proposal will not have a significant impact on agricultural development, however, PIRSA must be able to consider the detailed design of buffers to horticultural land at the detailed design stage.

The Board is supportive of the proposed water strategy in the EIS as it relates to stormwater use and reuse of treated wastewater.

The Board has requested an assessment against the objects of the *Natural Resources Management Act.* However, they have not advised in which respect the proposal may be inconsistent with those objects.

The Act's objects are reproduced below. It is considered that the proposal is consistent with those objects.

7—Objects

(1) The objects of this Act include to assist in the achievement of ecologically sustainable development in the State by establishing an integrated scheme to promote the use and management of natural resources in a manner that—

(a) recognises and protects the intrinsic values of natural resources; and

(b) seeks to protect biological diversity and, insofar as is reasonably practicable, to support and encourage the restoration or rehabilitation of ecological systems and processes that have been lost or degraded; and

(c) provides for the protection and management of catchments and the sustainable use of land and water resources and, insofar as is reasonably practicable, seeks to enhance and restore or rehabilitate land and water resources that have been degraded; and

(d) seeks to support sustainable primary and other economic production systems with particular reference to the value of agriculture and mining activities to the economy of the State; and

(e) provides for the prevention or control of impacts caused by pest species of animals and plants that may have an adverse effect on the environment, primary production or the community; and

(f) promotes educational initiatives and provides support mechanisms to increase the capacity of people to be involved in the management of natural resources.

(2) For the purposes of subsection (1), ecologically sustainable development comprises the use, conservation, development and enhancement of natural resources in a way, and at a rate, that will enable people and communities to provide for their economic, social and physical well-being while—

(a) sustaining the potential of natural resources to meet the reasonably foreseeable needs of future generations; and

(b) safeguarding the life-supporting capacities of natural resources; and

(c) avoiding, remedying or mitigating any adverse effects of activities on natural resources.

(3) The following principles should be taken into account in connection with achieving ecologically sustainable development for the purposes of this Act:

(a) decision-making processes should effectively integrate both long term and short term economic, environmental, social and equity considerations;

(b) if there are threats of serious or irreversible damage to natural resources, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation;

(c) decision-making processes should be guided by the need to evaluate carefully the risks of any situation or proposal that may adversely affect the environment and to avoid, wherever practicable, causing any serious or irreversible damage to the environment;

(d) the present generation should ensure that the health, diversity and productivity of the natural environment is maintained or enhanced for the benefit of future generations;

(e) a consideration should be the conservation of biological diversity and ecological integrity;

(f) environmental factors should be taken into account when valuing or assessing assets or services, costs associated with protecting or restoring the natural environment should be allocated or shared equitably and in a manner that encourages the responsible use of natural resources, and people who obtain benefits from the natural environment, or who adversely affect or consume natural resources, should bear an appropriate share of the costs that flow from their activities;

(g) if the management of natural resources requires the taking of remedial action, the first step should, insofar as is reasonably practicable and appropriate, be to encourage those responsible to take such action before resorting to more formal processes and procedures;

(h) consideration should be given to Aboriginal heritage, and to the interests of the traditional owners of any land or other natural resources;

(i) consideration should be given to other heritage issues, and to the interests of the community in relation to conserving heritage items and places;

(j) the involvement of the public in providing information and contributing to processes that improve decision-making should be encouraged;

(k) the responsibility to achieve ecologically sustainable development should be seen as a shared responsibility between the public sector, the private sector, and the community more generally; (l) the local government sector is to be recognised as a key participant in natural resource management, especially on account of its close connections to the community and its role in regional and local planning.

4.4 Regional Strategic Planning

Land Supply and Demand

The EIS considered the supply and demand for housing land in Metropolitan Adelaide for the next 30 years. Connor Holmes' *Land Supply and Demand Analysis* provided considerable detail and analysis, including commentary on potential impact on growing suburbs in the region. It was at discussed in Chapter 6 of the EIS, and attached at Appendix 3.

Connor Holmes considered:

- The demand for housing land resulting from anticipated population growth.
- The supply of potential housing land in other growth areas, and within existing suburbs.
- The government's approach of gradually moving to a 70:30 split between housing in existing suburbs and housing in new suburbs.

They concluded there will be solid demand for new housing in Adelaide. This demand will focus on metropolitan Adelaide's northern region where there are large landholdings, suitable for both masterplanned new suburbs, and employment areas, where industrial estates can be designed to tailored to meet current requirements for large buildings and access to major transport links.

Connor Holmes found, for the period 2006-2036, demand for housing at the site is predicted to be only approximately 13% of total dwellings demanded in the northern Adelaide, with a peak demand of approximately 25% per annum.

The strong predicted demand for housing land in metropolitan Adelaide's northern region will allow the successful completion of current and future residential projects in the region, the expansion of townships required to support their viability, as well as the staged and coordinated provision of housing land envisaged in the proposal.

Strategic Planning for Adelaide

Strategic planning for Adelaide is relevant to the proposal and its locality on a number of levels.

Within the site's locality, other owners have been waiting to subdivide their land. At a regional level it sets the context for the proposal's within Adelaide's growth over coming decades.

Strategic planning directs the provision of major infrastructure items, such as flood management, water, electricity and transport, and provides the framework for decisions on local issues.

The government has recently released the draft Planning the Adelaide We All Want. It provides an understanding of land use and infrastructure planning for greater Metropolitan Adelaide, and its northern region.

With this understanding of regional and metropolitan growth, Playford City Council can advise its local residents on the subdivision potential of their land.

The draft directions for metropolitan Adelaide considers the site a potential location for urban expansion, considering it is a large landholding, capable of delivering a 12,000 dwellings in coordinated and master planned way, subject to the completion of the major development assessment process.

The site's strategic location in northern metropolitan Adelaide, on Port Wakefield Road, and accessible to NEXY and existing and potential employment areas will ensure the proposal's success as a housing location, and enhance its contribution to Adelaide's economy.

Planning the Adelaide We All Want views as key a gradual shift in the types of *new Metropolitan housing from about a 50:50 ratio of infill development to fringe development to a ratio of around 70:30* by 2038 (page 14).

However, up to 2038 there will continue to be a need for new suburbs. Indeed in 2038, 30% of new housing will still be provided in new suburbs.

A second draft target is planning for an additional 11,600 hectares of land to accommodate the new suburbs for up to 124,000 dwellings and 44,500 jobs (page 86).

It is unrealistic to expect all new housing will be provided within walking distance of rail or o-bahn services.

Not only is this physically impossible, it limits housing choice. A lot of Adelaide's future residents will be looking for a home with a garden, and will be unwilling to compromise this dream for access to rapid transit. While it is good to move toward a city where the principal form of new housing is close to rail or o-bahn, planning must be done for other housing choices.

Restricting the supply of housing will result in:

- Increased in house prices, forcing many people out of the housing market, both as owners and renters.
- Rushed decisions made under the pressure of a shortage of housing land.

Opportunities for well located new suburbs must therefore be considered in strategic planning. This will improve competition, a key mechanism for managing housing affordability.

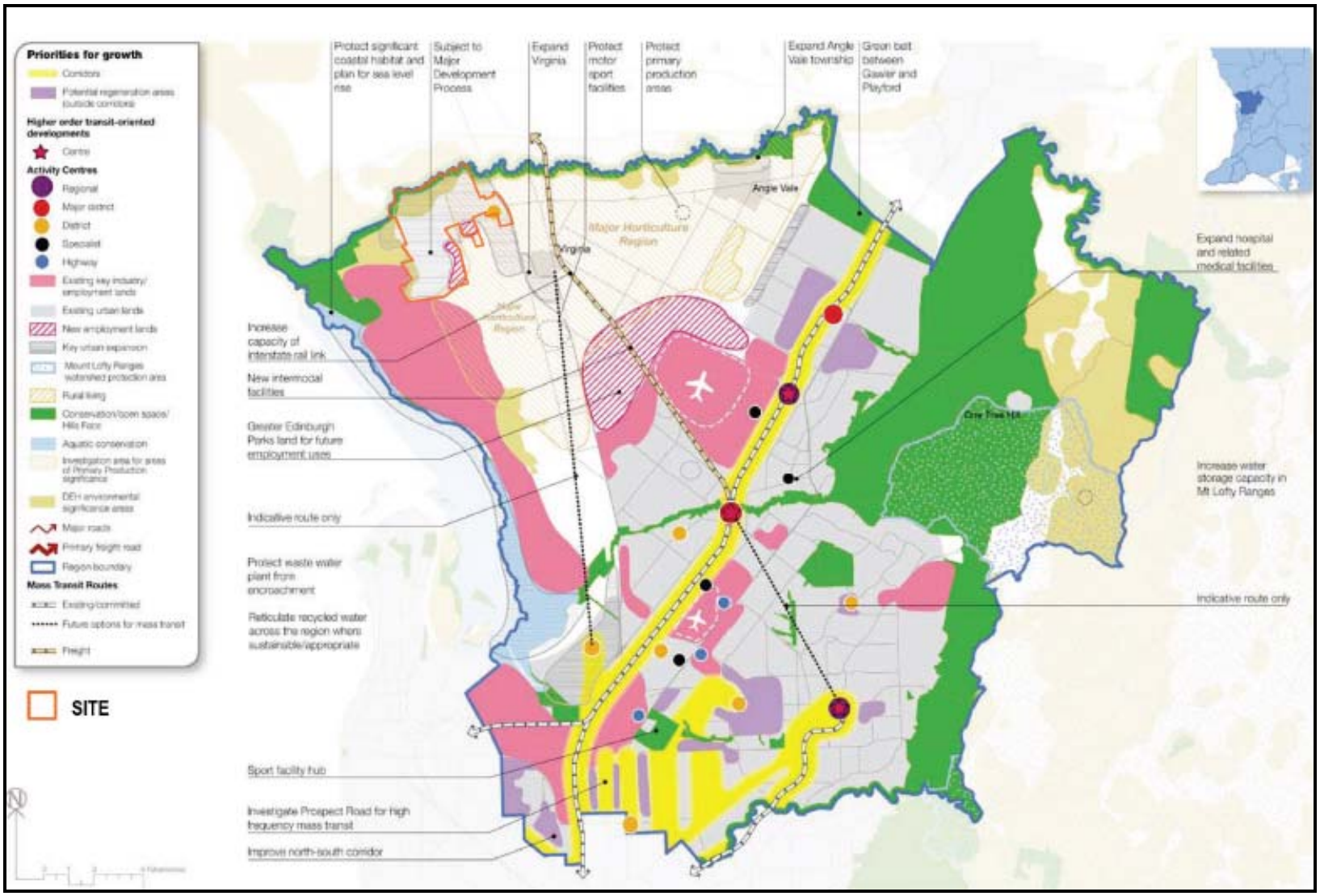


Figure 4.16: Site in 30 year Strategic Context

Source: Map F7 - Planning the Adelaide We All Want SA government 2009

The proposal's Staging Plan will allow the coordinated provision of metropolitan, regional and local services to its progressively arriving population.

Identification of growth areas in the draft *Planning the Adelaide We All Want,* and the proposal's staging plan will allow the government to coordinate the delivery of infrastructure over time.

Keeping the information in the Metropolitan Development Programme regarding land releases within the proposal will also be vital.

Adelaide's Urban Growth Boundary facilitates Adelaide's required growth for a certain period of time. However, this does not mean planning for growth beyond its boundaries must wait until every bit of land within the UGB has new houses on it. Planning takes a long time and must be commenced now.

Adelaide will continue to grow over coming decades, "*Not even the strongest totalitarian regimes have managed to* stop cities growing. *Cities are highly organic entities that respond to global economic opportunities….Planners are not causing this growth they are responding to it.* (Professor Peter Newman).

Planning must consider land outside the current UGB to ensure that Adelaide's growth is properly managed and land supply shortages avoided.

The site is located in metropolitan Adelaide's northern region. It is located on Port Wakefield Road, and major transport link with the potential to support fast regional bus links to train stations on the Gawler Line, soon to be upgraded.

As planning occurs in the region, other regional services will be provided.

These services are required as a consequence of Adelaide's population growth. Given the residential and employment activity in the northern region anticipated over the next 30 years, it is anticipated government will consider service delivery to northern Adelaide as a key priority. This is foreshadowed in *Planning the Adelaide We All Want,* and the final plan will provide the means of coordinating new population and new services.

This will benefit existing residents, as well as new residents.

Local Planning

The government has recently released for discussion the draft Planning the Adelaide We All Want. It provides an understanding of future land use directions for the site's locality. Figure 4.15 shows the directions the state government is considering for metropolitan Adelaide's northern region.

To the south and north of the site, land with a strategic relationship to Port Wakefield Road, and the excellent accessibility it offers, has been identified as having urban potential in the long term.

Given the government is considering this land's potential, it is appropriate it to be considered as part of the proposal, so its development can be undertaken in an orderly manner in conjunction with the proposal.

Accordingly, the Stage 1 Concept Plan has been amended to include a potential road link to land immediately adjacent to the south. This will allow future residential neighbourhoods on that land to have a road network integrated with the proposals', ensuring design opportunities for that land are not closed.

That land is owned by SA Potatoes, who have advised they wish to see the development potential of their land maintained.

Similar arrangements can be made during the detailed design of the Masterlan's future north eastern residential neighbourhoods.

Mallala Council is excited about the proposal next to its boundary.

Playford City Council is working to ensure its townships are sustainable urban centres. This needs to be balanced against the ability to establish sustainable new communities.

Figure 4.17: Stage 1 Layout as Amended
Source: Connor Holmes

Governance

If the proposal is approved by the Governor, it will move to the delivery and implementation phase. This phase will involve state government, infrastructure agencies and Playford City Council. Issues such as building approvals, creation, maintenance and ownership of urban infrastructure and the provision of services will require resolution.

Chapter 16.6 of the EIS describes the various funding and financing models which the private and public sector use to provide physical and social infrastructure, should the proposal be approved by the Governor.

They have been applied throughout South Australia in its existing, new and growing suburbs to support population growth and urban change.

However, an appropriate mechanism is required to resolve the myriad of issues which will arise during this process.

There are three levels of governance proposed.

Table 4.3 Governance Structure

LEVEL		PROPOSED STRUCTURE
1.	Technical	Playford Council already has a Land and Development Advisory Unit (LANDAU). It comprises engineers, town planners, and landscape architects. The team responsible for delivering and constructing Stage 1 will meet with LANDAU monthly. Matters discussed will include: • Designs • Technical Specifications • Application requirements • Inspections • Construction management • Handover requirements

LEVEL		PROPOSED STRUCTURE
2.	Financial and Policy	The Playford Alive project is a good model for governance of these issues, and can be applied to the proposal's delivery. The Buckland Park Project Control Group responsible for planning and financial decisions will meet monthly with senior staff of Playford City Council to discuss and resolve issues associated with: • Requirements for community facilities – standards, scale, access • Requirements for a Council depot. • The employment of a community worker – qualifications, experience, job description • Infrastructure handover arrangements – maintenance and defect periods • Community transport – timetabling frequency • Community building activities – coordination with Council's programmes, requirements for the proposal's. • Provision of Council services – waste, maintenance, baby immunisation, youth services, disability services. • Requirements for state funding of services. • Road closures and openings. • Council resourcing • Emergency Planning The Project Control Group will be responsible for considering the proposal within the context of land use and servicing planning for Virginia and the locality. Playford City Council has already established the Project Control Group, and regular meetings will commence shortly.
3.	Regional Planning and Service Delivery	*Planning the Adelaide We All Want* foreshadows Local Government Regional Partnership Forums as *permanent features of implementation and governance arrangements. They will meet at least annually with the Department of Planning and Local Government and other key agencies to ensure a continuous dialogue about the implementation of the Plan. Specifically, the forums will contribute to:* • *Annual updates of housing and employment targets.* • *Updates of Regional Implementation Strategies.* • *Coordinating implementation at a regional level.* • *Coordinating participation in and preparation of Structure Plans.* • *Identifying major infrastructure priorities to support housing and employment growth.* • *Coordinating consistency of Development Plans with the Plan.* • *Aligning council Strategic Management Plans with the regional policies and targets of the Plan.* A northern region Forum will be the ideal way to coordinate planning and service delivery across government, and to time with the provision of housing within the proposal. The Forum could also be an effective conduit for information on lot production to reach the Metropolitan Development Programme, facilitating state agency planning.

4.5 Detailed Planning

Comments on this issue were received in the following formal submissions.

- Playford City Council
- A local neighbour
- SA Potatoes

It was not raised in community meeting or community information days.

General

Council has noted the site is zoned Horticulture (West) zone and MOSS (recreation) zone in accordance with the Playford (City) Development Plan, and the construction of dwellings is prohibited.

Subject to the Governor approving the proposal, a Development Plan Amendment would therefore required prior to the construction of any dwelling, aside from those associated with the proposal's display village.

The MOSS (Recreation) Zone is retained in the proposal Masterplan.

New zones including a Buckland Park (Township) zone, Open Space zone, Employment zone and District Centre zone could be considered.

Any DPA process would follow the requirements of the *Development Act 1993.*

EIS Chapter 19 describes potential changes to the zoning, in accordance with EIS Guideline 4.11.4.

Stage 1, Neighbourhood Centre and Display Village

The Stage 1 Land Division is a component of the Masterplan.

Stage 1 is integrated into the Masterplan, with its open space, road, bicycle and pedestrian network, stormwater management facilities, and centres fitting into the Masterplan's networks and hierarchies.

It is also connected to adjoining locality.

Stage 1 sits at the eastern side of the Masterplan. This location was chosen as it is close to Port Wakefield Road, and the accessibility it offers, and existing utilities, such as water, power and gas which can be extended into the site.

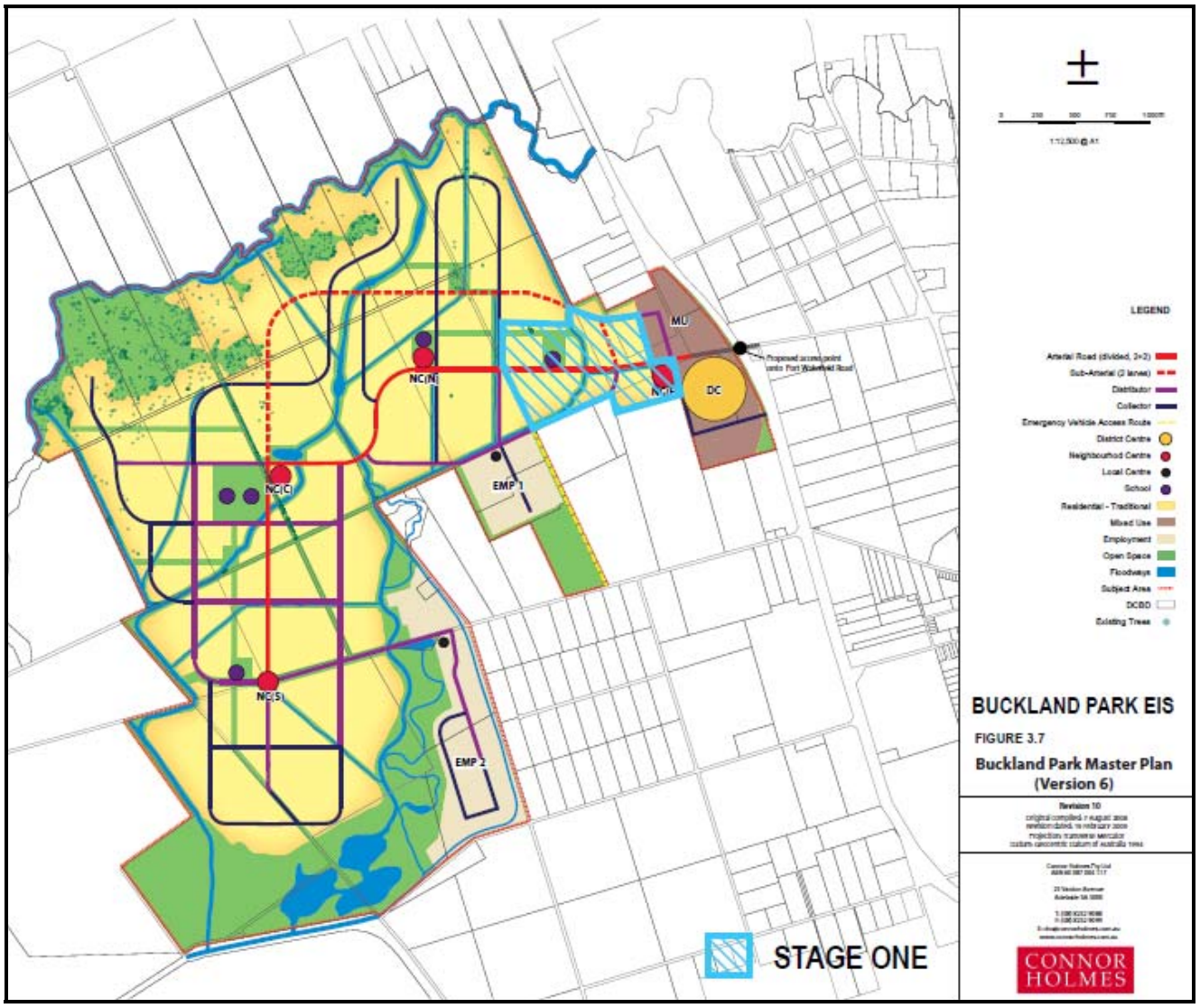


Figure 4.18: Stage 1 Within the Masterplan
Source: Connor Holmes

The Stage 1 Layout Plan illustrates the planned relationship of the various land use components within Stage 1.

Stage 1's open space, pedestrian and bicycle routes, schools, centres and stormwater management channels have been designed to link into the surrounding Masterplan.

As the proposal's implementation moves to future stages, these networks and hierarchies will be extended out of Stage 1 into these newer stages.

Stage 1's context and future connections can be seen more clearly in the diagram below.

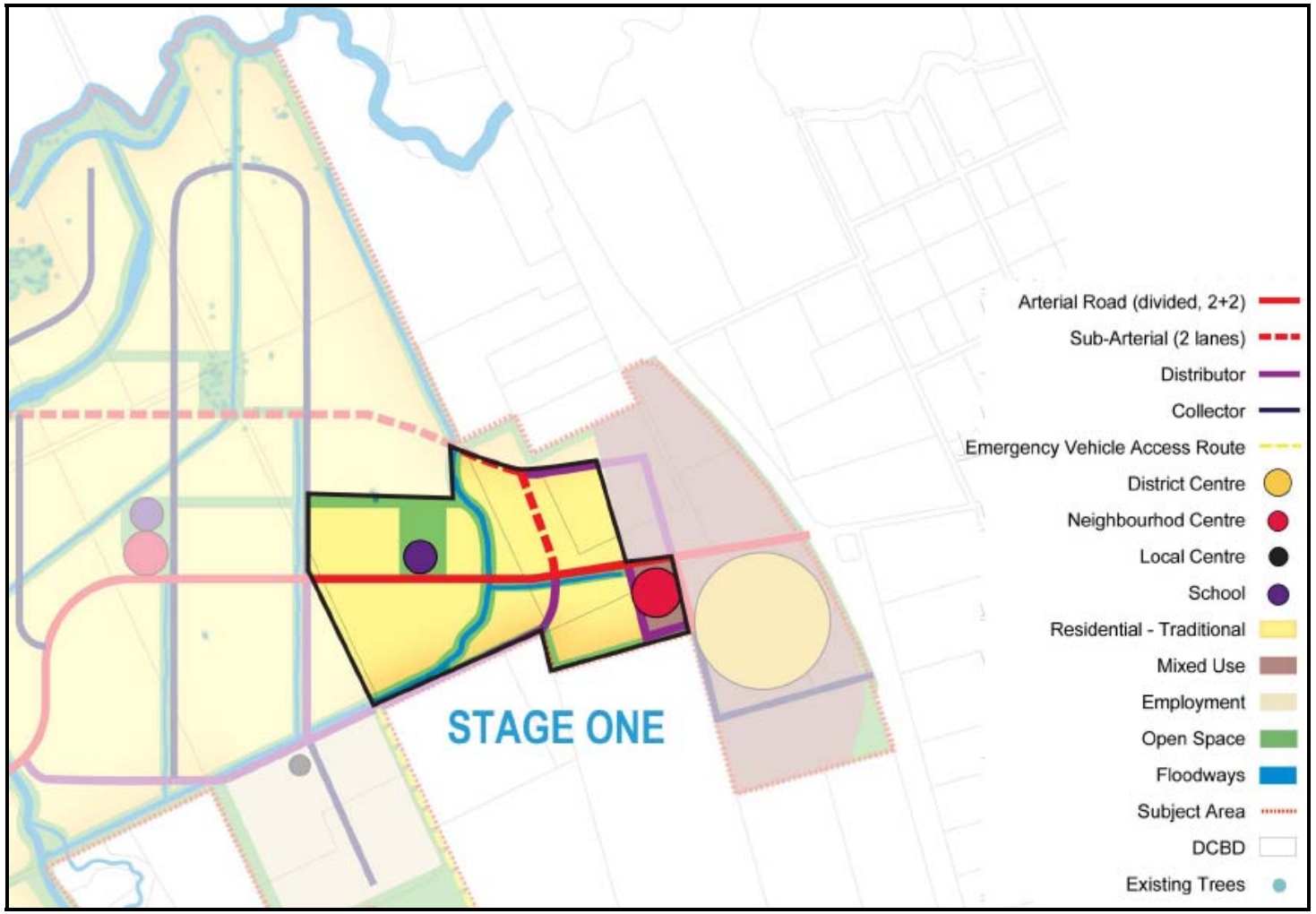


Figure 4.19: Stage 1 with Future Stages

The Stage 1 Layout Plan sets out the planned arrangement of Stage 1's land uses, and includes.

- A range of housing types, including a 15% component of Affordable Housing.
- New public roads connecting to the existing road network. The first stage of the Masterplan's main entry boulevard is included.
- The closure in part of Legoe Road.
- A primary school site located on the main entry boulevard to facilitate car and bus access, and open space containing pedestrian and bike paths.
- A neighbourhood centre site located at Stage 1's entry point, on the main entry boulevard to facilitate car and bus access.
- A Display Village.
- Two parks located within residential neighbourhoods.
- Balance lots which will accommodate roads and housing allotments in conjunction with future construction stages.
- Linear open space to accommodate stormwater infrastructure, landscaped outlooks to homes, and pedestrian and bike paths.

The Stage 1 Neighbourhood Centre will be an important facility for new residents. It includes retail facilities and a purpose built Community Centre.

A Display Village will adjoin the Neighbourhood Centre to provide a real focus of activity, and assist in supporting activities in the neighbourhood centre, such as cafes for example.

A high quality landscaped entrance is therefore required to create an inviting address for both existing and potential residents.

Stage 1's layout includes a logical network of pedestrian and bike routes which connect houses, the neighbourhood centre and schools.

Figure 4.20: Stage 1 Layout Plan
Source: Connor Holmes and Walker Corporation

Local Area

Stage 1 adjoins SA Potatoes land and has one other directly adjoining neighbour. Other horticultural uses to the south are separated from Stage 1 by Legoe Road.

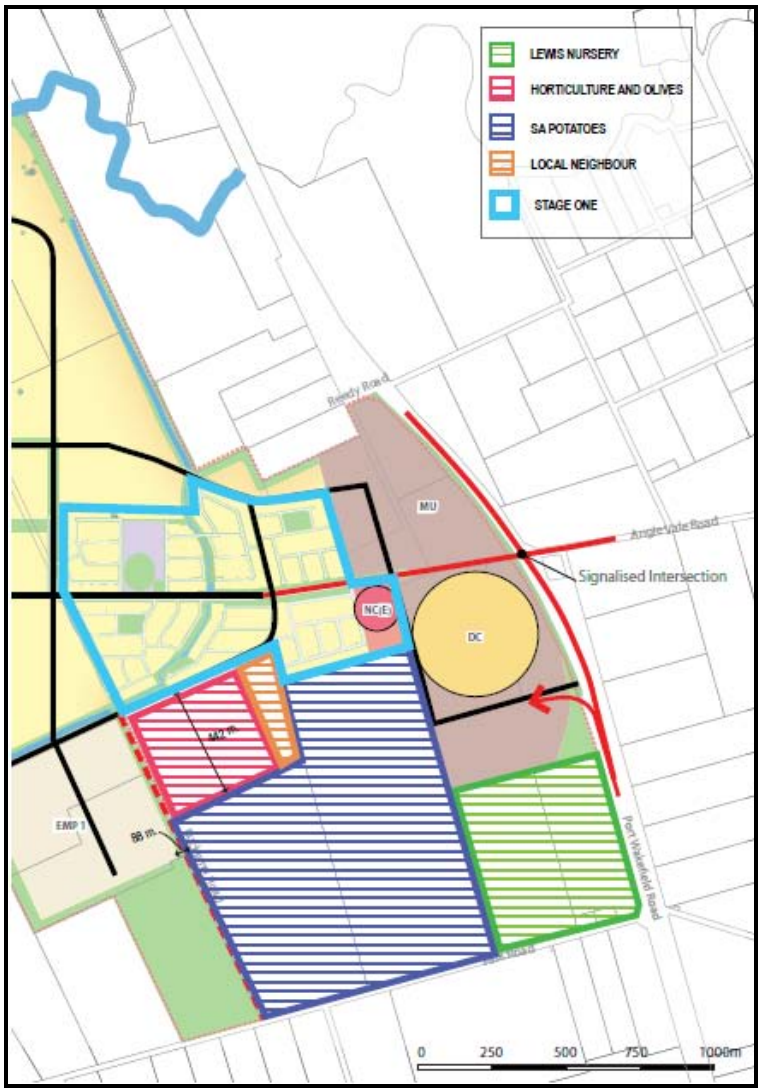


Figure 4.21: Local Context

Balance Lots

Stage 1 is confined within the boundaries of existing allotments, and public roads, to minimise impacts on the site's owners, and reduce requirements for closing public roads within the site.

As a result a balance lot has been left at Stage 1's western boundary, on Buckland Park Road.

This balance lot will be incorporated into Stage 2's land division.

Figure 4.23 shows the balance lot is capable of being incorporated into a reasonable land division arrangement to create regular housing allotments.

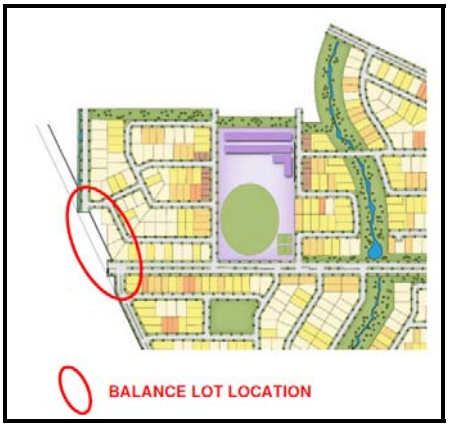


Figure 4.22: Balance Lot Location

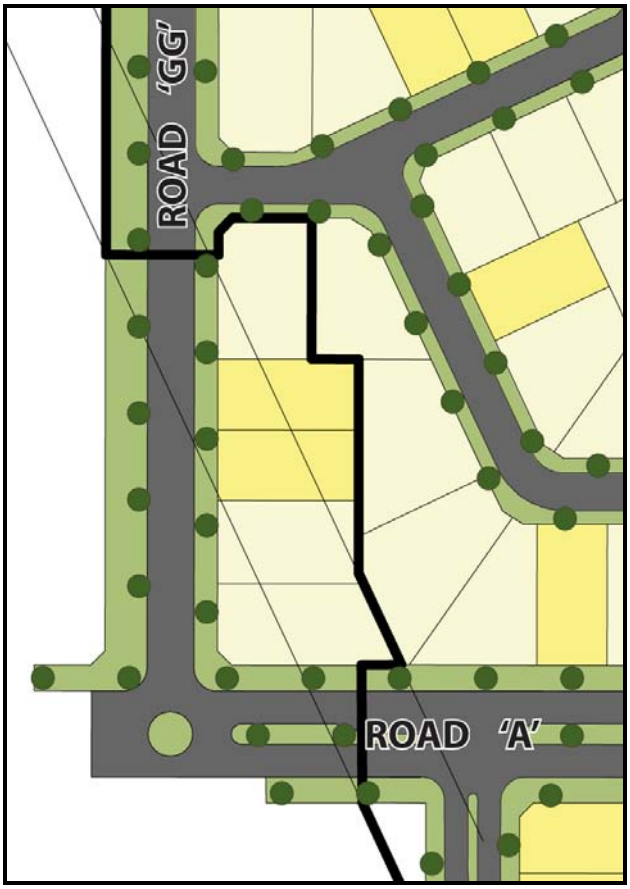


Figure 4.23: Allotment Design for Balance Lot
Source:Connor Holmes

Battle Axe Allotments

8 battleaxe allotments are included in the Stage 1 land division plan, or approximately 1% of Stage 1's total yield.

The battleaxe allotments are located with frontage onto open space, providing them with a high level of amenity and a pleasant outlook.

They will also provide passive surveillance of the open space areas.

They will not be totally enclosed by adjoining houses and back fences, as often happens with battle axe blocks.

Their "private entry", and direct open space frontage, will make these allotments popular with future residents, and an important component of the mix of housing planned for Stage 1.

The land division design could be amended to turn the driveways into public roads, or laneways, this would require a much higher standard of construction, arguably unnecessary when only 2 houses are being served and the driveways are only 15 metres long. Maintenance of these small and unnecessary public roads would be Council's responsibility.

Allotments Abutting Open Space

It is desirable open space is not entirely ringed by public roads, which results in an open and barren appearance. It may be appropriate for larger, district open space, where many users arrive by car, but for a local park, where residents feel they "own" the space, surrounding it totally with bitumen may not be the answer.

Therefore, within Stage 1 it is proposed to provide a mixture of road frontage, and house frontage to the local open space, balancing easy access from the public domain, with high amenity housing and improved passive surveillance.

There are many successful examples of house allotments with access directly onto open space.

Houses fronting onto open space have the following features:

- It gives potential residents another choice of allotment type, one with high amenity.
- It provides direct access from those houses onto the pedestrian and bicycle network contained in the open space.
- It provides more opportunities for passive surveillance of the open space, and enhances the sense that someone could be nearby.
- It is a more efficient use of land, and reduces the area paved over for roads.

The treatment of allotment boundaries to public reserves is fundamental to the success of this design approach.

There must be clear demarcation between public and private spaces, without marring the open space with long lengths of opaque fencing.

Design Guidelines will be attached to the sale of each allotment. For those allotments abutting open space, fencing along the boundary will be specifically addressed as follows:

- Fencing designs will be consistent across all allotments facing the open space.
- Fencing will be an open style to allow surveillance and views from gardens into open space.
- Fencing will be an open style so it will not become a canvass for graffiti.
- Courtyard walls required to provide privacy within dwellings or to utility areas will be setback from the boundary.

These allotments will have solid fencing to side boundaries.

The result will be an interesting treatment of the open space edge, and higher amenity for the adjoining houses, which will enjoy a direct open space outlook.

The Main Entry Boulevard

Most people entering Buckland Park will arrive via the main entry boulevard. It therefore serves an important urban design function.

It will set Buckland Park's landscape character, and will signal to new residents they are "home".

It will also ultimately carry high volumes of traffic, including buses and trucks, as it will be the site's primary access road. From commencement of construction it will be used for construction vehicles.

That part of the main entry boulevarde through Stage 1 will carry the highest volumes. Traffic volumes will greatly exceed the recognised maximum road volume for direct residential allotment frontage to a road, 6,000 vehicles per day.

It also forms a component of the Masterplan's pedestrian and bicycle network.

The main entry boulevarde's design through Stage 1 and adjoining allotments must therefore achieve these objectives:

- Include reserves for signature formal landscaping to create an entrance and address.
- Include reserves to accommodate pedestrians and bicycles.
- Orient residential allotments to minimise traffic noise impacts, and allow houses to face into their local neighbourhoods, rather than onto impersonal busy street.
- Minimise the number of driveways and roads accessing it.

Protecting the amenity of house allotments along the main entry boulevard is the design driver for Stage 1's layout in that location.

Allotments have been oriented to face local neighbourhood streets, rather than the more impersonal environment of the main entry boulevard, and its high traffic volumes.

Housing facing into local neighbourhood streets is more conducive to social interaction between neighbours, and will offer a better outlook for houses.

It is much better to have people coming and going from their homes in a neighbourhood environment, rather than an impersonal busy road.

Clause 6.2.2 of Playford City Council's Land Division Requirements 2008 prohibits direct residential property access onto any major collector road.

In compliance with Clause 6.2.2, residential allotments along the main entry boulevarde will have their car access off local neighbourhood streets.

It is inappropriate to front houses, garages and driveways onto the main entry boulevard, which would create conflicts between residential and through traffic, exacerbated by high traffic volumes.

To ensure the main entry boulevarde does not present as long lengths of opaque fencing, the following elements have been introduced into the Stage 1 design:

(i) Provision of service roads to some allotments, which run parallel to the main entry boulevarde. This opens up the boulevarde's appearance, and separates houses from busy traffic lanes, with distance, and screening landscaping.

This approach has only been used in limited locations as:

- Additional road area is required, which only serves residential allotment on one side, making it an inefficient use of serviced residential land.
- There are additional costs associated with constructing and maintaining roads which service a limited number of houses.

(ii) Provision of openings in the fence line, with cul-de-sac heads terminating at the boulevarde. This results in glimpses into to residential neighbourhoods, provides area for landscaping, and a mix of side and front views of houses, front gardens and side fences.

(iii) Provision of non-residential land uses along the boulevarde, to break the residential presentation. These include Buckland Park's landscaped entrance, open space, schools and the Stage 1 neighbourhood centre.

(iv) Provision of reserves as wide footpaths, and medians for landscape treatment, for example, avenue trees or screen planting to back fences. These areas will also accommodate Stage 1's and the Masterplan's pedestrian and bicycle network.

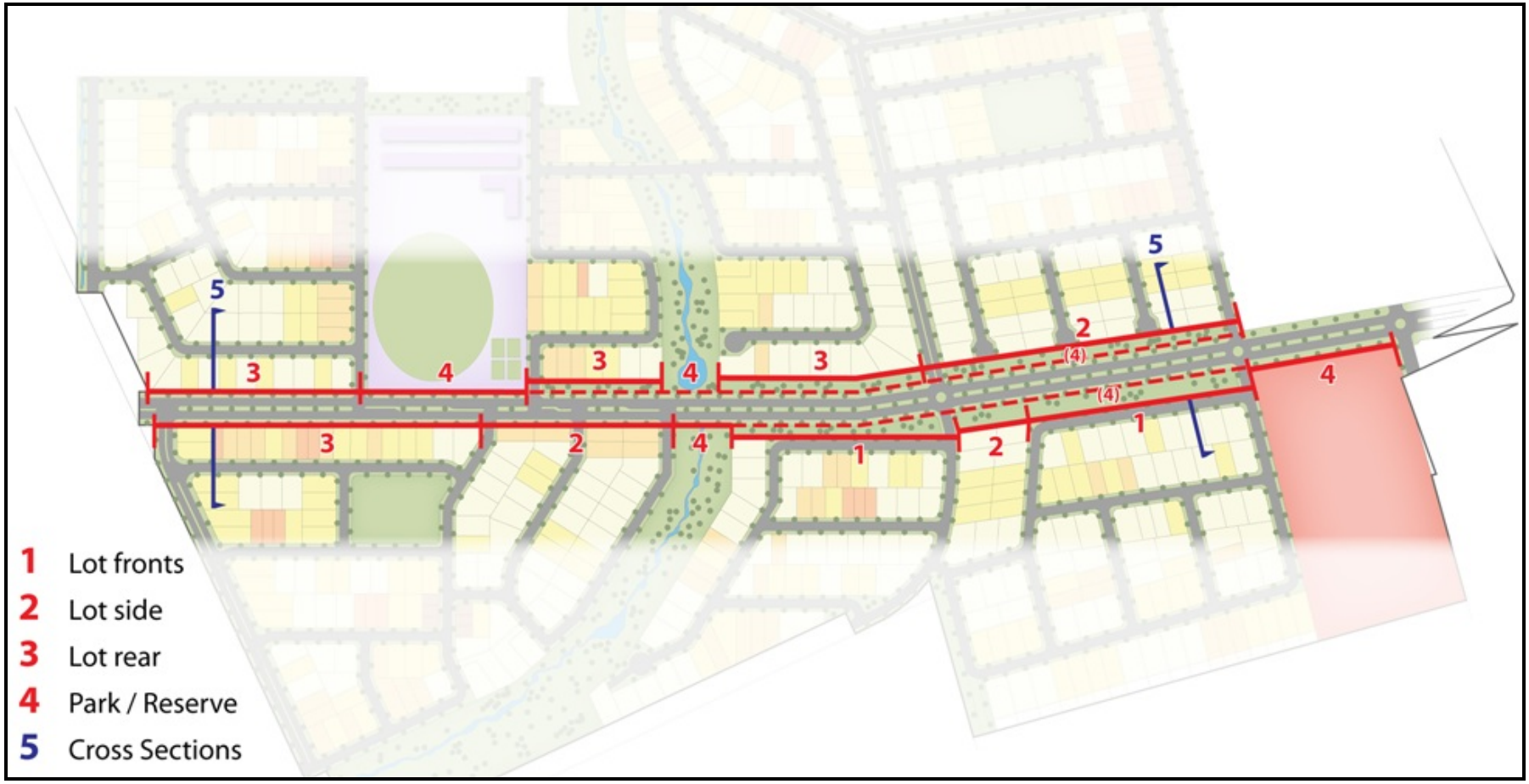


Figure 4.24: Boulevard Edge Treatment
Source: Connor Holmes

Fencing Controls

Special fencing controls will be applied to allotments abutting open space, the main entry boulevarde and the main distributor roads which connect through Stage 1 to future stages.

These controls will be embodied in Design Guidelines applied to the allotment sales and encumbered on titles.

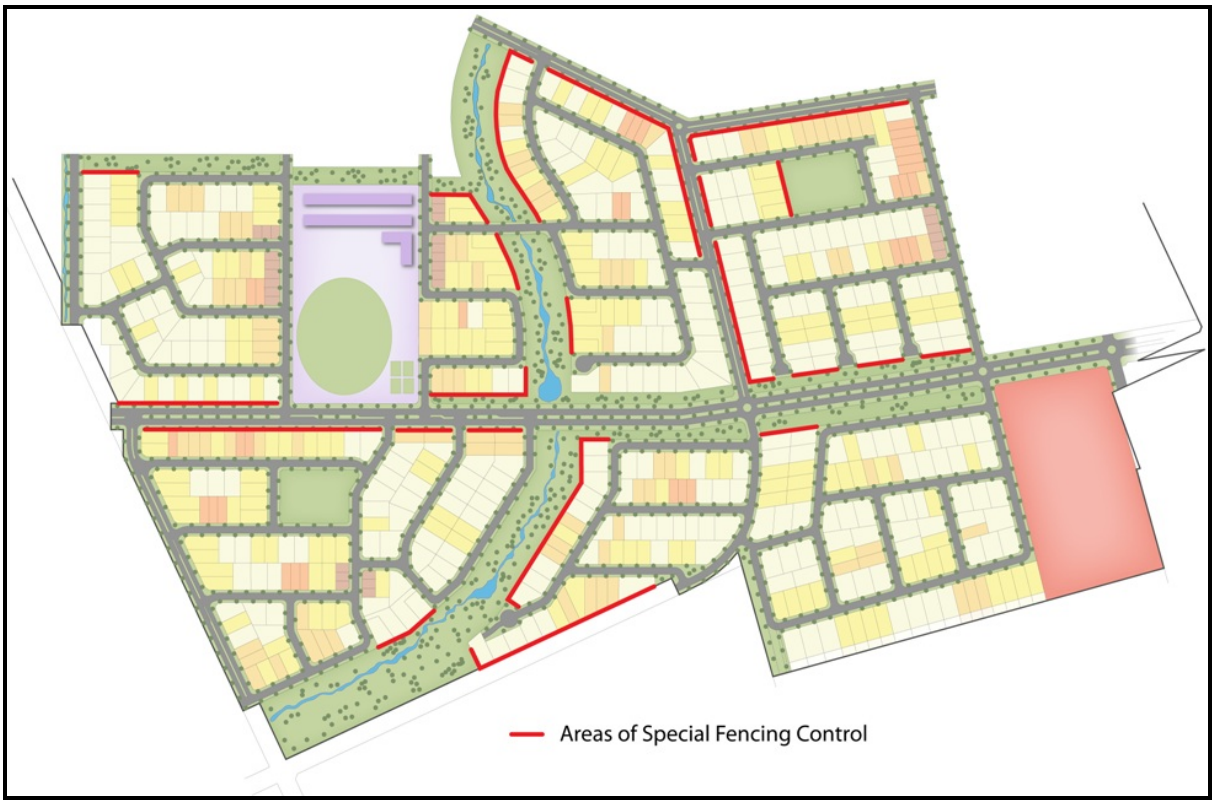


Figure 4.25: Locations for Fencing Controls
Source: Connor Holmes

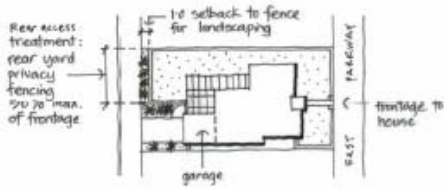
13.3 East Parkway Allotments

- The developer will be responsible for fencing along the boundaries that abut East Parkway on allotments identified in Section 2.5 of these Guidelines.
- For allotments identified in Section 2.5 of these Guidelines, the 'rear' fencing along property boundaries should:
  - be set back a minimum of 1 metre from the 'rear' property boundary and this setback area should be landscaped with appropriate species;
  - extend for a maximum of 50% along the property boundary; and
  - be consistent with the fencing described in Section 13.4 below.

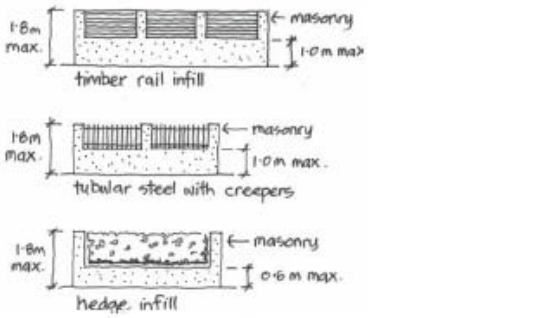
13.4 Fencing Adjacent to Reserves

- When housing has a boundary adjacent to a public reserve special fencing is required that creates a reasonable level of privacy while retaining some outlook to the reserve. Such fencing should generally be in accord with the options shown in the adjacent figure (except for the specific allotments identified below).
- For allotments 145 - 153 inclusive and 181 - 191 inclusive, the public reserve boundary fence must consist of a black metal post and railing (level plug) type fence of a maximum height of 1.2 metres above ground level (see adjacent figure and photo).
- Lockable gates that match the design and appearance of the fence will be allowed along the reserve frontage.

Note: Gates and fences built by the developer cannot be removed, relocated or replaced without prior written consent from the Encumbrance Manager.



Fence requirements for 'rear' boundaries of allotments fronting East Parkway



Required fencing types along boundaries adjacent to public reserves

Fence type for Lots 145 - 153 and 181 - 191 inclusive

Figure 4.26: Example of Design Guidelines – Bluestone
Source: Walker Corporation

Neighbourhood Centre Car Park

The Neighbourhood Centre Car Park location promotes shared use of the one car park facility by several land uses, and provides logical, legible and controlled pedestrian connections between it and those land uses:

- The Neighbourhood Centre (including Community Centre)
- The Neighbourhood Centre extension area
- The Display Village and Sales Office.

The main entry boulevarde will provide the main vehicle entry to the site, Stage 1 and the car park.

The car park has not been located fronting the main entry boulevarde for the following reasons:

(i) The main entry boulevarde will be the main entry for potential and existing residents. Attractive landscaping is required to set the proposal's character and create a sense of address.

Therefore a landscaped area, approximately 60 metres wide, is provided between the car park and the main entry boulevarde.

(ii) The number of access points access directly onto the main entry boulevarde must be limited, therefore direct access to the car park from the main entry boulevard is inappropriate.

(iii) Entry to the car park is off a local road, which will also serve residential allotments.

The local road's intersection with the main entry boulevard will be controlled by a round about.

(iv) Drivers on the main entry boulevarde will be confused if they can see the car park, but not find the entrance.

The car park itself will be landscaped.

The car park will therefore not be a strong visual feature at the entry to Stage 1, as it will be screened from the main entry boulevarde by high quality landscaping.

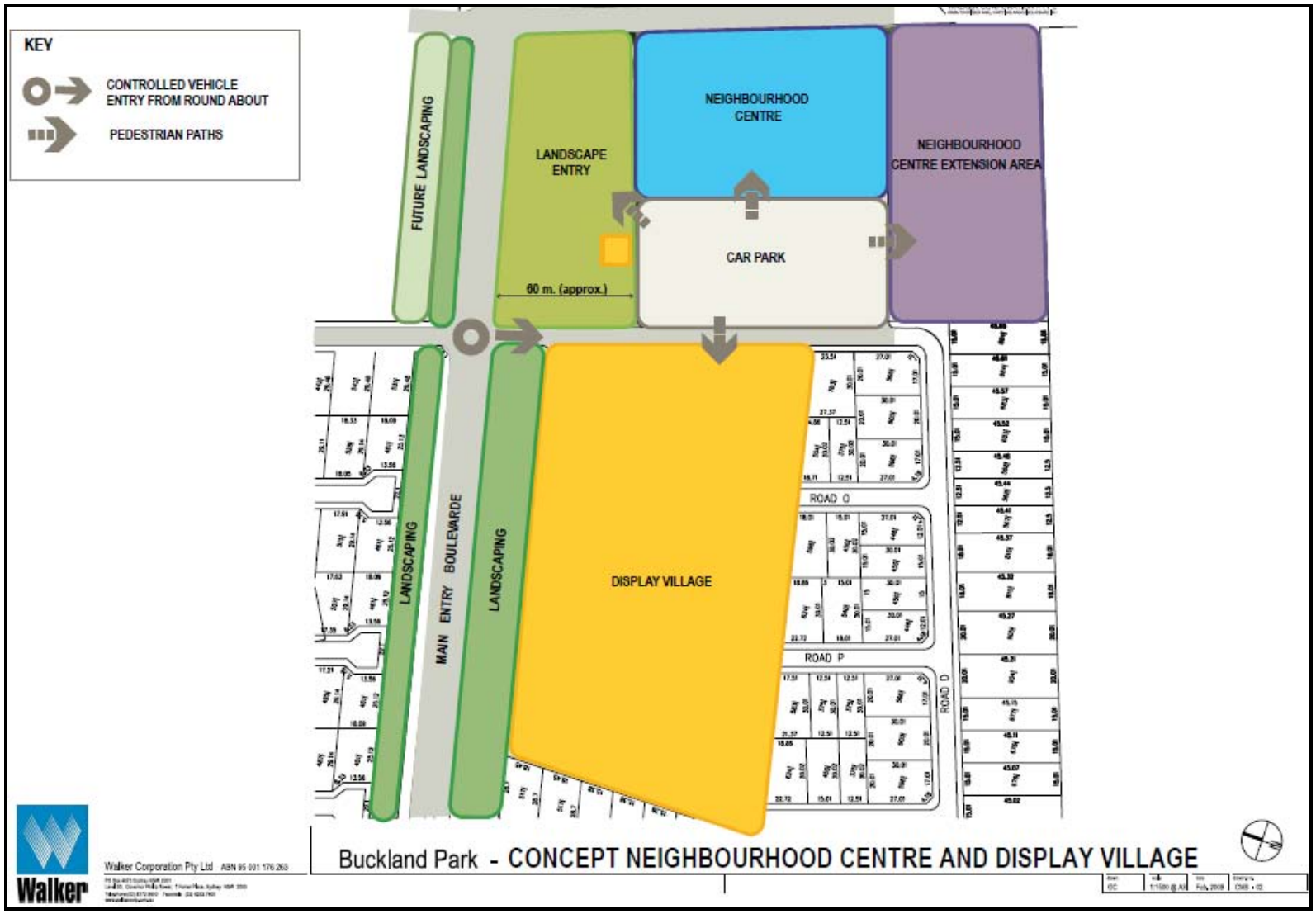


Figure 4.27: Principles for Car Park Location

Source: Walker Corporation

4.6 Infrastructure and State Services

Gas

APA provided a practical and feasible proposal for the provision of reticulated gas to new homes. APA's proposal is described in a straightforward manner in Chapter 15.1 of the EIS.

APA and EPIC Energy are preparing engineering designs and costings for augmenting gas utilities in accordance with the description in the EIS.

Telecommunications

Telstra has a statutory obligation to provide telecommunications to all new homes.

Telstra's underground external plant is designed to be protected against temporary immersion in water. (Telstra 2007)

However, above ground roadside cabinets, particularly those with mains power connections need to be located or elevated to eliminate the possibility of flooding.

Therefore, all Telstra roadside cabinets will be located above the 1:100 year ARI event level, as they will not be within the storm and flood water management channels.

Earlier this year, the federal Government announced the National Broadband Network. From 1 July 2010 all new residential allotments will be required to be served by fibre to the home, at the developer's cost.

Any statutory requirements for the provision of telecommunications to new allotments, applicable at the time of their creation will be complied with.

The federal Government's announcement supersedes any other model for the provision of telecommunications applied recently in Adelaide's new suburbs.

Electricity

As described in the EIS (page 15-2), the Virginia substation will be upgraded as part of the proposal, and additional transformers and 66kV lines connecting it to Angle Vale and Bolivar substations. These upgrades will provide security of supply to the locality.

A new substation will be built within the site.

It is standard for ETSA Utilities' substations to be built above the 1:100 year ARI flood event level. This is described in the EIS at page 15-2.

As a Network Service Provider (NSP) within the National Electricity Market, ETSA Utilities must comply with technical standards in the *National Electricity Rules*.

In particular, requirements relating to reliability and system security contained in Schedule 5.1 of the Rules are relevant to planning for future electricity needs.

In addition, as a licensed electricity entity in South Australia, ETSA Utilities is required to comply with the service obligations imposed by the *South Australian Electricity Distribution Code*. (ETSA Utilities).

ETSA Utilities is required to operate its power system within plant ratings and with acceptable quality of supply under reasonably expected operating conditions in order to comply with its requirements under the Rules and Code.

Ultimately, to supply the proposal, ETSA Utilities will need to extend the 66kV network to the site and establish local 66/11kV substations and 11kV feeders. (ETSA Utilities).

The cost of these works will be partly funded by the customer in accordance with the Code.

ETSA Utilities' core objective is to maintain a safe and reliable electricity supply for South Australians. (ETSA Utilities)

There are many factors beyond ETSA Utilities' control such as extreme weather and vandalism, as well as impact from vegetation, wildlife and motor vehicles, that contribute to power interruptions.

Should a power outage occur, ETSA Utilities is committed to restoring supply as soon as possible.

Further, ETSA Utilities continually monitors its network performance to minimise the risk of an interruption occurring.

ETSA Utilities provided over 99.97% network availability in 2008 which means on average across the State, customers experienced a power interruption for less than 0.03% of the year.

This equates to 150 minutes without power on average per customer in the 2007/08 regulatory year, continuing the trend of improvement on the previous year's result of 184 minutes, and from the 2005/06 result of 201minutes.

The 2005/06 result demonstrates the impact weather can have on the power supply. A destructive storm across Adelaide in August 2005, significant storms in regional areas in October and November 2006, and the January 2006 heatwave all contributed considerable minutes to the total average time customers were without power.

ETSA Utilities is pleased comprehensive reviews of its performance during major events have enabled it to substantially improve its response times during such conditions.

In addition to ensuring compliance with industry regulations, ETSA Utilities use a range of methods to track its performance in customer service and satisfaction. This includes conducting surveys asking our customers for feedback on their individual experience with ETSA Utilities. (ETSA Utilities)

As described on page 15-3 of the EIS:

> *The electricity augmentation works required to serve the proposal will not only provide immediate benefits to Virginia and Two Wells, they will create sufficient capacity in the electrical network to allow the expansion of these towns.*

ETSA's standards and objectives will be applied to the proposal as to any other community in South Australia.

The vacuum sewerage system will be supplied with electricity from the new infrastructure provided as part of the proposal.

Therefore it will be as secure as all other electricity powered facilities and homes in the site.

Emergency Services

SAPOL was consulted during preparation of the EIS. The results of that consultation were described in a straightforward manner in Chapter 15.2 of the EIS.

The SAPOL representative had no concerns regarding the proposal, and provided practical suggestions for the provision of police facilities near and in the site.

Chapter 15.3 described arrangements for the provision of ambulance and fire services.

The site can be accessed by emergency services via the excellent regional road network, supported by Port Wakefield Road. Access for emergency vehicles is available during flood events.

4.7 Coastal Environment

Comments on this issue were received in the following formal submissions.

- Playford City Council
- Adelaide and Mt Lofty Ranges Natural Resources Management Board
- Department of Land, Water and Biodiversity Conservation
- Mrs Picard
- Mallala District Council
- Department of Environment and Heritage
- The Friends of Gulf St Vincent

It was raised in community meeting or community information days.

Introduction

The site is located between 2.5 and 4 km from the Gulf St Vincent coast line.

The coastal plain is not part of the site or the proposal.

The site is separated by a minimum of approximately 2 km from the eastern edge of the coastal plain. The area between the site and the coastal plain consists of anthropogenic areas, including Cheethams salt pans, and private grazing properties.

The proposal does not include any construction works or activities within, adjoining or near the coastal plain.

The EIS Guideline required a description of the proposal's effect on mangroves, samphire, coastal dunes and associated shrublands, lignum shrublands and on seagrass. The potential for coastal retreat also needed to be considered.

In addition, the EIS considered coastal flora and fauna, and its value to the fisheries industry.

This consideration was based on technical reports prepared by Cooe, aquatic assessment, and Dr Bob Anderson's flora and fauna assessments. The reports were discussed in Chapters 5, 8, and 10 of the EIS, and were attached at Appendices 11, 14 and 15.

Coastal Retreat

The issue of coastal retreat must be considered in the context of the site's relationship to the coastal plain and coast line. The site is separated from the coastal plain by Cheetham salt pans and farming land, principally used for grazing.

Table 4.4: Distances to the coastline and coastal plain

	MINIMUM DISTANCE	MAXIMUM DISTANCE
Coastal Plain to site's western boundary	2 kilometres	3 kilometres
Coastline to site's western boundary	2.5 kilometres	4 kilometres

The site is above foreseeable predicted tide levels therefore it is not likely to ever provide a suitable habitat for mangroves and or other coastal vegetation (Cooe b).

The proposal does not limit options for planning for coastal retreat, as there are many kilometres of land between the site and the coastline and coastal plain.

To the north, this land is rural, private property, primarily grazing, and therefore vegetation retreat into that area would not require the removal of structures and improvements.

To the south, this land contains Cheetham salt pans, significant anthropogenic structures.

They are filled with sea water, contained in levee banks. Water in the northern pan is held at 2.85m AHD, and in the southern pan at 3.25m AHD. The levee banks are higher than the water level.

Sea levels are predicted to rise 1.0 metres by 2100.

Given the height of the salt pan levee banks, it is likely they will remain above sea level, effectively blocking the pans' submersion and loss. Therefore they will continue to support bird life.

The Cheetham salt pans are an existing block to vegetation retreat from the coastal plain inland. As the site is inland of the pans, the proposal will not reduce opportunities for retreating coastal vegetation, because those opportunities are already blocked.

Notwithstanding this, it is both impractical and unreasonable to reserve large parts of the site to permit the reconstruction of the salt pans as bird habitat, should they become submerged.

Sea level rise is discussed further in Section 4.1 of this report, and Chapter 7 of the EIS.

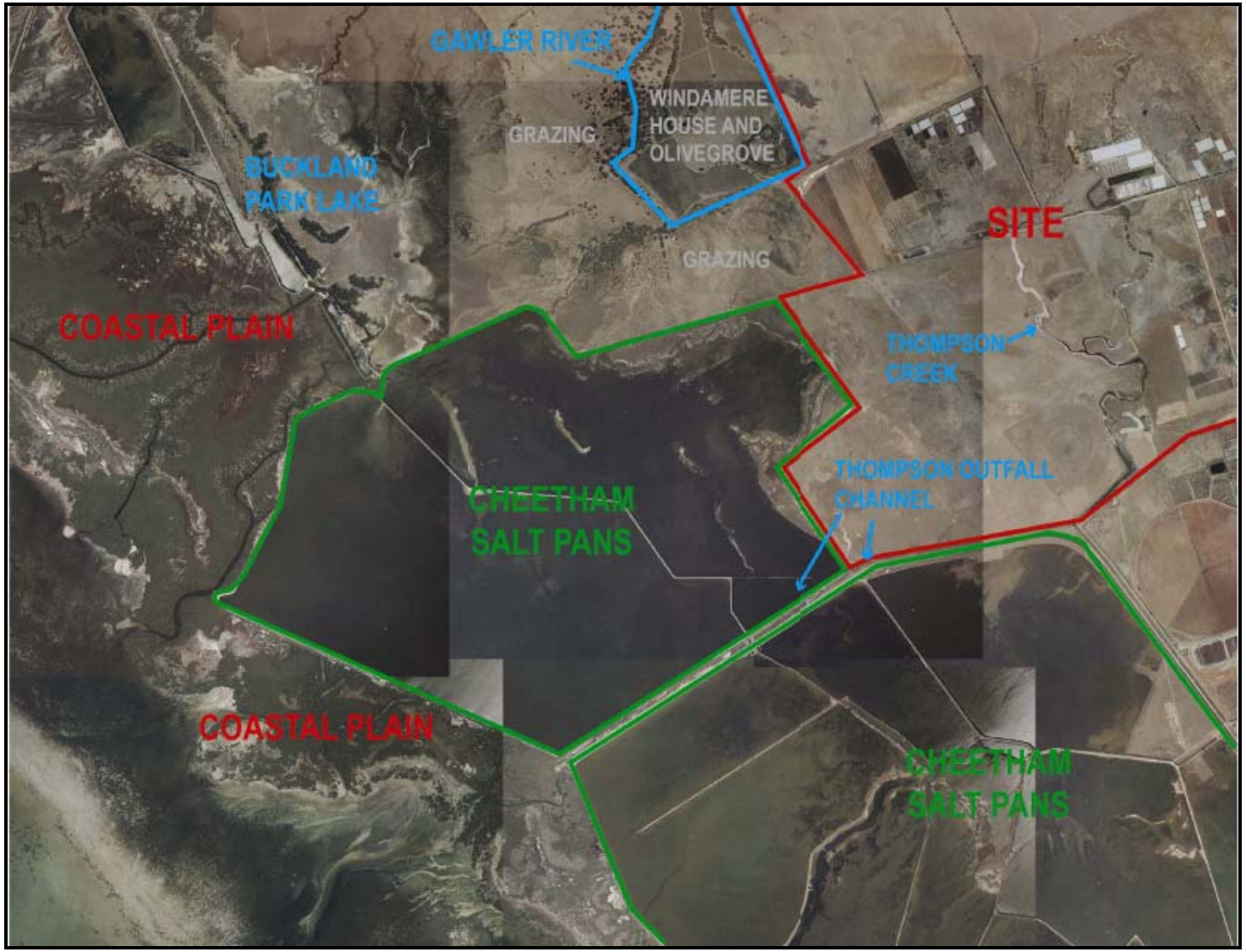


Figure 4.28: Site's Relationship to the coastline and coastal plain

Shorebirds

Referrals will be made to the Federal Minister for the Environment to determine any activities associated with any part of the proposal are controlled actions in accordance with the *Environment Protection and Biodiversity Conservation Act 1999.*

The Buckland Park Lake system is an important habitat for numerous bird species, including some of international significance. The northern part of the Lake is owned by the Crown, with the intention of proclaiming it as a protected area.

The EIS commits to achieving a Significant Environmental Benefit (SEB) associated with any clearance of native vegetation.

The Department of Environment and Heritage confirmed the potential for off site works to form part of a SEB, particularly suggesting enhancing the conservation values of the Buckland Park Lake System's southern part as one area of work.

This would compliment the rehabilitation of and revegetation of the Gawler River corridor.

Suitable SEBs will be established with the Department as part of detailed flora investigations and the preparation of Vegetation Management Plans.

The Adelaide and Mt Lofty Natural Resources Management Board's (NRMB) report, *Shorebird Management and Conservation* 2009, considers the habitat, habits and threats to shorebirds along Gulf St Vincent's eastern coast. It includes strategies for the management and conservation of shorebirds and their habitat.

The NRMB's report identifies potential risks to shorebirds of relevance to the proposal:

- Habitat loss
- Disturbance
- Water quality reduction – particularly turbidity and sediment toxicity.

These are addressed below.

1. Habitat Loss

The Cheetham salt pans adjoining the site are identified in the report as very high value shorebird habitat (Map 001).

Cheetham salt pans are not incorporated into the proposal, as they are a separate property.
No work or activities are proposed in the pans.

The impact of sea level rise on the pans is discussed above.

An 11 hectare area of grassland and saltbush on the site is identified as high value shorebird habitat (Map 001).

Table 1 (page 14) notes there are 922 hectares of grassland and saltbush habitat in the region.

The 11 hectares therefore represents 1% of the total mapped grassland and saltbush habitat.

However, the following should be noted:

- Only 6.4 hectares of saltbush habitat is potentially affected by the proposal. That is less than 1% of the total area mapped in the NRMB's report.
- Dr Anderson's flora survey (2008) identified a total of 72.7 hectares of this habitat on the site in that location. Of this, only 6.4 hectares is potentially affected by the proposal.
- The proposal includes revegetation of saltbush areas adjoining existing areas and Cheetham salt pans as an offset for any clearance if required. Works to habitat areas along the coastal plain were also offered if required.

Therefore there will be 66.3 hectares of shorebird habitat on the site adjoining the Cheetham Salt Pans, rather than the 11 hectares mapped in the NRMB's report. This could be increased if revegetation works are undertaken as part of any environmental offset requirement.

The NRMB's report discusses Delfin's Dry Creek concept, and its approach to mitigating the alienation of over 800 hectares with value for shorebird feeding and nesting, by revegetating 178 hectares of mangrove, samphire and wetland, and designing internal open space to deflect people from habitat areas surrounding and within their site (page 43).

Within this context, it is considered the proposal's approach to shorebird habitat retention, regeneration and revegetation, in conjunction with buffers to Cheetham salt pans is satisfactory.

More detail is provided below.

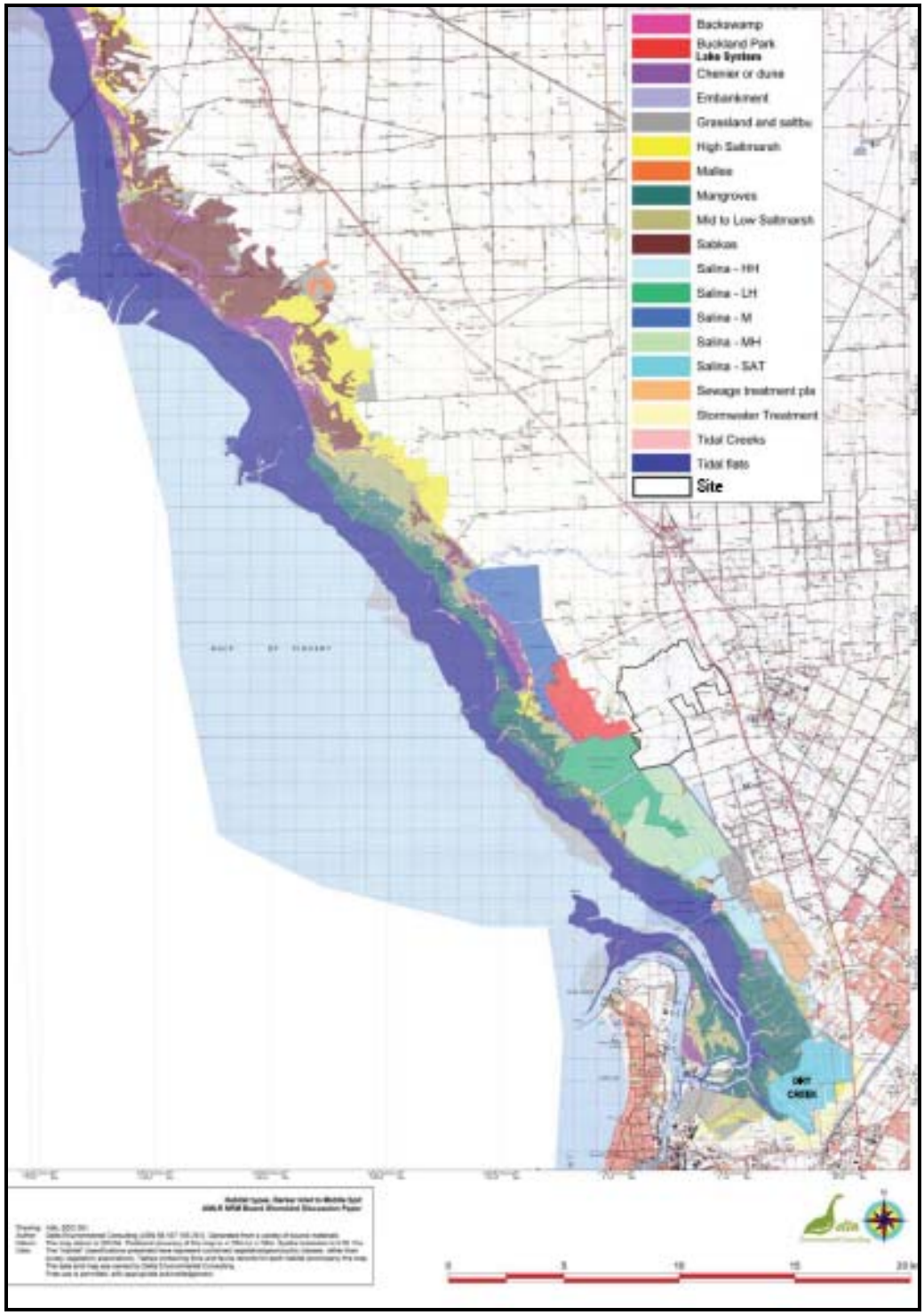


Figure 4.29: Shorebird Habitat with site

Source: Adelaide and Mt Lofty Ranges Natural Resources Management Board Map 001 adapted by Walker Corporation

NOTE: Map 001 incorrectly identified the Buckland Park Lake System as the site. This has been corrected in this Figure. Map 001 noted the proposal's channels' potential impact was "unknown". Please see Chapter 7 of the EIS, and Section 4.1 of this report for a description of the proposal's stormwater management system – which does not include discharge into the Gawler River or Buckland Park Lake System.

Figure 4.30: Shorebird Habitat adjoining Cheetham Salt Pans
Source: Dr Bob Anderson and Fyfe Surveyors

NOTE: The area hatched in red (6.4 hectares) is potentially affected by the Masterplan, while areas hatched in green (66.3 hectares) are to be retained.

2. Disturbance

The NRMB's report notes:

> *Development occurring in close proximity to shorebird feeding and roosting grounds may increase noise levels and trigger more 'peripheral vision' movement alarms in groups of shorebirds.*
>
> *Additionally, even though a development may not occur on the actual site used by shorebirds, occupiers of the developments will utilise areas outside the development, increasing direct disturbance in nearby shorebirds areas. Such 'spill over' increases in disturbance may be prevented by only approving appropriate developments, careful siting of new developments, incorporating habitat buffer zones, restricting coastal access to a few nodes, and designing open space landscaping to 'deflect' people away from areas of use to shorebirds.*
>
> *It is not possible, in an area as extensive as the study area with multiple landowners to completely remove the risk of disturbing events. However, it would appear possible to reduce the risk (and consequent impacts) to a lower level than currently.* (page 51) (Walker emphasis)

Habitat Buffers

The proposal includes habitat buffers. Proposed residential areas are separated from the Cheetham salt pans by a minimum of 66.3 hectares of samphire areas to be protected and retained in that part of the site.

Proposed residential areas are separated from the Cheetham salt pans by:

- 40 metre wide stormwater channels.
- 600 metres to 1,000 metres of open space.

These areas will include landscaped open space and stormwater detention basins, and samphire shrubland which will be retained, rehabilitated or revegetated in accordance with approved Vegetation Management Plans.

Fencing to exclude people and pets can be included as part of the Vegetation Management Plans.

The stormwater channels and basins can also be revegetated with samphire species, subject to meeting their engineering functions. Rehabilitation of this type has been successfully undertaken at Greenfields and Barker Inlet.

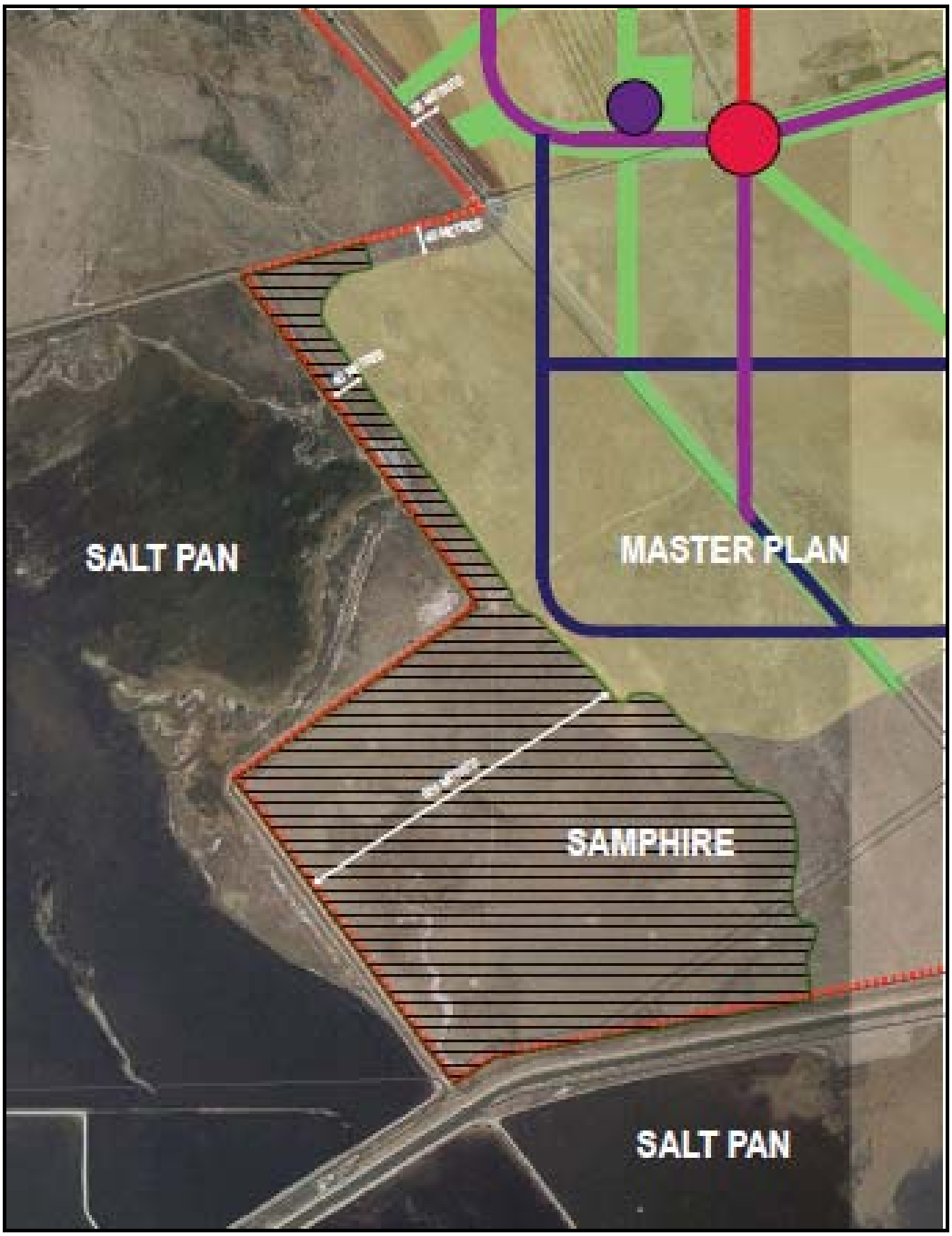


Figure 4.31: Site's South West Corner with Salt Pans

Deflecting people from habitat areas

Delfin's Dry Creek site adjoins, and is surrounded by shorebird habitat (NRMB, Map 002). Created habitat within their site will be in proximity to their new residential areas.

In respect of the Delfin Dry Creek concept, the NRMB notes:

> *As with all residential developments, (*the Dry Creek) *proposal has the potential to increase the levels of disturbance occurring in adjacent high value habitats such as the Greenfields and Barker Inlet Wetlands. Design of internal open space to deflect people from these high value areas may possibly mitigate this impact.* (page 43)

By contrast, the Buckland Park site adjoins shorebird habitat only in its south west corner, and as described above, this area will be maintained as a habitat area and buffer to Cheetham salt pans.

The proposal includes significant internal formal active and passive recreation areas which will be more attractive and useful than samphire habitat, thereby deflecting people from intruding on the site's samphire areas.

In addition, the proposal will facilitate the progressive implementation of the 'Gawler River Open Space Strategy', which will not only focus and control access to shorebird habitat, but raise community awareness and sensitivity to the issue. This is discussed in more detail below.

Given the site's limited relationship to shorebird habitat, the inclusion of habitat areas and buffers, and the inclusion of attractive open space, it is concluded the proposal will be successful in deflecting people from habitat areas in accordance with the NRMB's approach to this issue.

Noise

Parsons Brinkerhoff (2009) considered the potential impact of urban noise on birds using the salt pans.

They found ambient noise from residential areas would include traffic noise from collector roads and fixed noise sources such as air conditioning units. Peak and instantaneous short term noise from car horns, engines revving and recreational activity in gardens and parks will occur.

Given the existing potential noise disturbance of wildlife from the SA Shooting Park, agriculture (including gas guns designed to scare birds), Parsons Brinkerhoff concluded, *it is unlikely ambient noise from residential land uses would significantly impact upon migratory and terrestrial birds in the Cheetham salt pans or Buckland Park Lake.*

Domestic plant such as air conditioning units will require compliance the mandatory provisions of Part 6, Division 2 of the E*nvironment Protection (Noise) Policy 2007*, and in any case will be located a minimum of 55 metres from the western boundary (40 metres buffer, plus 15metres of backyard).

The CEMMP for storm and flood water management works and residential neighbourhoods in the site's south will include the following provisions:

- Construction activities will be timed so they do not coincide with migratory bird breeding periods.
- Construction compounds will be located as far as possible from the site's western boundary.
- Traffic Management Plans will ensure construction vehicle traffic routes are to and from the east.
- Noise Management Plans will be prepared which will locate stationary noise generating plant as far east as possible.
- Vegetation rehabilitation and management plans will nominate samphire areas for revegetation and conservation.

Peripheral Vision Movement

It is likely residential neighbourhoods closest to Cheetham salt pans will be designed with their back fences to the pans. Combined with separation distances this will reduce potential for movement to affect birds. Open space activities will be separated by significant distances.

3. Water Quality

The NRMB's report notes:

> *Stormwater capture and treatment is becoming more common in the study area and some Councils are requiring new housing subdivisions to treat stormwater to a higher level than past practice.*
>
> *Riparian and broad acre habitat restoration activities in the catchment, undertaken by community groups and agencies such as the Natural Resources Management Board and Department for Environment and Heritage's Urban Biodiversity Unit also have a role in reducing erosion and sediment migration.*
>
> *Over time such efforts should result in a reduction in sediment discharge to the intertidal zone.* (page 47)

The proposal includes the capture of up to 80% of the site's stormwater for reuse.

The remaining stormwater will not be discharged into any of the mapped shorebird habitat areas, the Gawler River or Buckland Park Lake System. As described in this report and the EIS, stormwater will be discharged via the Thompson Outfall Channel into the Gulf St Vincent.

To mitigate issues associated with turbidity in the Gulf St Vincent, the proposal's stormwater management strategy includes treatment to meet the SA EPA *Environmental Protection Water Quality Policy – Aquatic Ecosystem ("Marine Waters")* criteria. This is achieved through the implementation of WUSD principles to the proposed stormwater management strategy as described in Figure 4.1 of this report, Chapter 7 of the EIS, and in Wallbridge and Gilbert's technical report attached at Appendix 18 to the EIS.

Sediment and erosion control measures will be implemented during the proposal's construction, as described in the EIS.

As part of the proposal, the Gawler River and Thompson Creek riparian corridors will be rehabilitated as described in Section 4.1 and 4.9 of this report, and Chapter 10 of the EIS.

As noted in the NRMB's report, sediment toxicity has progressively reduced since the implementation of the *Environment Protection Act 1993* which places a duty of care all South Australians not to discharge toxic materials.

Accidental spills are dealt with by 'clean up orders', at the expense of the polluter.

All construction activities, and future land uses associated with the proposal will be compliant with the Act.

It is therefore anticipated the proposal satisfactorily addresses water quality and shorebird habitat.

Water Quality

The EIS recognises downstream threats as required by the draft *Metropolitan and Northern Coastal Action Plan* and *Coastal Conservation Assessment* (DEH and Board).

The site is located at the bottom of the Gawler River catchment, only the Gulf St Vincent, accessed by the Thompson Outfall Channel is downstream.

This is addressed by the implementation of a stormwater management strategy, prepared to ensure discharged stormwater meets the SA EPA (2003) *Environmental Protection Water Quality Policy – Aquatic Ecosystem ("Marine Waters")* criteria. Wallbridge and Gilbert, modelled the proposed stormwater management strategy using a MUSIC and established the Criteria will be exceeded.

The draft *Adelaide Coastal Water Quality Improvement Plan* and WSUD assumes all new developments will endeavour to reduce stormwater flows and sediment inputs to the coast. Accordingly, the proposal's storm water management strategy includes the capture of up to 80% of the proposal's stormwater for re-use. Only 20% will be discharged to the Gulf St Vincent via the Thompson Outfall Channel.

However, the predicted annual increase in runoff discharging to the Gulf St Vincent as a consequence of the proposal is only 3% – 5%. The site is only one small part of the catchment which discharges via the Thompson Outfall Channel.

The stormwater management strategy includes a detention basin which will slow the rate of discharge from the Thompson Outfall Channel to 10m^3/sec, as required to comply with the Playford (City) Development Plan controls.

Water quality will be protected by:

- Limiting the volume of stormwater discharged from the site.
- Slowing discharged stormwater to the pre-development rate of 10m^3/sec.
- Compliance with the Marine Criteria.

The EIS considered the potential impacts on ground water within the coastal plain. Sinclair Knight Merz concluded the proposal will have negligible impacts on ground water within the site's vicinity, including the coastal plain (2009). Their analysis accounted for sea level rise and its potential impacts on ground water at the coast line – please see Figures 4.9 and 4.10.

It is therefore concluded the proposal's relationship with ground water will not impact on coastal vegetation and dependant fauna.

The EIS considered the link between Potential Acid Sulphate Soils (PASS) and mobilisation of pollutants (page 8-5).

> *Excavation of ASS may release acid and metals that contaminate soil and affect plants and animals, reduce water quality, damage estuarine environments, decrease wetland biodiversity, and reduce fisheries production.*
>
> *Metals mobilised by acid leachate may accumulate in animals and move through the food chain. High nutrient loads will lead to eutrophication, algal blooms and loss of seagrass.*
>
> *However, any impact from released leachate is likely to be confined to an area 100 m around the Thompson Outfall Channel discharge point, as water runoff and soil disturbed by construction would be discharged from the site via the Channel.*
>
> *Golder and Associates identified PASS locations on the site, and recommended a management approach during construction.*
>
> *In tandem with specific measures to manage PASS issues, construction will be guided by Soil and Erosion Management and Water Management Plans.*

Golder and Associates identified parts of the site which are there is a high risk of encountering PASS. These areas have been largely contained in the Masterplan's southern and south western open space areas, minimising the potential for actual Acid Sulphate Soils to be undercovered.

Please see Section 4.19 for more detail.

Nevertheless, the CEMMP for each of the proposal's stages will be informed by detailed geotechnical investigations, and will include methods for managing, monitoring and rectifying any issue associated with soils, soil erosion and run off from construction.

The EIS considered potential impacts on fisheries and hatcheries, particularly in relation to the discharge of stormwater to the marine environment (page 8-7).

The Prawn Fishery established within Gulf St Vincent is reliant on the Port River, Barker Inlet and Gawler River estuaries as an important resource for prawn larval recruitment and as a nursery habitat. The Marine Scale Fishery also relies on these estuarine ecosystems as many targeted fish and crustacean species spend a part of their lifecycle within these estuarine environments.

Stormwater will be discharged from the site via the Thompson Outfall Channel, not the Gawler River. It will be treated prior to discharge to meet the with SA EPA (2003) Environmental Protection Water Quality Policy – Aquatic Ecosystem ("Marine Waters") criteria.

Weeds, pets and people

The EIS considered the potential impacts of an increased population on the Port Gawler Conservation Park, Port Gawler, Middle Beach, Buckland Park Lake and Cheetham salt pans (Chapters 7.6, 8 and 10).

The NRMB's report *Shorebird Management and Conservation* 2009 notes:

Disturbance comes in an incredible variety of guises and as such no one approach will address all forms. Activity-based disturbance (eg bait digging, offroad vehicle use, horse riding, walking & dog exercising on tidal flats and beaches) may be addressed by activity and zoning restrictions in Marine Parks and Aquatic Reserves. Outside protected areas, disturbance may be minimized by considering the approach taken in other states, where vehicles are banned on all state beaches with exceptions. This is a reversal of the current South Australian approach which permits vehicles on all beaches, with exceptions. (page 52)

The report goes on to list 'Possible control or remediation methods' associated with disturbance of shorebird habitat. These methods can be applied to all aspects of the coastal plain and coastal habitats.

- *Educational program to raise public consciousness*
- *Protective zoning of northern feeding & roosting areas under MP Act.*
- *Activity restrictions in Aquatic Reserves*
- *Change vehicles on beach policy from permitted with exception to banned with exception*
- *Planning Strategy & development plans could incorporate habitat buffers between feeding/roosting areas and new developments*
- *Implement fox control*
- *Dog and Cat Management Act 1995* (page 52)

Education and People

Education is described in Chapter 10 of the EIS, and Section 4.9 of this report.

In addition Welcome Packs to new residents can include information on planting coastal gardens and weed control. The NRMB has prepared a suitable brochure for residents which provides this information "Coastal Gardens A Planting Guide', it is at Annexure 4.

The 'Gawler River Open Space Strategy' is being prepared, and is currently in draft form. It includes a range of proposed walking and environmental education activities within the estuarine end of the Gawler River and Buckland Park Lake complex.

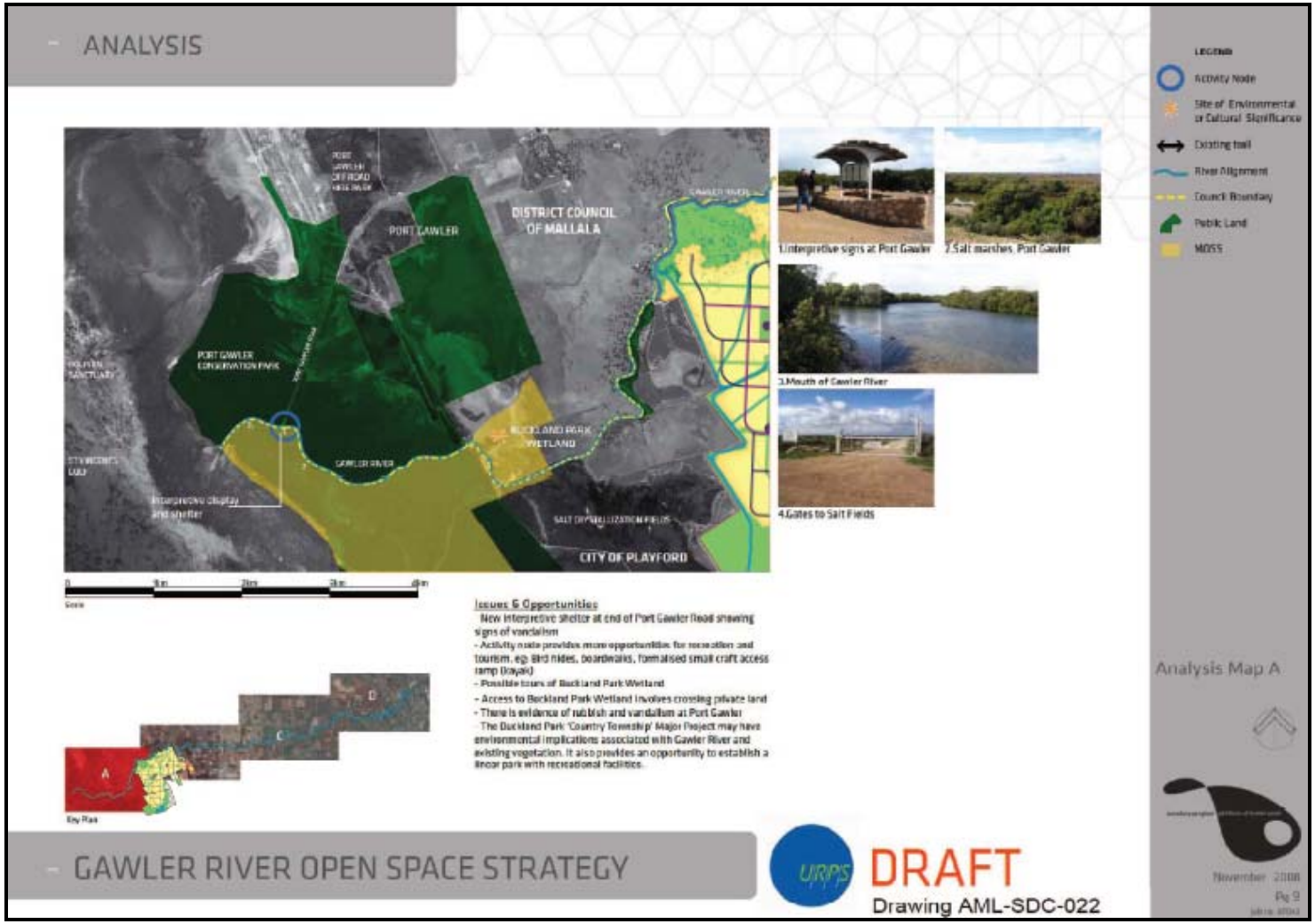


Figure 4.32: Draft Gawler River Open Space Strategy with the Proposal
Source: NRMB adapted by Walker Corporation

The proposal includes the progressive rehabilitation of the Gawler River corridor through the site, including large areas of the river's flood plain which adjoin the corridor.

This is described in Section 4.9 of this report, and Chapter 10 of the EIS, and Dr Anderson's technical flora report at Appendix 14 to the EIS.

The impact of stormwater management and ground water changes on remnant trees in the area is discussed in Section 4.1 of this report, and Chapter 7 of the EIS.

Rehabilitation works can include the implementation of the 'Gawler River Open Space Strategy' by including the linear trails.

Areas with ecological importance can be fenced if required, with walking trails, formal interpretation and observation points, and passive recreation facilities, deflecting people from these more sensitive areas.

The provision of facilities anticipated in the Strategy will control and focus people, and will deflect them from intruding in more sensitive areas. This is complemented by the provision of large areas of open space within the Masterplan which will include passive and active recreation facilities which will be attractive to people.

As noted by the NRMB, implementing the Strategy will educate the community and improve their awareness of the high ecological value of the area.

Protective Zoning

Subject to the Governor approving the proposal, any required Development Plan Amendment will include habitat areas in the site's north and south in an open space or MOSS (recreation) zone as appropriate.

Activity Restrictions

People will visit the Gulf St Vincent coast for boating, fishing and recreation activities in growing numbers as Adelaide's population grows.

However, this is not a consequence of providing housing for those people in any one location. It is a consequence of general population growth.

As recommended by the NRMB, the government can review the activities permitted in particular coastal locations and implement restrictions of fishing, bait collection, rubbish management and the like, necessary to address population pressures.

There is no direct access to the coastal plain from the site, therefore the proposal's residents will only be able to visit the coast via the public road network to specific public facilities like all other existing and future Adelaide residents.

Please see further discussion on vehicles, below.

4WD and Off Road Vehicles

Chapter 8 of the EIS considered the potential impacts associated with the recreational use of 4WD and off road vehicles.

The use of recreational vehicles on the coastal plain is a consequence of population growth, and not specific to the proposal.

However, the proposal's residents will only have the right to use coastal area for recreation, where these areas are open to the public.

4WD and off-road vehicles will be unable to reach the coastal plain directly from the site, because there is no road access. Areas on the coastal plain to the west and north of the site are separated by the Gawler River and private property. Areas on the coastal plain to the west and south of the site are separated by the Cheetham salt pans, which are private property, and are not capable of being traversed by vehicles in any case, as they are water bodies.

Access to the coastal plain from the site will therefore be focused and controlled to publicly accessible locations via the public road network. As the NRMB's report notes, the state government could consider banning these vehicles from beaches and coastal areas as the norm, rather than the exception. This is a way of managing the issue on a metropolitan wide basis as Adelaide's population grows.

This will address the issue of pressure on coastal areas by Adelaide's growing population for recreation acitivities.

Habitat Buffers

The proposal includes habitat buffers to Cheetham salt pans, as described in the section on Shorebirds, above.

The EIS commits to achieving a Significant Environmental Benefit (SEB) associated with any removal of native vegetation that may be a consequence of the proposal.

As part of this significant environmental benefit the EIS suggests the following works in the coastal plain could be considered (page 10-15).

Cooe found ecologically significant vegetation and habitat on the coastal plain to the site's west of the site has suffered degradation from feral animals and general rubbish. The impacts of Cheethams salt pans, with changes to land form and hydrology were also evident (Appendix 11).

Establishing an environmental improvement program in these areas would provide a suitable contribution towards achievement of a SEB. These actions could be part of the Draft Regional Recovery Plan for threatened species and ecological communities.

Works that could be undertaken by the proponent, or funded through the Native Vegetation Fund, include:

- *Removal of feral animals.*
- *Removal of weeds and rubbish.*
- *Revegetation.*
- *Drainage and erosion control works.*

These works would be subject to preparation of Rehabilitation and Revegetation Plans and Management Plans for the targeted land. Active participation in the Draft Regional Recovery Plan is a realistic contribution to the proposal's SEB.

When the requirements for SEB, if any, are established, discussions will be held with the owners of the coastal plain, the Department of Environment and Heritage and the Crown, about the possibility of works.

It is however re-iterated that the proposal is kilometres from the coastal plain mitigating any potential impacts on its flora and fauna, and no works are proposed near, adjacent or in that area.

Habitat buffers to the Port Gawler Conservation Park, Port Gawler, Middle Beach, and Buckland Park Lake were described in Chapter 8 of the EIS. The nearest proposed residential neighbourhood to Buckland Park Lake is 2.12 kilometres, the other significant areas are further away.

The rehabilitation of 71.6 hectares of remnant red river gum woodland in the site's north west corner will complement, and contribute to, the environmental values of the Gawler River estuary and Buckland Park Lake System.

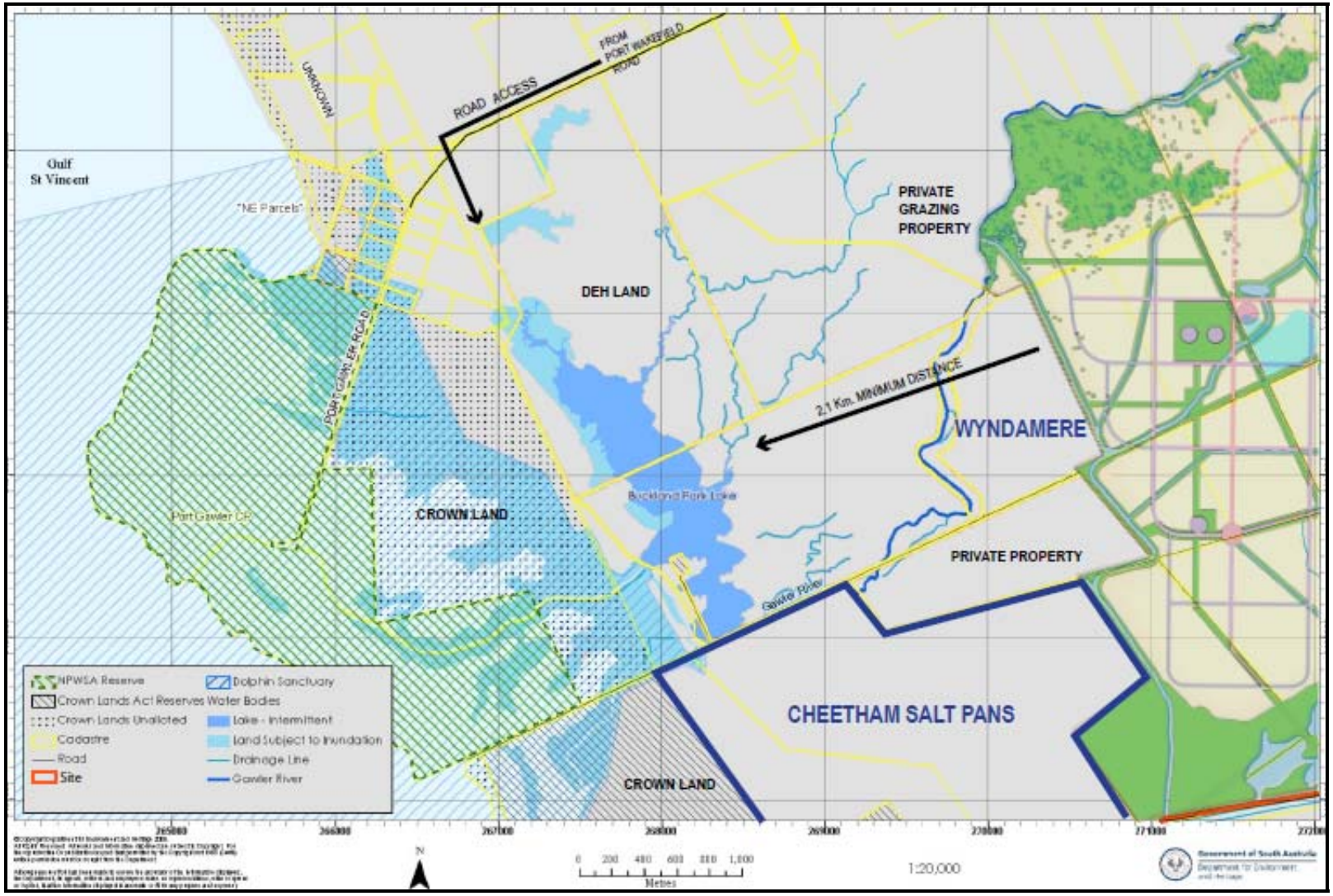


Figure 4.33: Gawler Conservation Park, Buckland Park Lake System and the Proposal

Source: Department of Environment and Heritage adapted by Walker Corporation

Pets

As described in Chapter 8 of the EIS, and section 4.9 of this report, educative material will be provided to residents in Welcome Packs, and specifically in Design Guidelines regarding the responsible pet ownership.

As suggested in the NRMB's report, application of the *Dog and Cat Management Act 1995* gives power to authorities to remove and destroy unmanaged pets.

The provision of "off leash" areas in the Masterplan's open space areas and designed and landscaped walking areas within the Masterplan will be an attractive alternative to dog walking in sensitive areas.

Weeds

The Adelaide and Mt Lofty Ranges Natural Resources Management Board noted the EIS's response to the weed issue is reasonable. The EIS already commits to Design Guidelines which require the use of indigenous plants (pages 20-3 and 20-6), and provision of Welcome Packs to residents which provide guidance for garden planting and weed management. This can be supplemented by the Board's advice on garden management at Appendix 4.

Rubbish

The EIS does not assume the introduction of an urban community will increase surveillance, discouraging dumping, and will bring services to the area.

However, it notes it will be one possible outcome of the proposal. It is indeed correct that the proposal will bring services to the area.

The EIS also describes the potential for rubbish to be generated by the proposal, ending up on the coastal plain.

> *Rubbish consisting of construction and domestic waste may accumulate on the samphire flats, in the mangrove forest and eventually out to sea increasing the level of stress on these habitats and adversely affecting plant and animal life.*
>
> *Conversely, rubbish dumping is currently occurring in the locality, facilitated by low residential densities and lack of passive surveillance. The introduction of an urban community, will increase surveillance, discouraging dumping, and will also bring services to the area, such as Council clean ups and maintenance programmes.*
>
> *This is a community wide issue, and not directly a consequence of the proposal.*
>
> *Consequently, government is taking action to reduce the level of waste and rubbish, for example banning plastic shopping bags is some areas, and public education campaigns aimed at waste reduction and the danger to the marine environment associated with garbage.*

The proposed stormwater management strategy includes the installation of gross pollutant traps and trash racks within the system to trap rubbish before stormwater is discharged into the Gulf St Vincent, as described in Wallbridge and Gilbert's report (page 24). Please see Figure 4.1.

The EIS includes measures to manage rubbish generated during construction (page 8-7).

The EIS mentions the link between increased recreational fishing and fishing related marine debris (page 8-6)…. *"an increase in pollution levels traditionally associated with recreational boating and fishing, such as fuel spills, plastic bags, drink bottles and cans, and organic waste…"*

The EIS explains PIRSA's role in managing recreational fishing and educating anglers.

It is important to note, recreational fishing is likely to increase as a result of Adelaide's population growth, particularly in its northern region, and this impact is not a consequence of the proposal.

A pro-active, whole of life approach to waste minimisation and awareness and recycling infrastructure has been adopted in the proposal and is described in the EIS, at Chapter 9.6, and in more detail in Parsons Brinkerhoff's climate change and sustainability report at Appendix 16.

Precedent

The government has recently released the draft Planning the Adelaide We All Want. It provides an understanding of land use and infrastructure planning for greater Metropolitan Adelaide, and its northern region.

As can be seen from Figure 4.34 below, the government is not envisaging other new suburbs on the western side of Port Wakefield Road, aside from some areas which may be considered as they adjoin the site and would integrate with the proposal, if it were approved.

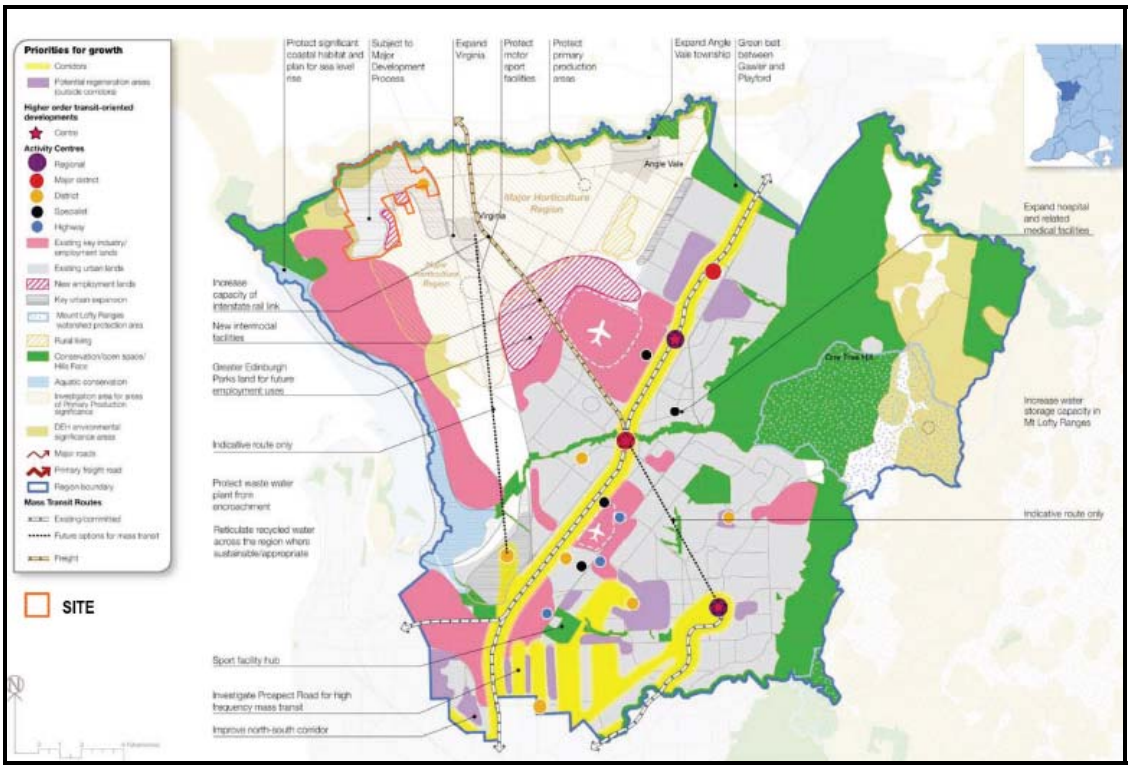


Figure 4.34: Site in 30 Year Strategic Context
Source: Map F7 - Planning the Adelaide We All Want SA government 2009

4.8 Community and Social

Comments on this issue were received in the following formal submissions.

- Playford City Council
- Adelaide and Mt Lofty Ranges Natural Resources Management Board
- Department of Further Education, Employment, Science and Training
- Mr Parnell
- Department of Health
- Department of Education and Children's Services
- Department of Families and Communities

It was raised in community meeting or community information days.

Social Context

At the 2006 Census Buckland Park, which includes the site and its vicinity, had a population of 250 people.

There were 104 dwellings, of which 16 were unoccupied at the time of the Census.

Average household size was relatively high, at 2.8 persons per household.

The median age was 37 years, compared with 38 years across Adelaide's metropolitan area, however the age profile comprised a smaller proportion of both young children (0-4 years), and older persons (65 years and over) compared with the metropolitan area.

While the proportion of people born overseas was similar to the metropolitan area, the proportion of people who spoke a language other than English at home was much higher, almost 50%, compared with 20% in the metropolitan area. The main languages spoken were Italian, Vietnamese and Greek.

Approximately 57% of the population aged 15 years and over were employed. Primary industry activities, specifically mushroom and vegetable growing and fruit and tree nut growing, provided employment for more than a third of Buckland Park's employed residents.

Unemployment was relatively high, at 9.8% compared with 5.2% in the metropolitan area.

Median household income was relatively low at $814 per week, which is around 88% of the metropolitan median.

Despite lower income levels, home ownership levels were very high with around 83% of dwellings fully owned or being purchased.

The proposal will change the character of Buckland Park's community. This will happen slowly as the proposal is implemented over 25 years.

Chapter 14 of the EIS and Connor Holmes' demographic analysis at Appendix 5 of the EIS describes the proposal's changes and growth over time.

It is anticipated there will be higher numbers of people occupying homes which they are in the process of purchasing.

Services currently unavailable in the area will arrive with the proposal's incoming population, benefiting the existing community. These will include public transport, retail facilities, schools and recreation facilities.

While it is anticipated a proportion of the proposal's workforce will be employed in horticulture, other industry sectors will also be represented.

New housing opportunities will be provided for members of families already living in the area, allowing children and parents to locate in housing which is serviced with utilities, easier to maintain than rural blocks and more affordable than rural blocks.

It is anticipated the new community will have ties with the existing, and that these will be built on as more homes are occupied. Community events will be open to all, and will include a range of activities of interest to all residents of the locality, for example, seasonal, religious or cultural activities or activities focused on the region's natural heritage, such as community planting days.

Employment and business opportunities will be available.

The area's character will change from essentially horticultural to residential, but this will happen slowly over decades, allowing people to adjust, and make decisions such as potentially leaving the area.

Principles and Core Values

The new community is envisaged to be active, social and inclusive. Central to the proposal's success is the creation of a place where people will want to live.

To facilitate this outcome the proposal includes:

- The construction and commissioning of a Neighbourhood Centre within Stage 1, to ensure the first residents can walk to buy convenience items or visit a café. However, it is unlikely the neighbourhood centre will be financially viable at commencement, so retailers will need to be supported by the proponent.

  Neither is the Neighbourhood Centre required as part of the proposal's final centres hierarchy. It is therefore being provided purely to provide the fledgling community with a focus and sense of place.

- A community worker.

- A community bus.

Population growth in metropolitan Adelaide's northern region will generate requirements for additional regional services such as public hospitals, tertiary education facilities and regional sports facilities. These facilities would be required in the region, regardless of where that housing is provided.

Also, new schools and more local services are a function of population growth, and cannot be seen as a direct consequence of providing houses for that population to live in.

Services will need to be specifically provided within the site, however, the proposal aims to provide houses for the people who are already coming to Adelaide.

There are commitments regarding the provision of services listed in Chapter 20 of the EIS.

The timing of these commitments is tied to the timing of implementation of each of the proposal's stages.

It is projected the stages will be implemented as follows:

Table 4.5: Projected Timing of Stages

STAGE	Lots created	Projected year
Stage 1	616	2014
Stage 2	4,740	2017 - 2021
Stage 3	7,940	2022 - 2026
Stage 4	11,140	2027 - 2031
Stage 5	12,000	2032 - 2036

Source: Connor Holmes 2009c

As noted in the EIS, these projections are likely to fluctuate in response to market conditions for example. Also production tends to be faster and the beginning and slower at the end of a proposal's creation. This affect is likely to be felt at the beginning and end of the 25 year implementation process, and at the beginning and end of each stage.

These projections can therefore only be considered as a planning tool, actual rates are likely to vary.

Community Building and Identity

Community themes will be prepared in consultation with Council. They will inform the design of both the public and private domain. The private domain will managed by 'Design Guidelines' attached to the sale of each allotment. An example of Design Guidelines is at Annexure 5, and draft Guidelines were prepared by Parsons Brinkerhoff (2009) at Appendix 16 of the EIS.

The public domain will be managed by assessment and endorsement of detailed landscape designs and construction drawings by the Council, prepared in consultation with the Council.

Community themes are central to the proposal's success. The potential themes have been outlined in the EIS, to illustrate the proposal is capable of including this important component.

Themes that can be implemented in the proposal include the site's indigenous vegetation, or Aboriginal, European and Asian cultural heritage.

Community building was described in the EIS, Chapter 14.1.5, 14.4, and 14.18.2. This will be a matter discussed regularly with Council as part of the governance arrangements outlined in Section 4.5.

It is anticipated the new community will form social ties naturally, as occurs in any new suburb, particularly when it comprises households with similar incomes, interests, and problems, and are at a similar point in their lifecycles.

Many activities will spring spontaneously from the community itself, for example special interest groups (Playgroup), sporting groups, or religious groups.

The community space will be available for these activities.

The importance of supporting new residents is central to making the proposal an attractive place to live. Therefore the proposal includes a community centre, community worker and community bus.

Many, many wonderful Australian communities have been established on underused farmland. Indeed, greenfields development is just that. There is always a period of newness, and residents need to be supported at that time.

It is likely the first residents at the site will be young families, as is the case with all new suburbs. But over the 25 year implementation period they and their families will age, their neighbourhoods will become established and a flush of new young residents will occupy the next stage. This will create the diversity found in established suburbs.

Recreation and Open Space

Open space within the site will be landscaped with species suitable for its climate and soil conditions. Detailed landscape designs will be prepared in consultation with Playford City Council, or the state government where rehabilitation of native vegetation is required.

There is adequate room in the Masterplan to accommodate an extensive range of active and passive recreation facilities. These facilities will be planned with Council and the state government through the governance arrangements described in Section 4.4.

Prior to the commencement of proposal's second stage a detailed recreation plan can be prepared with Council, which will look at facilities within the site, and within the Playford LGA so that the provision these facilities is coordinated and serves the needs of the existing and future communities. Existing shortfalls in provision elsewhere could be addressed in this manner.

Existing Playford residents are within a reasonable distance of the site, particularly for travel to regional level facilities. Similarly, new residents will be able to reach existing facilities in Playford. Travel to sporting venues on Saturday and Sunday is a ubiquitous feature of Australian family life, and it will be no different with the proposal.

Sporting facilities, with their requirements for large tracts of land are not commonly located on rail or o-bahn stations, and families go together, making car travel often cheaper than multiple public transport fares.

The EIS has included a list of anticipated required sporting facilities, and this can be refined and improved with the involvement of Council. A strategy for the site, and its surrounding region can be prepared.

Regional open space is required for biodiversity and major recreation and sporting facilities.

There is adequate room within the Masterplan's open space and centres to accommodate requirements for both biodiversity and recreation and sporting facilities.

The arrangements for final ownership of biodiversity areas will be resolved with Council and the State Government .

The potential for a shared community and school sports facility in Stage 1 will be discussed in detail with Council and the Department of Education and Children's services, or a private school provider.

Any such arrangement will ensure there is public access to the oval and its facilities if required.

Community facilities

The method of financing community facilities was described in Chapter 16.6 of the EIS.

Local community facilities will be discussed and arranged in accordance with the governance arrangements described in Section 4.4 of this report.

The proposed community centre and sales office is described in Chapter 3.2.3 of the EIS. They will be separate facilities, indeed the sales office is a separate building within the neighbourhood centre.

The Stage 1 neighbourhood centre, which includes the community centre is only required in its location until the adjoining District Centre is commissioned, as described in Chapter 3.2.3 of the EIS:

> *Approval is sought for a neighbourhood centre within Stage 1. The neighbourhood centre will be constructed in two phases. The first phase will be commissioned to coincide with the occupation of the first dwellings.*
>
> *The second phase will be constructed when demand for additional facilities is generated by new residents occupying Stage 1, or during later phases. It will include additional community space, additional supermarket space and four additional specialty shops.*
>
> *The Stage 1 neighbourhood centre is not part of the proposal's ultimate centre hierarchy. When the adjoining District Centre is commissioned, the neighbourhood centre will be redundant.*
>
> *At that time, the neighbourhood centre buildings will be either:*
>
> - *removed and the site redeveloped, or*
> - *refurbished for another use, ancillary to the district centre, or*
> - *incorporated into the district centre.*

The community worker will be employed and funded by the proponent, to start work shortly before the first residents arrive.

The worker will be based in the community space, which will be fitted out for the purpose, and will also be provided by the proponent.

The arrangements for the community worker will be agreed with Council using the governance arrangements described in Section 4.4. This will include the job description and relevant experience and qualifications, as well as the timing for their employment.

The facilities and fitout of the community space will be agreed in the same manner.

Education

The Masterplan accommodates land for 4 primary and 2 secondary schools. The EIS (page 14-6), and Connor Holmes's supporting *Social Analysis* (page 13) notes the school site near the Neighbourhood Centre (Central) could be used for a public B-12 school (super school), collocated with a private high school to allow shared use of facilities.

At this time it is anticipated some schools will be private and some public. School sites will be established in detailed land division designs, and will be available for purchase by either the private or public sector.

Department of Education and Children's Services (DECS) advised by letter dated 29 January 2009 approximately 65% of the state's children attend public schools.

Applying this ratio, the following timing and number of government and non-government schools would be required. It should be noted however, that these are planning projections only, and could vary with the realities of construction and occupation over the proposal's 25 year implementation period.

Table 4.6: Secondary School Enrolments and Schools

School Type	All Schools		Non Government		Government	
	Students	Schools	Students	Schools	Students	Schools
2016	167	-	67	-	100	-
2021	720	-	288	-	432	-
2026	1,418	2	567	1	851	1
2031	1,874	2	750	1	1,124	1
2036	2,046	2	818	1	1,228	1

Source: Connor Holmes 2009(b)

Connor Holmes' *Social Analysis* noted Virginia Public School had capacity to accommodate the proposal's children in the early stages of Stage 1's occupation. It has additional capacity for demountable buildings and students.

DECS' letter confirmed the information included in the *Social Analysis* regarding education facilities in the site's region aligns with its current understanding of the development of future facilities in the area.

At a meeting on 9 June 2009, DECS representatives confirmed additional students at Virginia Public School would allow increased teaching resources at the school.

DECS also advised they would consider a range of options for providing primary school education in Stage 1's early years, including:

- Use of space within the Stage 1's Neighbourhood Centre as a temporary school, as was done in Mawson Lakes.
- Use of houses within Stage 1 as a temporary school.

These options could accommodate up to 60 or 70 children.

Therefore there are a range of viable options for providing school places for the proposal's children in the short, medium and long term.

DECS has confirmed it is willing to participate in ongoing discussions regarding the provision of education facilities within the proposal.

These discussions will be commenced subject to the proposal's approval by the Governor. Given the 25 year implementation period, with occupation projected to commence in 2013, there is adequate planning lead time for the provision of schools, either by the public or private sector.

Successful planning be achieved by participation in the *Local Government Regional Partnership Forums,* as described in Section 4.4, and the maintenance of an accurate information on timing for the proposal's implementation in the Department of Planning and Local Government's 'Metropolitan Development Programme'.

Health

The Department of Health's submission noted the proposal has numerous aspects with potential for positive health outcomes (health benefits), including:

- The creation of a cohesive community through good planning and urban design. This may include the development of a sense of place, the provision of all basic community services (such as recreational areas, shops, library, schools as well as medical and allied health services).
- The proposed connectivity of all the proposal's parts to each other, which is considered vital and should enhance health.
- The commitment to Affordable Housing, in accordance with South Australia's Housing Strategy.
- Catering for the diverse housing needs that exist in the community by providing a range of dwelling types and styles.

Connor Holmes's project a population of 33,000 people based on numbers of person per dwelling. This figure may vary depending on the dwelling types and numbers of each type.

This is a planning projection, but the Department of Planning and Local Government produces population projections for metropolitan Adelaide and its regions.

The Department's projections can be used by the public heath service provider to inform planning for regional health services.

Should the proposal be approved by the Governor, it is likely the Department will accommodate the projected population in its regional projections to assist in planning for state regional health services and facilities.

Successful planning will be achieved by participation in the *Local Government Regional Partnership Forums,* as described in Table 4.3, and the maintenance of an accurate information on timing for the proposal's implementation in the Department of Planning and Local Government's 'Metropolitan Development Programme'.

The site is located 20 kilometres from Lyell McEwin public hospital. It is accessible to the hospital via an excellent road network comprising Port Wakefield Road and other substantial arterials. It is estimated it would take 35 minutes to travel to the hospital in a car, assuming a 60 kilometre speed limit. Travel by ambulance in an emergency would be quicker.

This is not an unreasonable travel time, given the frequency most people visit major hospital facilities. It is unlikely people seeking or returning from major health treatments would travel by bus, foot, or bike, no matter how close they lived to the hospital.

For workers at the hospital, it is not an unreasonable commute. If workers wished to commute by bus, foot or bike, they would likely choose to live closer to the hospital.

The community bus will be available in the proposal's early phase of occupation to take people to meet the 900 bus route which goes to Elizabeth and Salisbury, providing access to Lyell McEwan.

The beauty of a small community bus service is its flexibility and responsiveness. If required, the community bus service will be flexible enough to make special trips to the hospital as required by particular residents. This could be combined with taking other residents to Elizabeth.

As resident numbers grow this will be replaced by state regional bus services.

These public transport services will allow people to reach specialist medical services associated with Lyell McEwen hospital.

The proposal does not rely on the provision of health services from Virginia. Page 14-3 of the EIS notes,

> *Public general practice services are unlikely to be established within the site. However, a GP Plus Health Care Centre is planned at Elizabeth. In addition to a general practice service, this centre will provide the following:*
>
> - *Chronic disease self-management programs*
> - *After-hours GP services*
> - *Physiotherapy*
> - *Nursing and midwifery services*
> - *Health education*
> - *Specialist clinics*
> - *Minor medical procedures*
> - *Allied health—podiatry, dental, physiotherapy, occupational therapy*
> - *Children and youth health*
> - *Drug and alcohol services*
> - *Community mental health*
> - *Counselling*
> - *Aboriginal health.*
>
> *The centre will offer an extended hour service as an alternative to visiting a hospital, providing the proposal's residents with acceptable access to medical hospital services, public general practice services and specialist services.*
>
> *The Elizabeth GP Plus Health Care centre will be a large centre, and it is understood another, smaller GP Plus Centre is likely to be established within the Playford LGA. These centres will serve the proposal's residents, but have not been accommodated in the Masterplan. The availability of public transport will, therefore, be crucial in ensuring these services are accessible to residents.*
>
> *Provision has been made in the Masterplan for private medical services in the neighbourhood and district centres, it is expected that private general practice and specialist services will be established in these locations. If required, the District Centre can accommodate a GP Plus Health Care Centre.*

Further, and analysis of the availability of services in the locality, particularly in Virginia was undertaken for the EIS by Connor Holmes (2009b), and was described in Chapter 14.11.3.

It included considerations of the impact the proposal would have on those services.

> *The Virginia Medical Centre on Old Port Wakefield Road currently offers private GP, dental and limited specialist medical services, including physiotherapy.*
>
> *The proposal's first residents may place additional pressure on that service.*
>
> *The provider may choose to expand the practice. Additional clients may make it possible for the Centre to increase the range of services offered, which would benefit Virginia's existing residents.*
>
> *Should this not be possible, the speciality shops in phase 1 of the proposal's Stage 1 neighbourhood centre will be suitable for medical and dental practices. Suitable practitioners will be encouraged into the neighbourhood centre, and assisted if required if the resident population is not large enough to maintain financial feasibility.*
>
> *It is expected that private medical services will locate within the Masterplan's neighbourhood centres and District Centre. These facilities will be available to Virginia residents, increasing their health care options.*

The first residents are projected to arrive in 2013. This allows the provider to make plans for additional clients and business if they choose to do so.

However, the EIS commits to an active search for doctors and dentists to occupy Neighbourhood Centre shops, and to assisting them to occupy those shops (page 20-2).

The EIS notes the importance of public transport to provide access to a GP Plus Health Care Centre at Elizabeth and accordingly, provision has been made in the proposal for public transport.

Page 18 of Connor Holmes' *Social Analysis* notes information on GP Plus Health Centres and potential GP Plus Centre in Playford LGA was received from a Department of Health representative.

Funding for the provision of state and local health services was described in the EIS in detail at Chapter 16.6.

Planning for local health services will be a matter dealt with in the governance arrangements described in Section 4.4, which participation in a team approach with Playford City Council (see Table 4.3).

Affordable Housing

The EIS commits to the provision of 15% of the proposal's total yield as Affordable Housing.

Affordable Housing accommodates a range of household types from a cross section of the community. It is therefore not anticipated the presence of Affordable Housing within the proposal will result in a community flavoured by a concentration of social problems.

The proposal includes a community centre, community worker, community bus. The Masterplan includes a framework of centres for services and schools, connected by pedestrian and bicycle ways, and bus routes.

This will create a good living environment for all future residents.

There are three concentrations of Affordable Housing throughout the Masterplan:

- >15%: areas where a wide range of housing types, including medium density housing and apartments could be supported as the proposal becomes established, particularly around centres and close to public transport routes.

- 5%: - 15%: residential neighbourhoods comprising predominately lower density, detached housing, which will be progressively created across the Masterplan, and over time to 2036.

- < 5%: areas adjacent to the woodlands where allotments will be larger, to take advantage of landscape amenity and to accommodate requirements for tree retention. As these larger allotments will be necessarily more expensive it will be difficult to provide affordable homes. These areas are within the proposal's later stages.

As a deliberate consequence of this approach, it is expected the delivery of Affordable Housing will be 15% in the earlier stages, and will gradually increase as neighbourhood centres, the district centre and the mixed use precinct become established, and the range of facilities and services grows.

However, Affordable Housing is not proposed for concentration in identifiable "nodes", which could potentially become "stigmatized".

The figure below illustrates the three levels of distribution. It can be seen they are not concentrated, but indeed, spread over large areas of the Masterplan.

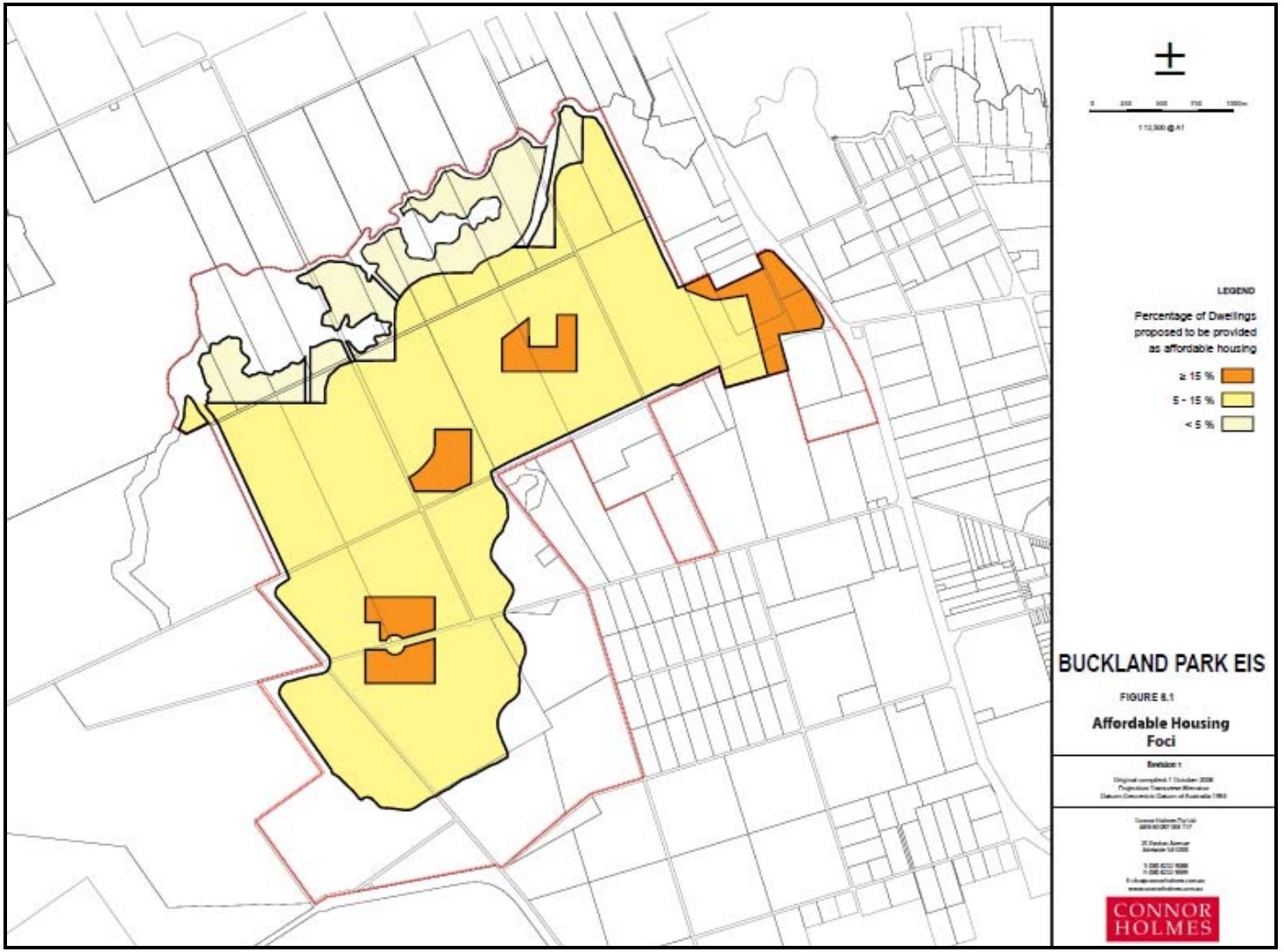


Figure 4.35: Distribution of Affordable Housing Across the Masterplan
Source: Connor Holmes 2009

The distribution of Affordable Housing has been planned considering the following:

- In the areas where <5%, or 5% to 15% of the new houses will be affordable, they will be spread throughout the residential neighbourhoods, integrated with other housing, as it is anticipated the type of households seeking affordable housing and other housing will be fundamentally the same so their housing should be located in the same manner.

- Areas where ≥15% affordable housing is proposed are located close to centres, with their associated services, facilities and public transport access. This affordable housing will be higher density, making it suitable for the required high needs component, as well as for smaller household seeking smaller dwellings. Some of these dwellings, particularly the small villas and apartments, may form part of retirement village or aged care projects within the proposal's later stages.

Stage 1

The Department of Families and Communities (DFC) have requested 15% of housing within Stage 1 be Affordable Housing, and this not be limited to the smaller allotments.

This is acceptable, and the proposal will be amended accordingly.

An *Affordable Housing Land Management Agreement* will be placed on the certificates of title included in Stage 1, securing the Affordable Housing component. It will be placed on the title prior to the lodging any land division applications for Stage 1.

Instead of nominating the allotments, as proposed, the Agreement will indicate the percentage of Affordable Housing to be provided in each of Stage 1's sub-stages. So, while the total percentage of Affordable Housing allotments in Stage 1 will be 15%, the percentage achieved within sub-stages may vary.

It is likely the percentage will be lower in earlier sub-stages, and higher in later sub-stages.

This will allow greater flexibility in the approach to providing Affordable Housing than offered in the proposal as made.

Subject the Governor deciding to approve the proposal, it is requested a decision on Stage 1's *Affordable Housing Plan* be reserved as provided for by Section 48(6) of the *Development Act 1993.*

Stages 2, 3, 4 and 5

Prior to lodgement of applications for the detailed land division of the proposal's later stages, Affordable Housing Land Management Agreements will be lodged in accordance with the requirements applicable at the time.

This can be included as a condition of consent, and will therefore apply to any development of the land undertaken in accordance with the approval in the future.

Disability Discrimination Act

The proposal does not include the construction of any buildings, aside from the Stage 1 Neighbourhood Centre and the Display Village homes and sales office.

Therefore the provisions of the *Disability Discrimination Act* would only apply to those buildings.

This will be addressed in the detailed design of those buildings, and the EIS requests these be reserved matters. An Access Consultant will be bought on board.

The community bus will be a small, 18 seater vehicle, all roads within Stage 1 will be capable of accommodating the bus.

The proposal does not include the construction of any public housing. However, the Masterplan accommodates land for this type of housing if the government wishes to construct it in the future. If so, the government would at that time be responsible for compliance with the *Disability Discrimination Act.*

The Masterplan also accommodates land suitable for retirement villages and nursing homes, which will allow residents to 'age in place'. It is likely these will be provided later in the proposal's implementation phase, as the population ages, and the proposal's centres and services become established.

Retirement villages and nursing homes may be developed by the public or private sector. Either way, compliance with the *Disability Discrimination Act* will be a requirement.

Employment

Enquiries have already been received from members of the local community regarding business and job opportunities during the construction and operation of the proposal. These were received during the community display days, and in correspondence which is included on the Enquiries register.

The Department of Further Education, Employment, Science and Technology (DFEEST) advised the EIS's methodology for generating employment data is satisfactory.

4.8.2 The Department of Trade and Economic Development (DTED) noted:

- Several of the *South Australian Strategic Plan's* targets will be met by the proposal, particularly Target 1.5 (business investment), Target 1.10 (jobs) and Target 1.22 (total population).
- Construction and operation will result in positive economic outcomes for the proposal and the region and the construction phase is likely to provide significant construction employment on the site, over a 25 year period.

- The operation phase will continue to provide economic benefit to the State, with the potential to create up to 10,687 jobs.
- The new population is likely to provide economic stimulus for the new and existing businesses in the area.
- The proposal's supply of land will support Adelaide's housing affordability competitiveness, which is essential to attracting and retaining population.

DTED recommended any planning controls applied to employment precincts not be overly prescriptive, but should instead allow for a variety of opportunities, compatible with residential areas.

DTED is satisfied with the proposal's ability to provide a quality living environment, that will support community well being, provide social connectivity and inclusion, and safe vibrant centres.

Playford Council noted, "*employment in retail and community sector is likely to be achieved as they relate directly to the to existing population*" (page 36).

It is not anticipated the proposal's centres, commercial, employment and mixed use precincts will accommodate uses that will employ all of the proposal's workers. There will be some employment commuting.

However, it is noted the site is located in metropolitan Adelaide's northern region, where there are large employment areas, both existing, in the process of creation and being considered in strategic planning.

It is neither possible, nor desirable to provide all employment for all residents within easy walking distance. This would create residential environments which are unattractive to most people.

For the sake of residential amenity, people chose homes that are away from factories, warehouses, shopping centres and commercial buildings.

The compromise they make is a commute.

This is normal and acceptable in any city, any where in the world.

The requirements for commuting may reduce in the future with increased work being undertaken remotely, through the internet for example.

So, while provision has been made in the Masterplan for areas that will support employment and provide conveniently located services for the new community, it is not desirable to provide 100% employment self sufficiency. This would create an residential environment unattractive to many people.

The planned creation of Transit Oriented Developments will provide housing opportunities for those people who believe convenience to work is more important than a garden.

Adelaide must offer a range of housing environments for its residents.

The commercial, mixed use and District Centre precincts have been located on Port Wakefield Road. This will optimise their accessibility, without impacting on local streets. It will maximise their ability to succeed as they will enjoy high visibility.

The employment precincts accommodated in the Masterplan will be established progressively over the coming decades.

They will be capable of accommodating a range of businesses from services to support the new community, horticultural based uses or businesses relocating from obsolete inner industrial sites.

This will support their viability, and flexibility to respond to changing employment and economic conditions over the coming decades

It is acknowledged there are other industrial areas within metropolitan Adelaide's northern region. However, with growing population and business in the region and in Adelaide it is anticipated there will be requirements for employment land in many configurations, and in many locations.

The employment precincts locations are appropriate as they are:

- Separated from residential neighbourhoods.
- Form a buffer to adjoining horticultural uses
- Are accessible to the Masterplan's major road hierarchy, negating the need for heavy vehicles to travel through local streets.
- Are accessible to all parts of the Masterplan via the road, pedestrian and bicycle networks to facilitate bus, pedestrian and bike access.

4.9 Biodiversity

Comments on this issue were received in the following formal submissions.

- Playford City Council
- Adelaide and Mt Lofty Ranges Natural Resources Management Board
- Department of Land, Water and Biodiversity Conservation
- Mr Grund
- Department of Environment and Heritage
- The Friends of Gulf St Vincent
- Native Vegetation Council

Biodiversity was also raised in community meetings and community information days.

Planning for Biodiversity

As part of the EIS investigations, areas of significant vegetation on the site were identified, surveyed and mapped, as described in the EIS, and in Dr Anderson's report (2008). Dr Anderson considered, not just the site, but areas around its boundaries, its region and the greater region.

Although not required by EIS Guidelines, he also surveyed fauna, and prepared a technical report (2008a).

Cooe, aquatic ecologists investigated flora and fauna on the coastal plain to the site's west.

Together these three reports provide a good understanding of flora and fauna in the site's region.

This information was used to inform the Masterplan. The following amendments were made to the Masterplan in response:

- Storm and flood water management channels were relocated to avoid Thompson Creek's eastern reach.
- Thompson Creek's eastern reach was incorporated into an open space area to facilitate its rehabilitation and ongoing protection.
- The Gawler River corridor and its MOSS (Recreation) zone, is accommodated in the Masterplan's open space, as required.
- The Gawler River flood plain areas with the densest vegetation were incorporated into the Masterplan's open space area to facilitate their rehabilitation and ongoing protection.
- An isolated patch of remnant river red gum woodland has been incorporated into an open space area of approximately 3 hectares. It is 520 to 870 metres from other remnant woodland areas along the Gawler River.
- An extensive area of samphire vegetation in the site's south west corner was incorporated into the Masterplan's open space area to facilitate its rehabilitation and ongoing protection.

The areas of potentially affected vegetation were then measured.

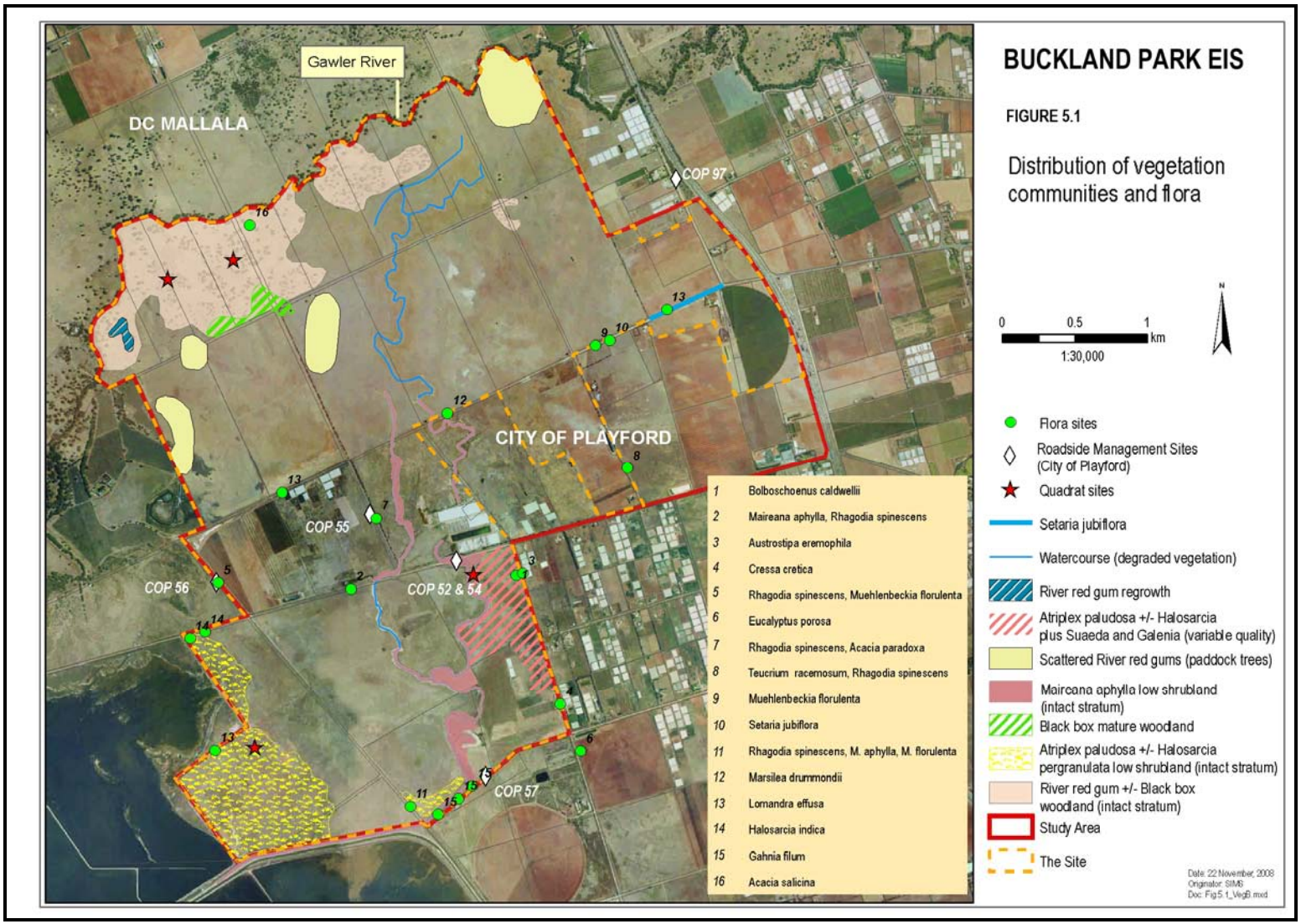


Figure 4.36: Survey of Indigenous Vegetation on the Site
Source: Dr B Anderson

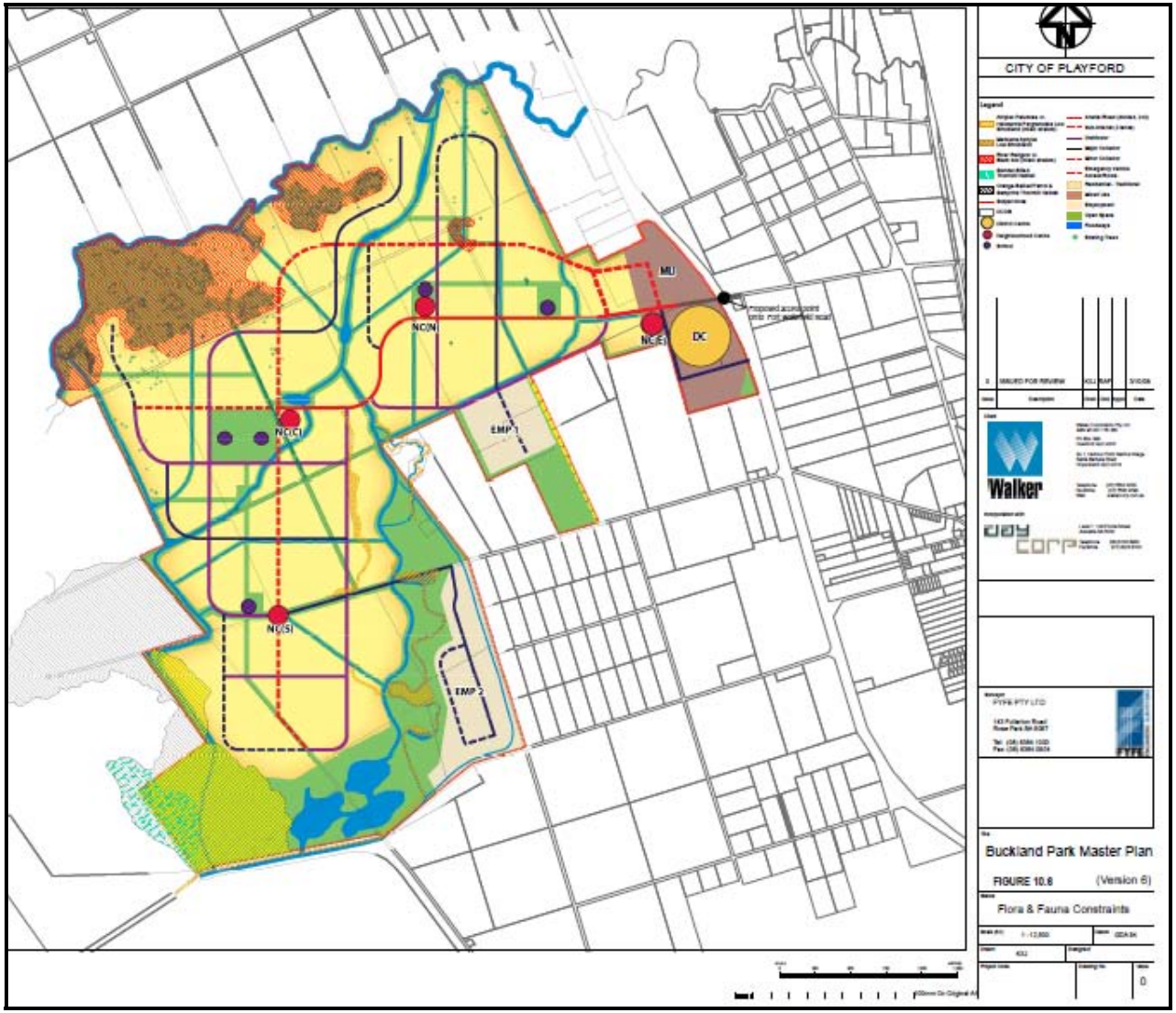


Figure 4.37: Surveyed Vegetation and the Masterplan
Source: Fyfe Surveyors

The site has a total area of approximately 1,340 hectares. Approximately 1,084 (81%) hectares contains no significant vegetation.

The site contains a total of 256 (19%) hectares with some flora and fauna significance. Of this 180.3 (13%) hectares is accommodated in the Masterplan's open space areas. This includes 7.4 hectares of Gawler River corridor, which currently contains no significant vegetation, but is an important environmental area. It is proposed to rehabilitate this land as part of the proposal's implementation.

75.7 (6%) hectares is within the Masterplan's residential areas, and is therefore potentially impacted by new neighbourhoods.

Sixty five (65) scattered paddock trees are within the Masterplan's proposed residential neighbourhoods.

Chapter 10 of the EIS, and Dr Anderson's technical reports at Appendices 14 and 15, considered cumulative effects on vegetation over the whole site, and provided a framework for detailed vegetation strategies to address potential issues which will be designed and implemented at each stage.

Table 4.7: Vegetation Survey and Measurements

Sector	Vegetation Areas Not Affected	Gawler River Corridor	Vegetation Areas Potentially Affected	TOTAL	Trees Potentially Affected
1	17.8 hectares	6.5 hectares	6.2 hectares	30.5 hectares	33
2	71.6 hectares	0.9 hectares	33 hectares	105.5 hectares	32
3	18.2 hectares	0 hectares	29.9 hectares	48.1 hectares	0
4	65.3 hectares	0 hectares	6.4 hectares	71.7 hectares	0
TOTAL	172.9 hectares 68%	7.4 hectares 3%	75.5 hectares 30%	255.8 HECTARES 100%	65

180.3 (71%) hectares of the surveyed vegetation areas are to be retained in the Masterplan's open space areas, and 75.5 (30%) hectares of the surveyed vegetation areas are potentially affected by the Masterplan's new neighbourhoods.

Please see further descriptions and discussion below.

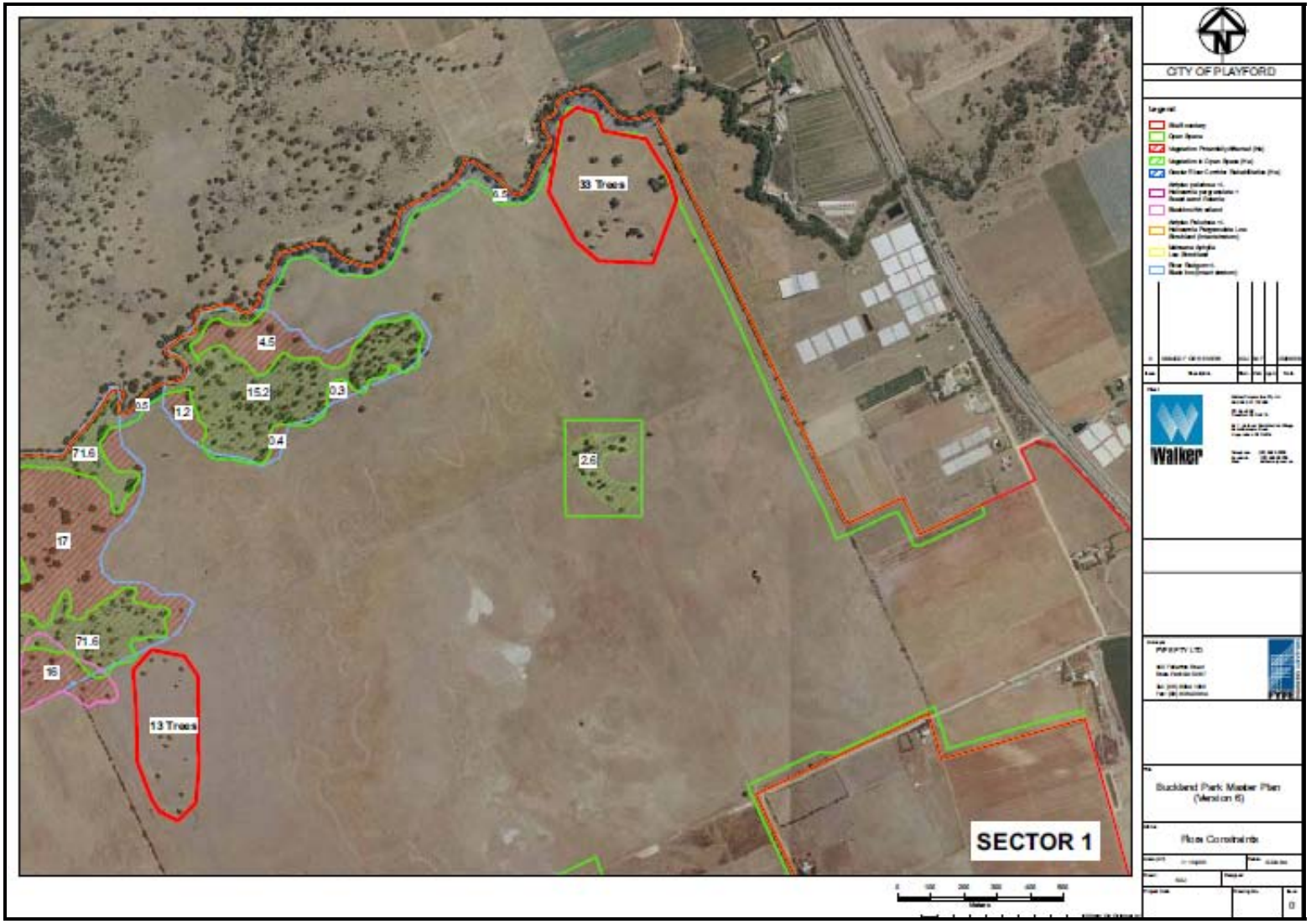


Figure 4.38: Western End of Gawler River and Flood Plain
Source: Dr Bob Anderson and Fyfe Surveyors

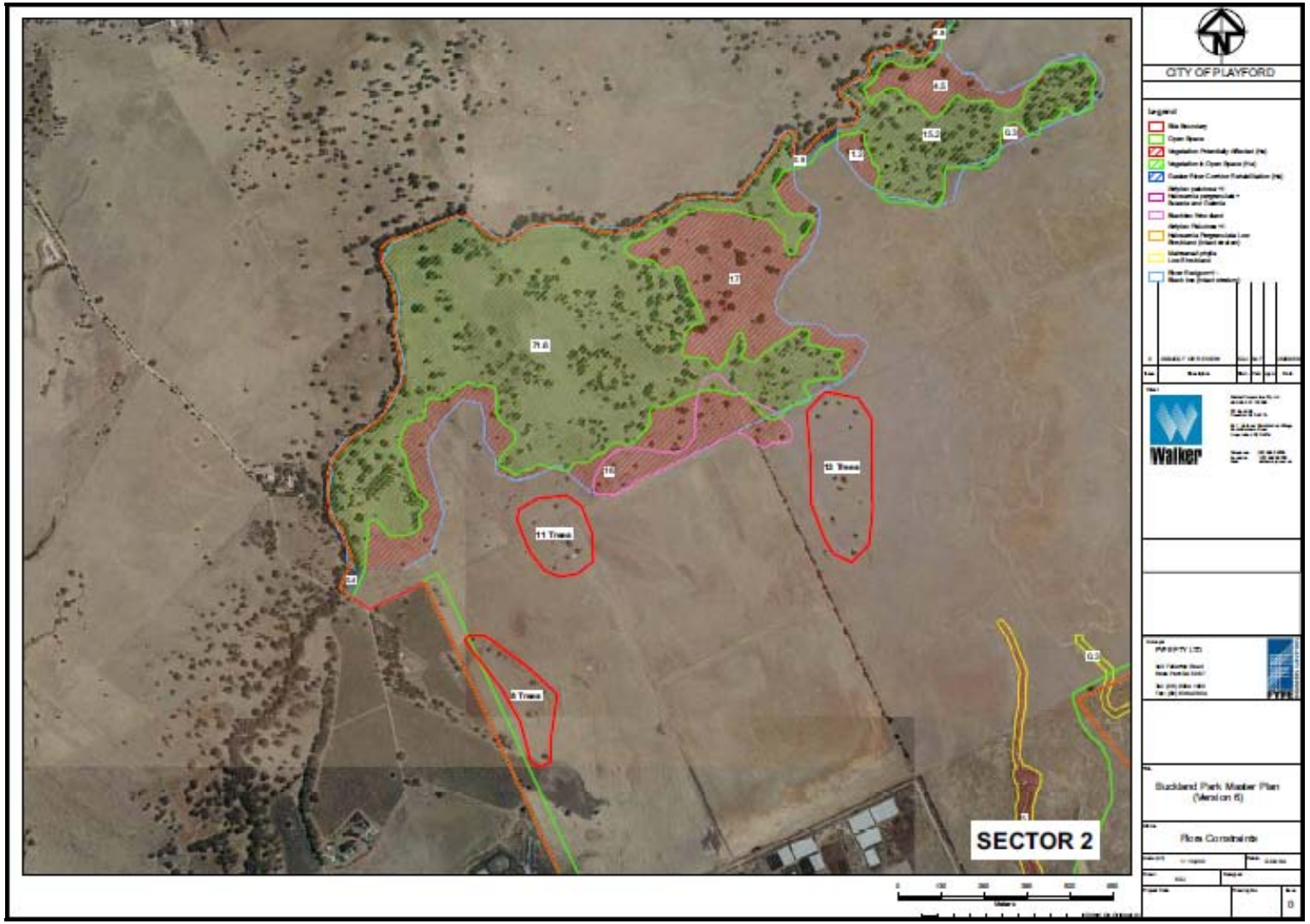


Figure 4.39: Eastern End of Gawler River and Flood Plain
Source: Dr Bob Anderson and Fyfe Surveyors

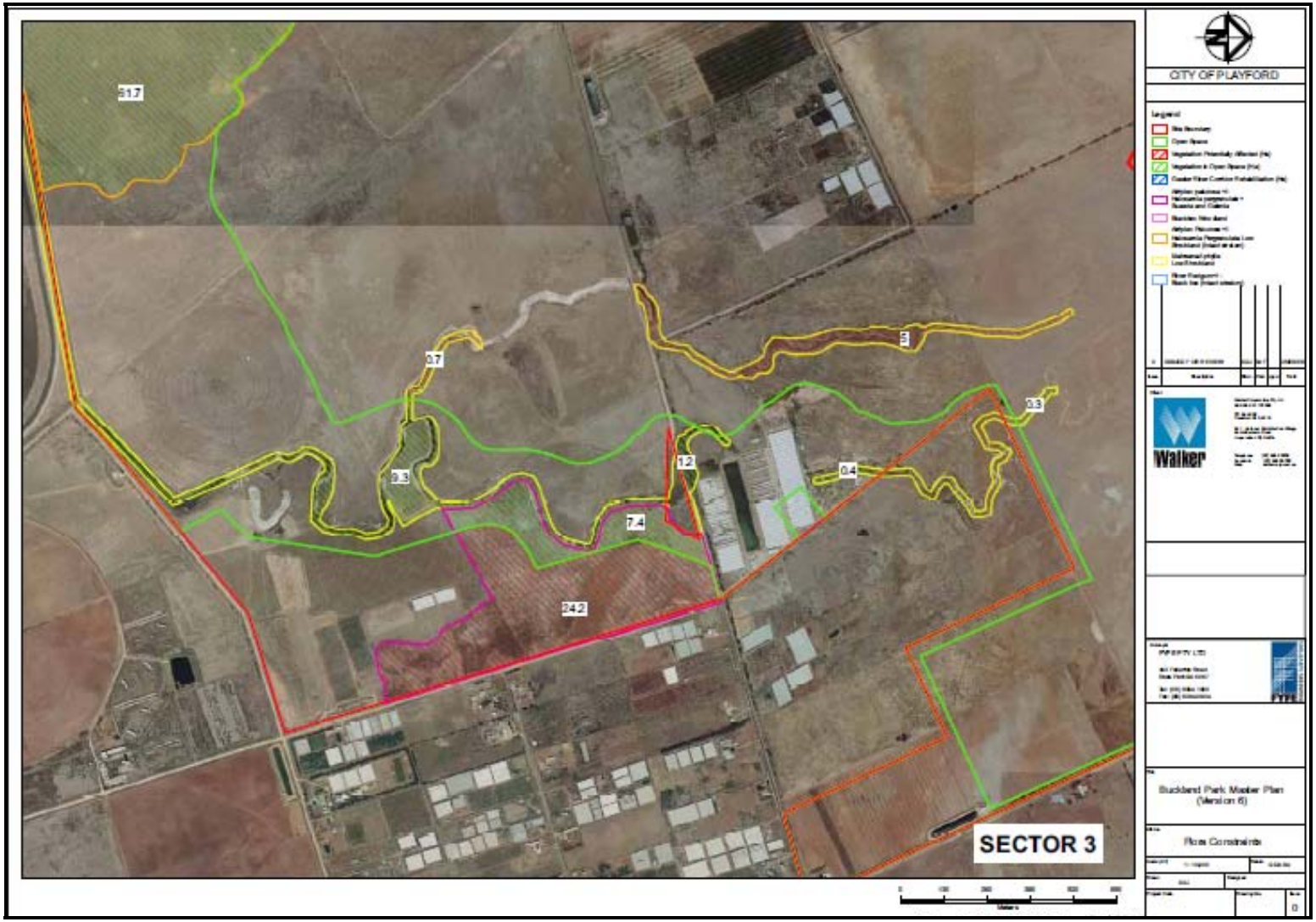


Figure 4.40: Thompson Creek
Source: Dr Bob Anderson and Fyfe Surveyors

Figure 4.41: Samphire in the Site's South West Corner
Source: Dr Bob Anderson and Fyfe Surveyors

How will Significant Environmental Benefits be Calculated?

The proposal will be implemented over a period of 25 years. The EIS sets out viable means of achieving environmental benefits associated with each of the proposal's stages, which are summarised below.

Stage 1

There are no vegetation or habitat issues associated with Stage 1, and its land uses and land division have been designed in detail, and are submitted for approval.

The federal Environment Minister has considered a referral in accordance with *the Environmental Protection and Biodiversity Conservation Act*.

On 17 June 2009, his delegate determined Stage 1 was not a controlled action under the Act, and no further applications or approvals were required.

Prior to the commencement of Stage 1's construction Flora and Fauna, Weed and Soil, Erosion and Water Management Plans will be prepared and approved. These will be implemented during, and post construction.

Stages 2, 3, 4, and 5

Stages 2 through 5 will be designed in detail prior to commencement of their construction, and will be subject to further approvals from State government, particularly the Department of Environment and Heritage, and Federal government.

The following process will be undertaken to calculate Significant Environmental Benefits required to offset the removal of any remnant vegetation on the site.

1. All 256 hectares identified as having flora and fauna significance will be surveyed in detail by qualified ecologists to establish if the vegetation and communities are:

   - Degraded and to what extent; or
   - Diverse and of high value.

   An arborist assessment of the 65 trees will be undertaken to identify their significant tree status, biodiversity value, and potential impacts on root zones.

   Biological Survey of South Australia methodology will be applied, or other as appropriate.

2. The survey information will inform preparation of detailed engineering, land use and land division plans.

   The 180.3 hectares containing remnant vegetation, or located in the Gawler River corridor will be retained in open space areas, as shown on Figures 4.39 to 4.42.

Exact areas of impact will be defined, however it is noted an estimated 75.7 hectares of vegetation, or 6% of the site area, is potentially impacted.

3. Vegetation Management Plans for the 256 hectares will be prepared and approved by the Native Vegetation Council prior to approval of the detailed land division plan.

4. The Vegetation Management Plans will include requirements for achieving a Significant Environmental Benefit (SEB) associated with the proposal, through the following measures provided for in the *Native Vegetation Act 1991*.

    - Establish and actively manage new areas of native vegetation on the site and/or at an agreed area of the same or similar community(ies) in the region.
    - Protect and manage native vegetation on the site, including formal protection by a Heritage Agreement.
    - Establish a Heritage Agreement for other areas of native vegetation, with a Vegetation Management Plan.
    - Payment into the Native Vegetation Fund.
    - A combination of the above management options.

    The Native Vegetation Council has established guidelines for determining the level of SEB required for clearance of scattered paddock trees (Native Vegetation Council).

    In other cases the following general guide is used by the Native Vegetation Council to determine an appropriate SEB offset.

    - Clearance of degraded native vegetation - SEB offset rate 2:1 level of clearance.
    - Clearance of high value native vegetation - SEB offset rate 10:1 level of clearance.
    - Clearance of semi-degraded native vegetation - SEB offset sliding scale from 2:1 to 10:1.

    Native vegetation planted as part of the SEB offset is protected under the legislation as though it was naturally occurring native vegetation. The existence of an SEB offset is flagged against the land title documents for the property to ensure future landowners are aware of the requirement to continue the protection and management of these sites.

    Native Vegetation Council, 2007, prioritises the value of different actions as contributors to achieving clearance offsets and SEBs:

    - The highest value - managing intact areas native vegetation to maintain habitat and prevent future degradation, provided the management potentially provides substantial environmental gains.

- 2nd highest value - improving degraded blocks, for example, by excluding, weed control and perhaps strategic planting to improve habitat.
- 3rd highest value – using existing remnant trees as a structure to build a diverse and valuable habitat by planting under storey species for example.
- 4th highest value - revegetating cleared land, although this takes time to re-establish useful habitat.
- Other offsets – achieving a more significant landscape context, by linking or expanding core areas of habitat.

As described in the EIS, Dr Anderson's Technical Flora Report and summarized below, the 180.3 hectares proposed for retention, which contains significant vegetation provides opportunities for applying all 5 of the offset principles described above.

5. Prior to the commencement of construction within any stage, Flora and Fauna, Weed and Soil, Erosion and Water Management Plans will be prepared and approved as part of the Construction Environmental Management and Monitoring Plan.

The Department of Land, Water and Biodiversity Conservation acknowledged the EIS seeks approval for a broad concept only, and further detailed survey work will be incorporated into CMPs.

What are the Practical and Feasible Methods of Achieving a SEB?

The proposal provides for achievement of the required compensation and mitigation methods.

There are opportunities for SEB works to be undertaken in areas of conservation significance in the site's locality, such as the Gawler River corridor, or areas in the region, such as Buckland Park Lake, Port Gawler Conservation Park, or other areas of State owned land along the coast.

Cooe (2008) found ecologically significant vegetation and habitat on the coastal plain to the site's west of the site has suffered degradation from feral animals and general rubbish. The impacts of Cheethams salt pans, with changes to land form and hydrology were also evident.

Establishing an environmental improvement program in these areas would provide a suitable contribution towards achievement of a SEB. These actions could be part of the Draft Regional Recovery Plan for threatened species and ecological communities.

The Adelaide and Mt Lofty Ranges Natural Resources Management Board listed works in the coastal plain that could be undertaken, or funded through the Native Vegetation Fund:

- Removal of feral animals.
- Removal of weeds and rubbish.
- Revegetation.
- Drainage and erosion control works.

These works would be subject to preparation of Rehabilitation and Revegetation Plans and Management Plans for the targeted land.

A targeted weed management strategy for the Gawler River corridor through the site would result in positive environmental outcomes, contributing a SEB.

The river bed and its banks are densely infested with weeds such as African boxthorn, briar rose, castor oil plant, Noogoora burr, fennel, prickly pear and olive, which are proclaimed or major environmental weeds in South Australia. Bridal creeper, a weed of national significance (WONS) also occurs along the River.

Weed infestations occur along the whole Gawler River length, east and west of the site. In order to be effective, an integrated management programme involving Councils and other land owners is required.

Excluding grazing from vegetation areas will have a positive environmental benefit.

Rehabilitation, revegetation and management of other areas within the site with significant vegetation will make a positive contribution towards SEB, particularly:

- Along the Gawler River corridor and its flood plain in the north-west corner.
- Areas in the south-west corner.
- Thompson Creek's eastern reach.

All storeys of native vegetation will be used and the placement of these species in the landscape will, as far as practicable, accord with that which would have originally been present prior to 1836.

Landscape design for public domain areas will include a component of indigenous flora. To achieve this commitment, collection of propagating materials from different biotypes from the same species within the site and region will be required.

Species required for landscaping, revegetation or regeneration which are difficult to propagate from seeds will propagated from cuttings. The amount of seeds of each species (for direct seeding) and the numbers of plants required as tube stock (seedlings and struck cuttings) will be determined after the exact areas with particular soil characteristics and uses are identified during each stage's detailed design.

Areas of samphire and woodland revegetation have been undertaken successfully in many Australian locations, including Greenfields to the south of the site. There is no reason to anticipate that revegetation programmes will not be successful on the site, and it is understood Playford City Council undertakes such programmes elsewhere in the LGA.

In respect of other open space and landscaped areas within the proposal, it is anticipated appropriate species can be planted both in the public and private domain.

The site is currently cleared farming land, but prior to European occupation supported a range of species, including trees, shrubs and ground covers.

While indigenous planting can be incorporated into landscaping, other introduced species will be used for particular applications, such as where there are particular aesthetic or climate control requirements.

All the management, mitigation and rehabilitation measures will require further documentation to address all issues of implementation and on-going maintenance.

These will be prepared as part of the detailed design phase of each stage, and approved by state government and council.

The implementation of appropriate buffers in the detailed design will prevent the spread of turf grasses.

There are no conservation areas surrounding the site that require fencing as a consequence of the proposal. The site is surrounded by private horticulture and farm land, the Cheetham salt pans, the Jefferies site, and Port Wakefield Road.

The proposal's relationship to the Buckland Park Lake system, the Gawler Conservation Park and the coastal plain is discussed in the Chapter 8 of EIS and Section 4.7 of this report.

The management of weeds was described in Chapters 7, 8, 10, and 18 of the EIS.

Works in the vegetated areas will be funded by the developer during construction.

The Gawler River Corridor

Areas containing remnant river red gums along the Gawler River and in the site's north west corner are biologically significant, as identified in Dr Anderson's report and described in Chapter 10 of the EIS.

The EIS acknowledges the importance of vegetation along the Gawler River as a habitat (page 10-11):

> *While the trees are of botanical interest as a vegetation community and most are significant trees as defined under the Development Act 1993, their particular value is as fauna habitat, especially for avifauna and some mammals, especially bats.*

This matter is discussed in detail in the Dr Bob Anderson's report (2008b).

The majority of trees within these areas are to be retained in open space areas, and planting of new trees undertaken.

This, coupled with stopping cattle grazing in the area is anticipated to create a more robust environment, suitable for the growth of young trees to replace those which are old and dying.

The EIS proposes the progressive rehabilitation of the Gawler River corridor, including weeding, revegetation, and protection of important trees by fencing to deny public and pet access and allow limbs to drop as habitat.

Vesting the rehabilitated Gawler River corridor and part of its flood plain with State will form one part of an public corridor along the river. The government may then consider options which connect that section to the Buckland Park Lake system, or other sections of the river.

The rehabilitation of the area is one public benefit which will flow from the proposal.

The area is currently degraded by significant weed infestations, stock feed species, cattle grazing permitted by the site's existing zoning and drainage modifications.

The Department of Land, Water and Biodiversity Conservation note the proposed rehabilitation of the Gawler River is favourable for weed control.

Issues associated with preserving large trees include:

- Public safety, from dropped limbs for example.
- Residents get annoyed when they can't grow a nice lawn where trees use all the water and drop litter.
- Bushfires.
- Residents don't like spiders, bats, snakes and lizards associated with trees.
- Trees can damage house foundations and buildings.
- Residents and potential residents won't like to see public open space fenced off.
- Tree roots or limbs may be damaged by soil compaction or trucks during construction.

For these reasons, detailed design of neighbourhoods and retained areas of vegetation will be important.

Adequate buffers will be provided between neighbourhoods and retained vegetation. Residents will need to accept fencing of some areas to deny them and their pets access, if that is required.

Residents will be encouraged to have a sense of ownership over treed areas, through community building events.

Trees will only be incorporated into larger lots, where Design Guidelines can specify safe and reasonable buffers within those lots where dwellings will not be permitted.

It is anticipated these allotments will be the most valuable within the proposal.

CEMMPs will include provisions for construction exclusion zones around trees to be retained in neighbourhoods.

Welcome Packs, such as that at Appendix 6 will be provided to educate new residents on the ecological assets around their homes, and this will be supplemented by community building activities focused on environmental works.

Figure 4.42: The Gawler River Corridor Today

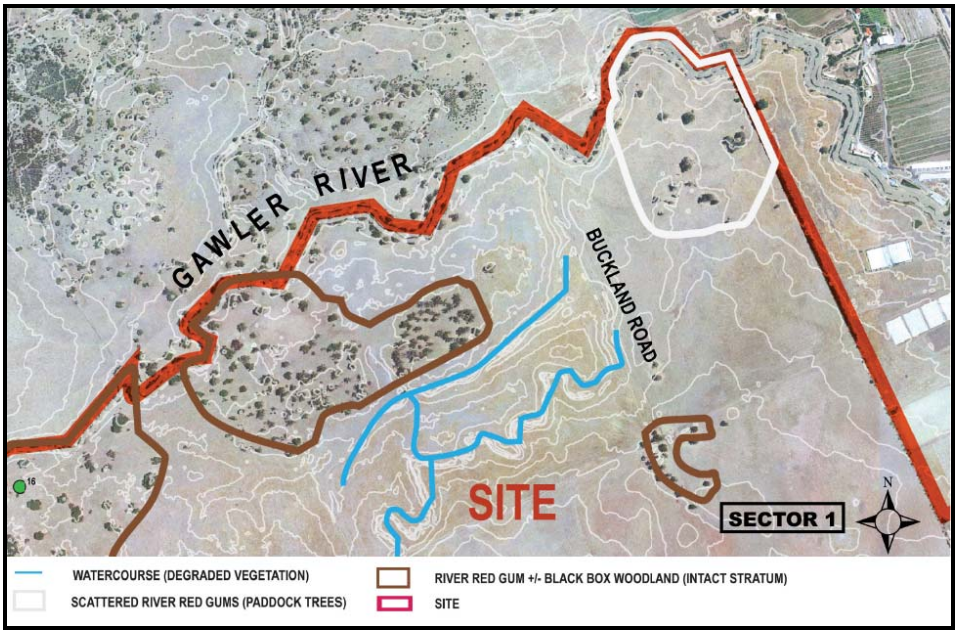


Figure 4.43: Survey Gawler River Corridor – East
Source: Dr Bob Anderson

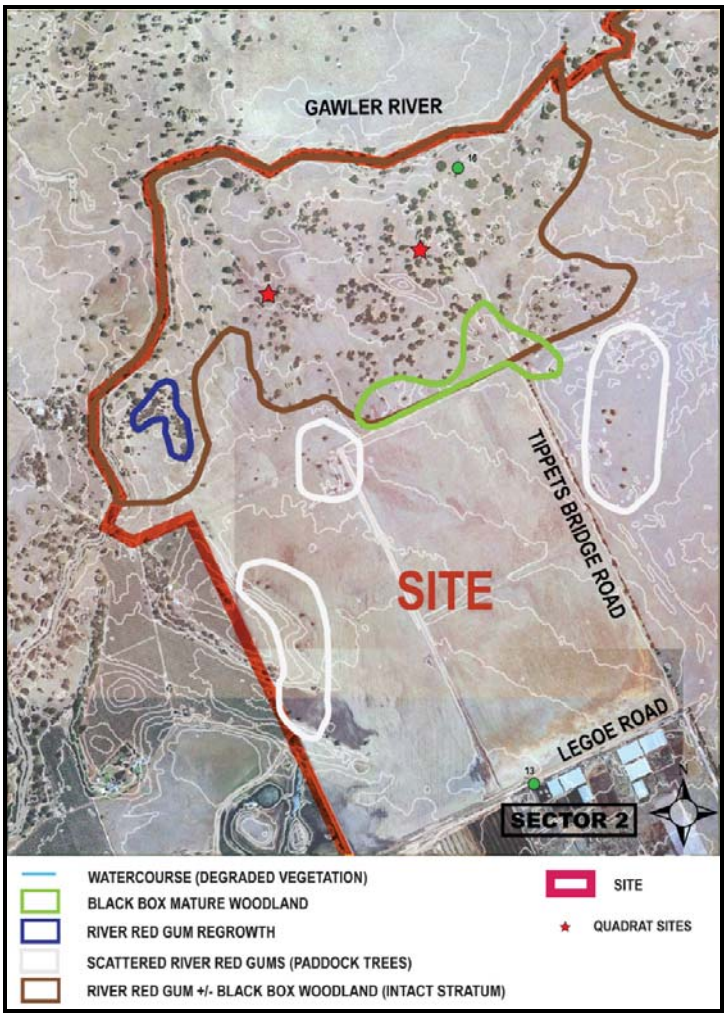


Figure 4.44: Survey Gawler River Corridor – West
Source: Dr Bob Anderson

Thompson Creek

The Thompson Creek corridor does not contain samphire, although there is an area adjoining to the west.

The Masterplan accommodates significant areas of vegetation along Thompson Creek in its open space areas to facilitate rehabilitation, management and conservation. The storm and flood water management channels were amended during the Masterplan's design to avoid the most significant areas.

The rehabilitation of Thompson Creek included in the proposal will improve its ecological contribution.

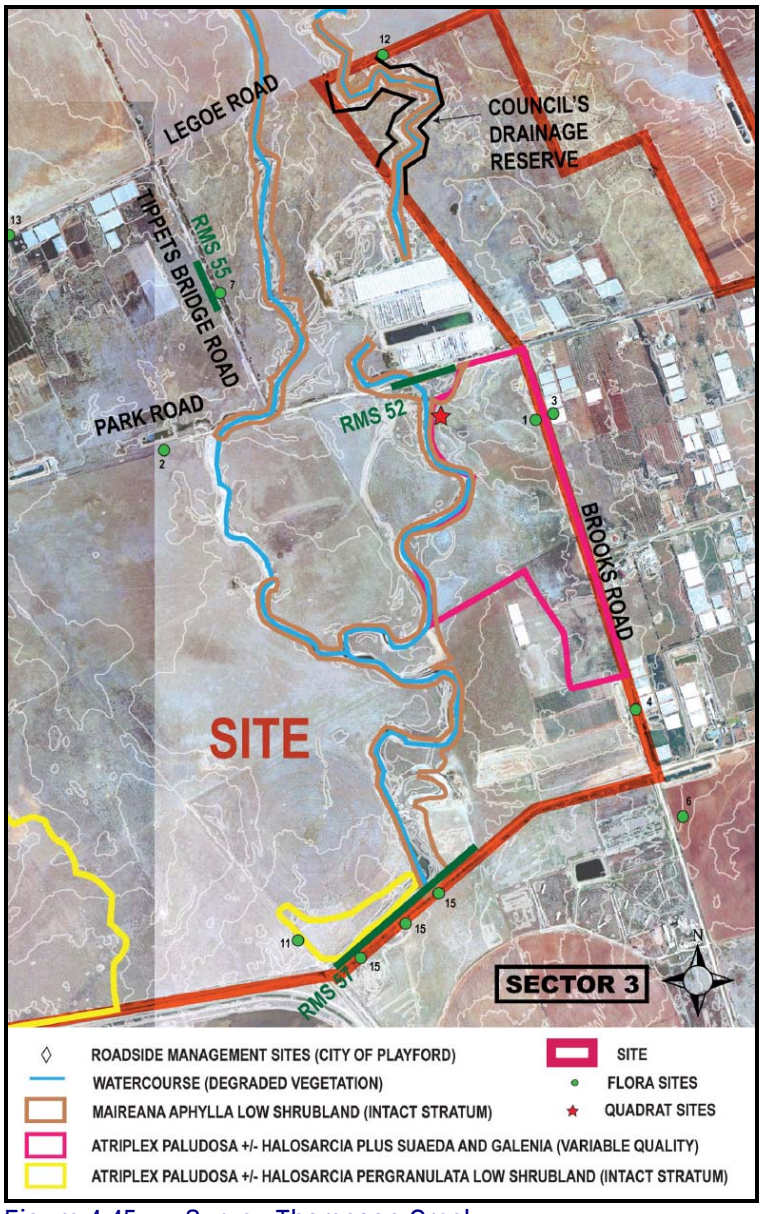


Figure 4.45: Survey Thompson Creek
Source: Dr Bob Anderson

Samphire Areas

Dr Bob Anderson notes all of the major vegetation communities originally present in the region are still represented there (2008).

However, less than 4% of the natural vegetation communities remain on the Adelaide Plains and remnants are usually small, isolated and often degraded.

For example, within the Playford LGA, no more than 1% of the original area of terrestrial, dryland vegetation remains on the plains.

The site is on the edge of two of the State Hundreds. It is in the northern most part of the Hundred of Port Adelaide, which contains 11.8% remnant native vegetation of which 4.3% is formally reserved. The Hundred of Port Gawler, north of the Gawler River and the site contains 15.3% remnant native vegetation of which 4.4% is formally conserved.

This is considered to be a low remnancy status for each Hundred. Both Hundreds include LGAs other than the Playford LGA.

Based on analysis of regional data only about 1.2% of the original terrestrial, inland vegetation is present as remnant vegetation.

Most of the remnant native vegetation is located along the coast and there is a disproportionate representation of coastal samphire and mangrove vegetation communities in these totals.

Even though there is a disproportionate representation of samphire communities along the coastal plain to the west of the site, it is proposed to retain extensive areas of the site's samphire within the Masterplan's open space areas.

During design work, the Masterplan was adjusted to remove proposed residential areas from all but a small portion of samphire.

Samphire on the site contains a number of important plant species of regional significance, and is a potential habitat for the Orange Bellied Parrot.

The retained areas of samphire are contiguous with adjoining areas on private grazing land adjoining the site's west.

It will be rehabilitated and fenced if required to prevent access by pets and people.

A small area of samphire will potentially be impacted by a southern residential neighbourhood.

Samphire vegetation can be readily established, as demonstrated at Greenfields and Barker Inlet.

The Masterplan's southern area of open space, adjoining existing samphire, provides an ideal location for establishing new samphire as a significant environmental benefit.

However, it may be more appropriate to rehabilitate other species elsewhere on the site, or rehabilitate or revegetate samphire areas in the coastal plain to the west of the site as a Significant Environmental Benefit, if required.

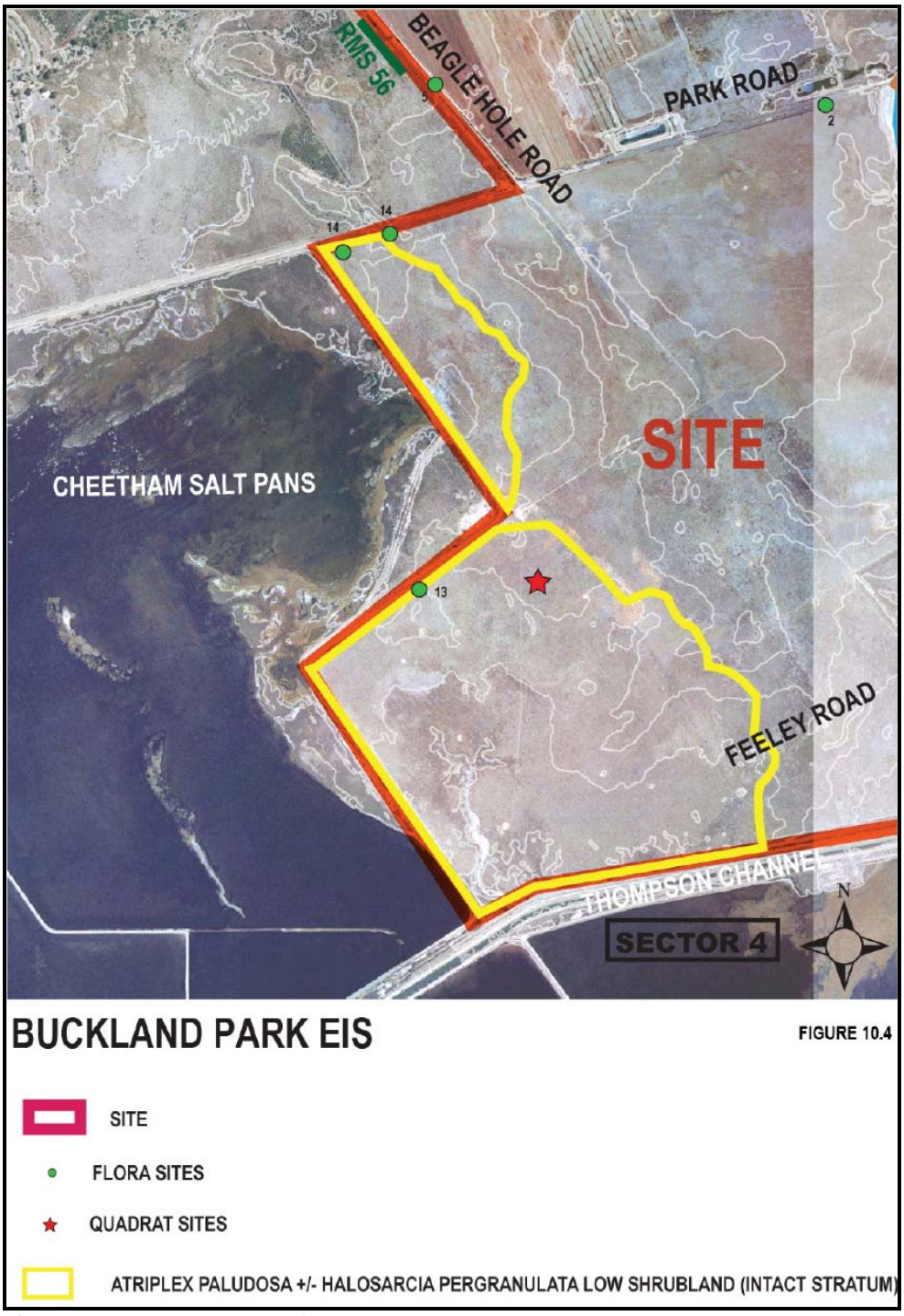


Figure 4.46: Survey South West Corner
Source: Dr Bob Anderson

How will Biodiversity Issues be Addressed in New Neighbourhoods?

Biodiversity will be addressed in new neighbourhoods as described below. It is anticipated these measures will make a positive contribution to the region's biodiversity.

1. Detailed land division designs will be informed by vegetation survey and requirements to achieve a significant environmental benefit. They will allow for buffers to areas of vegetation to be retained, incorporate trees into parks, and allow large allotments or road reserves to incorporate trees which are suitable for retention in neighbourhoods.

   Buffers can be roads encircling residential allotments for example. These prevent fires and turf grasses spreading, and allow good public outlooks into the natural areas.

   Treed areas on the site are an important asset. It is anticipated allotments with a relationship to those areas, for example an attractive outlook, will be the most highly sought after within the proposal. .

2. Each new residential title will be burdened with requirements for new householders to comply with Design Guidelines. The Guidelines will require the use of indigenous plants in private gardens.

3. "Welcome Packs" will be provided to each new resident which includes material on the design of their gardens, responsible pet management and on their interaction with the natural environment.

   The Department of Environment and Heritage and the Adelaide and Mt Lofty Ranges Natural Resources Management Board have prepared similar information for residential projects. These are attached at Appendix 6.

   These will be used as a model for Welcome Pack information.

4. Open space and the public domain will be planted with indigenous species. This will be subject to agreement and approval with Playford Council in accordance with the governance arrangements described in Section 4.4.

   The following species have been identified as being important for use in landscaping and rehabilitated areas to provide a habitat for native threatened butterflies, and can be included in landscaped areas, particularly in the site's southern area where there is already butterfly habitat:

   - *Melaleuca lancelata*
   - Spear grasses *Austrostipa, A. eremophila, A. scabra.*
   - Wallaby grass *Austrodanthonia.*
   - Wetland sedge *Gahnia Filum.*
   - Bitterbush *Adriana.*

5. Community building activities could include planting and rehabilitation of the site's biodiversity areas.

The Department of Land, Water and Biodiversity Conservation expect the proposal will decrease available opportunities for weeds and vertebrate pests.

Roadside Marker System Sites

There are 4 Roadside Marker System sites within the site's external boundaries.

1. RMS 52 Park Road is located adjacent to the parcel of Crown Land which is not included in the proposal, and has been excluded from the site.

   Council notes:

   Thompson Creek runs through this site. It is the only road in the Far Western Plains survey with this feature, and it has a good range of ephemeral creek bank vegetation in a relatively saline area. It also has a large buffer zone that encompasses a 15m portion of the creek.

   The crown land and adjoining RMS 52 are contiguous with Thompson Creek's eastern reach.

   The Masterplan has been designed to incorporate Thompson Creek's eastern reach into a large area of open space, and it will be rehabilitated and revegetated as part of the proposal.

   Thompson Creek, the crown land and RMS 52 will therefore a contiguous area of rehabilitated and revegetated waterway separated from any proposed residential neighbourhood.

   While they are near a proposed employment precinct, it is noted that RMS 52 and the crown land already adjoin Perpetual Holdings' significant operation, and rehabilitated riparian areas are often provided in employment zones.

   Road improvements required in this location will be carefully designed to protect and enhance the natural vegetation in this area.

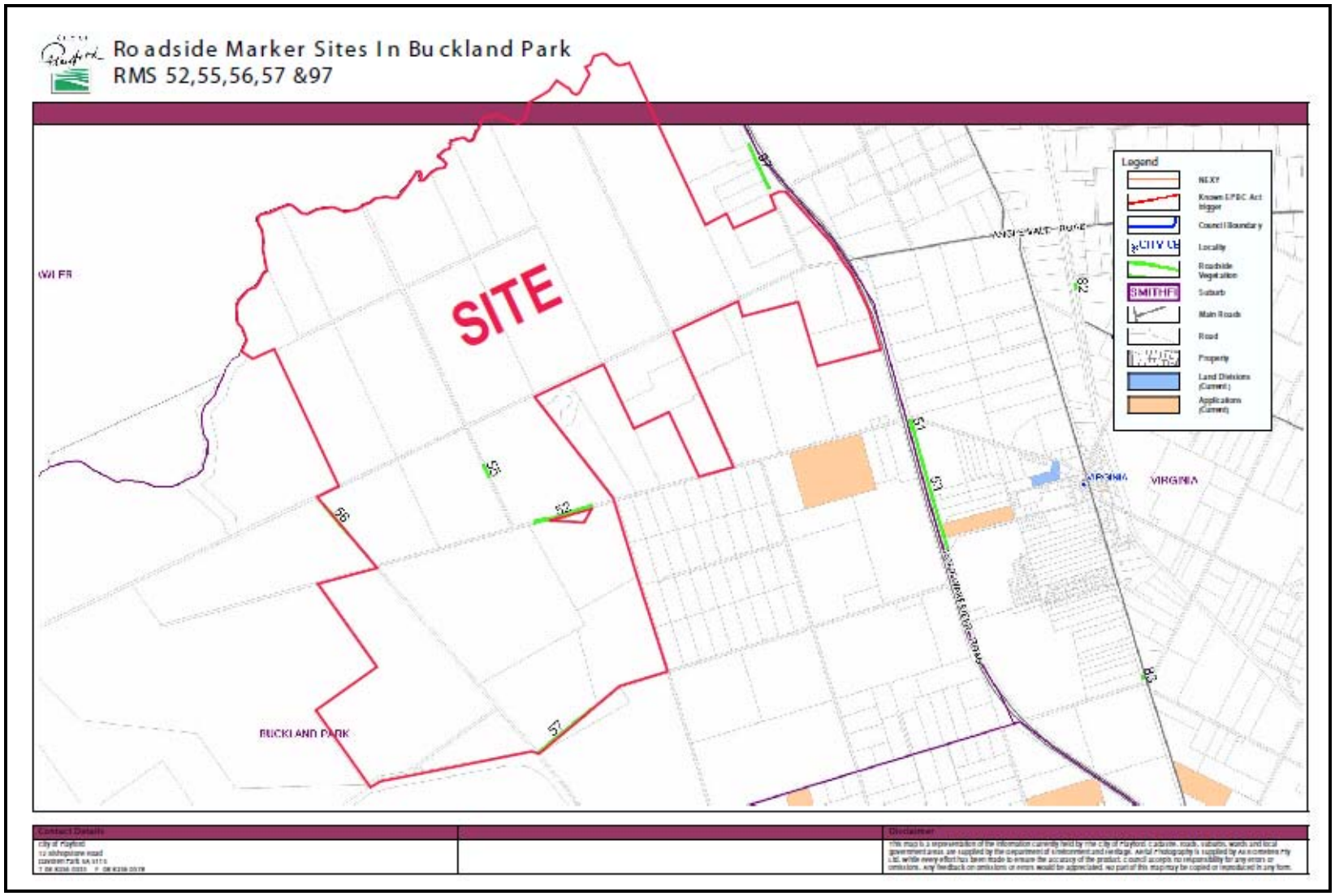


Figure 4.47: Roadside Marker System Sites

Source: Playford City Council

2. RMS 55 Tippets Bridge Road has been incorporated into a linear park, included in the Masterplan to accommodate a row of trees growing along the alignment. Its ongoing protection and expansion will be facilitated by its inclusion in open space.

   Council describes it as follows:

   Site contains a relatively intact population of Acacia paradoxa (kangaroo thorn) which is regenerating. There are other isolated clumps of A paradoxa in the far western plains but this is by far the largest population. There is also a large number of Nitraria billardierei (nitre bush) and Austrostipa elegantissima (elegant speargrass) and a range of Chenopod (saltbush) shrubs and groundcovers.

3. 56 Beagle Hole Road is located at the site's western edge. It is incorporated into the Masterplan's open space areas, and will be adjacent to a storm and flood water management channel. Its vegetation can be protected during construction of that channel, or revegetation will be undertaken.

   Council describes it as follows:

   There are good populations of Isolepis nodosa (knobby club-rush), Cyperus gymnocaulos (spiny flat-sedge) and Muehlenbeckia florulenta (lignum) in this site. Isolepis was very uncommon in the area so there is provenance seed potential here. Also of note is that the site was relatively weed free. It appeared that Isolepis and in particular Cyperus gymnocaulos were holding the weeds at bay.

   A few young eucalypts on site – either E camaldulensis (river red gum) or E leucoxylon (blue gum).

4. RMS 57 Thompson Road is located at the south of the site within a large area of the Masterplan's proposed open space.

   Council describes it as follows:

   Rhagodia crassifolia (Fleshy saltbush) shrubland. Thompson Creek runs parallel to the site, which is 20m wide. The creekside vegetation is in good health and weed intrusion is minimal.

   There is a good representation of saline-tolerant Chenopods (saltbushes) at the site.

   Any storm and flood water management, landscape or vegetation works in this area can be designed to allow its expansion into revegetated areas.

   It contains plants suitable for the yellow sedge skipper butterfly.

No new residential neighbourhoods are proposed in the south or south west of the site. Dr Anderson's report (2008a) recognised the work and investment made by Council in the RMS sites.

They have therefore not been included in residential neighbourhoods, and will therefore not be the subject of residents' gardening and "beautification" efforts.

They are part of the Masterplan's open space.

It is therefore concluded there will be limited, if any impact on RMS sites associated with the proposal, subject to the proper design and construction of Park Road and the protection and rehabilitation of the areas during any construction works in the vicinity.

Indeed, vegetation works carried out during the proposal's implementation has the potential to enhance these areas.

New residents will be encouraged to adopt them as their own if appropriate, through education and community building programmes. See information at Appendix Four.

Avifauna

The EIS Guidelines did not require consideration of fauna on or near the site. Notwithstanding this, a fauna investigation was commissioned as part of the EIS and Masterplan's preparation to ensure a complete environmental assessment was undertaken.

This is discussed in Chapters 5 and 10 of the EIS, and was at Appendix 15.

The rehabilitation of treed areas in the site's northern and north west parts will ensure the ongoing availability of suitable habitat.

Samphire areas in the site's south west section are suitable habitat for the Orange Bellied Parrot. As described above this area has been excluded from the Masterplan's built elements, and included in its open space.

It will be rehabilitated, and if required, fenced as described above.

A referral will be made to the Federal Minister for the Environment in accordance with the *Environmental Protection and Biodiversity Conservation Act,* at the appropriate stage of the proposal's implementation.

Should the Minister determine that any part of the proposal is a 'controlled action' in accordance with the Act, a full environmental assessment will be required and will be considered by both state and federal government prior to determinations on proposals or construction are made.

4.10 Transport

Comments on this issue were received in the following formal submissions.

- Playford City Council
- Adelaide and Mt Lofty Ranges Natural Resources Management Board
- Mrs Picard
- Mr Parnell
- Department of Health
- Lewis Nursery
- Department of Transport, Infrastructure and Energy

It was raised in community meeting or community information days.

Planning for Transport

The Department of Transport Energy and Infrastructure (DTEI) noted the fundamentals of the proposal align with discussions between the proponent and DTEI.

DTEI supports the proposal's provisional approval, with reserved matters to allow the following issues of detail to be investigated.

- The concept design of signals at Port Wakefield Road intersection.
- An access strategy for the Port Wakefield Road intersection beyond the initial signals, including:
  - Requirements for future upgraded site access off Port Wakefield Road.
  - The trigger point for that upgrade, that is, the point at which the initial traffic signals no longer have the capacity to cater for the proposal's traffic.
  - The form of that upgrade, for example, a grade separated intersection at Legoe Road, or a second set of traffic lights at Park Road.
  - Concept plans for that upgrade, including requirements for land required within the site, which should be vested in road reserve at no cost to government.
- Impacts on the surrounding road network, including the safety and efficiency of junctions, intersections and rail crossings in the surrounding network, including within Virginia.
- Demonstration that the site can be adequately accessed in an emergency or closure of the main entry boulevarde.

The site is located within metropolitan Adelaide's northern region. This region has major centres, a railway line, excellent road links, employment areas, major hospitals and education facilities. Over coming decades, it is expected these facilities will grow or be augmented.

Parsons Brinkerhoff considered transport planning for the proposal's internal and external transport requirements (2009a).

In respect of external transport, travel from the site to major employment and service destinations was the focus.

The site is located approximately 32 kilometres from the Adelaide CBD. It is 12 kilometres from the industrial precincts of Playford and Direk and 27 kilometres from Pt Adelaide. It is 14 kilometres from Elizabeth, a major Adelaide centre with a large range of facilities and services.

It is connected to these centres by Port Wakefield Road, and connections will be improved should the proposed Northern Connector proceed. The proposal will assist in the viability of government providing this important piece of infrastructure by increasing the population it will serve.

Given the quality road network, the proposal's public transport will be provided by buses. It is anticipated this will be the most efficient type of public transport in the future, particularly with anticipated improvements in bus technology such as use of more efficient fuels or renewable energy.

However, *Planning the Adelaide We all Want* 2009, envisages a new mass transit route through the western part of metropolitan Adelaide's north in the site's vicinity to connect it with employment areas around Port Adelaide.

The proposed bus services will be designed to provide access to services, schools and retail facilities, particularly in the early years of occupation. Later as more homes are occupied, planning for public transport focuses on access to the region's major centres, rail station and other regional bus routes.

Regional cycling routes can be coordinated with the new *Stuart O'Grady Bikeway* being constructed as part of the Northern Expressway (NEXY). Bicycle lanes are being built to connect NEXY to the Salisbury Highway. Consideration of cycling a link between the site and NEXY should be included as part of any required upgrading of Port Wakefield Road south of Angle Vale Road.

In respect of internal transport planning, the fundamental approach has been to ensure employment opportunities, services and social infrastructure are provided for within the Masterplan. These are connected by internal bus routes, and pedestrian and bike ways.

This approach to transport planning differs from the historical approach taken in Adelaide.

The Masterplan aims for a high level of self containment for day to day trips to schools, retail, social services and businesses, and accommodates higher employment levels than is typical in other new suburbs in Adelaide.

To meet this aim, the Masterplan includes:

- A District Centre on Port Wakefield Road, integrated with a large mixed use precinct.
- Three Neighbourhood Centres located within the residential precincts, supported by other light industrial/manufacturing employment in dedicated precincts.
- A temporary Neighbourhood Centre within Stage 1 which will provide services within walking distance to the first residents occupying the proposal.
- Six schools

By comparison, most other new suburbs offer low levels of trip containment, relying instead on existing services in other adjoining areas.

The Masterplan aims to reduce levels of dependency on car ownership, particularly the necessity for households to purchase a second car. This aim will be achieved through a combination of:

- A network of on-street and off-street pedestrian and cycle paths to link residential precincts as directly as possible with activity centres. The internal cycle network can be connected to the regional cycling network.

- Provision of a bus service from the beginning of residential occupation. The service will link residential precincts with activity centres within the site, and with larger centres in Virginia, Angle Vale and Elizabeth, Salisbury and Munno Para. The bus service will link the site to the metropolitan rail network.

The modelled mode share statistics (Table 12.7 of the EIS) report a total mode share of approximately 50% of internal travel between 2016 through to 2031 by walking, cycling and public transport modes. This is considered a very high proportion of travel by sustainable modes, and reflects a correspondingly much lower than average use of cars.

In other new residential areas in outer Adelaide, bus services are typically provided as incremental extensions of existing service arrangements. Each increment follows well after residents have occupied the new area, meaning there is a lag in public transport provision. By the time public transport is provided, residents have established car reliant travel patterns, and may have made expensive commitments to second cars.

The proposal differs from this traditional model. The EIS commits to the provision of a community bus service from day one of occupation. This service will comprise a small bus providing regular services to Virginia, Munno Parra and to connect with the Route 900 service to Salisbury and Elizabeth and suburban rail interchanges.

The effectiveness of this, and later government bus services, will be assured by the Masterplan's planned network of bus routes, which are integrated with residential neighbourhoods and centres to create logical routes and easy walking access to bus stops for the majority of residents.

They are coordinated with pedestrian and cycle network.

Other new suburbs do not benefit from this integrated approach to land use and transport planning over a large area.

The proposal's planned public transport will contribute to the *State Strategic Plan* target to 'increase the use of public transport to 10% of metropolitan weekday passenger vehicle km travelled by 2018 (target 3.6).

This is a metropolitan wide target. Public transport use will be higher in some locations, for example, within Transit Oriented Development, and lower in other locations, such as existing and growing suburbs.

It is not the government's intention this target be applied as an "approval criteria" to residential proposals within metropolitan Adelaide.

Public transport use is very much influenced by work travel, as a combination of job opportunities that are well served by accessible public transport. Employment opportunities in northern Adelaide are reasonably diverse, and it would require a relatively dense network of bus services to achieve the 10% target for all new housing.

Compared to other established Adelaide suburbs, car use within the site will be lower, and walking and cycling use higher.

Therefore, in terms of sustainable targets, the proposal is expected to achieve better outcomes compared to other existing, growing or new suburbs in Adelaide.

The proposal is not a Transit Oriented Development. However, it is not government policy that all new housing is provided in this form. Indeed, it is government policy that by 2036, 30% of new housing be provided in new suburbs, and up to that time the proportion is higher.

The Department of Health noted the proposal had numerous aspects with the potential for positive health outcomes, for example, the creation of a cohesive community through good planning and urban design, and the proposed connectivity of all parts of the township to each other is considered vital and should enhance health.

More information on planning for transport and land use is given in Table 4.7.

Public Transport

As the site is currently undeveloped, it is not served by public transport, or water, sewer and electricity.

The provision of public transport must be planned for, as with other infrastructure. Accordingly, Parsons Brinkerhoff (2009a) have planned bus routes which be progressively implemented with each of the proposal's stages.

Bus services, will be provided from the first days of occupation by a community bus service, and later by a subsidised metro service. As passenger numbers increase, the subsidy will cease.

The 900 bus service currently provides only two services a day, from Virginia to Salisbury and Elizabeth. It is timetabled to serve school trips. The service would need to be made more frequent.

During community information days, many comments were received from the community regarding the poor public transport service in the area.

The proposal will increase population in the locality, making enhancement of the 900 bus route more viable.

This would benefit the whole community.

The diagram below shows planned regional bus routes extending into the site, providing connections from residential neighbourhoods to internal and regional destinations.

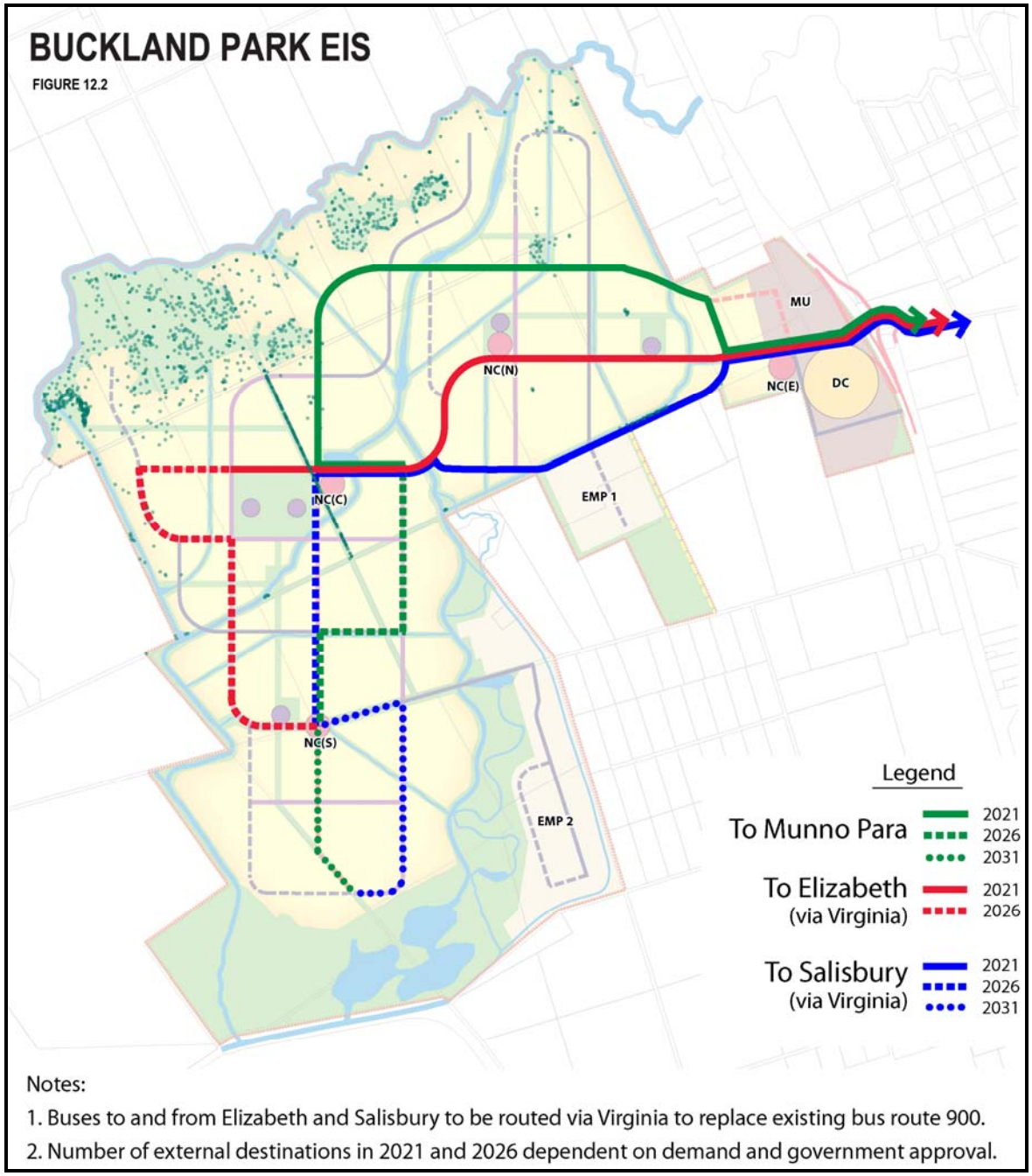


Figure 4.48: Bus Routes and Staging
Source: Parsons Brinkerhoff

Bus services are planned to be progressively expanded to match the proposal's population growth (EIS page 14-4).

- 1 household (projected 2013) –Community bus service commences.
- 1,500 households (projected 2018) – Subsidised government bus service.
- 4,500 households (projected 2023) – Unsubsidised government bus service.

The proposed public transport implementation strategy has been discussed with DTEI, who have confirmed its fundamentals align with those discussions.

The Adelaide CBD is unlikely to be major employment location for the proposal's working population. Only 7% of the Playford Local Government Area's (LGA) existing workers work in the CBD.

Strong population and employment growth is expected in Adelaide's northern region, supported by enhanced infrastructure and strategic planning.

Connor Holmes (2209b) project a high proportion of the proposal's workers will be based in Playford, Salisbury or Port Adelaide Enfield LGAs.

Therefore commuting by public transport to work will not require multiple interchanges, which are needed to access the CBD.

An allowance for a shift from cars to rail was considered in Parsons Brinkerhoff's report. It found that traffic volumes on Port Wakefield Road remained a Level of Service (LoS) B in peak periods until 2031, rather than dropping to LoS C as was the case without the rail option.

A bus interchange will be integrated into the District Centre at the time of its design.

While the bus route network has been integrated into the Masterplan, there will be opportunities during the detailed design to vary routes and services to access the Masterplan's north eastern neighbourhoods. The road hierarchy facilitates bus access to this area.

The Community Bus

The objective of providing a community bus service from the outset of occupation are:

- To have good and reliable services in place to reduce car dependence.
- To establish a public transport "habit".

The community bus service will provide regular services to Virginia, Munno Para and connect with Route 900 service to Salisbury and Elizabeth.

They will be provided from the Stage 1 Neighbourhood Centre initially, and then as population grows, pick people up from residential streets within Stage 1.

The community bus service will be provided by the proponent.

The community bus service's timetable will be flexible and responsive to the needs of the community to provide the most effective and attractive service possible. It will be coordinated by the community worker.

Council will be involved in decisions regarding the community bus service in accordance with the governance arrangements outlined in Section 4.5.

DTEI will be consulted regularly regarding its route and service connections to regional public transport.

Operating parameters for the community bus service are yet to be determined. However, its purpose is threefold:

- To provide access to external schools before these are constructed and operating in Buckland Park. Destinations will include Angle Vale and Virginia.
- To provide access to retail and community facilities at Virginia (and potentially at Munno Para), to supplement initial facilities proposed for Buckland Park.
- To link to the Route 900 bus services at Virginia.

Its timetable will therefore not be linked to the frequency of the Route 900 bus, so it will be able to provide more frequent services.

Walking and Cycling

Unlike other new suburbs, the proposal has been planned as an integrated community. An on and off road pedestrian and bicycle network has been incorporated into the Masterplan. It links residential neighbourhoods with centres, schools and employment areas. This network will include links via the entry boulevard to Port Wakefield Road, where access can be safely provided to cycling facilities that may be provided in the future along Angle Vale Road or along Port Wakefield Road to the *Stuart O'Grady Bikeway*.

The site is relatively flat, and this network will encourage use of the sustainable bicycle mode.

An efficient bus route network will complement the pedestrian and bicycle networks, further reducing reliance on cars.

Approximately 50% of internal trips are projected to be by pedestrians, bicycles or buses.

Detailed design of pedestrian and bicycle networks will be undertaken with each of the proposal's stages. The key objective will to ensure their success by designing attractive facilities.

DTEI supports the proposal's aim of reducing car dependency through planned cycling and walking networks and providing suitable facilities, and notes the inclusion of direct paths through open space is appropriate.

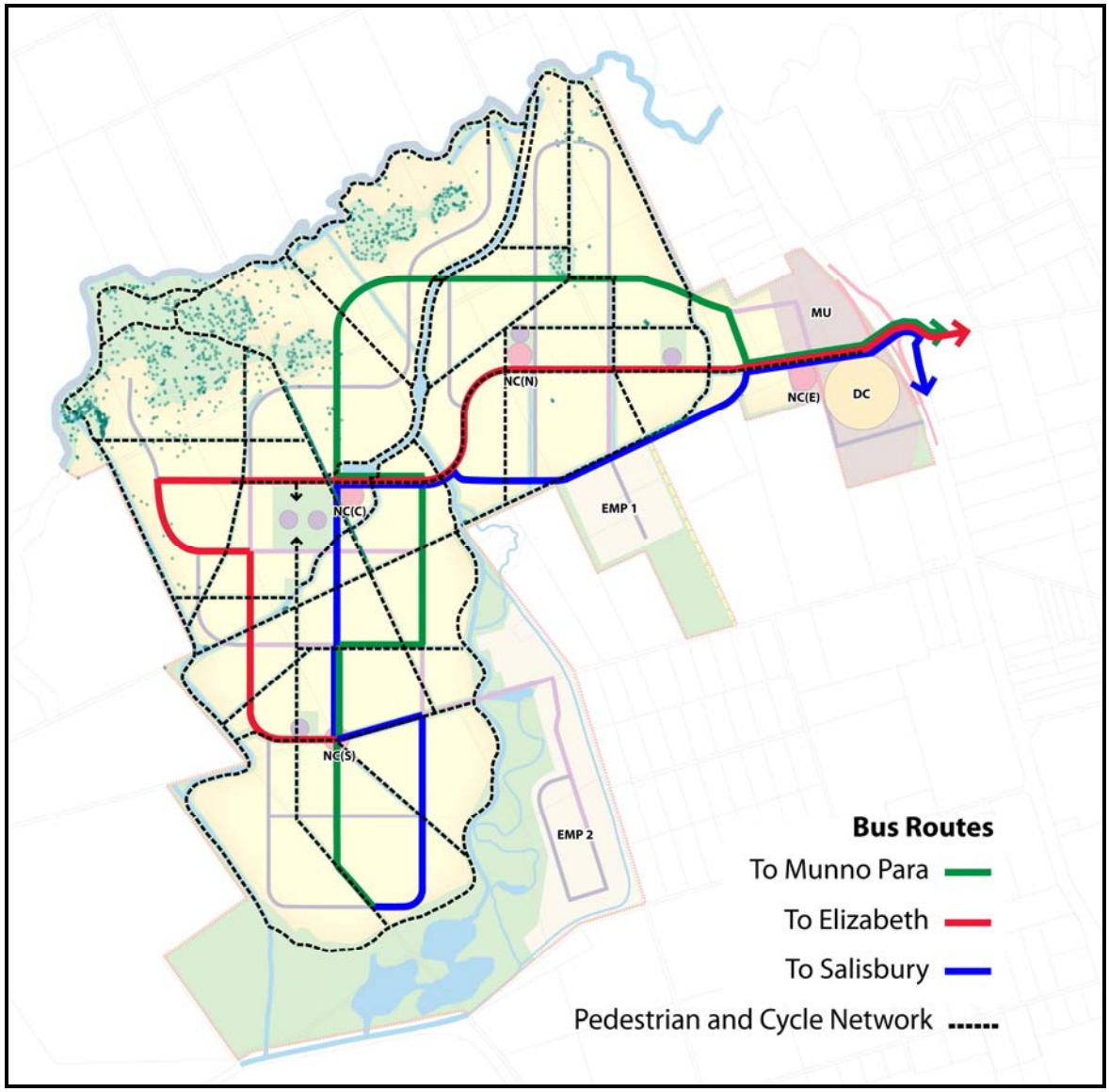


Figure 4.49: Bicycles, Pedestrians and Buses
Source: Parsons Brinkerhoff and Connor Holmes

The proposal includes the features DTEI advise contribute to a cycling and walking friendly environment:

- Pedestrian networks consisting of footpaths, off road shared use paths and safe road crossings.
- Bicycle networks consisting of on road bicycle lanes, off road shared use paths, safe road crossings, arterial roads and local roads.
- An internal road network including a grid pattern of direct routes with footpaths on each side of the road, lower local road speeds and low traffic volumes.

The proposal's scale and Masterplan allow these features to be achieved, in a manner not possible in a smaller scale proposals.

Pedestrian and bicycle networks will be provided in three forms:

- Footpaths on every street.
- Dedicated cycle lanes on designated arterial/sub-arterial roads to provide for direct and safe movements along major spine roads.
- A comprehensive network of off-road shared paths for cyclists and pedestrians linking residential precincts with schools and other activity centres. These paths will largely be located along in landscaped linear open space.

In many cases, these routes will be shorter to centres than roads.

This approach is designed to maximise the potential for the use of the sustainable walk and cycle modes for internal travel.

They are designed to accommodate all users – recreational cyclists, commuters, adults, children, and users with disabilities.

Off road routes will be sign posted to provide clarity of direction to users.

The off road network will be designed to provide for safe movements of cyclists and pedestrians; where these paths cross roads, pedestrian crossing facilities will be provided.

These may include a combination of pedestrian activated lights on roads having an arterial/sub arterial function, median refuges, etc.

The detailed design of on road and off road pedestrian and bicycle networks will be undertaken with Playford Council. Key considerations will be the cost of construction and the cost of ongoing maintenance, as well as providing adequate safety for cyclists.

Detailed designs of land division plans, pedestrian and bicycle routes will aim for the most efficient routes from Point A to Point B.

Port Wakefield Road Intersection

DTEI require an investigation of the future connections between the site and Port Wakefield Road, beyond the proposed initial signalised intersection Legoe Road. There are two options that must be considered:

- An upgrade of the Legoe Road intersection, for example, grade separation.
- A second signalised intersection at Park Road.

DTEI has recommended this investigation be a reserved matter.

The land required for a potential upgraded intersection is shown as a separate Lot 26 on the 'Superlot Land Division Plan'. The retention of Lot 26, or a change to its shape or size will be determined during the required investigation. Lot 26 in its final form will be vested to the state government, at the time of land division in that location, if required for access.

Parsons Brinkerhoff project the proposed signalised intersection will operate efficiently with sufficient capacity, until 2021, based on the projected roll out of construction and occupation of allotments.

An initial construction access point to the site will be provided via Reedy Road, the site's existing road entry from Port Wakefield Road. This will supplement the existing site entry via Park Road and Buckland Road; this entry will form an access for construction activities.

It will only be required until the Legoe Road intersection traffic lights are installed, early in the construction programme.

A reduction to 80 km/h speed limit on the approaches to the new signalised intersection at Legoe Road would be required. This would be in place simultaneously with the signalised intersection, well before District Centre's construction.

There are existing intersections along Port Wakefield Road, for example at Waterloo Corner, where drivers successfully slow down. It is anticipated the new intersection will function in the same way, regardless of whether land around the intersection is still being used for horticulture.

Port Wakefield Road

DTEI will continue to monitor the safety of the Thompson Road and McEvoy Road intersections with Port Wakefield Road, and identify any action to ensure their safe operation.

SIDRA analysis has forecast traffic for 2031 have been prepared as part of the traffic analysis, with estimates of further growth to 2036. Estimated midblock LOS impacts on Port Wakefield Road are reported in Table 9.3 of Parsons Brinkerhoff's report. This table indicates a LOS C is forecast to 2036.

Further SIDRA analyses will be undertaken to address access to the site as required by DTEI to satisfy reserved matters.

Council is concerned the proposal will result in a 460% increase in morning peak traffic on Port Wakefield Road above current levels.

Firstly, there is a high forecast level of pedestrian and bicycle trips for local travel, which, in combination with bus use, results in a much lower than average car use.

Secondly, Port Wakefield Road currently carries low levels of peak traffic, as it is a long distance freight route in a horticultural environment. It is not a commuter route.

The proposal, and other strategic changes anticipated in the region over time, will naturally change Port Wakefield Road's function so it has a stronger commuter focus.

The impacts of traffic changes on Port Wakefield Road have been modelled and described in Parsons Brinkerhoff's report.

Local Road Network

Lewis Nursery operates 24 hours a day, 7 days a week, requiring truck access along Park Road. Increased traffic from the proposal along Park Road is therefore of concern to the Lewis family.

There will be some increase in traffic on Park Road during the very initial construction phase, however, most construction traffic will enter the site more directly via Reedy Road.

This initial phase will end when the signalised intersection is operational at the Legoe and Port Wakefield Road intersection. At that time access into site via Park Road would become less convenient and attractive for access to the site.

Therefore the existing traffic arrangements along Park Road, and its intersection with Port Wakefield Road will continue.

DTEI has required consideration of future access arrangements, beyond the capacity of the signalised Legoe Road intersection. This must include consideration of a signalised intersection and access off Park Road.

If this is the appropriate solution, the intersection and Park Road upgrade would be built to DTEI's and Council's requirements, and to a capacity required to serve all properties and activities that require it for access.

Parsons Brinkerhoff's report considered the proposal's potential impacts on the surrounding DTEI road network, and on various other local roads (section 9.1.3). In particular:

- Peak traffic impacts on Angle Vale Road. It is anticipated Angle Vale Road will require duplication between Port Wakefield Road and Old Port Wakefield Road to 2+2 lane standard, potentially between 2028 and 2031.
- Peak traffic impacts on Port Wakefield Road. The analysis found the Level of Service (LOS) along Port Wakefield Road to the site's south is forecast to be at LOS C or better at 2031.
- A commuter rail extension to Virginia. The potential impacts were assessed, including the potential consequential impact on traffic flows on Port Wakefield Road.
- Old Port Wakefield Road, Penfield Road, Curtis Road and Heaslip Road. Peak traffic impacts were assessed.
- Peak impacts of traffic movements generated by Virginia, and potentially passing through Virginia, were quantified.
- Peak traffic impacts on areas west of Port Wakefield Road were addressed.

Additionally, extensive SIDRA analyses of intersection movements were undertaken at the Port Wakefield Road/Angle Vale Road/Entry Boulevard intersection, which were documented.

Further work will be undertaken to address the reserved matters DTEI has requested.

Masterplan Transport Network

The main entry boulevarde will be designated a "boulevarde" in the road hierarchy.

Elements of the road hierarchy have been defined, in accordance with good road engineering practice to create the road and bus route hierarchy needed to inform the Masterplan. This was done in consultation with Council and DTEI.

Detailed designs for roads, intersections and pedestrian and bicycle networks will be prepared with each future stage in conjunction with the detailed land division.

Road safety audits can be undertaken at that time.

Parsons Brinkerhoff prepared principles for road junction design and these are included in their report at section 9.1.2.5.

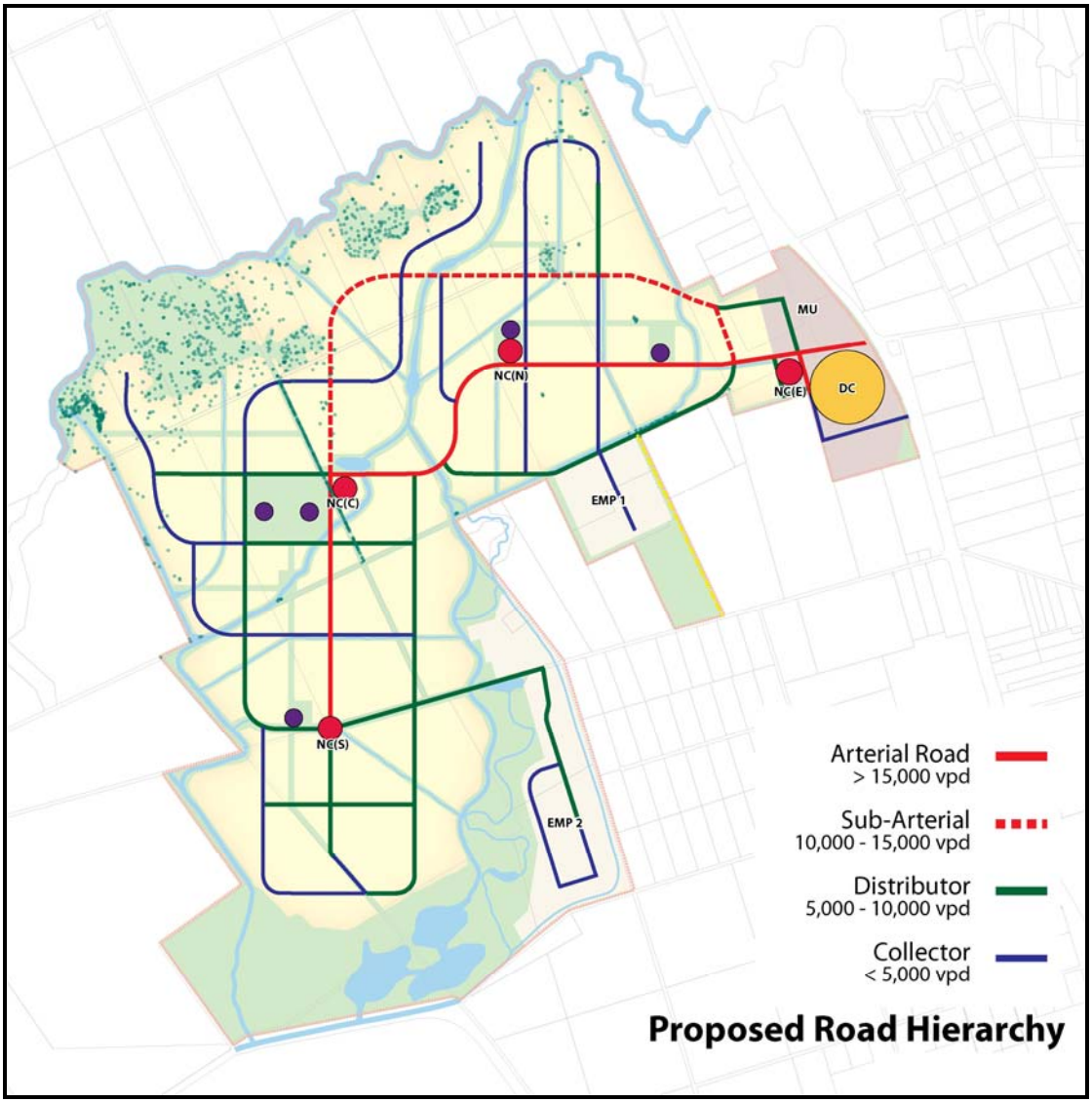


Figure 4.50: Road Hierarchy
Source: Parsons Brinkerhoff

Stage 1 Design Documentation

Playford City Council has asked for the following information to allow it to assess Stage 1 land division in context. The details of this information will be resolved with Council's Land and Development Advisory Unit (LANDAU) in accordance with the governance arrangements described in Section 4.4.

- A plan demonstrating the overall road hierarchy of this development should be provided, including cross sections of each road type.

  A detailed road hierarchy has been defined for the Masterplan, in consultation with Playford Council.

  It is described in detail in Section 6 of Parsons Brinkerhoff's report at Annexure 24 of the EIS. The description includes proposed cross sections.

- A traffic impact statement supporting the road hierarchy should be provided.

  Parsons Brinkerhoff's report is a comprehensive traffic assessment and formed an integral part of designing the Masterplan and the commentary in the EIS.

- Proposed road reserve widths should be shown on the plan of division

  Road reserves are shown on the plan of land division, however more detail will be provided in consultation with Council's LANDAU in accordance with the governance arrangements described at Section 4.5.

- The footpath network should be developed and provided including all off road paths.

  The EIS provides a pedestrian network for the Masterplan and Stage 1 (pages 15-10 and 15-11).

- A cycling plan should be developed and provided for the development.

  The EIS provides a bicycle network for the Masterplan and Stage 1 (pages 15-10 and 15-11).

- Confirmation is needed for the interface between Buckland Road and the western side of the land division.

  The Stage 1 Land Division plan shows its relationship to Buckland Park Road. In this location, it is an unmade and unused road, and its reserve has been incorporated into surrounding grazing paddocks. Its alignment is undiscernible.

  It is not proposed to close any of Buckland Park Road as part of Stage 1. Road closures are described in the EIS's Figure 1.3 (page 1-8).

  However, parts of the road will be constructed within the existing road reserve to serve new lots.

Figure 4.51: Buckland Park Road and Stage 1 Land Division
Source: Fyfe Surveyors

- The use of open space in the Stage 1 for storm and flood management needs to be clarified.

  Only one storm and flood water management channel passes through Stage 1.

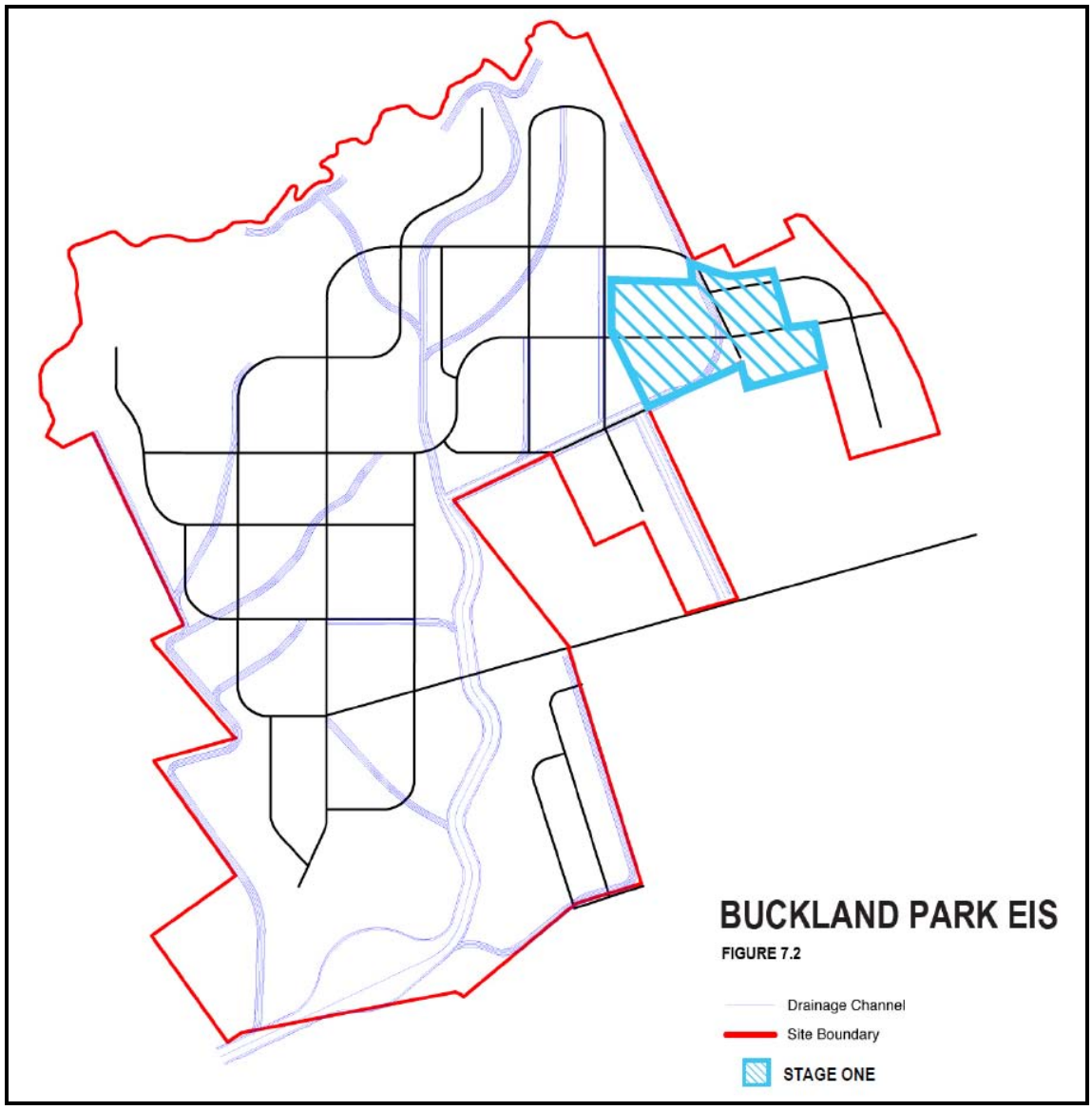


Figure 4.52: Storm and Flood Water Management Channels with Stage 1 Land Division
Source: Wallbridge and Gilbert adapted by Walker Corporation

It is located within linear open space and will take the form described in Section 4.5 of this report. As described, it can will be incorporated into landscaped open space, and incorporate planting, and pedestrian and bicycle paths.

Other parts of Stage 1's open space may include water features as Stage 1 will be important in creating the proposal's character and address.

4.11 Sustainability

Comments on this issue were received in the following formal submissions.

- Playford City Council
- Adelaide and Mt Lofty Ranges Natural Resources Management Board
- Mr Parnell
- Mrs Picard
- Department of Health
- Department of Premier and Cabinet

It was raised in community meeting or community information days.

The proposal has been designed with a focus on sustainability principles, and adaptation to the impacts of climate change in South Australia.

The importance of incorporating the principles of sustainability and climate change into the proposal is recognised, as evidenced in the *Buckland Park Development Application* May 2007:

> *It is widely accepted that sustainability entails meeting the social, environmental and economic objectives of the current generation, while balancing the needs of future generations.*
>
> *Sustainability seeks to achieve resource conservation, prevent pollution, maintain biodiversity and improve community well-being.*
>
> *Sustainability in the Buckland Park Township will not be solely limited to the environment, but it is intended to create a community which provides people with a feeling of general safety, security, and a sense of community, with opportunities for employment, relaxation and learning.*
>
> *It is intended that the community will provide for families and smaller or changing households, youth and the aging. (Connor Holmes 2007)*

The proposal's sustainability vision is to: *'achieve an attractive and cohesive community embracing the ideals of housing choice, affordability, innovation and sustainability.'* (Parsons Brinkerhoff 2009b)

The proposal includes Design Guidelines to ensure the sustainability initiatives are implemented. These are attached at Annexure 1 to Parsons Brinkerhoff's report (2009b).

The Adelaide and Mt Lofty Natural Resources Management Board commends the inclusion of sustainability guidelines with all allotment sales, but recommends they strictly require compliance with principles, rather than encourage compliance.

This can be done, within reasonable bounds, the affordability and attractiveness of housing is a sustainability consideration, as is the freedom of people to choose.

The Department of Health noted one of the proposal's aspects with potential for positive health outcomes is the potential reduction in greenhouse gas emissions, and hence mitigate extreme climate change, through:

- Good orientation and design of the built environment, thus increasing energy efficiency.
- Water efficiency measures including reuse of wastewater, thus increasing energy (and water) efficiency.
- The concept of a self containment (community services such as schools, health services, employment, district centre) to reduce need to travel and hence greenhouse gas emissions.
- A commitment to encouraging the use of modes of transport other than private motor vehicles. This is illustrated by the commitment to provide a free community bus to connect with the Adelaide Metro bus at Virginia until an Adelaide Metro service operates from Buckland Park.

The Masterplan and proposal are designed to maximize and opportunities to walk and cycle to local destinations including public transport stops and interchanges as a key to achieving *sustainability outcomes.*

Council has noted the SA Government is focusing on the creation of Transit Oriented Development (TOD) as fundamental to urban sustainability, and a commitment to an integrated public transport service is therefore required.

However, it is not government policy for all new housing to be provided in TODs, or indeed even as infill within existing suburbs.

Indeed, it is government policy that by 2038, 30% of new housing be provided in new suburbs, and up to that time the proportion is higher, as articulated in *Planning the Adelaide We All Want* (page 14).

Within this planning context it is not a requirement for all new suburbs to be TODs.

The *Planning Strategy for Metropolitan Adelaide* 2007 includes 'Land Use and Transport Integration' policies.

Table 4.7: 'Land Use and Transport Integration' policies.

POLICY		COMMENT
1.	*Integrate transport and land use planning decisions to facilitate a safe, sustainable, efficient and effective transport network.*	
(a)	*Support and make best use of existing transport infrastructure and services, and protect sites of strategic importance for the future development of the transport system.*	Planning for public transport has been undertaken, including the use of a community bus to connect to existing bus and train services, and in the medium term the upgrade of the metropolitan bus services to the region.
(b)	*Require significant development proposals to include an assessment of the implications for the transport system at the local and regional levels and identify measures to address these implications.*	The proposal includes a comprehensive assessment of the implications for the transport system at a regional and local level, and measures to address those implications are included.
(c)	*Ensure that the location and design of developments protect and maintain the function of State Government-maintained roads, freight, rail and shipping routes.*	The site and the proposal not will affect the freight, rail or shipping routes. It is located on Port Wakefield Road and will be connected to metropolitan Adelaide's northern region by Port Wakefield Road, and further afield by NEXY and the Northern Connector (if this project proceeds). These road networks ensure the site's accessibility by high quality transport links. The proposal's use of these existing and future road networks contributes to the efficient utilization of government investment in those networks. The function of Port Wakefield subject to the proposal's approval is discussed in Chapter 12 of the EIS, Parsons Brinkerhoff's report at Appendix 24 to the EIS and Section 4.10 of this report.
(d)	*Ensure that future transport infrastructure is incorporated in decision making when planning for local and regional urban growth and economic activity.*	The site is located on Port Wakefield Road and will be connected to metropolitan Adelaide's northern region by Port Wakefield Road, and further afield by NEXY and the Northern Connector (if this project proceeds). These road networks ensure the site's accessibility by high quality transport links. The proposal's use of these existing and future road networks contributes to the efficient utilization of government investment in those networks. The upgrade of the Gawler Rail line will benefit the proposal, and the proposal's residents will contribute to increased patronage on the line, contributing to the efficient use of the government's investment on the line.

POLICY	COMMENT
(e) *Ensure transport planning and infrastructure decisions promote development in appropriate locations and are coordinated with the staging of urban expansion as outlined in the Residential Metropolitan Development Program*	*Planning the Adelaide We all Want* foreshadows the proposal, subject to the successful completion of the Major Development assessment process. Regular updates of the Metropolitan Development Programme, which will include projections for lot production from the proposal, will ensure planning for road and public transport can be undertaken in a timely manner.
2. Facilitate transit-oriented development around selected high-service public transport routes.	
NOT APPLICABLE	
3. Maximise accessibility to and use of the public transport system through greater integration with land use to reduce the need for private motorised travel.	
(a) *Incorporate the provision of public transport in planning policy preparation (for example, new suburbs or activity centres) and provide on-ground services at an early stage of development to initiate public transport patronage as the neighbourhood becomes established.*	The proposal includes provision of public transport from the earliest occupation.
(b) *Locate activities that generate large numbers of visitors, such as major offices, schools, tertiary education facilities, and major health and recreational facilities, at public transport nodes and/or in activity centres.*	The Masterplan's District Centre and Neighbourhood Centres are located on planned bus routes and pedestrian and bike paths.
(c) *Ensure development is oriented towards, and linked with, public transport nodes and that convenient and safe walking access and secure bicycle storage is provided.*	The Masterplan's District Centre and Neighbourhood Centres are located on planned bus routes and pedestrian and bike paths.
(d) *Increase dwelling densities near major public transport routes, stations and interchange points.*	The Masterplan accommodates higher residential densities around public transport routes and centres.
4. Encourage people to walk and cycle to destinations by providing suitable infrastructure and developing safe, attractive and convenient walking and cycling environments.	
(a) *Provide a safe, strategic network of commuter and recreational links between major cycle trip destinations, such as activity centres, community facilities, public transport, parks and residential neighbourhoods.*	A network of bicycle ways is provided throughout the Masterplan, linking activity centres, residential neighbourhoods, open space and bus routes. Internal bicycle networks can be connected to the regional network, particularly the *Stuart O'Grady Bikeway* along the NEXY corridor, via Port Wakefield Road.

POLICY	COMMENT
(b) *Provide secure parking and change facilities for cyclists in commercial development*	Secure parking and change facilities for cyclists can be provided in future commercial development.
(c) *Develop high-quality walking environments designed for the comfort, ease and safety of all users.*	The proposed open space and pedestrian paths are capable of being designed for pedestrian safety, comfort and ease.
(d) *Improve opportunities for incidental exercise (particularly walking and cycling) by locating residential neighbourhoods and key services and facilities and other regularly visited destinations within walking distance of each other.*	The Masterplan's residential neighbourhoods are linked to services, facilities and centres by pedestrian routes.
5. *Facilitate an effective freight transport network which provides for more efficient freight logistics, channels heavy vehicle traffic onto designated routes, shifts more freight from road to rail, and is protected from encroachment by incompatible activities.*	
NOT APPLICABLE	
6. *Recognise the strategic importance of intermodal facilities which enable efficient freight movement, particularly through linking road, rail and sea transport.*	
NOT APPLICABLE	
7. *Protect and manage airports to give priority to freight and passenger movements and ensure adjacent land uses are compatible with airport activities.*	
NOT APPLICABLE	
8. *Protect and manage the location and function of port facilities to meet the needs of business and provide for intrastate, interstate and international export services.*	
NOT APPLICABLE	
9. *Ensure integrated transport and land use supports quality of life outcomes.*	
(a) *Ensure that road corridors are planned to integrate land use and transport to address health and safety issues along transport routes.*	The proposal's road hierarchy has been planned to integrated with the Masterplan's neighbourhoods, centres and employment areas. They have been designed to maximise accessibility for the pedestrians, bicyclists, bus users and cars.
(b) *Design and locate development adjacent transport corridors to minimise health and safety issues arising from road traffic noise and transport uses through consideration of a range of factors including distance from major transport corridors, building layout and design, the inclusion of noise attenuation measures, safe pedestrian and vehicle access points, and appropriate building ventilation.*	The Department of Health has noted the benefits of the Masterplan, and has asked consideration be given during detailed neighbourhood design to noise and health issues associated with major roads. It is noted no major highway is proposed in the Masterplan, and residential neighbourhoods, or housing in mixed use areas will be separated from Port Wakefield Road.

POLICY	COMMENT
(c) *Minimise the negative effects of large volumes of freight transport movements in urban areas through urban design and timing of freight movements in consultation with freight, business and community representatives.*	The Masterplan's employment precincts and centres are located so that road access from them to Port Wakefield Road is clear and direct, see discussion in Section 4.10 of this report.
(d) *Provide equitable access to a range of health services, community facilities and employment through a range of transport options.*	The Masterplan's centres will offer a range of services, and have been designed for accessibility by foot, bike or bus. A community bus will provide transport options for residents before all centres are established on the site.
(e) *Provide pedestrian and cycle corridors separate from transport routes and in coordination with the establishment of facilities in MOSS, Parklands, linear parks, and other public open spaces*	Pedestrian and cycle routes are planned as separate from roads, and also using roads. They are provided in parklands, linear parks and other open space. A linear park can be provided in the MOSS zone, along the Gawler River in accordance with the 'Gawler River Open Space Strategy'

The planned provision of pedestrian and bicycle networks and public transport routes and services, from the occupation of the first home, is described in Section 4.10.

The Masterplan's provision for walk and cycle trips between new residential neighbourhoods, the District Centre, Neighbourhood Centres, employment areas, and schools, coordinated with public transport routes is anticipated to achieve a mode split to sustainable transport modes of approximately 50% of internal travel.

It is anticipated most of the proposal's working residents will hold jobs in metropolitan Adelaide's northern region, with relatively low levels of commuting to Adelaide's CBD.

High proportions of non-work related trips are expected to be within site to the facilities and services provided there. Many of these trips will be made on foot, by bicycle, by bus or by short car trips.

A reduction in car dependency will be sought through the planned provision of public transport.

The importance of public transport provision from the start of occupation is understood, and addressed by the provision of a community bus.

The Masterplan includes a centres hierarchy, comprising a District Centre and three neighbourhood centres.

Given these centres position within metropolitan Adelaide's centres hierarchy described by Connor Holmes (2009a), it is anticipated they will be able to offer an extensive range of retailing and services, ensuring a high amount of self containment, once completed in 2036.

From a social, environmental and economic sustainability perspective, there are potentially strong benefits associated the centres hierarchy, which aims to maximise self containment including:

- reduced car dependency and greenhouse emissions
- increased local economic and employment opportunities; and
- increased opportunities for social interaction among residents.

As a result, the proposal could be expected to have a lower greenhouse gas profile per allotment upon completion in 2036, than other new suburbs at similar distances from the Adelaide CBD area.

It is also noted that most work opportunities are expected within the site and the northern region of Adelaide, relatively minor job shares in the CBD are likely. For non work travel, very high proportions of trip are expected to be captured within the site, given the proposed level of facilities to be provided.

Many of these trips will be by walking or cycling. Non work trips out of the site will be accessible via the planned public transport network, thus obviating the need for high car ownership levels.

The sustainability aspects of the provision of pipes and infrastructure where explained in detail in Parson Brinkerhoff's report (2009b).

Coordination of services to the proposal is facilitated by the staging plan and there will be ongoing coordination with State Government and Playford Council, through the governance arrangements described in Section 4.5. Community building and service provision is also discussed in Section 4.5.

However, it is understood the state and federal government are moving to regulate the production of these items to ensure they meet energy efficient standards.

As part of a 10-year energy efficiency plan adopted by the Council of Australian Governments on 2 July 2009, inefficient hot water systems will be phased out, and all appliances will be properly labelled under new national energy efficiency standards (noting that water efficiency labelling already exists in Australia, with the WELS rating system).

These recent changes will include national legislation for improved appliance labelling and energy ratings as well as phasing out inefficient electric hot water systems and accelerating the phase-out of inefficient lighting, beginning with a ban on incandescent light globes to start in November 2009.

Within the parameters of the proposal, which does not include the construction of houses, the following features can contribute to the achievement of South Australia's *Strategic Plan Attaining Sustainability targets.*

- Road layouts which facilitate lot layouts that allow buildings to be oriented to reduce energy requirements.

- An integrated approach to water management which will uses WSUD principles, minimize the use of potable water, and make significant amounts of stormwater available for reuse.
- Commitments to the design of the neighbourhood centre and sales office to the highest energy efficiency standards.
- Encouragement of builders who specialize in energy efficient homes to establish in the Display Village.
- Promotion of energy and water efficient appliances in the sales centre.
- Connection of all residential allotments to mains gas and recycled water.
- Promoting energy efficient in the Design Guidelines.
- Reduction in electricity consumption by shifting toward a lower greenhouse emission intensive energy supply.
- Reducing potential emissions from transport through co-location of housing, employment, services and integrated public transport
- Reducing waste to landfill from construction and operational activities
- Encouraging a shift toward low greenhouse emission modes of transport
- Encouraging a whole of water cycle approach to water and wastewater collection, consumption and re-use
- Protecting and managing existing local biodiversity
- Aligning delivery of the proposal with provision of government and community services.
- Introducing a dedicated community officer to drive social inclusion and community building programs.
- Committing to establish a Neighbourhood Centre in Stage 1 of the proposal
- Delivering diversity in housing types including a commitment to 15% affordable housing (approximately 1800 dwellings) over the proposal period to 2036.

These measures are viable and practical.

Given the scale of the proposal, and its 25 year implementation period, it is likely other technologies and the use of more efficient energy sources could be trialed within the proposal.

In particular, the improvements in bus technology will be interesting to watch over coming decades.

Council has noted the implementation of its existing waste management programmes in the proposal will have a positive impact on the reduction of waste.

The timing of these services will be coordinated through the governance arrangements described at Section 4.5.

It is understood the Northern Adelaide Waste Management Authority (NAWMA), which services the City of Playford, has already planned for its services' growth to the northern Adelaide region.

It has already forecasted provision of waste management services to the site and proposal, which of a standard consistent with current levels of service provision within the City of Playford.

The resource management was discussed in Chapter 9 of the EIS, and at length in Parsons Brinkerhoff's report.

In accordance with the EIS Guidelines, the EIS provided a qualitative assessment of likely types of waste generated during the proposal's construction and operation for residential and commercial facilities, and the potential for incorporating recycling and resource recovery.

It was concluded the proposal will generate approximately 6,546 tonnes of household waste per year, when completed and occupied in 2036 (equivalent to a total of 7,266 tonnes of greenhouse gases per annum).

This is equal to approximately 0.55 tonnes of waste per household per year.

Should, as predicted, the average household size increase to 2.75 persons per household by 2036 (Connor Holmes 2009c) then the total waste generated per year (and commensurate greenhouse gases) could decrease by approximately 380 tonnes per year to 6,168 tonnes of household waste per year.

Zero Waste SA advises a green waste service is already provided by the City of Playford, and that kitchen food waste pilots which utilise the green waste bin for collection are currently being carried out with a range of councils.

It is anticipated City of Playford would provide this service.

The EIS's Table 9.4 reflects increasing total greenhouse gas emissions (not per capita emissions) commensurate with population increasing at the site to 2036.

As explained within the EIS, as a result of the Masterplan's centres hierarchy, the proposal could be expected to have a lower greenhouse gas profile per allotment upon completion in 2036, than other projects occurring at similar distances from the Adelaide CBD area.

The proposal identifies a number of innovative sustainable transport solutions both in the interim and the longer term, to assist in mitigating the anticipated transport-related greenhouse emissions impacts, as identified within the EIS.

The proposal has been designed to integrate land use and an efficient car, bus, pedestrian and bicycle transport, as illustrated in the Masterplan. There is extensive provision for walk and cycle trips between residential neighbourhoods, the District Centre, neighbourhood centres, commercial, employment and mixed use precincts, and schools.

Most work opportunities are expected to either within site, or metropolitan Adelaide's northern region. Relatively few residents are expected to work in Adelaide's CBD.

For non work travel, very high proportions of trip are expected to be captured within the site, given the proposed level of facilities to be provided. Many of these trips will be via walk/cycle.

External non work trips will be accessible via the planned public transport network, thus obviating the need for high car ownership levels.

Combined, these strategies will help reduce unnecessary transportation costs and greenhouse emissions.

The EIS specifically includes a climate change risk assessment at Chapter 9.1 which identifies potential threats and proposes adaptive measures.

The EIS also considers in detail the impact of greenhouse gas emissions both during the proposal's construction and operation.

Importantly, it is recognised not all adaptation measures identified can be applied to or resolved within the proposal directly or in its own right.

A number of these adaptation measures will require a coordinated across-government and in some instances inter-jurisdictional level of response.

The *Buckland Park Sustainability Guidelines* note existing legislation, all new residential dwellings and extensions built in South Australia must achieve 5 star energy rating.

It is understood signed a *National Partnership Agreement on Energy Efficiency* on 2 July 2009, after closure of the Buckland Park EIS public commentary period.

Design requirements future dwellings on the site will be responsive to any revised regulatory measures, which have been subjected to normal regulatory impact assessment processes and legislated.

New buildings and homes will be subject to:

- The provisions of the Building Code of Australia applicable at the time any of the buildings are constructed.
- The mandatory disclosure of commercial buildings and tenancies' energy efficiency commencing in 2010, if built at or after that date.
- New efficiency requirements for hot-water systems and lighting.
- Phased-in mandatory disclosure of residential building energy, greenhouse and water performance at the time of sale or lease, commencing with energy efficiency by May 2011.

It is also noted that future home owners and businesses within the site will have access to the Government assistance encompassed within the *National Partnership Agreement on Energy Efficiency* to:

- Households to reduce energy use by providing information and advice, financial assistance and demonstration programs;
- Business and industry to obtain the knowledge, skills and capacity to pursue cost-effective energy efficiency opportunities and therefore meet the challenges of a low carbon economy.

It is reiterated the proposal does not include the construction of buildings, aside from the Stage 1 neighbourhood centre and Display Village.

The Display Village does however provide an opportunity for one of the demonstration programmes alluded to.

4.12 Local Interface

Comments on this issue were received in the following formal submissions.

- Playford City Council
- The Department of Health
- EPA and Zero Waste
- Mr Parnell
- Local resident
- Adelaide and Mt Lofty Ranges Natural Resources Management Board
- Mr Tonks
- SA Potatoes
- Gawler River Quails
- Lewis Nursery
- Jefferies
- Department of Primary Industry - Agriculture

It was raised in community meeting or community information days.

Jefferies

Odour modelling prepared by Connell Wagner as part of the EIS investigations identified a buffer, 1.7 kilometres wide is required between the Jefferies composting facility and the nearest residential neighbourhood. It was at Appendix 13 to the EIS.

The EPA concluded it is unlikely dust from the Jeffries compost facility will have an unacceptable effect on the proposal. They noted the modelling indicates, under normal operation and continuing good management, the EPA odour criteria will be met at all proposed residential areas.

However, the supplied modelling showed when feedstock is in a worst-case condition, as represented by 20% organic liquid, the predicted levels over the southern part of the site are unsatisfactory.

In response, the Masterplan's residential neighbourhoods are set back 1.7 kilometres from the facility, and the southern area is included in the Masterplan's open space.

The buffer, combined with Jefferies' high quality management of its operations, will mitigate potential negative impacts, both on residential neighbourhoods and Jefferies' operations.

However, it is acknowledged there is a possibility future residents will still complain, should particular odour incidences occur, when windrows are turned for example. Residents may complain when there is no real odour issue, but they rightly or wrongly perceive an issue.

The required 1.7 kilometre between the nearest proposed residential neighbourhood could be combined with visual barriers to reduce residents' potential perceptions regarding the facility's operation.

In this respect, Jefferies approved plans include landscaping along their northern boundary. In addition, landscaping can be provided in the southern part of the site. Landscaping can be designed to specifically dissipate wind energy, however, this will need to be balanced with biodiversity requirements, and considering the soil conditions in that part of the site.

Consideration of the landscape treatment in this area will be undertaken with Jefferies, or the owner of the facility at that time.

The Masterplan's employment precinct located within the 1.7 kilometre buffer will be occupied by light industrial or horticultural value adding uses. Indeed, Perpetual Holdings existing glass house business will be remaining within that precinct.

To ensure future employment uses are not affected by Jefferies' operations, planning controls can be included in any Development Plan Amendment which prohibits outdoor activities including storage and work activities.

Jefferies' use of McEvoy Road for vehicle access will not be impacted by the proposal, as access from the site via that road is not included.

The location for the EIS's modelling was identified from plans within the *Environmental Management Plan* approved with the Jefferies facility, and its approved plans listed in the determination notice.

They show the active composting facility on that part of Jefferies' land located south of McEvoy Road.

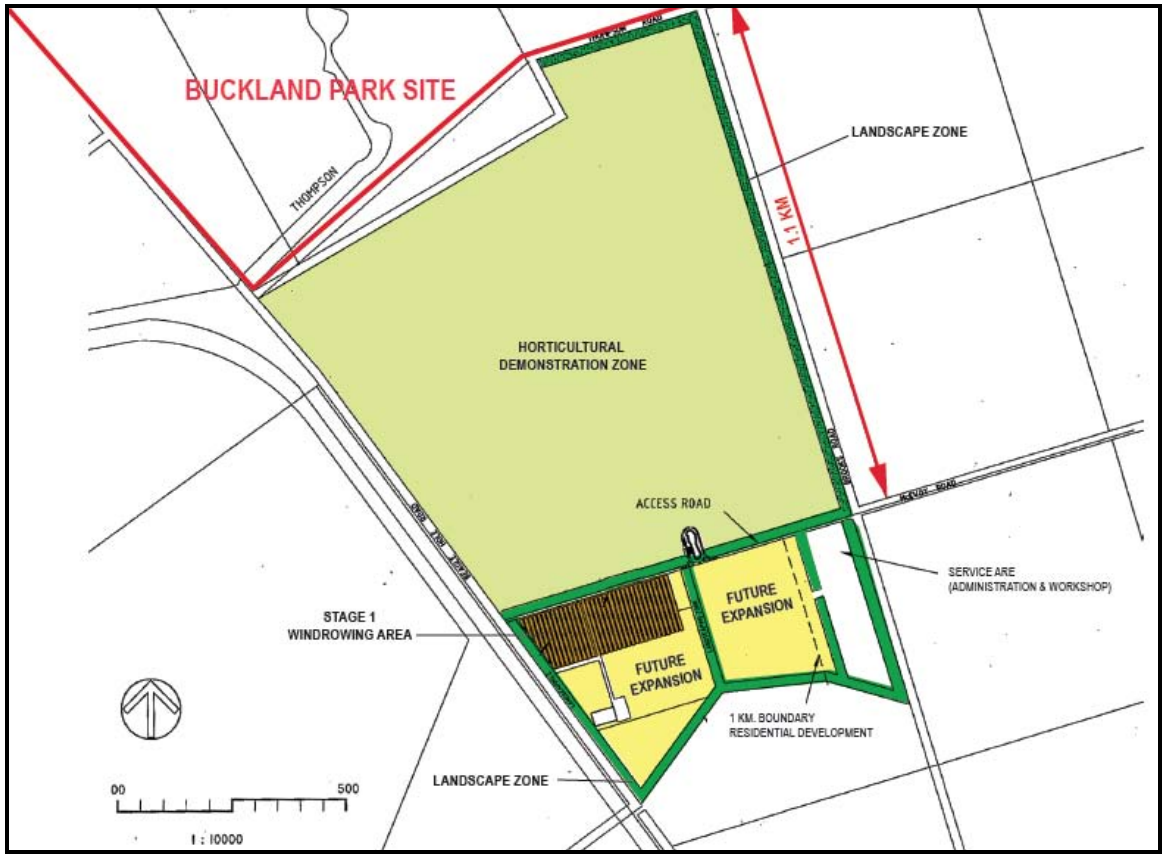


Figure 4.53: Jefferies General Layout Plan

Source: Rodenburg Davey and Associates Pty Ltd Figure 3.3

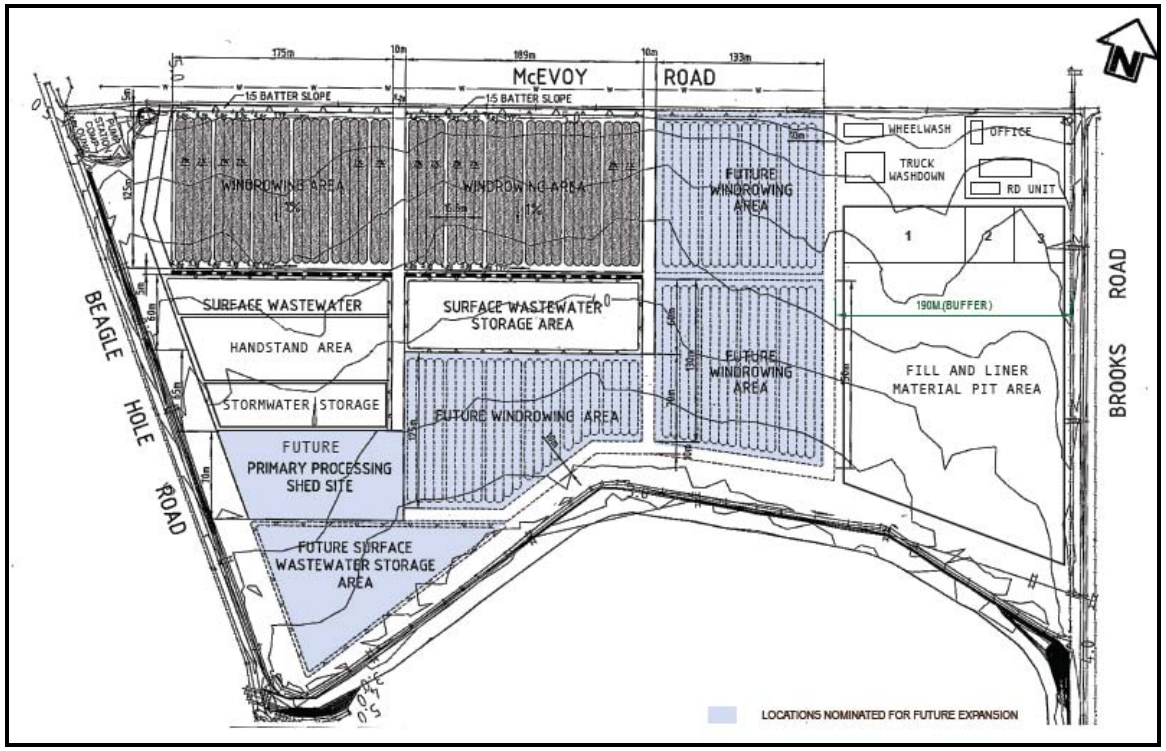


Figure 4.54: Jefferies Approved Layout Plan

Source: Kelly Brown and Root – AEV 402 – DWG – 050 (B) 20 May 2004 (viewed at the Department of Planning and Local Government on 3 July 2009)

The expansion of industries which are actively diverting waste from landfill should be encouraged to meet the state's waste targets. Therefore it is important to consider Jefferies' options for expansion.

Jefferies have clearly identified their intended locations for future expansion. The approved general layout plan shows future areas, and these have been approved in principle.

The area for future expansion is south of McEvoy Road, no closer to the site than its existing operations. Therefore the proposed 1.7 kilometre buffer from proposed new residential buffers will not be affected.

The approved plans show parts of Jefferies' land are already included in the existing facility's required buffer– please see eastern side of the approved layout plan.

Should Jefferies wish to expand their operations, a new or amended Public Environmental Report would be required, or an amended decision notice. Fresh environmental assessment will be undertaken at that time.

Expansion into the northern part of the site would have to consider existing dwellings in the locality, which are already located within 1 kilometre of Jefferies' northern and eastern boundaries.

It is important to note, it is projected new residential neighbourhoods will not be created in the site's south until approximately 2032, as part of Stage 5.

In the intervening years improvements in composting technology and techniques may reduce odour impacts, and some activities may be undertaken in closed sheds with inbuilt odour measures. Industry and government standards may improve.

There are opportunities for positive interactions between the proposal and Jefferies. For example, the proposal will generate demand for large volumes of landscape material over a 25 year time frame.

Jefferies produces this material and is ideally placed to supply it to the site.

The proposal will also include residential, commercial and industrial activities which will produce feedstock suitable for Jefferies operation, and is ideally located to deliver it to Jefferies.

It is therefore anticipated the proposal and the Jefferies facility will be good neighbours into the future and will be able to grow together.

Planning for Horticulture

PIRSA have concluded the proposal will not have a significant impact of agricultural development, however, PIRSA must be able to consider the detailed design of buffers to horticultural land at the detailed design stage.

The potential impacts on future residential neighbourhoods from horticultural activities was considered in the EIS. Horticulture may create noise, odours and spray drift.

The investigations undertaken for the EIS found, that subject to horticulturalists operating in accordance with required standards, the proposal and its neighbours should be able to coexist.

As described in Section 4.4, *Planning the Adelaide We All Want* foreshadows urban uses on land adjoining the site in the longer term, and subject to the proposal receiving approval.

The current *Metropolitan Planning Strategy* aims to protect key areas of primary production, including the northern Adelaide plains. The area identified in the Strategy as an "area of strategic interest for primary production", within the site is only 177.6 ha, which is not significant when considering the total size of the area of strategic interest.

Indeed, it is only a small portion of the site.

It is appropriate to also consider the best and most economic use for this land.

The Development of Horticultural Industries on the Adelaide Plains – A Blueprint for 2030 2007 prepared for the Virginia Horticulture Centre concluded this land had limited value as agricultural land.

Conversely it is strategically important to proposal's success, as it enjoys the best access to Port Wakefield Road, a major piece of transport infrastructure.

The exclusion of the land will affect the viability of the proposal which will contribute to the state's economic strength.

There is a need for viable new suburbs to serve Adelaide's economic and population growth in strategic locations.

In this circumstance, it is considered the land is under used, and more appropriately used for urban purposes.

Buffers to horticultural uses are included in the Masterplan. In particular, employment precincts were located where possible adjoining existing horticulture businesses. In other locations buffers of 20 metres where included, or there is a public road between the two uses.

Crop Spraying

Connell Wagner found aerial spraying is unlikely to be a significant activity in the site's locality.

They also considered spray drift from adjoining activities, and found it is likely to have negligible impact on the proposal.

The EPA noted, as there is separation from existing activities, it is unlikely spray drift will be an issue. However, if the area to the site's immediate south were used for horticulture, there would be the potential for unacceptable spray drift and associated odour issues.

The area immediately to the south is currently occupied by a residential premise, SA Potatoes and another farm with olive groves.

Noise

Any acoustic mounding and/or fences identified as being required during the detailed design of any of the proposal's stages will be provided by the proponent as part of construction works.

Bird scaring devices, such as gas guns may be used at various times of the year at Windamere, adjoining the site's west boundary, and in locations east of Port Wakefield Road in the site's region.

Parsons Brinkerhoff have considered the implications of this issue. The operation of audible bird scaring devices requires adherence to the Audible Bird Scaring Devices Environmental Noise Guidelines 2007 South Australian Environment Protection Authority.

They conclude there is potential for gas guns used at Windamere to exceed the EPA guidelines at the nearest proposed residential neighbourhood.

It is unknown whether gas guns are indeed actually used at Windamere.

The nearest proposed residential neighbourhood to Windamere is projected to be constructed between in 2022 and 2027 (Stage 3).

Prior to 2022, a Bird Management Plan can be resolved with the owners of Windamere.

SA State Shooting Park

The Office of Sport and Recreation manage the SA Shooting Park. They have noted Connell Wagner's findings that the 1.06 kilometre separation between the Park and the site means it will be unlikely there is any impact.

They will manage the Park as they do now, and have retained a copy of Connell Wagner's report for their records.

Virginia Neighbourhood Centre

Connor Holmes concluded as follows:

> *At the 2006 Census, Virginia had a population of 1,433 persons, but a retail floor space of 5,582m². To support this amount of floor space the Virginia neighbourhood centre is reliant on a catchment that extends well beyond Virginia's town boundaries. This catchment would overlap with Buckland Park's secondary catchment.*
>
> *It is anticipated shops in Virginia's neighbourhood centre are more likely* (than other centres) *to be impacted by Buckland Park's centres, in particular the District Centre, as Virginia is close to Buckland Park, and its catchment will overlap with Buckland Park's secondary catchment.*
>
> *However, District Centres and Neighbourhood Centres play distinctive roles within centre hierarchies.*
>
> *It is widely experienced, and specifically encouraged in the Planning Strategy and Development Plan, that a number of Neighbourhood Centres would be located within the catchment of a more widely spaced District Centre network.*
>
> *The Virginia Neighbourhood Centre would be expected to play a similar role to Buckland Park's Neighbourhood Centres, providing primarily weekly, daily and convenience purchases to their surrounding communities.*
>
> *It is not anticipated Buckland Park's District Centre will draw expenditure away from the Virginia Neighbourhood Centre. The Neighbourhood Centres' role is different and compatible with the provision of District Centre, which provides for higher order comparison and specialty shopping.*
>
> *Buckland Park can be expected to actually generate additional expenditure at other centres within its region.*
>
> *In the case of the Virginia Neighbourhood Centre, this benefit is likely to fluctuate.*
>
> *Firstly, the establishment of the new Buckland Park community will boost spending at Virginia, but this would fall away with the establishment of new centres in Buckland Park. The impact of these fluctuations will be mitigated by the following measures:*
>
> - *Stage 1's Neighbourhood Centre will be constructed in phases, so only the minimum amount of retail floor space is provided to meet only the needs of Buckland Park's first occupants.*
> - *Neighbourhood Centres provided in Buckland Park's future stages will only be provided as the population, and demand, grows. These Centres will therefore have their own catchment to draw on, and will not seek custom from the Virginia Neighbourhood Centre's catchment.*

SA Potatoes

SA Potatoes is located to the south of Stage 1. They grow potatoes there between October and January. They undertake normal farming activities, such as ploughing, weeding, harvesting, fertilizing; and odours from fertilizing and spray drift from aerial and ground weed and pest control spraying.

These activities are unrestricted, aside from compliance with Environment Protection (Noise) Policy 2007 and the EPA Guidelines for Responsible Pesticide Use.

As noted above, Connell Wagner found these activities are unlikely to impact on the proposal, as long as applicable environmental controls are complied with.

The Stage 1 Layout Plan has residential allotments adjoining SA Potato's land.

These allotments have been designed so a 15 metre wide "no building" easement can be provided adjoining their shared boundary, while allowing for a house and a usable garden.

The creation of a 15 metre wide public open space buffer along the shared boundary was considered. However, this would impose management and maintenance costs on Council, and would not be easily accessible for maintenance, and would not be functional as public open space.

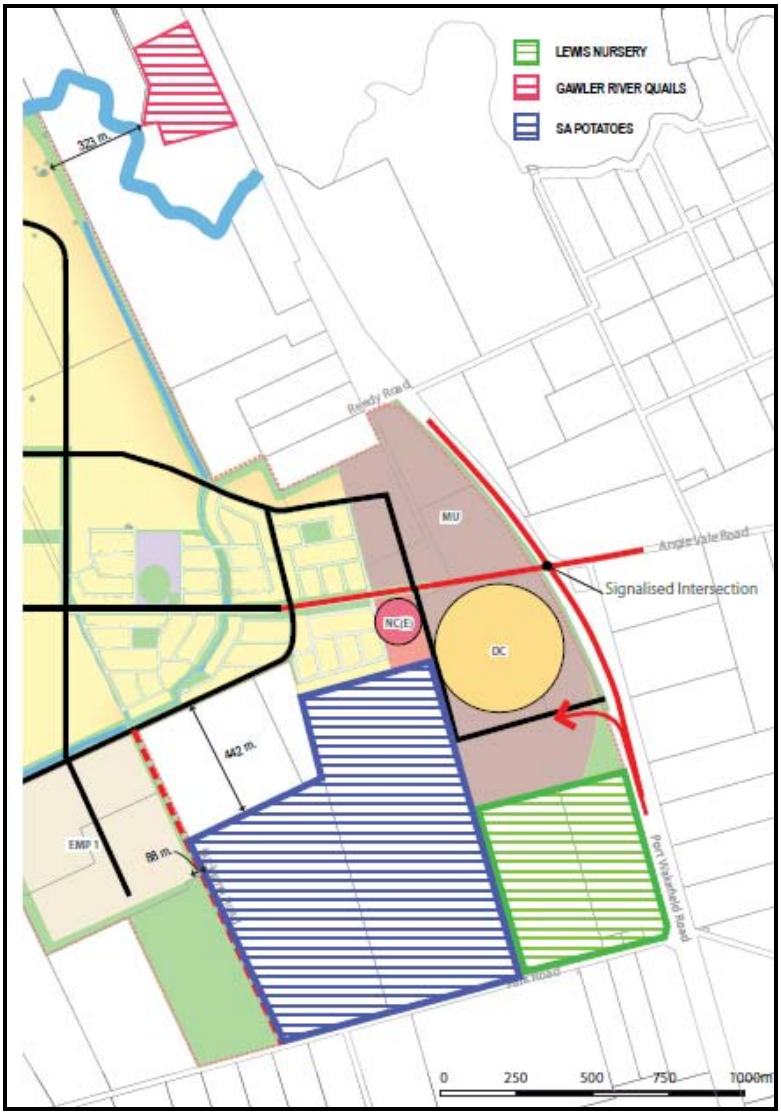


Figure 4.55: Adjoining Businesses
Source: Walker Corporation

It would also create an unsafe space which could not be seen, especially if SA Potatoes developed their land for residential purposes, which was flagged as a definite possibility in their EIS submission.

Recycled water used within the site will be sourced from Bolivar Waste Water Treatment Plant. Therefore it will be of similar, or better quality than recycled water from the WRSV pipeline which currently provides recycled water to horticulturists in the region.

It is therefore unlikely its use will adversely affect the viability of potato growing in the area.

Lewis Nursery

Lewis Nursery is located adjoining the site to the south, on Port Wakefield Road. They have made considerable investment of $many millions in:

- Wholesale nursery production.
- High density olive grove and pomegranate orchards
- 20 full time employees
- Unique genetic material.
- Long term trials of new methods of horticultural tree crops.
- Advanced tree breeding programmes.

In this location the Masterplan accommodates a mixed use precinct, with good visibility and access to Port Wakefield Road.

Within this context, it is anticipated commercial activity, which may include retail activities for home and building related business will fit well with a commercial nursery operation.

During the proposal's construction phase there will requirements for large amounts of landscape materials, which Lewis Nursery supplies. Given the Nursery's close relationship to the site, there are potential economies associated with sourcing plants from the Nursery for construction.

However, any arrangement would be subject to normal tendering and contracting arrangements.

The potential involvement of local businesses in this way is an example of the proposal's potential contribution to the region's economic strength.

Parsons Brinkerhoff considered potential noise conflicts between Lewis Nursery's operations and the nearest proposed residential neighbourhood, some 1,300 metres away. They based their analysis on noise levels for typical machinery, sourced from AS 2436-1981 *Guide to Noise Control on Construction, Maintenance and Demolition Sites,* and did not take noise readings in the field. The information on noise generated by machinery in this document was considered a reasonable guide to the types of noise generated at a commercial nursery.

They assumed reasonable parameters for operations at Lewis Nurseries. It was not possible to undertake field work, as particular activities were not being undertaken at the Nursery at the time of producing this report.

Based on the assumptions made, Parsons Brinkerhoff concluded operational noise levels from Lewis Nursery would not be audible at the nearest proposed residential boundary.

Gawler River Quails

This business is located 400 metres north the Gawler River, and approximately 323 metres from the nearest proposed residential neighbourhood.

They process poultry within sheds on their property, overnight.

The nearest proposed residential neighbourhood is projected to commence in 2022 (Stage 3).

Prior to its commencement detailed design of residential neighbourhoods closest to Gawler River Quails detailed noise investigations will be undertaken, the design will be completed with houses beyond the range of any noise from the sheds.

Given the distance between the sheds and the nearest proposed residential neighbourhood, it is considered unlikely there will be any significant impact.

Adjoining Neighbour

Adjoining Stage 1 to the south is a residential property, with two family homes and a horse related business.

Up to 19 horses are kept in a paddock located on the eastern side of the property, adjoining a proposed residential neighbourhood. The houses enjoy an outlook to the east.

To the north, the property is separated from the site by Legoe Road.

The family currently enjoy a rural residential lifestyle, without near neighbours.

To mitigate potential conflicts between horses and the family, and new residents, and to retain an open outlook from their property to the east, as well as to the north over Legoe Road, the Stage 1 concept plan has been amended to include a 20 metre wide open buffer between their boundary and the nearest new residential property.

This buffer also allows the provision of a road link into SA Potatoes' land if in the future they wish to subdivide it for housing as they foreshadowed in their submission.

4.13 Place Names

Two land owners within the site commented on this issue, by direct contact with Walker.

Walker commits to naming parts of the proposal:

- "Formosa". This is the Portuguese word for "beautiful". Taiwan used to be called Formosa. The land owner is of Taiwanese origin. The name therefore has a cultural link to the site.
- After one of the owner's late daughter. The family has significant links with the area.

Other themes for names identified in the EIS include the site's Indigenous, European and natural heritage. It is appropriate to create links its Asian and Italian heritage also.

Place and street names will be agreed to by Playford City Council and the Geographical Names Board.

4.14 Stage 1 Road Closures

Comments on this issue were received in the following formal submissions.

- Playford City Council
- Epic Energy
- Electranet
- SA Water
- ETSA
- Office of Sport and Recreation
- A local, adjoining resident

It was also raised by a local resident at the Department of Planning's formal public meeting.

Epic Energy, Electranet, SA Water, ETSA and the Office of Sport and Recreation did not to the road closure, and confirm it would not impact on their assets.

In accordance with the governance arrangements described in Section 4.4, discussions will be held Playford City Council regarding compliance with the *Sale or Disposal of Assets Policy,* which states:

> *All assets shall be disposed of through a tender process and/or independent accredited Agent (eg Auctioneer, Real Estate Agent), duly engaged in accordance with Council's Procurement Policy, with the asking price set at independent market value. Incorporated community groups may purchase surplus assets at a formal independent market valuation."*

The EIS commits to maintaining public road access, both during the construction of Stage 1, and in its final design.

Access to the local resident's property will therefore be maintained. Emergency vehicles will be able to more easily find the local resident's property, as access off Port Wakefield Road will be made more legible by the creation of a signalised intersection, and the new main entry boulevarde.

4.15 Mosquitoes

Comments on this issue were received in the following formal submissions.

- Playford City Council
- The Department of Health
- EPA and Zero Waste

It was not raised in community meeting or community information days.

Introduction

This response should be read in conjunction with the *Mosquitoes at Buckland Park* report prepared by the Sansom Institute (Appendix 22) as part of the EIS investigations, Cooe's peer review of that report (Appendix 23) and Chapter 9.10 of the EIS.

It should be read in the context of the relevant EIS Guidelines:

4.3.19	*Describe measures that may be undertaken to control mosquitoes in and near the site to reduce the possible health risks.*
4.3.20	*Describe how the mosquito control measures will impact on species that require insects for food.*
4.3.21	*Describe the impact of insect control measures on recreational fishing and local ecology.*

Beyond the Guidelines requirements, the Sansom Institute was commissioned to undertake field work as part of EIS preparation. Their field trapping found low numbers of rangeland mosquitoes in or near the site.

As would be expected, the majority of *Aedes Vigilax* mosquitoes (823 females) were found at Site 6, located in the coastal plain approximately 3.7 kilometres from the nearest proposed residential area within the site (Dr Williams).

The smallest numbers of mosquitoes, 58 (7%) were found at sites 1, 2 and 3, which were in or near the site. These were mostly *Culex* and *Anopheles* (Dr Williams).

To supplement their field work, and obtain a picture of mosquito types across the region and across seasons, the Sansom Institute considered historical data for areas to the site's south where coastal vegetation is the same as coastal vegetation to the site's west.

They chose Globe Derby and Torrens Island, which had been the subject of previous study. However, it is vital to note, the site and Globe Derby and Torrens Island have a different relationship to coastal salt marsh terrain and mangrove forest.

Globe Derby is 500 to 600 metres from this terrain, and Torrens Island is covered.

By contrast, the site is 3.1 to 7 kilometres from this terrain and is separated by pasture grazing land and Cheetham salt pans.

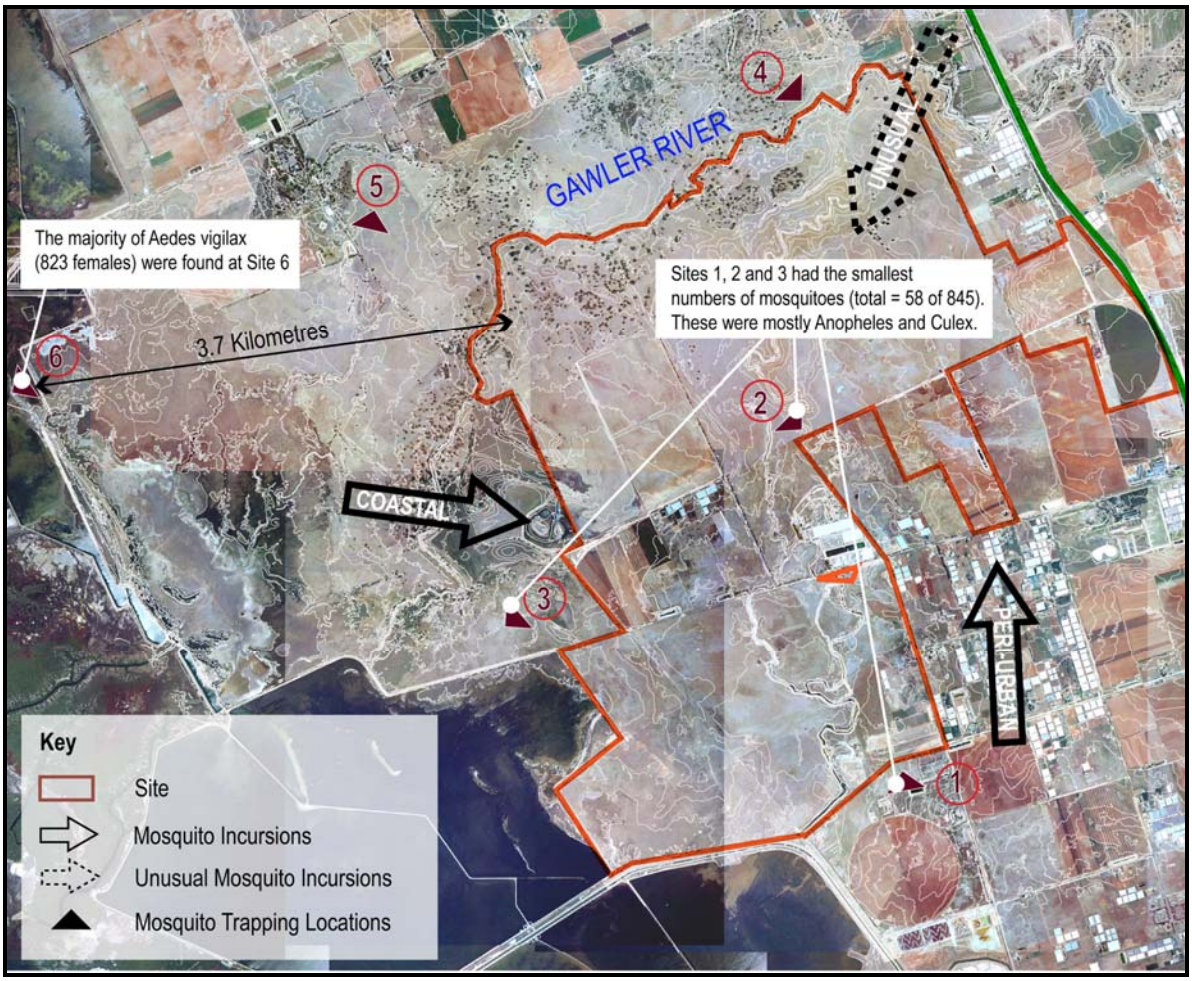


Figure 4.56: Mosquito Trap Locations
Source: Sansom Institute

Figure 4.57: Globe Derby with Mosquito Habitat
Source: Google Earth adapted by Walker Corporation

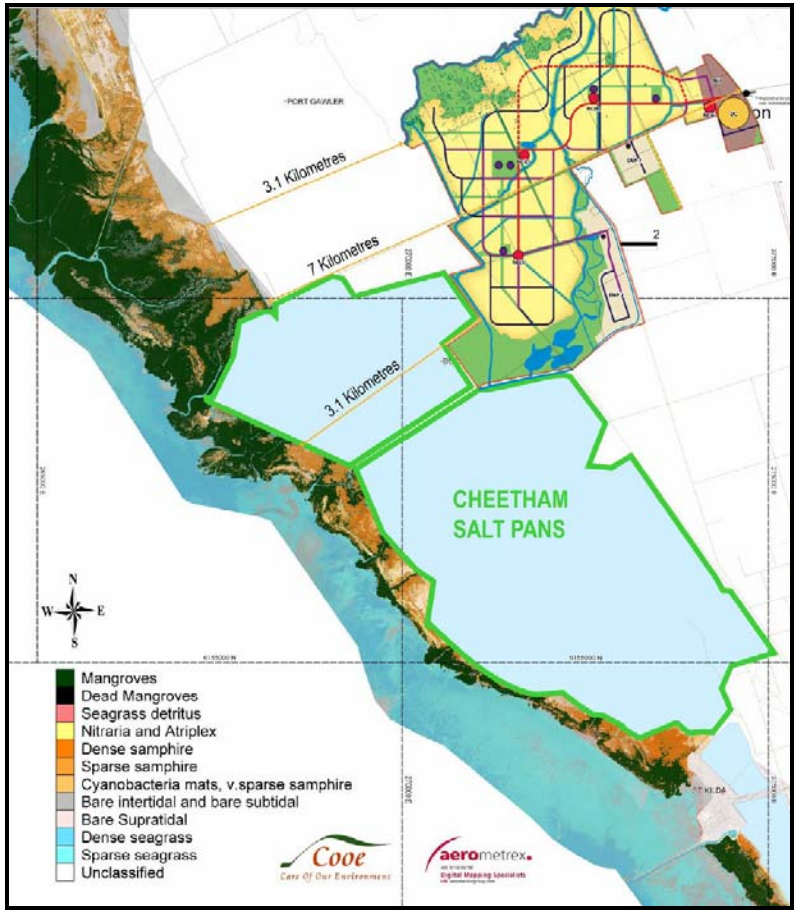


Figure 4.58: The Site with Mosquito Habitat
Source: Prepared by, Cooe and Aerometrex, used by the Sansom Institute and adapted by Walker Corporation

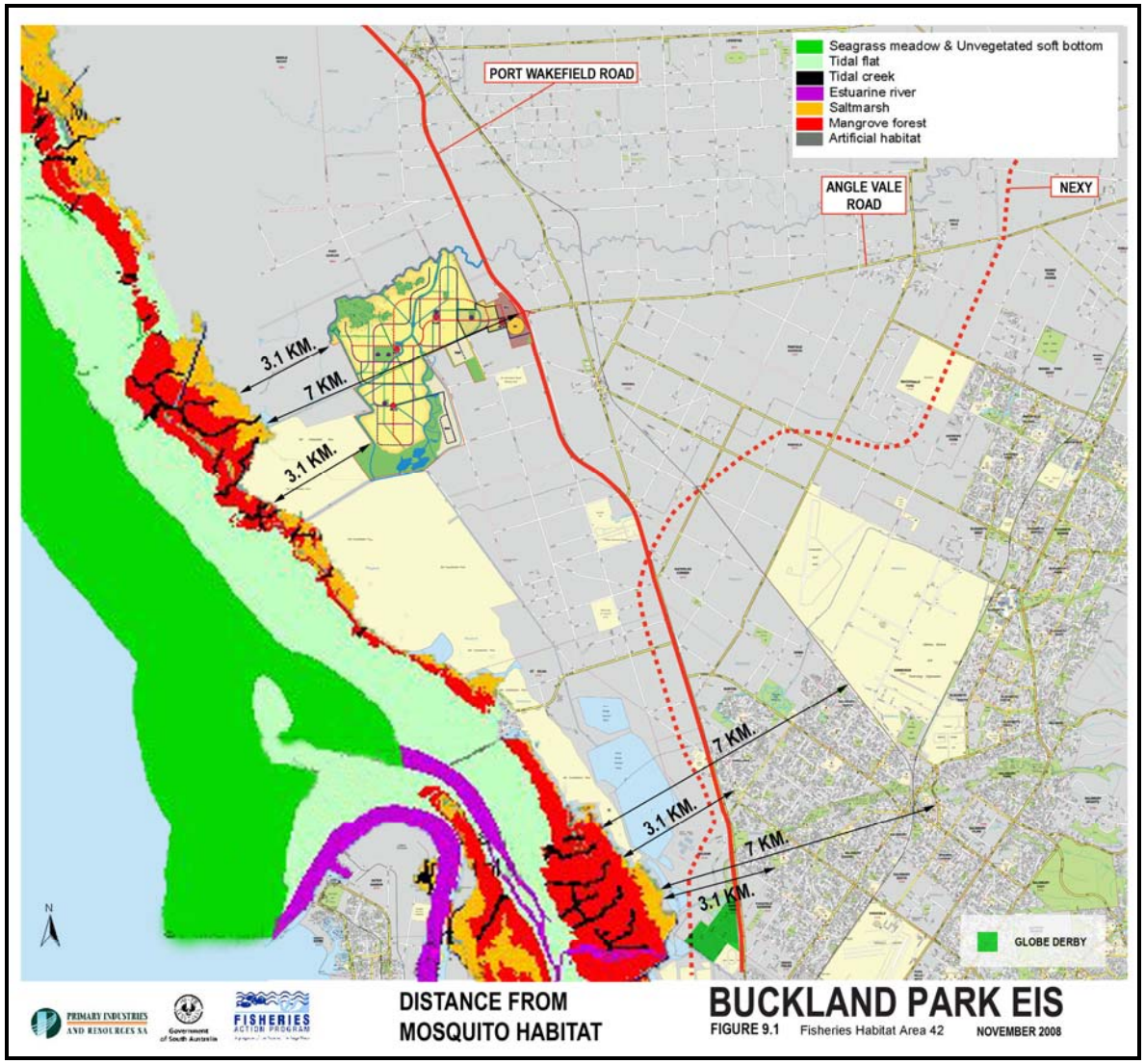


Figure 4.59: The Site, Salisbury and Globe Derby with Mosquito Habitat

This diagram places the site, Globe Derby and urbanised parts of the Salisbury Local Government Area in context, relative to coastal terrain.

This figure shows the site has a similar relationship to rangeland mosquito habitat as large parts of Salisbury east of Port Wakefield Road.

The Sansom Institute concluded the proposal would result in an increase in the number of urbanised species on the site. However, urbanised species are not associated with health issues.

The Institute determined the number of urbanised species *should be no greater than for any other residential area in Adelaide.*

The Sansom Institute concluded rangeland mosquitoes may come into the site from habitat areas 3.1 to 7 kilometres to the site's west.

Measures to control mosquitoes

In accordance with Guideline 4.3.19, the Sansom Institute's report, the EIS and this Response Report include measures that may be undertaken in and near the site to reduce the possible health risks associated with rangeland mosquitoes.

These measures form a clear, localised strategy applicable to the site, and appropriate for the anticipated levels of mosquito impacts.

1. Provide Buffers between new residential neighbourhoods and extensive insect habitat are included as a planning tool in the *Tweed Shire Development Control Plan 2008.*

   Tweed Shire is located in coastal northern NSW. Given its context, surrounded by wetlands and coastal areas in a warm, humid climate, it has recognised issues with mosquitoes and midges.

   The Tweed Shire is not comparable to the City of Playford, which does not have the same extensive relationship to coastal ecosystems, nor the site for the same reason.

   However, it has been chosen for comparison purposes as actually addresses this issue. Other Councils within NSW and South Australia do not, as most are like City of Playford, and do not need to consider mosquitoes in their planning activities.

   The *Tweed Shire Development Control Plan 2008* has a section on planning for mosquito management.

   The DCP notes, *As a general rule, the areas where biting midge and mosquito problems will regularly be a nuisance to our human populace will be within 1 kilometre of extensive insect breeding areas.* (page A6-2)

   The DCP therefore recommends a 50 metre to 1 kilometre buffer between new residential neighbourhoods and insect breeding sites (page A6 – 9). There should not be any vegetation corridors within the buffer, as these facilitate the movement of insects to residential areas.

   Like much of Adelaide's urban area, the site is 3.1 to 7 kilometres from the coastal plain, where rangeland mosquitoes' habitat is found.

   The proposal's new residential neighbourhoods are well beyond 1 kilometre from mosquito extensive breeding areas. Indeed, the buffer distance is 3 kilometres, see Figure 4.53 above.

   This buffer comprises open grazing land and Cheetham salt pans. There are therefore no "vegetated corridors".

   The proposal's location relative to extensive mosquito breeding areas is therefore compliant with the *Tweed Shire Development Control Plan 2008* planning policy.

2. Design and construction of civil works. The *Tweed Shire Development Control Plan 2008* discusses appropriate measures for mosquito management in new residential neighbourhoods (page A6-9).

   The DCP recommends the following, which are relevant to the proposal, and can be implemented:

   - Any earthworks such as fillings should not impede surrounding drainage systems.

   - Roadway embankments should be designed to eliminate (if possible) any standing water impoundment or redirection of water flows into potential mosquito breeding areas.

   - The design and routes of stormwater drainage should avoid silt accumulation and be free draining.

   - Exit points from drains into waterways or wetlands should be designed to avoid habitat changes at discharge points, where organically enriched drainage from urban areas is directed into mangrove areas or tea tree wetlands. Misdirected stormwater into these habitats can create new mosquito breeding sites or increase existing breeding by favouring certain aquatic and semi aquatic vegetation species that restrict drainage flow. Care must be taken to avoid increasing tidal influence back up drains into freshwater wetlands as this increases saltmarsh mosquito favourability.

     This measure will be considered in the stormwater design, however, it is noted, the proposed Stormwater Management Strategy does not include direct discharge into waterways.

     The Thompson Outfall Channel will carry stormwater from the site to the Gulf St Vincent.

     The outfall point is 2 kilometres from the site's western boundary, and 2.7 kilometres from the nearest proposed residential neighbourhood.

3. Design Guidelines will be applied to allotment sales which require the installation of insect screens to new homes. Design Guidelines are an encumbrance on certificates of title. Compliance with their provisions is therefore mandatory.

   New householders will be responsible for fitting the insect screens to their houses.

   Installation of insect screens worked successfully in a recent medium density project containing hundreds of apartments on the Rhodes Peninsula in Sydney. The apartments are built immediately adjoining mangrove mosquito habitat.

   In response to residents' complaints about mosquitoes, the builder fitted insect screens to every apartment. Complaints ceased.

There were no planning controls requiring insect screens, these were provided as part of the builder's design specifications.

It is considered requiring screens in the Design Guidelines will be equally successful at the site, particularly as it is located kilometres from mosquito habitat, as opposed to the Rhodes Peninsula, which is immediately adjacent.

4. "Welcome Packs" will be provided to new residents on their arrival.

   The Tweed Shire DCP includes education and awareness as an appropriate method of managing potential mosquito impacts. Its guidelines could be included in the educative material provided to the proposal's residents in Welcome Packs (pages A6 – 7 to A6 – 8).

   The information relating to mosquitoes is summarised below:

   - Keep vegetation surrounding the house to a minimum. This reduces insect harbouring areas and increases air flow surrounding the house.
   - Keep lawns well mowed as any activity that reduces sheltering sites and lowers humidity surrounding the house will help to deter mosquitoes.
   - Keep insect screens well maintained.
   - Insect protection during outdoor activities.

   It is anticipated residents' motivation to maintain insect screens will be directly proportional to their experience of mosquitoes.

5. Education on mosquito protection is provided by the South Australian government. This will increase people's awareness, both within the site and within Adelaide's existing urban areas.

6. Physical barriers are a measure implemented in other parts of the world.

   The creation of a physical barrier by hedge planting or fencing on the western boundary of future residential neighbourhoods is a feasible option, as these elements are common in residential areas.

   As the Sansom Institute note in their report, further research will be required on the form of this potential measure.

   However, if it is required, it will not be for at least a decade. Construction will not reach the site's western portion until then. New residential areas in the site's eastern portion are unlikely to experience mosquito issues.

   During this period additional research can be undertaken into the need, form and maintenance of such a barrier.

7. An integrated vector management strategy has been established in the *SA Integrated Mosquito Management, Strategic Directions Paper* 2007.

   This approach involves all state and local government, and crosses local government boundaries.

   An integrated strategy implies consideration over regions within Adelaide, not individual sites and a whole of government approach.

Seven measures that may be undertaken to control mosquitoes in and near the site to reduce possible health risks have been described in the Sansom Institute's report, the EIS and this Response Report.

It is therefore concluded EIS Guideline 4.3.19 has been complied with.

Measure 1 Buffers, is complied with as there is a 3 kilometre buffer between the site and extensive areas of insect habitat.

Measures 2 Design and construction of civil works, 3 Design Guidelines, and 4 Welcome Packs will be implemented in the proposal at the proponent's expense.

Measure 5 Education, is already being implemented by the South Australian government, and while information may require wider distribution, this would not be as a result of the proposal's location, but is a result of Adelaide's growing population.

Measure 6 Physical Barriers may not be required. A decision on its implementation can be made over coming decades as the proposal is progressively implemented in a westerly direction. If it is required, it would be implemented at the proponent's expense.

Measure 7 An integrated vector management strategy (IVMS) is already being implemented by the South Australian government, and should be applied over a region, and not confined to one particular site.

Given the implementation of measures 1, 2, 3, 4 and 5, it is concluded that residents within the proposal are less likely to be affected by mosquitoes than residents in other parts of Adelaide who are not protected by these measures, but whose homes have a similar relationship to insect habitat.

Measures 2, 3, 4, and 5 are more difficult to retrofit into an existing area, than incorporating them from the beginning as proposed.

Implementation of these measures in the proposal, reduces the likelihood of measures 6 and 7 and associated government involvement being required.

Impacts on other species, the ecology and fisheries

Notwithstanding the implementation of measures 1, 2, 3, 4 and 5 of the localized strategy to reduce possible health risks associated with mosquitoes described above, measure 7, which includes active mosquito control measures may be required.

However, the first component of an IVS is monitoring and information collection. This is used to target and tailor more active measures, such as chemical use, to suit the circumstances.

The Sansom Institute concluded this will *largely circumvent any significant impacts on local fisheries* by ensuring unnecessary spraying of insecticides.

Aquatic ecologists, Cooe peer reviewed the Institute's findings, and endorsed the recommended approach. The types of insecticides used and their off target impacts are well known.

Any mosquito control measures involving insecticides that may be required will be targeted to fit the circumstances, reducing the possibility of ineffective measures that may unnecessarily impact on other species. Therefore, ongoing monitoring will be required to inform decisions on control measures.

Reduction in mosquitoes (particularly larvae) as a source of food for fish is considered to have a small to an undetectable impact on the marine fauna because no local marine species is thought to be wholly dependent on mosquitoes as a food source.

Impacts can be further reduced by targeting mosquito larvae in their fourth instar, leaving younger larvae available as a food source.

Both the Sansom Institute's and Cooe's peer review were reported in Chapter 9.10 of the EIS.

4.16 Aviation

Comments on this issue were received in the following formal submissions.

- Friends of Parafield Airport
- DTEI - Aviation

It was raised at the Department of Planning's formal public meeting.

The proposal will not impact on Flight Training Adelaide's activities from its Parafield Airport base.

Their flight paths are just west of the site, and some noise may be experienced by residents although it is unlikely this will be a significant issue.

4.17 Environmental Issues

Comments on this issue were received in the following formal submissions.

- The Department of Health
- EPA and Zero Waste
- Mr Parnell

Acid Sulphate Soils

No Actual Acid Sulphate Soils (AASS) or indicators of ASS were found by Golders and Associates in their investigation of the site, as described in the EIS (page 5-2) and explained in Golders and Associates report attached to the EIS in Appendix 8.

Potential Acid Sulphate Soils (PASS) were located in three of their boreholes, and in a channel located off the site. In all three cases the material was below ground water, and in the case of the channel, below the surface water level.

The three boreholes were located in the southern section of the site or adjacent to Thompson Creek, in areas which were identified as having high potential for these soils in the desk top study.

However, PASS was not encountered in any the bores located in areas which Golders had concluded there was a high risk of finding this material given the presence of St Kilda soils and a height above sea level less than 5 metres AHD.

They concluded, "*Therefore PASS material at the site appears to be small localised areas within the St Kilda formation associated with former water course alignments.*

Considering the above it is expected PASS material on the site is at low risk of being exposed unless it is planned to excavate below ground water or undertake a process that will lower the groundwater table (such as dewatering) in areas in or adjacent to identified high risk sectors.

In areas where PASS material may be encountered acid production should be considered for the design of infrastructure. For example, the grade of concrete recommended should be appropriate for the conditions. (page 11)

Accordingly, to minimise encountering PASS, the Masterplan includes Thompson Creek, the site's southern section and the site's south western section in open space areas.

This minimises the risk of PASS material being encountered during construction, and the risk of acid affecting infrastructure.

However, Golders and Wallbridge and Gilbert recommend management strategies that can be implemented during construction and the design of infrastructure.

> *If Acid Sulphate Soils (ASS) are encountered within trenches, the soil will need to be treated prior to the installation of any infrastructure, therefore causing construction costs to increase.*
>
> *Precautions will need to be taken to prevent ingress of leachate from ASS getting into the trenches and being transported around the site. Both vacuum and pressure systems will minimise leachate ingress due to the relatively shallow depth of drains. Gravity drains also drain for long distances at a constant downward grade which facilitates the transport of leachate (if encountered). Both the vacuum and pressure sewerage drains are not required to constantly grade downward, this in itself would minimise the spread of ASS leachate should it be encountered*. (Wallbridge and Gilbert page 43)

Golder and Associates recommends detailed ASS investigations and preparation of an ASS Management Plan, prior to commencement of:

- works involving excavation below groundwater
- works that may lower the water table around watercourses, or in medium or high risk areas.
- works in areas identified as being medium or high risk.

No further investigations are required in the remainder of the site.

A range of measures to mitigate any impacts associated with disturbing PASS materials include the use of appropriate grade concrete according to the situation, bulk treatment or selective treatment of disturbed soils with lime, and avoidance or limiting of dewatering.

Detailed geotechnical investigations will be undertaken for each of the proposal's stages, and engineering designs prepared, commencing with Stage 1.

These will consider requirements for the management of ASS to prevent leachate being exposed during construction, and measures to monitor or mitigate any potential impacts. The CMP will include an ASS Management Plan, if required, which will be implemented during construction.

Particular consideration will be required for the southern storm and flood water management channel in the site's south, and its associated detention basin. Please see discussion in Section 4.1.4.

However, given there is a low risk of PASS being encountered, and this area is generally excluded from the Masteplan's built components, it is considered this will not be a significant issue for the proposal.

An Acid Sulphate Soil Management Plan will be included in the storm and flood water management's Construction Management Plan. It will be based on detailed ground water and geotech investigations, and will include methods of construction required and monitoring and remediation methods during construction.

Land Contamination

The Department of Health welcomed the EIS's commitment to a comprehensive soil and groundwater investigation including the appointment of an accredited Victorian EPA auditor in achieving appropriate planning practice wherever a sensitive land use is proposed.

Sensitive land uses include:

- residences
- childcare centres
- pre-school
- primary schools
- secondary schools
- residential care facilities.

The EPA recommends the following be provided confirming potential contamination of groundwater arising at or from the site and from off-site sources will not impact the suitability of the site for proposed sensitive uses:

- a definitive statement from an environmental consultant who is a site contamination auditor; or
- a Site Contamination Report Audit prepared by an SA EPA accredited site contamination auditor.

As part of the preparation of a Site Contamination Audit Report, and prior to construction of the proposed storm and flood drainage system and ASR scheme, a site contamination auditor should confirm land on which the facilities are to be located, is suitable for that purpose, and there will be no significant impact on the aquatic environment arising from constructing facilities in those locations.

The EPA have advised there is an environmental protection order, issued on 14th July 2009, relating to uncontrolled fill at Lot 6, Thompson Road, within the site. They advise the chemical characteristics of that fill must be taken into account when determining Lot 6's suitability for its proposed use.

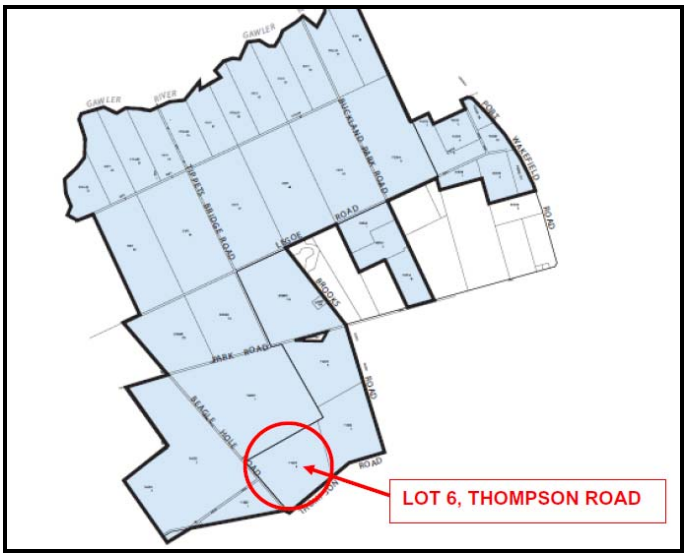


Figure 4.60: Lot 6, Thompson Road

The Masterplan shows Lot 6 as open space, which will be used for landscaping, storm and flood water channels and the stormwater detention and capture basin.

Detailed geotechnical, hydrogeological and land contamination investigations will be required to inform the design of infrastructure constructed on Lot 6.

Any remediation required to address chemical contamination in the uncontrolled fill will be undertaken in accordance with a Remediation Action Plan, and audited by a SA EPA accredited auditor.

Fill and Spoil

Spoil management, and management of any excavated soils from the site, should not be removed prior to an assessment being undertaken to determine their chemical characteristics in accordance with Schedule 6 of the *Environment Protection (Fees and Levy) Regulations 1994.*

Where the spoil and or soil exceeds the chemical criteria for waste fill, disposal must be to a facility licensed under the *Environment Protection Act 1993* to receive and or treat the waste.

Any re-use of waste generated during construction in accordance with resource management strategies must be undertaken in accordance with the EPA draft *Protocol For Waste Derived Fill*, dated April 2009.

Any fill imported into the site will comply with the draft Protocol, of final Protocol if available.

Air Quality during Construction

The EPA note, given the separation of proposed construction areas from sensitive receptors, construction dust should be capable of being managed in accordance with a Construction Management and Monitoring Plan (CMMP).

Construction Management Plans, which will include Dust Management Plans will be prepared for all construction works, and implemented during those construction works as described in the EIS at page 18-3 of the EIS, the commitments given in Chapter 20, and Section 7 of this report.

Waste and Resource Management

Zero Waste SA is satisfied the following matters which are pertinent to their functions and responsibilities have been addressed in the EIS:

- waste minimisation in the construction process wherever feasible by minimising material quantities and implementing design which uses standard sizes and components
- design of buildings to support future adaptability and thereby minimising new building requirements and maximising the re-use and redevelopment of existing built infrastructure

- incorporating the reuse of materials, materials with recycled content and materials that are recyclable at the end of their life, and all three wherever possible, specifically:
  - assessing materials, products and systems for their durability, low maintenance and future ability to be recycled
  - assessing construction technologies, products and materials for their future ability to be dismantled with minimum damage and to be re-cycled
  - selecting materials using life cycle costing principles for materials and system selection
  - minimise material quantities through approaches such as simple design, standard material sizes and components
  - avoiding toxic emitting, hazardous materials and those that release hazardous emissions (Volatile Organic Compounds) into the atmosphere (with particular attention to carpets and upholstery, paints and adhesives, including those with toxic / pollutant release during fires and during construction modification / refurbishment activities
  - give preference to materials with low embodied energy and locally sourced products where available
  - ensure any timber used is not sourced from high conservation value forests (old growth, rainforest)
- use of on-site waste separation facilities to maximise reuse, and recycling/resource recovery (and manage litter impacts on site)
- provision of sufficient and appropriate space to accommodate all waste management systems, including general waste bins and recycling bins for households, businesses and educational institutions
- interior design of dwellings and other built infrastructure to accommodate sufficient and appropriately located space to allow separation of recyclable materials from general waste

However, Zero Waste SA has requested the following matters be implemented.

- Avoidance techniques are applied during construction.
- Waste generated during construction is re-used.
- Waste generated during construction is recycled.

The EIS includes a commitment to the preparation of Construction Management Plans for each of the proposal's stages. The CMP will include Waste Management Plans that address avoidance, re-use and recycling. These will include the commitments sought by Zero Waste SA.

Land Uses in the Masterplan

The EPA's 2007 *Guidelines for Separation Distances* should be used to minimise the effects of any new residential neighbourhoods, new industries, and new fast food outlets within the site.

It is noted separation distances to the Jefferies Composting Facility and other local activities have already been considered in detail in Section 4.12 of this report, and the EIS, chapters 11.1 and 14.17 and technical reports at Appendix 12 and 13 to the EIS.

The EPA has recommended playgrounds and child care centres be located away from the main roads.

This can be implemented in the detailed design of each stage, particularly residential neighbourhoods and centres.

The Department of Health notes planning to include housing in the Mixed Use Zone near Port Wakefield Road provides an opportunity to include a range of aspects which directly or indirectly may improve the population's health, for example, energy efficiency, optimal use of infrastructure, active living components, affordable housing.

However, the Mixed Use Area and the adjoining residential neighbourhood are located adjacent to, or relatively close to Port Wakefield Road.

The Masterplan also includes residential neighbourhoods adjoining its internal principle roads.

The EPA criteria recommended for new residential neighbourhoods near existing major roads is as follows:

Outdoors

The development should be designed to provide a major outdoor recreation area on the ground level for each individual residence (this only applies to residents on the ground level and not to apartments above ground level in multi-story residential developments) that limits the noise level associated with road traffic to 52 dB(A) L_{Aeq} measured continuously over 15 hours between 7am and 10pm.

This may be achieved through separation, acoustic mounding, building orientation, continuous fencing (including points of access), and the like.

Indoors

- *Achieve the "satisfactory" design sound levels, with windows closed, for residential buildings near major roads set out in AS/NZS 2107:2000 Acoustic - Recommended Design Sound Levels and Reverberation Times for Building Interiors; and*
- *Maximum internal noise level at night (10pm - 7am), 45dB(A) L_{Amax}(fast), with windows closed.*

  The residential building facade and other measures such as separation, building and floor plan orientation and layout, continuous fencing, mounding and the like, should be designed to limit the noise level inside the dwelling associated with road traffic.

These measures can be applied to the assessment of any residential proposal in proximity to major roads.

The EPA recommends that new residential areas should be adequately separated from the major noise sources in the site's vicinity such as Port Wakefield Rd and the SA State Shooting Park.

While the EPA suggests areas adjacent to these noise sources be parks or recreational areas, it is noted:

- The SA Shooting Park is separated from any proposed residential neighbourhood by 1.06 kilometres, as is therefore not "adjacent".
- Any residential neighbourhoods or mixed use areas that may include a residential component are setback from Port Wakefield Road and will be separated from that road by large scale commercial and retail buildings.

The following standards and EPA recommendations will be complied with during detailed planning.

- All construction activity must comply with the mandatory provisions of Part 6, Division 1 of the *Environment Protection (Noise) Policy 2007;*
- Land intended for use as residential land should be zoned accordingly to provide residential amenity when applying the *Environment Protection (Noise) Policy 2007.*
- Any development on non-residential land should comply with the *Environment Protection (Noise) Policy 2007.*
- Any residential development within the mixed use area should be designed, sited and constructed to achieve the following internal noise levels:
  - Achieve the "satisfactory" design sound levels, with windows closed, for residential buildings near major roads set out in AS/NZS 2107:2000 Acoustic - Recommended Design Sound Levels and Reverberation Times for Building Interiors; and
  - Maximum internal noise level at night (10pm - 7am), 45dB(A) L_{Amax}(fast), with windows closed.
- Fixed domestic machines installed as part of the development must comply with the mandatory provisions of Part 6, Division 2 of the *Environment Protection (Noise) Policy 2007*.

If the proposal is approved these requirements are recommended as conditions of approval and associated notes.

5.0 MODIFICATIONS TO THE PROPOSAL

5.1 The Masterplan

During the extensive planning and environmental assessment period, the proposal's Masterplan was prepared and adjusted, considering environmental constraints which were progressively identified.

The Masterplan has gone through many iterations in response to physical, economic, and social issues during the course of the environmental assessment.

- Economic, social and planning context. The site area was enlarged in 2008 to allow increased employment land and frontage to Port Wakefield Road. The Masterplan was adjusted to create a better relationship between neighbourhood centres, employment areas, and open space networks and pedestrian, bike and road networks.

  These amendments will provide residents and businesses with a legible main road "address", and will improve visibility and accessibility for community services, and commercial and employment activities, increasing their potential for successfully contributing to the proposal's success and self sufficiency, and its contribution to the economy.

- Biodiversity context. The Masterplan's open space areas where adjusted in response to flora and fauna survey work. The amount of open space in the Masterplan has been balanced, to ensure requirements for maintenance and management are within reasonable bounds. However, the *Development Act 1993* requirement that 12.5% of the site is open space has been exceeded, and the MOSS (recreation) zone accommodated.

  The Gawler River corridor, and associated areas of river red gums are incorporated into open space areas. To ensure clearing is minimised, lower density residential areas are included adjacent to these areas, and a commitment made to achieving a significant environmental benefit.

  In the site's southern portion, the eastern reach of Thompson Creek and its important native vegetation has been incorporated into open space, and stormwater management channels were adjusted during the design process to avoid the creek.

  In the site's south western portion, the Masterplan was adjusted to remove potential residential neighbourhoods from areas identified as samphire habitat, and allow open space for new areas of samphire to be planted, compensating for its loss in other parts of the Masterplan. This has been successfully undertaken in other new suburbs in Adelaide.

  Where storm and flood water management channels pass through this area, they can be revegetated with samphire species.

The site's south western portion adjoins Cheetham salt pans, which are a habitat for migratory birds. A buffer of samphire vegetation will separate the Masterplan's residential neighbourhoods from the pans.

- Groundwater and potential urban salinity context. The site's south and south western portion has the highest ground water table. Potential residential neighbourhoods have therefore been removed from this area to reduce the likelihood of large scale construction activities in the area.

  Where storm and flood water management channels pass through this area and the detention basin is located engineering responses can be included in the proposal to address this issue where construction will occur where ground water is high.

- Potential Acid Sulphate Soils context. The site's southern and south western portion have been identified as at highest risk for Potential Acid Sulphate Soils, particularly those locations along Thompson Creek's eastern reach. The Masterplan's residential neighbourhoods have therefore mostly been removed from this area to reduce the likelihood of large scale construction activities in the area. These have mostly been incorporated into open space areas.

  Where storm and flood water management channels pass through this area and the detention basin is located engineering responses have been included in the proposal to address this issue where construction will occur in high risk PASS areas.

- Topographical context. The site's south and south western portion is the lowest part of the site, and is therefore potentially affected by increased tidal surge associated with sea level rise. This area is contained principally within the Masterplan's open space ares. Some parts of the Masterplan's southern residential neighbourhoods will require fill to achieve a 4.00mAHD finished site level, but the area has been minimised to include only parts where requirements for fill are least.

- Sustainability context. One of the fundamental sustainability principles underlying the proposal is the capture of stormwater for reuse, and to minimise discharge into the Gulf St Vincent.

  As the site's south western portion is the lowest part of the site, stormwater will drain to this location, facilitated by the proposed stormwater management channels.

  It is the most suitable location the capture of stormwater for its reuse.

  Residential neighbourhoods have been removed from this area, and provision made for retention and detention basins, within open space areas. Parts of these basins can be landscaped and used for active recreation, or samphire vegetation.

- Local context. The Jefferies composting facility and demonstration farm is located to the south of the site. The composting facility has the potential to produce odour. Modelling has been undertaken which established a 1.7 kilometre buffer is required between the composting facility and the nearest residential neighbourhood.
  Accordingly, residential neighbourhoods were removed from the site's southern portion within that buffer, and it has been incorporated into open space.

  As described above, this open space area will serve a variety of purposes. An additional use will be landscaping, which will compliment that done on the Jefferies' site, to provide a visual barrier between the nearest residential neighbourhoods and Jefferies.

It can be seen the site's south and south west amendments have been made to minimise the interaction of the Masterplan's proposed residential neighbourhoods and identified.

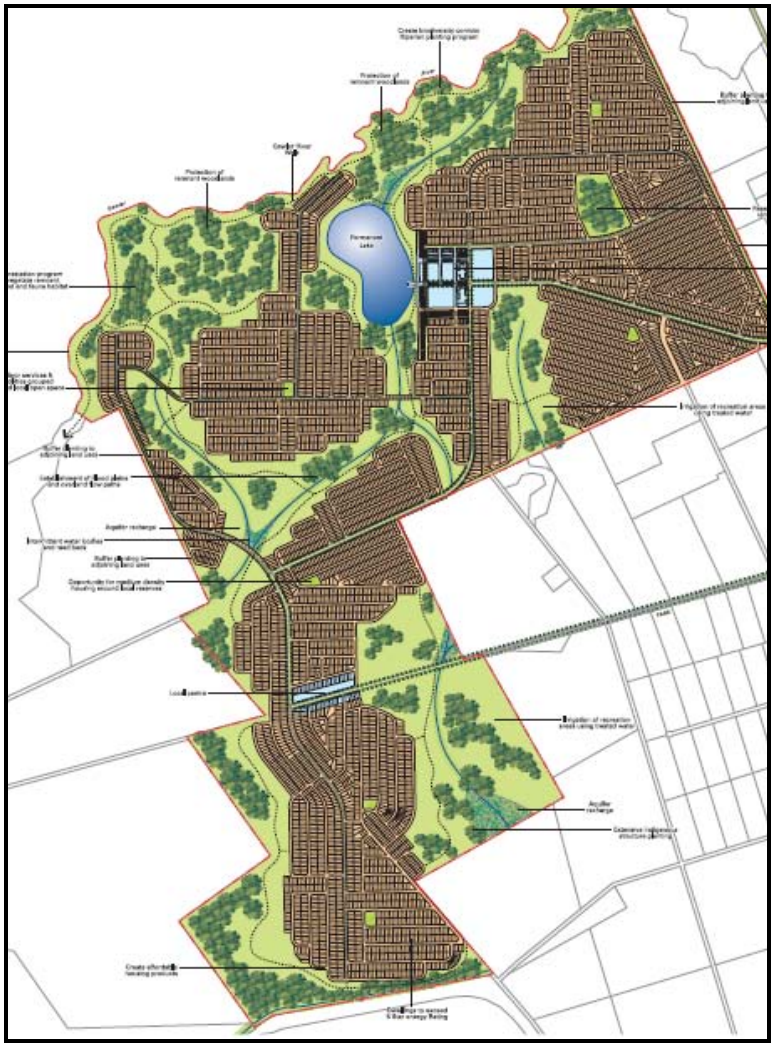


Figure 5.1: Concept Masterplan December 2006

Figure 5.2: Concept Masterplan September 2007

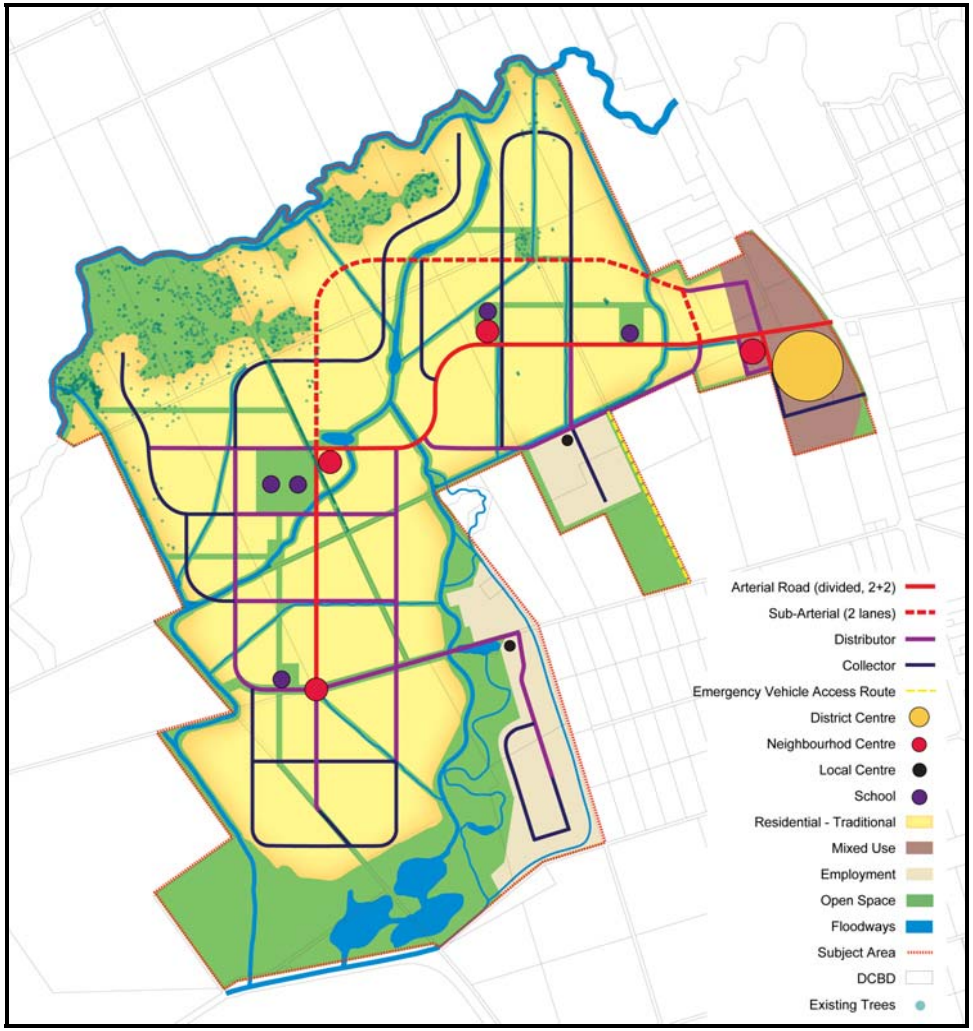


Figure 5.3: Masterplan March 2009

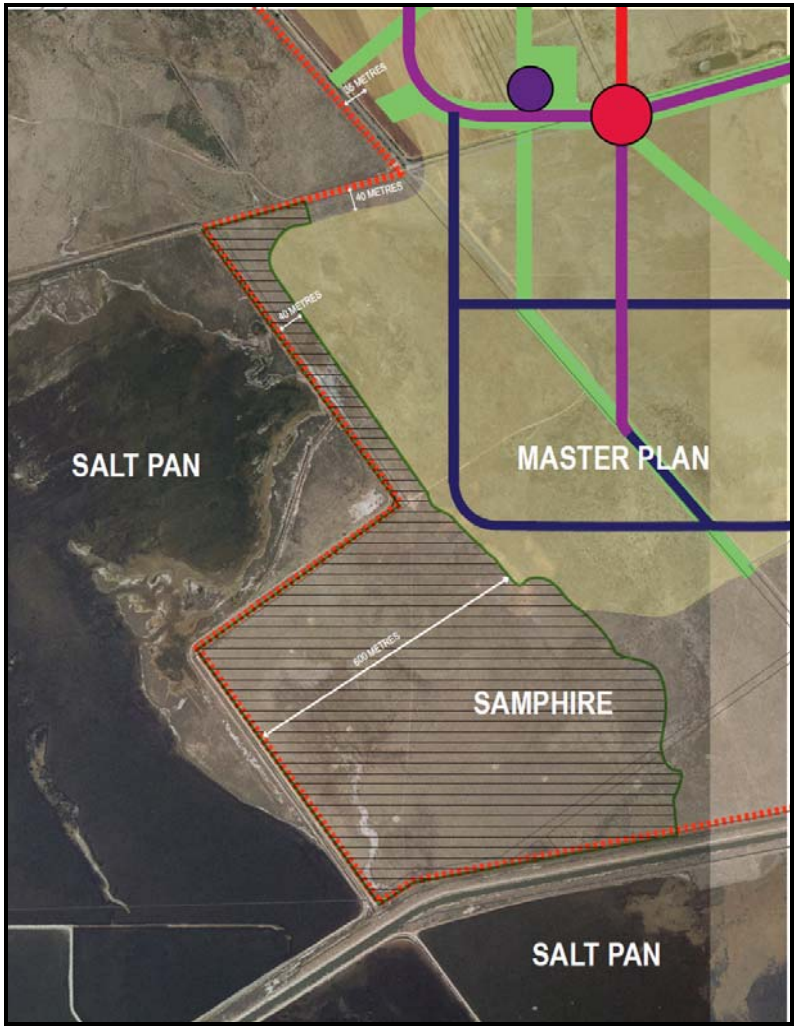


Figure 5.4: The South West Corner

5.2 Stage 1

Comments on the Stage 1 land division design were received from:

- Playford City Council
- Local Neighbour
- SA Potatoes

In response amendments were made to design.

(1) Council was concerned about the maintenance and utilities' costs associated with small reserves on Legoe Road. These reserves have been removed, and the land incorporated into residential allotments or road reserves.

(2) Amendments have been made to two cul-de-sac heads to comply with Clause 6.10 of the City of Playford's *Land Division Requirements 2008.* The proposed 'T' heads have been replaced with 9 m radius round heads.

(3) SA Potatoes wants to retain the potential to develop its land in the future, and has requested links be provided between its land and the Masterplan's road network. Accordingly, a road reserve is provided which links SA Potatoes' land with Stage 1's layout.

As this link is not required now, it is not proposed to construct it at this time, but leave it as a landscaped strip.

(4) To provide a setback from the Stage 1 boundary shared with SA Potatoes, a 15 metre wide easement has been included at the rear of allotments in that location. The easement will prevent dwellings or habitable rooms within 15 metres of SA Potatoes boundary.

To maintain amenity on the affected allotments, they are deeper than the average size. Houses can therefore be located beyond the easement. They are 45 metres deep, while the majority of Stage 1's allotments are 30 metres deep.

(5) A local resident has requested a clear set back from her eastern boundary, where it adjoins Stage 1, to assist in maintaining her privacy and eastern outlook.

The road reserve referred to in point 2 adjoins her eastern boundary, providing the requested setback to the east.

The road reserve is 20 metres wide.

These amendments have reduced Stage 1's yield from 616 to 614 allotments.

The Super Lot and Stage 1 land division plans have been amended to reflect these changes.

Figure 5.5: Location of Design Amendments

Figure 5.6: Amended Stage 1 Concept Plan

6.0 PROPOSAL SUMMARY

6.1 Proposal Documentation

These drawings and reports describe the proposal being assessed. They are at Appendix 7.

Table 6.1: Proposal Drawings

REF	REV	AUTHOR	TITLE	DATE
	Revision 2	Walker Corporation	Cover Sheet	30 September 2009
19000PO1-r3	Issue 4	Fyfe Engineers Surveyors	Super Lot Land Division	10 August 2009
19000PO2-r5	Issue 5	Fyfe Engineers Surveyors	Stage 1 Concept Land Division– Sheets 1 to 4	10 August 2009
VERSION 6	Revision 12	Connor Holmes	Buckland Park Master Plan	22 September 2009
VERSION 6	Revision 12	Connor Holmes	Buckland Park Residential Staging Plan	22 September 2009
		Wallbridge and Gilbert	Buckland Park – Drainage Channel Layout	September 2009
		Wallbridge and Gilbert	Buckland Park – MUSIC Model Layout Diagram	September 2009
VERSION 6	Revision 12	Connor Holmes	Buckland Park Pedestrian and Cycle Network	22 September 2009
2112592A-001		Parsons Brinkerhoff	Proposed Road Hierarchy	1 April 2009
2112592A-002		Parsons Brinkerhoff	Proposed Staged Development of Bus Route Strategy 2020 - 2031	1 April 2009
2112592A-003		Parsons Brinkerhoff	Proposed Bus Route Strategy 2031	1 April 2009
2112592A-004		Parsons Brinkerhoff	Bus Route Catchment Area 2031	1 April 2009
VERSION 1	Revision G	Connor Holmes	Buckland Park Stage 1 Residential Allotment Mix	22 September 2009

REF	REV	AUTHOR	TITLE	DATE
VERSION 1	Revision G	Connor Holmes	Buckland Park Stage 1 Land Use Plan	22 September 2009
VERSION 1	Revision G	Connor Holmes	Buckland Park Stage 1 Pedestrian and Cycle Network	22 September 2009
VERSION 1	Revision G	Connor Holmes	Buckland Park Stage 1 Special Fencing Control	22 September 2009
CMS-01	Revision 1	Walker Corporation	Concept Neighbourhood Centre	February 2009
CMS-02	Revision 1	Walker Corporation	Display Village Location	February 2009
071315 SK29	Revision 0	Swanbury Penglase	Stage 1 Neighbourhood Centre Landscape Concept	5 March 2009
	Revision 0	Fyfe Engineers Surveyors and Dr Robert Anderson	Flora Constraints – Sector 1	25 September 2009
	Revision 0	Fyfe Engineers Surveyors and Dr Robert Anderson	Flora Constraints – Sector 2	25 September 2009
	Revision 0	Fyfe Engineers Surveyors and Dr Robert Anderson	Flora Constraints – Sector 3	25 September 2009
	Revision 0	Fyfe Engineers Surveyors and Dr Robert Anderson	Flora Constraints – Sector 4	25 September 2009
		Walker Corporation and ETSA Utilities	Buckland Park Regional Electricity Infrastructure	February 2009
		Walker Corporation and APA and Telstra	Buckland Park Regional Gas and Telecommunications Infrastructure	February 2009
		Walker Corporation and DTEI	Buckland Park Regional Transport Infrastructure	February 2009
		Walker Corporation and SA Water	Buckland Park Regional Water Infrastructure	February 2009

Table 6.2: Proposal Reports

AUTHOR		TITLE	DATE
1	Walker Corporation	Buckland Park Environmental Impact Statement and attached Appendices.	March 2009
2	Walker Corporation	Buckland Park Final Response Report and attached Appendices.	October 2009
3	Australian Heritage Cultural Management	Aboriginal Cultural Survey – Buckland Park	September 2008

Table 6.3: Proposal Letters

AUTHOR		TITLE	DATE
1	SA Water	Buckland Park Development	17th June 2009
2	SA Water	Buckland Park Development – STAGE 1	17th June 2009
3	ETSA	Buckland Park Development – Electricity Infrastructure Tenure	19th November 2009
4	Envestra	Pricing Proposal Buckland Park Estate – Stage 1	11 June 2009

7.0 COMMITMENTS

7.1 Building Rules

1. All aspects of the proposal will comply with the Building Rules. A Building Rules assessment and certification will be undertaken, by Playford City Council or a Private Certifier, in accordance with the provisions of the *Development Act 1993* and the Minister for Urban Development and Planning will be provided with the certification documentation, as required by Regulation 64 of the *Development Regulations 1993*

7.2 Neighbourhood Centre

Prior to Commencement of Construction

2. The Neighbourhood Centre's architectural design will be submitted to the Governor for approval. It will include:

    - exterior materials
    - floor plans
    - elevations
    - sections
    - signs
    - the location, type, screening and noise specifications of building plant and equipment
    - achievement of 5-energy rating as described in the Green Building Code of Australia.
    - use of durable, locally sourced, renewable, recycled or energy efficient products.
    - use of 5-star rated appliances in internal fitouts
    - compliance with the *Disability Discrimination Act.*

3. The Neighbourhood Centre's landscape design will be submitted to the Governor for approval. It will include:

    - pedestrian routes, including access for mobility impaired people.
    - designs for shelter, shade and screen structures.
    - soft and hard paving
    - water features
    - sign structures
    - plant species, number and location, which demonstrate the use of indigenous plants
    - irrigation methods
    - playgrounds
    - fencing

4. Estate, neighbourhood centre and community centre signs, including elevations which describe the colours, materials and wording will be submitted to the Governor for approval.

5. Car park design including dimensions, aisle widths, driveway location relative to local roads, pedestrian paths and landscape details will be submitted to the Governor for approval.

6. Stormwater management designs which demonstrate the application of Water Sensitive Urban Design principles to the Neighbourhood Centre will be submitted to the Governor for approval.

Prior to Occupation

7. Prior to occupation of the Neighbourhood Centre, a Waste Management Plan will be submitted to the Department of Planning and Local Government for approval. It will address:

    - Internal waste collection areas showing storage receptacles for non-recyclables, recyclables and organic material.
    - Arrangement for waste collection with cleaners and commercial contractors which demonstrate recycled, organic and non-recyclable materials.
    - Arrangements to inform and involve tenants with the centre's waste management systems.
    - Arrangements for public bins to discourage littering and encourage separation of non-recyclables, recyclables and organic material.

Commissioning and occupation

8. The Neighbourhood Centre, with a café, community centre, small supermarket and speciality shops will be commissioned to coincide with the occupation of the first dwelling.

9. All reasonable efforts will be made to secure suitable businesses, in particular, a doctor, dentist, café and small supermarket, to occupy the Neighbourhood Centre and to ensure these businesses open to coincide with the occupation of the first dwelling.

During Operation

10. The Neighbourhood Centre will operate within the following hours:

    - Retail – supermarket and specialty shops
        - Monday to Saturday – 7:00 am to 6:30 pm
        - Sunday – 9:00 am to 1:00pm

    - Café in a specialty shop
        - Monday to Saturday – 7:00 am to 6:30 pm
        - Sunday – 9:00 am to 5:00pm

    - Community Centre
        - Monday to Friday – 9:00 am to 5:00 pm
        - Weekends and after office hours – as required to suit community activities

11. The Waste Management Plan will be implemented during the Neighbourhood Centre, Display Village and Sales Centre's operation.

12. Noise generated from the Neighbourhood Centre will comply with Section 20 (3) and (4) of the *Environment Protection (Noise) Policy 2007.*

7.3 Display Village

Prior to Commencement of Construction

13. The 32 display dwellings' architectural designs and sign details will be submitted to the Governor for approval.

14. All reasonable efforts will be made to secure home builders specialising in Affordable Dwellings to display their homes in the Village as early as possible in its establishment.

15. All reasonable efforts will be made to secure home builders specialising in energy efficient home design to display their homes in the Village as early as possible in its establishment.

7.4 Sales Office and Display Centre

16. The Sales Office's architectural design will be submitted to the Governor for approval. It will include:

- exterior materials
- floor plans
- elevations
- sections
- signs
- the location, type and screening, and noise specifications of building plant and equipment
- achievement of 5-energy rating as described in the Green Building Code of Australia
- use of recycled or energy efficient products
- use of 5-star rated appliances in internal fitouts
- compliance with the *Disability Discrimination Act.*

Prior to Occupation

17. Prior to occupation of the Sales Centre a Waste Management Plan will be submitted to the Department of Planning and Local Government for approval. It will address:

    - Anticipated volumes of waste generated during operations.
    - Areas for the storage and collection of waste, including facilities for recyclable and organic material.
    - Arrangements for waste collection with cleaners and waste collection contractors which include recycling.

During Operations

18. The Sales Office and Display Centre will operate between 8:30 am to 5:00 pm Monday to Sunday.

19. The Waste Management Plan will be implemented during the Sales Centre's operation.

20. Display space will be made available for energy efficient appliances and building products, and for exhibitions on government sustainability initiatives. All reasonable efforts will be made to secure suitable exhibitors for the display space.

21. All reasonable efforts will be made to secure appliance and land packages with the manufacturers or distributors of energy efficient appliances, particularly domestic gas powered air-conditioning, gas appliances generally, which will make the installation of these appliances cost effective for residents.

22. Resident Welcome Packs and the Design Guidelines will be available in the Sales Centre to all potential residents.

7.5 Design Guidelines

23. Every new residential allotment's Certificate of Title will be encumbered with Design Guidelines which require the following to be included in new houses and gardens:

    - Consistent and specified fence designs in the locations shown on drawing 'Buckland Park Stage 1 Special Fencing Control'.
    - Protection and care of retained trees within the allotment, if applicable.
    - Appropriate garden design – including the use of indigenous and drought tolerant plants where possible and practical, the design of responsible watering systems.
    - Protection and maintenance of existing trees, if these are included in the allotment.
    - Energy efficient house designs.
    - The installation of energy and water efficient appliances and fittings.
    - Designing for happy, healthy and manageable pets.

- The provision of "no junk mail" signs on letter boxes.
- Locating a waste bin storage area which is easily accessible, screened from public view, and large enough to accommodate recycling and other bins.
- Insect screens to all windows and doors.
- Inclusion of mosquito barriers in the form of fencing or hedges, if required for the allotment.
- Fixed domestic machines to comply with Part 6, Division 2 of the *Environment Protection (Noise) Policy 2007*

7.6 Resident Welcome Packs

24. Prior to registration of the first residential allotment a resident Welcome Pack will be submitted to the Department of Planning and Local Government for its approval. It will include the following information:

    - Welcome letter describing:
      - the community and community facilities
      - planning and construction activities
      - useful contacts such as council, government agencies, emergency services
      - local business details
      - upcoming events
      - transport information, including bus timetables and routes
      - Community website information and password.
    - Information on available sustainability initiatives, for example, energy efficient appliance packages.
    - Information on the site's biodiversity attributes and their responsibilities
    - The value of biodiversity areas in the region
    - Designing wildlife friendly backyards
    - Responsible garden planting choices and weed control.
    - Responsible use of garden chemicals and pesticides.
    - Responsible garden watering and use of water generally.
    - Designing insect repellent backyards, for example keeping vegetation away from the house and maintaining lawns.
    - The importance of maintaining insect screens
    - Personal protection from insects during outdoor activities.
    - Rubbish management schemes.
    - Responsible pet management

    Despite the preceding list, every attempt will be made to ensure the Welcome Pack is indeed welcoming!

25. The resident Welcome Pack will be given to each residential allotment purchaser upon settlement of their purchase. The resident Welcome Pack will be available in the Sales Office for potential purchasers.

7.7 Community Bus

26. Prior to the registration of the first residential allotment, arrangements for the provision of a community bus will be provided to the Department of Planning and Local Government for its approval. Prior to submission, these arrangements will be discussed with Playford City Council.

27. The submission will include the following details:

- The type and capacity of the vehicle.
- Maintenance schedule.
- Driver's job description.
- Days and hours of operation.
- Timetable parameters.
- Routes.

28. The Community Bus will be provided and operated in accordance with the approved submission. At a minimum, it will be an 18 seater vehicle, and will provide a service which takes commuters to and from the Virginia No 900 bus and children to public schools on weekdays. It will also include at least one service to Elizabeth and Salisbury in the morning and one return service in the afternoon, Monday to Saturday.

7.8 Community Worker

29. Prior to the occupation of the first house, an appropriately qualified community worker will be employed to assist residents.

30. Arrangements for the community worker's employment will be provided to the Department of Planning and Local Government for their approval. Prior to submission, these arrangements will be discussed with Playford City Council.

31. The submission will include the following details:

- The job description, including required qualifications and experience.
- Arrangements for funding of community activities and events.

32. The community worker's job description will be discussed with Playford City Council, but will include the following duties:

    - Get to know new residents and distribute the Welcome Package.
    - Organise activities and events such as:
        - Meet the street.
        - Community barbeques and picnics.
        - Seasonal events, such as Christmas Carols or Easter parades.
        - Community planting days, to engender a sense of responsibility and ownership of the site's biodiversity assets.
        - Sporting and cultural activities.
        - Community planning days, to engender interest in the design of public parks and spaces, buildings and urban design.
    - Facilitate the creation of community groups such as a business owner groups, Neighbourhood Watch, Playgroup, Mother's groups or other special interest groups.
    - Facilitate use of the community centre for religious worship.
    - Facilitate communication between Council, government agencies and the community regarding issues, programmes and services.
    - Coordinate the community bus service's timetable to optimize its utility to the community.
    - Facilitate communication between the proponent and the community on construction activities.
    - Provide information on, and to, the region's sporting and cultural organisations.
    - Prepare the community newsletter and manage the community website.
    - Provide a point of contact for Virginia's existing resident, horticulture and business community.

33. The community worker will be employed and activities provided in accordance with the approved arrangements.

7.9 Community Newsletter

34. A community newsletter will be distributed to residents four times a year, to keep them up dated on activities, events, services and construction activities.

7.10 Community Website

35. A community website will be established to provide information on activities, events, services and construction activities.

7.11 Community Space

36. Prior to commencing the Neighbourhood Centre's construction, plans and details of the community space's fitout will be provided to the Department of Planning and Local Government for its approval. These details will be discussed with Playford City Council.

37. The community space will be suitable for community activities, such as Playgroup, meetings, religious worship, mobile library services, baby immunisation clinic, youth groups and disability services, and include at a minimum:

- A kitchen, including equipment, appliances and tableware.
- Office equipment for the community worker, including furniture, phone, internet, computer, and photocopier.
- Storage space, capable of providing separate, locked spaces for different users.
- Floor coverings.
- Toilets as required by the Building Code of Australia.
- Furniture, such as chairs, trestle tables, whiteboard.
- Computer facilities to allow electronic presentations.
- Internet connections, particularly with a connection to Playford City Council's central library.

7.12 Affordable Housing

38. 15% of the proposal's total house lot yield will be Affordable Housing.

39. Prior to commencing Stage 1's construction an 'Affordable Housing Land Management Agreement' will be registered over the following Certificates of Title, which are affected by Stage 1:
    - 5228/167
    - 5424/348
    - 5868/769
    - 5916/59

40. The 'Affordable Housing Land Management Agreement' will identify:
    - Each of Stage 1's sub-stages.
    - The percentage of Affordable Housing allotments within each sub-stage.
    - The total percentage of Affordable Housing allotments within Stage 1 is 15%.
    - The size of each Affordable Housing allotment.

    It is understood the 'Affordable Land Management Agreement' will be progressively rescinded from non-Affordable Housing allotments as each of Stage 1's Land Division Plans are registered at the Land Titles Office and Certificate of Titles issued.

41. Prior to lodgement of applications for future land divisions, 'Affordable Land Management Agreements' will be registered on the certificates of title affected by the land division, in accordance with the requirements applicable at the time.

7.13 Education Facilities

Prior to commencement of construction

42. Prior to commencement of Stage 1's construction evidence will be submitted to the Department of Planning and Local Government that arrangements have been made with the Department of Education and Children's Services for primary school places, either within the site, or at Virginia Public School.

Later stages

43. Detailed design of Stages 2, 3, 4 and 5's land division will include school sites in accordance with the 'Buckland Park Masterplan'. The size, location and style of school sites will be agreed with the Department of Education and Children's Services and private sector providers.

44. Once per year during the implementation period, lot production projections for the following 5 year period will be provided to the Department of Planning and Local Government. The first projections will be provided prior to commencement of Stage 1's construction.

    The Department will be able to incorporate this information into the 'Metropolitan Development Programme' at each annual update, allowing the Department of Education and Children's Services to plan for the provision of primary and secondary education facilities within the site, and tertiary facilities within the region.

7.13 Health Facilities

45. Once per year during the implementation period, lot production projections for the following 5 year period will be provided to the Department of Planning and Local Government. The first projections will be provided prior to commencement of Stage 1's construction.

    The Department will be able to incorporate this information into the 'Metropolitan Development Programme' at each update, allowing the Department of Health to plan for the provision of health facilities within the region.

7.14 Aboriginal Cultural Heritage

46. Prior to the lodgement of the Stage 2, 3, 4 and 5 land division plans, applications for a determination under Section 12 of the *Aboriginal Heritage Act 1988* will be lodged to the Minister for Aboriginal Affairs and Reconciliation.

47. The applications will be accompanied by research and site investigations of the stage being considered. A survey using appropriate geophysical (remote sensing) methods, and limited (in the first instance) excavation to determine depth, nature and extent of selected artefact scatters in Potential Archaeological Deposit areas identified by Australian Cultural Heritage Management.

    The survey will identify and assess archaeological horizons, and inform cultural heritage management plans and monitoring regimes once ground disturbance begins.

    If required, further excavation will be undertaken before ground disturbance occurs and during construction to define the extent of occupation areas.

    Limited test excavations will be undertaken in areas where Australian Cultural Heritage Management have recommended geophysical survey, in order to establish baseline stratigraphic profiles for the areas being surveyed, and to provide positive identification for a sample of any sub-surface anomalies recorded by the remote sensing work.

    If the excavations reveal any Aboriginal sites, objects or remains, work would immediately cease and the discovery would be reported to the Department of Aboriginal Affairs and Reconciliation.

    If required, the Minister for Aboriginal Affairs and Reconciliation's authorisation under Section 21 of the *Aboriginal Heritage Act 1988* will be obtained for any excavation work.

48. If required applications will be approved by the Minister for Aboriginal Affairs and Reconciliation under Section 23 of the *Aboriginal Heritage Act 1988,* before any site or object is disturbed.

49. Detailed land division designs for each stage will reflect the findings of the site investigations, and the requirements of any Section 12 determinations or Section 23 authorisations.

50. The Kaurna people will be consulted regarding the use of cultural themes in public domain landscaping, and the interpretation of their cultural connections to the site in that landscaping.

7.15 Employment

51. All reasonable efforts will be made to secure businesses and facilities for employment areas and centres at appropriate times in the proposal's implementation process.

7.16 Recreation and Open Space

52. Prior to commencement of construction a 'Recreation Facilities Strategy' will be prepared in collaboration with Playford City Council. It will consider:

    - The recreation needs of the proposal's and Playford's population over time
    - The availability of facilities.
    - Requirements for additional facilities to meet those needs, particularly the location and timing for the provision of a district level sports complex with associated facilities within the site.

53. The provision of open space and its embellishment will comply with Section 50 of the *Development Act 1993*. It is acknowledged Playford City Council counts only 50% of land used for storm and flood management facilities towards meeting open space obligations.

54. Arrangements will be made with Playford City Council for accommodating a 2,500m^2 maintenance depot site within an open space area. The location of the depot site will be agreed with Council.

7.17 Public Domain Landscaping

55. Prior to commencement of each stages' land division's construction, a public domain landscape plan for open space and road reserves will be submitted to Playford City Council for approval. It will include a statement of design intent which addresses:

    - The desired character and urban design objectives.
    - Design themes and principles.
    - Landscape plans which nominate:
        - hard and soft paving
        - plant locations, numbers, species and size
        - street furniture, including rubbish bins which provide opportunities to recycle if appropriate
        - lighting and signage
        - irrigation systems and the application of WSUD principles.
    - Street tree species and number, confirming there will be one street tree per allotment frontage, and two street trees per allotment side.
    - Engineering designs for pedestrian paths and cycle ways which are consistent with drawings 'Buckland Park Pedestrian and Cycle Network' and 'Buckland Park Stage 1 Pedestrian and Cycle Network'.
    - A management plan for open space and public domain with a commitment to maintenance and defects period prior to the facility's handover to Council.

56. Prior to commencement of construction of the southern open space a detailed landscape plan will be submitted to the Department of Planning and Local Government for that area which shows:

    - Planting to visually screen the site from the Jefferies facility to the south
    - Planting to complement existing planting which encourages butterflies, including the following species:
        - Melaleuca lancelata,
        - Spear grasses Austrostipa,
        - A. eremophila
        - A. scabra
        - Wallaby grass *Austrodanthonia*
        - Wetland sedge *Gahnia Filum*
        - Bitterbush *Adriana.*
    - Planting of samphire species if required under Vegetation Management Plans prepared in accordance with the Commitments given in Section 7.18.

57. Stages 3, 4 and 5's public domain landscape designs will incorporate the recommendations of the report prepared in accordance with Commitment 91.

7.18 Native Vegetation and Significant Trees

58. Prior to any rezoning of the site from *Horticulture (west*), the Minister for Environment's agreement to Vegetation Management Plans will be obtained, if required. The Plans will include the following:

    - Detailed ecological investigations which establish the quality and diversity of vegetation in the 256 hectares and the 65 trees, identified on drawings prepared by Fyfe Engineers Surveyors and Dr Robert Anderson - 'Flora and Fauna Constraints - Sector 1', Flora and Fauna Constraints - Sector 2', Flora and Fauna Constraints - Sector 3' and 'Flora and Fauna Constraints - Sector 4', including:

        – Whether locations within the red and green hatched areas on the drawings are anthropogenic, or remnant native vegetation.
        – Whether remnant native vegetation is a community, or scattered paddock trees.
        – The quality of remnant native vegetation communities and scattered paddock trees, and their quality as fauna habitat.

    - The 'Flora and Fauna Constraints' drawings will be reviewed for accuracy based on the more detailed investigations, and constraint areas adjusted accordingly.

- Principles for the design of detailed land division, roads and storm and flood water management facilities will be established, including, but not limited to:

    - Protection of vegetation during construction, and rehabilitation after construction
    - Retention of trees in parks and road reserves.
    - Incorporation of trees within larger allotments.
    - The location of buffers to particular areas, as road reserves, or within retained areas hatched in green on the drawings.
    - Retention of significant remnant communities and the Gawler River corridor in open space or MOSS zones.

- Principles for the calculation of any significant environmental benefit required in association with removal of native vegetation within the 75.5 hectares hatched in red on the drawings, or the 65 trees will be determined, based on:

    – the Native Vegetation Council's '*Guidelines for Native Vegetation Significant Environmental Benefit Policy for the Clearance of Scattered Paddock Trees'.*
    – Clearance of degraded native vegetation - SEB offset rate 2:1 level of clearance.
    – Clearance of high value native vegetation - SEB offset rate 10:1 level of clearance.
    – Clearance of semi-degraded native vegetation - SEB offset sliding scale from 2:1 to 10:1.

  Note: There will be no significant environmental benefit associated with the areas within the 75.7 hectares found to have no ecological significance.

- Principles for achievement of Significant Environmental Benefit will be established, and could comprise the following:
    – Excluding grazing activities.
    – Rehabilitation and revegetation of the Gawler River riparian corridor.
    – Rehabilitation and revegetation of Thompson Creek's eastern reach's riparian corridor.
    – Rehabilitation and revegetation of Samphire areas in the site's south western corner.
    – Rehabilitation and revegetation of other areas within the green hatched areas.
    – Creation of threatened butterfly habitat in the site's southern area.
    – Creation of a section of the Gawler River Open Space Strategy through the site.
    – The timing for the above works, which will consistent with the timing of the proposal's staged implementation.

  Note: Should these measures not achieve the required significant environmental benefit, works in the coastal plain may be considered via a Native Vegetation Fund or the like.

- The following priorities will be given to the value of principles for achieving significant environmental benefits:

    - The highest value - managing intact areas native vegetation to maintain habitat and prevent future degradation.
    - 2nd highest value - improving degraded blocks, for example, by excluding grazing, weed control and perhaps strategic planting to improve habitat.
    - 3rd highest value – using existing remnant trees as a structure to build a diverse and valuable habitat by planting under storey species for example.
    - 4th highest value - revegetating cleared land.
    - Other offsets – achieving a more significant landscape context, by linking or expanding core areas of habitat.

59. Any works associated with achieving any significant environmental benefit will be undertaken in accordance with the principles established in Vegetation Management Plans during the construction of adjoining land divisions over the proposal's 25 year implementation period.

60. Prior to commencement of rehabilitation works in the Gawler River riparian corridor and Thompson Creek's eastern reach riparian corridor, detailed engineering and landscape designs will be submitted to Playford City Council or the Department of Environment and Heritages for approval. The plans will demonstrate:

    - The works are for rehabilitation purposes only, and not for aesthetic purposes.
    - A stable grade of the stream beds will be maintained.
    - The watercourses are stabilised and/or returned to a more natural ecosystem.
    - Associated floodplain areas are considered.
    - Erosion will not be increased up or down stream.
    - Flooding will not be increased up or downstream.
    - Water table height or salinity levels will not be increased.
    - Detrimental impacts on water dependant ecosystems, eg habitat destruction, alteration of flows or structures affecting migration will not be caused.
    - Natural flow regimes will not be altered.
    - Loss of connectivity of ecosystems upstream or downstream will not be caused.

61. Suitable agreements will be reached with the Department of Environment and Heritage or Playford City Council for the hand over 180.3 hectares hatched in green and contained in open space areas after rehabilitation and embellishment works are complete, and subject to a maintenance and defect period.

62. Roadside Marker System sites will be incorporated into Vegetation Management Plans for open space areas.

63. A referral to the federal Minister for the Environment will be made in accordance with the *Environmental Protection and Biodiversity Conservation Act* for the Stage 2, 3, 4 and 5 land divisions. Referrals will be accompanied by flora and fauna assessments prepared by an ecologist. The Minister will determine whether the land divisions are controlled actions under the Act. If they are controlled actions, applications will be made to the Minister for his assessment. These applications will be assessed by State and Local Government prior to any approval for construction being given.

7.19 Public Transport

64. Prior to the commencement of Stage 1's construction satisfactory arrangements will be made with the Department of Transport, Energy and Infrastructure for the provision of bus services to the region.

    - Increasing frequency, or altering the timetabling, of the Route 900 bus prior to the occupation of the 1st house.
    - Provision of new regional services between the site, Munno Para, Elizabeth and Salisbury upon the occupation of the 1,500th house.

    These arrangements will consider existing population and projected population growth within metropolitan Adelaide's northern region, including the site and other new and existing suburbs, and their public transport needs.

65. Once per year during the implementation period, lot production projections for the following 5 year period will be provided to the Department of Planning and Local Government. The first projections will be provided prior to commencement of Stage 1's construction.

    The Department will be able to incorporate this information into the 'Metropolitan Development Programme' at each update, allowing the Department of Transport, Infrastructure and Energy to plan for the provision of public transport services within the region.

7.21 Port Wakefield Road

Prior to commencement of traffic signal construction

66. A concept design for the traffic signals at the Port Wakefield Road and Legoe Road intersection will be submitted to the Department of Transport, Energy and Infrastructure for approval prior to the commencement of its construction.

67. An access strategy for the Port Wakefield Road and Legoe Road intersection will be submitted to the Department of Transport, Energy and Infrastructure for approval. It will include:
    - The trigger point for an upgrade, that is, the point when the capacity of the traffic signals to accommodate the proposal's traffic is met.
    - The form of that upgrade, for example, a grade separated intersection at Legoe Road, or a second set of traffic lights at Park Road.
    - Concept plans for that upgrade, including requirements for land within the site.

68. An assessment of potential impacts on the surrounding road network, including the safety and efficiency of junctions, intersections and rail crossings in the surrounding network, including within Virginia will be submitted to the Department of Transport, Energy and Infrastructure for approval.

69. A demonstration the site can be adequately accessed in an emergency or closure of the main entry boulevarde will be submitted to the Department of Transport, Energy and Infrastructure for approval.

Construction and commissioning

70. Traffic signals and associated road works at the intersection of Legoe Road and Port Wakefield Road will be constructed in accordance with the requirements of Department of Transport, Energy and Infrastructure, and the Federal Department of Infrastructure, Transport, Regional Development and Local Government.

71. The new intersection and traffic signals will be commissioned in accordance with the requirements and procedures of Department of Transport, Energy and Infrastructure, and the Federal Department of Infrastructure, Transport, Regional Development and Local Government.

72. Once per year during the implementation period, lot production projections for the following 5 year period will be provided to the Department of Planning and Local Government. The first projections will be provided prior to commencement of Stage 1's construction.

    The Department will be able to incorporate this information into the 'Metropolitan Development Programme' at each update, allowing the Department of Transport, Infrastructure and Energy to plan for the provision of road and transport services within the region.

7.22 Access During A Flood Event

Prior to commencement of construction

73. Prior to commencing construction of the Stage 1 land division a flood access plan for Port Wakefield Road will be formulated in collaboration with the Department of Transport Infrastructure and Energy, Playford City Council, the SA Police and the State Emergency Service, which addresses the following:

    - The capability of Port Wakefield Road's surface to withstand flood inundation up to a 1:100 year ARI event along the length impacted by flooding.

    - The delineation of Wakefield Road's carriage way in a 1:100 year ARI event along the length impacted by flooding.

    - The procedure for managing and controlling the access of non-emergency service vehicles in a 1:100 year ARI event along Port Wakefield's length impacted by flooding.

7.23 Land Division Design – Stages 2, 3, 4 and 5

All Land Divisions

74. Detailed land division designs will comply with the *City of Playford Land Division Requirements 2008* to the reasonable satisfaction of Playford City Council.

75. Detailed land division designs will show road reserve widths, including all dimensions to the satisfaction of Council.

76. Detailed land division designs will be consistent with the land uses and principles described in following proposal drawings:
    - 'Buckland Park Master Plan' 22 September 2009
    - 'Proposed Road Hierarchy, 1 April 2009
    - 'Proposed Bus Route Strategy 2031' 1 April 2009
    - 'Buckland Park Pedestrian and Cycle Network' 22 September 2009
    - 'Flora Constraints – Sector 1', 25 September 2009
    - 'Flora Constraints – Sector 2', 25 September 2009
    - 'Flora Constraints – Sector 3', 25 September 2009
    - 'Flora Constraints – Sector 4', 25 September 2009
    - 'Buckland Park – Channel Layout Diagram' August 2009

77. Land division designs will include separate allotments for ETSA, Tesltra and SA Water utilities as required by those agencies, and described in Commitments 132, 139 and 145.

78. Land division designs will minimise requirements for road closures by incorporating existing roads into the new road or open space network where ever practicable. In particular, Tippets Bridge and Park Roads will remain open to accommodate existing Western Reticulation Service Virginia pipelines, and Roadside Marker System sites 52 and 55.

79. Land division designs will maintain public road access to private properties adjoining the site, providing local road connections from the road hierarchy on the 'Proposed Road Hierarchy' suitable for the volume and type of traffic generated by the activities on those adjoining private properties.

Stage 3 Land Division

80. Land division designs will include the recommendations of the noise reports prepared as part of Commitments 93 and 94, for example, by incorporating buffers.

Stage 5 Land Division

81. Land division plans will demonstrate no residential allotment is located within 1.7 kilometres from the southern boundary of McEvoy Road, between Cheetham salt pans and Brooks Road.

Stage 2, 3, 4 and 5 Land Divisions

82. Detailed land division plans for Stages 2, 3, 4 and 5 will incorporate the principles regarding the protection of native vegetation established in Commitment 58.

83. Detailed land division plans for Stages 2, 3, 4 and 5 will incorporate the requirements of any determination under the *Aboriginal Heritage Act* as described in Commitment 49.

84. Detailed land division plans for Stages 2, 3, 4 and 5 will be submitted to the Department of Primary Industry and Resources to allow consideration of buffers to adjoining horticultural activities.

85. Detailed land division plans for Stages 2, 3, 4 and 5 will address the requirements of the EPA's *Guidelines for Separation Distances 2007* when creating allotments to accommodate new non-residential activities. It is noted separation distances between proposed residential neighbourhoods and existing non-residential activities have been considered in this environmental assessment and are addressed in other commitments.

86. Detailed land division plans for Stages 2, 3, 4 and 5, particularly in locations adjoining Port Wakefield Road will address the requirements of the *Environment Protection (Noise) Policy 2007.*

87. Detailed land division plans for Stages 2, 3, 4 and 5, particularly in locations adjoining Port Wakefield Road will ensure sensitive land uses, such as playgrounds and child care centres are located away from main roads as far as practicable.

Stage 3, 4 and 5 Land Divisions

88. Detailed land division plans for Stages 3, 4 and 5 will incorporate the recommendations of the report prepared in accordance with Commitment 91, if any.

Stage 4 and 5 Land Divisions

89. Detailed land division plans for land adjoining Cheetham salt pans within Stages 4 and 5 will show back fences along residential allotments western boundaries, to minimise potential disturbance of shorebirds in the pans.

Stage 5 – Port Wakefield Road and Legoe Road

90. The detailed land division for land adjoining the intersection of Port Wakefield Road and Legoe Road will include separate allotments for land required to accommodate a future upgrade of the intersection, identified in accordance with Commitment 67. This land is shown as Lot 26 on the 'Super Lot Land Division' plan. It will be vested with the SA Government at registration of the land division.

7.24 Detailed Investigations

Mosquitoes

91. Prior to approval of the detailed land divisions for Stages 3, 4 and 5 a report will be submitted to the Department of Planning and Local Government for approval which includes the following:

    - The exact nature of rangeland mosquito numbers within the site. Field investigations and trapping will be undertaken over a 12 month period, during all 4 seasons, and in various weather and wind conditions.

    - Methods for managing mosquitoes within Stages 3, 4 and 5 if required. This may include the provision of physical barriers, such as fences or hedges if at the time of the report's preparation this approach is proven, or vector management process comprising monitoring and methods such as treatment.

    Note: At this time it is anticipated these measures will not be required given the buffer distances between Stages 3, 4 and 5 and rangeland mosquito habitat in the coastal plain.

92. Any recommendations made in the report will be implemented in Stages 3, 4 and 5's detailed land division plans, Design Guidelines and public domain landscape designs.

Noise

93. Prior to approval of Stage 3's detailed land division a 'Bird Management Plan', if required, will be prepared and submitted to the Department of Planning and Local Government for approval. It will consider specifically the use of bird scaring gas guns on the Windamere Estate and impacts on the Masterplan's north western residential neighbourhoods.

94. Prior to the approval of Stage 3's detailed land division a noise assessment will be submitted to Department of Planning and Local Government which assesses noise generated from Gawler River Quail's operations and processes on their property north east of the site, and impacts on the Masterplan's north eastern residential neighbourhoods. Consideration will be given to the EPA's *Guidelines for Separation Distances 2007.*

Groundwater

95. Prior to preparing engineering designs, the locations for storm and flood water channels, and stormwater detention basin, will be investigated for land contamination. Prior to commencing constructing these facilities, a statement prepared by an SA EPA accredited site contamination auditor will be submitted to the EPA which confirms contamination in those locations will not result in significant adverse affects on the aquatic environment.

96. Prior to preparing engineering designs for roads, utilities, the wetlands, detention basin, the capture basin it contains, the storm and flood water management channels, and any landscape water feature, detailed hydrogeological investigations will be undertaken to ensure designs and specifications are appropriate for the hydrogeological conditions, and if required management procedures can be incorporation onto the designs or CEMMP prepared under Commitment 155.

Geotechnical

97. Prior to preparing engineering designs for roads, storm and flood water management facilities, and utilities, detailed geotechnical investigations will be undertaken to ensure designs and specifications are appropriate for the geotechnical conditions, and if required management procedures can be incorporated into the designs or CEMMP prepared under Commitment 155.

98. Prior to preparing engineering designs for roads, storm and flood water management facilities, and utilities, detailed Acid Sulphate Soils investigations will be undertaken to ensure designs and specifications are appropriate for geotechnical conditions, and if required management procedures can be incorporated into the designs or CEMMP prepared under Commitment 155.

Contamination

99. Prior to preparing detailed land divisions and engineering designs for roads, storm and flood water management facilities, and utilities, detailed land contamination investigations will be undertaken to ensure land uses, designs and specifications are appropriate for land contamination conditions, and if required management procedures can be incorporated into the CEMMP prepared under Commitment 155.

100. If required land contamination Remediation Plans will be prepared and implemented during construction in accordance with the General Environmental Duty defined in Part 4, section 25(1) of the *Environment Protection Act 1993*, the *Environment Protection (Water Quality) Policy 2004*, and other relevant Environment Protection Policies made under Part 5 of the *Environment Protection Act 1993*, draft guideline *Environmental Management of On-Site Remediation* and other relevant Environment Protection and Authorisation publications and guidelines.

101. The investigations, remediation plans and implementation will be audited by an SA EPA accredited auditor in accordance with the SA Environmental Protection Authority's *Guidelines for the Site Contamination Audit System* January 2009.

102. Known uncontrolled fill on Lot 6, Thompson Road will be investigated and remediated or removed in accordance with EPA guidelines.

7.25 Civil Engineering Designs

Prior to Commencement of Construction

103. Civil engineering drawings prepared for Stages 4 and 5 will demonstrate that minimum finished site levels are 4.0 metres AHD, and minimum finished floor level for any buildings are 4.25 metres AHD. Where required to achieve a fall for site drainage and minimum road grades, site levels and finished floor levels may be higher.

104. Prior to commencement of construction detailed engineering designs for storm and flood water management facilities and systems will be approved by Playford City Council.

105. Detailed engineering designs for storm and flood water management facilities and systems will be consistent with the framework shown on drawing 'Buckland Park Drainage Channel Layout' September 2009.

106. Detailed engineering designs for storm and flood water management facilities will demonstrate 1:100 year flood or stormwater events can be accommodated within the channels.

107. Storm and flood water management facilities will be located to avoid as much as practically possible significant remnant vegetation surveyed and shown on drawings 'Flora and Fauna Constraints - Sector 1', Flora and Fauna Constraints - Sector 2', Flora and Fauna Constraints - Sector 3' and 'Flora and Fauna Constraints - Sector 4' prepared by Fyfe Engineers Surveyors and Dr Robert Anderson, as amended in accordance with Commitment 58. Where this is not practically significant environmental benefits will be calculated in accordance with Commitment 58.

108. Storm and flood water management facilities will be designed to be separate from the Gawler River's natural water flow regime.

109. Gross pollutant traps will be provided on each pipe system where it discharges into an open water course or open drain to the reasonable satisfaction of Council.

110. Water Sensitive Urban Design features including swales, gross pollutant traps, wetlands and the detention basin will included in the stormwater management system in accordance with in the framework provided in the 'Buckland Park – MUSIC Model Layout Diagram' September 2009.

111. The stormwater management system will be designed to meet the following criteria:

- Water discharged into the Thompson Outfall Channel will meet Playford City Council's requirement that the pre-development discharge rate of $10m^3$/sec is maintained.
- Water discharged into the Thompson Outfall Channel meets the *Environment Protection (Water Quality) Policy 2003* criteria.
- Opportunities for water pooling are minimized in accordance with WSUD principles.
- Opportunities for mosquito breeding are minimized by ensuring:
  - drainage systems are not impeded by surrounding earthworks;
  - silt accumulation is avoided and facilities are free draining;
  - exit points from drains into waterways or wetlands avoid habitat changes at discharge points, where organically enriched drainage is potentially directed into mangrove or coastal samphire areas. If required, care will be taken to avoid increasing tidal influence back up drains into freshwater wetlands.
  - Opportunities for water pooling after storm events are minimized.
- Areas of the Gawler River flood plain and Thompson Creek contained with in open space continue to receive some flood water.
- Disturbance of soil and groundwater beneath the facilities is minimized.
- Potential for groundwater leakage into the facilities, and stormwater leakage into the groundwater is minimised.
- Potential groundwater intrusion into storm and flood water channels is minimised by ensuring their grade, depth, width and invert height are appropriate for the location relative to ground water depth.

112. Subsurface drainage will be incorporated into civil engineering designs if required to prevent the creation of perched groundwater. Locations where this may be required will be identified in the detailed hydrogeological investigations undertaken in accordance with Commitments 95 and 96.

113. Should groundwater disposal be required, approval will obtained from the Environment Protection Authority and the Department of Water Land and Biodiversity Conservation discharge under the *Environmental Protection Act 1993* and the *Natural Resource Management Act 2004*.

114. Engineering designs for the stormwater management system will demonstrate up to 80% of the proposal's stormwater will be captured for re-use. A capture basin with a volume of up to 100ML will be provided within the detention basin, and up to 50ML/per annum will be treated on site through the wetlands, stored in the aquifer and used on site.

115. Prior to commencement of the detention basin and capture basins' construction detailed engineering designs will be submitted to Playford City Council for approval. Designs will include:

- Liners and extent of influence of ground water.
- Wall design.
- Water inlet design.
- Water outlet design.
- Maintenance regime to prevent water blocking or silting up.
- Defects and handover period.

116. Detailed designs of any permanent ground water management scheme which may be required associated with any public or private structure will be submitted to Playford City Council, or the relevant infrastructure agency for approval. Where such a scheme is associated with a public structure, maintenance, monitoring arrangements will be agreed with Council, or the relevant infrastructure agency.

117. Prior to commencing construction of the capture basin, all reasonable efforts will be made to find a user for the captured stormwater. Discussions will be held with Playford City Council, Salisbury City Council, SA Water, the Department of Environment and Heritage, Virginia Horticulture Centre and potential commercial and industrial users. Options for the treatment of captured stormwater off site, and its reuse on site for irrigating the public domain will be investigated as part of those discussions.

118. A monitoring, management and maintenance plan will be prepared for the storm and flood water management facilities in consultation with Playford City Council for the stormwater treatment devices to ensure all water discharged from the site, or into the aquifer meets the *Environment Protection (Water Quality) Policy 2003*. It will include arrangements for handing facilities over to Council, including defects periods.

7.26 Aquifer Storage Recharge

119. A license will be obtained from the Environment Protection Authority for the Aquifer Storage Recharge scheme in accordance with the provisions of the *Environment Protection Act 1993,* and any conditions of that license will be complied with.

120. Prior to commencing construction of treatment wetlands associated with ASR detailed engineering and planting designs will be submitted to Playford City Council and the Environment Protection Authority for approval. The designs will demonstrate:
    - Water injected into the aquifer will meet the *Environment Protection (Water Quality) Policy 2003*
    - There is sufficient capacity to treat a maximum of 1 in 1 year peak storm event.
    - They are not connected to any natural watercourse.
    - They have a flow limited off take to ensure large flood flows from the main flood management channels cannot enter the wetlands, minimising potential for pollutant remobilisation.

7.27 Utilities and roads

Potable Water to the Site

121. A commercial agreement, or an SA Water Developer Agreement, will be entered into with SA Water for the staged provision of a potable water main to the site and pressure reduction valve, in accordance with the process described in their letter 'Buckland Park Development – STAGE 1'.

122. Technical investigations in collaboration with SA Water will be completed for the staged provision of potable water mains, and associated infrastructure, to the site from the Little Para Water Treatment Plant, in accordance with the process described in their letter 'Buckland Park Development'.

    Investigations will include identification of other properties that will connect to that infrastructure, and finalisation of a commercial agreement for the reimbursing the proponent for connection of those beneficiaries to infrastructure funded by the proponent.

Waste Water to the Site

123. All waste water infrastructure will be delivered under a Developer Agreement with SA Water as described in their letter 'Buckland Park Development – STAGE 1'.

124. Technical investigations in collaboration with SA Water and negotiations will be completed for the provision and timing for Stage 1's interim waste water facilities in accordance with the process described in their letter 'Buckland Park Development – STAGE 1'.

125. The detailed design of the temporary below ground facility for waste water storage will be approved by SA Water, including its emergency storage capacity, location, layout, access, odour control, telemetry, disposal arrangements and the timing for its decommissioning upon provision of a waste water main to Bolivar Waste Water Treatment Plant as described in their letter 'Buckland Park Development – STAGE 1'.

126. Technical investigations will be completed in collaboration with SA Water regarding the appropriate type of reticulated waste water network to be provided, particularly in regard to protection of the system from ground water infiltration, as described in their letter 'Buckland Park Development – STAGE 1'.

127. All waste water delivered to Bolivar Waste Water Treatment Plant will meet the SA Water *Guidelines for Discharge of Pumping Mains and Alternate Sewerage Systems* as described in their letter 'Buckland Park Development – STAGE 1'.

128. Technical investigations in collaboration with SA Water will be completed regarding the provision of a sewer main from the site to the Bolivar Waste Water Treatment Plant, and infrastructure required to ensure discharged waste water meets SA Water *Guidelines for Discharge of Pumping Mains and Alternate Sewerage Systems,* in accordance with the process described in their letter 'Buckland Park Development'.

129. Technical investigations will be completed in collaboration with SA Water regarding the appropriate type of reticulated waste water network to be provided, particularly in regard to protection of the system from ground water infiltration, as described in their letter 'Buckland Park Development'.

130. Technical investigation in collaboration with SA Water will be completed regarding the vacuum sewer system for commercial or industrial users, and SA Water's detailed design approval will be obtained, as described in their letter 'Buckland Park Development'.

131. The location of any vacuum sewer pump station or temporary waste water storage facility will be agreed with SA Water, having regard to the location of housing and other occupied buildings, and will comply with Environment Protection Authority separation requirements, as outlined in SA Water's letter 'Buckland Park Development'.

132. All land required for vacuum sewer pump stations will be nominated as separate allotments on the land division plans, and will be vested with SA Water upon registration of the land division, in accordance with their letter 'Buckland Park Development'.

133. The waste water management system will be designed to ensure the general obligations of the *Environment Protection (Water Quality) Policy 2003* are met, and to ensure that effluent does not overflow or escape from drains, pipes, sumps, tanks, storage/treatment basins into any watercourse, or into stormwater drains which do not drain into the effluent collection, treatment and disposal system, except where the effluent complies with criteria in the above policy, or escapes to or is infiltrated by saline groundwater.

134. An 'Emergency Response' and 'Contingency Plan' will be submitted to SA Water for approval as part of commissioning a 'Waste Water Management System' to cover the operation and maintenance of the waste water system. The Response and Plan will include contingencies in the case of pump malfunction and emergency storage times within the system.

Recycled Water to the Site

135. Technical investigations in collaboration with SA Water will be completed for the provision of recycled water to the site from the Bolivar Waste Water Treatment Plant, via a new rising main, or other source, in accordance with the commitment made in their letter 'Buckland Park Development'.

136. The recycled water system will be designed and constructed in accordance with SA Water and Water Supply Association of Australia (WSAA) standards.

Water Utilities Reticulation within the site

137. Each new allotment will be connected, and remain connected, to reticulated potable water, recycled water, sewer in accordance with engineering design standard plans approved by SA Water.

Water Features

138. Prior to the construction of any water feature in the public domain, for aesthetic, stormwater management or treatment, detailed designs will be submitted to Playford City Council for approval which demonstrate:
    - Compliance with the *Public and Environmental Health Act 1987*. The Department of Health will be consulted regarding the guidelines applicable in each case.
    - Ground water mounds will not develop under the feature.

Electricity to the Site

139. An allotment of 1 hectare will be dedicated to ETSA Utilities for a new Buckland Park substation. It will be a registered, unencumbered, Torrens Title allotment, with direct access onto a public road capable of accommodating heavy vehicles, access to water, sewer and stormwater drainage, located above the 100 year flood level, and with Native Title, native vegetation, and environmental heritage clearance.

140. A Development Approval with conditions acceptable to ETSA Utilities for the construction of the substation will be obtained.

141. Any easements across the site, or any other private land, for the provision of electricity utilities to the site will be obtained and registered, on terms considered appropriate to ETSA Utilities. Easement widths will vary, but will be a maximum of 26 metres.

142. In accordance with the *South Australian Electricity Distribution Code* agreements will entered into with ETSA for the staged provision of electricity to Stage 1.

Electricity Reticulation within the site

143. Prior to the commencement of construction arrangements will be made with ETSA for the provision of underground internal reticulation of electricity utilities to all new allotments created within the stage.

Gas Reticulation within the site

144. Prior to the commencement of construction arrangements will be made with Envestra and a suitable gas retailer for the provision of underground internal reticulation of gas utilities to all new allotments created in accordance with the conditions set out in their letter 'Pricing Proposal For Buckland Park Estate – Stage 1'.

Telecommunications to the site

145. An allotment of 180m^2 will be incorporated into the Stage 1 'Concept Land Division' and dedicated to Telstra for a new Buckland Park Telstra Outposted MDF room to Telstra's requirements.

Telecommunications Reticulation within the site

146. Prior to the commencement of construction arrangements will be made with Telstra for the provision of underground internal reticulation of telecommunication utilities to all new allotments created.

Road design

147. Prior to construction commencing engineering designs for roads, drainage, footpaths and intersections will be prepared in accordance with the requirements of Playford City Council. Road and drainage designs will include:
    - Water table levels.
    - Drainage inverts.
    - Pavement details.

148. All roads will be constructed to the reasonable satisfaction of Playford City Council.

149. Engineering designs for the internal road network will be consistent with the road hierarchy shown on drawing 'Proposed Road Hierarchy'.

150. Engineering designs for roadway embankments will, if required, eliminate any standing water impoundment or redirection of water flows into potential mosquito breeding areas.

151. Engineering designs for the internal road network will include designs for crossings at the intersections of roads and storm and flood water management channels. These may include bridges or fords, depending on the size and depth of the channel. The designs will be accompanied by information which confirms the crossings are above the peak 1:100 year ARI flood event.

152. Engineering designs for the internal road network will incorporate the recommendations of any of the detailed investigations completed in accordance with Commitments in Section 7.24 'Detailed Investigations'.

7.28 Road Closures and Openings

153. Applications for road closures within Stage 2, 3, 4 and 5 will be made in accordance with the provisions of the *Roads (Opening and Closing) Act 1991.*

154. Public road access and utility services to private properties adjoining will be maintained in land division plans in accordance with Commitment 79.

7.29 Construction Management and Monitoring

CEMMP preparation

155. Prior to commencement of construction, Construction Environmental Management and Monitoring Plans (CEMMP) will be submitted to the Department of Planning and Local Government Prior for approval. A separate CEMMP will be prepared for each of the following proposal elements;

- Neighbourhood Centre
- Sales Office
- Display Village dwellings
- Storm or flood water management facilities
- Utilities and infrastructure
- Stage 1 land division including roads and open space
- Stage 2 land division including roads and open space
- Stage 3 land division including roads and open space
- Stage 4 land division including roads and open space
- Stage 5 land division including roads and open space

CEMMP component plans

156. Induction procedures

All construction workers and visitors to the construction site will receive induction training on all aspects of the CEMMP and its associated plans. In particular, induction will address on site practices, procedures and responses in place in accordance with the *Occupation Health, Safety and Welfare Act 1986,* its regulations and Codes of Practice.

157. Construction zone and staging plan

The plan will consider the location and potential impacts on residents, both within completed stages and external to the site.

It will include plans which nominate construction zones, compounds (including offices, amenities, toilets, car parking areas, plant and machinery storage, hazardous materials storage, and the like).

Construction compounds will be located to be above a 1:100 year ARI flood event.

158. Community consultation plan

The plan will include:

- the name and contact details of the project manager, which will be signposted on the site.
- the procedure for responding to complaints
- A complaints register, including date, name and response action, such as clean ups, remediation work or modification of procedures.
- a timetable for community meetings to discuss construction activities.
- a timetable for notification of construction activities, including advertisements in local papers, letter box drops or the like as appropriate.

The plan will provide for consultation with the community, whether they live within the site or adjoining the site.

The Project Manager will establish a Construction Management Group with proponent and builder representatives, which will meet monthly to discuss and resolve issues associated with construction activities and facilitate communication. Council and SAPOL will be invited to join the Group.

159. Operations Plan

The plan will set out construction and truck movement hours as follows:

- Monday to Saturday – 6:00a.m. to 7:00p.m.
- Sundays and public holidays – 9:00a.m. to 6:00p.m.

Any work undertaken on Sunday or public holidays will be subject to exemptions from the Environment Protection Authority in accordance with Clause 23(1)(b) of the *Environmental Protection (Noise) Policy 2007.*

160. Construction Traffic Plan

The plan will nominate construction routes through the locality to reduce the affects of construction on external roads, protect residential streets and sensitive uses from unwarranted traffic, and minimize conflicts with pedestrians.

Within the site, construction traffic will be confined to the designated construction zones. All construction related vehicles will be parked in nominated construction parking areas, which will be fenced to prevent non-authorised personal from accessing plant and equipment. These areas will be appropriately sign posted.

- The Construction Traffic Management Plan, which will restrict construction traffic to routes chosen to minimize potential conflicts with pedestrians, for example by avoiding local roads and schools.

- All construction related vehicles will be parked in nominated construction parking areas, which will be fenced to prevent non-authorised personal from accessing plant and equipment. These areas will be appropriately sign posted.

The plan will describe properties in the construction zone's locality, and their access to the public road system. It will describe arrangements for maintaining that public road access, or alternate convenient access, during the entire construction period.

161. Pedestrian Management and Public Safety Plan

The plan will include measures to protect public safety, for example:

- The clear fencing and sign posting of construction zones, and requirements for fencing to exclude all non-authorised people from accessing those areas. These zones will be appropriately sign posted.
- Potential pedestrian routes around construction zones and will sign posted and fenced as required. Signs will redirect pedestrians if safer alternative routes as required.
- The community will be informed of construction locations and activities (see Consultation Plan – Commitment 158)

162. Soil, Erosion and Water Management Plan

The plan will demonstrate compliance with:

- The Environment Protection Authority's *Stormwater Pollution Prevention Code of Practice for the Building and Construction Industry* 1997.
- The Environment Protection Authority's *Environment Protection (Water Quality) Policy 2003*
- The Environment Protection Authority's *Handbook for Pollution Avoidance on Commercial and Residential Building Sites 2004*.
- The general environmental duty as defined in Part 4, section 25 (1) of the *Environment Protection Act 1993*

It will address control of run-off of stormwater during earthworks and construction work to ensure water quality is not detrimentally affected.

It will include a schedule of regular inspection and maintenance of soil and erosion control measures, such as silt traps, covers for disturbed surfaces, temporary drains, settling ponds and water retention basins.

Provision will be made for measures to be augmented if required.

The plan will include diagrams of all facilities, and plans which show their location.

163. Noise Management Plan.
The plan will list the required standards, monitoring measures and protocols for correcting any variations from the standards.

It will comply with provisions in the *Environmental Protection (Noise) Policy 2007,* Clause 23.

164. Weed Management Plan.
Plans will include the following:

- Undeveloped allotments will be regularly weeded to ensure weeds do not seed.
- Civil engineering plans will minimize the areas of soil disturbance, and therefore vegetation disturbance.
- Construction vehicle routes will be defined and vehicles will be limited to those routes. For Stage 1, the construction route is Legoe Road, onto Port Wakefield Road. Legoe Road is within the site's boundaries.
- Wheel wash bays will be provided at construction zone exits to ensure exposed soil from the site is not spread from construction vehicle wheels.
- The movement of earthmoving and road compacting vehicles to and from the site will be minimized.
- Car park areas will be sealed so worker's cars to not come in contact with exposed soils.
- Covering and spraying of stockpiled soil from the site.
- Covering of spoil loads in trucks leaving the site.
- Fencing around construction zone.

165. Spoil and Fill Management Plan
Excavated soils from the site will not be removed prior to an assessment being undertaken to determine their chemical characteristics in accordance with Schedule 6 of the *Environment Protection (Fees and Levy) Regulations 1994.*

Where the spoil and or soil exceeds the chemical criteria for waste fill, disposal will be disposed of at a facility licensed under the *Environment Protection Act 1993* to receive and or treat the waste.

Any re-use of waste generated during construction in accordance with resource management strategies will be undertaken in accordance with the EPA draft *Protocol For Waste Derived Fill*, April 2009.

The Plan will identify the volume of spoil associated with each construction activity, its quality and location for disposal, whether on the site, or off site.

The suitability of any fill for its proposed purpose will be determined prior to its importation to the site to ensure it will not cause contamination, in accordance with the Environment Protection Authority's draft *Protocol for the Production and Use of Waste Derived Fill* April 2009.

166. Dust and Air Quality Management Plan.
The Plan will comply with the provisions of the *Environment Protection (Air Quality) Policy 1994*, if relevant and the *EPA Handbook for Pollution Avoidance on Commercial and Residential Building Sites 2004*.

The plan will include the following provisions:

- Undeveloped allotments will be left in a neat and tidy condition, with soil surfaces stabilised to minimise erosion.
- Civil engineering plans will minimize the areas of soil disturbance, and therefore potential for dust creation.
- Construction vehicle routes will be defined and vehicles will be limited to those routes. For Stage 1, the construction route is Legoe Road, onto Port Wakefield Road. Legoe Road is within the site's boundaries.
- Wheel wash bays will be provided at construction zone exits to ensure exposed soil from the site is not spread from construction vehicle wheels.
- The movement of earthmoving and road compacting vehicles to and from the site will be minimized.
- Car park areas will be sealed so worker's cars to not come in contact with exposed soils.
- Stockpiled soil will be covered or sprayed with water to stop dust been blown.
- Covering of spoil loads in trucks leaving the site.
- Dust generating activities will be stopped during high winds.

167. Waste and Rubbish Management Plan
The plan will include details of the type of rubbish that will be generated, the type, capacity and location of collection receptacles and a schedule for collection.

It will include a schedule of regular inspection of areas around the construction zones, particularly areas with biological significance, and provisions for removing any rubbish in those areas associated with construction activities.

The Plan will include methods for avoiding waste and rubbish creation, re-use of waste materials and recycling of waste materials.

168. Cultural Heritage Management Plan
The plan will include provision for Kaurna monitoring when any ground is disturbed for the first time, and protocols for the management of any items of archaeology that may be found.

In accordance with Section 23 of the *Aboriginal Heritage Act 1988* if an Aboriginal site, object or remains are found during the investigations or any work on the site the Minister for Aboriginal Affairs and Reconciliation's authorisation is required to damage, disturb, interfere or remove the object, site or remains.

All agents, employees and contractors, such as construction crews, will be conversant with the provisions of the *Aboriginal Heritage Act 1988*, particularly Section 20, which requires immediately contact the Department of Aboriginal Affairs and Reconciliation in the event that archaeological items (especially skeletal material) are uncovered during earthmoving.

The Department of Aboriginal Affairs and Reconciliation Guidelines will be applied:

- *Guideline 1 - Determination of Aboriginal sites and objects and Authorisation to damage, disturb or interfere with Aboriginal sites, objects or remains*
- *Guideline 2 - Section 20 of the Aboriginal Heritage Act 1988: Discovery of sites, objects or remains*
- *Guideline 3 - Excavating sites, objects or remains*
- *Guideline 4 - Care of, control of, sale of and other dealings with objects*
- *Guideline 5 - Divulging information contrary to Aboriginal tradition*
- *Guideline 6 - Access to and Excavation of land by authorised and Aboriginal persons*
- *Guideline 7 - Directions by the Minister restricting access to Aboriginal sites, objects or remains*
- *Guideline 9 - Identifying and recording Aboriginal sites, objects and remains*

169. Flora and Fauna Management Plan

The Plan will be prepared by an ecologist who will survey construction zones on foot prior to preparing the plan, to ensure any indigenous plants (of significance) or animals are removed prior to construction commencing.

All trees and areas to be protected during construction will be identified on plans, including required buffer areas. Areas or trees, including root zones, requiring protection will be fenced from construction zones.

Rehabilitation, Revegetation and Management Plans will be prepared in accordance with the Vegetation Management Plans approved in accordance with Commitment 58.

Where possible, removed plant material will be used in rehabilitation and revegetation after works are completed.

Construction of Stages 4 and 5 will be undertaken:

- Outside of periods when shorebirds are visiting Cheetham salt pans.
- From construction zones, compounds, and traffic routes located as far as possible on the eastern side of those stages.

Rehabilitation, Revegetation and Management Plans will be prepared in accordance with the Vegetation Management Plans approved in accordance with Commitment 58.

170. Ground Water Management Plan

The Plan will comply with the provisions of the:

- *Environment Protection (Water Quality) Policy 2003*
- *EPA Handbook for Pollution Avoidance on Commercial and Residential Building Sites 2004*
- *Stormwater Pollution Prevention Code of Practice for the Building and Construction Industry* 1997.
- The general environmental duty as defined in Part 4, section 25 (1) of the *Environment Protection Act 1993*

In the unlikely event, temporary ground water extraction systems are required to facilitate construction a permit will be obtained from the Environment Protection Authority and the Department of Land, Water and Biodiversity Conservation prior to implementation. Any permit application will be accompanied by an environmental management plan.

171. Hazardous Material Storage Plan

The Plan will be consistent with the *EPA Bunding and Spill Management Guidelines 2004* (as updated in 2007) and the *EPA Handbook for Pollution Avoidance on Commercial and Residential Building Sites 2004*.

It will identify potentially hazardous or polluting substances associated with construction, including fuel and toilet facilities.

It will identify suitable locations for these activities, considering any particular environmental circumstances applying to construction zone.

It will include:

- Requirements for sealing the storage areas to prevent spills entering the soil;
- Bunding around storage areas to prevent spills leaving the area;
- Facilities for capturing and treating any spills;
- Procedures for cleaning up spills.

172. Emergency Procedures Management Plan

The Plan will identify potential emergency events, which are likely to include fire, medical emergencies, floods.

It will include procedures for dealing with these events, and emergency fire control and first aid equipment will be maintained on site, and construction workers will be trained in their use.

It will include contact details for emergency services such as local police, fire services and ambulances. These details will be sign posted within all areas associated with construction.

173. Acid Sulphate Soil Management Plan

The plan will include identification of the risk of uncovering Potential Acid Sulphate Soils and procedures if this occurs, including:

- Bulk treatment with lime to neutralise their acidity. Current information suggests 15.1 kg/m3 to 30kg/m3 would be required.
- Selective treatment where excavated natural soils are stockpiled and dried, further sampled to characterise suspected acid sulphate soils and determine if lime treatment rates to neutralise their net acidity.

174. Remediation Plan

The plan will identify the risks associated with land contamination within the construction area. It will include requirements for contamination remediation associated with the intended final use of the land.

Auditing of the Remediation Plan, and its implementation will be undertaken in accordance with the SA Environmental Protection Authority's *Guidelines For The Site Contamination Audit System* January 2009.

All works associated with the rehabilitation and remediation will be undertaken in accordance with the General Environmental Duty defined in Part 4, section 25(1) of the *Environment Protection Act 1993*, the *Environment Protection (Water Quality) Policy 2004*, and other relevant Environment Protection Policies made under Part 5 of the *Environment Protection Act 1993*, draft guideline *Environmental Management of On-Site Remediation* and other relevant Environment Protection and Authorisation publications and guidelines.

The General Environmental Duty also requires application of all reasonable and practical measures to prevent or minimise harm to the environment during any activity which pollutes, or may pollute.

175. Utilities Plan

The plan will identify requirements for water, sewer and electricity to serve construction areas, and these will be approved by utilities agencies as required.

The plan will describe properties in the construction zone's locality, and their access to utilities. It will then include arrangements for maintaining that utility access, during the entire construction period.

CEMMP implementation

176. All construction works and site activities will be undertaken in accordance with the approved Construction Environmental Management and Monitoring Plan.

177. Playford City Council will be given seven days notice prior to the commencement of and construction works, including the project director's name and contact details.

7.30 PM 199

178. Cheetham Pty Ltd will be consulted regarding the proposed use of that part of PM 199 which affects the site as a biodiversity protection area.

7.31 Governance

179. Subject to the agreement of Playford City Council, during the design and implementation period meetings will be held with Playford City Council as follows:

- Playford City Council's Land and Development Advisory Unit (LANDAU) once per month to resolve technical issues associated with urban infrastructure, particularly:
  - Designs
  - Technical Specifications
  - Application requirements
  - Inspections
  - Construction management
  - Handover requirements

- Playford City Council's Buckland Park Project Control Group once per month to resolve issues within the proposal and the Virginia locality associated with:
  - Requirements for community facilities – standards, scale, access
  - Requirements for a Council depot.
  - The employment of a community worker – qualifications, experience, job description
  - Infrastructure handover arrangements – maintenance and defect periods
  - Community transport – timetabling frequency
  - Community building activities – coordination with Council's programmes, and the proposal's requirements.
  - Provision of Council services – waste, maintenance, baby immunisation, youth services, disability services.
  - Requirements for state funding of services.
  - Road closures and openings.
  - Council resourcing
  - Emergency Planning

- Subject to the agreement of Playford City Council and the Minister for Planning and Urban Development, annual meetings will be held with the northern region's 'Local Government Regional Partnership Forum', to provide information on projected lot yields and timing and the progress of the proposal's implementation to assist in planning for infrastructure across metropolitan Adelaide's northern region.

If Forum meetings are to be confined to government attendees only, this information will be provided to the Department of Planning and Local Government for provision to the Forum, and inclusion in the Metropolitan Development Programme.