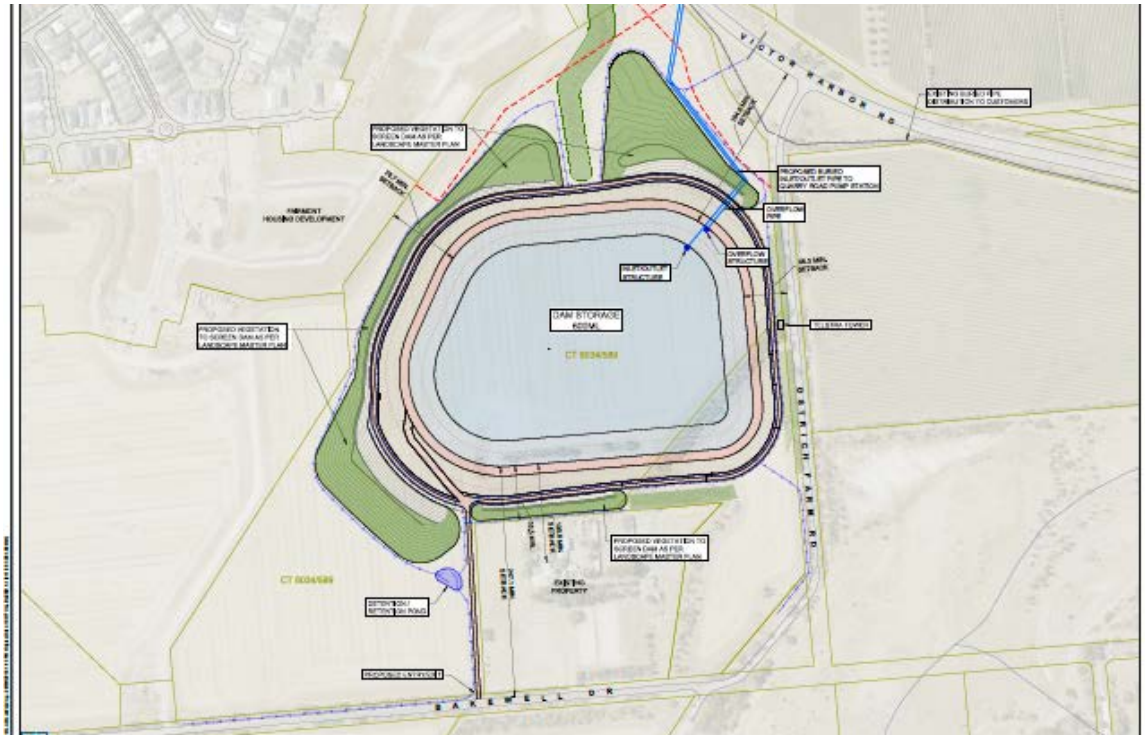
Willunga Basin Water Company Pty Ltd

Construction of a 600ML treated water storage dam

Bakewell Drive and Ostrich Farm Road, Seaford Heights

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SCAP AGENDA ITEM: 3.2.1

Application Summary	
Application No:	145/V004/19
KNET Reference:	2019/01789/01
Applicant:	Willunga Basin Water Company Pty Ltd
Proposal:	Construction of a 600ML treated water storage dam with associated bulk earthworks, stormwater detention basin, inlet-outlet pipe (buried), landscape mounding and screening, security fencing, and signage
Subject Land:	Bakewell Drive & Ostrich Farm Road, Seaford Heights
Relevant Authority:	Minister for Planning
Role of the Commission:	Section 49(7): the State Commission Assessment Panel must undertake an assessment of the proposal and provide a report to the Minister for Planning.
Zone / Policy Area:	Primary Production Zone & Deferred Urban Zone
Categorisation:	Merit
Public Notification:	Yes - development cost exceeds $4m
Representations:	4 representations were received (2 to be heard).
Lodgement Date:	31 January 2019
Council:	Onkaparinga Council
Development Plan:	Onkaparinga Council Development Plan Consolidated 20 December 2018
Referral Agencies:	Commissioner of Highways, Chief Executive of the Department that administers the NRM Act, Heritage SA, Onkaparinga Council

Executive Summary

The proposal relates to the construction of a water storage dam within a Primary Production Zone at Seaford Heights. The dam will be used to supplement an existing irrigation network that supports primary production activities in the McLaren Vale region.

The development was sponsored for the purposes of 'public infrastructure' under Section 49 of the Development Act 1993, and underwent a statutory referral and notification process, with a total of four public submissions received. Two representations were supportive of the proposal, and two raised concerns due to the close physical proximity of a 600ML treated water storage dam to a recently developed residential estate.

The applicant provided a detailed response to these issues, and with appropriate mitigation measures, external impacts can be appropriately managed – either in terms of the initial design response (including the establishment of an extensive landscape buffer) or the implementation of operational protocols to monitor dam levels and vector controls.

No objection was raised by the local Council or relevant state agencies, with the dam to be constructed in accordance with recognised design and engineering standards.

Based on an assessment of the development application, a review of relevant planning policies, public submissions, council comments and the technical advice of referral bodies, the proposal demonstrates sufficient merit to be recommended for approval, subject to appropriate conditions.

Assessment Report

1. Strategic Context

The 30-Year Plan for Greater Adelaide seeks to protect and secure water resources within the region, including the development of complementary recycled wastewater networks and stormwater harvesting to reduce pressure on less sustainable supplies. The plan references the expansion of recycled water from the Bolivar Wastewater Treatment Plant to support the intensification of horticultural production in the Northern Adelaide Plains. This has resulted in the current implementation of the Northern Adelaide Irrigation Scheme (NAIS) and stormwater harvesting projects like the Gawler Water Re-Use Scheme (which is a co-development with Bunyip Water and the Light Regional Council).

2. Background

The Willunga Basin Water Company (WBWC) is a privately-owned water infrastructure provider and operates a reclaimed water scheme in South Australia's McLaren Vale region. The company is working in collaboration with the McLaren Vale Grape Wine & Tourism Association and the McLaren Vale Growers Council to deliver reclaimed water, replacing and/or augmenting mains and groundwater by small to medium sized irrigators.

The applicant has also advised that *"concerns around over-extraction resulted in the regional groundwater resource in McLaren Vale being proclaimed which led to regulation of groundwater extraction via individual bore specific water allocation. These allocations were capped with a maximum quantity of underground water available for allocation (taking and holding) in the McLaren Vale Prescribed Wells Area (PWA) of 6,600 ML/annum."*

WBWC takes treated water from SA Water's Christies Beach Wastewater Treatment Plant, then distributes this via a network of dams, pipes and pumps to growers in the McLaren Vale region. WBWC currently pump treated water from Christies Beach WWTP to a 13ML holding dam at Quarry Road, Seaford Heights via a trunk main.

The treated water is used to irrigate vines, fruit trees, nut crops and flowers, which has proven to be a more price competitive source than regional bore water and completely safe for drip irrigation. This water is currently supplied to 220 growers at a pressure that suits most on-farm drip irrigation systems. There is no water ordering system – users simply access the water supply at a mutually agreed flow rate and each outlet has a flowmeter with water usage logged continuously.

The purpose of the new 600ML dam is to increase the storage capacity within the network (during periods of low demand) and then release during periods of high demand (i.e. summer months).The annual treated volume of the Christies Beach WWTP is around 10,000 ML, of which around 55% is currently used by WBWC with the balance of treated water (minus a small amount used by SA Water) discharged to Gulf St Vincent.

A consequential benefit of reducing outflows into the Gulf St Vincent and increasing local supplies of treated water to support agricultural production will have a net environmental benefit (on the one hand reducing nutrient loads into the marine environment and diverting this reclaimed resource to support local agricultural production.

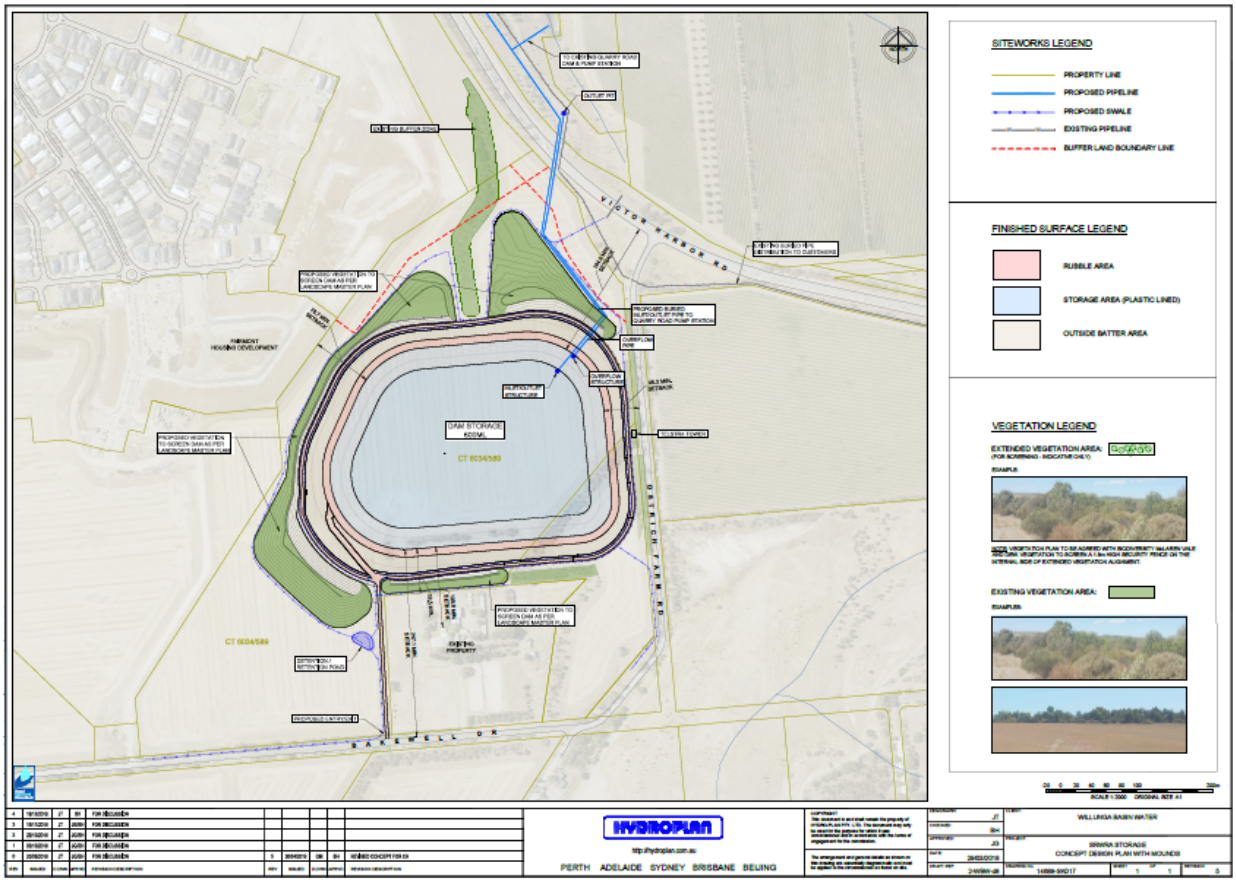
SA Health has previously granted SA Water a licence under the *Public and Environmental Health (Waste Control) Regulations* for the supply of recycled water from the Christies Beach WWTP (subject to conditions directed to achieve water quality requirements).

Crown Sponsorship

The Willunga Basin Water Co. Pty Ltd was granted a crown sponsorship for the purposes of 'public infrastructure' to enable the application to be lodged under Section 49 of the *Development Act 1993*. The sponsorship decision was made by the Minister for Transport, Infrastructure and Local Government on 17 January 2019.

3. Description of Development

The proposal comprises the construction of a 600 ML treated water storage dam located on vacant land at Bakewell Drive, Seaford Heights.



In detail, the dam is defined by the following features:

- 330 metres in length, 265m in width and 9.3 metres in depth;
- a 'turkey's nest' configuration, with the top of the dam banks elevated above the natural ground level;
- fill height of the dam walls above ground level varies from 4.6m to 7.6m;
- internal and external slopes will comprise a 1 in 3 batter;
- an internal, high-density polyethylene (HDPE) liner manufactured from UV stabilised material placed on a low-permeability subgrade will also be installed;
- the base of the embankment will feature an access road, security fencing and a swale to collect stormwater runoff;
- adjacent the access road will be a series of constructed earth mounds of varying heights between 1.5m – 7.8m at a slope of 1 in 4 to provide a landscape screen.
- the dam will include an underdrain system for leak detection purposes;

- a stormwater swale will also be constructed to collect stormwater runoff and direct it towards a proposed detention basin and discharge points (and the offsite);
- the dam will be filled and emptied using the existing pumping infrastructure at the existing Quarry Road site. No on-site pumps are to be installed.

The proposed dam embankments will provide the following setbacks from adjoining roads and property boundaries:

- 78.5 metres (approx.) from the crest of the dam to the adjoining residential property to the north;
- 58 metres (approx.) from the crest of the dam to allotments that have been created on the adjoining Vista Estate to the west;
- 47 metres (approx.) from the crest of the dam to the kerb of Ostrich Farm Road to the east;
- 185 metres (approx.) from the crest of the dam to the existing kerb of Victor Harbor Road to the northeast; and
- 247 metres (approx.) from the crest of the dam to the existing kerb of Bakewell Drive to the south.

Site access will be achieved from a 4m wide driveway access and crossover on Bakewell Drive that can provide adequate clearance and sight lines for all vehicles.

The proposed earthworks will involve the excavation of 280,000m^3 of soil to construct the water storage dam, whilst the material 'won' will be utilised to form the dam wall embankments and mounds for landscape screening purposes.

Additional works will comprise a stormwater detention basin (to limit peak flows from the southern catchment); a 500mm buried inlet-outlet pipe connecting the proposed dam to the quarry road dam pump station (over Victor Harbor Road); and a 1.8m high chain wire security mesh fence around the perimeter of the dam embankment; warning signage to prevent unauthorized access; and landscape planting.

Application details are in the ATTACHMENTS.

4. Subject Land & Project Area

The project involves private land holdings and a public road reserve, with the land parcels formally described as follows:

Section / Lot	Plan	Road	Locality	CT Reference
A108	DP 80592	Bakewell Drive	Seaford Heights	CT 6034/589
A102	DP 46795	Ostrich Farm Road	Seaford Heights	CT 5829/936

Table 1: Subject Land Parcels

The locality comprises a mix of urban, industrial, commercial and agricultural land uses on the edge of the Adelaide metropolitan area, with more recent urban development to the north, farmland to the east and south-west and an integrated waste depot to the south.

The subject land (30ha) is currently utilised for broadacre cropping purposes – consistent with the zoning of the land. The land is undulating, with the dam site being a natural highpoint, affording wide views across southern suburbs, Onkaparinga River Valley and hills face and coastal areas to the south-west and north-west.



Above & Below – Vista Residential Estate and Perimeter fencing adjacent site.





Above & Below – View from Ostrich Farm Road to the west and south-west.





Above & Below – View from Bakewell Drive to dam site in background.



The land is largely cleared of vegetation, with the exception of a line of mature olive trees toward the southern boundary (previously planted for fruit production) and approximately 200 juvenile trees located within a windbreak towards the south-eastern boundary.

The subject land is effectively delineated by the Victor Harbour Road to the east, Ostrich Farm Road to the south-east and Bakewell Drive to the south. Both roads are sealed and allow for the two-way flow of traffic.

A new residential subdivision is being developed on adjacent land to the north of the proposed storage dam site, being the Vista – Seaford Heights master planned estate by Fairland (Fairmont Land Holdings Pty Ltd). *Horizon Stages 2 and 3* abut the storage dam site and are under construction. Later stages of construction will extend south-westwards to the corner of South Road and Bakewell Drive.

A total of 1100 allotments on 88 hectares are proposed (approximately 1300 homes) with a supporting town centre, including an ALDI supermarket (constructed), and specialty shops, office space and a medical centre (also constructed) (ref: https://fairland.com.au/land-for-sale/vista-seaford-heights?show=about).

The subject land (subject land) is owned by the Southern Region Waste Resource Authority (SRWRA), which is a regional subsidiary established by the Cities of Onkaparinga, Marion and Holdfast Bay, pursuant to Section 43 of the *Local Government Act 1999*, that operates waste management services on behalf of these Councils.

The administrative and land fill operations of SRWRA are located at 112 Bakewell Drive (southern side) and are open to the public, Monday to Saturday. SRWRA currently receives over 100,000 tonnes of waste annually, making it one of the state's major landfill centres.

A listed State Heritage Place is situated to the immediate south of the storage dam, being the former Noarlunga Ostrich Farm, including former Prior's Court Homestead (1850s section only) and Barn, which was listed on the state heritage register in August 1993.

Access to the development site for construction, operational and maintenance vehicles will be achieved from Bakewell Drive.

The development parcels contain a number of easements in relation to infrastructure, road widening and utility services. None are impacted by the development.

Land Management Agreement

A Land Management Agreement (LMA) also applies to Allotment 108. This was agreed to between the Minister for Planning and the SRWRA (being the landowner) on 23 October 2017. The landowner must not cause, suffer or permit interference with, damage to or removal or destruction of the Buffer Zone landscaping (or if damaged, re-establish and/or reconstruct and part of the Buffer Zone landscaping). This landscaping area must also be maintained "as primarily a passive vegetated area to screen development and interrupt sightlines from Victor Harbour Road" (refer Clauses 5.1 and 5.). The land owner must also obtain the consent of the developer of the land in respect to 2009 development deed (or as subsequently varied).

The Buffer Zone landscaping is defined in the LMA (refer Annexure A). The footprint of the treated water storage dam does not directly encroach upon this area, although care will need to be taken during construction that sufficient protection and maintenance procedures are in place (such as from a Construction and Environmental Management Plan) that delineates those plantings to be retained and an appropriate zone of influence (that redirects vehicles, avoids compaction etc). It is noted that the Council (via its involvement

with SRWRA) and the applicant have addressed the issue of the LMA – the former in its response to SCAP on any planning issues, and the latter in its development application.

Development Deed

The subject land (Allotment 108) was purchased from the SA Housing Trust and the Urban Renewal Authority in November 2017. The purchase of his land also resulted in the execution of a development deed, its key provision being to limit future uses or activities that would impact on the amenity of adjacent land for residential purposes. The applicant's legal advice makes reference to Clause 3, which essentially seeks a restriction on those activities that relate to the receipt handling, storage or disposal of any waste on the land.

The question posed by the applicant was whether the storage of treated waste water (i.e. that has been recycled to make it fit for another – irrigated agriculture – purpose) can still be considered as 'waste' – noting that the deed is quite specific in respect to the land use which is not envisaged, which probably related to ensuring that there was no northwards expansion of the existing waste and recycling facility (i.e. the business of its new owner), so instead would remain a relatively undeveloped, non-urban buffer to their operations.

The legal argument on the definition of waste vis-à-vis recycled water as a different product after it leaves the Christies Beach WWTP (and having been sold to the applicant) can be read in the ATTACHMENTS. This provides a good summary of the matter and there is no reason to dispute its conclusions.

In addition, it is noted that there is no mandatory referral required to the Environment Protection Authority (under either Schedule 21 or 22 of the Development Regulations 2008), and that of recent proposals considered by SCAP and then determined by the Minister for Planning (i.e. Gawler Water Reuse Scheme and Northern Adelaide Irrigation Scheme), the EPA advised DPTI-Planning that no referrals were required as the end-product was no longer 'waste'.

5. Design Review

No decision review process was undertaken for this project.

6. Procedural Matters

The proposal was lodged and assessed under Section 49 of the *Development Act 1993* as 'public infrastructure' (having been previously sponsored by the Minister for Transport, Infrastructure and Local Government pursuant to Section 49 – Clause 2(c)).

7. Council Comments

Onkaparinga Council

The Council considered the application at its meeting held on 19 March 2019. Council is generally supportive of the development. The Council considered the appropriateness of the land use in a Primary Production Zone, the design and setback of the dam from neighbouring land uses, the use of embankments and landscaping to minimise its visual appearance, the potential for external impacts (noise, odour etc), adjacent state heritage place, and its location within the McLaren Vale Character Preservation District. A number of conditions were recommended.

A copy of the Council's advice is provided in the ATTACHMENTS.

8. Agency Referrals

Commissioner of Highways

No objection. It was noted that the subject land abuts the Victor Harbor Road, an arterial road under the care and control of the Commissioner of Highways. The Metropolitan Road Widening Plan shows a possible requirement for a strip of land up to 35m from the width of the Victor Harbor Road frontage for possible road widening purposes. The application was documentation was reviewed in relation to the location of the dam on the land, and it was noted that closest batter slope will be setback from the existing road reserve a distance of 35m. This arrangement is acceptable to DPTI-Transport.

Access to the development site will be achieved via local roads (Bakewell Drive and Ostrich Farm Road), and whilst construction traffic will be lead to a temporary increase in vehicle movements (likely to be via the Main South Road / Bakewell Drive intersection), during the operational phase these movements will be much lower – noting that existing construction traffic that is associated with the development of the residential estate is also using Bakewell Drive and rear access for larger vehicles.

An underground pipeline (500mm) will be constructed linking the proposed storage with the nearby Quarry Road dam. This aspect is not 'development' (refer Schedule 14 of the Regulations), but will need the permission of the road operator / landowner (separate process). DPTI-Transport, subject to their requirements, have not objected to this aspect. A number of conditions have been recommended, noting that whilst Condition 1 of their advice has been 'directed', the Minister for Planning cannot be directed by a referral body to attach any conditions to a crown approval (but it is open for SCAP to recommend its adoption in their advice to the Minister).

Heritage SA

No objection. The proposed development was considered to be acceptable in relation to the adjacent State heritage place for the following reason/s.

- The proposed development is for a large, 600 megalitre, raised water storage dam to be constructed on slightly elevated land behind the former Ostrich Farm Homestead.

- The vegetated outer row of mounds proposed to be constructed to ameliorate the visual impact of such a large civil structure are a considerable distance back from the main homestead and no demolition of any outbuildings are envisaged.

- Heritage South Australia has received clarification advice on the plans and is satisfied that the impact upon the heritage values of the place would be minimised by the distance to mounds and the height of the dam in the open landscape has been sufficiently ameliorated.

No conditions were recommended.

Natural Resources Management Act

No referral required. The development site is not within a prescribed water resources area such that a referral to the Chief Executive for the Department administering the *Natural Resources Management Act 2004* was not required. The reason for this was that the proposed dam will be used solely for the storage of treated wastewater; would comprise a turkey nest construction, situated on a hill top; and will not collect or store water flowing over land or any other prescribed water resource.

Furthermore, the proposed facility, including the stormwater management system, will involve no nett taking or retention of surface water and will therefore not require a water licence under the NRM Act. As such, the Department had no specific comment to make on the application in relation to NRM Act requirements. A number of standard advisory notes were recommended.

Technical Regulator

A signed declaration form was provided by the applicant in accordance with Schedule 5, Clause 2A, of the *Development Regulations 2008.*

Applicant Response

The applicant provided a formal response to this advice on 3 May 2019.

State agency referral advice and the applicant's response is in the ATTACHMENTS.

9. Public Notification

Pursuant to Section 49(7d) of the *Development Act 1993*, as a development with a project cost exceeding $4m the application was publicly notified in the Adelaide Advertiser and local Messenger Press. Four (4) valid representations were received.

Representor ID	Issue	Applicant's Response
R1 -Support with conditions	▪ *Design and landscaping* ▪ *Amenity and flooding* ▪ *Security and fencing* ▪ *LMA considerations*	*The applicant noted Council's resolution of 19 March 2019 in support of the development application which considered the proposed land use, dam design, landscaping screen, minimal amenity loss and impact in respect to odour.*
R2 – Concerns and need to consider alternate location	▪ *Mosquito, insect, odour issues for nearby residences* ▪ *Should be relocated to a less urban area.*	*The applicant advised that the design of the dam has been guided by the 'South Australian Integrated Mosquito Management Resource Package, 2006' which has been prepared by SA Health as an informative guide for Mosquito Management Practitioners.* *In addition, the topography of the site on an open, rolling hilltop with good wind dispersion, water depth, lac of shading and water balancing measures will actively assist with the management of mosquitos.* *An 'Odour Assessment' of the water storage dam has been undertaken by ERM which was based on field odour*

Representor ID	Issue	Applicant's Response
		observations at current treated water storage facilities in the area of the proposed dam location. The results from the observations were evaluated against the separation distance to the nearest sensitive receptors, general settings of the area as well as wind data.
R3 - Support	▪ *Improves access to water for irrigation purposes.* ▪ *Supports primary production activities within the McLaren Vale region.*	*The applicant noted that the McLaren Vale Grape Wine and Tourism Association (MVGWTA) is a peak body representing more than 550 businesses and over $500M in farm-gate value – encompassing all grape growers, winemakers and tourist providers in McLaren Vale, South Australia.*
R4 – Concerns and further information	▪ *Potential impacts on adjoining (residential) land – e, g, amenity loss & visual impact, flood risk, odour* ▪ *Appropriateness of development on primary production land.* ▪ *Encroachment into buffer landscaping under LMA; potential conflict with Development Deed.* ▪ *Inconsistency in plans – location of swales.* ▪ *Need to provide input into CEMP requirements.*	*In respect to potential odour impacts, the closest residential setback of 56m should not compromise local amenity, based on the expected operational and intended design parameters. An Operations Management Plan will also be developed.* *The applicant does not agree that the land will be used for the receipt, handling or storage of waste.* *The development does not incorporate a proposed swale or any earthworks within either the 'Buffer Zone Landscaping Area' or the 'Buffer Land' as described and defined in the LMA (and as such there is no change to the use of this land).* *Water storage dams are common place in Primary Production Zones and will directly support irrigated production and rural employment.* *It is acknowledged that the proposed dam will be constructed as a 'turkey's nest' with the top of the dam embankment elevated above the natural ground level of the subject land. The dam will sit approximately*

Representor ID	Issue	Applicant's Response
		5 metres higher than the existing ground level. However, a series of earthen mounds utilizing the excess spoil will allow a series of landscaped screening features to be established to minimise visual impacts. *The proposed development involves a 'turkey's nest' dam with the top of the dam banks elevated above the natural ground level and as such there will be no natural runoff into the dam. The only natural 'inflows' the SRWRA storage would receive would be via rainfall directly on the storage. However, an overflow feature is required to account for any over-filling or significant rain event (but directed away from the site).* *Odour impacts are expected to be low and can be appropriately managed. No pumps are proposed.*

Change to the design:

In its response to representations, the applicant also sought to amend its site plan for the development, being a slight increase in the setback of proposed landscape mounds and pipe infrastructure away from the Victor Harbor Road alignment; and the incorporation of an overflow structure into the dam design.

A copy of the representations and applicant's response are contained in the ATTACHMENTS.

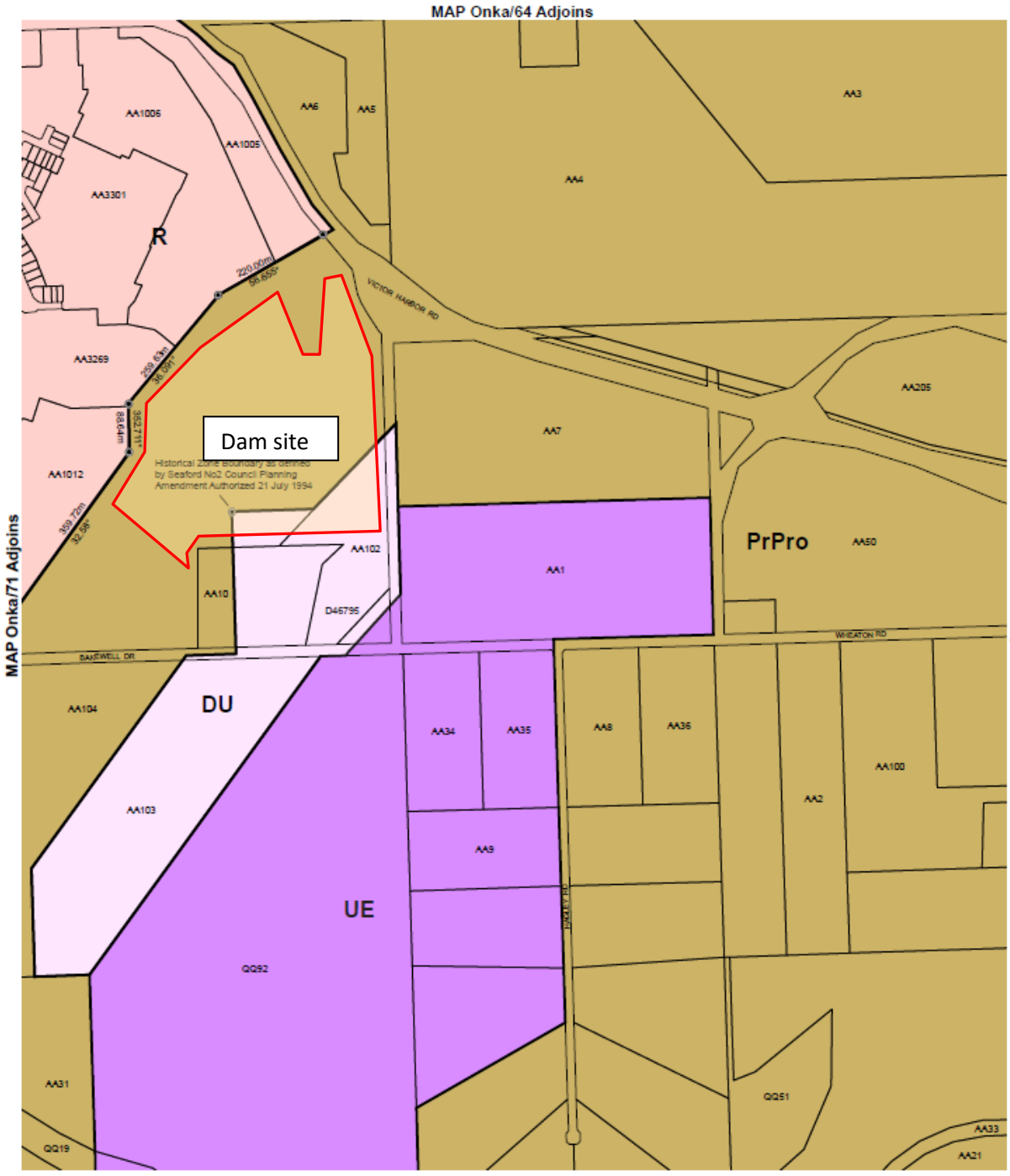
10. Policy Summary

The various components of the proposed development are located within two zones of the Onkaparinga Council Development Plan (Consolidated 20 December 2018).

Primary Production Zone

This zone seeks the long-term continuation of primary production in support of economically productive, efficient and environmentally sustainable development. Primary production uses and activities should be protected from encroachment by incompatible land uses and protection of scenic qualities of rural landscapes.

New development should maintain and enhance the existing rural character, key scenic routes, scenic surrounds to townships, rural amenity and prominent landscapes for the enjoyment of residents and visitors. Development which would remove productive land from agriculture or diminish its overall productivity for primary production should not be undertaken unless the land is required for essential public purposes.

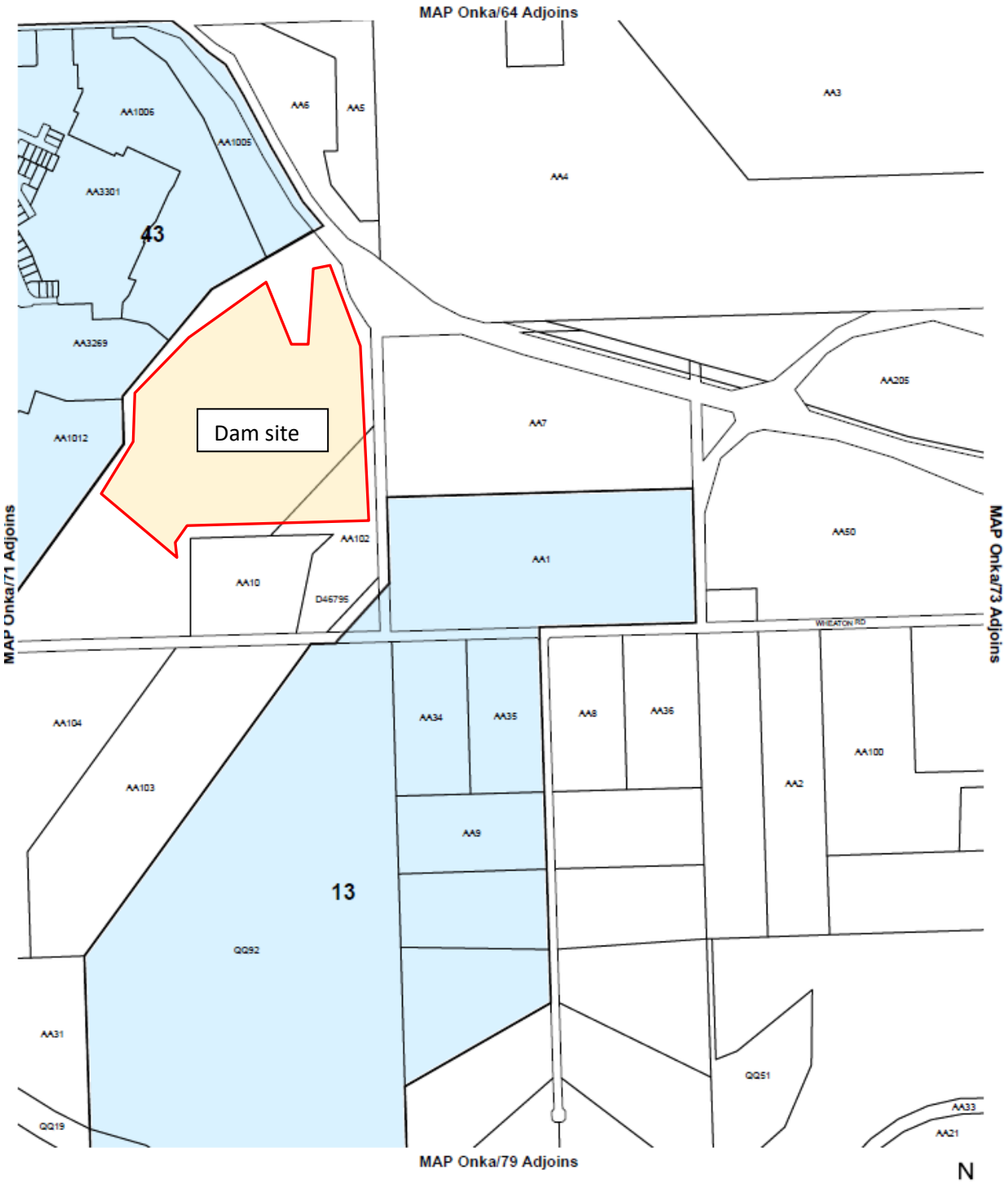


Zones

DU	Deferred Urban
PrPro	Primary Production
R	Residential
UE	Urban Employment
	Zone Boundary

Zone Map Onka/72

ONKAPARINGA COUNCIL
Consolidated - 20 December 2018



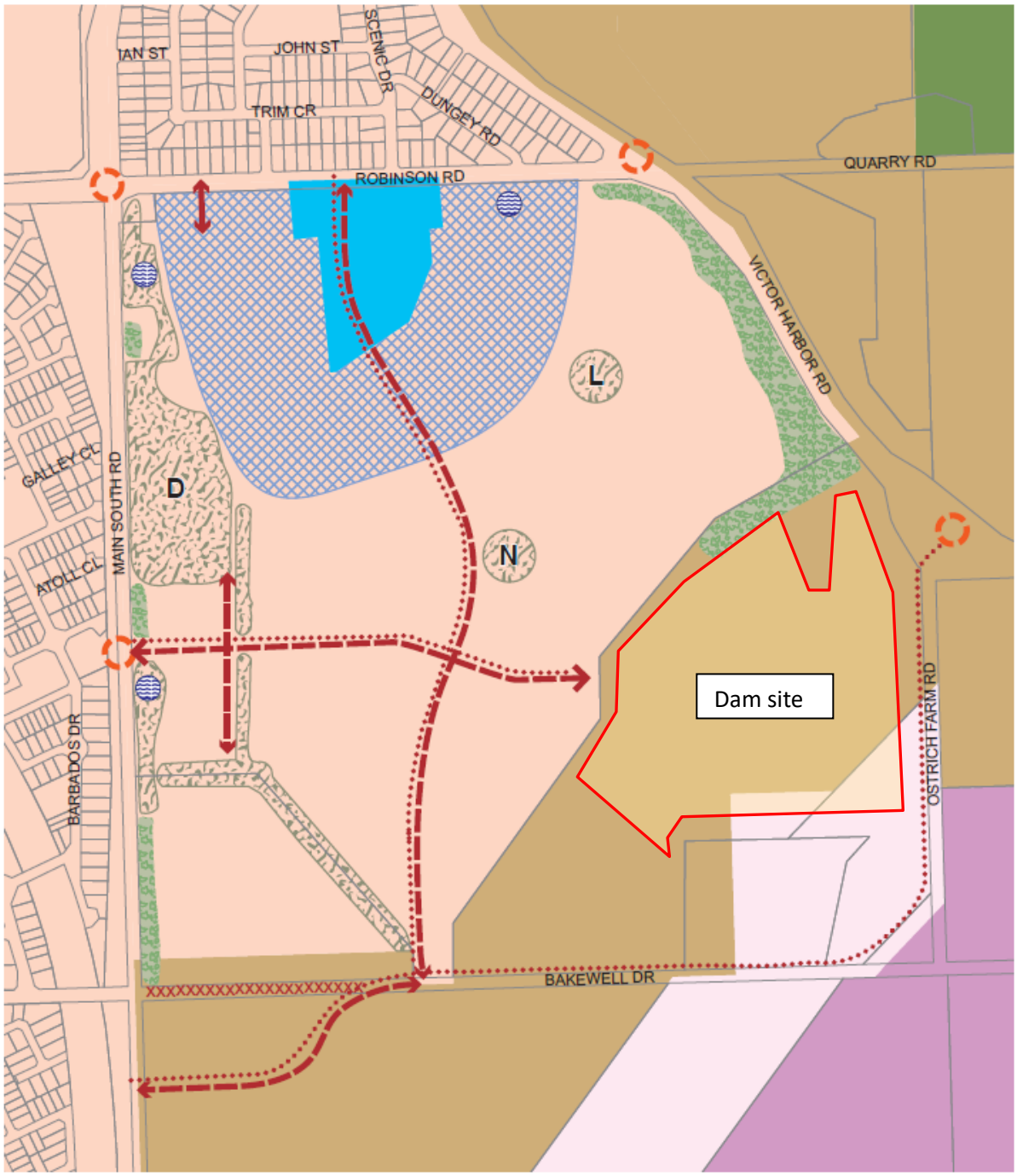
Lamberts Conformal Conic Projection, GDA94

Policy Area
13 Infrastructure Policy Area
43 Seaford Heights Policy Area

Policy Area Map Onka/72

Policy Area Boundary

ONKAPARINGA COUNCIL
Consolidated - 20 December 2018



Concept Plan Map Onka/19

SEAFORD HEIGHTS

Consolidated - 20 December 2018

ONKAPARINGA COUNCIL

Excavation and earthworks should take place in a manner that is not extensively visible from surrounding localities, and not impair the amenity of the locality in which land, buildings or objects are situated. Landscaped buffers located adjacent a residential or urban zone should be designed taking into account the nature, source and frequency of potential adverse impacts; prevailing winds in the locality; topography of the area; existing vegetation and the presence of potentially sensitive adjacent uses.

Appropriately scaled 'value added' commercial activities should be encouraged to utilise local rural production, including the establishment of niche market products, within suitable areas and resulting in minimal landscape intrusion and environmental impact.

The zone comprises a significant portion of land known as the Willunga Basin, which is recognized as an important environmental and economic asset. New development should continue to protect its key features, and recognize the landscape as one encompassing a range of rural production activities on land which is to be regarded as a precious and finite resource, which is vital for the continuation of the rural and tourism economy in the region.

Deferred Urban Zone

This zone seeks to maintain a restricted range of rural uses that are not prejudicial to the future development of the land for urban purposes and maintain the rural appearance of the zone. The land will primarily be used for broad-acre cropping and grazing purposes until required for future urban expansion. Land uses or activities that are incompatible with long-term urban development, or likely to be detrimental to the orderly and efficient servicing and conversion of the land for urban use, should not be supported. It is envisaged that development will only occur following the rezoning of the land and the completion of detailed structure planning to ensure an orderly extension of existing urban areas and to prevent the creation of isolated communities that are remote from infrastructure and services.

Adjacent land policies:

Residential Zone

A Residential Zone should comprise a range of dwelling types, including a minimum of 15 per cent affordable housing, with increased dwelling densities in close proximity to centres, public transport routes and public open spaces. New development within the zone should establish and maintain these areas an attractive place in which to live and where the residential use of land is the primary function. Non-residential development such as shops, schools and consulting rooms should be of a nature and scale that: (a) serves the local community; (b) is consistent with the character of the locality; and (c) does not detrimentally impact on the amenity of nearby residents.

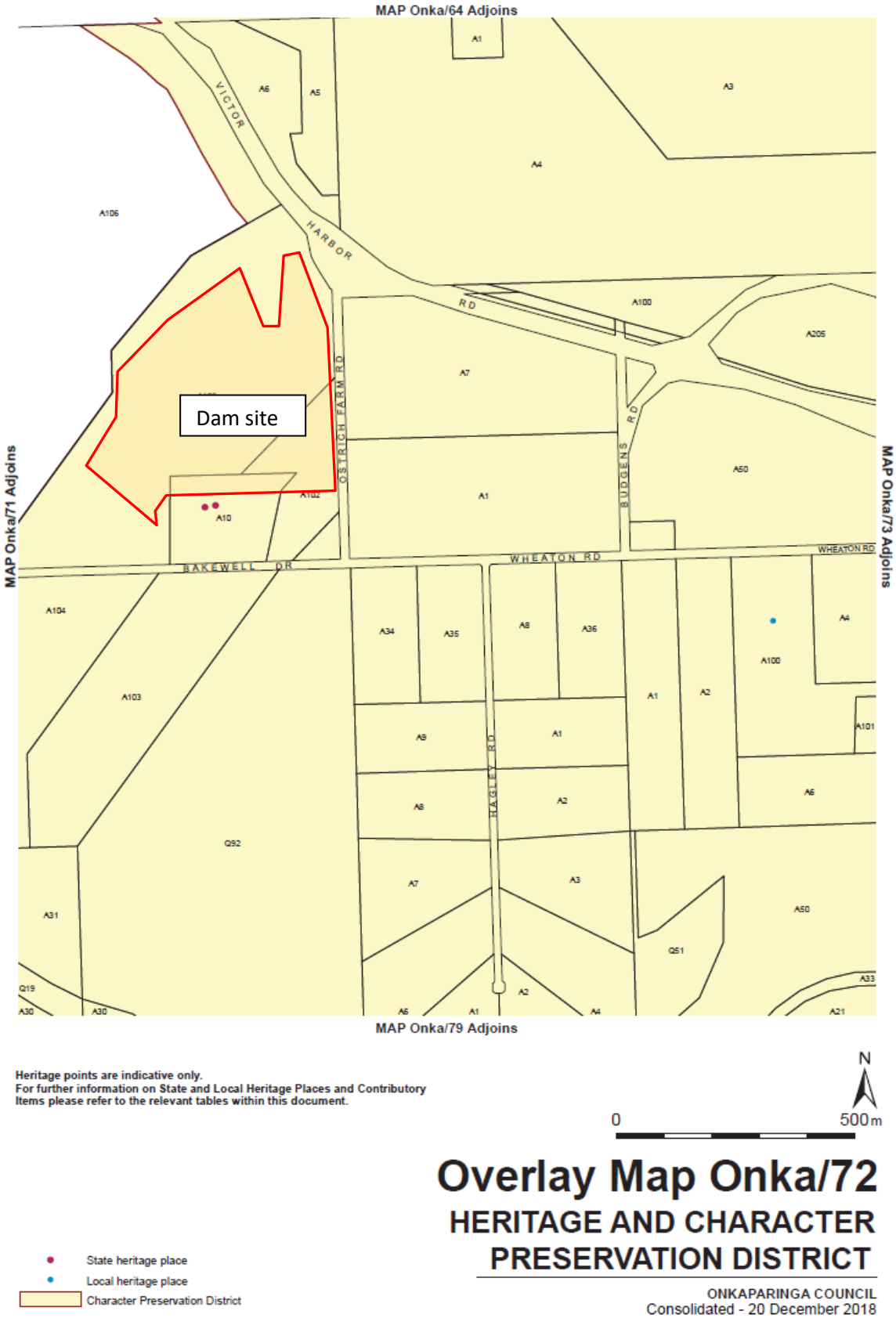
Policy Area 43: Seaford Heights

The policy area reinforces the need for higher densities and more affordable housing close to retail centres, public transport and accessible open space. Development within Seaford Heights should be undertaken in accordance with *Concept Plan Map Onka/19 – Seaford Heights,* whilst a vegetated area consistent with GRO Plan LX1114 (Lot A) should be provided to screen urban development and interrupt site lines from Victor Harbor Road.

General Policies

The Council-Wide policies of relevance to the assessment of the application include: design and appearance, building setbacks, hazards, heritage places, infrastructure, interface between land uses, landscaping, fences and walls, natural resources, orderly

and sustainable development, renewable energy facilities, siting and visibility, transportation and access and waste.



Overlays:

The Victor Harbor Road is designated as a Primary Arterial Road, and the subject land is within the Heritage and Character Preservation District (Overlay Map Onka/72). The development site (and associated land parcels) are excluded from bushfire protection planning provisions.

Relevant planning policies are contained in the ATTACHMENTS.

11. Character Preservation (McLaren Vale) Act 2012

For the purposes of this assessment, Clauses 6 & 7 are relevant.

Clause 6 - Objects

(1) The objects of this Act are—

> *(a) to recognise, protect and enhance the special character of the district while at the same time providing for the economic, social and physical well-being of the community; and*
>
> *(b) to ensure that activities that are unacceptable in view of their adverse effects on the special character of the district are prevented from proceeding; and*
>
> *(c) to ensure that future development does not detract from the special character of the district; and*
>
> *(d) otherwise to ensure the preservation of the special character of the district.*
>
> *A person or body involved in the administration of an Act must, in exercising powers and functions in relation to the district, have regard to and seek to further the objects of this Act.*

Clause 7—Character values of district

(1) The following character values of the district are recognised:

> *(a) the rural and natural landscape and visual amenity of the district;*
> *(b) the heritage attributes of the district;*
> *(c) the built form of the townships as they relate to the district;*
> *(d) the viticultural, agricultural and associated industries of the district;*
> *(e) the scenic and tourism attributes of the district.*

(2) The character values of the district are relevant to—

> *(a) assessing the special character of the district; and*
> *(b) the policies to be developed and applied under the Planning Strategy and any Development Plan under the Development Act 1993 that relates to the district*

12. Planning Assessment

The development application has been assessed against the relevant planning policies of the Mount Remarkable Council Development Plan. The Minister must have regard to these policies but is not bound by them, as its advice is required to consider whether or not a proposal is seriously at variance with the provisions of the local Development Plan.

Land Use

The project area is located within two zones: Primary Production and Deferred Urban. The key planning criteria for the former is the long-term continuation of primary production in support of economically productive, efficient and environmentally sustainable development; and for the latter, is to preserve the land for future urban expansion.

The main purpose of the storage dam is to support primary production activities within the McLaren Vale region, specifically the irrigation of vines, fruit trees, nut crops and flowers, through an increase in the storage capacity of the network (during periods of low demand) and then release during periods of high demand (i.e. summer months). The provision of permanent water storages to supply crops and livestock within primary production areas are common features within a rural landscape.

The loss of primary production land – when considered against the overall land area available and the direct support of those activities (to sustain and improve the productivity of that land, support local employment and underwrite future economic returns) is entirely consistent with the zone's objectives, and similar to the development footprint of agricultural processing activities that also provide a value-adding function.

The balance of the land will remain available for primary production use, which in the past has been for broadacre cropping and grazing purposes. A portion of the Deferred Urban Zone will also be needed to construct the dam, essentially its south-eastern corner, and the removal of some existing vegetation. The current planning scheme does seek to limit new development within this zone that would compromise or restrict its future developability.

However, as the applicant's planning report notes, the likelihood of this land being developed for a residential use is low. Firstly, the land acts as a buffer to the SRWRA site (and is owned by them), which the proposed land use will still achieve (not being a more sensitive land use being established closer to their landfill operations).

Secondly, the two land parcels that comprise this zone are – like the primary production land to the north, east and south-west – located within the Heritage and Character Preservation District Overlay and is subject to the *Character Preservation (McLaren Vale) Act 2012* (which seeks to restrict the creation of new residential lots).

And thirdly, the provision of land for infrastructure purposes – whether it be for water, sewer, electrical, telecommunications or other essential services – also needs to be considered (in terms of the wider population or user groups it serves, on the one hand, and the most beneficial or effective location to deliver that service).

In these circumstances, the proposed land use is considered to be consistent with the existing zoning, and should not compromise the future use or developability of this land – subject to the other provisions of the plan being met, which relate to the management of any interface impacts (e.g. visual amenity, odour etc) to those current and future residents of the new Vista estate within the Residential Zone to the immediate north.

I have also considered Concept Plan Onka/19: Seaford Heights, and whilst this identifies a landscaping strip (referred to by other instruments) and a more generic primary production area, the development of a storage dam does not – on its face – compromise the delivery of its key requirements (connectivity, layout, services, open spaces etc). The landscaping strip is to be retained (in accordance with past requirements).

The proposed storage dam should have no discernible or operational impact on the development of the Urban Employment Zone to the south and SRWRA site in particular, or the further development of the Deferred Urban Zone.



Above: Proposed layout of the Vista Residential Estate.

Interface between land uses

The main environmental issues relate to the potential for odour impacts from the close proximity of a 600ML treated water storage dam to residential development to the north and west. New development should not detrimentally affect the amenity of the locality or cause unreasonable interference through the emission of odour (or other airborne pollutants) or noise. It is noted that (besides construction activities) a water storage facility should be a relatively benign use -but in this case will hold treated wastewater.

The applicant has provided undertook investigations to ascertain the level of existing odour impacts from four treated water storage dams in the area of Noarlunga, Willunga and Aldinga on 16 August 2018 to provide a representative assessment of comparable facilities within the region and local climatic conditions.

To address potential concerns regarding odour from the treated water storage dam, the Willunga Basin Water Company engaged ERM to perform an odour assessment. There is no recommended SA buffer distance or mandatory referral requirement to the Environment Protection Authority or SA Health for the storage of treated wastewater.

ERM's assessment was based on field odour observations at four current treated water storage facilities in the general region of the proposed dam, based on a modified version of the German Standard VDI 3490 (1993) method for each survey.

As described in the ERM report, this standard 'describes a procedure for logging odour in the field which involves noting the odour intensity based on a scale of 0 to 6 (see Table 1) every 10 seconds over a 10-minute period for a number of locations. In addition to making intensity observations, the observer also noted the character of the odours observed, if that can be determined'.

Perceived Odour Strength	Intensity Rating	Interpretation Source: VDI 3490 (1993) and modified interpretations from Pitt (2014)[2]
Extremely Strong	6	In normal circumstances, this should be very rare in a field situation. For an offensive type of odour, the reaction would be to immediately mitigate against further exposure until the exposure level is reduced. The odour cannot be tolerated.
Very Strong	5	The odour character is clearly recognisable. For an offensive type of odour, exposure to this level is considered unpleasant/undesirable to the point that action to mitigate against further exposure is considered or taken.
Strong	4	The odour character is clearly recognisable. For an offensive type of odour, exposure to this level would be considered unpleasant/undesirable.
Distinct	3	The odour character is clearly recognisable. Note that this must still apply even if in a different context or situation - for example, not knowing or expecting what type of odour may be present. The odour is tolerable – even for an offensive odour.
Weak	2	A detectable weak odour stronger than very weak and less strong than distinct.
Very Weak	1	Odour only just detectable.
Not Perceptible	0	No odour present.

Table 2: Odour intensity Scale with interpretation **Source:** ERM Report (from applicant).

The nearest *existing* sensitive receptor location is a residence to the south of the dam at a distance of 105 m from the water edge of the proposed dam maximum fill height, and the nearest expected residential receptor (from a home still to be built) was 78m. In their representation, Fairland advised that the separation distance for the nearest prospective home was around 56m. In follow-up correspondence, ERM confirmed that even at this distance, its field observations and findings on potential odour impacts remain unchanged (i.e. were acceptable).

These field observations concluded that whilst there is odour associated with treated water storage dams, the character of that odour is not perceived as offensive, and it is not a wastewater related odour. Where observed, the odour was of a lower level and intermittent, especially at distance from the source (which for most locations had no odour observed and no distinct or strong intensity odours).

For the Seaford Heights location, consideration as given to local prevailing wind conditions, and the dam's location, which due to its elevation and exposure to stronger winds, should provide good dispersion conditions. However, the following comment is also noted:

> *From the field odour observations and the assessment it cannot be concluded that there will be no odour at the nearest sensitive receptor locations at the Seaford heights residential development as a result of the construction of the treated water storage dam as proposed. However, what the assessment shows is that any odour would be very low level (low odour concentration and intermittent) and not of an offensive nature.*

ERM observed that dispersion modelling would be difficult to replicate for the current project, as its "difficult to characterize emissions and odour impacts from low level non offensive odour sources to then produce impact predictions that could be used for realistic separation distance requirements." To provide a workable baseline, an applicable odour assessment criteria for the location was likely to be 2 odour units.

In practice, the ERM report noted that such an odour level would be *recognisable, but not perceived as offensive, and typically present intermittently at low levels even very close to the dams.* The odour from treated wastewater should not be perceived as a product from a wastewater treatment plant (i.e. wastewater related), but would instead have the character of a muddy lake or pond water. For the Little Road Treated Water Storage Dams, *very little*

odour was observed at an approximate distance of 50 m from the dam water edge and no odour was observed at a distance of approximately 90 m from the dam water edge.

An Operations Management Plan was recommended to ensure "good practices" were adopted and maintained, including *routine water quality monitoring protocols and site inspections specifically targeting observation of odour for monitoring of performance*. In addition, details should be provided on preventative measures for maintenance of water quality and an incident response plan (should an odour event occur).

The ERM report concluded that with an *effective Operations Management Plan in place, there is a low risk of elevated odour from the proposed treated water storage*, even where separation distances were limited to residential receptors.

Built form and Visual amenity

Planning policies seek to discourage the development of unsightly structures or features that compromise existing landscape character values – in this case, open farming land to the south of a new residential estate. The modification of existing landforms, through the excessive excavation, mounding or benching of materials, can comprise these planning scheme objectives, although mitigation measures can be successfully used to minimise their impact and/or appearance. A number of photomontages have been produced and are contained in the WAX report submitted by the applicant - see below.

The construction of the storage dam will involve the the excavation of 280,000m^3 of soil to construct the water storage dam, whilst the material 'won' will be utilised to form the dam wall embankments and mounds for landscape screening purposes. Primary Production Zone polices require the excavation and filling of land to be kept to a minimum, whereupon PDC16 stipulates a 1.5m limitation (for both) to "preserve the natural form of the land and the native vegetation". It is noted that no *natural vegetation* requires removal.

SEAFORD HEIGHTS DAM

1.6 VIEWPOINT 3- CORNER EDISON AND COTTERELL ROAD

WAX



Existing viewpoint



Artists impression of proposed development superimposed on to existing viewpoint.

The proposed embankments and/or mounding will be up to 7.8 metres in height, and on its face, represents a significant departure from PDC16, although the nature of the development proposed and situational context also needs to be considered (as an earthen embankment presents and is viewed differently to a built structure – such as a large shed or dwelling), and whether or not the development can be directly viewed from nearby land and how such views (at project completion) are interpreted.

It is acknowledged, however, that the extent and width of the storage dam will occupy a significant footprint with large earthen embankments, and will require equally significant mounding and landscaping measures to obscure its more dominant features.

To understand these matters, the applicant commissioned a Visual Impact Assessment from WAX Design (a recognised landscape design and architecture firm). The report took into account the design and location of the water storage dam, and gave consideration to the existing site and landscape context (and the visual impact of the development from key viewpoints and the height of recently constructed boundary fencing).

SEAFORD HEIGHTS DAM

WAX

1.7 VIEWPOINT 3- CORNER EDISON AND COTTERELL ROAD



Existing viewpoint



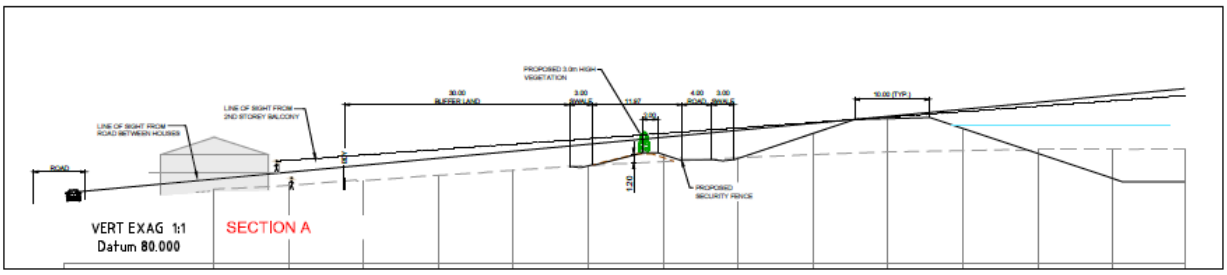
Artists impression of proposed development superimposed on to existing viewpoint.

The report also noted existing modifications to the landscape character, such as the Victor Harbor Road and new residential development to the north, and the regional waste facility to the south, whilst discussion within the WAX report (though not repeated here, refer pages 7-13 of that report) generally concludes that the level of visual impact would not be significantly compromised with the introduction of a more elevated landform on the existing farmland – subject to appropriate mitigation measures being adopted.

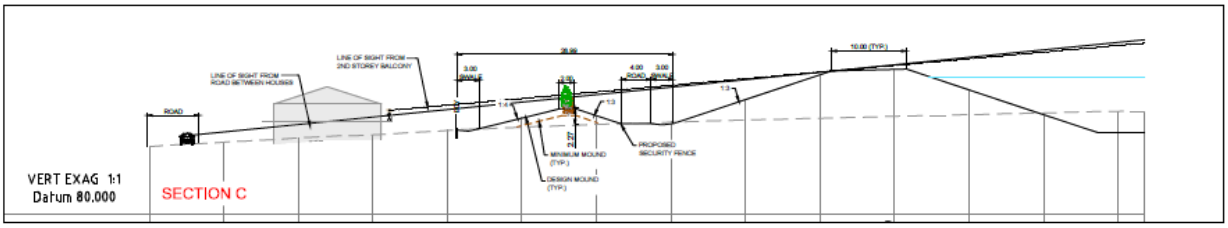
These measures are in the form of a series of landscaped mounds that essentially wrap around the northern and north-western edges of the dam embankment, to provide a vegetated backdrop to the development from the most directly affected current and future residential properties within the Vista estate (and also provide some visual relief, both immediate and more distant views, from Victor Harbor Road and Bakewell Drive).

The landscaping proposed has been carefully considered – both in the context of the locality and providing a logical extension to existing vegetation buffers to the north-east – which will (in the WAX report's words) 'significantly increase landscape amenity, removing the monoculture of the existing arable cropping and replacing it with a diverse native vegetation character that will increase the visual amenity as well as provide increased habitat biodiversity" (p15).

I broadly agree with the conclusions of the WAX assessment, in that whilst the construction of the dam will make it more visible (due to its elevated nature) and represents a significant modification to the existing natural land form, the most immediately affected properties are within the Vista development (which 'backs on' to the subject land and at a lower elevation), for which the proposed mitigation strategy can be readily implemented.



Above and below: Sectional view of dam and residential development



At its southern edge, the Vista development comprises large retaining walls and fencing along its perimeter, with the majority of homes that border this land orientated towards the north and north-west. Other views will be disrupted by the mass of new built form and rooflines, and alignment of the internal road network, which will obscure the development (with the landscaping solution in place, or in the establishment period, would be read as a grassed embankment or mounding with surface cover only).

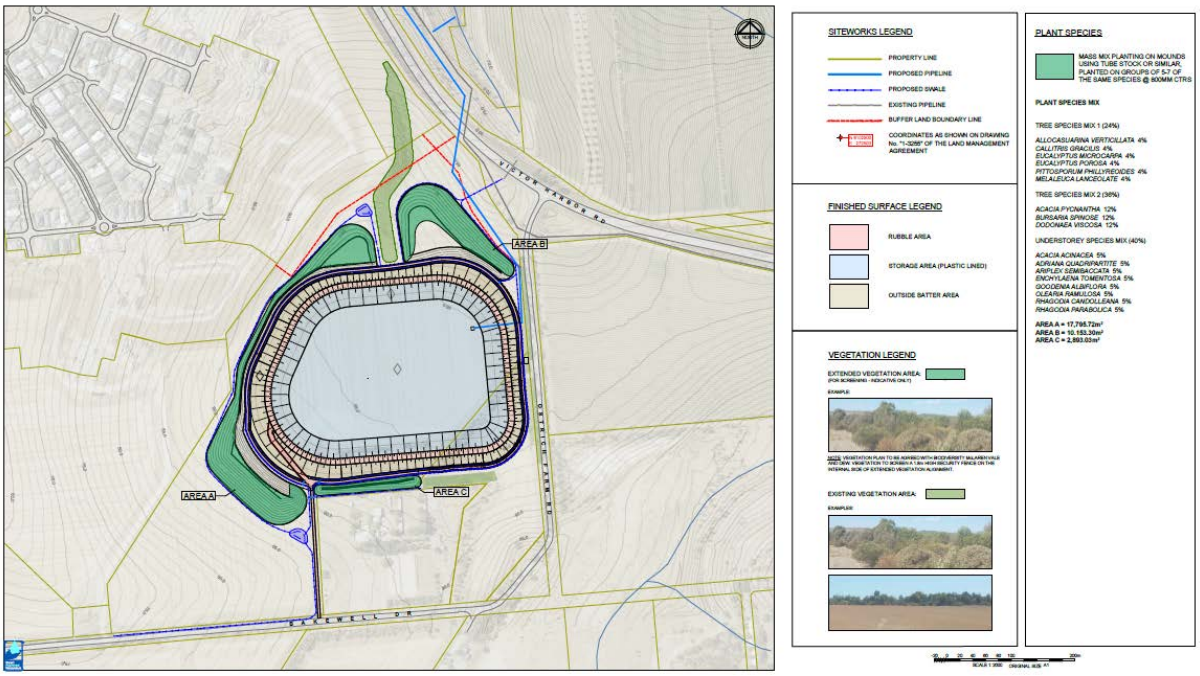
The solution proposed is both practical (utilizing surplus spoil) and effective (utilizing native plantings with sufficient depth and proximity to achieve the required 'natural' buffer).

Landscaping, fences and walls

Planning policy seeks to incorporate landscaping into new developments to reduce the visual impact of larger built form or related elements, to enhance visual appearance and to complement existing vegetation, including native vegetation, and to contribute to the viability of ecosystems and species and promote water and biodiversity conservation. Furthermore, landscaping should include the planting of locally indigenous species where appropriate, and achieve mature height levels to screen new development (where appropriate) that enhance its appearance.

Landscaping

The proposed development will incorporate a series of landscape screening mounds surrounding the northern and north-western perimeter of the dam. A landscaping plan has been prepared by WAX, which also includes a plant species schedule (with mature height levels) and mix. Overall, the landscaping plan provides for just under 31,000m^2 of plantings within three zones (A to C).



Trees



Acacia pycnantha

Width x height: 6m x 6m
Growing rate: FG
Density/Spacing: Specimen
Supply size: Tube

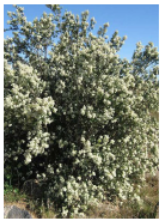
Description: fast growing shrub or small tree, which can be grown on recharge sites and a wide range of shallow soils



Allocasuarina verticillata

Width x height: 6m x 8m
Growing rate: MG
Density/Spacing: Specimen
Supply size: 45L

Description: A tree that can be grown on a range of sites. It is considered to have moderate growth rates and is a useful windbreak or shelterbelt species.



Bursaria spinosa

Width x height: 3m x 4m
Growing rate: FG
Density/Spacing: Specimen
Supply size: 140mm

Description: Once established bursarias are extremely hardy and will last 30-50 years.



Callitris gracilis

Width x height: 8m x 20m
Growing rate: MG
Density/Spacing: Specimen
Supply size: 45L

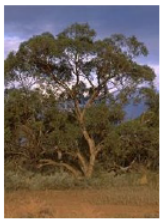
Description: The native pine can be used as a shelter tree, for shade or a windbreak, for stabilisation of dune country or as an excellent feature tree for large gardens or parks.



Dodonaea viscosa

Width x height: 3m x 4m
Growing rate: FG
Density/Spacing: 1 per m^2
Supply size: 140mm

Description: A relatively fast growing shrub with an ability to pioneer degraded sites. Many of the subspecies are extemely frost and drought tolerant and are also considered a valuable source of pollen.



Eucalyptus porosa

Width x height: 12m x 14m
Growing rate:
Density/Spacing: Specimen
Supply size: 45L

Description: A robust, dark-barked mallee which can grow into an impressive single-trunked tree.

Maximum width x maximum height e.g.4m x4m
FG fast growing – 1-2 meters in first year
MG moderate growth – 1 meter in first year
SG slow growth – 50cm – 1 meter in first year

Landscaping Plan
& Species Schedule (part)

These measures can effectively screen the development (or obscure its appearance) from adjoining (residential) land. It is noted, however, that the landscape plantings will need to be carefully nurtured and maintained during the establishment phase, such that a final landscaping plan is recommended (along with a maintenance and establishment strategy, which may include a watering program, to ensure the plan is delivered).

Fencing

The proposed development will incorporate a 1.8m chain wire security fence around the base of the dam embankment to restrict public access to the water storage. Given the height, positioning, setback distances and intervening mounding and vegetation, the extent and height of fencing is acceptable and necessary for this development. It is also noted that such fencing would generally be exempt from approval (being less than 2.1m in height and can meet the requirements of Schedule 3 of the Regulations).

Both the landscaping and fencing provisions of the Development plan are satisfied.

Orderly and Sustainable Development

Many of the project benefits are environmental in nature – with reference made to those general policies (natural resources and coastal development) that seek to preserve and maintain the coastal environment from the impacts of marine discharge of treated waste water (with elevated nutrient levels) into Gulf St Vincent and the over-extraction of groundwater to support primary production in the region.

The proposed development will make more efficient use of a treated waste water resource, and replacing water that would otherwise be drawn from less sustainable sources or is already controlled and permitted due to existing stresses from previous over use. The additional diversion of treated water from the Christie's Beach Waste Water Treatment Plant will assist in limiting future impacts to seagrass meadows and providing more favorable conditions for the recovery of degraded areas.

In addition, the establishment of an additional storage source should enable producers to place less reliance on the water extraction within the McLaren Vale Prescribed Wells Area, which has seen increases in salinity levels in the northern part of the region, which can be progressively more prohibitive for grape production. Additional supplies will also provide both a practical and economic impetus to extend the network, and additional opportunities for growers and their crop selections.

Natural Environment and Resources

The Development Plan seeks that development be designed to maximize conservation, minimize consumption; and encourage the reuse of water resources.

(a) Native Vegetation

The proposal requires the clearance of an existing (planted) windbreak comprising up to 200 juvenile trees and a row of mature olives. Aborman Tree Solutions provided a brief letter to the applicant and noted the following:

> *The juvenile trees are planted specimens and are all less than two metres in circumference, these trees are therefore not controlled by the Development Act 1993 or the Native Vegetation Act 1991. The mature olive trees within the site have been planted for the purpose of fruit production; these trees are exempt from control as per the Development Act 1993. As the trees are planted specimens they are not identified as native vegetation. The trees are not controlled by the Development Act 1993 or the Native Vegetation Act 1991 and therefore their*

removal is permitted and no approval from the local council or the Native Vegetation Council is required.

Whilst the removal of vegetation that provides a landscaped buffer and/or habitat should be avoided, it is noted that existing plantings that are required to be maintained by an existing Land Management Agreement are not impacted by the works, whilst replacement plantings will be provided in the form of extensive landscape buffers.

(i) Stormwater

Planning policy seeks to ensure that stormwater is managed appropriately, either to be sustainability harvested, or not designed to interrupt natural flows or processes, or if captured, redirected away from other land and infrastructure to maintain or be consistent with pre-development flow levels. A stormwater design has been prepared by Tonkins Consulting on behalf of the applicant.



Existing tree locations (Aborman advice to applicant).

Three existing discharge points for overland flows were identified on the land. As the proposed dam and associated earthworks would alter the natural profile of the land (and interrupt existing drainage lines), a series of swales are proposed to redirect these flows around the dam to the existing drainage points, and create another outfall location at the south-eastern low point (to 'utilise the natural fall of the land and would keep the post-development flow regime as close as possible to the existing flow regime').

The Tonkin's modelling also indicates the need for a small detention basin (60m3) to meet the pre-development flow rate of 84 L/s. The design specification would exceed the current pre-development peak flow rate of 74 L/s (as some rainfall water will be captured by the dam instead). Additional information – in response to concerns raised in the Fairland representation – considered the impact of rainfall on the storage and the potential for uncontrolled release.

The applicant advised the following:

> *…. the structure has been designed to 'manage' the depth of rainfall associated with a 1 in 100,000 Annual Exceedance Probability (AEP) rainfall event. This scenario results in a rainfall depth of 350mm as compared to a 1:100 Average Recurrence Interval (ARI) event that has a 120mm rainfall depth. The dam will therefore need to provide a freeboard depth that ensures that the rainfall from this event can be contained within the storage without water overtopping the dam*

Based on this assessment, a minimum freeboard of 600mm will be provided. In addition, an overflow feature will be incorporated to direct any surplus water to a closed pipe system under Victor Harbor Road to land owned by the proponent. The design will allow for twice the anticipated fill rate (i.e. 16ML or 2x8ML/day).

(ii) Water Quality

The subject land is situated within the McLaren Vale Prescribed Wells Area (and would be subject to the conditions of the McLaren Vale Water Allocation Plan if the development involved groundwater extraction such that a licence would be required). No extraction is proposed and the proposed dam will not capture stormwater runoff per se (but would capture localised rainfall). The operation of the dam, essentially as a closed system, is not expected to impact on water quality runoff from the site.

It is acknowledged, however, that during construction – without appropriate mitigation measures – water borne sediments from rainfall events could impact on local water quality, so will need to be carefully managed via a Soil Erosion and Drainage Management Plan. The Tonkins report outlines various control measures which can be successfully implemented (sediment fences, management of stockpiles, vehicle washdown points etc). Following reinstatement of land, the design will provide for grassed batters and swales to improve water quality leaving the site, which is consistent with similar projects.

In addition, the applicant has taken into account daphnia, algae and mosquito issues that can raise community concerns with the on-going management of treated water storages. The mitigation measures include filters, water balancing techniques, and the overall design of the development. In its response to representations, the applicant noted that the dam's specification was informed by the *South Australian Integrated Mosquito Management Resource Package, 2006*. It was also noted that a beneficial elevation with good wind dispersion, a deeper water body, artificial liner and absence of shelter for mosquito larvae and regular inspections and maintenance protocols should limit their incidence or growth.

(c) Noise

The development does not rely on any external or ancillary pumping equipment. Inflows are pumped from the Quarry Road dam, with outflows controlled by gravity release. There is the potential for local disturbance and nuisance during construction activities, and more infrequent, incidental maintenance woks (which would be consistent with its current primary production use – such as operating machinery). During construction, a Construction and Environmental Management Plan (CEMP) is recommended to manage external impacts, noting that the Vista residential development is currently being developed on neighbouring land (and would itself be a source of localized disturbance as infrastructure is developed, services installed and dwellings constructed).

Cultural and European Heritage

The development site is directly adjacent to a listed state heritage property being the former Noarlunga Ostrich Farm, including former Prior's Court Homestead (1850s section only) and Barn, entered onto the State Heritage Register on 19 August 1993.

The 1850s section of the homestead and its adjacent barn represents an unusual aspect of South Australian agricultural production during the early part of the 20th century. The establishment of an ostrich farm in 1916, as a successor to the South Australian Ostrich Company's farm at Port Augusta, continued the 19th century agricultural experimentation of rearing ostriches for feather production until 1926, when changes in fashion trends caused the ostrich feathers to be no longer required (SHB 1993).

The proposal was referred to Heritage SA for comment with no objection raised. The advice stated that the proposed development was considered to be acceptable in relation to the adjacent State heritage place for the following reason/s.

- The proposed development is for a large, 600 megalitre, raised water storage dam to be constructed on slightly elevated land behind the former Ostrich Farm Homestead.

- The vegetated outer row of mounds proposed to be constructed to ameliorate the visual impact of such a large civil structure are a considerable distance back from the main homestead and no demolition of any outbuildings are envisaged.

- Clarification was provided that the impact upon the heritage values of the place would be minimised by the distance to mounds and the height of the dam in the open landscape has been sufficiently ameliorated.

No conditions were recommended, although the agency's standard advisory notes re: heritage sites and final plans should be included as advisory notes.

No sites or objects of Aboriginal Cultural significance were identified; however, the developer of the land would still be bound by existing legislative requirements, which should be included as advisory notes in any recommendation to the Minister.

Transportation and Access

Planning policies seek to ensure that new development provides safe and efficient access and does not compromise existing transport modes through either its construction or operational phases. The project details were referred to both the local Council and Commissioner of Highways as the relevant road authorities.

Neither of the respective road authorities raised an objection to the development, noting that access to the project site will be achieved from Bakewell Drive (a local road). It is noted that this road is currently used by vehicles and trucks that service the Southern Region Waste Resource Authority (SRWRA) site (and provides a rear entrance for larger construction equipment and material deliveries for the Vista development).

The applicant has not provided a dedicated Transport Management Plan (which could be requested as a condition of consent), but noting that the site plans nominate an appropriate access point from Bakewell Drive, the development is expected to recover and re-use most of the excavated material from the site works to build the dam (that will limit both inward and outward truck movements), and that earth moving equipment (once on site) will remain until the works are completed, any increase in local traffic is likely to be from daily workforce movements and within the road's existing capacity.

The number of vehicle movements post-construction for maintenance and inspection purposes is expected to be minimal, such that it should not exceed that currently required to graze sheep or plant crops on the balance of the farming land.

The Commissioner of Highways has advised that the Metropolitan Road Widening Plan shows a possible requirement for a strip of land up to 35m from the width of the Victor Harbor Road frontage for possible road widening purposes. Whilst meeting this requirement, the applicant – in its response to representations, council and agency comments – has slightly increased the setback of the landscaped batter slope to provide greater clearance to this possible future road widening requirement.

An underground pipeline (500mm) will be constructed linking the proposed storage with the nearby Quarry Road dam. The proposed inlet / outlet pipe and overflow pipe has generally been located outside of this potential 35 metre road widening strip, other than where the pipes are proposed to cross Victor Harbor Road to the north of the site.

This aspect is not 'development' (refer Schedule 14 of the Regulations), but will need the permission of the road operator / landowner (separate process). DPTI-Transport, subject to their requirements, have not objected to this aspect. A number of conditions have been recommended, noting that whilst Condition 1 of their advice has been 'directed', the Minister for Planning cannot be directed by a referral body to attach any conditions to a crown approval (but it is open for SCAP to recommend its adoption in their advice to the Minister, which would be appropriate for this application).

In its response to representations, the applicant made a slight amendment to the site plan, to provide a slightly increased setback distance to Victor Harbor Road.

Infrastructure

Planning policy supports the provision of new infrastructure in an economical and environmentally sensitive manner, with the visual impact of such facilities being appropriately managed to mitigate any external impacts. The storage dam will augment and connect with the existing treated water distribution network across the McLaren Vale region, such that it accords with those provisions relating to the efficient and cost-effective use of existing infrastructure assets. Appropriate mitigation measures to limit the visual impact of larger earthen embankments can be implemented.

Constructability

A geotechnical investigation of the subject was undertaken by SMEC on behalf of the applicant, to provide a technical understanding of the foundation, excavation and earthworks conditions to construct a 600ML dam. Four boreholes were drilled. Borehole tests were consistent with the expected regional geology – top soil, silty clay, sandstone, and siltstone. No groundwater was encountered.

The natural clay soils encountered are expected to be generally excavatable using conventional machinery such as excavators and dozers. Specialist rock breaking equipment will likely to be required for excavation of medium strength siltstone below 3m in depth. It is noted that the natural clay soils at the site high plasticity increasing with depth, and will be reactive in response to seasonal moisture change (and a higher risk of surface movements and shrinkage cracks).

The applicant's planning report notes that the dam will be constructed to meet *EPA Guideline EPA509/14 – Wastewater Lagoon Construction*, which is also the accepted standard for SA Health. Due consideration has been given to the seismic risk, flood performance and foundation design, such that the potential for excessive seepage and associated erosion piping is appropriately managed. It is noted that the dam designer

(Hydroplan) has significant experience in the investigation, design, installation and operation of a wide variety of water management systems, and was involved in the Gawler Water Reuse scheme and construction of the Hill Dam (680ML and turkey's nest design).

Further assessment work has been undertaken in respect to the freeboard level (600mm) and the slope stability of the dam embankment – to account for both normal operating conditions, flood, seismic and rapid drawdown events. The internal stability of the embankment would be further considered as part of the detailed design, to meet material compatibility and permeability requirements.

The Council has requested that no blasting (or similar activities) occur on the site. The applicant has not proposed this method; however, a condition is recommended.

Dam Failure

The site of the proposed water storage is situated on top of a natural highpoint, resulting in the proposed design based on a 'turkey's nest' configuration. The dam is not being built on a watercourse and is not subject to natural *inflows*, where the risk of erosion and embankment instability is much greater.

The applicant has advised that the dam will be designed and constructed in accordance with the requirements of relevant Australian Standards (AS/NZS 1170 Structural Design Actions) and the Australian National Committee on Large Dams (ANCOLD). The dam will also be lined and a monitoring system installed. Following public notification, the applicant has also amended its design, to provide a minimum 600mm freeboard with overflow feature, primarily to provide an outlet in circumstances where the dam could be overfilled.

It is recommended that periodic inspections be undertaken as a condition of approval, whereby changes to the dam's condition over time can be appropriately monitored and the necessary repair works undertaken. The dam will generally be used to store winter supplies, and then discharge to growers over the summer season.

Management Plans

The applicant's planning report references a Construction and Environmental Management Plan (CEMP), Operations Management Plan (OMP) and a Traffic Management Plan (TMP). These undertakings are supported to minimise the extent of impacts or nuisance to adjoining land during the construction and operational phases. It is recommended that these plans be prepared in consultation with the local Council and then submitted for final approval by the State Commission Assessment Panel.

Character Preservation District

The subject land is within a Character Preservation District defined under the *Character Preservation (McLaren Vale) Act 2012*. The proposed development does not compromise the key objectives of this Act, noting that the provision of additional irrigation water directly supports new and existing viticultural, agricultural and associated industries within the district, whilst the proposed landscaping treatments ensure that any short-term impacts or loss of amenity experienced during the construction process is addressed through a comprehensive revegetation plan to preserve and maintain its unique rural and natural landscape attributes.

Seriously at Variance

Pursuant to Section 49 of the *Development Act 1993* and having undertaken an assessment of the application against the relevant Development Plan, the application is NOT seriously at variance with the provisions of this plan.

13. Conclusion

The construction of water storage dam within a Primary Production Zone that provides irrigation water to support general farming, viticulture and horticulture activities within a state strategic area is consistent with the zone's key objectives and should not compromise the further development of either the subject land or adjoining sites.

The proximity of the water storage to a more sensitive urban land use has been carefully considered, both in the design and operation of the development, whilst the provision of significant landscaped buffer areas will address any short-term loss of amenity for those dwellings that are physically proximate to the rural-residential interface – noting that the proposed size and dimensions of the proposed water storage is substantial.

Construction impacts will need to be proactively managed – particularly given the extent of earthworks and the high likelihood of areas of bare earth and raised dust for an extended period before new landscaping can be established and exposed areas stabilised. Waterborne erosion will also need to be controlled through the adoption of practical measures to restrict off-site impacts, particularly below the development site.

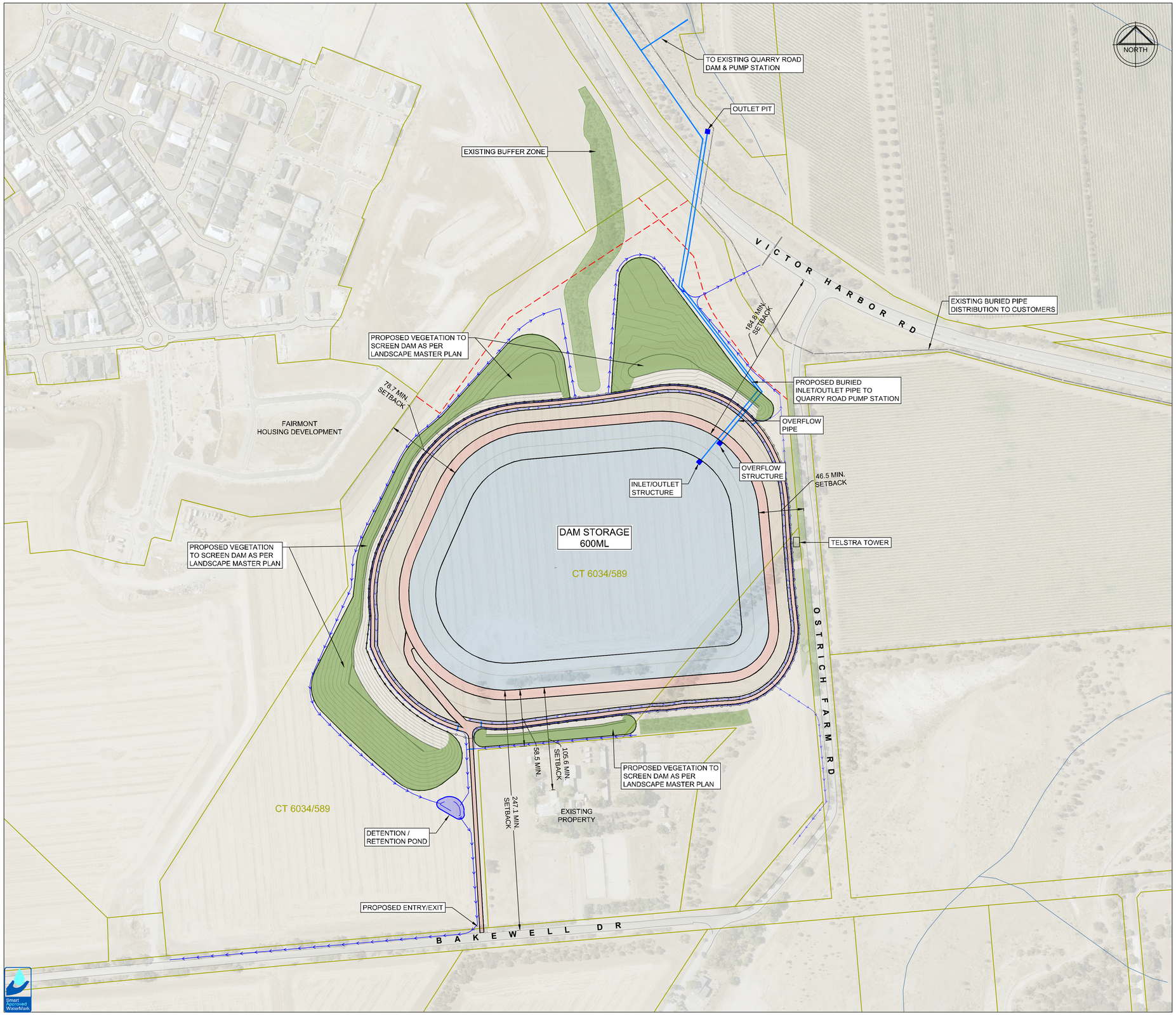
No objection was raised by the Onkaparinga Council or relevant state agencies.

The concerns of representors have been noted, however the applicant's response document, and the overall technical detail in support of the application to resolve and/or mitigate these issues based on a practical understanding of likely impacts, provides sufficient support for a development authorisation to be granted.

If no further information is required, and all relevant assessment matters have been considered, this planning report can be endorsed by the State Commission Assessment Panel pursuant to Section 49 (7e) of the *Development Act 1993,* and a formal recommendation with appropriate conditions provided to the Minister for Planning for his further review and decision.



Simon Neldner
TEAM LEADER – CROWN AND MAJOR DEVELOPMENTS
PLANNING AND LAND USE SERVICES (DPTI)



SITEWORKS LEGEND

- PROPERTY LINE
- PROPOSED PIPELINE
- PROPOSED SWALE
- EXISTING PIPELINE
- BUFFER LAND BOUNDARY LINE

FINISHED SURFACE LEGEND

- RUBBLE AREA
- STORAGE AREA (PLASTIC LINED)
- OUTSIDE BATTER AREA

VEGETATION LEGEND

EXTENDED VEGETATION AREA:
(FOR SCREENING - INDICATIVE ONLY)

EXAMPLE:



NOTE: VEGETATION PLAN TO BE AGREED WITH BIODIVERSITY McLAREN VALE AND DEW. VEGETATION TO SCREEN A 1.8m HIGH SECURITY FENCE ON THE INTERNAL SIDE OF EXTENDED VEGETATION ALIGNMENT.

EXISTING VEGETATION AREA:

EXAMPLES:





-20 0 20 40 60 80 100 200m

SCALE 1:2000 ORIGINAL SIZE A1

REV	ISSUED	D.DWN	APRVD	REVISION DESCRIPTION	REV	ISSUED	D.DWN	APRVD	REVISION DESCRIPTION
4	19/12/2018	JT	BH	FOR DISCUSSION					
3	16/11/2018	JT	JG/BH	FOR DISCUSSION					
2	22/10/2018	JT	JG/BH	FOR DISCUSSION					
1	03/10/2018	JT	JG/BH	FOR DISCUSSION					
0	20/09/2018	JT	JG/BH	FOR DISCUSSION	5	30/04/2019	QM	BH	REVISED CONCEPT FOR CH

HYDROPLAN

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PERTH ADELAIDE SYDNEY BRISBANE BEIJING

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The arrangement and general details as shown on this drawing are essentially diagrammatic and must be applied to the circumstances as found on site.

DES/DRAWN:	JT
CHECKED:	BH
APPROVED:	JG
DATE:	29/03/2018
DRAFT REF:	2-WBW-d8

CLIENT: WILLUNGA BASIN WATER

PROJECT: SRWRA STORAGE
CONCEPT DESIGN PLAN WITH MOUNDS

DRAWING No.	SHEET	OF	REVISION
14689-SK017	1	1	5

Drawing file: Z:\WORK\14689 SRWRA Dam\Drawings\SK017-dft (578ML w Mounds).dwg - 30/04/2019 4:43 PM Original Size: ISO FULL BLEED A1 (841.00 X 594.00 MM)

EXISTING QUARRY ROAD DAM AND PUMPING STATION

NORTH

N 6102700
E 272500

N 6102600
E 272500

N 6102500
E 272500

N 6102400
E 272500

BUFFER ZONE LANDSCAPING AREA AS PER "LAND MANAGEMENT AGREEMENT" DRAWING No. 1-3255

ISSUE #3
DRAINAGE

BUFFER LAND AS PER "LAND MANAGEMENT AGREEMENT" ANNEXURE C PLAN No. GP21/2011

PROPOSED VEGETATION TO COMPLEMENT EXISTING BUFFER ZONE

TOP OF MOUND 102.00m

35m OFFSET FROM EXISTING BOUNDARY

TOP OF MOUND
102.00m

V I C T O R H A R B O R R D

EXISTING 500mm BURIED PIPE DISTRIBUTION TO CUSTOMERS

ISSUE #1
LOW POINT

PROPOSED 500mm BURIED INLET-OUTLET PIPE TO QUARRY ROAD PUMP STATION

ISSUE #4
LOW POINT

F99.50m
TOP OF BANK
10m WIDE

F90.95m
BOTTOM OF DAM

1:3 INTERNAL
BATTER

MOUND TOTAL FILL =
180,000m3 (NO FILL FACTOR)

PROPOSED ENTRANCE ADJACENT TO PROPOSED TELSTRA TOWER

O S T R I C H F A R M R D

TOE OF BATTER

TOP OF MOUND 101.50m

CT 6034/587 BOUNDARY

CT 6034/589 BOUNDARY

ISSUE #2
LOW POINT

PROPOSED VEGETATION CONNECTING TO EXISTING TREE LINE

B A K E W E L L D R

Smart Approved WaterMark

SITEWORKS LEGEND

- PROPERTY LINE
- PROPOSED PIPELINE
- PROPOSED SWALE
- EXISTING PIPELINE
- BUFFER LAND BOUNDARY LINE
- N 6102500 E 272500 — COORDINATES AS SHOWN ON DRAWING No. "1-3255" OF THE LAND MANAGEMENT AGREEMENT

FINISHED SURFACE LEGEND

- RUBBLE AREA
- STORAGE AREA (PLASTIC LINED)
- OUTSIDE BATTER AREA

VEGETATION LEGEND

EXTENDED VEGETATION AREA:
(FOR SCREENING - INDICATIVE ONLY)

EXAMPLE:



NOTE: VEGETATION PLAN TO BE AGREED WITH BIODIVERSITY McLAREN VALE AND DEW. VEGETATION TO SCREEN A 1.8m HIGH SECURITY FENCE ON THE INTERNAL SIDE OF EXTENDED VEGETATION ALIGNMENT.

EXISTING VEGETATION AREA:

EXAMPLES:





-20 0 20 40 60 80 100 200m

SCALE 1:2000 ORIGINAL SIZE A1

REV	ISSUED	D.DWN	APRVD	REVISION DESCRIPTION
0	20/09/2018	JT	JG/BH	FOR DISCUSSION
-				-

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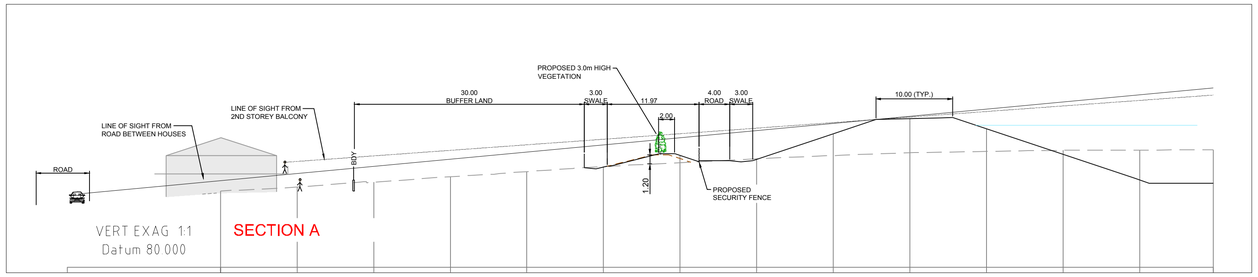
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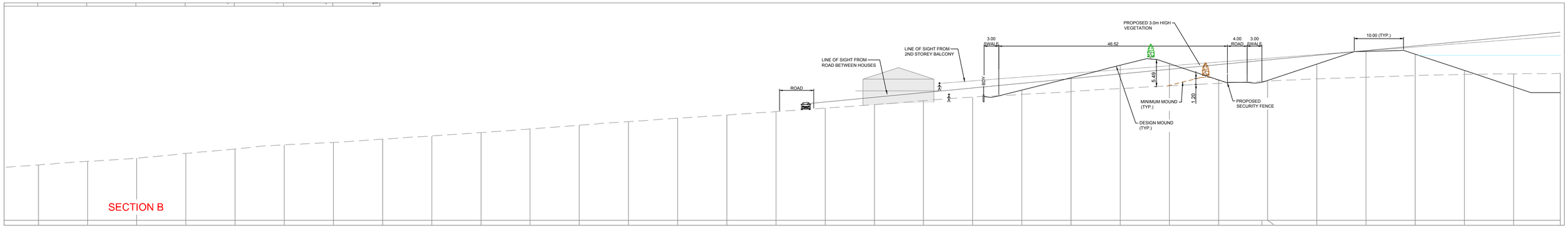
DES/DRAWN:	JT
CHECKED:	BH
APPROVED:	JG
DATE:	29/03/2018
DRAFT REF:	2-WBW-d4

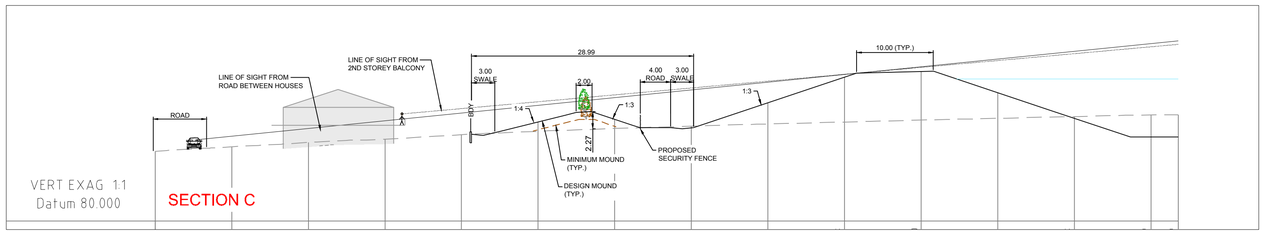
CLIENT: WILLUNGA BASIN WATER

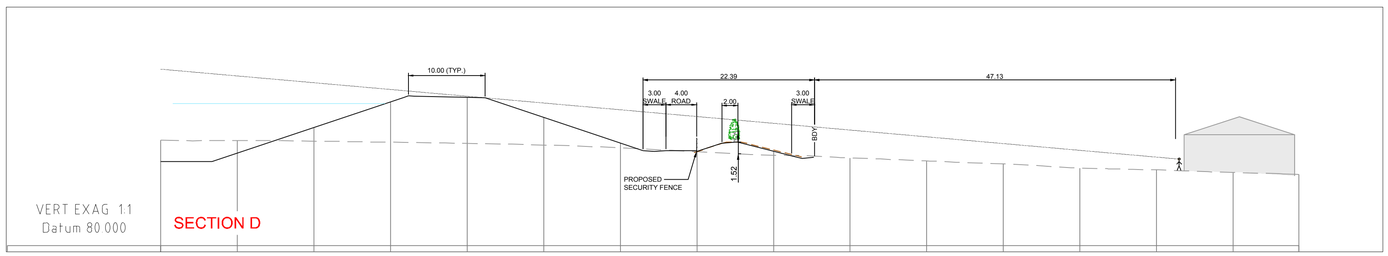
PROJECT: SRWRA STORAGE
CONCEPT DESIGN PLAN WITH MOUNDS

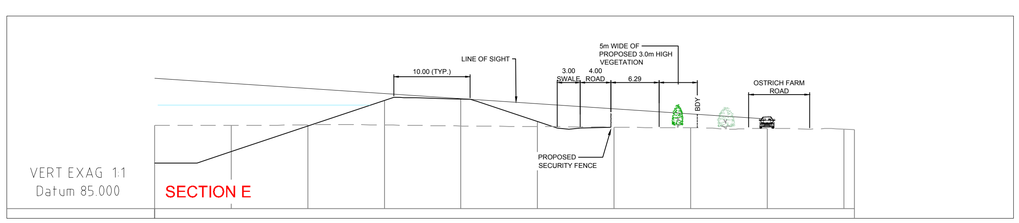
DRAWING No.	SHEET	OF	REVISION
14689-SK017	1	3	0

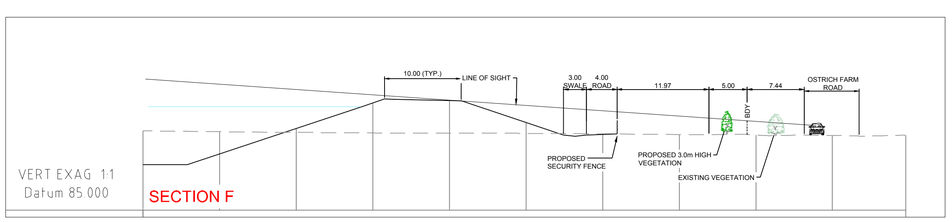












-4 0 4 8 12 16 20 40m

SCALE 1: 400 ORIGINAL SIZE A1

REV	ISSUED	D.DWN	APRVD	REVISION DESCRIPTION	REV	ISSUED	D.DWN	APRVD	REVISION DESCRIPTION
0	??/09/2018	JT	JG/BH	FOR DISCUSSION	-				-

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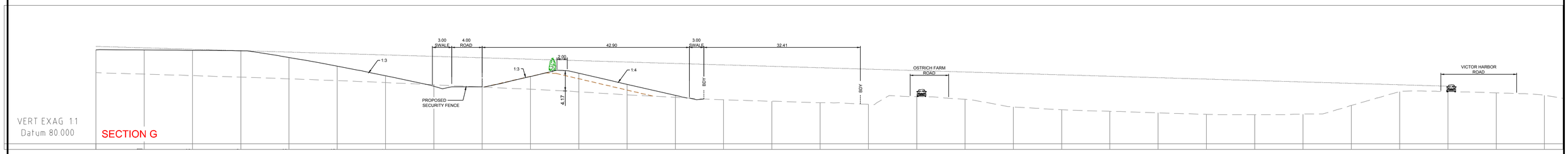
The arrangement and general details as shown on this drawing are essentially diagrammatic and must be applied to the circumstances as found on site.

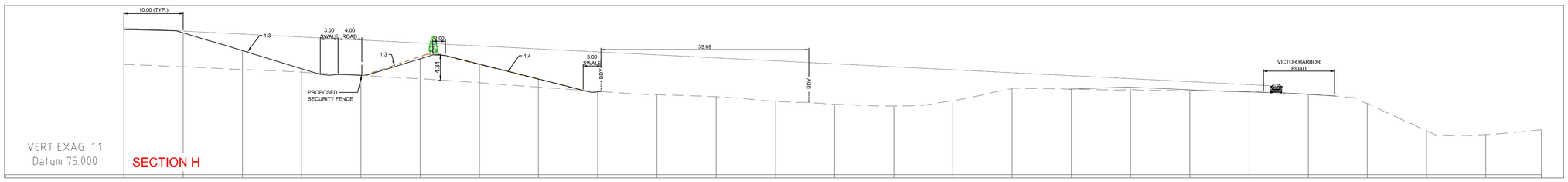
DES/DRAWN:	JT
CHECKED:	BH
APPROVED:	JG
DATE:	29/03/2018
DRAFT REF:	2-WBW-d4

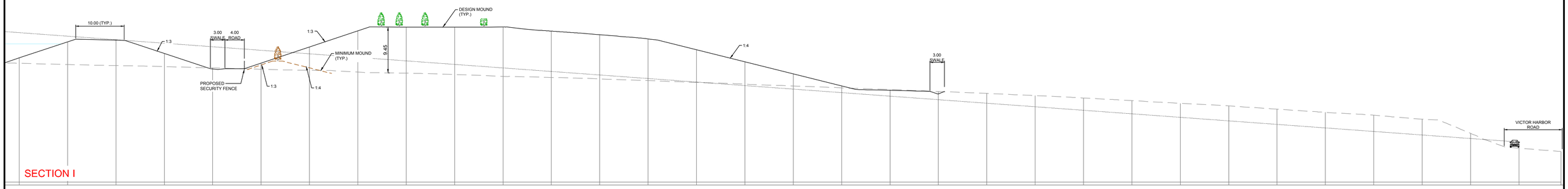
CLIENT: WILLUNGA BASIN WATER

PROJECT: SRWRA STORAGE
CONCEPT DESIGN PLAN WITH SECTION VIEWS

DRAWING No.	SHEET	OF	REVISION
14689-SK017	2	3	0







-4 0 4 8 12 16 20 40m

SCALE 1: 400 ORIGINAL SIZE A1

REV	ISSUED	D.DWN	APRVD	REVISION DESCRIPTION
0	20/09/2018	JT	JG/BH	FOR DISCUSSION
-				-

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DES/DRAWN:	JT
CHECKED:	BH
APPROVED:	JG
DATE:	29/03/2018
DRAFT REF:	2-WBW-d4

CLIENT: WILLUNGA BASIN WATER

PROJECT: SRWRA STORAGE
CONCEPT DESIGN PLAN WITH SECTION VIEWS

DRAWING No.	SHEET	OF	REVISION
14689-SK017	3	3	0

SEAFORD HEIGHTS DAM

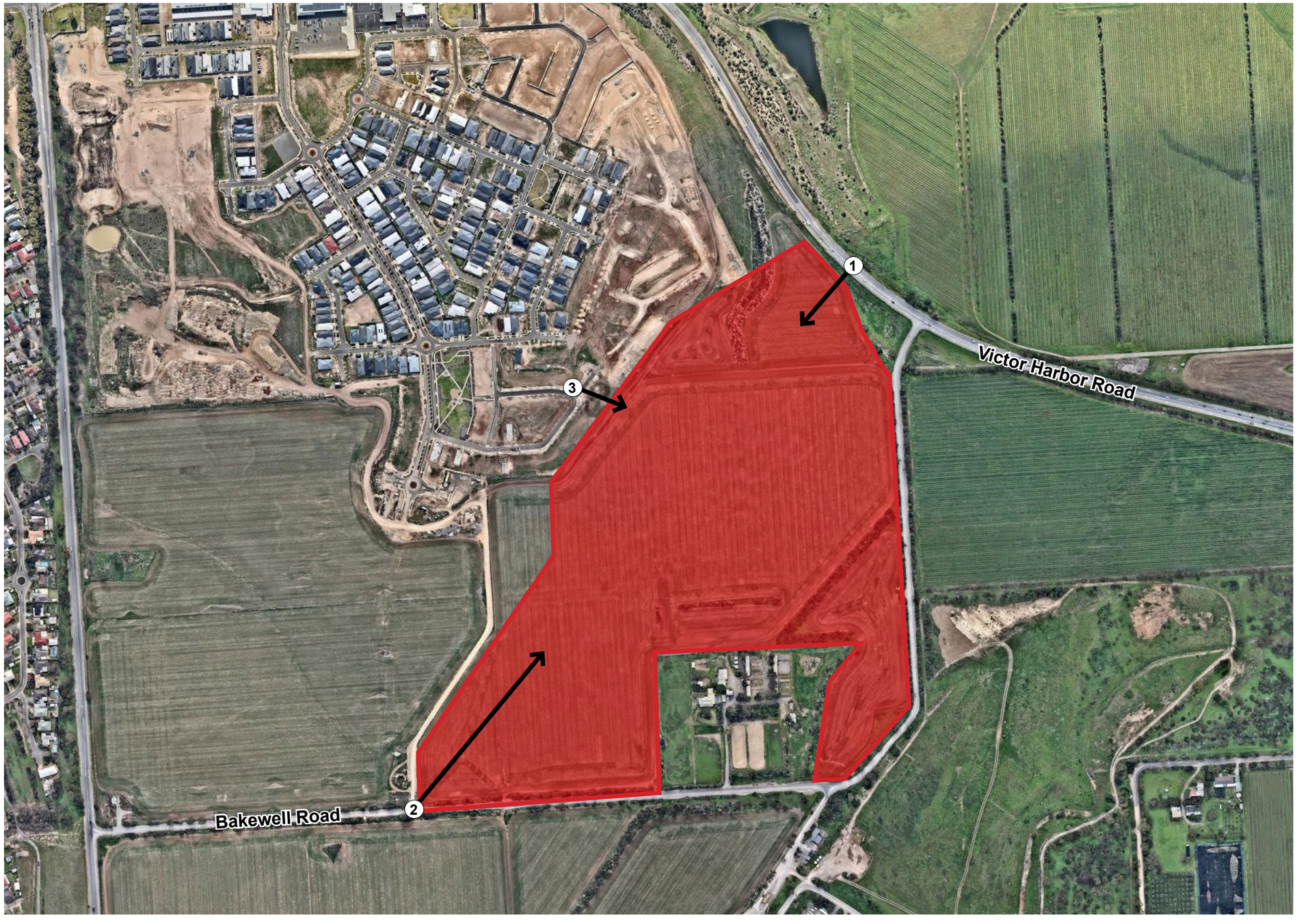
VISUALISATIONS

17 OCTOBER 2018

WAX

SEAFORD HEIGHTS DAM

1.1 VIEWPOINT LOCATIONS



KEY

Subject Site

Viewpoints

200m

SEAFORD HEIGHTS DAM

1.2 VIEWPOINT 1- VICTOR HARBOR ROAD



Existing viewpoint



Artists impression of proposed development superimposed on to existing viewpoint.

SEAFORD HEIGHTS DAM

1.3 VIEWPOINT 1- VICTOR HARBOR ROAD



Existing viewpoint



Artists impression of proposed development superimposed on to existing viewpoint.

SEAFORD HEIGHTS DAM

1.4 VIEWPOINT 2- BAKEWELL ROAD



Existing viewpoint



Artists impression of proposed development superimposed on to existing viewpoint.

SEAFORD HEIGHTS DAM

1.5 VIEWPOINT 2- BAKEWELL ROAD



Existing viewpoint



Artists impression of proposed development superimposed on to existing viewpoint.

SEAFORD HEIGHTS DAM

1.6 VIEWPOINT 3- CORNER EDISON AND COTTERELL ROAD



Existing viewpoint



Artists impression of proposed development superimposed on to existing viewpoint.

SEAFORD HEIGHTS DAM

1.7 VIEWPOINT 3- CORNER EDISON AND COTTERELL ROAD



Existing viewpoint

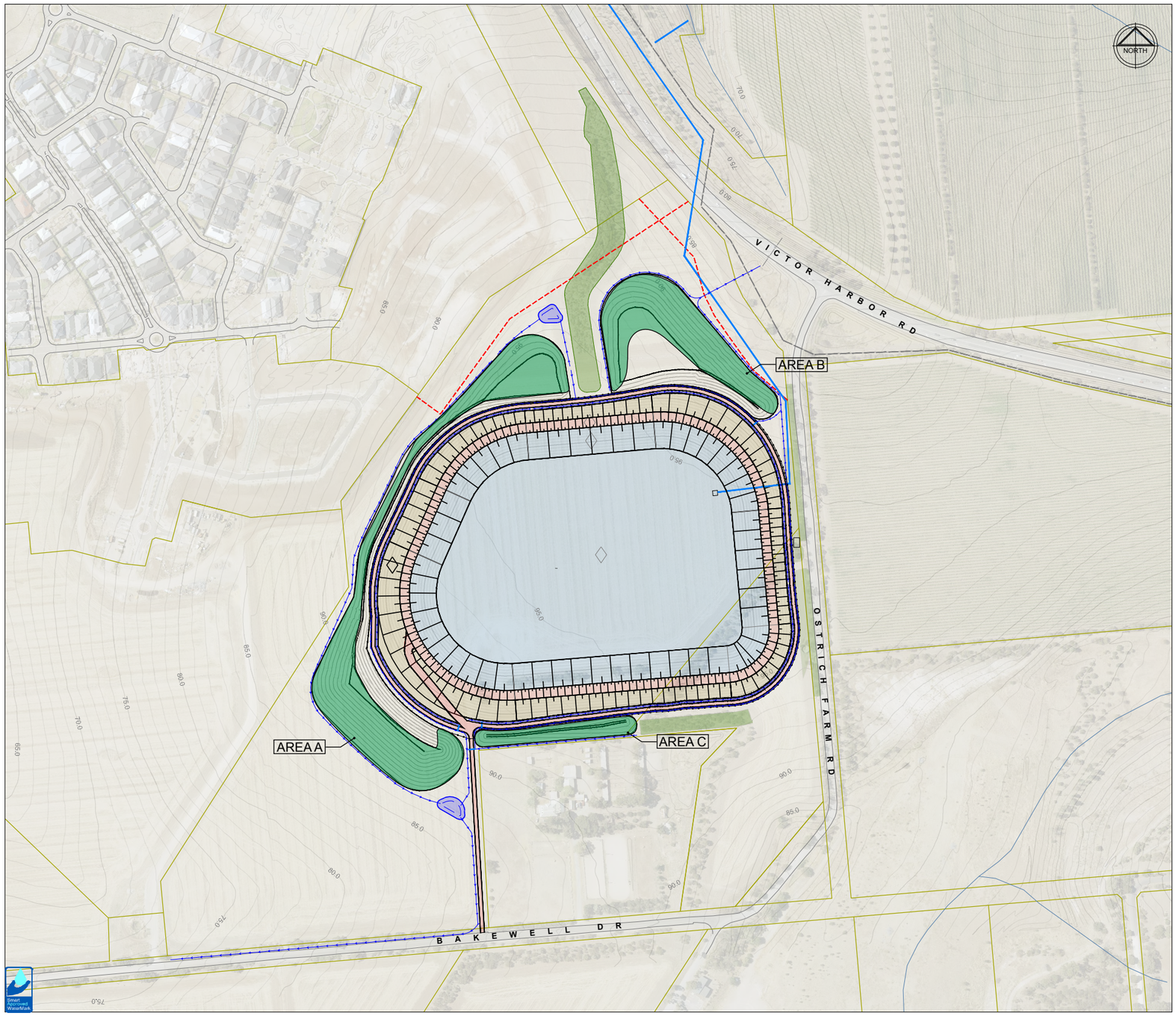


Artists impression of proposed development superimposed on to existing viewpoint.

SEAFORD HEIGHTS DAM

LANDSCAPE MASTERPLAN

WAX



SITEWORKS LEGEND

- PROPERTY LINE
- PROPOSED PIPELINE
- PROPOSED SWALE
- EXISTING PIPELINE
- BUFFER LAND BOUNDARY LINE
- N 6102500 E 272500 — COORDINATES AS SHOWN ON DRAWING No. "1-3255" OF THE LAND MANAGEMENT AGREEMENT

FINISHED SURFACE LEGEND

- RUBBLE AREA
- STORAGE AREA (PLASTIC LINED)
- OUTSIDE BATTER AREA

VEGETATION LEGEND

EXTENDED VEGETATION AREA:
(FOR SCREENING - INDICATIVE ONLY)

EXAMPLE:



NOTE: VEGETATION PLAN TO BE AGREED WITH BIODIVERSITY McLAREN VALE AND DEW. VEGETATION TO SCREEN A 1.8m HIGH SECURITY FENCE ON THE INTERNAL SIDE OF EXTENDED VEGETATION ALIGNMENT.

EXISTING VEGETATION AREA:

EXAMPLES:





PLANT SPECIES

MASS MIX PLANTING ON MOUNDS USING TUBE STOCK OR SIMILAR, PLANTED ON GROUPS OF 5-7 OF THE SAME SPECIES @ 800MM CTRS

PLANT SPECIES MIX

TREE SPECIES MIX 1 (24%)

ALLOCASUARINA VERTICILLATA 4%
CALLITRIS GRACILIS 4%
EUCALYPTUS MICROCARPA 4%
EUCALYPTUS POROSA 4%
PITTOSPORUM PHILLYREOIDES 4%
MELALEUCA LANCEOLATE 4%

TREE SPECIES MIX 2 (36%)

ACACIA PYCNANTHA 12%
BURSARIA SPINOSE 12%
DODONAEA VISCOSA 12%

UNDERSTOREY SPECIES MIX (40%)

ACACIA ACINACEA 5%
ADRIANA QUADRIPARTITE 5%
ARIPLEX SEMIBACCATA 5%
ENCHYLAENA TOMENTOSA 5%
GOODENIA ALBIFLORA 5%
OLEARIA RAMULOSA 5%
RHAGODIA CANDOLLEANA 5%
RHAGODIA PARABOLICA 5%

AREA A = 17,795.72m²
AREA B = 10.153.30m²
AREA C = 2,893.03m²

-20 0 20 40 60 80 100 200m

SCALE 1:2000 ORIGINAL SIZE A1

SECTION 49 & 49A – CROWN DEVELOPMENT DEVELOPMENT APPLICATION FORM

PLEASE USE BLOCK LETTERS

COUNCIL: City of Onkaparinga

APPLICANT: Willunga Basin Water Co. Pty Ltd

ADDRESS: Suite 1005, 147 Pirie Street SA 5000

CROWN AGENCY: Department of Planning Transport & Infrastructure

FOR OFFICE USE

DEVELOPMENT No: _____

PREVIOUS DEVELOPMENT No: _____

DATE RECEIVED: / /

CONTACT PERSON FOR FURTHER INFORMATION

Name: Richard Dwyer (Ekistics Planning & Design)

Telephone: (08) 7231 0286 & 0402 344 401 [work] _____ [Ah]

Fax: _____ [work] _____ [Ah]

Email: rdwyer@ekistics.com.au

☐ Complying	Decision: _____
☐ Merit	Type: _____
☐ Public Notification	Finalised: / /
☐ Referrals	

NOTE TO APPLICANTS:

(1) All sections of this form must be completed. The site of the development must be accurately identified and the nature of the proposal adequately described. If the expected development cost of this Section 49 or Section 49A application exceeds $100,000 (excl. fit-out) or the development involves the division of land (with the creation of additional allotments) it will be subject to those fees as outlined in Item 1 of Schedule 6 of the *Development Regulations 2008.* Proposals over $4 million (excl. fit-out) will be subject to an advertising fee. (2) Three copies of the application should also be provided.

	Decision required	Fees	Receipt No	Date
Planning:				
Land Division:				
Additional:				
Minister's Approval				

EXISTING USE: Agriculture/Primary Production

DESCRIPTION OF PROPOSED DEVELOPMENT: Public infrastructure in the form of a 600ML water storage dam

LOCATION OF PROPOSED DEVELOPMENT: Bakewell Drive, Seaford Heights

House No: _____ Lot No: 108 & 102 Street: Bakewell Drive Town/Suburb: Seaford Heights

Section No [full/part] _____ Hundred: Willunga Volume: 6034 Folio: 589

Section No [full/part] _____ Hundred: Willunga Volume: 5829 Folio: 936

LAND DIVISION:

Site Area [m^2] _____ Reserve Area [m^2] _____ No of existing allotments _____

Number of additional allotments [excluding road and reserve]: _____ Lease: **YES** ☐ **NO** ☐

DEVELOPMENT COST [do not include any fit-out costs]: $ 5,400,000

POWERLINE SETBACKS: Pursuant to Schedule 5 (2a)(1) of the *Development Regulations 2008,* if this application is for a building it will be forwarded to the Office of the Technical Regulator for comment unless the applicant provides a declaration to confirm that the building meets the required setback distances from existing powerlines. The declaration form and further information on electricity infrastructure and clearance distances can be downloaded from sa.gov.au.

I acknowledge that copies of this application and supporting documentation may be provided to interested persons in accordance with the *Development Act 1993* and meet the requirements for lodgement under s.49 of the Development Act 1993.

SIGNATURE: _____ Dated: 25 / 01 / 2019

Government of South Australia

DEVELOPMENT REGULATIONS 2008
Form of Declaration (Schedule 5 clause 2A)

To: Brett Fundak
Senior Infrastructure Co-ordinator
Department of Planning, Transport and Infrastructure

From: Willunga Basin Water Company Pty Ltd
Suite 1005, 147 Pirie Street, SA, 5000

Date of Application: 25 / 01 / 2019

Location of Proposed Development: _____

House No: _____ Lot No: 108 & 102 Street: Bakewell Drive

Town/Suburb: Seaford Heights

Section No (full/part): _____ Hundred: Willunga

Volume: 6034 Folio: 589 (Lot 108)

& Volume: 5829 Folio: 936 (Lot 102)

Nature of Proposed Development:

Public infrastructure in the form of a 600ML water storage dam

I CRAIG HEIDENREICH **being the applicant/ a person acting on behalf of the applicant (delete the inapplicable statement) for the development described above declare that the proposed development will involve the construction of a building which would, if constructed in accordance with the plans submitted, not be contrary to the regulations prescribed for the purposes of section 86 of the Electricity Act 1996. I make this declaration under clause 2A(1) of Schedule 5 of the Development Regulations 2008.**

Signed: _____ **Date:** 25 / 01 / 2019

Government of South Australia

Note 1

This declaration is only relevant to those development applications seeking authorisation for a form of development that involves the construction of a building (there is a definition of 'building' contained in section 4(1) of the Development Act 1993), other than where the development is limited to –

a) an internal alteration of a building; or
b) an alteration to the walls of a building but not so as to alter the shape of the building.

Note 2

The requirements of section 86 of the Electricity Act 1996 do not apply in relation to:

a) an aerial line and a fence, sign or notice that is less than 2.0 m in height and is not designed for a person to stand on; or
b) a service line installed specifically to supply electricity to the building or structure by the operator of the transmission or distribution network from which the electricity is being supplied.

Note 3

Section 86 of the Electricity Act 1996 refers to the erection of buildings in proximity to powerlines. The regulations under this Act prescribe minimum safe clearance distances that must be complied with.

Note 4

The majority of applications will not have any powerline issues, as normal residential setbacks often cause the building to comply with the prescribed powerline clearance distances. Buildings/renovations located far away from powerlines, for example towards the back of properties, will usually also comply.

Particular care needs to be taken where high voltage powerlines exist; or where the development:

- is on a major road;
- commercial/industrial in nature; or
- built to the property boundary.

Note 5

An information brochure: 'Building Safely Near Powerlines' has been prepared by the Technical Regulator to assist applicants and other interested persons.

This brochure is available from council and the Office of the Technical Regulator. The brochure and other relevant information can also be found at **sa.gov.au/energy/powerlinesafety**

Note 6

In cases where applicants have obtained a written approval from the Technical Regulator to build the development specified above in its current form within the prescribed clearance distances, the applicant is able to sign the form.

REAL PROPERTY ACT, 1886
South Australia

The Registrar-General certifies that this Title Register Search displays the records maintained in the Register Book and other notations at the time of searching.

Certificate of Title - Volume 6034 Folio 589

Parent Title(s) CT 5403/182

Creating Dealing(s) RTU 11136862

Title Issued 01/05/2009 **Edition** 3 **Edition Issued** 05/12/2017

Estate Type

FEE SIMPLE

Registered Proprietor

SOUTHERN REGION WASTE RESOURCE AUTHORITY
OF PO BOX 2414 MCLAREN VALE SA 5171

Description of Land

ALLOTMENT 108 DEPOSITED PLAN 80592
IN THE AREA NAMED SEAFORD HEIGHTS
HUNDRED OF WILLUNGA

Easements

NIL

Schedule of Dealings

Dealing Number	Description
12835643	AGREEMENT UNDER DEVELOPMENT ACT, 1993 PURSUANT TO SECTION 57(1)

Notations

Dealings Affecting Title NIL

Priority Notices NIL

Notations on Plan NIL

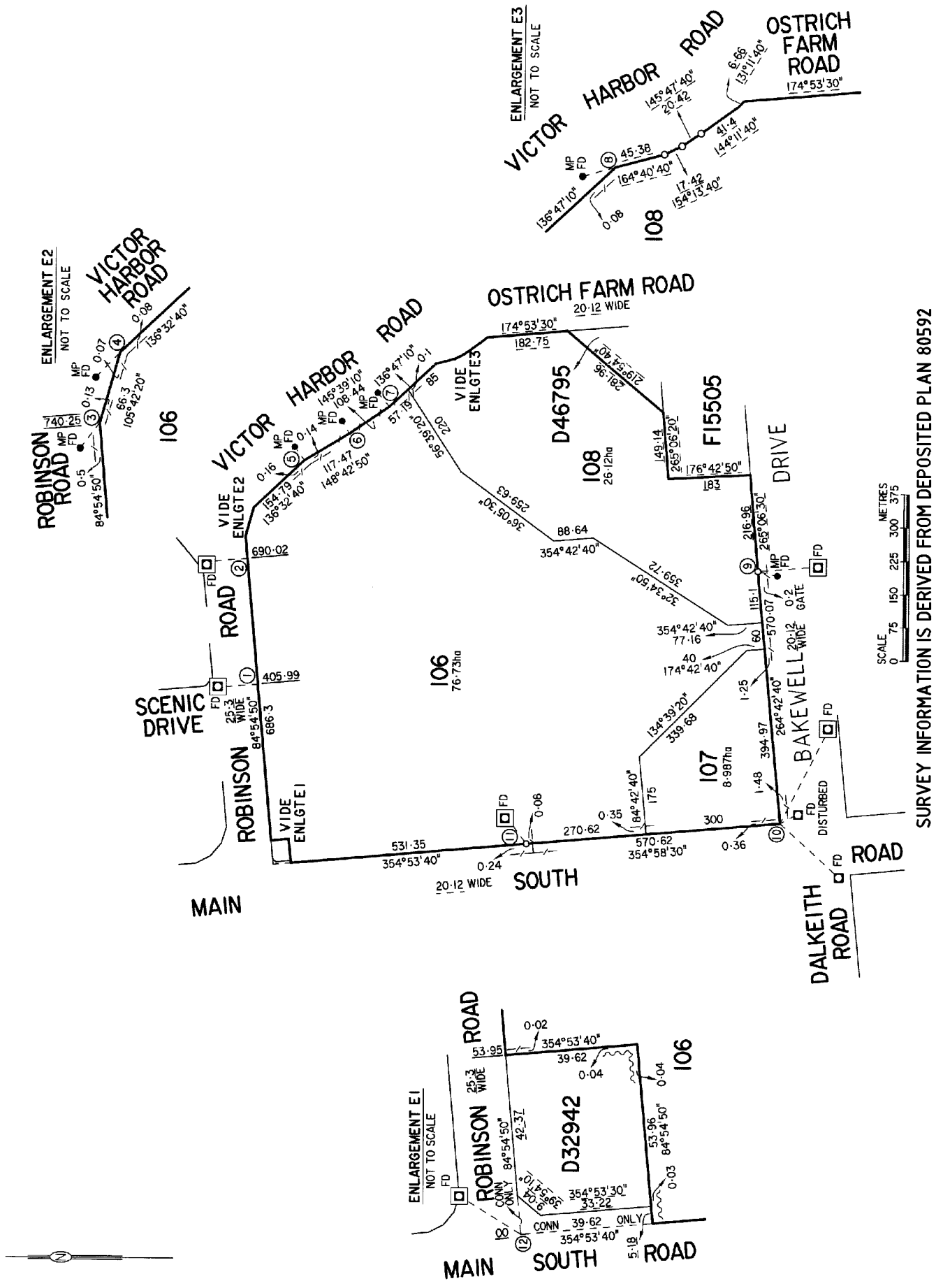
Registrar-General's Notes

CONTROLLED ACCESS ROAD VIDE PLAN 10
APPROVED G21/2011
AMENDMENT TO DIAGRAM VIDE 47/2010

Administrative Interests NIL

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Product	Register Search (CT 6034/589)
Date/Time	12/04/2018 12:29PM
Customer Reference	SRWRA2
Order ID	20180412006232
Cost	$39.45



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REAL PROPERTY ACT, 1886
South Australia

The Registrar-General certifies that this Title Register Search displays the records maintained in the Register Book and other notations at the time of searching.

Certificate of Title - Volume 5829 Folio 936

Parent Title(s) CT 5403/179

Creating Dealing(s) SC 8974989

Title Issued 14/12/2000 **Edition** 4 **Edition Issued** 24/07/2009

Estate Type

FEE SIMPLE

Registered Proprietor

SOUTHERN REGION WASTE RESOURCE AUTHORITY
OF PO BOX 2414 MCLAREN VALE SA 5171

Description of Land

ALLOTMENT 102 DEPOSITED PLAN 46795
IN THE AREA NAMED SEAFORD HEIGHTS
HUNDRED OF WILLUNGA

Easements

NIL

Schedule of Dealings

Dealing Number	Description
12966519	LEASE TO TELSTRA CORPORATION LTD. (ACN: 051 775 556) COMMENCING ON 01/06/2018 AND EXPIRING ON 31/05/2028 OF PORTION (AREA A IN F 253623)

Notations

Dealings Affecting Title NIL

Priority Notices NIL

Notations on Plan NIL

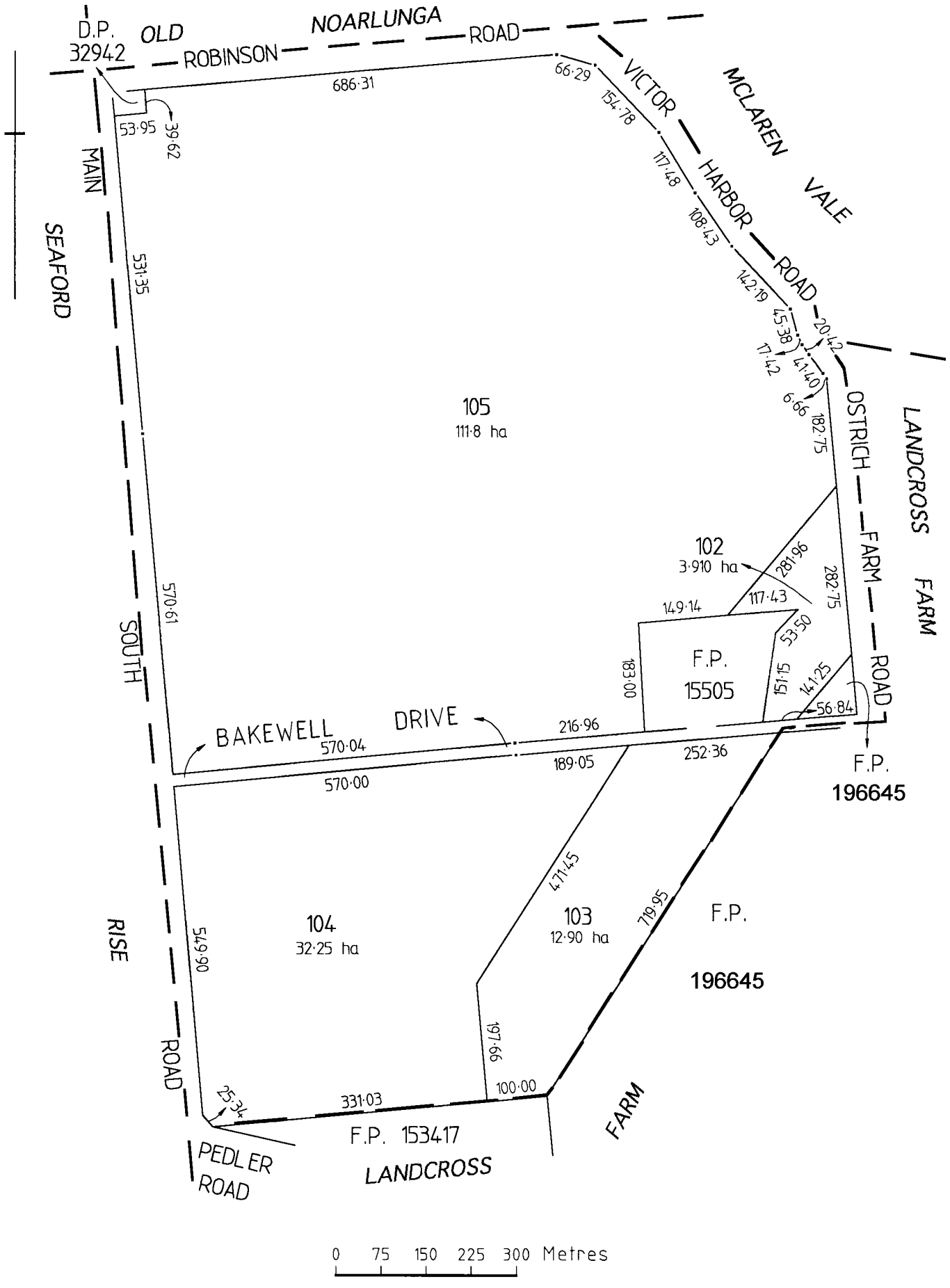
Registrar-General's Notes

AMENDMENT TO DIAGRAM VIDE 47/2010
APPROVED FILED PLAN FOR LEASE PURPOSES FX253623

Administrative Interests NIL

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Product	Register Search (CT 5829/936)
Date/Time	20/12/2018 03:57PM
Customer Reference	SRWRA4
Order ID	20181220008756
Cost	$28.75



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25 January 2019 REF No.: 00664-004

Department of Planning, Transport & Infrastructure
Level 7, 50 Flinders Street
ADELAIDE SA 5000

Attention: *Brett Fundak – Senior Infrastructure Coordinator*
By email*: brett.fundak@sa.gov.au*

Dear Brett,

RE: DEVELOPMENT APPLICATION FOR PUBLIC INFRASTRUCTURE IN THE FORM OF A 600ML WATER STORAGE DAM AT BAKEWELL DRIVE, SEAFORD HEIGHTS

I refer to our meeting held today in relation to the lodgement of a Development Application for 'public infrastructure' in the form of a 600ML water storage dam at Allotment 102 and Allotment 108, Bakewell Drive, Seaford Heights.

The *attached* documentation is provided to the Department of Planning Transport & Infrastructure for lodgement with the State Commission Assessment Panel (SCAP). The documentation provided in support of this Development Application includes a completed 'Crown Development Application Form' and 'Electricity Declaration Form' together with a 'Planning Statement' prepared by Ekistics Planning and Design. The Planning Statement also includes the following appended documentation and reports that have been prepared in support of the proposed development:

- ***Appendix 1:*** Certificates of Title
- ***Appendix 2:*** DPTI Sponsorship of Application as Public Infrastructure
- ***Appendix 3:*** Development Deed
- ***Appendix 4:*** Legal Opinion – Stuart Henry SC
- ***Appendix 5:*** Land Management Agreement (LMA)
- ***Appendix 6:*** Concept Plans for Development (Hydroplan)
- ***Appendix 7:*** Geotechnical Investigation Report (SMEC)
- ***Appendix 8:*** Construction Report (SMEC)
- ***Appendix 9:*** Odour Assessment (ERM)
- ***Appendix 10:*** SA Health Approval for use of Recycled Water
- ***Appendix 11:*** SA Health Correspondence
- ***Appendix 12:*** Arborist Report (Arborman)
- ***Appendix 13:*** Visual Impact Assessment (WAX Design)

- *Appendix 14:* Stormwater Management Plan (Tonkin)

We understand that this documentation will now be issued to SCAP to commence the assessment process and that a taxation invoice will be generated by SCAP for the requisite lodgement and planning assessment fees. This taxation invoice should be directed to the 'Willunga Basin Water Co. Pty. Ltd.' at Suite 1005, 147 Pirie Street, SA 5000.

We would like to take this opportunity to thank you for the assistance and advice you have provided in association with the preparation and collation of this application. Please do not hesitate to contact the undersigned on (08) 7231 0286 or direct on 0402 344 401 should you have any questions or queries, or should you require any additional information in support of this development application for public infrastructure.

Yours Sincerely



Richard Dwyer
Managing Director

ekistics

WATER STORAGE DAM

BAKEWELL DRIVE, SEAFORD HEIGHTS

Crown Development Planning Report

Prepared for:
Willunga Basin Water Authority Pty. Ltd.

Date:
06.02.2019

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Proprietary Information Statement

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Document Control

Revision	Description	Author	Date
V1	Draft Planning Statement	RAD	27/11/18
V2	Draft Planning Statement - edits	RAD	19/12/18
V3	Draft Planning Statement - edits	RAD	20/12/18
V4	Draft Planning Statement - edits	RAD	23/01/19
V5	Revised Planning Statement - edits	JR	06/02/19

Approved by:  *Managing Director* Date: 06/02/2019

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1. Introduction

This Planning Statement has been prepared on behalf of the Willunga Basin Water Company Pty. Ltd. ["WBWC"] which operates a large reclaimed water scheme in South Australia servicing the McLaren Vale, Willunga and Sellicks regions. WBWC is owned and operated by Water Utilities Australia Pty. Ltd. ["WUA"].

WBWC is licensed to take treated water from SA Water's Christies Beach Wastewater Treatment Plant ["WWTP"] and pumps it via a network of more than 120 kilometres of pipelines to more than 220 irrigators in the McLaren Vale region. The treated water is principally used for drip irrigation of vines, fruit trees, nut crops and flowers (primary production) within the McLaren Vale region.

WBWC wish to expand their water storage network and are seeking to obtain Development Plan Consent for a new 600 ML Water Storage Dam on land located at Lot 108 in Deposited Plan 80592 and Lot 102 in Deposited Plan 46795 (Bakewell Drive, Seaford Heights).

This Planning Statement seeks to provide relevant information about the subject land and locality, describes the nature of the proposed development and provides an assessment of the development application against the relevant provisions of the Onkaparinga Council (City) Development Plan. This Statement has been prepared to assist the State Commission Assessment Authority (SCAP) in its assessment and determination of the development application.

For the purposes of this statement, the Onkaparinga Council (City) Development Plan (Consolidated 20 December 2018) will be referred to as the 'Development Plan', the *Development Act*, *1993* will be referred to as the 'Act' and the *Development Regulations*, *2008* will be referred to as the 'Regulations'.

2. Background

2.1 Willunga Basin Water Company

The Willunga Basin Water Company (WBWC) was founded in 1997 and operates as a subsidiary of Water Utilities Australia (WUA).

WBWC is signatory of the '*Christies Beach Wastewater Re-use deed*' with the South Australian Water Corporation ['SA Water'] dated 15 January 1998 which provides license for WBWC to divert treated waste water from the Christies Beach WWTP for irrigation use in the Willunga Basin and Environs (subject to certain terms and conditions). Pursuant to this deed, SA Water licenses WBWC to use the entire volume of water (summer and winter) flowing from the Plant however WBWC is not required to divert any of the treated water.

The historical source of water for vineyard irrigation in McLaren Vale was predominantly native regional groundwater. Concerns around over-extraction resulted in the regional groundwater resource in McLaren Vale being proclaimed which led to regulation of groundwater extraction via individual bore specific water allocation. These allocations were capped with a maximum quantity of underground water available for allocation (taking and holding) in the McLaren Vale Prescribed Wells Area (PWA) of 6,600 ML/annum.

WBWC was established by a consortium of irrigators in McLaren Vale to provide an additional source of irrigation water to support the growing demand for water from the region's expanding wine industry. Starting with an initial customer base of 2,100ML of treated water, WBWC has expanded consistently to a current customer base of 6,500ML of customers. The growth in demand for treated water is a result of a number of factors including the deterioration of regional groundwater, growth of the local wine sector and in response to the effects of climate change. Currently more than 10,000ML of water is used for irrigation in the region. The demand for additional water is on-going and WBWC is experiencing strong demand from the Blewitt-Springs region due to deterioration in local groundwater salinity.

The Blewitt Springs region is to the north-east of McLaren Vale and WBWC does not currently have pipework in this region. WBWC expanded its network into McLaren Flat (east of McLaren Vale and south of Blewitt Springs) in 2015/16 which was in response to strong demand in this region for treated water as a result of deteriorating regional groundwater salinity. This expansion incorporated the capacity to expand into Blewitt Springs in the future. Existing aquifers in Blewitt Springs are also experiencing declining ground water quality with increased salinity and the proposed water storage facility will act as a catalyst for WBWC to expand its pipe network into the Blewitt Springs region which will give these irrigators access to a sustainable, good quality, alternate water source.

The capacity of WBWC to supply additional customers is currently limited by the availability of water to meet the peak summer demands. The proposed treated water storage dam will enable an additional 600ML of treated water to be distributed by WBWC in summer. Completion of the water storage dam will provide WBWC a sufficient amount of additional treated water to enable expansion of its pipeline into Blewitt Springs, thereby

providing an alternate water source to irrigators in this region who are suffering from deteriorating groundwater salinity. Given the location of the proposed water storage facility WBWC could also supplement water supply to existing customers in the region.

2.2 Role & Purpose of Proposed Water Storage Dam

WBWC currently sources the majority of its treated water from the Christies Beach WWTP operated by SA Water. SA Water subjects the sewerage entering the Christies Beach WWTP to sequential treatment (sedimentary sedimentation / settling / filtration and chlorination) and the treated water is then either discharged to the sea at Christies Beach, or it is diverted by pipe to a storage dam operated by WBWC.

The annual treated volume of the Christies Beach WWTP is around 10,000 ML, of which around 55% is used by WBWC with the balance of treated water (minus a small amount used by SA Water) discharged to Gulf St Vincent.

The treated water purchased from SA Water is pumped several kilometres from WBWC's dam at the Christies Beach WWTP to WBWC's site at Quarry Road, Seaford Heights. The Quarry Road site includes a small 13ML storage dam and a pump station. From the Quarry Road site, WBWC distributes the recycled water at pressure to customers in McLaren Vale via an existing network of pipes.

Figure 2.1 *WBWC Existing Dam at Quarry Road, Seaford Heights.*



The proposed new dam is conveniently located near the WBWC's Quarry Road dam and pump station which is a key factor in the selection and suitability of the subject site for the proposed water storage dam. Recycled water received at Quarry Road is proposed to be pumped to the proposed new dam for storage in winter, and gravity fed back to the Quarry Road site when it is needed for distribution to customers in summer. Accordingly, the purpose of the dam is to take and store recycled water purchased from SA Water at the Christies Beach WWTP at times when there is low demand for irrigation water (winter), and then distribute that recycled water to customers in times of high demand (summer).

WBWC have an existing pipe that crosses Victor Harbour Road in the road reserve adjacent to the proposed dam site which delivers treated water to customers in summer. A separate transfer pipe will be installed to fill the dam and then transfer the water back to the existing Quarry Road dam by gravity for pumping to customers by the existing Quarry Road Pump Station. This avoids the need for pumping of water from the proposed dam site.

The Quarry Road Pump Station has the capacity to pump 28-32ML/d of treated water but is constrained by the existing availability of treated water from the CBWWTP which is 22-24ML/d. This means there is 6-8ML/d of pumping capacity that is not being fully utilised. The peak irrigation period in McLaren Vale lasts for around 3-4 months (100 days) and the pump station could deliver an additional 600ML of water if it is available. The storage dam has therefore been designed to ensure the optimal use of WBWC's existing supply infrastructure at the Quarry Road site.

The proposed storage dam represents an appropriate and economic use of land that acts as an effective 'buffer' between residential development within the 'Vista' estate and the ongoing land fill operations on the adjacent SRWRA site to the south-east. The land will therefore be utilised for more productive purposes than existing cropping by providing a buffer separation between incompatible land uses whilst also providing public infrastructure for the supply and distribution of water that will support and intensify higher value agricultural use of surrounding primary production land.

3. Procedural Matters

3.1 Trigger for Development Approval

Pursuant to Schedule 2 and 3 of the *Development Regulations, 2008,* the excavation and filling of land for the purposes of a water storage dam is classified as development, where the levee bank is greater than three (3) metres in height (above the natural surface of the land) and where the dam has a capacity exceeding 5.0 ML.

The proposed new water storage dam will also require a new 500mm buried inlet-outlet pipe to be built between the new pipe and the Quarry Road pump station. Notwithstanding, as 'Public Infrastructure' the construction, reconstruction, alteration, repair or maintenance of any drains, pipe or underground cable is likely to be State Agency development that is exempt from approval pursuant to Section 49(3) of the *Development Act, 1993* and pursuant to Section 67(1) and Schedule 14 of the *Development Regulations, 2018*.

Further, it is noted that WBWC is signatory to a Deed with the City of Onkaparinga which gives WBWC authority to install infrastructure in Council roads, reserves and other land vested in Council. WBWC has more than 120km of pipelines already installed in the City of Onkaparinga area pursuant to this Deed and any pipework associated with the proposed treated water storage will be installed in accordance with this existing Deed.

3.2 Nature of Development

The proposed development constitutes Crown 'development' pursuant to Section 49 (2)(c) of the Act as the project has been supported by the Department of Planning Transport and Infrastructure (DPTI) for the purpose of the provision of 'public infrastructure'.

Pursuant to Section 49 of the *Development Act, 1993* 'public Infrastructure' is defined as follows:

> *Public Infrastructure means –*
>
> *(a) the infrastructure, equipment, structures, works, and other facilities used in or connection with the supply of water or electricity, gas or other forms of energy, or the drainage or treatment of waste water or sewerage;*
>
> [our emphasis]

A proposed dam for the storage, supply and distribution of treated water to customers engaged in primary production within the McLaren Vale region is therefore public infrastructure for the purposes of Section 49 of the *Development Act, 1993*.

Correspondence confirming the Department's support of the Development Application as 'Public Infrastructure' is attached in ***Appendix 2***.

3.3 Planning Authority

Given the development application has been supported as 'public Infrastructure' pursuant to Section 49(2)(c) of the Act, the development application must be lodged with the State Commission Assessment Authority (SCAP) for assessment.

Pursuant to Section 49(12) of the Act, the **Minister for Planning** is the Relevant Authority to determine the development application following receipt of a report from the SCAP pursuant to Section 49(7e) of the Act.

3.4 Public Notification

Pursuant to Section 49(7)(d), a development proposed, initiated or supported by the State, involving work exceeding $4 million will be subject to public notification.

The proposed water storage dam will be fully funded by WBWC and is estimated to cost approximately $5.4M to construct.

Given the proposed development involves works exceeding $4 million, the proposed development must be publicly notified to adjoining owners and interested parties.

3.5 Referrals

Pursuant to Section 49(4)(a) & Section (7)(a) of the Act as well as Schedule 8 of the Regulations, the application may require referral to the following authorities:

- **Onkaparinga Council**;
- **State Heritage Branch**
  - If, in the opinion of the relevant authority, the development materially affects the context of the adjoining State Heritage Place recognised as the '*Former Noarlunga Ostrich Farm, including Prior's Court Homestead and (1850's section only) and Barn*'.
- **Department for Environment and Water ['DEW']**
  - The proposed development is located within the '*Western Mount Lofty Ranges Prescribed Water Resources Area*' and may:
    - take water from a surface water prescribed area (i.e. Onkaparinga River and Pedler Creek); and/or
    - involve the construction of a dam in a part of the State within the ambit of a notice under Section 132 of the *Natural Resources Management Act 2004*.

- The **Department of Planning Transport and Infrastructure** (DPTI) –

  - DPTI has advised that the subject site is affected by a road widening requirement shown on the Metropolitan Adelaide Road Widening Plan. The plan shows a possible requirement for a strip of land up to 35 metres in width from the Victor Harbor Road frontage of this site for future road purposes. This requirement caters for a possible future duplication of Victor Harbor Road at this location. Although the exact nature and timing of this proposal has yet to be determined (and no funding has been committed), the consent of the Commissioner of Highways under the *Metropolitan Adelaide Road Widening Plan Act, 1972* is required to all building works on or within 6m of the possible requirement.

    A referral to the Commissioner of Highways is also required for any development which, in the opinion of the Relevant Authority, would encroach within a road widening setback under the *Metropolitan Adelaide Road Widening Plan Act, 1972.* The Commissioner of Highways has the power of 'Direction' in respect of a proposed development that would encroach on land shown on the Metropolitan Adelaide Road Widening Plan as potentially required for road widening or would be undertaken within 6 metres of the boundary of such land. Importantly, the proposed dam and associated landscape batter slopes are not located within the 35 metre road winding strip adjacent Victor Harbor Road however a proposed stormwater swale and a buried inlet-outlet pipe to the quarry road pump station is located within the road widening requirement and therefore referral may be required to DPTI.

In addition, we understand that the Department may possibly seek informal referral advice from the following State Agencies:

- Environment Protection Authority (EPA); and
- SA Health.

4. Subject Site and Locality

4.1 Description of the Subject Site

The subject site is located on Bakewell Drive, Seaford Heights and comprises Certificate of Title Volume 6034 Folio 589 (Allotment 108 of Deposited Plan 80592) and Certificate of Title Volume 5829 Folio 936 (Allotment 102 Deposited Plan 46795). A copy of the relevant Certificates of Title are attached in ***Appendix 1***.

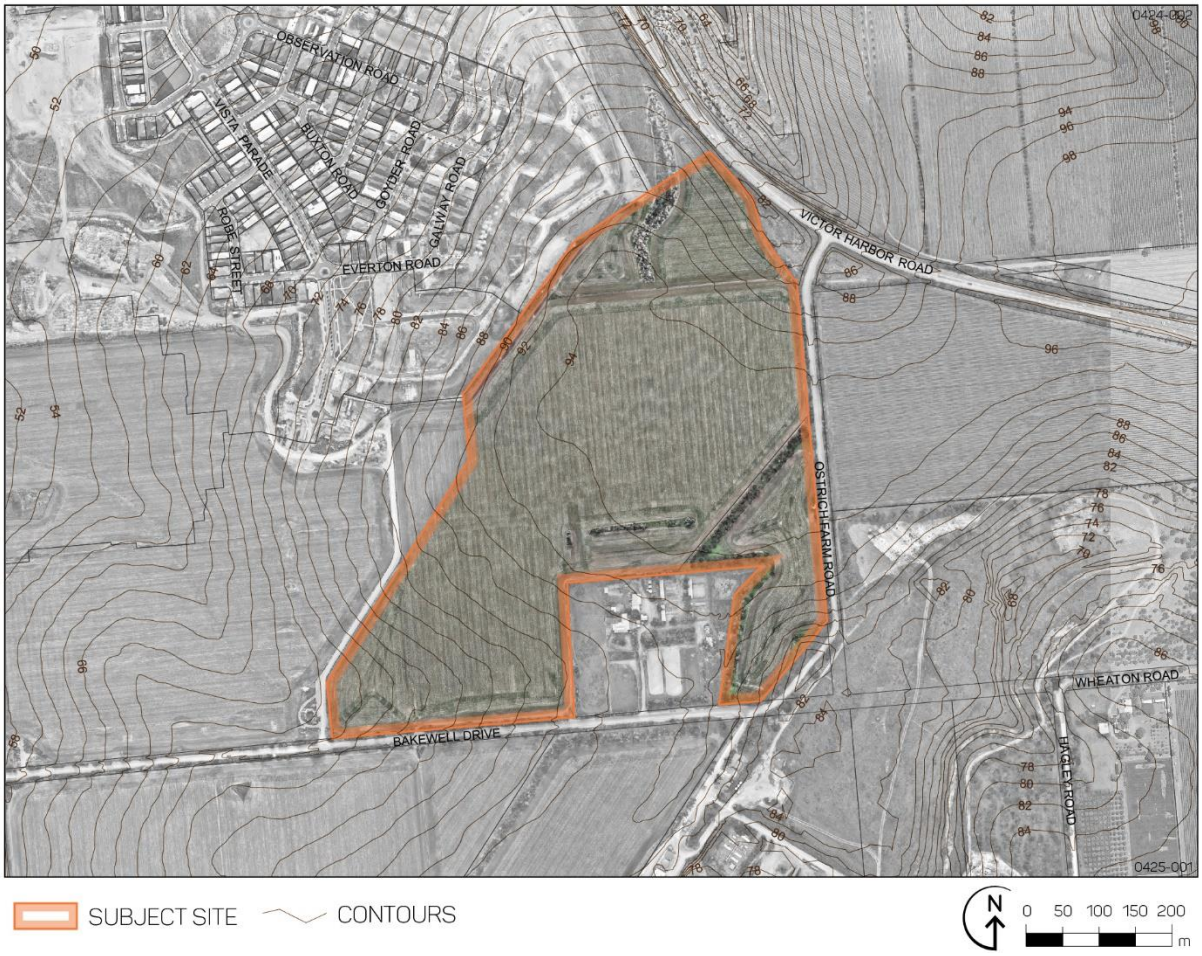
An aerial photograph of the subject site is provided in ***Figure 4.1*** over page.

The subject site measures an area of 30.03 hectares and is formed by a wide, gently sloping hilltop and ridgeline that extends in a north-south direction, parallel to the coastline. There are no discernible features and the land contains few topographic or vegetation elements. The existing land cover is arable cropping which results in seasonal variations in vegetation retention, harvesting and other agricultural operations on the land.

The subject site contains a belt of mature olive trees toward the southern boundary. Given these olive trees within the site have been planted for the purpose of fruit production they are not recognised as Regulated or Significant Trees pursuant to the *Development Act, 1993*. Further, as the trees are planted specimens they are not identified as native vegetation. Accordingly, the trees are not controlled by the *Development Act, 1993* or the *Native Vegetation Act, 1991.*

In addition, there are approximately 200 juvenile trees located within a windbreak towards the south-eastern boundary of these site. The juvenile trees are planted specimens and are all less than two metres in circumference and therefore these trees are not controlled by the *Development Act, 1993* or the *Native Vegetation Act, 1991.*

Figure 4.1 *Aerial Photograph of Subject Site*



4.2 Land Ownership / Tenure

The land is currently owned by Southern Regional Waste Resource Authority ['SRWRA']. WBWC have entered into a lease with SRWRA to build and operate the dam on the subject site. The 20-year lease commences from 1 January 2019 and has an opportunity for a 20-year renewal (40 years in total).

4.2.1 Development Deed

Importantly, SRWRA purchased the land from the South Australian Housing Trust and the Urban Renewal Authority in 2017 and at the time of purchase the vendors and SRWRA executed a 'Development Deed' dated 7 November 2017. The deed recites that its purpose is to limit the impact of any development of the land on the amenity of nearby land that is used for residential purposes (or that is proposed to be used for residential purposes). A copy of this Development Deed is Attached at ***Appendix 3***.

Under the terms of the Lease with SRWRA, WBWC will effectively take on the obligations of the Development Deed.

Pursuant to Clause 3 of this Deed '*SRWRA must not cause, suffer or permit the receipt, handling, storage or disposal of waste on the Land*'.

An independent legal opinion has been obtained from Stuart Henry SC (Barrister) dated 5 July 2018 and addresses the question of whether the storage of treated water sourced from the Christies Beach WWTP in a dam to be constructed on the subject site would be contrary to Clause 3 of the Development Deed (i.e. whether or not the treated water is 'waste' as defined in the Development Deed).

The Legal opinion confirms that upon delivery from SA Water to WBWC, the treated water becomes a product, and is no longer waste. The Legal opinion is attached at ***Appendix 4*** and concludes that '*The recycled water is not, in my view, a form of 'waste' for the purposes of the Development Deed'*.

4.2.2 Land Management Agreement

A Land Management Agreement (LMA) between the Minister for Planning and the land Owner (SRWRA) also applies to the land and is attached at ***Appendix 5***.

The purpose of this agreement (executed as a Deed applying to the whole of Certificate of Title Volume 6034 Folio 589) is to ensure that the land owner does not cause, suffer or permit interference with, damage or removal or destruction of a landscaped and vegetated area of the site that has been established as a 'Buffer Zone Landscaping Area' to screen urban development from Victor Harbor Road. In addition, the deed identifies separate 'Buffer Land' which is to be maintained as primarily a passive vegetated area to screen development and interrupt site lines from Victor Harbor Road.

Under the LMA the land owner must ensure that the 'Buffer Zone Landscaping Area' is maintained as primarily a passive vegetated area to screen development and interrupt sight lines from Victor Harbor Road. The land owner must also obtain the consent of Fairmont Land Holdings Pty. Ltd. (adjacent residential developer) for any change in the use of the 'Buffer land' as described and defined in the LMA.

The 'Buffer Zone Landscaping Area' and the 'Buffer Land' are demonstrated spatially in ***Figure 4.2*** and ***Figure 4.3*** respectively.

Under the terms of the Lease with SRWRA, WBWC will effectively take on the obligations of Clause 5 (Management of Land) of this LMA and therefore must not breach this LMA.

Importantly, the proposed development has been designed so that it will '*not cause, suffer or permit interference with, damage to or removal or destruction of the Buffer Zone Landscaping*' in the 'Buffer Zone Landscaping Area' as defined in Annexure B of the LMA nor will it result in the change of the use of the 'Buffer Land' as defined within Annexure C of the LMA.

Figure 4.2 *Buffer Zone Landscape Area*

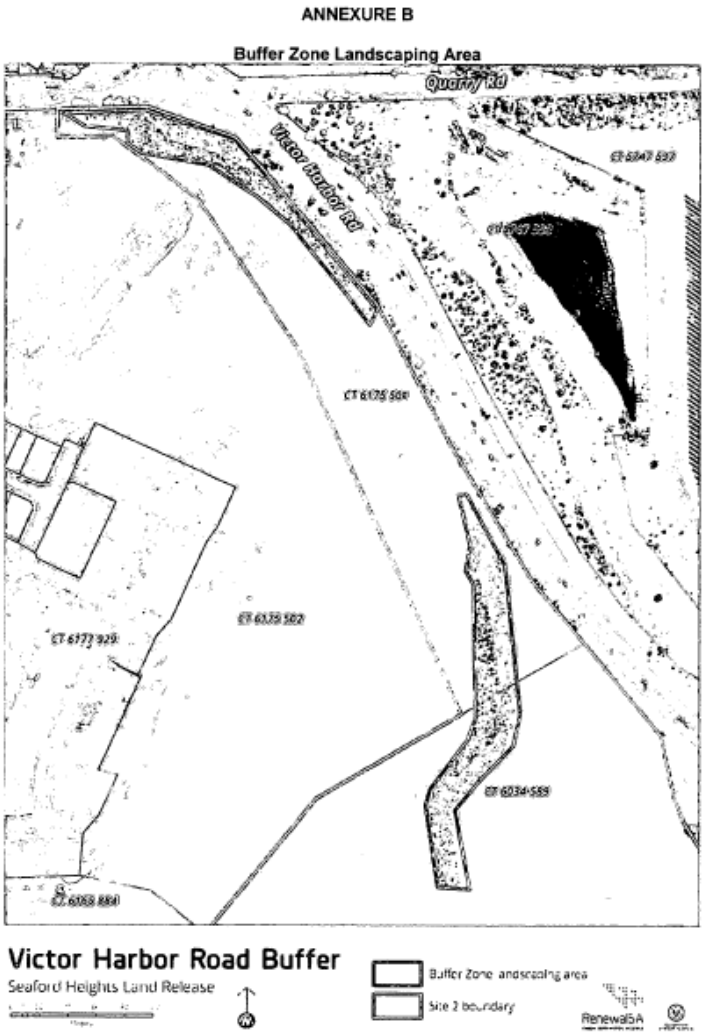
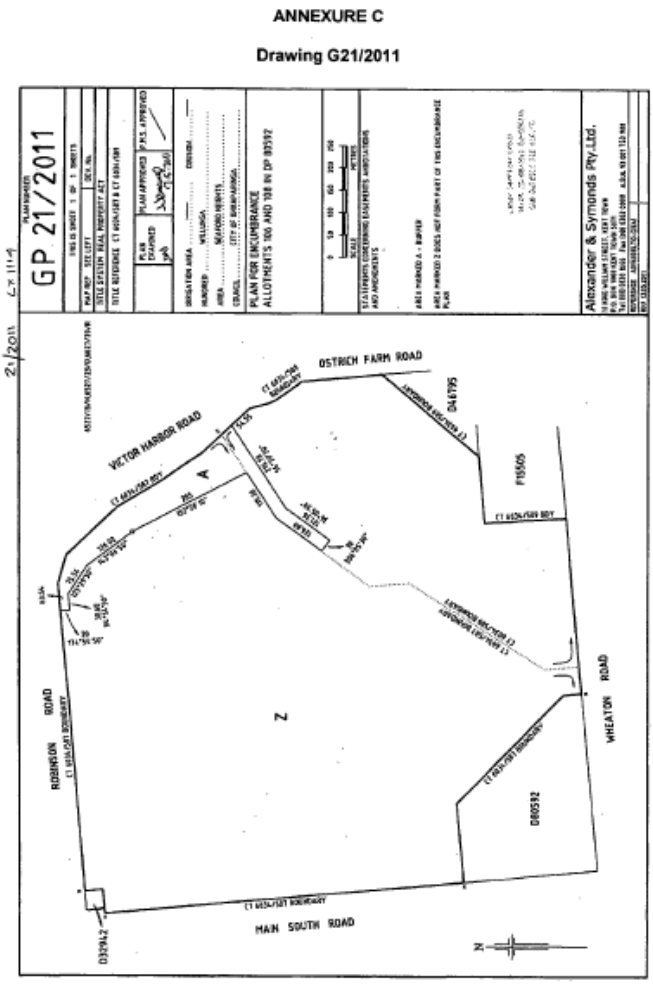


Figure 4.3 *Buffer Land (Area Marked 'A')*



4.3 Development Locality

An aerial photograph of the subject site and surrounds was provided previously in ***Figure 4.1***.

The existing landscape character of the locality is defined by the undulating agricultural landscape which contains vineyards, fields, valleys and significant belts of vegetation located on large allotments that follow the underlying topography of the hills environment. Allotments typically include areas of vegetation along the cadastral boundaries with cleared land to allow for cropping or wine production.

The northern edge of the locality falls away to form the Onkaparinga River Valley resulting in panoramic views to the ocean and the suburbs of Old Noarlunga and Seaford.

To the immediate south and east of the subject site is an existing dwelling on the corner of Bakewell Drive and Ostrich Farm Road (refer to ***Figure 4.4***). The homestead and barn are recognised as a State Heritage Place and are sited on an allotment of approximately 4 hectares.

Further to the south and east of the site, over Bakewell Drive and Ostrich Farm Road, is the Southern Regional Waste Resource Authority (SRWRA) which is one of the State's major landfill operations currently receiving over 100,000 tonnes of waste annually (refer to ***Figure 4.5***). The SRWRA landfill site is responsible for providing and operating waste management operations for the Onkaparinga, Marion and Holdfast Bay Councils.

To the immediate west of the subject site is the Vista Seaford Heights estate, currently developed by Fairland (Fairmont Land Holdings Pty. Ltd.). The Vista development is a master planned residential community set on approximately 88 hectares of land and will include over 1,100 allotments of various sizes as well as areas of public open space and a neighbourhood centre. The underlying topography of the Vista estate has resulted in the construction of high retaining walls and fencing (up to 4m) across the eastern half of the site as well as benching to allow for level residential allotments. Retaining walls are located on the boundary between the subject site and the Vista development. This limits views from the Vista Estate into the subject land with residential rooflines, retaining walls and fencing at the boundary interface with the subject site. An image of existing fencing and the retaining wall adjacent the western boundary of the subject site is provided in ***Figure 4.6.***

Figure 4.4 *State Heritage Place, Ostrich Farm Road*



Figure 4.5 *SRWRA Land Fill and Waste Transfer*



Figure 4.6 *Fencing & retaining walls on property boundary with Vista Seaford Heights*





5. Description of Proposal

5.1 Overview

The development will comprise a nominal 600 ML treated water storage dam located centrally on the site at Lot 102 & 108 Bakewell Drive Seaford Heights. The proposed dam will measure approximately 330 metres in length, 265m in width and 9.3 metres in depth (from the top of crest to dam floor with a proposed water depth of 8.3m).

The dam will be a 'turkey's nest' dam with the top of the dam banks elevated above the natural ground level and as such there will be no natural runoff into the dam. Due to the variable ground level across the site the fill height of the dam walls above ground level varies from 4.6m to 7.6m.

The dam will be constructed with a 1 in 3 internal batter which will be lined with a high-density polyethylene (HDPE) liner manufactured from UV stabilised material placed on a low-permeability subgrade. There will be an external 1 in 3 slope surrounding the dam which will be constructed with compacted earth. At the base of this dam embankment will be an access road, security fencing and a swale to collect stormwater runoff.

The proposed storage dam will include an underdrain system to enable leakage to be readily identified and managed.

Adjacent the dam embankment and access road will be a series of constructed earth mounds of varying heights (depending on existing ground level) between 1.5m – 7.8m at a slope of 1 in 4. These will be constructed using the excess fill excavated for the dam and will be vegetated with plants and trees in order to minimise visual impacts of the dam embankment. At the base of the mounds opposite the dam embankment, there will be a 3m wide swale which will collect stormwater runoff and direct it towards a proposed detention basin and discharge points (and ultimately off of the subject site).

The proposed mounds will be vegetated with site appropriate plant species which are currently present within the existing landscape buffer. These will grow to a mature height which will help to facilitate the visual management of the development and will significantly improve and enhance the existing landscape buffer that has been established on the site to screen urban development (Vista Estate) from Victor Harbor Road.

The dam embankment is proposed to incorporate the following setback from adjoining roads and property boundaries:

- 58.5 metres (approx.) from the crest of the dam to adjoining residential property to the south;
- 79 metres (approx.) from the crest of the dam to allotments that have been created on the adjoining Vista Estate to the west;
- 47 metres (approx.) from the crest of the dam to the kerb of Ostrich Farm Road to the east;

- 185 metres (approx.) from the crest of the dam to the existing kerb of Victor Harbor Road to the north-east; and
- 247 metres (approx.) from the crest of the dam to the existing kerb of Bakewell Drive to the south.

Access to the site is proposed from a single 4.0 metre wide driveway access and crossover on Bakewell Drive that will be designed to ensure adequate clearance and sight lines for vehicles entering and exiting the site.

Importantly, the proposed development will not impact or in any way conflict with the existing 'Buffer Zone Landscaping Area' or the 'Buffer Land' that has been established as a landscape 'buffer' to screen urban development in the adjoining Vista Estate from Victor Harbor Road.

Proposed site works are summarised as follows:

- Excavation of 280,000 m^3 of soil to construct a water storage dam with a capacity of 600 ML;
- Excess fill to be utilised to form the dam wall embankments as well as vegetated earth mounds developed around the dam to assist to screen the structure from Victor Harbor Road, the Adelaide Plains and adjoining properties including the Vista Estate;
- A stormwater detention basin (to limit peak flows from the southern catchment);
- A proposed 500mm buried inlet-outlet pipe connecting the proposed dam to the quarry road dam pump station (over Victor Harbor Road);
- A new compacted rubble access driveway measuring 4.0 metres in width to provide access for a maintenance utility vehicle from Bakewell Drive to the dam and around the upper circumference of the dam wall;
- 1.8 metre high chain wire security mesh fencing around the base perimeter of the dam wall embankment and set behind proposed vegetated mounds so that it is effectively screened from the adjoining road network;
- Appropriate signage to prevent access to the dam infrastructure; and
- Landscape planting utilising native tree and shrub species (including species currently present within the existing 'Buffer Zone Landscaping Area' on site).

Proposed concept plans for the proposed development are provided at ***Appendix 6.***

5.2 Site Amenities & Infrastructure

As a static water storage dam there are no proposed amenities on site with no requirement for a site office, store or other ancillary structures and facilities.

The proposed dam will be filled and emptied using the existing pumping infrastructure at the existing WBWC site at Quarry Road. On this basis, the development application for the new dam will not require new pumping infrastructure.

A 1.8 m high chain wire mesh fence and associated signage is proposed around the perimeter of the dam to prevent public access to the dam but to also restrict access by animals and wildlife (to prevent any damage to the membrane liner). The fencing will be set behind proposed vegetation mounds so that it is effectively screened from the adjoining road network.

Whilst is will be necessary to install a new 500mm inlet / outlet pipeline between the treated water storage and WBWC's Quarry Road dam it is noted that this 'public infrastructure' (involving the construction, reconstruction, alteration, repair or maintenance of a drain or pipe) is likely to be State Agency development that is exempt from approval pursuant to Section 49(3) of the *Development Act, 1993* and pursuant to Section 67(1) and Schedule 14 of the *Development Regulations, 2018*.

5.3 Dam Construction

5.3.1 Geotechnical Considerations

A 'Geotechnical Investigation Report' has been prepared by SMEC and is attached at ***Appendix 7***.

This report has been prepared to provide a broad understanding of the foundation, excavation and earthworks conditions for the proposed water storage dam. Investigations included drilling four (4) boreholes to a target depth of 8.0 metres. The boreholes were positioned to provide a broad coverage of the proposed storage area. The field investigation was completed in general accordance with AS1726:2017 *Geotechnical Site Investigations*, and the position of the boreholes was recorded on site using a hand-held GPS unit and has been reported on engineering logs. Samples were collected for laboratory testing and were submitted for testing at the NATA registered Golder laboratory in Adelaide. The purpose of the testing was to assess the physical and dispersive properties of the soil.

SMEC confirmed that the regional geology map (1:50,000 Noarlunga Sheet) shows undifferentiated Quaternary deposits at the surface including Hindmarsh Clay, Ngalinga Clay and a lower sand unit equivalent to the Carisbrook Sand, Ochre Cove Formation and Seaford Formation. The Hindmarsh/Ngalinga Formations comprise brown, red and olive clays and sandy clays with sand and gravel lenses.

The geology map indicates the upper clay soils are underlain by Proterozoic bedrock including:

- SEACLIFF SANDSTONE: Pale grey and red sandstone, quartzite and red siltstone
- BRACHINA FORMATION: Red and green siltstone and fine-grained sandstone
- REYNELLA SILTSTONE MEMBER: Mostly massive siltstone with small rock fragments
- WILMINGTON FORMATION: Massive, green-grey, fine-grained sandstone

The subsurface conditions encountered in the boreholes were broadly consistent with the expected regional geology. ***Table 5.1*** over page identifies the soil units encountered on site. No groundwater was encountered within the depth investigated.

Table 5.1 *Summary of Encountered soil units (Source: SMEC)*

Topsoil (A Horizon):	Silty CLAY, dark brown with roots and other organics, trace to some sand
Upper Clays (B Horizon)	Silty and Sandy CLAY, medium plasticity, pale brown mottle, with some sand and gravel
Hindmarsh / Ngalinga Clays	CLAY, high plasticity, grey mottled orange-brown and red-brown
Residual Soils	CLAY and CLAYEY SAND and with extremely-to-highly weathered fragments of the parent rock
Siltstone	Siltstone, red brown, orange brown and pale grey, indistinct fabric. Highly weathered and low strength at the top of the stratum, becoming moderately to slightly weathered and medium strength with depth. Encountered BH2 only.
Sandstone	Sandstone, orange brown, very low strength, highly to extremely weathered. Encountered BH4 only.

Emerson Class laboratory testing was completed on three samples of the clays soils and indicated that the soils below 2.0 m depth may be dispersive.

The soil classification testing indicated the following soil properties:

- Clay soils with fines content (clays and silts) greater than 76%;
- High to very high plasticity, increasing with depth; and
- Soils are highly reactive with respect to change in moisture content (linear shrinkage > 15%).

The geotechnical investigations have revealed that the natural clay soils encountered in the boreholes are expected to be generally excavatable using conventional machinery such as excavators and dozers. Slower production rates would be expected in the residual soils and the very low strength weathered rocks. Should the medium strength siltstone soils be encountered, the use of specialist rock breaking equipment may be required. However, the need for the use of drill and blast techniques for excavation is not considered likely. It is anticipated that the type of construction equipment used on site will be similar in nature to the equipment undertaking excavation on the adjacent 'Vista Estate'.

SMEC have recommended that temporary batter slopes or benches in the clay soils shall be cut at no steeper than 1H to 1V. For permanent works a 3H to 1V batter is considered suitable, provided the clays are protected from erosion caused by concentrated flows.

SMEC have also confirmed that the natural clay soils at this site have high plasticity, with plasticity increasing with depth. Such soils are reactive in response to seasonal moisture changes (high shrink-swell potential) which may cause large surface movements and development of shrinkage cracks following desiccation. Pipe connections and shallow foundations will need to be designed with appropriate articulation to allow for surface movements.

5.3.2 Dam Design & Construction

The proposed water storage dam does not require an EPA license, however the facility will be designed in accordance with the '*EPA Guideline EPA509/14 – Wastewater Lagoon Construction*'.

In addition, a '*Geotechnical Inspection and Testing Authority*' (GITA) will provide Level 1 supervision on-site during construction in accordance with AS3798:2007 to provide appropriate CQA (Construction Quality Assurance) consistent with the requirements of the guidelines.

The design of the proposed dam will also follow appropriate elements of the ANCOLD (Australian National Commission on Large Dams) Guidelines on Consequence Categories for Dams (2012).

Seismic Performance

The design of the dam and overflow structures including the foundation would include seismic loading. The structures will be designed to meet the Operating Basis Earthquake (OBE) and Safety Evaluation Earthquake (SEE) seismic load conditions in accordance with ANCOLD (1998).

Flood Performance Review

The water storage dam is a turkey's nest configuration, with the proposed dam crest level several metres above surrounding ground levels and located at a high point in the regional topography. On this basis, inflows due to flood are effectively excluded from the storage.

Foundation Design

The foundation design for the dam will be based on the geological/geotechnical model.

Consideration would be given to the adequacy of the existing foundation condition and the performance of the dam under the various flooding conditions and treatments required to ensure adequate stability and integrity of the structure. Assessment for the design would include aspects such as deformations, seepage, piezometric conditions and the like.

The foundation design will ensure compatibility between the various storage structures, that differential movements are not excessive and that potential for excessive seepage and associated erosion/piping is appropriately managed.

Embankment Design:

Freeboard Assessment

The level of freeboard for the embankment will be assessed in accordance with the procedure outlined in the *USBR Design Standards 13 – Embankment Dams*. However, as this dam type is a turkey's nest and hence there is no run-off into the dam, it is typical to adopt a freeboard equivalent to rainfall depth for the extreme rainfall event. Design rainfall storm events based on Intensity Frequency Duration (IFD) data for this site location would be sourced from Bureau of Meteorology

Embankment Stability

The slope stability of the embankment will be assessed for various load cases including normal operating conditions, flood, seismic and rapid drawdown. The acceptance criteria for the dams would be based on ANCOLD recommendations. The outcomes of this assessment will set the dimensions and slopes of the embankment.

The internal stability of the embankment would be considered as part of the design, using the filter criteria detailed in Fell et al (2015). Filters (if required) will be designed to meet material compatibility and permeability requirements. Potential for segregation of the filters would also be taken into consideration during the design of the filters

Camber

A settlement assessment would be undertaken as part of the design of the embankment to determine the requirements for camber

Inlet / Outlet works

Design of the inlet/outlet works will incorporate the design of the embankment penetration protection detail and is likely to comprise concrete encasement of the inlet/outlet pipe(s).

Overflow

An overflow structure is required to allow for controlled discharge of water (if in the unlikely event that this is ever required). The overflow structure will be designed to ensure that the adopted arrangement provides the requisite performance up to and including the maximum discharge. The assumed maximum discharge would be taken to be equivalent to 1.5 x the peak inflow rate of 24ML/day.

The design of the overflow will comprise both hydraulic and structural aspects of the structure. The design will consider the hydraulic capacity of the structure, as well as requirements for energy dissipation and erosion

potential. This design would be undertaken using empirical formulas. The various overflow components would then be sized to meet stability and structural requirements in accordance with ANCOLD Guidelines and Australian Standards with consideration given to sliding and overturning stability and include bearing pressure and compressive strength assessments. Aspects such as uplift loading and drainage would be incorporated into the assessment.

The overflow structure would be designed to ensure positive contact with the embankment to accommodate likely settlement of the embankment and overflow structure.

Access Road

The dam crest access track would be designed with cross fall to direct surface water away from the storage.

Instrumentation

Design of the instrumentation system for the storage will be designed in accordance with ANCOLD (2003) and relevant EPA and SA Health requirements. As a minimum the instrumentation system will include storage level detection, seepage monitoring and ground water piezometers.

Dam Access

Access to the storage would be required for inspection and maintenance of the liner and storage generally.

It is envisaged that access would require the provision of ladders and or platforms. These elements will be designed in accordance with the requirements of AS1657-2018.

Signage

Required site signage will be designed to meet the requirements of AS1319 (Safety Signs for the Occupational Environment.)

Safety in Design

Hazard identification and risk assessment will be undertaken throughout the design process.

Where possible, occupational health and safety risks would be eliminated or reduced to an acceptable level for each component of the structure to ensure that structures being used by people at work "*are safe and without risks to health when properly used*".

Design considerations include safety requirements relating to operation and maintenance, the choice of materials and products, methods and sequence of construction and OH&S issues relating to dam safety monitoring

5.3.3 *Construction Environmental Management Plan*

It is envisaged that a Construction Environmental Management Plan (CEMP) will be prepared following receipt of Development Approval and will describe how activities undertaken during the construction phase of development will be managed to avoid or mitigate negative environmental impacts on the site and how those environmental management requirements will be implemented.

Accordingly, the applicant would accept a suitable condition of approval requiring the preparation of a CEMP to the satisfaction of SCAP prior to commencement of construction.

It is anticipated that the CEMP will demonstrate how possible air emissions (dust management), noise, waste, water quality and traffic will be managed to prevent impacts on the land subject to development, and on nearby land uses and the natural environment.

5.3.4 *Traffic Management Plan*

Earthmoving equipment and other construction and delivery vehicles will access the site during construction.

Excavated fill will be used to create the dam wall batters and therefore construction materials are not proposed to be removed from the site during construction. On this basis, there will be a relatively low traffic generation associated with the construction of the facility.

Notwithstanding, once a contractor is engaged for the construction activity, it is anticipated that a Traffic Management Plan will be prepared as part of an overall 'Construction Environmental Management Plan' (CEMP) and will outline how vehicles are to access the site. This plan would consider the need to install work zone traffic management along Bakewell Drive to manage the interface between construction traffic and through traffic.

The applicant would accept a suitable condition of approval requiring the preparation of a CEMP and associated Traffic Management Plan to the satisfaction of SCAP, prior to commencement of construction.

5.4 Dam Operations

The operation of the dam will be undertaken by WBWC who has experience in the operations of similar dams including three (3) treated water storage dams adjacent to the Willunga Community Wastewater Management Scheme on Little Road, Willunga.

The dam will be filled in winter and emptied in summer.

WBWC maintains an Irrigation Risk Management Plan (IRMP) in accordance with the '*Australian Guidelines for Water Recycling*' and EPA's Recycled Water Guidelines. The IRMP provides for reporting of water use and operations to relevant regulatory authorities. WBWC constantly monitors water consumption using data loggers on each customer meter, as well as 24x7 monitoring of water flows in the network via their '*Supervisory, Control and Data Acquisition*' (SCADA) system. This enables WBWC to monitor the balance of water across their network and to identify water losses which is not apparent under WBWC's current operations.

WBWC maintains a network of shallow observation wells for monitoring leakage or runoff from storage dams or irrigation sites.

5.5 Environmental Management

5.5.1 Air Quality / Odour

The EPA Guideline titled '*Evaluation distances for effective air quality and noise management*' dated August 2016 clearly states that '*There is no recommended evaluation distance for recycled water storage lagoons, so a site-specific assessment is recommended*'.

An 'Odour Assessment' of the water storage dam has therefore been undertaken by ERM (refer to ***Appendix 9***) which was based on field odour observations at current treated water storage facilities in the area of the proposed dam location. The results from the observations were evaluated against the separation distance to the nearest sensitive receptors, general settings of the area as well as wind data. ERM advised that dispersion modelling was not performed for the assessment since it is difficult to characterise emissions from low level non-offensive odour sources (given odour impacts from low level non-offensive odour sources typically produce over predictions in separation distance requirements in dispersion modelling).

The field odour observations methodology applied for the assessment was a modified version of the German Standard VDI 3490 (1993) method for odour surveys. The method standardises the odour logging approach by the adoption of a standard scale for describing odour intensity, as detailed in the German Standard VDI 3882, which relates to odour measurement. This method was selected as it enables the evaluation of odour over time rather than single point in time with discrete observations.

Locations for the field odour observations were selected to cover one upwind location for reference of background odour and downwind locations at various distances from the targeted odour source. In addition to recording odour intensity observations, wind conditions (wind direction and wind speed) were also recorded for each observation.

Based on field odour observations from other dams (i.e. The Aldinga Storage Dam, Quarry Road Treated water storage dam and Little Road treated water storage dams) ERM noted that odour from the treated water storage dams is recognisable, but not perceived as offensive, and typically present intermittently at low levels even very close to the dams. While the treated water is a product from a wastewater treatment plant, the odour from the storage dams is not perceived as wastewater related. The character of the odour of the treated water is closer in resemblance to muddy lake or pond water.

The field odour observations undertaken by ERM showed the following:

- There is odour associated with treated water storage dams. However, the character of the odour is not perceived as offensive, and it is not a wastewater related odour;

- The levels of odour observed were mostly low level and intermittent, especially at distance from the sources;
- At most locations no odour was observed for most of the time; and
- No distinct or strong intensity odours were observed.

The ERM assessment also incorporated an analysis of local wind data as this indicates where impacts will occur. Wind data from the Noarlunga BoM weather station (the nearest weather station to the site) was used to identify prevailing wind directions. ERM observed that Noarlunga BoM station is located in a windy location (very low frequency of low wind speeds) and that the proposed water storage dam is proposed on a hill top at a higher elevation than the Noarlunga weather station, which should give greater exposure. This means that the site location can be expected to be windier than Noarlunga and this provides good dispersion conditions.

ERM state that '*While there is potential exposure of the nearby sensitive receptors (with prevailing SE and N winds for part of the year), dispersion conditions at the elevated site location should be good and the residential receptors are not in locations, relative to the storage dam, that would pose any particular exposure risk*.'

Based on the field odour observations and the assessment, ERM noted that it cannot be concluded that there will be no odour at the nearest sensitive receptor locations at the Seaford Heights residential development as a result of the construction of the treated water storage dam as proposed. However, ERM concluded that the assessment shows that any odour would be very low level (low odour concentration and intermittent) and not of an offensive nature.

ERM recommend that an 'Operations Management Plan', that includes odour management, be developed for the treated water storage dam. Accordingly, the applicant will prepare an Operations Management Plan in association with the detailed design of the dam and this will include a requirement for routine water quality monitoring protocols and site inspections specifically targeting observation of odour for monitoring of performance. The Operations Management Plan will also provide information on preventative measures for maintenance of water quality and an incident response plan (should an odour event occur).

ERM conclude that '*With an effective Operations Management Plan in place, there is a low risk of elevated odour from the proposed treated water storage*'.

5.5.2 Noise

The proposed dam will be filled and emptied using the existing pumping infrastructure at the existing WBWC site at Quarry Road. On this basis, the new dam will not require pumping infrastructure to transfer water to and from the existing Quarry Road dam. Accordingly, no noise will be generated on site during the ongoing operation of the dam.

5.5.3 Vectors

The supply of recycled water is governed by SA Health and WBWC holds an approval from SA Health for the use of recycled water through the Willunga Basin Pipeline network pursuant to the *South Australian Public Health (Wastewater) Regulations, 2013*. A copy of the approval granted by SA Health to WBWC is attached at ***Appendix 10***. This approval includes, amongst other things, the provision for the storage of the treated water which includes (in Clause 9) the following requirement:

> *The storages are not to provide a source of offensive odours or nuisance conditions including breeding of vectors such as mosquitos.*

WBWC have consulted with SA Health on the construction of the dam and SA health advised that the design of the dam was consistent with SA Health's requirements for minimising impacts associated with nuisance vectors such as mosquitos. (Refer to correspondence from SA Health Attached at ***Appendix 11***).

The design of the proposed dam has been informed by the '*South Australian Integrated Mosquito Management Resource Package, 2006*' which has been prepared by SA Health as an informative guide for Mosquito Management Practitioners.

The guide includes criteria to be considered in the design and construction of artificial or man-made 'wetland' systems commonly constructed to control and treat stormwater and waste water and are not specifically tailed to a Dam for the storage of recycled water. Importantly wetlands comprise land or areas (such as marshes or swamps) that are covered often intermittently with shallow water or have soil saturated with moisture. A wetland is very different to a functional water storage dam that is designed with steep bank slopes, deep water and the absence of grasses and vegetation that is often used in wetlands to filter and improve water quality.

Notwithstanding, the design of the water storage dam has taken into consideration the following key design considerations for wetlands to assist with the management of mosquitos:

> *1. Where possible and to avoid any potential conflict between people and wetlands construction should occur away from 'people intensive' areas such as high density residential area, schools and aged care facilities. The location of the wetland should also take into account the possible dispersal of mosquitos species present in the area.*

The proposed Water Storage Dam is located on 'adjacent land' to the Vista Estate which is a master planned residential development. The guide does not include a recommended separation distance to a wetland and simply seeks to avoid any potential conflict. Given the water storage dam is not a wetland and includes the adoption of proposed design techniques to manage and control mosquitos, there is no outward impact arising from the proximity of this infrastructure to residential properties.

2. Wetlands should be constructed in open areas subject to wind action. Wind produces surface waves that aid in the disruption of larval respiration/adult oviposition and reduce the growth of algae and plants that provide protection for both adults and larvae.

The topography of the subject site forms a rolling hilltop that is open with good wind dispersion conditions at the elevated site.

Wind data for the subject site is located within the Odour Assessment prepared by ERM (attached at ***Appendix 9***). Wind data from the Noarlunga BoM weather station was utilised to inform the odour assessment and this weather station is located approximately 4km to the north of the proposed water storage dam. The Odour Assessment states '*However, it should be observed that Noarlunga BoM station is located in a windy location (very low frequency of low wind speeds) and that the proposed SRWRA storage dam site is located on hill top at a higher elevation than the Noarlunga weather station which should give greater exposure. This means that the site location can be expected to be windier that Noarlunga and this provides good dispersion conditions*.'

3. Shallow water and dense vegetation is attractive to mosquitoes whereas deeper, open water bodies with steep margins free from vegetation are less appealing as a habitat source.

The proposed dam will measure approximately 330 metres in length, 265m in width and 9.3 metres in depth and will be constructed with a 1 in 3 internal batter which will be lined with a high-density polyethylene (HDPE) liner manufactured from UV stabilised material. There will be an external 1 in 3 slope surrounding the dam which will be constructed with compacted earth and not vegetated with landscaping. The proposed dam is therefore a relatively large, deep and open water body with step margins free from vegetation and therefore will not be attractive to mosquitoes.

4. Wetlands should be greater than 60cm in depth overall and with steep sides to discourage mosquito breeding. Increased water depth will also enable fish predator species to inhabit the area.

As discussed, the proposed water storage dam is a deep (up to 8.5m) and relatively open water body with steep banks to discourage mosquitoes breeding

5. Maintain good water movement through the wetland to promote low mosquito populations, e.g. still water is more attractive to mosquitoes and prevents water from becoming stagnant (certain species are attracted to stagnant/polluted water).

A major operational feature of the dam is that it will be recurrently filled and emptied which will assist to enhance water quality and prevent the water from becoming stagnant and attractive to mosquitoes.

6. The use of sprinkler systems which may inhibit or reduce adult oviposition and aeration systems to disturb the water surface making it unsuitable for larvae.

Given the design features of the proposed water storage dam and the recurrent filling and emptying of the dam it will not be necessary to install other aeration systems to disturb the water surface and make it unsuitable for larvae.

> *7. Removal or the periodic control of excess vegetation from areas such as drains, dams and wetlands will in many cases provide increased water movement, predator access for larval control and a reduction in shelter for both adults and larvae.*

The proposed water storage dam and internal embankments will remain free from vegetation that could offer shelter for both adults and larvae.

> *8. Choose vegetation that will not vigorously invade the water body or the surrounding banks and requires minimal maintenance.*

The proposed water storage dam and embankments will remain free from vegetation.

> *9. Drains should be designed so that silt is prevented from building up and water is unable to pond.*

Not relevant to the proposed water storage dam.

> *10. Any maintenance required to the wetland system including drainage systems should be undertaken in a manner that ensures further mosquito habitats are not created, e.g. wheel ruts.*

The proposed water storage dam would be regularly accessed for monitoring and maintenance with a weekly inspection and a biannual program of vegetation control.

> *11. Regular surveillance and monitoring of the wetland and surrounding area (pre and post wetland establishment) to determine mosquito abundance and species type (Department of Medical Entomology (b), 1998).*

The proposed water storage dam would be regularly accessed for monitoring and maintenance with a weekly inspection and a biannual program of vegetation control.

5.5.4 Water Quality

Daphnia

Experience with other wastewater storage dams indicates that daphnia is the most likely water quality issue of concern. Daphnia are small crustaceans that live off natural occurring algae in all types of water storages. Daphnia do not pose a public health concern but cause problems in irrigation systems as they block drippers and filters.

WBWC filters the water supplied to customers from the dam on-site with the backwash water returned to the dam. The most effective control is to ensure the dam is filled and emptied on a regular cycle as refilling the lagoon introduces water which is free from daphnia.

This is consistent with the normal operating approach adopted by WBWC for its water storage facilities.

Filamentous Algae

Filamentous algae are colonies of microscopic plants that link together to form threads or mesh-like filaments. These primitive plants normally grow on the surface of hard objects or other substrates under the water, but they can break loose and form floating mats. Whilst unsightly, they are not a threat to public health particularly given the secure environment of the proposed water storage facility preventing public access to the algae.

The algae generally becomes a food source for Daphnia and as such an algal event is more likely to lead to a Daphnia event which will be managed as outlined above.

5.6 Traffic and Access

Traffic considerations associated with the proposed development include road widening requirements to Victor Harbor Road, proposed access arrangements to the site as well as traffic generation and the capacity of the existing road network to accommodate the traffic generated by the proposed development.

5.6.1 Road Widening (Victor Harbor Road)

The Department of Planning Transport and Infrastructure (DPTI) have advised that the subject site is affected by a road widening requirement shown on the Metropolitan Adelaide Road Widening Plan. The plan shows a possible requirement for a strip of land up to 35m in width from the Victor Harbor Road frontage of this site for future road purposes. This requirement caters for a possible future duplication of Victor Harbor Road at this location. Although the exact nature and timing of this proposal has yet to be determined (and no funding has been committed), the consent of the Commissioner of Highways under the Metropolitan Adelaide Road Widening Plan Act is required to all building works on or within 6m of the possible requirement.

The proposed dam wall batters and landscape batter slopes are all setback further than 35m from the Victor Harbor Road reserve and therefore it is not anticipated that the proposed development will impact on potential future road widening of this road.

5.6.2 Traffic Generation

General Operations

Existing traffic volumes on both Bakewell Drive and Ostrich Farm Road are low and are likely to be in the order of 100 vehicles per day and comprising mainly refuse type vehicles accessing the adjacent SRWRA site.

During general operations, it is anticipated that a single utility vehicle would access the site of the proposed water storage dam a few times per week for general site security and maintenance.

The traffic volume generated by the proposed development would therefore be insignificant, even considering the relatively low existing traffic volumes on the adjoining road network. On this basis, the traffic volume

generated by the proposed development is not likely to impact the current operation of the adjoining road network or its intersections.

During Construction

During construction, earthmoving equipment and other construction and delivery vehicles will access the site. Given the earth excavated to create the dam will be used to form the dam wall batters and on-site landscaping (i.e. a neutral balance of cut and fill) it is not anticipated that material will be removed from the site and large construction equipment will remain on-site for the duration of construction works. On this basis, relatively low traffic generation associated with the construction of the facility is expected. Once a contractor is engaged for the construction activity, as part of a Site Management Plan the contractor will be required to prepare a Traffic Management Plan which outlines how vehicles are to access the site. Where required, this plan could consider the need to install work zone traffic management along Bakewell Drive to manage the interface between construction traffic and through traffic.

5.6.3 Proposed Vehicle Access

Proposed vehicle access to the site is via a single crossover to Bakewell Road which is located adjacent the eastern boundary of the site. This access crossover is approximately 235m west of the vehicle access driveway into the SRWRA and will be designed to ensure adequate clearance and sight lines for vehicles entering and exiting the site. The proposed access will cater for vehicle movements in all directions and has been designed to accommodate access and egress for a standard utility vehicle.

5.7 Landscaping

5.7.1 Arboriculture & Native Vegetation Assessment

Arborman Tree Solutions undertook an inspection of the site on Monday 24 September 2018 to determine the presence of possible Regulated or Significant Trees on site pursuant to the *Development Act, 1993* and to determine if any vegetation clearance on-site requires approval from the Native Vegetation Council pursuant to the *Native Vegetation Act, 1991*.

The report prepared by Arborman (***Appendix 12***) confirms that there are no Regulated or Significant Trees on site and therefore Development Plan Consent is not required for the removal (tree damaging activity) of any existing trees on site.

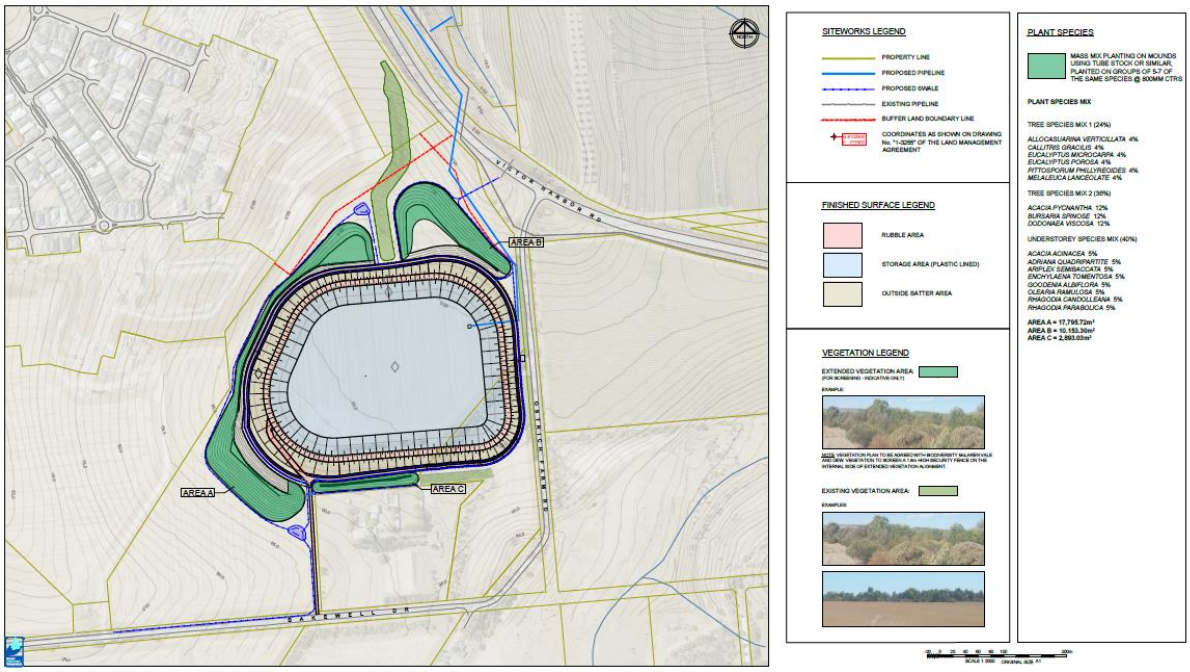
In addition, Arborman Tree Solutions have confirmed that the trees planted in a wind break adjacent the southern boundary of the site are juvenile planted specimens and their clearance is not controlled under the *Native Vegetation Act, 1991.*

Accordingly, no approval is required for the removal of any existing vegetation on site to accommodate the proposed new dam.

5.7.2 *Landscape Design*

A landscape plan has been prepared by Wax Design Pty. Ltd. and is reproduced in ***Figure 5.1*** below and also attached with the 'Visual Impact Assessment' dated 17 October 2018 (refer to ***Appendix 13***).

Figure 5.1 *Landscape Master Plan (Wax Design dated 17 October 2018)*



As described in Section 5.1 above, adjacent the proposed dam embankment will be a series of constructed earth mounds of varying heights (depending on existing ground level) between 1.5m – 7.8m at a slope of 1 in 4. These will be constructed using the excess fill excavated for the dam and will be vegetated with site appropriate plant species. The plant species have been selected to match those planted within the existing 'Buffer Zone Landscaping Area' which was established on site (and will be retained) to screen urban development in the Vista Estate from Victor Harbor Road.

The Landscape Master Plan nominates a mix of landscape species to be established across approximately 3.08 hectares of the site on the constructed earth mounds surrounding the proposed dam. The approach replaces the existing arable cropping land with trees and shrubs to reflect the pockets of remnant vegetation east of Victor Harbor Road and will result in a significant improvement to the landscape character by returning native vegetation to the site.

The mix, composition and proportion of proposed landscape species to be planted on site is identified in ***Table 5.1*** below.

The proposed mass mix planting on mounds will be established using tube stock (or similar) planted in groups of 5-7 of the same species at 800mm centres.

Table 5.1 *Plant Species (Composition and Mix)*

Tree Species (Mix 1)	**24%**	**Tree Species (Mix 2)**	**36%**	**Understorey Species Mix (40%)**	**40%**
Allocasurina Verticillata	4%	Acacia Pycnantha	12%	Acacia Acinacea	5%
Callitris Gracilis	4%	Bursaria Spinose	12%	Adriana Quadripartite	5%
Eucalyptus Microcarpa	4%	Dodonaea Viscosa	12%	Ariplex Semibaccata	5%
Eucalyptus Porosa	4%			Enchylaena Tomentosa	5%
Pittosporum Phillyreoides	4%			Goodenia Albiflora	5%
Melaleuca Lanceolate	4%			Olearia Ramulosa	5%
				Rhagodia Candolleana	5%
				Rhagodia Prabolica	5%

5.8 Stormwater Management

A Stormwater Management Plan has been prepared by Tonkin Consulting and is attached at ***Appendix 14***.

The proposed Stormwater Management Plan has been prepared taking into consideration the requirements of the City of Onkaparinga (Council) as well as other relevant authorities and policies including:

- The Onkaparinga Council Development Plan;
- The Western Mount Loft Ranges Water Allocation Plan; and
- McLaren Vale Water Allocation Plan.

Hydrological modelling was undertaken with sub-catchments defined and delineated using topographical data. The time of concentration for each sub-catchment were subsequently estimated based on flow path lengths and slopes and utilisation of an appropriate run-off coefficient. As expected, the steeper batter slopes and more formalised drainage paths (swales) associated with the proposed development resulted in lower times of concentration for the smaller catchments in the post-development scenario.

The results of this modelling demonstrated that:

- The post-development major and minor event flow rates for the north-east and north-west sub-catchments do not exceed the flow rates for the pre-development scenario (i.e. the slight increase in impervious area is off-set by the reduction in catchment size given the proposed dam will capture and retain all water that falls onto its surface); and
- The runoff for the southern catchment is higher for the post-development scenario and therefore a detention basin will be required to reduce the peak flows from this catchment.

A DRAINS model was then utilised to determine that a detention basin was required for the southern catchment comprising:

- A basin volume of 60 m^3;
- A basin depth of 0.6m; and
- An outlet pipe diameter of 375mm.

The modelling indicates that the basin configuration described above reduces the 10% AEP peak flows from the southern catchment to 74L/s which is less than the pre-development peak flows (82 L/s).

In relation to Water Quality, Tonkin Consulting consider that the operation of the proposed water storage dam will not impact on the water quality of runoff from the site with the design of the proposed dam incorporating the following features that will reduce pollutant loads leaving the site:

- The batters of the storage dam will be grassed which will act as buffer strips;
- The grassed swales used to convey flows to the discharge points will provide further treatment of the flow; and
- The proposed detention basin will provide additional water quality improvement for flows from the southern catchment.

A MUSIC (Model for Urban Stormwater Improvement Conceptualisation) model was also developed to provide an understanding of the likely quality of stormwater runoff from the site and concluded that the development will not negatively impact the water quality of downstream receiving waters.

A Stormwater Management Plan (SMP) has been prepared detailing the measures to manage stormwater discharged from the site and is reproduced in ***Figure 5.2*** *below.*

The key features of the stormwater management strategy include:

- The use of grassed swales to convey flows to the discharge points;
- A detention basin to limit peak flow rates from the southern catchment; and
- Vegetated batters.

The modelling undertaken as part of the development of the SMP by Tonkin Consulting confirms that the proposed measures comply with the requirements of the City of Onkaparinga.

Figure 5.2 *Stormwater Management Plan*



5.8.2 Western Mount Lofty Ranges Prescribed Water Resources Area

The subject site is also located within the McLaren Vale Prescribed Wells Area and specifically within the Surface Water Management Zone (SWMZ) O_OM12 within the catchment of the Onkaparinga River. On this basis, the development is therefore subject to the requirements of the Western Mount Lofty Ranges Water Allocation Plan (WAP). The WAP sets the amount of water that will be available, how that water may be allocated to users, and the types of activities that are permitted with that water.

The WAP sets out the maximum amount of surface water and watercourse water that can be taken within an SWMZ. The limit aims to ensure sufficient flows for environmental water provisions as well as for downstream users. Each SWMZ also has a diversion limit which is the "*total volume of surface water that can be collected or diverted by all dams and/or intercepted by existing and new commercial forests*."

Given the proposed dam is constructed in a 'Turkey nest' configuration and is not located within a watercourse, the dam will not capture any 'surface water' (water flowing across the ground surface) and is therefore not likely to require a licence for the operation of a new water storage facility under the Western Mount Lofty Ranges Water Allocation Plan.

5.8.3 McLaren Vale Water Allocation Plan

The site is also situated within the McLaren Vale Prescribed Wells Area and is therefore subject to the conditions of the McLaren Vale Water Allocation Plan. This WAP pertains to the taking and use of groundwater.

Given the proposed development does not involve the extraction of ground water, it is not anticipated that a licence would be required in association with the proposed operations of the water storage dam.

6. Project Benefits

6.1 Employment and Economic Value

According to University of Adelaide's Kym Anderson, "*Economic Contributions and Characteristics of Grapes and Wine in Australia's Wine Regions*" 2009, 719 people were employed in grape growing in McLaren Vale in 2006 and 1,803 in winemaking. We know there was about 9,000 ML of irrigation water used at that time to support about 6,250Ha of vines with a crush of 56,000 tonnes.

On this basis, we can interpolate that about 80 full time on farm jobs and 200 winery jobs per 1,000ML of irrigation water used.

Given the proposed water storage dam will be 600ML the regional benefits from this project would be:

1. Preserve/create 48 full time on farm jobs and 120 winery jobs.
2. Preserve/create 3,750 tonnes of premium grape production worth $5.5M in farm gate revenue annually (average price of $1,500/tonne),
3. Preserve/create 2.25M bottles of premium wine production annually, worth $33.75M annually in bottled wine sales (average price of $15/bottle)

This excludes the benefits to the tourism sector from the sustainable management of the regions water resources.

6.1.1 Employment Impact

In 2009 'Property Insights' examined the economic impact of investing one million dollars in property investment on behalf of the Urban Development Institute of Australia (UDIA). Whilst applying to property development more broadly, this report provides a useful guide to the economic value and impact of the proposed water storage dam.

6.1.2 Employment During Construction

According to Property Insights, every-one million dollars of development industry investment in South Australia generates 6.9 full time equivalent development industry jobs. Development industry investment also indirectly supports jobs in a range of other industries. For everyone million dollars of development industry investment, the combined direct and indirect employment impact is fourteen (14) full time equivalent jobs.

The proposed water storage dam represents development industry investment of approximately $5.4M and applying the above metrics the direct employment impact of the development is estimated at approximately 37 development industry jobs. When indirect employment impacts are taken into account, the total employment impact of the development is estimated at approximately 76 full time equivalent jobs.

6.1.3 Employment Upon Operation

The treated water storage is a relatively passive operational asset and WBWC will not need to employ additional operational staff as a direct result of this development. Notwithstanding, the additional treated water supplied by this facility will enable or sustain significant regional employment in the wine industry in both grape and wine production.

As has been discussed the project also provides the catalyst for WBWC expanding its treated water pipeline network into Blewitt Springs as well as enabling additional customer connections to be made within the existing network. In total WBWC has a 5-year plan with an estimated $10M in infrastructure investment including the treated water storage dam. The remaining expenditure is predominantly in pipeline installation which is currently performed by local contractors. This further adds to the potential for job creation arising from the proposed development.

6.1.4 Wages and Salaries

Property Insights estimates that a one million dollar investment in the development industry generates wages and salaries of $256,287 within the development industry.

The indirect impact on wages and salaries arising from development industry activity is substantial, estimated at an additional $344,997 for every one million dollars of investment. The combined direct and indirect impact on wages and salaries is therefore estimated at $601,284 per million dollars of investment.

Applying the above metrics, the proposed water storage dam is estimated to generate direct wages and salaries of $1.38M and total (direct and indirect) wages and salaries of $3.25M.

6.1.5 State and Federal Taxes

Development industry activity attracts a range of State and Federal taxes. Property Insights estimates that for every million dollars of development industry investment, direct taxes of $62,921 are generated. When indirect taxation impacts are considered, total taxes generated by one million dollars of development industry investment is estimated at $143,281.

Applying these metrics, the direct tax impact of the proposed water storage dam is estimated at $340K and the total tax impact, including direct and indirect impacts, is estimated at $774K.

6.2 Environmental Benefits

6.2.1 Environmental Impact of Proposal

The proposed development will ensure a more efficient use of a limited resource and delivers strong environmental and community value by reducing the discharge of treated effluent to the Gulf St Vincent and by replacing water that would otherwise be taken from a stressed groundwater resources and the River Murray.

6.2.2 Sea Grass Preservation

Pursuant to the South Australian EPA seagrass is commonly lost when nutrient levels in the water increase. These nutrients cause a large number of epiphytes to grow on the seagrass leaves, causing them to become too heavy and to break off. The nutrients also encourage more microscopic algae to grow in the water, reducing the amount of light getting to the seagrass, particularly in the deeper regions. Over 50 km² of seagrass have been lost from the Adelaide metropolitan coastline. This has been attributed to the effects of discharges such as sewage effluent and sludge and also stormwater.

The Adelaide Coastal Water's Study (ACWS) was a large-scale scientific study undertaken from 2001 to 2007 on Adelaide's coastal waters investigating seagrass loss, decline in water quality and sea floor instability.

The study included the production of 20 technical reports and a final report which contained 14 recommendations was released in February 2008 (*Fox et al 2007*). The top two recommendations are summarised below:

Recommendation #1

> *As a matter of priority, steps must be taken to reduce the volumes of wastewater, stormwater, and industrial inputs into Adelaide's coastal environment. This should be done within the context of an overarching strategy designed to remediate and protect the metropolitan coastal ecosystem.*

Recommendation #2

> *The total load of nitrogen discharged to the marine environment should be reduced to around 600 tonnes (representing a 75% reduction from the 2003 value of 2400 tonnes).*

The proposed water storage dam will directly reduce the discharge of treated effluent to the Gulf St Vincent with concomitant benefits to marine ecology and biodiversity consistent with these two recommendations.

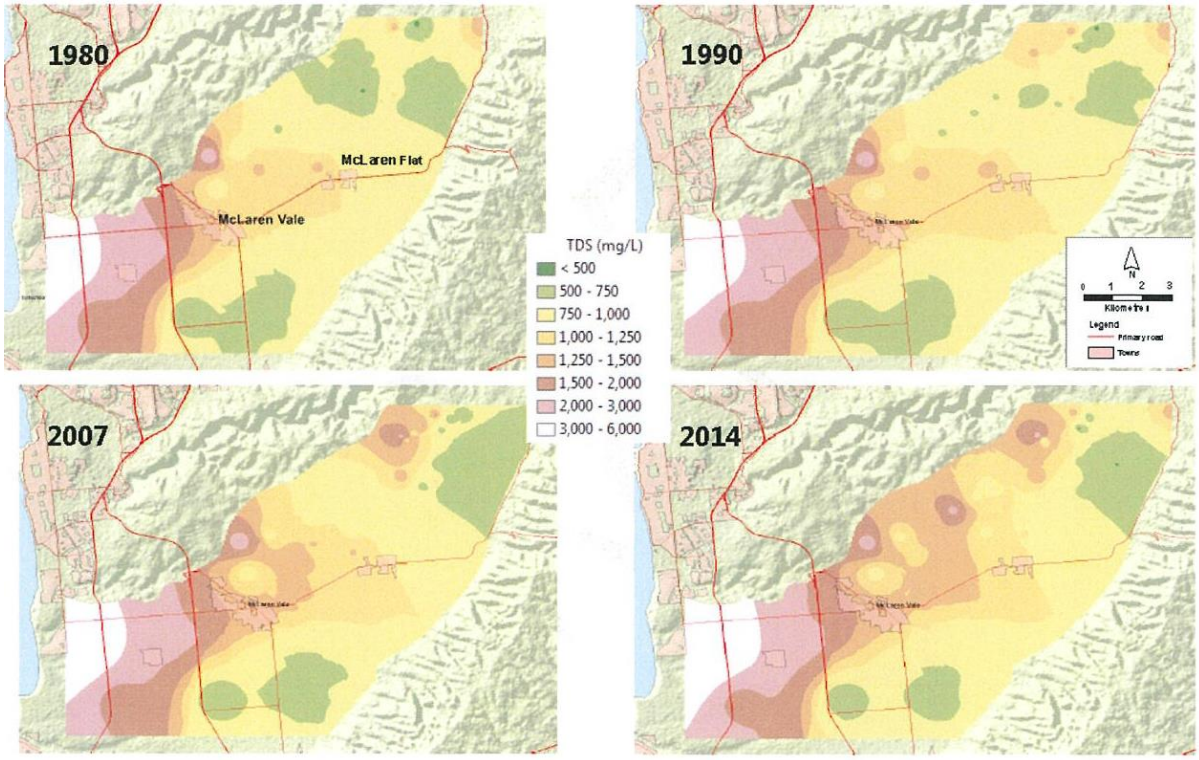
6.2.3 Reduced Ground Water Extraction

The McLaren Vale Prescribed Wells Area was proclaimed in 1999 and the water allocation plan has been in place since 2002. Despite actual yield averaging 4,400 ML, well below the 6,600 ML maximum allocation yield under the McLaren Vale PWA Water Allocation Plan, the basin is still under stress in some areas and is not suitable for additional large-scale extraction.

Recent investigations from the Department of Environment and Water (DEW) have identified a progressive increase in the salinity of the groundwater in the Pirramimma and Masin Sands aquifers which are located in the northern part of the McLaren Vale region. Salinity trends from 1990 to 2014 are shown below indicating significant parts of these aquifers are yielding groundwater with a salinity in excess of 1,500mg/L. These salinities are marginal for grape production and prohibitive for premium grape production.

In particular, the Piramimma Sands aquifer which extends into the Blewitt Springs region has seen considerable degradation since 2007. This is consistent with the increased demand for treated water from WBWC from irrigators in this region. The treated water provided by WBWC has a salinity level in the range of 650 – 850mg/L which is ideally suited to premium wine production. The treated water storage facility will act as a catalyst for WBWC expanding its pipe network into the Blewitt Springs region which will give these irrigators access to a sustainable, good quality, alternate water source.

Figure 6.1 *Time series map of groundwater salinity in the Maslin Sands aquifer (Source: Department of Environment and Water, 2018)*



7. Development Plan Assessment

The subject site is located within both the **Primary Production Zone** and the **Deferred Urban Zone** of the City of Onkaparinga, as referenced within the Onkaparinga Development Plan (Consolidated 20 December 2018).
The primary production Zone generally seeks the long-term continuation of primary production whilst the Deferred Urban Zone generally accommodates a restricted range of rural uses that are not prejudicial to development of the land for future urban purposes.
The subject site is also located within the **Character Preservation District Overlay** of the Onkaparinga Development Plan. This is a district where:

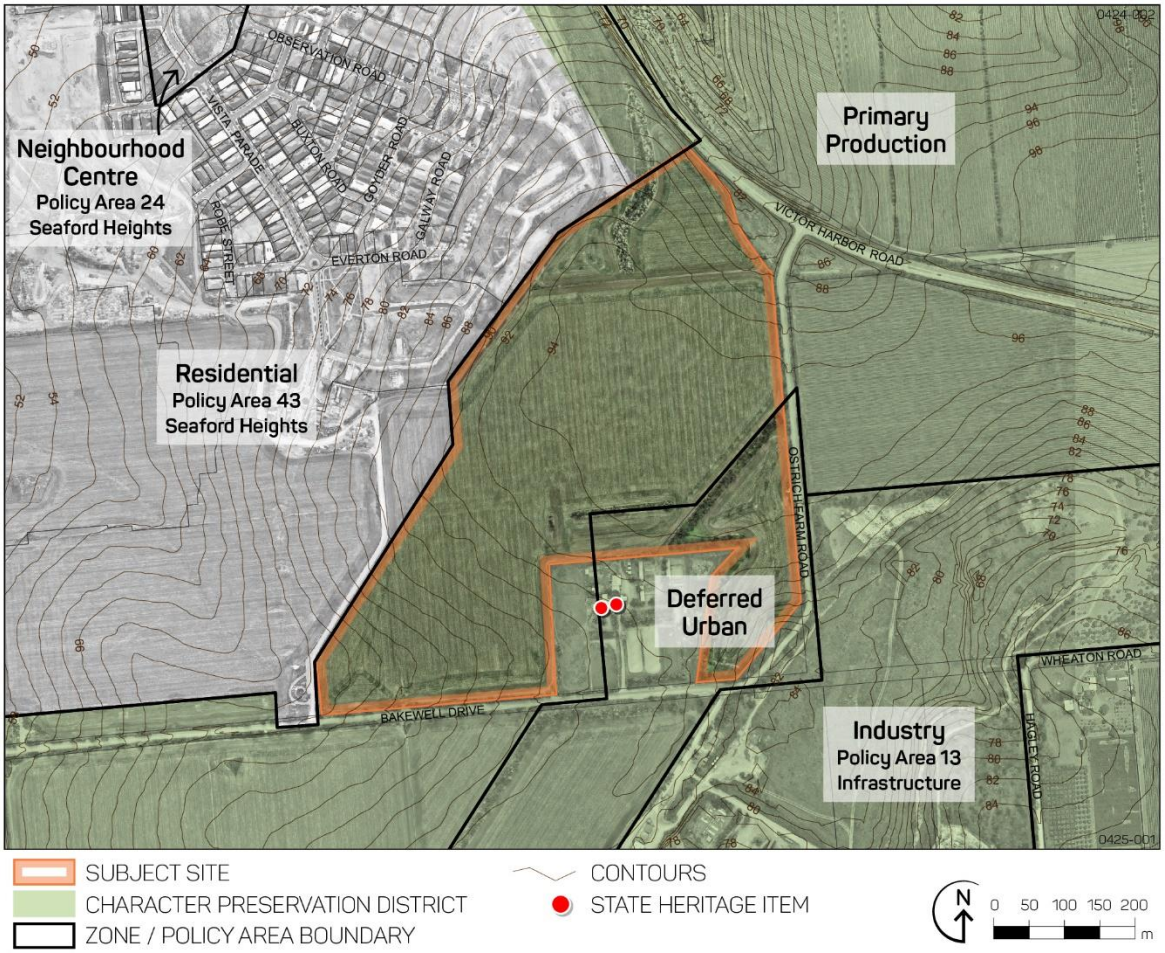
- scenic and rural landscapes are highly valued, retained and protected;
- development near entrances to towns and settlements does not diminish the rural setting, character and heritage values associated with those towns and settlements;
- the long term use of land for primary production and associated value adding enterprises is assured and promoted;
- activities positively contribute to tourism;
- the heritage attributes of the district are preserved; and
- buildings and structures complement the landscape.

The site is also subject to the ***Character Preservation (McLaren Vale) Act, 2012*** which provides measures to protect and enhance the special character of the McLaren Vale region while providing for the economic, physical and social wellbeing of the communities within the district. The Onkaparinga Development Plan was amended in 24 February 2013 to include the 'Heritage and Character Preservation District Overlay' which largely reflects the identified character values of the *Character Preservation (McLaren Vale) Act, 2012*

To the immediate west of the site is the 'Seaford Heights Policy Area 43' of the 'Residential Zone'.

The site location in the context of the zone and policy framework is provided in ***Figure 7.1*** over page.

Figure 7.1 *Zoning and Policy Area of Subject Site*



In addition, the subject site is also located within the:

- The **McLaren Vale Prescribed Wells Area**; and
- The **Western Mount Lofty Ranges Prescribed Water Resource Area.**

Development within the McLaren Vale Prescribed Wells Area and the Western Mount Lofty Ranges Prescribed Water Resource Area should not adversely affect the quality or quantity of water resources within these areas.

The McLaren Vale Prescribed Wells Area and the Western Mount Lofty Ranges Prescribed Water Resource Area are demonstrated spatially within ***Figure 7.2*** and ***Figure 7.3*** respectively.

Figure 7.2 *McLaren Vale Prescribed Wells Area*

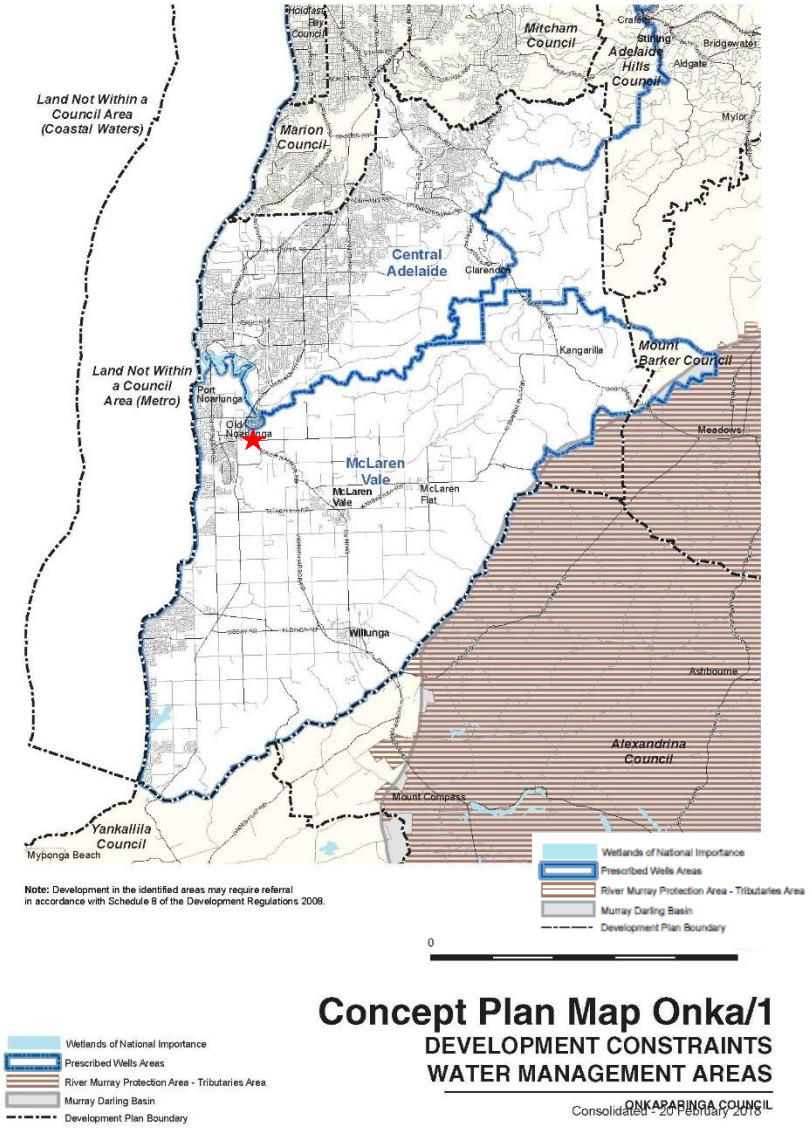
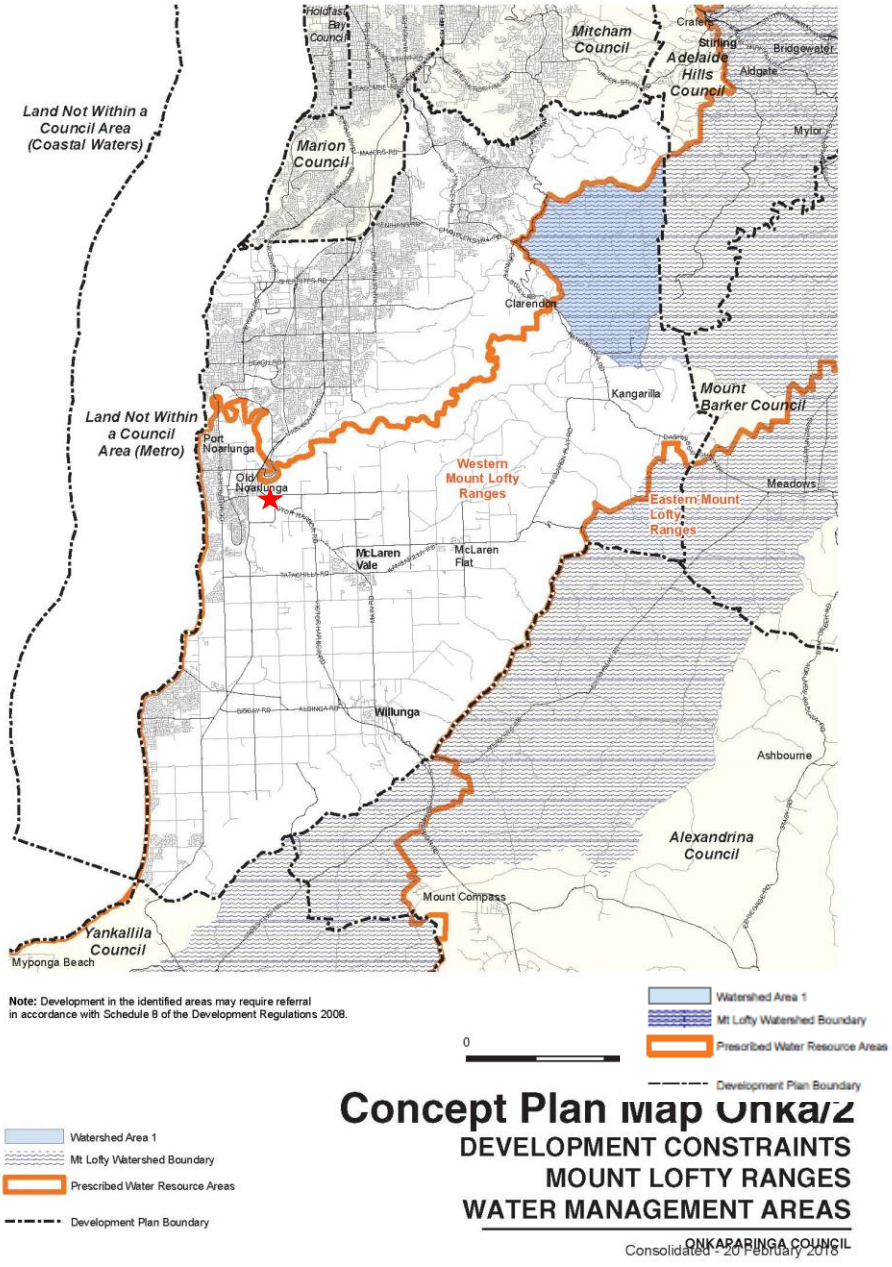


Figure 7.3 *Western Mount Lofty Ranges Prescribed Water Resource Area.*



An assessment of the relevant Development Plan provision is outlined below.

7.2 Land Use

The proposed water storage dam is a form of public infrastructure involving the storage and supply of water.

The suitability of the proposed use of the land for a water storage dam within both the Primary Production Zone and Deferred Urban Zone is discussed below.

7.2.1 Primary Production Zone

Some of the key provisions of the Primary Production Zone directly relating to the use of land within the Primary Production Zone are reproduced below:

OBJ 1 *The long term continuation of primary production where natural resources are not jeopardised.*

OBJ 2 *Economically productive, efficient and environmentally sustainable primary production.*

OBJ 4 *Protection of primary production from encroachment by incompatible land uses and protection of scenic qualities of rural landscapes.*

OBJ 5 *The extension of the economic base of the region in an environmentally sensitive and sustainable manner.*

OBJ 8 *Encouragement of the establishment of appropriately scaled 'value added' commercial activities to utilise local rural production, including the establishment of niche market products, within suitable areas and resulting in minimal landscape intrusion and environmental impact.*

OBJ 9 *The maintenance and enhancement of the natural resources of the zone.*

Desired Character Statement

Much of the area is suitable for a range of agricultural production, notably vines, grazing, cropping, almonds, strawberries and other similar foods including niche market products. Accommodation of associated 'value added' industries in appropriate locations is envisaged, along with appropriately scaled tourism infrastructure.

PDC 4 *Development within the zone should be compatible with its use as a water catchment and storage area, and with its values as an area of agricultural production and scenic quality.*

PDC 5 *Development should ensure that genuine agricultural activities are not prejudiced.*

PDC 6 *Development which would remove productive land from agriculture or diminish its overall productivity for primary production should not be undertaken unless the land is required for essential public purposes.*

PDC 7 Primary production should be carried out having regard to water conservation, the preservation of bushland remnants and landscape beauty.

Water storage dams are common place in Primary Production Zones however a water storage dam of this size and capacity is not specifically contemplated or nominated as an envisaged land use within the Primary Production Zone.

Whilst the proposed water storage dam will result in the removal of some land utilised for primary production cropping, it will provide an additional source of irrigation water to support the growing demand for water from the region's expanding viticulture and horticultural industries within the Primary Production Zone.

The proposed treated water storage dam will enable an additional 600ML of treated water to be distributed by WBWC in summer. Further, the completion of the treated water storage will provide additional treated water to WBWC to expand its pipeline into Blewitt Springs thereby providing an alternate water source to irrigators in this region who are suffering from deteriorating groundwater salinity.

The proposed development therefore directly satisfies Objective 1 and 2 of the Zone by contributing to the long term continuation of primary production within the region without jeopardising natural resources and promoting economically productive, efficient and environmentally sustainable primary production.

In accordance with Objective 5 of the Primary Production Zone the proposed water storage dam will also allow for the sustainable expansion of existing viticulture and horticulture in the region in an environmentally sensitive and sustainable manner. The proposed development will directly extend and expand the economic base of the region with direct regional benefits from the proposed 600ML water storage dam including:

- The preservation/creation of 48 full time on farm jobs and 120 winery jobs;
- The preservation/creation of 3,750 tonnes of premium grape production worth $5.5M in farm gate revenue annually (average price of $1,500/tonne); and
- The preservation /creation of 2.25M bottles of premium wine production annually, worth $33.75M annually in bottled wine sales (average price of $15/bottle)

In accordance with Principle of Development Control 5 of the Primary Production Zone the proposed development will support and not prejudice agricultural activities within the Zone. Further, in accordance with Principle of Development Control 7 of the Primary Production Zone the proposed storage and ultimate distribution of treated water will assist to conserve water and reduce stress on existing aquifers used for agricultural irrigation whilst providing irrigators with access to a sustainable, good quality, alternate water source.

The proposed development is also compatible with Principle of Development Control 4 of the Primary Production Zone which acknowledges that the Zone is used as a water catchment and storage area and does not prejudice the values of the area in regard to agricultural production and scenic quality (to be discussed in Section 7.3 below).

Whilst the proposed development will remove an existing small portion of land currently used for agriculture, the land will be utilised for a water storage dam which is a form of public infrastructure (for the supply and distribution of water) which is directly aligned with Principle of Development Control 6 of the Primary Production Zone.

Accordingly, the proposed development is highly aligned with the Primary Production Zone and whilst the proposed development will result in a very small loss of land utilised for primary production cropping it will provide water storage that will support and intensify higher value agricultural use of surrounding primary production land.

7.2.2 Deferred Urban Zone

The Deferred Urban Zone represents a narrow strip of land (approximately 200 metres in width) at the north-west interface with the Southern Regional Waste Resource Authority (SRWRA) which is one of the State's major landfill operations currently receiving over 100,000 tonnes of waste annually. As stated in the Seaford Heights Development Plan Amendment by the Minister dated 26 May 2011, the Deferred Urban Zone provides a buffer to landfill operations on the SRWRA site. Following closure, remediation and management of the SRWRA site (including requirements to suitably manage possible land fill gas migration), the Deferred Urban Zone could arguably be rezoned to accommodate future urban expansion when it is no longer required as a buffer.

Notwithstanding, it is noted that the entirely of the Deferred Urban Zone (in this location) and the surrounding Primary Production Zone is located within the *Heritage and Character Preservation District Overlay* and is subject to the *Character Preservation (McLaren Vale) Act, 2012*. This Act provides measures to protect and enhance the special character of the McLaren Vale region and restricts the creation of additional residential development in the rural areas of the districts to halt urban sprawl to the south of Adelaide's built-up area.

Given the Deferred Urban Zone is now located within the Character Preservation District Overlay and is separated from the Seaford Heights Residential Zone by the Primary Production Zone, it may arguably never be rezoned for urban purpose.

The proposed Water Storage Dam therefore represents an appropriate and economic use of the land within the Deferred Urban Zone which acts as an effective 'buffer' between residential Development within the 'Vista' estate and the ongoing land fill operations on the adjacent SRWRA site.

The more relevant provisions of the Deferred Urban Zone that directly relate to the use of land for public infrastructure in the form of a Water Storage Dam are reproduced below:

OBJ 1 ***A zone accommodating a restricted range of rural uses that are not prejudicial to development of the land for urban purposes and maintain the rural appearance of the zone.***

OBJ 2 ***A zone comprising land to be used primarily for broad-acre cropping and grazing purposes until required for future urban expansion.***

OBJ 3 *Prevention of development likely to be incompatible with long-term urban development, or likely to be detrimental to the orderly and efficient servicing and conversion of the land for urban use.*

Desired Character

The zone primarily comprises land for future urban expansion. While the zoning is to be regarded as a holding measure with its ultimate use not yet determined, development within the zone will generally comprise low-scale agricultural uses that do not prejudice the orderly conversion of the land for residential purposes.

It is envisaged that development will only occur following the rezoning of the land and the completion of detailed structure planning to ensure an orderly extension of existing urban areas and to prevent the creation of isolated communities that are remote from infrastructure and services.

PDC 1 *The following forms of development are envisaged in the zone:*

- *broad-acre cropping*
- *grazing.*

PDC 2 *Development listed as non-complying is generally inappropriate.*

PDC 3 *Development should not be undertaken if it will be prejudicial to the orderly and economic development of future urban land uses within the zone.*

The proposed water storage dam is a form of public infrastructure which will provide an appropriate and economic use of land in the Deferred Urban Zone that forms an effective 'buffer' between the adjoining Seaford 'Vista' estate and the SRWRA land fill facility.

Given the location of the site within the Character Preservation District Overlay and the ongoing statutory framework provided by the recent introduction of the *Character Preservation (McLaren Vale) Act, 2012,* it is unlikely that the Deferred Urban Zone will now be rezoned for future urban purposes. Accordingly, the proposed development is unlikely to prejudice the orderly and economic development of future urban land uses within the Zone.

Further, in the unlikely event that the land within the Deferred Urban Zone is rezoned for urban purposes, the proposed water storage dam would not result in outward impacts (i.e. noise, odour, air quality etc) that would restrict or prevent the balance of land within this Zone being used for future urban purposes.

7.3 Character Preservation District Overlay

As discussed, the subject site is located within the Character Preservation District Overlay of the Onkaparinga Development Plan.

The following relevant Objective and Principle of Development Control of the Character Preservation District Overlay is relevant to the use of land for public infrastructure in the form of a Water Storage Dam.

OBJ 1 *A district where:*

(a) scenic and rural landscapes are highly valued, retained and protected

(b) development near entrances to towns and settlements does not diminish the rural setting, character and heritage values associated with those towns and settlements

(c) the long term use of land for primary production and associated value adding enterprises is assured and promoted

(d) activities positively contribute to tourism

(e) the heritage attributes of the district are preserved

(f) buildings and structures complement the landscape.

PDC 1 *Development in the district should:*

(a) when located near townships, contribute towards and maintain the identity of those townships

(b) retain the predominant rural landscape character and function

(c) foster primary production and associated value adding enterprises and tourism activities.

The proposed water storage dam has been carefully designed with landscape mounds which will be constructed adjacent the dam embankment and will disrupt views of the embankment. The mounds are proposed to be planted with native vegetation and will increase the amenity of the proposed development from viewpoints on Victor Harbor Road and Bakewell Drive. These features will replace the existing arable cropping land with trees and shrubs, complementing existing pockets of remnant vegetation east of Victor Harbor Road. The proposed development will therefore '*retain the predominant rural landscape character'* as outlined in Principle of Development Control 1.

The proposed water storage dam will also assure and promote the long-term use of land for primary production within the Character Preservation District by providing an additional source of irrigation water to support the growing demand for water from the region's expanding viticulture and horticultural industries. The storage and

supply of additional water for the purposes of primary production in the district will also foster further primary production and associated value adding enterprises as envisaged by Objective 1 and PDC 1.

7.4 Built Form, Landscape & Visual Impact

The visual impact of the proposed development is closely related to the proposed built form composition of the dam and associated landscape treatments that have been proposed to screen the development and preserve the visual character of the locality.

The following provisions of the Development Plan are most relevant to the built form and landscape composition of the development and its resultant visual impact on the locality.

Primary Production Zone

OBJ 4 Protection of primary production from encroachment by incompatible land uses and protection of scenic qualities of rural landscapes

PDC 16 The excavation and/or filling of land should:

(a) be kept to a minimum and be limited to no greater than 1.5 metres so as to preserve the natural form of the land and the native vegetation

(b) only be undertaken in order to reduce the visual impact of buildings, including structures, or in order to construct water storage facilities for use on the allotment

(c) only be undertaken if the resultant slope can be stabilised to prevent erosion

(d) result in stable scree slopes which are covered with top soil and landscaped so as to preserve and enhance the natural character or assist in the re-establishment of the natural character of the region.

PDC 17 Driveways and access tracks should follow the contours of the land so as to reduce their visual impact and erosion from water run-off and be surfaced with dark materials.

PDC 19 Buildings, including structures, should be located in unobtrusive locations and, in particular, should be located:

(a) on an excavated rather than a filled site in order to reduce the vertical profile of the building

(b) in such a way as to maximise the retention of existing native vegetation and the protection and retention of watercourses.

PDC 20 Buildings, including structures, should be designed in such a way and be of such a scale as to be unobtrusive and not detract from the desired rural character of the zone:

(a) the mass of buildings should be minimised by variations in wall and roof lines and by floor plans which complement the contours of the land

(b) large eaves, verandas and pergolas should be incorporated into designs so as to create shadowed areas which reduce the bulky appearance of buildings

(c) the mass of buildings should be minimised by having separate vehicle storage areas.

PDC 31 *Development should be undertaken with the minimum effect on natural features, land adjoining water, scenic routes or scientifically attractive areas.*

PDC 38 *Visually prominent structures associated with agricultural activities and intensive animal keeping should not be developed on exposed land and on scenic routes.*

PDC 40 *Excavation and earthworks should take place in a manner that is not extensively visible from surrounding localities.*

PDC 41 *The appearance of land, buildings and objects should not impair the amenity of the locality in which they are situated.*

PDC 42 *The rural character, comprising natural features and man-made activities, should be preserved by careful siting, design and landscaping of new building development and/or intensive land uses.*

PDC 43 *Buildings or structures should be sited unobtrusively and be of a character and design which will harmonise with the landscape.*

PDC 61 *Landscaped buffers located adjacent a residential or urban zone should be designed taking into account the nature, source and frequency of potential adverse impacts; prevailing winds in the locality; topography of the area; existing vegetation and the presence of potentially sensitive adjacent uses*

Council Wide

Design and Appearance

OBJ 1 *Development of a high design standard and appearance that responds to and reinforces positive aspects of the local environment and built form*

Infrastructure

OBJ 2 *The visual impact of infrastructure facilities managed.*

Landscaping, Fences and Walls

OBJ 1 *The amenity of land and development enhanced with appropriate planting and other landscaping works, using locally indigenous plant species where possible.*

OBJ 2 *Functional fences and walls that enhance the attractiveness of development*

PDC 7 *Landscaping for non-residential development should be undertaken in accordance with Table Onka/6 - Landscaping Guidelines for Non-Residential Development.*

Screening and buffers	1	Screen plantings and materials should be provided for visual separation between service areas or a common boundary between residential and commercial activities.
	2	A densely vegetated landscaped buffer should be provided between development which is industrial or commercial in nature and any adjacent residential land.

Site character	1	The function of landscaping usually extends beyond utilitarian purposes to establish an image or sense of place described herein as 'site character'.
	2	Good visual balance and welcoming, pleasant surroundings are key elements to a positive outcome; blending natural and man-made forms to relate more closely to the 'human' scale.
	3	Landscaping should be the deliberate outcome of a defined desired character, rather than an experiment of random elements.
Establishment and maintenance	1	Plantings within bays should allow room for growth and movement.
	2	Landscaped areas should be fully irrigated until the plants are established or self sufficient.
	3	Mulching should be provided to improve site presentation, moderate soil conditions and act as a weed suppressant.

Siting and Visibility

PDC 1 Development should be sited and designed to minimise its visual impact on:

(a) the natural, rural or heritage character of the area

(b)...

PDC 4 *Buildings and structures should be designed to minimise their visual impact in the landscape, in particular:*

(a) the profile of buildings should be low and the roof lines should complement the natural form of the land

(b) the mass of buildings should be minimised by variations in wall and roof lines and by floor plans which complement the contours of the land

(c) large eaves, verandas and pergolas should be incorporated into designs so as to create shadowed areas that reduce the bulky appearance of buildings.

PDC 9 *Development should be screened through the establishment of landscaping using locally indigenous plant species:*

(a) around buildings and earthworks to provide a visual screen as well as shade in summer, and protection from prevailing winds

(b) along allotment boundaries to provide permanent screening of buildings and structures when viewed from adjoining properties and public roads

(c) along the verges of new roads and access tracks to provide screening and minimise erosion

Sloping Land

OBJ 1 *Development on sloping land designed to manage visual impacts, minimise impacts on the natural environment and protect soil stability and water quality.*

PDC 7 *The cutting and/or filling of land outside townships and urban areas should:*

(a) be kept to a minimum and be limited to a maximum depth or height no greater than 1.5 metres so as to preserve the natural form of the land and the native vegetation

(b) only be undertaken in order to reduce the visual impact of buildings, including structures, or in order to construct water storage facilities for use on the allotment

(c) only be undertaken if the resultant slope can be stabilised to prevent erosion

(d) result in stable scree slopes which are covered with top soil and landscaped so as to preserve and enhance the natural character or assist in the re-establishment of the natural character of the area.

The proposed dam will be compatible with the use of the area for water catchment and storage, whilst maintaining scenic quality within the locality

As described in Section 5 above, the dam will be constructed as a 'turkey's nest' with the top of the dam embankment elevated above the natural ground level of the subject land. The dam will sit approximately 5 metres higher than the existing ground level. As a result of the sloping site, the dam embankments vary in height above ground level, varying between 4.6m to 7.7m.

The dam will be constructed with a 1 in 3 internal batter which will be plastic lined. There will be an external 1 in 3 slope surrounding the dam which will be constructed with compacted earth. Engineering requirements state that these embankments must be free of vegetation. At the base of this dam embankment will be an access road, security fencing and a swale to collect stormwater runoff.

Adjacent the dam embankment and access road will be a series of constructed earth mounds of varying heights (depending on existing ground level) between 1.5m – 7.8m at a slope of 1 in 4. These will be constructed using the excess fill excavated for the dam and will be vegetated with plants and trees in order to minimise visual impacts of the dam embankment.

The mounds are proposed to be vegetated with site appropriate plant species (refer to Section 5.7.2 above) which are currently present within the existing 'Buffer Zone Landscaping Area' on site.

The visual effect of the proposed development is therefore mitigated through the addition of a series of vegetated landscape mounds in front of the dam embankments. The mounds have been designed in positions which screen views of the dam embankment from viewpoints along Victor Harbor Road and Bakewell Drive as well as the 'Vista' residential housing estate. The mounds will respond to the local topography and landscape character by presenting as a series of low hills with vegetation.

The introduction of the new landscape into the locality will be appreciated within the context of the wider landscape character. Existing ridgelines and hills to the north and east are covered with belts of vegetation and trees that contribute to the local landscape character. The proposed mounds and vegetated treatments aim to replicate these existing landscape features, providing areas of vegetation over elevated landforms.

The proposed development has been designed to create an extension of the existing 'Buffer Zone Landscaping Area' and vegetated horizon line when viewed from Main South Road and the Vista residential housing estate.

The development of the site offers the opportunity to increase the vegetation character and screening associated with the land management agreement buffer planting area. The use of native species together with complementary tree and shrub species, will significantly increase the landscape amenity, removing the monoculture of the existing arable cropping and replacing it with a diverse native vegetation character that will increase the visual amenity as well as provide increased habitat biodiversity.

As the dam will be elevated above the surrounding locality, the water within the dam will not be visible from any external points and in combination with the proposed landscape mounds, there will not be any indication that the subject land contains a water storage dam.

A 'Visual Impact Assessment' of the development has been prepared by WAX Design and considers the visibility of the proposed development and the contribution to the amenity of the locality that the proposed development will make.

The Visual Impact Assessment is attached in ***Appendix 13*** and confirms that the proposed series of vegetated landscape mounds to the north, west and south as well as the retention of the existing tree line to the east will adequately screen the proposed development from views on Victor Harbor Road, Bakewell Drive and from the adjacent Vista residential housing estate. WAX Design conclude that the subject land will be viewed as a series of landscape mounds with vegetated ridges above the existing arable land which is reminiscent of the surrounding locality which contains many vegetated ridges, hills, vineyards and cropping land.

In accordance with Council Wide 'Siting and Visibility' PDC 9, the proposed development will therefore be effectively screened through the establishment of native vegetation on landscaped mounds that will provide permanent visual screening of the structure from adjoining properties and roads.

The Visual Impact Assessment also includes a series of photomontages providing an indication of the visual effects of the development at the following three (3) external viewpoints:

1. Victor Harbor Road;
2. Bakewell Drive; and
3. The Vista Residential Housing development (Corner of Edison & Cotterell Road).

WAX Design confirm that the photomontages only provide an indication of the visual effects of the development and should be taken into consideration alongside the visual assessment discussion and analysis within the broader Visual Impact Assessment.

Figure 7.4 *Visual Impact Assessment – Viewpoint locations*



Figure 7.5 *Viewpoint 1 – Victor Harbor Road*



Existing viewpoint



Artists impression of proposed development superimposed on to existing viewpoint.

Figure 7.6 *Viewpoint 2 – Bakewell Road*



Existing viewpoint



Artists impression of proposed development superimposed on to existing viewpoint.

Figure 7.7 *Viewpoint 3 – Vista Estate (Corner of Edison & Cotterell Road)*



Existing viewpoint



Artists impression of proposed development superimposed on to existing viewpoint.

It is acknowledged that Primary Production Zone PDC 16(a) and Council Wide 'Sloping Land' PDC 7 identify that the excavation and/or filling of land should be kept to a minimum and be limited to no greater than 1.5 metres so as to preserve the natural form of the land and the native vegetation. Whilst the proposed development includes mounds that are larger than anticipated in the zone (up to 7.8 metres in height), they are being constructed in response to the underlying topography of the land and will be used to introduce significant areas of native vegetation. The construction of the dam will result in large amounts of excess fill which will be used to form the mounds, reducing the visual impact of the dam embankment and protecting the character of the locality. Consistent with Primary Production Zone PDC 16(b) and Council Wide 'Sloping Land' PDC 7 the proposed retention of fill on site has been undertaken in order to reduce the visual impact of the structure and to construct water storage facilities on the site.

7.5 Interface with Sensitive Development

The following provisions of the Onkaparinga Development Plan are considered most relevant to the assessment of the interface of the proposed development with adjoining sensitive land uses.

Primary Production Zone

PDC 61 Landscaped buffers located adjacent a residential or urban zone should be designed taking into account the nature, source and frequency of potential adverse impacts; prevailing winds in the locality; topography of the area; existing vegetation and the presence of potentially sensitive adjacent uses.

Council Wide

Interface Between Land Uses

OBJ 1 *Development located and designed to minimise adverse impact and conflict between land uses.*

OBJ 2 *Protect community health and amenity from adverse impacts of development.*

OBJ 3 *Protect desired land uses from the encroachment of incompatible development.*

PDC 1 *Development should not detrimentally affect the amenity of the locality or cause unreasonable interference through any of the following:*

(a) the emission of effluent, odour, smoke, fumes, dust or other airborne pollutants

(b) noise

(c) vibration

(d) electrical interference

(e) light spill

(f) glare

(g) hours of operation

(h) traffic impacts.

PDC 11 *Development with the potential to emit harmful or nuisance-generating air pollution should incorporate air pollution control measures to prevent harm to human health or unreasonable interference with the amenity of sensitive uses within the locality*

The potential impacts associated with the development of a water storage dam are generally limited to possible noise, air quality (odour), traffic (during site construction and operation) and vibration (during dam construction). Each matter is addressed respectively below.

7.5.1 Air Quality (Odour)

An 'Odour Assessment' of the water storage dam has been undertaken by ERM (refer to ***Appendix 9*** and Section 5.5.1 above) and was based on field odour observations at current treated water storage facilities in the area of the proposed dam location. ERM have concluded that any odour associated with the proposed dam would be very low level (low odour concentration and intermittent) and not of an offensive nature.

In addition, ERM observed that the proposed water storage dam is proposed on a hill top providing good exposure and good dispersion conditions. Further, it is noted that the proposed Water Storage Dam

incorporates a series of vegetation landscape mounds which will separate and provided a 'buffer' between the proposed dam and the closest adjoining sensitive residential development to the west and south in accordance with Primary Production Zone PDC 61.

7.5.2 Noise

As previously discussed in Section 5.5.2 above, the proposed dam will be filled and emptied using the existing pumping infrastructure at the existing WBWC site at Quarry Road. The new dam will therefore not require new pumping infrastructure to transfer water to and from the existing Quarry Road dam. Accordingly, no noise will be generated on site during the ongoing operation of the dam.

7.5.3 Traffic Impacts

Existing traffic volumes on both Bakewell Drive and Ostrich Farm Road are relatively low (approximately 100 vehicles per day). During general operations, it is anticipated that a single utility vehicle would access the site of the proposed water storage dam a few times per week for general site security and maintenance. The traffic volume generated by the proposed development would therefore be relatively insignificant, even considering the relatively low existing traffic volumes on the adjoining road network. On this basis, the traffic volume generated by the proposed development is not likely to impact the current operation of the adjoining road network or its intersections.

During construction, earthmoving equipment and other construction and delivery vehicles will access the site. Given the earth excavated to create the dam will be used in the dam wall batters and on-site landscaping (i.e. a neutral balance of cut and fill) it is not anticipated that material will be removed from the site. On this basis, it is anticipated that there will be a relatively low traffic generation associated with the construction of the facility. Once a contractor is engaged for the construction activity, as part of a Site Management Plan the contractor will be required to prepare a Traffic Management Plan which outlines how vehicles are to access the site. Where required, this plan could consider the need to install work zone traffic management along Bakewell Drive to manage the interface between construction traffic and through traffic.

7.5.4 Vibration

A 'Geotechnical Investigation Report' and 'Construction Report' has been prepared by SMEC and is attached at ***Appendix 7 and Appendix 8 respectively.***

The geotechnical investigations have revealed that the natural clay soils on site are expected to be generally excavatable using conventional machinery such as excavators and dozers. Slower production rates would be expected in the residual soils and the very low strength weathered rocks. Should medium strength siltstone be encountered the use of specialist rock breaking equipment may be required. However, SMEC note the need for the use of drill and blast techniques for excavation is not considered likely.

On this basis, it is not anticipated that vibration during construction of the proposed dam will detrimentally affect the amenity of the locality nor result in vibration damage to adjoining residential buildings or outbuildings during construction.

7.6 Infrastructure

The following provisions of the Onkaparinga Development Plan are considered most relevant to the development of infrastructure assessment of the interface of the proposed development with adjoining sensitive land uses.

Council Wide

Infrastructure

PDC 11 Utility buildings and structures should be grouped with non-residential development, where possible

Orderly and Sustainable Development

PDC 6 Development should be located and staged to achieve the economical provision of public services and infrastructure, and to maximise the use of existing services and infrastructure.

In accordance with Council Wide 'Infrastructure' PDC 11 and 'Orderly and Sustainable Development' PDC 6 the proposed dam is located adjacent and in close proximity to WBWC's Quarry Road dam and pump station (opposite the site over Victor Harbor Road) to maximise the efficiency of the existing recycled water storage network and infrastructure.

The proximity of the proposed dam to the existing Quarry Road dam and pump station and its connectivity to the existing recycled water network is a key factor in the selection and suitability of the subject site for the proposed water storage dam.

Recycled water received at Quarry Road is proposed to be pumped to the new dam for storage, and gravity fed back to the Quarry Road site when it is needed for sale to customers. WBWC have an existing pipe that crosses Victor Harbour Road in the road reserve adjacent to the proposed dam site which enables the treated water to be transferred into the proposed dam via a minor pipe extension. A separate gravity transfer pipe will be installed to transfer the water back to the existing Quarry Road dam for pumping by the existing Quarry Road Pump Station. This avoids the need for pumping of water from the proposed dam site.

7.7 Transportation and Access

The following provisions of the Onkaparinga Development Plan are considered most relevant to the traffic and transport assessment of the proposed development.

Primary Production Zone

PDC 17 Driveways and access tracks should follow the contours of the land so as to reduce their visual impact and erosion from water run-off and be surfaced with dark materials.

Sloping Land

PDC 1 Development and associated driveways and access tracks should be sited and designed to integrate with the natural topography of the land and minimise the need for earthworks.

PDC 2 Development and associated driveways and access tracks, including related earthworks, should be sited, designed and undertaken in a manner that:

(a) minimises their visual impact

(b) reduces the bulk of the buildings and structures

(c) minimises the extent of cut and/or fill

(d) minimises the need for, and the height of, retaining walls

(e) does not cause or contribute to instability of any embankment or cutting

(f) avoids the silting of watercourses

(g) protects development and its surrounds from erosion caused by water runoff

PDC 3 Driveways and access tracks across sloping land should be accessible and have a safe, all-weather trafficable surface.

Siting and Visibility

PDC 8 Driveways and access tracks should be designed and surfaced to blend sympathetically with the landscape and to minimise interference with natural vegetation and landforms.

PDC 9 Development should be screened through the establishment of landscaping using locally indigenous plant species:

(c) along the verges of new roads and access tracks to provide screening and minimise erosion.

Transportation and Access

OBJ 2 Development that:

(a) provides safe and efficient movement for all transport modes

(b) ensures access for vehicles including emergency services, public infrastructure maintenance and commercial vehicles

(c)…

PDC 22 Development should have direct access from an all-weather public road.

PDC 23 Development should be provided with safe and convenient access which:

(a) avoids unreasonable interference with the flow of traffic on adjoining roads

(b) provides appropriate separation distances from existing roads or level crossings

(c) accommodates the type and volume of traffic likely to be generated by the development or land use and minimises induced traffic through over-provision

(d) is sited and designed to minimise any adverse impacts on the occupants of and visitors to neighbouring properties.

PDC 29 Driveways, access tracks and parking areas should be designed and constructed to:

(a) follow the natural contours of the land

(b) minimise excavation and/or fill

(c) minimise the potential for erosion from surface runoff

(d) avoid the removal of existing vegetation

(e) be consistent with Australian Standard AS: 2890 - Parking facilities.

During general operations, it is anticipated that a single utility vehicle would access the site of the proposed water storage dam a few times per week for general site security and maintenance. Given there is no public access to the site and only a single utility vehicle would visit the site at any one time, it is not proposed to provide any car parking on site.

The existing traffic volumes on both Bakewell Drive and Ostrich Farm Road are low and are likely to be in the order of 100 vehicles per day. Given the very low traffic generated by the development (one utility vehicle several times a week) and the relatively low existing traffic volumes on the adjoining road network, the traffic volume generated by the proposed development is not likely to impact the current operation of the adjoining road network or its intersections.

During construction, earthmoving equipment and other construction and delivery vehicles will access the site. Given the earth excavated to create the dam will be used to form the dam wall batters and on-site landscaping (i.e. a neutral balance of cut and fill) it is not anticipated that material will be removed from the site. On this

basis, it is anticipated that there will be a relatively low traffic generation associated with the construction of the facility. Once a contractor is engaged for the construction activity, as part of a Site Management Plan the contractor will be required to prepare a Traffic Management Plan which outlines how vehicles are to access the site. Where required, this plan could consider the need to install work zone traffic management along Bakewell Drive to manage the interface between construction traffic and through traffic.

Proposed vehicle access to the site is via a single crossover to Bakewell Drive which will be designed to ensure adequate clearance and sight lines for vehicles entering and exiting the site. The proposed access will cater for vehicle movements in all directions and has been designed to accommodate access and egress for a standard utility vehicle.

Given the very limit number of traffic movements generated by the development the proposed 3.0m wide vehicle access driveway into the site and around the upper circumference of the dam wall is proposed to be constructed with compacted rubble. In accordance with Council Wide 'Traffic and Access' PDC 23(d) and 'Sloping Land' PDC 1 and 2 the proposed access track around the upper circumference of the dam wall and around the base of the dam embankment will be effectively screened from the adjoining 'Vista' residential estate, Victor Harbor Road and Bakewell Drive by proposed landscape treatments including a series of mounds which will be constructed adjacent the dam embankment. The existing belt of established trees along Ostrich Farm Road to the east will also effectively limit the views of the dam and access road from this direction.

In accordance with Council Wide 'Traffic and Access' PDC 23, the proposed development therefore provides safe and convenient vehicle access which will not impact on the current operation of the adjoining road network or its intersections and has been designed to accommodate the volume and nature of traffic likely to be generated by the development.

7.8 Stormwater

The following provisions of the Onkaparinga Development Plan are considered most relevant to the assessment of stormwater.

Hazards - Flooding

PDC 6 *Development should not be undertaken in areas liable to inundation by tidal, drainage or flood waters unless the development can achieve all of the following:*

(a) it is developed with a public stormwater system capable of catering for a 1-in-100 year average return interval flood event

(b) buildings are designed and constructed to prevent the entry of floodwaters in a 1-in-100 year average return interval flood event.

PDC 7 *Development, including earthworks associated with development, should not do any of the following:*

(a) impede the flow of floodwaters through the land or other surrounding land

(b) increase the potential hazard risk to public safety of persons during a flood event

(c) aggravate the potential for erosion or siltation or lead to the destruction of vegetation during a flood

(d) cause any adverse effect on the floodway function

(e) increase the risk of flooding of other land

(f) obstruct a watercourse.

Natural Resources - Water Sensitive Design

PDC 5 *Development should be designed to maximise conservation, minimise consumption and encourage re-use of water resources.*

PDC 7 *Development should be sited and designed to:*

(a) capture and re-use stormwater, where practical

(b) minimise surface water runoff

(c) prevent soil erosion and water pollution

(d) protect and enhance natural water flows

(e) protect water quality by providing adequate separation distances from watercourses and other water bodies

(f) not contribute to an increase in salinity levels

(g) avoid the water logging of soil or the release of toxic elements

(h) maintain natural hydrological systems and not adversely affect:

(i) the quantity and quality of groundwater

(ii) the depth and directional flow of groundwater

(iii) the quality and function of natural springs.

PDC 8 *Water discharged from a development site should:*

(a) be of a physical, chemical and biological condition equivalent to or better than its pre-developed state

(b) not exceed the rate of discharge from the site as it existed in pre-development conditions.

PDC 9 *Development should include stormwater management systems to protect it from damage during a minimum of a 1-in-100 year average return interval flood.*

PDC 10 *Development should have adequate provision to control any stormwater over-flow runoff from the site and should be sited and designed to improve the quality of stormwater and minimise pollutant transfer to receiving waters.*

PDC 11 *Development should include stormwater management systems to mitigate peak flows and manage the rate and duration of stormwater discharges from the site to ensure the carrying capacities of downstream systems are not overloaded.*

PDC 12 *Development should include stormwater management systems to minimise the discharge of sediment, suspended solids, organic matter, nutrients, bacteria, litter and other contaminants to the stormwater system.*

PDC 13 *Stormwater management systems should preserve natural drainage systems, including the associated environmental flows.*

PDC 14 *Stormwater management systems should:*

(a) maximise the potential for stormwater harvesting and re-use, either on-site or as close as practicable to the source

Natural Resources - Water Catchment Areas

PDC 17 *Development located within any of the following areas should not adversely affect the quality or quantity of water resources:*

(a) 'River Murray Protection Area - Tributaries Area' designated on Concept Plan Map Onka/1 - Development Constraints - Water Management Areas

(b) 'Prescribed Wells Areas' designated on Concept Plan Map Onka/1 - Development Constraints - Water Management Areas

(c) 'Mount Lofty Watershed 1' designated on Concept Plan Map Onka/2 - Development Constraints Mount Loft Ranges Water Management Areas

(d) 'Prescribed Water Resource Areas' designated on Concept Plan Map Onka/2 - Development Constraints Mount Lofty Ranges Water Management Areas.

PDC 24 *The location and construction of dams, water tanks and diversion drains should:*

(a) occur off watercourse

(b) not take place in ecologically sensitive areas or on erosion prone sites

(c) provide for low flow by-pass mechanisms to allow for migration of aquatic biota

(d) not negatively affect downstream users

(e) minimise in-stream or riparian vegetation loss

(f) incorporate features to improve water quality (eg wetlands and floodplain ecological communities)

(g) protect ecosystems dependent on water resources.

Natural Resources - Soil Conservation

PDC 38 Development should be designed and sited to prevent erosion.

PDC 40 Development should minimise the loss of soil from a site through soil erosion or siltation during the construction phase of any development and following the commencement of an activity

A Stormwater Management Plan has been prepared by Tonkin Consulting and is attached at ***Appendix 14***.

The proposed Stormwater Management Plan has been prepared taking into consideration the requirements of the City of Onkaparinga (Council) as well as other relevant authorities. The proposed stormwater management system has been designed to mitigate peak flows and manage the rate and duration of stormwater discharges from the site to ensure the carrying capacities of downstream systems are not overloaded.

In accordance with Natural Resources, Water Sensitive Design, PDC 8 the proposed stormwater management system has been designed so that water discharged from the development site will:

- not exceed the rate of discharge from the site as it existed in pre-development conditions; and
- be of a physical, chemical and biological condition equivalent to or better than its pre-development state.

Tonkin consulting have undertaken MUSIC modelling which has concluded that the development will not negatively impact the water quality of downstream receiving waters and therefore in accordance with water Catchment Areas PDC 17 the proposed development will not adversely affect the quality of water resources in the McLaren Vale 'Prescribed Wells Area' or the Western Mount Loft Ranges 'Prescribed Water Resource Area'.

8. Conclusion

WBWC operates a large reclaimed water scheme in South Australia servicing the McLaren Vale, Willunga and Sellicks regions. WBWC is licensed to take treated water from SA Water's Christies Beach Wastewater Treatment Plant and pumps it via a network of more than 120 kilometres of pipelines to more than 220 irrigators in the McLaren Vale region. The treated water is principally used for drip irrigation of vines, fruit trees, nut crops and flowers (primary production) within the McLaren Vale region.

The capacity of WBWC to supply additional customers is currently limited by the availability of water to meet the peak summer demands. Accordingly, WBWC seeks Development Plan Consent for a new 600 ML Water Storage Dam on land located at Lot 108 in Deposited Plan 80592 and Lot 102 in Deposited Plan 46795 (Bakewell Drive, Seaford Heights). The purpose of the dam is to take and store recycled water purchased from SA Water at the Christies Beach WWTP at times when there is low demand for irrigation water (winter), and then distribute that recycled water to customers in times of high demand (summer).

The completion of the treated water storage will provide additional treated water to WBWC to expand its pipeline into Blewitt Springs thereby providing an alternate water source to irrigators in this region who are suffering from deteriorating groundwater salinity. The proposed development will also ensure a more efficient use of a limited resource and delivers strong environmental and community value by reducing the discharge of treated effluent to the Gulf St Vincent and by replacing water that would otherwise be taken from a stressed groundwater resources and the River Murray.

The proposed 600ML water storage dam will also result in significant regional economic and employment benefits including:

- Preservation /creation of 48 full time on farm jobs and 120 winery jobs;
- Preservation /creation of 3,750 tonnes of premium grape production worth $5.5M in farm gate revenue annually (average price of $1,500/tonne), and
- Preservation /creation of 2.25M bottles of premium wine production annually, worth $33.75M annually in bottled wine sales (average price of $15/bottle).

This excludes the benefits to the tourism sector from the sustainable management of the regions water resources.

Following an inspection of the subject site and locality, a review of the proposed plans and associated documentation accompanying the application and a detailed assessment of the proposed development against the relevant provisions of the Onkaparinga Council Development Plan, we have formed the opinion that the proposed development represents appropriate and orderly development that deserves favourable consideration for approval.

In particular, we note that:

- The proposed water storage dam is aligned with the **Primary Production Zone** given it will:
  - support and not prejudice agricultural activities within the Zone and will allow for the sustainable expansion of existing viticulture and horticulture in the region in an environmentally sensitive and sustainable manner.
  - store and facilitate the distribution of treated water which will assist to conserve water and reduce stress on existing aquifers used for agricultural irrigation whilst providing irrigators with access to a sustainable, good quality, alternate water source;
  - not prejudice the values of the area with respect to agricultural production and scenic quality;
  - result in a very small loss of land utilised for primary production cropping but will provide public infrastructure for the supply and distribution of water that will support and intensify higher value agricultural use of surrounding primary production land.
- The proposed water storage dam is an appropriate land use in the **Deferred Urban Zone** given the context of the subject site and surrounds and given:
  - it represents an appropriate and economic use of the land in a Zone that acts as an effective 'buffer' between residential Development within the 'Vista' estate and the ongoing land fill operations on the adjacent SRWRA site;
  - the location of the site within the Character Preservation District Overlay and the ongoing statutory framework provided by the recent introduction of the *Character Preservation (McLaren Vale) Act, 2012,* suggests that it is unlikely that the Deferred Urban Zone will now be rezoned for future urban purposes and therefore the proposed development is unlikely to prejudice the orderly and economic development of future urban land uses within the Zone;
  - irrespective, if the land within the Deferred Urban Zone is ultimately rezoned for urban purposes, the proposed water storage dam would not result in outward impacts (i.e. noise, odour, air quality etc) that would restrict or prevent the balance of land within this Zone being used for future urban purposes.
- In accordance with the **Character Preservation District Overlay** the proposed water storage dam:
  - has been carefully designed with landscape mounds which will be constructed adjacent the dam embankment and will disrupt views of the embankment and '*retain the predominant rural landscape character*'.
  - will assure and promote the long-term use of land for primary production within the Character Preservation District by providing an additional source of irrigation water to:
    - support the growing demand for water from the region's expanding viticulture and horticultural industries; and
    - foster further primary production and associated value adding enterprises;

- The proposed development will not breach nor contravene an existing '**Development Deed**' applicable to the site (dated 7 November 2017) which requires that the land owner '*SRWRA must not cause, suffer or permit the receipt, handling, storage or disposal of waste on the Land*.
- The proposed development will not impact, damage or remove any landscaping in the 'Buffer Zone Landscaping Area' nor will it result in the change of the use of the 'Buffer Land' as defined within the **Land Management Agreement (LMA)** between the Minister for Planning and the land Owner (SRWRA) which applies to the land.
- The design of the proposed dam will follow appropriate elements of the **ANCOLD (*Australian National Commission on Large Dams*)** Guidelines on Consequence Categories for Dams (2012).
- The proposed water storage dam does not require an EPA license, however the facility has been designed in accordance with the '***EPA Guideline EPA509/14 – Wastewater Lagoon Construction***' and a '***Geotechnical Inspection and Testing Authority***' **(GITA)** will provide Level 1 supervision on-site during construction in accordance with AS3798:2007 to provide appropriate CQA (Construction Quality Assurance).
- **Geotechnical investigations** have revealed that the proposed dam is likely to be excavatable using conventional machinery such as excavators and dozers with some specialist rock breaking equipment and that the need for the use of drill and blast techniques for excavation is considered unlikely.
- A **Construction Environmental Management Plan (CEMP)** will be prepared following receipt of Development Approval and will describe how activities undertaken during the construction phase of development will be managed to avoid or mitigate negative environmental impacts on the site and how those environmental management requirements will be implemented.
- A **Traffic Management Plan** will be prepared as part of an overall 'Construction Environmental Management Plan' (CEMP) and will outline how vehicles are to access the site during construction.
- The **operation of the dam** will be undertaken by WBWC who:
    - has experience in the operations of similar dams including three (3) treated water storage dams adjacent to the Willunga Community Wastewater Management Scheme on Little Road, Willunga;
    - holds an approval from SA Health for the use of recycled water through the Willunga Basin Pipeline network pursuant to the *South Australian Public Health (Wastewater) Regulations, 2013*;
    - maintains an Irrigation Risk Management Plan (IRMP) in accordance with the '*Australian Guidelines for Water Recycling*' and EPA's Recycled Water Guidelines which provides for reporting of water use and operations to relevant regulatory authorities;
    - will constantly monitor water consumption using data loggers on each customer meter, as well as 24x7 monitoring of water flows in the network via their '*Supervisory, Control and Data Acquisition*' (SCADA) system;
    - will maintain a network of shallow observation wells for monitoring leakage or runoff from the storage dam; and

  - will maintain an 'Operations Management Plan' that will address standard operations, water quality monitoring to ensure water quality standards, mitigation measures for improvements to water quality if required and incident response procedures to ensure performance.

- Based on field odour observations and assessment undertaken by ERM it cannot be concluded that there will be no **odour** at the nearest sensitive receptor locations at the Seaford Heights residential development as a result of the construction of the treated water storage dam however ERM have concluded that the assessment shows that any odour would be very low level (low odour concentration and intermittent) and not of an offensive nature.
- No **noise** will be generated on site during the ongoing operation of the dam (with only minor stormwater pumps required to occasionally pump stormwater from on-site detention basins back into the water storage dam during and immediately following rain and storm events).
- The proposed dam design will be consistent with SA Health's requirements for minimising impacts associated with nuisance **vectors** such as mosquitos.
- The **traffic volume** generated by the proposed development are relatively insignificant and will not impact the current operation of the adjoining road network or its intersections.
- Relatively **low traffic generation is anticipated during construction** as earth excavated to create the dam will be used to form the dam wall batters and on-site landscaping (i.e. a neutral balance of cut and fill) and therefore it is not anticipated that material will be removed from the site.
- With the exception of a proposed stormwater swale and a buried inlet-outlet pipe to the quarry road pump station, the proposed development is setback further than 35 metres from Victor Harbor Road reserve and is therefore **unlikely to impact on potential future road widening** of this road.
- Arborman have confirmed that no approval is required for the removal of any **existing vegetation** on site to accommodate the proposed new dam given:
  - there are no Regulated or Significant Trees on site;
  - the trees planted in a wind break adjacent the southern boundary of the site are juvenile planted specimens and their clearance is not controlled under the *Native Vegetation Act, 1991.*
- A '**Visual Impact Assessment**' of the development has been prepared by WAX Design and confirms that:
  - the proposed series of vegetated landscape mounds to the north, west and south of the proposed dam as well as the retention of the existing tree line to the east will adequately screen the proposed development from views on Victor Harbor Road, Bakewell Drive and from the adjacent Vista residential housing estate;
  - following development of the dam and the establishment of proposed landscape treatments the subject land will be viewed as a series of landscape mounds with vegetated ridges above the existing arable land which is reminiscent of the surrounding locality which contains many vegetated ridges, hills, vineyards and cropping land;

- » the proposed development has been designed to create an extension of the existing 'Buffer Zone Landscaping Area' and vegetated horizon line when viewed from Main South Road and the Vista residential housing estate; and
- » there will not be any indication that the subject land contains a water storage dam as the dam will be elevated above the surrounding locality and suitably screened with proposed landscape mounds,

- Tonkin Consulting have confirmed that the proposed **stormwater management system** has been designed so that water discharged from the development site will:

  - » not exceed the rate of discharge from the site as it existed in pre-development conditions; and
  - » be of a physical, chemical and biological condition equivalent to or better than its pre-development state.

The proposed development is therefore adequately aligned with the most relevant provisions of the Onkaparinga Development Plan and warrants Development Approval, subject to reasonable and relevant conditions.

SMEC
Member of the Surbana Jurong Group

local people
global experience



DRAFT GEOTECHNICAL INVESTIGATION REPORT

SRWRA Storage Seaford

Reference No. 3005628
Prepared for Hydroplan
18 June 2018

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The information within this document is and shall remain the property of Hydroplan.

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The report supersedes all previous draft or interim reports, whether written or presented orally, before the date of this report. This report has not and will not be updated for events or transactions occurring after the date of the report or any other matters which might have a material effect on its contents or which come to light after the date of the report. SMEC is not obliged to inform you of any such event, transaction or matter nor to update the report for anything that occurs, or of which SMEC becomes aware, after the date of this report.

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1 Introduction

A geotechnical investigation has been undertaken by SMEC Australia at the location of the proposed Willunga Basin Water storage project at Seaford Heights, South Australia. The project locality is shown on Figure 1.

The objective of the investigation was to provide Hydroplan with a broad understanding of the foundation, excavation and earthworks conditions for a proposed 700 ML water storage to be located on Ostrich Farm Road.

SMEC understands that Hydroplan is looking for a site for a Willunga Basin Water storage for the Southern Region Waste Resource Authority (SRWRA) with the capacity of 700ML. The concept design is for a site at Seaford Heights on Ostrich Farm Road at the top of a hill, which is located above a new subdivision, the Victor Harbor Road and neighbouring properties. Excavations within the subdivision infer a weathered profile of siltstones and sandstone at depth, which are inferred to extend under the water storage facility.

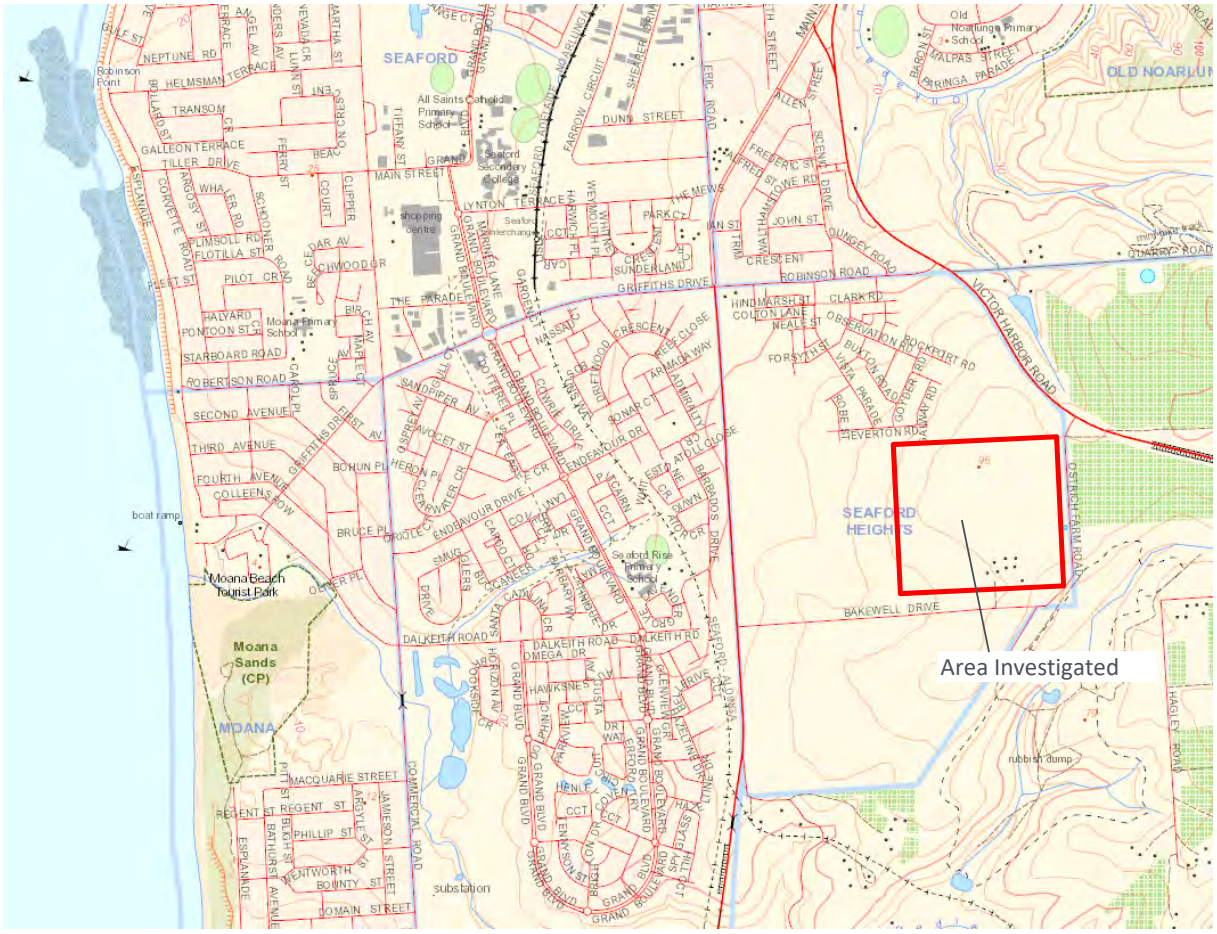


Figure 1: Project Location

[Image Source: Department of State Development, the Government of South Australia, SARIG (South Australian Resources Information Gateway) https://map.sarig.sa.gov.au/ accessed May 2018]

2 OUTLINE OF THE SITE INVESTIGATION

2.1 Field Investigation

The field investigation was carried out on 21 May and 22 May 2018 and comprised drilling four boreholes (denoted BH1 to BH4) to a target depth of 8 m. The boreholes were drilled by subcontractor Drilling Solutions using a truck mounted drilling rig and the HQ diamond coring technique.

The boreholes were positioned to provide a broad coverage of the proposed storage area. The field investigation was completed in general accordance with AS1726:2017 Geotechnical Site Investigations, and was supervised by an experienced Geotechnical Engineer from SMEC. The boreholes were backfilled with spoil following completion of the site investigation.

A plan of the boreholes is included in Appendix A. Representative site photographs are presented in Appendix B. Engineering logs of the boreholes are contained in Appendix C. The position of the boreholes was recorded on site using a hand-held GPS unit and has been reported on the logs.

2.2 Laboratory Testing

Samples were collected for laboratory testing and were submitted for testing at the NATA registered Golder laboratory in Adelaide. The purpose of the testing was to assess the physical and dispersive properties of the soil.

The following scope of testing was completed:

- 3 x Particle Size Distribution
- 3 x Atterberg Limits
- 3 x Emerson Class

3 SITE CONDTIONS

3.1 Site Description

The project site is located at Seaford Heights, approximately 31 km south of the Adelaide CBD. The site is bound to the east by Ostrich Farm Road, to the south by Bakewell Road, to the west by undeveloped farmland and to the north-west by a residential sub-division.

The topography of the local area consists of a series of undulating hills. The proposed water storage basin is located at the top of a hill and the terrain gently slopes away from a high point at the centre of the site (near BH1). At the time of investigation, the land was being used for agricultural purposes and the surface vegetation consisted of a low stubble, with rows of trees surrounding the perimeter of the field. Photographs of the site are included in Appendix B.

3.2 Regional Geology

The regional geology map (1:50,000 Noarlunga Sheet) shows undifferentiated Quaternary deposits at the surface including Hindmarsh Clay, Ngalinga Clay and a lower sand unit equivalent to the Carisbrook Sand, Ochre Cove Formation and Seaford Formation. The Hindmarsh/Ngalinga Formations comprise brown, red and olive clays and sandy clays with sand and gravel lenses.

The geology map indicates the upper clay soils are underlain by Proterozoic bedrock including:

- SEACLIFF SANDSTONE: Pale grey and red sandstone, quartzite and red siltstone
- BRACHINA FORMATION: Red and green siltstone and fine-grained sandstone
- REYNELLA SILTSTONE MEMBER: Mostly massive siltstone with small rock fragments
- WILMINGTON FORMATION: Massive, green-grey, fine-grained sandstone

It is understood that bedrock consistent with the above units has been intercepted at shallow depth during construction of the subdivision.

3.3 Subsurface Conditions

The subsurface conditions encountered in the boreholes were broadly consistent with the expected regional geology. The sub-surface soils can be broadly categorized into the following units listed in Table 1. The depth of the various units is summarised in Table 2.

Table 1: Summary of Encountered Soil Units

UNIT	DESCRIPTION
Topsoil (A Horizon):	Silty CLAY, dark brown with roots and other organics, trace to some sand.
Upper Clays (B Horizon)	Silty and Sandy CLAY, medium plasticity, pale brown mottle, with some sand and gravel
Hindmarsh / Ngalinga Clays	CLAY, high plasticity, grey mottled orange-brown and red-brown
Residual Soils	CLAY and CLAYEY SAND and with extremely to highly weathered fragments of the parent rock
Siltstone	Siltstone, red brown, orange brown and pale grey, indistinct fabric. Highly weathered and low strength at the top of the stratum, becoming moderately to slightly weathered and medium strength with depth. Encountered BH2 only.
Sandstone	Sandstone, orange brown, very low strength, highly to extremely weathered. Encountered BH4 only.

Table 2: Summary of sub-surface lithology

UNIT	BH1	BH2	BH3	BH4
Top Soil	0.0 m to ≈0.2 m	0.0 m to ≈0.2 m	0.0 m to ≈0.2 m	0.0 m to ≈0.2 m
Upper Clay	≈0.2 m - ≈2.5 m	≈0.2 m - 1.3 m	≈0.2 m - ≈2.5 m	≈0.2 m - ≈3.6 m
Hindmarsh / Ngalinga Clay	≈2.5 m - 7.5 m	Not Encountered	≈2.5 m - 7.8 m	Not Encountered
Clayey Sand	7.5 m – 8.0 m (EOH)	Not Encountered	7.8 - 8.06 m (EOH)	Not Encountered
Residual Soil		1.3 m – 1.6 m		3.6 m - 4.9 m
Siltstone / Sandstone		1.6 m – 8.1 m (EOH)		4.9 m - 8.0 m (EOH)

No groundwater was encountered within the depth investigated.

3.4 Dispersion Testing

Emerson Class laboratory testing was completed on three samples of the clays soils. The Emerson test divides soils up into eight classes based on their coherence in water (dispersion and slaking) and the presence of carbonate or gypsum.

The results of the testing were as follows:

- BH01 - 1.7 m to 2.0 m – **CLASS 4**, The remoulded soil does not disperse in water. Calcium carbonate (calcite) is present.
- BH01 - 2.7 m to 3.0 m and BH01 - 4.7 m to 5.0 m – **CLASS 2**, Air-dried crumbs of soil show a moderate to slight reaction. A moderate reaction consists of an easily recognizable cloud of colloids in suspension, usually spreading in thin streaks on the bottom of the beaker. A slight reaction consists of the bare hint of cloud in water at the surface of the crumbs.

The testing indicates that the soils below 2 m depth may be dispersive.

3.5 Soil Classification Testing

The results of soil classification testing are summarized in Table 3. The testing indicates the following soil properties:

- Clay soils with fines content (clays and silts) greater than 76%;
- High to very high plasticity, increasing with depth;
- Soils are highly reactive with respect to change in moisture content (linear shrinkage > 15%)

Table 3 : Summary of laboratory testing

TEST INTERVAL	SOIL DESCRIPTION	MOISTURE CONTENT %	PARTICLE SIZE DISTRIBUTION			ATTERBERG LIMITS		
			% Gravel	% Sand	% Silt and Clay	Liquid Limit (%)	Plasticity Index (%)	Linear Shrinkage (%)
BH01 1.7 m to 2.0 m	Clay, CH	21.7	1	19	80	56	36	15
BH01 2.7 m to 3.0 m	Clay, CH	31.0	0	24	76	69	49	16
BH01 4.7 m to 5.0 m	Clay, CH	32.3	0	20	80	81	58	16

3.6 Infiltration Rate

One in-hole infiltration test was completed at a depth of 5.5 m in a separate hole drilled adjacent to BH1. To conduct the test a solid casing was placed flush with the base of the hole. The casing was slightly pushed into the clay so the water didn't leak out horizontally. The PVC casing was then filled with water to the top of the hole and the rate of infiltration was measured over a period of two hours.

For this test an infiltration rate of 2.2 X 10^{-5} m/sec was calculated.

The above value represents an upper bound of the likely in-situ permeability. The value is indicative only as it is unclear if the soils surrounding the test holes reached full saturation. The true saturated in-situ permeability may be several magnitudes of order lower. The typical range of permeability for relatively homogeneous clays below the zone of weathering / effects of vegetation is 1 x 10^{-12} m/sec to 10^{-8} m/sec (Carter and Bentley (1991)). Further testing is recommended.

It is noted that the bedrock encountered at BH2 is includes numerous defects and seams spaced at 20 to 60 mm. As a result, the rock is likely to be relatively permeable.

3.7 Excavations and Earthworks

The natural clay soils encountered in the boreholes are expected to be generally excavatable using conventional machinery such as excavators and dozers. Slower production rates would be expected in the residual soils and the very low strength weathered rocks. Use of specialist rock breaking equipment will likely be required for excavation of the medium strength siltstone encountered in BH2 below 3 m depth.

Temporary batter slopes or benches in the clay soils shall be cut at no steeper than 1H to 1V. For permanent works a 3H to 1V batter is considered suitable, provided the clays are protected from erosion caused by concentrated flows.

The natural clay soils at this site have high plasticity, with plasticity increasing with depth. Such soils are reactive in response to seasonal moisture changes (high shrink-swell potential) which may cause large surface movements and development of shrinkage cracks following desiccation. Pipe connections and shallow foundations will need to be designed with appropriate articulation to allow for surface movements.

4 Statement of Limitations

4.1 Geotechnical Reports

The following notes have been provided to outline the methodology and limitations inherent in geotechnical reporting. The issues discussed are not relevant to all reports and further advice should be sought if there are any queries regarding any advice or report.

Geotechnical reports are prepared by qualified personnel on the information supplied or obtained and are based on current engineering standards of interpretation and analysis.

Information may be gained from limited subsurface testing, surface observations, previous work, and is supplemented by knowledge of the local geology and experience of the range of properties that may exhibited by the materials present. For this reason geotechnical reports should be regarded as interpretative rather than factual documents, limited to some extent by the scope of information on which they rely.

Where the report has been prepared for a specific purpose (e.g. design of a three storey building), the information and interpretation may not be appropriate if the design is changed (e.g. a twenty-storey building). In such cases, the report and the sufficiency of the existing work should be reviewed by SMEC in the light of the new proposal.

Every care is taken with the report content, however, it is not always possible to anticipate or assume responsibility for the following conditions:

- Unexpected variations in ground conditions. The potential for this depends on the amount of investigative work undertaken.
- Changes in policy or interpretation by statutory authorities
- The actions of contractors responding to commercial pressures

If these occur, SMEC would be pleased to resolve the matter through further investigation, analysis or advice.

4.2 Unforeseen Conditions

Should conditions encountered on site differ markedly from those anticipated from the information contained in the report, SMEC should be notified immediately. Early identification of site anomalies generally results in any problems being more readily resolved and allows re-interpretation and assessment of the implications for future work.

4.3 Subsurface Information

Logs of a borehole, recovered core, test pit, excavated face, or cone penetration test are an engineering and/or geological interpretation of the subsurface conditions. The reliability of the logged information depends on the drilling/testing method, sampling/observation spacing's and the ground conditions. It is not always possible or economic to obtain continuous high-quality data. It should also be recognised that the volume of material observed or tested is only a fraction of the total subsurface profile.

Interpretation of subsurface information and application to design and construction must take into consideration the spacing of the test locations, the frequency of observations and testing, and the possibility that geological boundaries may vary between observation points.

Groundwater observations and measurements outside of specially designed and constructed piezometers should be treated with care for the following reasons:

- In low permeability soils groundwater may not seep into an excavation or bore in the short time it is left open.
- A localized perched water table may not represent the true water table.
- Groundwater levels vary according to rainfall events or season.
- Some drilling and testing procedures mask or prevent groundwater inflow.
- The installation of piezometers and long-term monitoring of groundwater levels may be required to adequately identify groundwater conditions.

Appendix A Site Plan

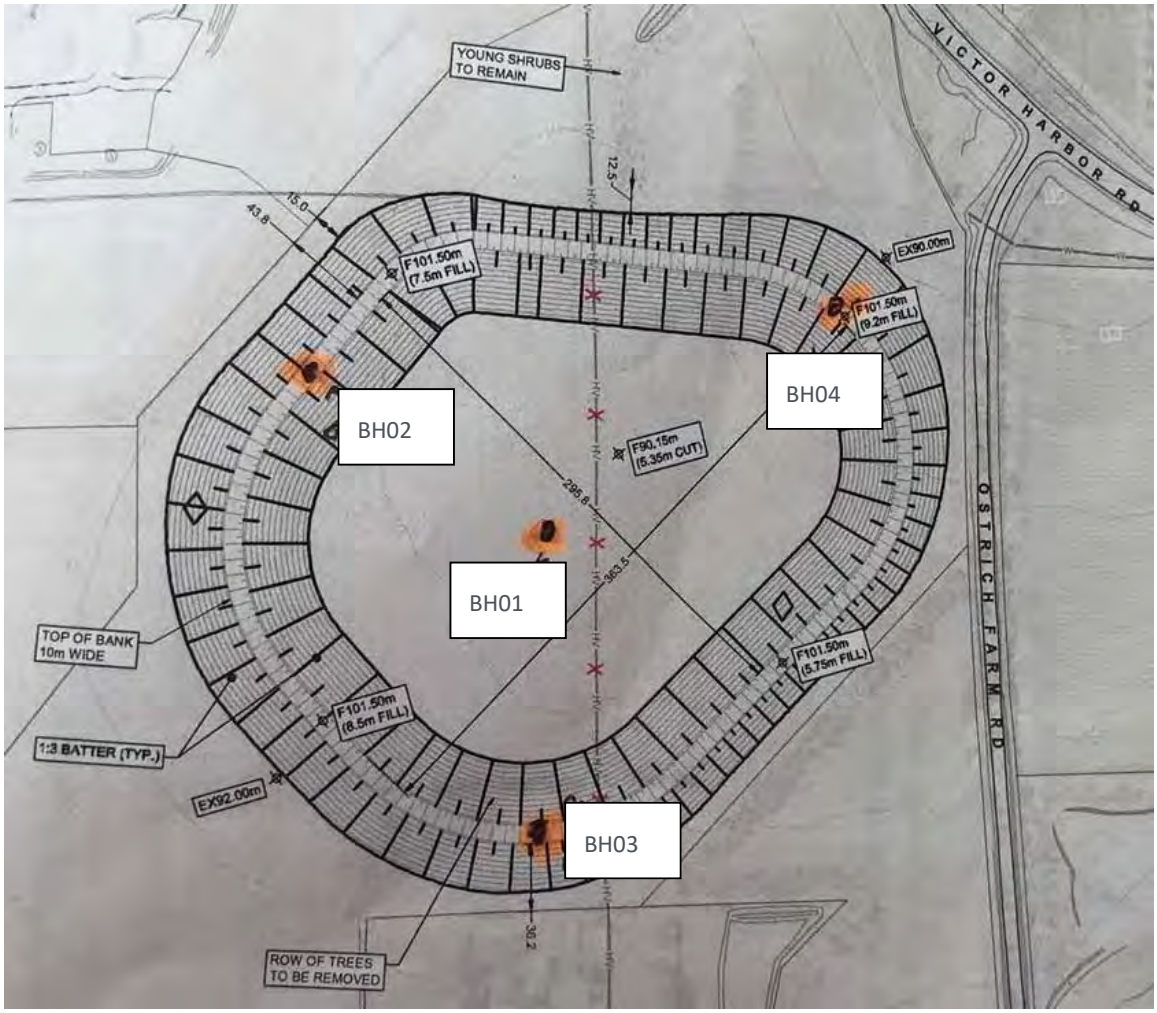


Figure 2: Borehole Location Plan

Appendix B Site Photographs



Photograph 1: Site looking downhill towards Victor Harbor Road



Photograph 2: Looking east towards Ostrich Farm Road



Photograph 3: Looking south towards BH 1 (location of truck in background)



Photograph 4: BH4 looking North



Photograph 5: BH4 looking North-East



Photograph 6: BH4 looking East



Photograph 7: BH4 looking South



Photograph 8: BH4 looking uphill towards BH1



Photograph 9: BH4 looking West



Photograph 10: BH3 looking North



Photograph 11: BH3 looking West



Photograph 12: BH3 looking South



Photograph 13: BH3 looking East



Photograph 14: South Western Corner of Site, Looking West



Photograph 15: South Western Corner of Site, Looking South



Photograph 16: South Western Corner of Site, Looking North



Photograph 17: BH2 Looking East



Photograph 18: BH2 Looking North



Photograph 19: BH2 Looking West



Photograph 20: BH2 Looking South



Photograph 21: BH2 Looking North Adjacent Subdivision.

Appendix C Borehole Logs

CORED DRILL HOLE - ENGINEERING LOG

HOLE NO : BH1
PROJECT NUMBER : 3005628
SHEET : 1 OF 2
FINAL DEPTH : 8 m

CLIENT : Hydroplan
LOCATION : Centre of site
PROJECT : Willunga Basin SRWRA Storage

POSITION : E: 272459.0, N: 6102245.0 (MGA94 Zone 54) SURFACE ELEVATION : INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : MKV2 MOUNTING : Truck CONTRACTOR : Drilling Solutions HOLE DIA :

DATE STARTED : 22/05/2018 DATE COMPLETED : 22/05/2018 DATE LOGGED : 22/05/2018 LOGGED BY : SK CHECKED BY : SP

CASING DIAMETER : BARREL (Length) : BIT : BIT CONDITION :

DRILLING						MATERIAL				FRACTURES		
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	TCR% RQD% DRIL. DEPTH	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION / DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Weathering / Alteration	ESTIMATED STRENGTH Is(50) ● - Axial ○ - Diametral EL -0.03 VL -0.1 L -0.3 M -1 H -3 VH -10 EH	DEFECT SPACING (mm) 20 60 200 600 2000	VISUAL	ADDITIONAL DATA (joints, partings, seams, zones, etc) Description, orientation, infilling or coating, shape, roughness, thickness, other
HQ3					0.0		START CORING AT 0.00m					
							0.10m **Silty CLAY (CI)**: medium plasticity, dark brown, with fine to medium grained sand, (topsoil)					
					0.5		CORE LOSS 1.50m (0.10-1.60)					
					1.0							
					1.5		1.60m					
				1.70m 1 2.00m	2.0		**Silty CLAY (CH)**: high plasticity, mottled pale brown and off-white, trace fine grained sand 2.00m					
					2.5		CORE LOSS 0.70m (2.00-2.70)					
				2.70m			2.70m					
				2 3.00m	3.0		**Silty CLAY (CH)**: high plasticity, grey brown, trace fine grained sand 3.00m					
							CORE LOSS 0.40m (3.00-3.40)					
					3.5		3.40m **Silty CLAY (CH)**: high plasticity, mottled grey brown and orange brown; moist greater than plastic limit, very stiff - hard					
					4.0		4.00m CORE LOSS 0.20m (4.00-4.20)					
							4.20m **Silty CLAY (CH)**: high plasticity, grey brown mottled orange brown and red brown; moist greater than plastic limit, very stiff to hard					
				4.70m 3 5.00m	4.5							
					5.0		5.00m					

DRILLING

CC	Concrete core
WB	Wash bore
DB	Wash bore with drag bit
NQ	Wireline core barrel 42mm
NQ3	Wireline core barrel 45mm
HQ	Wireline core barrel 64mm
HQ3	Wireline core barrel 62mm
PQ	Wireline core barrel 85mm
NMLC	Diamond core 52mm diameter
HMLC	Diamond core 62mm diameter
VC	Vibro-core drilling
PT	Continuous push tube

WATER

▽	dd/mm/yy Water Level on Date shown
▽	Drilling water level
▶	water inflow
◀	water outflow

WEATHERING

FR	Fresh
SW	Slightly Weathered
MW	Moderately Weathered
HW	Highly Weathered
DW	Distinctly Weathered
XW	Extremely Weathered
RS	Residual Soil

STRENGTH

EH	Extremely High
VH	Very High
H	High
M	Medium
L	Low
VL	Very Low

ROUGHNESS

Po	Polished
Sl	Slickensided
Sm	Smooth
Ro	Rough
VR	Very Rough

DEFECT TYPE

Bg	Bedding
C	Cleavage
Pt	Parting
CZ	Crushed Zone
SZ	Shear Zone
IS	Infilled Seam
Jt	Joint
Se	Seam
SS	Shear Seam
Ve	Vein
VO	Void
Cn	Contact
Bd	Boundary
DB	Drilling Break
HB	Handling Break

COATING

CN	Clean
CT	Coating (>= 1.0mm)
FLD	Filled
SN	Stained
VNR	Veneer (< 1.0mm)

PLANARITY

Cu	Curved
DIS	Discontinuous
Ir	Irregular
Pl	Planar
St	Stepped
Un	Undulose
Vu	Vuggy
Wv	Wavy

INFILL

Ca	Calcite
Cl	Clay
Fe	Iron Oxide
Fe Cl	Iron Oxide Clay
Ch	Chlorite
Um	Unidentified Mineral
Qz	Quartz
X	Carbonaceous
Py	Pyrite
Mn	Manganese
Cr	Crushed Rock
Co	Coal
Gp	Gypsum
Fp	Feldspar

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC CORED BOREHOLE 3005628 SRWRA SEAFORD - SP EDITS.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

CORED DRILL HOLE - ENGINEERING LOG

HOLE NO : BH1
PROJECT NUMBER : 3005628
SHEET : 2 OF 2
FINAL DEPTH : 8 m

CLIENT : Hydroplan
LOCATION : Centre of site
PROJECT : Willunga Basin SRWRA Storage

POSITION : E: 272459.0, N: 6102245.0 (MGA94 Zone 54) SURFACE ELEVATION : INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : MKV2 MOUNTING : Truck CONTRACTOR : Drilling Solutions HOLE DIA :

DATE STARTED : 22/05/2018 DATE COMPLETED : 22/05/2018 DATE LOGGED : 22/05/2018 LOGGED BY : SK CHECKED BY : SP

CASING DIAMETER : BARREL (Length) : BIT : BIT CONDITION :

DRILLING						MATERIAL				FRACTURES		
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	TCR% RQD% DRIL. DEPTH	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION / DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Weathering / Alteration	ESTIMATED STRENGTH Is(50) ● - Axial ○ - Diametral EL -0.03 VL -0.1 L -0.3 M -1 H -3 VH -10 EH	DEFECT SPACING (mm) 20 60 200 600 2000	VISUAL	ADDITIONAL DATA (joints, partings, seams, zones, etc) Description, orientation, infilling or coating, shape, roughness, thickness, other
HQ3		8.00			5.0 5.20m 5.5 6.00m 6.0 6.50m 6.5 7.20m 7.50m 7.5 8.00m 8.0 8.5 9.0 9.5 10.0		CORE LOSS 0.20m (5.00-5.20) **Silty CLAY (CH)**: high plasticity, grey brown mottled red brown; moist greater than plastic limit, very stiff to hard CORE LOSS 0.50m (6.00-6.50) **Silty CLAY (CH)**: high plasticity, grey brown mottled red brown; moist greater than plastic limit, very stiff to hard **Sandy CLAY (CI-CH)**: medium to high plasticity, red brown and grey brown, fine to coarse grained sand; moist greater than plastic limit, very stiff to hard **Clayey SAND (SC)**: fine to medium grained, red brown and grey brown; moist Hole Terminated at 8.00 m Target Depth					5.50: PP In-situ =370 - 420 kPa

DRILLING

CC	Concrete core
WB	Wash bore
DB	Wash bore with drag bit
NQ	Wireline core barrel 42mm
NQ3	Wireline core barrel 45mm
HQ	Wireline core barrel 64mm
HQ3	Wireline core barrel 62mm
PQ	Wireline core barrel 85mm
NMLC	Diamond core 52mm diameter
HMLC	Diamond core 62mm diameter
VC	Vibro-core drilling
PT	Continuous push tube

WATER

dd/mm/yy Water Level on Date shown	
Drilling water level	
water inflow	
water outflow	

WEATHERING

FR	Fresh
SW	Slightly Weathered
MW	Moderately Weathered
HW	Highly Weathered
DW	Distinctly Weathered
XW	Extremely Weathered
RS	Residual Soil

STRENGTH

EH	Extremely High
VH	Very High
H	High
M	Medium
L	Low
VL	Very Low

ROUGHNESS

Po	Polished
Sl	Slickensided
Sm	Smooth
Ro	Rough
VR	Very Rough

DEFECT TYPE

Bg	Bedding
C	Cleavage
Pt	Parting
CZ	Crushed Zone
SZ	Shear Zone
IS	Infilled Seam
Jt	Joint
Se	Seam
SS	Shear Seam
Ve	Vein
VO	Void
Cn	Contact
Bd	Boundary
DB	Drilling Break
HB	Handling Break

COATING

CN	Clean
CT	Coating (>= 1.0mm)
FLD	Filled
SN	Stained
VNR	Veneer (< 1.0mm)

PLANARITY

Cu	Curved
DIS	Discontinuous
Ir	Irregular
Pl	Planar
St	Stepped
Un	Undulose
Vu	Vuggy
Wv	Wavy

INFILL

Ca	Calcite
Cl	Clay
Fe	Iron Oxide
Fe Cl	Iron Oxide Clay
Ch	Chlorite
Um	Unidentified Mineral
Qz	Quartz
X	Carbonaceous
Py	Pyrite
Mn	Manganese
Cr	Crushed Rock
Co	Coal
Gp	Gypsum
Fp	Feldspar

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC CORED BOREHOLE 3005628 SRWRA SEAFORD - SP EDITS.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0



PointID : BH1 Depth Range: 0.00 - 5.00 m



PointID : BH1 Depth Range: 5.00 - 8.00 m

SMEC	TITLE: Hydroplan SMEC Ostrich Farm Rd Seaford Willunga Basin SRWRA Storage Core Photo - BH1	DRAWN	DATE: 27/05/2018
		CHECKED	DATE: 27/05/2018
		SCALE: Not To Scale	A4
		PROJECT No: 3005628	FIGURE No: 1/1

GrfcTbl DG PHOTO CORE PHOTO 2 PER PAGE 3005628 SRWRA SEAFORD.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

CORED DRILL HOLE - ENGINEERING LOG

HOLE NO : BH2
PROJECT NUMBER : 3005628
SHEET : 1 OF 2
FINAL DEPTH : 8.1 m

CLIENT : Hydroplan
LOCATION : Adjacent Sub-division
PROJECT : Willunga Basin SRWRA Storage

POSITION : E: 272312.0, N: 6102316.0 (MGA94 Zone 54) SURFACE ELEVATION : INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : MKV2 MOUNTING : Truck CONTRACTOR : Drilling Solutions HOLE DIA :

DATE STARTED : 22/05/2018 DATE COMPLETED : 22/05/2018 DATE LOGGED : 22/05/2018 LOGGED BY : SK CHECKED BY : SP

CASING DIAMETER : BARREL (Length) : BIT : BIT CONDITION :

DRILLING | MATERIAL | FRACTURES

PROGRESS: DRILLING & CASING; DRILLING FLUID; TCR% RQD% DRILL DEPTH; GROUND WATER LEVELS; SAMPLES & FIELD TESTS; ELEVATION; DEPTH (m); GRAPHIC LOG

MATERIAL DESCRIPTION
ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components

Weathering / Alteration; ESTIMATED STRENGTH Is(50) (● - Axial, ○ - Diametral): EL -0.03, VL -0.1, L -0.3, M -1, H -3, VH -10, EH

DEFECT SPACING (mm): 20, 60, 200, 600, 2000

VISUAL

ADDITIONAL DATA (joints, partings, seams, zones, etc)
Description, orientation, infilling or coating, shape, roughness, thickness, other

HQ3

START CORING AT 0.00m

0.10m **Silty CLAY (CL)**: low plasticity, dark brown, with fine to medium grained sand, with roots

CORE LOSS 0.90m (0.10-1.00)

1.00m **Silty CLAY (CL)**: low plasticity, pale orange brown, brown and pale brown, trace roots

1.30m **CLAY (CL-CI)**: low to medium plasticity, pale brown and white, (EW SILTSTONE)

1.60m **SILTSTONE**: fine grained, pale brown with orange brown and brown staining — HW

From 1.8 m: pale grey with orange brown staining

2.00m

2.05m CORE LOSS 0.05m (2.00-2.05)

SILTSTONE: fine grained, indistinct fabric, red brown, orange brown and pale grey — HW

2.80m

CORE LOSS 0.20m (2.80-3.00)

3.00m **SILTSTONE**: fine grained, indistinct fabric, red brown, orange brown and pale grey — HW / HW - MW

From 4.0 m: orange brown and pale grey

5.0

1.65: Note coring commenced from surface, start of rock core section of borehole log
1.60 Fractured Zone, 150 mm
1.80 Jt, 70 - 90°, Cl VNR, Ir
2.20 Fractured Zone, 35 mm
2.26 CS, clayey gravel, 50 mm
2.33 Fractured Zone, 130 mm
2.51 CS, clayey gravel, 30 mm
2.63 Fractured Zone, 70 mm
3.09 Jt, 50°, Fe SN, Pl, Ro
3.16 CS, 10°, gravelly clay, 20 mm
3.22 Jt, 60°, Fe SN, Pl, Ro
3.28 Jt, 40°, Fe SN, Pl, Ro, x2
3.46 Jt, 50°, Fe SN, Un, Ro
3.50 CS, 20°, 10 mm
3.54 Jt, 40 - 70°, Fe SN, Un, Ro
3.64 CS, 30°, 40 mm
3.68 Fractured Zone, 80 mm
3.80 Jt, 70 - 90°, Cl FLD, Ir, 5 mm thick
4.03 CS, 40°, gravelly clay, 60 mm
4.05 Jt, 50°, Cl FLD, Pl, 5-10 mm thick
4.16 Jt, 60°, Cl FLD, Pl, 2 mm thick, x2 at 10 mm spacing
4.40 Jt, 20°, Cl FLD, Pl, 5 mm thick
4.52 Jt, 20°, Cl FLD, Pl, 5 mm thick
4.63 Jt, 60°, Fe SN, Pl, Cl CT, x2 cross-jointed
4.70 CS, 40°, gravelly clay, 50 mm
4.80 Jt, 20°, Fe SN, Pl

DRILLING

CC	Concrete core
WB	Wash bore
DB	Wash bore with drag bit
NQ	Wireline core barrel 42mm
NQ3	Wireline core barrel 45mm
HQ	Wireline core barrel 64mm
HQ3	Wireline core barrel 62mm
PQ	Wireline core barrel 85mm
NMLC	Diamond core 52mm diameter
HMLC	Diamond core 62mm diameter
VC	Vibro-core drilling
PT	Continuous push tube

WATER

dd/mm/yy Water Level on Date shown
Drilling water level
water inflow
water outflow

WEATHERING

FR	Fresh
SW	Slightly Weathered
MW	Moderately Weathered
HW	Highly Weathered
DW	Distinctly Weathered
XW	Extremely Weathered
RS	Residual Soil

STRENGTH

EH	Extremely High
VH	Very High
H	High
M	Medium
L	Low
VL	Very Low

ROUGHNESS

Po	Polished
Sl	Slickensided
Sm	Smooth
Ro	Rough
VR	Very Rough

DEFECT TYPE

Bg	Bedding
C	Cleavage
Pt	Parting
CZ	Crushed Zone
SZ	Shear Zone
IS	Infilled Seam
Jt	Joint
Se	Seam
SS	Shear Seam
Ve	Vein
VO	Void
Cn	Contact
Bd	Boundary
DB	Drilling Break
HB	Handling Break

COATING

CN	Clean
CT	Coating (>= 1.0mm)
FLD	Filled
SN	Stained
VNR	Veneer (< 1.0mm)

PLANARITY

Cu	Curved
DIS	Discontinuous
Ir	Irregular
Pl	Planar
St	Stepped
Un	Undulose
Vu	Vuggy
Wv	Wavy

INFILL

Ca	Calcite
Cl	Clay
Fe	Iron Oxide
Fe Cl	Iron Oxide Clay
Ch	Chlorite
Um	Unidentified Mineral
Qz	Quartz
X	Carbonaceous
Py	Pyrite
Mn	Manganese
Cr	Crushed Rock
Co	Coal
Gp	Gypsum
Fp	Feldspar

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC CORED BOREHOLE 3005628 SRWRA SEAFORD - SP EDITS.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

CORED DRILL HOLE - ENGINEERING LOG

HOLE NO : BH2
PROJECT NUMBER : 3005628
SHEET : 2 OF 2
FINAL DEPTH : 8.1 m

CLIENT : Hydroplan
LOCATION : Adjacent Sub-division
PROJECT : Willunga Basin SRWRA Storage

POSITION : E: 272312.0, N: 6102316.0 (MGA94 Zone 54) SURFACE ELEVATION : INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : MKV2 MOUNTING : Truck CONTRACTOR : Drilling Solutions HOLE DIA :

DATE STARTED : 22/05/2018 DATE COMPLETED : 22/05/2018 DATE LOGGED : 22/05/2018 LOGGED BY : SK CHECKED BY : SP

CASING DIAMETER : BARREL (Length) : BIT : BIT CONDITION :

DRILLING						MATERIAL				FRACTURES		
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	TCR% RQD% DRIL. DEPTH	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION / DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Weathering / Alteration	ESTIMATED STRENGTH Is(50) ● - Axial ○ - Diametral EL -0.03 VL -0.1 L -0.3 M -1 H -3 VH -10 EH	DEFECT SPACING (mm) 20 60 200 600 2000	VISUAL	ADDITIONAL DATA (joints, partings, seams, zones, etc) Description, orientation, infilling or coating, shape, roughness, thickness, other
HQ3		8.10			5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5 10.0	8.10m	**SILTSTONE**: fine grained, indistinct fabric, red brown, orange brown and pale grey *(continued)* From 5.25 m: red brown and orange brown From 6.0 m: orange brown Hole Terminated at 8.10 m Target Depth	HW - MW MW - SW				4.92 Jt, 50°, Cl FLD, Pl, 6 mm thick 5.03 Jt, 70°, Cl VNR, Pl 5.10 Jt, 20°, Cl VNR, Pl 5.26 Jt, 70°, Cl FLD, Pl, 2-5 mm thick 5.64 Jt, 10°, Fe SN, Pl 5.66 Jt, 10°, Cl CT, Pl 5.73 Jt, 40°, Cl FLD, Pl, 2 mm thick 5.85 Jt, 30°, Fe SN, Pl 5.87 Jt, 60 - 80°, Cl CT, Un, Um SN 6.50 CS, 10°, gravelly clay, 20 mm 6.54 Jt, 30°, Um SN, Pl 6.65 Jt, 70°, Cl FLD, Un 6.92 Jt, 20°, Um SN, Pl 7.00 Jt, 40°, Cl FLD, Pl 7.02 Jt, 70 - 80°, Cl FLD 7.23 Jt, 40°, Cl FLD, Pl, x2 7.33 Jt, 50°, Cl FLD, Pl 7.35 Jt, 80 - 90°, Um SN, Un 7.61 Jt, 30°, Cl VNR, Pl 7.70 Jt, 40°, Um SN, St 7.79 Jt, 20°, Cl VNR, Pl 7.95 Jt, 20°, Um SN, Pl 7.97 Jt, 50°, Cl FLD, Pl, Um SN

DRILLING

CC	Concrete core
WB	Wash bore
DB	Wash bore with drag bit
NQ	Wireline core barrel 42mm
NQ3	Wireline core barrel 45mm
HQ	Wireline core barrel 64mm
HQ3	Wireline core barrel 62mm
PQ	Wireline core barrel 85mm
NMLC	Diamond core 52mm diameter
HMLC	Diamond core 62mm diameter
VC	Vibro-core drilling
PT	Continuous push tube

WATER

▽	dd/mm/yy Water Level on Date shown
▽	Drilling water level
▶	water inflow
◀	water outflow

WEATHERING

FR	Fresh
SW	Slightly Weathered
MW	Moderately Weathered
HW	Highly Weathered
DW	Distinctly Weathered
XW	Extremely Weathered
RS	Residual Soil

STRENGTH

EH	Extremely High
VH	Very High
H	High
M	Medium
L	Low
VL	Very Low

ROUGHNESS

Po	Polished
Sl	Slickensided
Sm	Smooth
Ro	Rough
VR	Very Rough

DEFECT TYPE

Bg	Bedding
C	Cleavage
Pt	Parting
CZ	Crushed Zone
SZ	Shear Zone
IS	Infilled Seam
Jt	Joint
Se	Seam
SS	Shear Seam
Ve	Vein
VO	Void
Cn	Contact
Bd	Boundary
DB	Drilling Break
HB	Handling Break

COATING

CN	Clean
CT	Coating (>= 1.0mm)
FLD	Filled
SN	Stained
VNR	Veneer (< 1.0mm)

PLANARITY

Cu	Curved
DIS	Discontinuous
Ir	Irregular
Pl	Planar
St	Stepped
Un	Undulose
Vu	Vuggy
Wv	Wavy

INFILL

Ca	Calcite
Cl	Clay
Fe	Iron Oxide
Fe Cl	Iron Oxide Clay
Ch	Chlorite
Um	Unidentified Mineral
Qz	Quartz
X	Carbonaceous
Py	Pyrite
Mn	Manganese
Cr	Crushed Rock
Co	Coal
Gp	Gypsum
Fp	Feldspar

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC CORED BOREHOLE 3005628 SRWRA SEAFORD - SP EDITS.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0



PointID : BH2 Depth Range: 0.00 - 5.00 m



PointID : BH2 Depth Range: 5.00 - 8.10 m

SMEC	TITLE: Hydroplan SMEC Ostrich Farm Rd Seaford Willunga Basin SRWRA Storage Core Photo - BH2	DRAWN	DATE: 27/05/2018
		CHECKED	DATE: 27/05/2018
		SCALE: Not To Scale	A4
		PROJECT No: 3005628	FIGURE No: 1/1

GrfcTbl DG PHOTO CORE PHOTO 2 PER PAGE 3005628 SRWRA SEAFORD.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

CORED DRILL HOLE - ENGINEERING LOG

HOLE NO : BH3
PROJECT NUMBER : 3005628
SHEET : 1 OF 2
FINAL DEPTH : 8.06 m

CLIENT : Hydroplan
LOCATION : Southern Boundary Adjacent Farm House
PROJECT : Willunga Basin SRWRA Storage

POSITION : E: 272462.0, N: 6102076.0 (MGA94 Zone 54) SURFACE ELEVATION : INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : MKV2 MOUNTING : Truck CONTRACTOR : Drilling Solutions HOLE DIA :

DATE STARTED : 22/05/2018 DATE COMPLETED : 22/05/2018 DATE LOGGED : 22/05/2018 LOGGED BY : SK CHECKED BY : SP

CASING DIAMETER : BARREL (Length) : BIT : BIT CONDITION :

DRILLING | MATERIAL | FRACTURES

PROGRESS: DRILLING & CASING; DRILLING FLUID; TCR% RQD% DRILL DEPTH; GROUND WATER LEVELS; SAMPLES & FIELD TESTS; ELEVATION; DEPTH (m); GRAPHIC LOG

MATERIAL DESCRIPTION
ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components

Weathering / Alteration

ESTIMATED STRENGTH Is(50) ● - Axial ○ - Diametral
EL -0.03 VL -0.1 L -0.3 M -1 H -3 VH -10 EH

DEFECT SPACING (mm): 20 60 200 600 2000

VISUAL

ADDITIONAL DATA
(joints, partings, seams, zones, etc)
Description, orientation, infilling or coating, shape, roughness, thickness, other

HQ3

START CORING AT 0.00m

0.0 CORE LOSS 1.20m (0.00-1.20)

0.00: Topsoil: Silty CLAY; medium plasticity, dark brown, with fine to medium grained sand

1.20m **Sandy Silty CLAY (CI)**: medium plasticity, pale grey brown, fine to coarse grained sand, trace fine to medium gravel gravel; moist greater than plastic limit

1.70m **Gravelly Sandy CLAY (CI)**: medium plasticity, mottled pale brown and off-white, fine to coarse grained sand, fine to medium grained gravel; moist greater than plastic limit

2.00m CORE LOSS 1.50m (2.00-3.50)

3.50m **Sandy CLAY (CH)**: high plasticity, mottled red brown and pale grey, fine to medium grained sand; very stiff

5.00m

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0

DRILLING

CC	Concrete core
WB	Wash bore
DB	Wash bore with drag bit
NQ	Wireline core barrel 42mm
NQ3	Wireline core barrel 45mm
HQ	Wireline core barrel 64mm
HQ3	Wireline core barrel 62mm
PQ	Wireline core barrel 85mm
NMLC	Diamond core 52mm diameter
HMLC	Diamond core 62mm diameter
VC	Vibro-core drilling
PT	Continuous push tube

WATER

dd/mm/yy Water Level on Date shown	
Drilling water level	
water inflow	
water outflow	

WEATHERING

FR	Fresh
SW	Slightly Weathered
MW	Moderately Weathered
HW	Highly Weathered
DW	Distinctly Weathered
XW	Extremely Weathered
RS	Residual Soil

STRENGTH

EH	Extremely High
VH	Very High
H	High
M	Medium
L	Low
VL	Very Low

ROUGHNESS

Po	Polished
Sl	Slickensided
Sm	Smooth
Ro	Rough
VR	Very Rough

DEFECT TYPE

Bg	Bedding
C	Cleavage
Pt	Parting
CZ	Crushed Zone
SZ	Shear Zone
IS	Infilled Seam
Jt	Joint
Se	Seam
SS	Shear Seam
Ve	Vein
VO	Void
Cn	Contact
Bd	Boundary
DB	Drilling Break
HB	Handling Break

COATING

CN	Clean
CT	Coating (>= 1.0mm)
FLD	Filled
SN	Stained
VNR	Veneer (< 1.0mm)

PLANARITY

Cu	Curved
DIS	Discontinuous
Ir	Irregular
Pl	Planar
St	Stepped
Un	Undulose
Vu	Vuggy
Wv	Wavy

INFILL

Ca	Calcite
Cl	Clay
Fe	Iron Oxide
Fe Cl	Iron Oxide Clay
Ch	Chlorite
Um	Unidentified Mineral
Qz	Quartz
X	Carbonaceous
Py	Pyrite
Mn	Manganese
Cr	Crushed Rock
Co	Coal
Gp	Gypsum
Fp	Feldspar

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC CORED BOREHOLE 3005628 SRWRA SEAFORD - SP EDITS.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

CORED DRILL HOLE - ENGINEERING LOG

HOLE NO : BH3
PROJECT NUMBER : 3005628
SHEET : 2 OF 2
FINAL DEPTH : 8.06 m

CLIENT : Hydroplan
LOCATION : Southern Boundary Adjacent Farm House
PROJECT : Willunga Basin SRWRA Storage

POSITION : E: 272462.0, N: 6102076.0 (MGA94 Zone 54) SURFACE ELEVATION : INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : MKV2 MOUNTING : Truck CONTRACTOR : Drilling Solutions HOLE DIA :

DATE STARTED : 22/05/2018 DATE COMPLETED : 22/05/2018 DATE LOGGED : 22/05/2018 LOGGED BY : SK CHECKED BY : SP

CASING DIAMETER : BARREL (Length) : BIT : BIT CONDITION :

DRILLING						MATERIAL				FRACTURES		
PROGRESS: DRILLING & CASING	PROGRESS: DRILLING FLUID	TCR% RQD% DRIL. DEPTH	GROUND WATER LEVELS	SAMPLES & FIELD TESTS	ELEVATION / DEPTH (m)	GRAPHIC LOG	MATERIAL DESCRIPTION ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components	Weathering / Alteration	ESTIMATED STRENGTH Is(50) ● - Axial ○ - Diametral EL -0.03 VL -0.1 L -0.3 M -1 H -3 VH -10 EH	DEFECT SPACING (mm) 20 60 200 600 2000	VISUAL	ADDITIONAL DATA (joints, partings, seams, zones, etc) Description, orientation, infilling or coating, shape, roughness, thickness, other
HQ3					5.0		5.10m CORE LOSS 0.10m (5.00-5.10)					
							Sandy CLAY (CH): as above, increased sand content; very stiff					
					5.5							
					6.00m							
					6.0		6.09m CORE LOSS 0.09m (6.00-6.09)					
							Sandy CLAY (CH): high plasticity, mottled orange brown, red brown and grey brown, fine to medium grained sand, trace fine grained gravel; hard					
					6.5							
					7.0							
					7.5							
					7.80m		**Clayey SAND (SC)**: fine to coarse grained, pale brown and red brown, medium to high plasticity clay; moist, hard					
		8.06			8.0		8.06m Hole Terminated at 8.06 m Target Depth					
					8.5							
					9.0							
					9.5							
					10.0							

DRILLING

CC	Concrete core
WB	Wash bore
DB	Wash bore with drag bit
NQ	Wireline core barrel 42mm
NQ3	Wireline core barrel 45mm
HQ	Wireline core barrel 64mm
HQ3	Wireline core barrel 62mm
PQ	Wireline core barrel 85mm
NMLC	Diamond core 52mm diameter
HMLC	Diamond core 62mm diameter
VC	Vibro-core drilling
PT	Continuous push tube

WATER

dd/mm/yy Water Level on Date shown	
Drilling water level	
water inflow	
water outflow	

WEATHERING

FR	Fresh
SW	Slightly Weathered
MW	Moderately Weathered
HW	Highly Weathered
DW	Distinctly Weathered
XW	Extremely Weathered
RS	Residual Soil

STRENGTH

EH	Extremely High
VH	Very High
H	High
M	Medium
L	Low
VL	Very Low

ROUGHNESS

Po	Polished
Sl	Slickensided
Sm	Smooth
Ro	Rough
VR	Very Rough

DEFECT TYPE

Bg	Bedding
C	Cleavage
Pt	Parting
CZ	Crushed Zone
SZ	Shear Zone
IS	Infilled Seam
Jt	Joint
Se	Seam
SS	Shear Seam
Ve	Vein
VO	Void
Cn	Contact
Bd	Boundary
DB	Drilling Break
HB	Handling Break

COATING

CN	Clean
CT	Coating (>= 1.0mm)
FLD	Filled
SN	Stained
VNR	Veneer (< 1.0mm)

PLANARITY

Cu	Curved
DIS	Discontinuous
Ir	Irregular
Pl	Planar
St	Stepped
Un	Undulose
Vu	Vuggy
Wv	Wavy

INFILL

Ca	Calcite
Cl	Clay
Fe	Iron Oxide
Fe Cl	Iron Oxide Clay
Ch	Chlorite
Um	Unidentified Mineral
Qz	Quartz
X	Carbonaceous
Py	Pyrite
Mn	Manganese
Cr	Crushed Rock
Co	Coal
Gp	Gypsum
Fp	Feldspar

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC CORED BOREHOLE 3005628 SRWRA SEAFORD - SP EDITS.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0



PointID : BH3 Depth Range: 0.00 - 5.00 m



PointID : BH3 Depth Range: 5.00 - 8.06 m

SMEC	TITLE: Hydroplan SMEC Ostrich Farm Rd Seaford Willunga Basin SRWRA Storage Core Photo - BH3	DRAWN	DATE 27/05/2018
		CHECKED	DATE 27/05/2018
		SCALE Not To Scale	A4
		PROJECT No 3005628	FIGURE No 1/1

GrfcTbl DG PHOTO CORE PHOTO 2 PER PAGE 3005628 SRWRA SEAFORD.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

CORED DRILL HOLE - ENGINEERING LOG

HOLE NO : BH4
PROJECT NUMBER : 3005628
SHEET : 1 OF 2
FINAL DEPTH : 8 m

CLIENT : Hydroplan
PROJECT : Willunga Basin SRWRA Storage
LOCATION : Intersection Victor Harbour Rd/Ostrich Farm Rd

POSITION : E: 272634.0, N: 6102385.0 (MGA94 Zone 54) SURFACE ELEVATION : INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : MKV2 MOUNTING : Truck CONTRACTOR : Drilling Solutions HOLE DIA :

DATE STARTED : 22/05/2018 DATE COMPLETED : 22/05/2018 DATE LOGGED : 22/05/2018 LOGGED BY : SK CHECKED BY : SP

CASING DIAMETER : BARREL (Length) : BIT : BIT CONDITION :

DRILLING | MATERIAL | FRACTURES

PROGRESS: DRILLING & CASING; DRILLING FLUID; TCR% RQD% DRILL DEPTH; GROUND WATER LEVELS; SAMPLES & FIELD TESTS; ELEVATION; DEPTH (m); GRAPHIC LOG; MATERIAL DESCRIPTION — ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components; Weathering / Alteration; ESTIMATED STRENGTH Is(50) ● - Axial ○ - Diametral (EL -0.03, VL -0.1, L -0.3, M -1, H -3, VH -10, EH); DEFECT SPACING (mm) (20, 60, 200, 600, 2000); VISUAL; ADDITIONAL DATA (joints, partings, seams, zones, etc) Description, orientation, infilling or coating, shape, roughness, thickness, other

HQ3

START CORING AT 0.00m

CORE LOSS 1.60m (0.00-1.60)

0.00: Topsoil: Silty CLAY; medium plasticity, dark brown, with fine to medium grained sand

1.60m

Silty CLAY (CI): medium plasticity, pale brown with some brown mottled, with fine to medium grained sand, trace medium grained rounded gravel

1.85m

2.00m

Sandy CLAY (CI): medium plasticity, pale brown and brown, fine to coarse grained sand, trace fine to medium grained sub-rounded to rounded gravel

CORE LOSS 1.10m (2.00-3.10)

3.10m

Sandy Gravelly CLAY (CI): medium plasticity, grey brown and pale brown, medium grained sub-rounded to rounded gravel, fine to coarse grained sand

3.60m

CLAY (CL): low plasticity, orange brown, red brown and yellow brown, with highly weathered sandstone fragments to 30 mm
From 3.7 m: becoming orange brown and pale grey

4.90m

5.0

DRILLING

CC	Concrete core
WB	Wash bore
DB	Wash bore with drag bit
NQ	Wireline core barrel 42mm
NQ3	Wireline core barrel 45mm
HQ	Wireline core barrel 64mm
HQ3	Wireline core barrel 62mm
PQ	Wireline core barrel 85mm
NMLC	Diamond core 52mm diameter
HMLC	Diamond core 62mm diameter
VC	Vibro-core drilling
PT	Continuous push tube

WATER

▽	dd/mm/yy Water Level on Date shown
▽	Drilling water level
▶	water inflow
◀	water outflow

WEATHERING

FR	Fresh
SW	Slightly Weathered
MW	Moderately Weathered
HW	Highly Weathered
DW	Distinctly Weathered
XW	Extremely Weathered
RS	Residual Soil

STRENGTH

EH	Extremely High
VH	Very High
H	High
M	Medium
L	Low
VL	Very Low

ROUGHNESS

Po	Polished
Sl	Slickensided
Sm	Smooth
Ro	Rough
VR	Very Rough

DEFECT TYPE

Bg	Bedding
C	Cleavage
Pt	Parting
CZ	Crushed Zone
SZ	Shear Zone
IS	Infilled Seam
Jt	Joint
Se	Seam
SS	Shear Seam
Ve	Vein
VO	Void
Cn	Contact
Bd	Boundary
DB	Drilling Break
HB	Handling Break

COATING

CN	Clean
CT	Coating (>= 1.0mm)
FLD	Filled
SN	Stained
VNR	Veneer (< 1.0mm)

PLANARITY

Cu	Curved
DIS	Discontinuous
Ir	Irregular
Pl	Planar
St	Stepped
Un	Undulose
Vu	Vuggy
Wv	Wavy

INFILL

Ca	Calcite
Cl	Clay
Fe	Iron Oxide
Fe Cl	Iron Oxide Clay
Ch	Chlorite
Um	Unidentified Mineral
Qz	Quartz
X	Carbonaceous
Py	Pyrite
Mn	Manganese
Cr	Crushed Rock
Co	Coal
Gp	Gypsum
Fp	Feldspar

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC CORED BOREHOLE 3005628 SRWRA SEAFORD - SP EDITS.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

CORED DRILL HOLE - ENGINEERING LOG

HOLE NO : BH4
PROJECT NUMBER : 3005628
SHEET : 2 OF 2
FINAL DEPTH : 8 m

CLIENT : Hydroplan
PROJECT : Willunga Basin SRWRA Storage
LOCATION : Intersection Victor Harbour Rd/Ostrich Farm Rd

POSITION : E: 272634.0, N: 6102385.0 (MGA94 Zone 54) SURFACE ELEVATION : INCLINATION° / ORIENTATION° : 90° / N/A

RIG TYPE : MKV2 MOUNTING : Truck CONTRACTOR : Drilling Solutions HOLE DIA :

DATE STARTED : 22/05/2018 DATE COMPLETED : 22/05/2018 DATE LOGGED : 22/05/2018 LOGGED BY : SK CHECKED BY : SP

CASING DIAMETER : BARREL (Length) : BIT : BIT CONDITION :

DRILLING | MATERIAL | FRACTURES

PROGRESS: DRILLING & CASING; DRILLING FLUID; TCR% RQD% DRIL. DEPTH; GROUND WATER LEVELS; SAMPLES & FIELD TESTS; ELEVATION; DEPTH (m); GRAPHIC LOG; MATERIAL DESCRIPTION (ROCK NAME : grain size, colour, texture and fabric, features, inclusion and minor components); Weathering / Alteration; ESTIMATED STRENGTH Is(50) (● - Axial, ○ - Diametral) EL -0.03 VL -0.1 L -0.3 M -1 H -3 VH -10 EH; DEFECT SPACING (mm) 20 60 200 600 2000; VISUAL; ADDITIONAL DATA (joints, partings, seams, zones, etc) Description, orientation, infilling or coating, shape, roughness, thickness, other

HQ3

5.0 — SANDSTONE: extremely to highly weathered, very low strength, fine grained, orange *(continued)*

From 6.2 m to 6.5 m: becoming orange and pale grey

6.50m

Sandy Silty CLAY: low plasticity, orange, fine grained sand, (extremely weathered SANDSTONE)

7.50m

CORE LOSS 0.50m (7.50-8.00)

8.00 — 8.00m

Hole Terminated at 8.00 m
Target Depth

5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5 10.0

DRILLING

CC	Concrete core
WB	Wash bore
DB	Wash bore with drag bit
NQ	Wireline core barrel 42mm
NQ3	Wireline core barrel 45mm
HQ	Wireline core barrel 64mm
HQ3	Wireline core barrel 62mm
PQ	Wireline core barrel 85mm
NMLC	Diamond core 52mm diameter
HMLC	Diamond core 62mm diameter
VC	Vibro-core drilling
PT	Continuous push tube

WATER

dd/mm/yy Water Level on Date shown
Drilling water level
water inflow
water outflow

WEATHERING

FR	Fresh
SW	Slightly Weathered
MW	Moderately Weathered
HW	Highly Weathered
DW	Distinctly Weathered
XW	Extremely Weathered
RS	Residual Soil

STRENGTH

EH	Extremely High
VH	Very High
H	High
M	Medium
L	Low
VL	Very Low

ROUGHNESS

Po	Polished
Sl	Slickensided
Sm	Smooth
Ro	Rough
VR	Very Rough

DEFECT TYPE

Bg	Bedding
C	Cleavage
Pt	Parting
CZ	Crushed Zone
SZ	Shear Zone
IS	Infilled Seam
Jt	Joint
Se	Seam
SS	Shear Seam
Ve	Vein
VO	Void
Cn	Contact
Bd	Boundary
DB	Drilling Break
HB	Handling Break

COATING

CN	Clean
CT	Coating (>= 1.0mm)
FLD	Filled
SN	Stained
VNR	Veneer (< 1.0mm)

PLANARITY

Cu	Curved
DIS	Discontinuous
Ir	Irregular
Pl	Planar
St	Stepped
Un	Undulose
Vu	Vuggy
Wv	Wavy

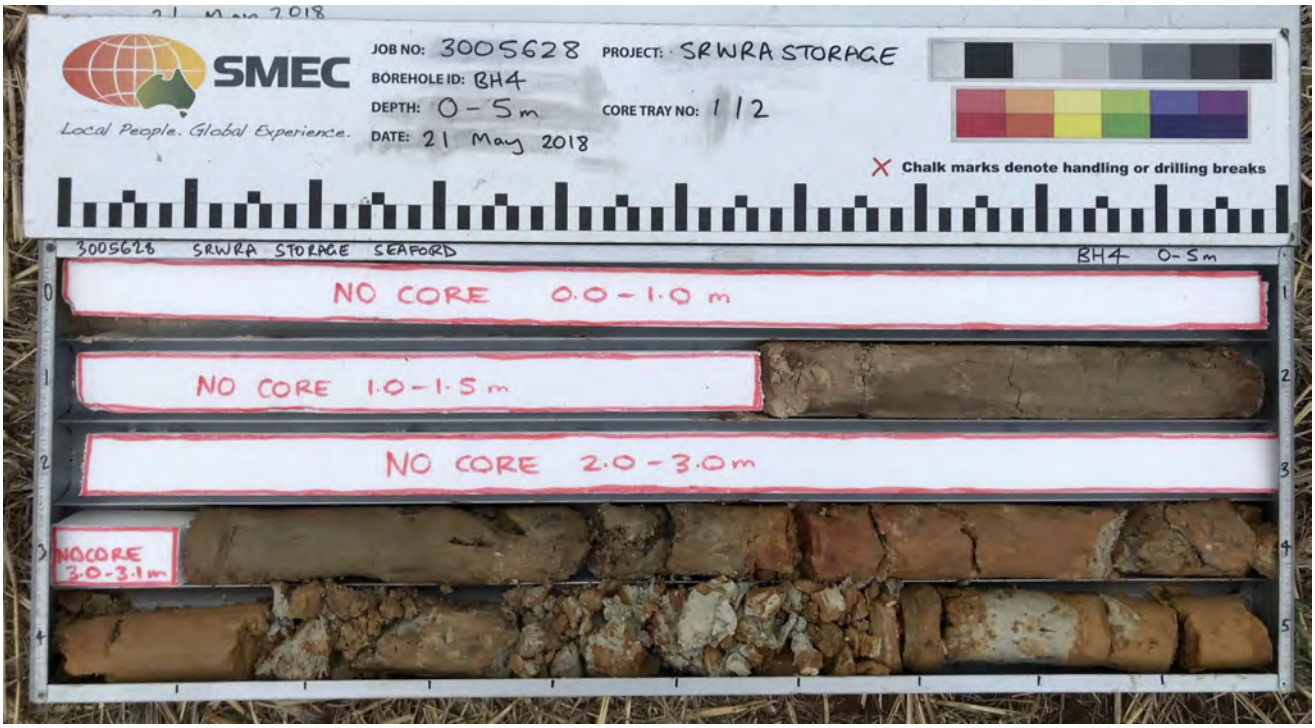
INFILL

Ca	Calcite
Cl	Clay
Fe	Iron Oxide
Fe Cl	Iron Oxide Clay
Ch	Chlorite
Um	Unidentified Mineral
Qz	Quartz
X	Carbonaceous
Py	Pyrite
Mn	Manganese
Cr	Crushed Rock
Co	Coal
Gp	Gypsum
Fp	Feldspar

See Explanatory Notes for details of abbreviations & basis of descriptions.

SMEC AUSTRALIA

Log _SMEC CORED BOREHOLE 3005628 SRWRA SEAFORD - SP EDITS.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0



PointID : BH4 Depth Range: 0.00 - 5.00 m



PointID : BH4 Depth Range: 5.00 - 8.00 m

SMEC	TITLE: Hydroplan SMEC Ostrich Farm Rd Seaford Willunga Basin SRWRA Storage Core Photo - BH4	DRAWN	DATE 27/05/2018
		CHECKED	DATE 27/05/2018
		SCALE Not To Scale	A4
		PROJECT No 3005628	FIGURE No 1/1

GrfcTbl DG PHOTO CORE PHOTO 2 PER PAGE 3005628 SRWRA SEAFORD.GPJ | Lib: SEMC 1.06.5 lib Prj: SMEC 1.06.0

Appendix D Results of Laboratory Testing

Soils testing - Particle size distribution & consistency limits test report

Standard method (by sieving)

AS1289.3.6.1, 2.1.1, 3.1.2, 3.2.1, 3.3.1, 3.4.1 & AS 1726:2017 Section 6.1

GOLDER

Test request #:	**TRA18-0129**	**Lab sample ID:**	LADL201805289
Client:	SMEC		
Client address:	Level 4, 19 Grenfell Street, Adelaide, SA, 5000		
Project ID:	**1896865-002**	**Lab report ref.:**	LADL_18016377

Golder Associates Pty Ltd

ADELAIDE GEOTECHNICAL LABORATORY

118 Franklin Street,
Adelaide,
South Australia 5000

Project name:	Storage Basin	**Exploratory Hole**	**BH01 (22/5/18)**
Location:	Seaford	**Sample depth (m):**	1.70 - 2.00
		Client sample ref:	
		Project reference:	3005628

Specimen description: (AS 1726:2017 Section 6.1)

(CH) CLAY, high plasticity, pale grey brown, with fine to coarse grained sand, trace fine gravel

Sampling co-ordinates		Reduced Level
Easting (m)	**Northing (m)**	

PARTICLE SIZE DISTRIBUTION AS 1289.3.6.1

Sieve Size	Passing	LB S	UB S
125 mm	100%		
75 mm	100%		
63 mm	100%		
53 mm	100%		
37.5 mm	100%		
26.5 mm	100%		
19 mm	100%		
13.2 mm	100%		
9.5 mm	100%		
6.7 mm	100%		
4.75 mm	100%		
2.36 mm	99%		
1.18 mm	98%		
600 µm	98%		
425 µm	96%		
300 µm	94%		
150 µm	84%		
75 µm	80%		

Method:	AS 1289.2.1.1	AS 1289.3.1.2	AS 1289.3.2.1	AS 1289.3.3.1	AS 1289.3.4.1	
	Moisture content	**1 point Liquid limit**	**Plastic limit**	**Plasticity index**	**Linear shrinkage**	**Curling/ Crumbling/ Cracking**
Result:	21.7% As Rcvd.	56%	20%	36%	15.0%	Cracking / Curling
LB S:						-
UB S:						-

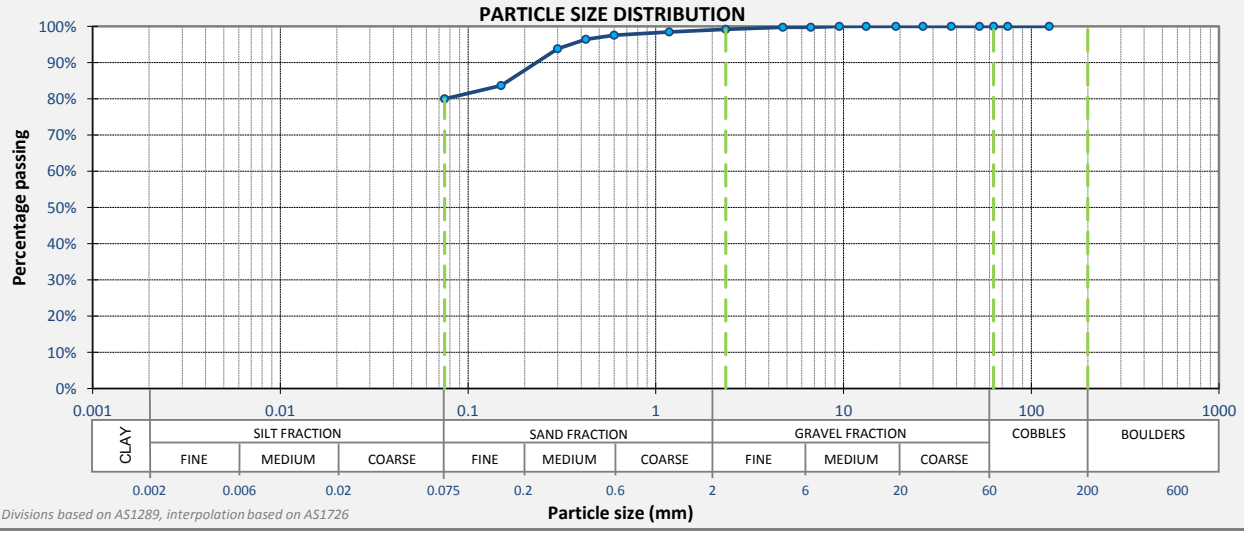
Att. preparation method:	Dry sieved	**LSM length (mm):**	250
Specimen history/notes:	Preparation of specimen and testing performed on sample supplied to the laboratory		

Definitions:
LB S = Lower bound specification; N/A = Not applicable
LSM = Linear shrinkage mould; ND = Not determined; SIB = Slip in bowl
UB S = Upper bound specification; NO = Not obtainable; NP = Non plastic

GRADING SUMMARY

Fines	Sand*	Gravel*	Cobbles*
(<75 µm)	**(>75 µm - <2.36 mm)**	**(>2.36 mm - <63 mm)**	**(>63mm - <200 mm)**
80.0%	**19.2%**	**0.8%**	**0.0%**

Proportions based on guidance in AS1726-2017 Section 6.1.4.2



Divisions based on AS1289, interpolation based on AS1726

Testing performed by: RD **Results reviewed by:** DBergen **Date reported:** 8/06/2018

Cert. ref.: **1896865-002_BH01 (22-5-18)_TRA18-0129_PSD_1805289_Rep18016377**

Approved signatory:

NATA

NATA accreditation number: 1961 - Site:1954 - Adelaide
Accredited for compliance with ISO/IEC 17025 - Testing

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Daniel Bergen - Laboratory Technician

Phone: +61 (08) 8213 2100 **Fax:** +61 (08) 8213 2101 **E-mail:** adlgeolab@golder.com.au **Web:** www.golder.com.au

Soils testing - Particle size distribution & consistency limits test report

Standard method (by sieving)

AS1289.3.6.1, 2.1.1, 3.1.2, 3.2.1, 3.3.1, 3.4.1 & AS 1726:2017 Section 6.1

GOLDER

Test request #:	**TRA18-0129**	**Lab sample ID:**	LADL2018052810
Client:	SMEC		
Client address:	Level 4, 19 Grenfell Street, Adelaide, SA, 5000		
Project ID:	**1896865-002**	**Lab report ref.:**	LADL_18016378

Golder Associates Pty Ltd

ADELAIDE GEOTECHNICAL LABORATORY

118 Franklin Street,
Adelaide,
South Australia 5000

Project name:	Storage Basin	**Exploratory Hole**	**BH01 (22/5/18)**
Location:	Seaford	**Sample depth (m):**	2.70 - 3.00
		Client sample ref:	
		Project reference:	3005628

Specimen description: (AS 1726:2017 Section 6.1) — (CH) CLAY, high plasticity, grey, with fine to coarse grained sand

Sampling co-ordinates		Reduced Level
Easting (m)	**Northing (m)**	

PARTICLE SIZE DISTRIBUTION AS 1289.3.6.1

Sieve Size	Passing	LB S	UB S
125 mm	100%		
75 mm	100%		
63 mm	100%		
53 mm	100%		
37.5 mm	100%		
26.5 mm	100%		
19 mm	100%		
13.2 mm	100%		
9.5 mm	100%		
6.7 mm	100%		
4.75 mm	100%		
2.36 mm	100%		
1.18 mm	100%		
600 µm	99%		
425 µm	98%		
300 µm	94%		
150 µm	85%		
75 µm	76%		

Method:	AS 1289.2.1.1	AS 1289.3.1.2	AS 1289.3.2.1	AS 1289.3.3.1	AS 1289.3.4.1	
	Moisture content	**1 point Liquid limit**	**Plastic limit**	**Plasticity index**	**Linear shrinkage**	**Curling/ Crumbling/ Cracking**
Result:	31.0% As Rcvd.	69%	20%	49%	16.0%	Cracking / Curling
LB S:						-
UB S:						-
Att. preparation method:		Dry sieved		**LSM length (mm):**		250

Specimen history/notes: Preparation of specimen and testing performed on sample supplied to the laboratory

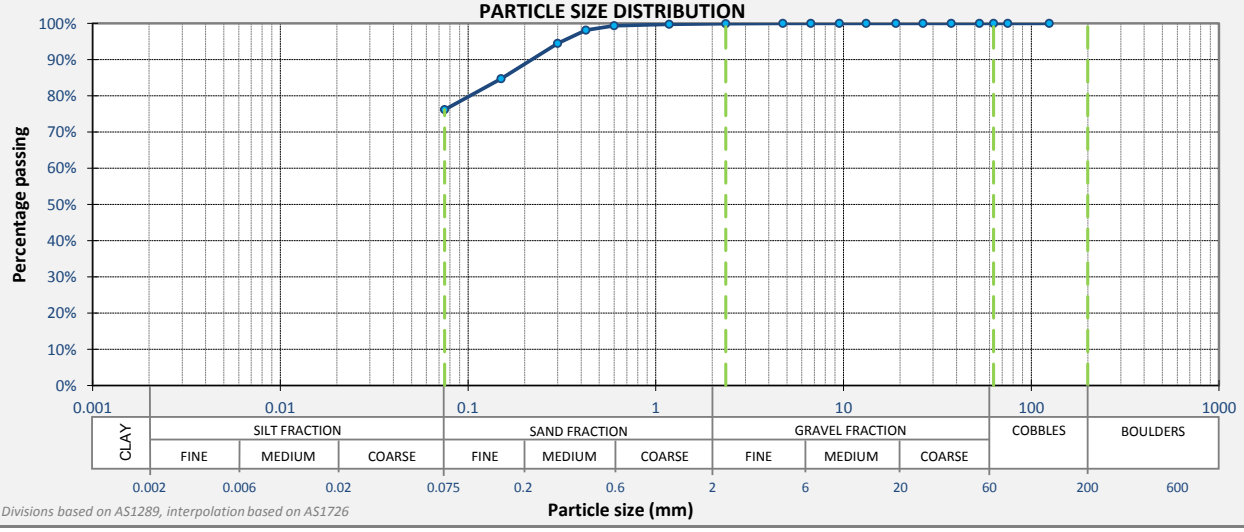
Definitions:
LB S = Lower bound specification
LSM = Linear shrinkage mould
UB S = Upper bound specification
N/A = Not applicable
ND = Not determined; SIB = Slip in bowl
NO = Not obtainable; NP = Non plastic

GRADING SUMMARY

Fines	Sand*	Gravel*	Cobbles*
(<75 µm)	(>75 µm - <2.36 mm)	(>2.36 mm - <63 mm)	(>63mm - <200 mm)
76.2%	**23.7%**	**0.1%**	**0.0%**

Proportions based on guidance in AS1726-2017 Section 6.1.4.2

PARTICLE SIZE DISTRIBUTION



Divisions based on AS1289, interpolation based on AS1726

Testing performed by: RD **Results reviewed by:** DBergen **Date reported:** 8/06/2018

Cert. ref.: 1896865-002_BH01 (22-5-18)_TRA18-0129_PSD_18052810_Rep18016378

Approved signatory:

NATA accreditation number: 1961 - Site:1954 - Adelaide
Accredited for compliance with ISO/IEC 17025 - Testing

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Daniel Bergen - Laboratory Technician

Phone: +61 (08) 8213 2100 **Fax:** +61 (08) 8213 2101 **E-mail:** adlgeolab@golder.com.au **Web:** www.golder.com.au

These tests were carried out in accordance with the Australian standards identified in this certificate.

Soils testing - Particle size distribution & consistency limits test report

Standard method (by sieving)

AS1289.3.6.1, 2.1.1, 3.1.2, 3.2.1, 3.3.1, 3.4.1 & AS 1726:2017 Section 6.1

GOLDER

Test request #:	**TRA18-0129**	**Lab sample ID:**	LADL2018052811
Client:	SMEC		
Client address:	Level 4, 19 Grenfell Street, Adelaide, SA, 5000		
Project ID:	**1896865-002**	**Lab report ref.:**	LADL_18016379

Golder Associates Pty Ltd

ADELAIDE GEOTECHNICAL LABORATORY

118 Franklin Street,
Adelaide,
South Australia 5000

Project name:	Storage Basin	**Exploratory Hole**	**BH01 (22/5/18)**
Location:	Seaford	**Sample depth (m):**	4.70 - 5.00
		Client sample ref:	
		Project reference:	3005628

Specimen description: (AS 1726:2017 Section 6.1)	(CH) CLAY, high plasticity, mottled red green grey, with fine to coarse grained sand	**Sampling co-ordinates** Easting (m)	Northing (m)	**Reduced Level**

PARTICLE SIZE DISTRIBUTION AS 1289.3.6.1

Sieve Size	Passing	LB S	UB S
125 mm	100%		
75 mm	100%		
63 mm	100%		
53 mm	100%		
37.5 mm	100%		
26.5 mm	100%		
19 mm	100%		
13.2 mm	100%		
9.5 mm	100%		
6.7 mm	100%		
4.75 mm	100%		
2.36 mm	100%		
1.18 mm	100%		
600 µm	100%		
425 µm	99%		
300 µm	96%		
150 µm	88%		
75 µm	80%		

Method:	AS 1289.2.1.1	AS 1289.3.1.2	AS 1289.3.2.1	AS 1289.3.3.1	AS 1289.3.4.1	
	Moisture content	**1 point Liquid limit**	**Plastic limit**	**Plasticity index**	**Linear shrinkage**	**Curling/ Crumbling/ Cracking**
Result:	32.3% As Rcvd.	81%	23%	58%	16.0%	Crumbling
LB S:						-
UB S:						-
Att. preparation method:		Dry sieved		**LSM length (mm):**		250
Specimen history/notes:	Preparation of specimen and testing performed on sample supplied to the laboratory					

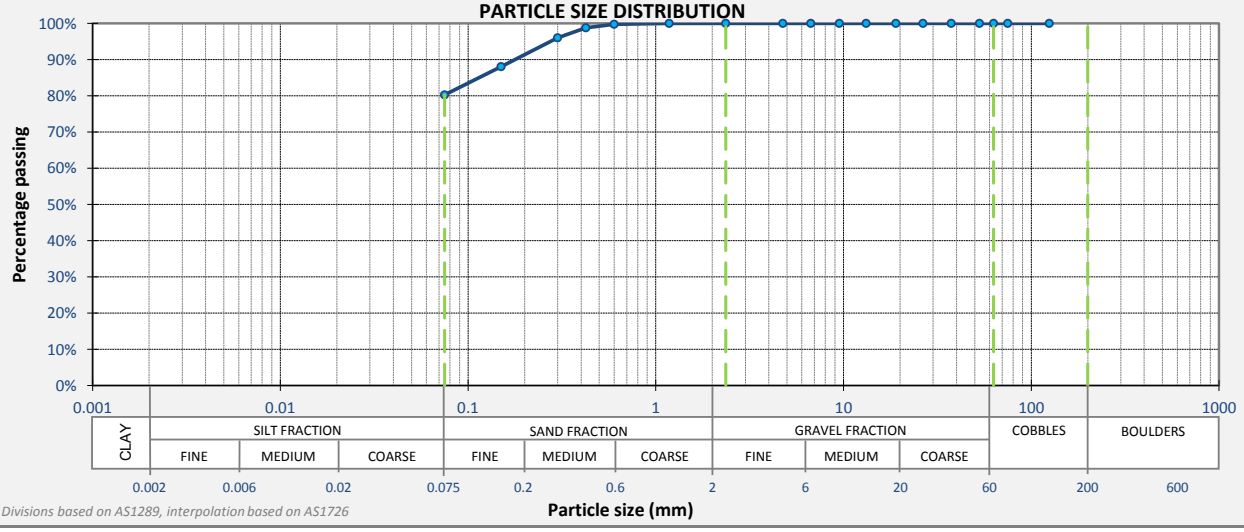
Definitions:
LB S = Lower bound specification
LSM = Linear shrinkage mould
UB S = Upper bound specification
N/A = Not applicable
ND = Not determined; SIB = Slip in bowl
NO = Not obtainable; NP = Non plastic

GRADING SUMMARY

Fines	Sand*	Gravel*	Cobbles*
(<75 µm)	(>75 µm - <2.36 mm)	(>2.36 mm - <63 mm)	(>63mm - <200 mm)
80.3%	**19.7%**	**0.0%**	**0.0%**

Proportions based on guidance in AS1726-2017 Section 6.1.4.2

PARTICLE SIZE DISTRIBUTION



Divisions based on AS1289, interpolation based on AS1726

Testing performed by: RD **Results reviewed by:** DBergen **Date reported:** 8/06/2018

Cert. ref.: **1896865-002_BH01 (22-5-18)_TRA18-0129_PSD_18052811_Rep18016379**

Approved signatory:

NATA accreditation number: 1961 - Site:1954 - Adelaide
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Daniel Bergen - Laboratory Technician

Phone: +61 (08) 8213 2100 **Fax:** +61 (08) 8213 2101 **E-mail:** adlgeolab@golder.com.au **Web:** www.golder.com.au

Soils testing - Report of Emerson class number
Soil classification
AS 1289.3.8.1-2017

GOLDER

Test request ID:	**TRA18-0129**	**Lab sample ID:**	LADL201805289	**Golder Associates Pty Ltd** **ADELAIDE GEOTECHNICAL LABORATORY** 118 Franklin Street, Adelaide, South Australia 5000	
Client:	SMEC				
Client address:	Level 4, 19 Grenfell Street, Adelaide, SA, 5000				
Project ID:	**1896865-002**	**Lab report ref.:**	LADL_18016380		
Project name:	Storage Basin	**Exploratory Hole**	**BH01 (22/5/18)**	**Sample depth (m):**	1.70 - 2.00
				Client sample ref:	
Location:	Seaford	**Project reference:**	3005628		

Specimen description (Based on visual and tactile assessment)	(CH) CLAY, high plasticity, pale grey brown, with fine to coarse grained sand, trace fine gravel	**Sampling co-ordinates**		**Reduced Level**
		Easting (m)	**Northing (m)**	

TEST REPORT - SUMMARY OF ANALYSIS

Visual reference



Date sampled:	
Date tested:	06/06/18
Temperature (°C):	21.0°
Type of water used:	Distilled

Observations / Notes

Reaction to hydrochloric acid- Calcite

Emerson class number
Class 4

Emerson Class:	**Definition / Notes**
Class 1	*Air-dried crumbs of soil show a strong dispersing reaction, i.e., a colloidal cloud covers nearly the whole of the bottom of the beaker, usually in a very thin layer. The reaction should be evident within 10 minutes. In extreme cases all the water in the beaker becomes cloudy, leaving only a coarse residue in a cloud of clay.*
Class 2	*Air-dried crumbs of soil show a moderate to slight reaction. A moderate reaction consists of an easily recognizable cloud of colloids in suspension, usually spreading in thin streaks on the bottom of the beaker. A slight reaction consists of the bare hint of cloud in water at the surface of the crumbs.*
Class 3	*The soil remoulded at the plastic limit disperses in water.*
Class 4	*The remoulded soil does not disperse in water. Calcium carbonate (calcite) or calcium sulfate (gypsum) is present.*
Class 5	*The remoulded soil does not disperse in water and the 1:5 soil/water suspension remains dispersed after 10 minutes.*
Class 6	*The remoulded soil does not disperse in water and the 1:5 soil/water suspension begins to floculate within 10 minutes.*
Class 7	*The air-dried crumbs of soil remain coherent in water and swell.*
Class 8	*The air-dried crumbs of soil remain coherent in water and do not swell.*

Definitions:
ND = Not determined

Test performed by: RD
Result reviewed by: DBergen
Date reported: **08/06/2018**

Cert. ref.: 1896865-002__TRA18-0129_Emerson_LADL201805289_R016380
Approved signatory:

NATA

NATA accreditation number: 1961 - Site:1954 - Adelaide
Accredited for compliance with ISO/IEC 17025 - Testing

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Daniel Bergen - Laboratory Technician

Soils testing - Report of Emerson class number
Soil classification
AS 1289.3.8.1-2017

GOLDER

Test request ID:	**TRA18-0129**	**Lab sample ID:**	LADL2018052810	**Golder Associates Pty Ltd**	
Client:	SMEC			**ADELAIDE GEOTECHNICAL LABORATORY**	
Client address:	Level 4, 19 Grenfell Street, Adelaide, SA, 5000			118 Franklin Street, Adelaide, South Australia 5000	
Project ID:	**1896865-002**	**Lab report ref.:**	LADL_18016381		
Project name:	Storage Basin	**Exploratory Hole**	**BH01 (22/5/18)**	**Sample depth (m):**	2.70 - 3.00
				Client sample ref:	
Location:	Seaford	**Project reference:**	3005628		

Specimen description (Based on visual and tactile assessment)	(CH) CLAY, high plasticity, grey, with fine to coarse grained sand	**Sampling co-ordinates**		**Reduced Level**
		Easting (m)	**Northing (m)**	

TEST REPORT - SUMMARY OF ANALYSIS

Visual reference



Date sampled:	
Date tested:	06/06/18
Temperature (°C):	21.0°
Type of water used:	Distilled

Observations / Notes

Emerson class number

Class 2

Emerson Class:	**Definition / Notes**
Class 1	*Air-dried crumbs of soil show a strong dispersing reaction, i.e., a colloidal cloud covers nearly the whole of the bottom of the beaker, usually in a very thin layer. The reaction should be evident within 10 minutes. In extreme cases all the water in the beaker becomes cloudy, leaving only a coarse residue in a cloud of clay.*
Class 2	*Air-dried crumbs of soil show a moderate to slight reaction. A moderate reaction consists of an easily recognizable cloud of colloids in suspension, usually spreading in thin streaks on the bottom of the beaker. A slight reaction consists of the bare hint of cloud in water at the surface of the crumbs.*
Class 3	*The soil remoulded at the plastic limit disperses in water.*
Class 4	*The remoulded soil does not disperse in water. Calcium carbonate (calcite) or calcium sulfate (gypsum) is present.*
Class 5	*The remoulded soil does not disperse in water and the 1:5 soil/water suspension remains dispersed after 10 minutes.*
Class 6	*The remoulded soil does not disperse in water and the 1:5 soil/water suspension begins to floculate within 10 minutes.*
Class 7	*The air-dried crumbs of soil remain coherent in water and swell.*
Class 8	*The air-dried crumbs of soil remain coherent in water and do not swell.*

Definitions:
ND = Not determined

Test performed by: RD
Result reviewed by: DBergen
Date reported: **08/06/2018**

Cert. ref.: 1896865-002__TRA18-0129_Emerson_LADL2018052810_R016381
Approved signatory:

NATA

NATA accreditation number: 1961 - Site:1954 - Adelaide
Accredited for compliance with ISO/IEC 17025 - Testing
THIS DOCUMENT SHALL ONLY BE REPRODUCED IN FULL

Daniel Bergen - Laboratory Technician

Soils testing - Report of Emerson class number
Soil classification
AS 1289.3.8.1-2017

GOLDER

Test request ID:	**TRA18-0129**	**Lab sample ID:**	LADL2018052811	**Golder Associates Pty Ltd**	
Client:	SMEC			**ADELAIDE GEOTECHNICAL LABORATORY**	
Client address:	Level 4, 19 Grenfell Street, Adelaide, SA, 5000			118 Franklin Street, Adelaide, South Australia 5000	
Project ID:	**1896865-002**	**Lab report ref.:**	LADL_18016382		
Project name:	Storage Basin	**Exploratory Hole**	**BH01 (22/5/18)**	**Sample depth (m):**	4.70 - 5.00
				Client sample ref:	
Location:	Seaford	**Project reference:**	3005628		

Specimen description (Based on visual and tactile assessment)	CLAY, Reddish green grey	**Sampling co-ordinates** Easting (m)	Northing (m)	**Reduced Level**

TEST REPORT - SUMMARY OF ANALYSIS

Visual reference



Date sampled:	
Date tested:	06/06/18
Temperature (°C):	21.0°
Type of water used:	Distilled

Observations / Notes

Emerson class number

Class 2

Emerson Class:	Definition / Notes
Class 1	*Air-dried crumbs of soil show a strong dispersing reaction, i.e., a colloidal cloud covers nearly the whole of the bottom of the beaker, usually in a very thin layer. The reaction should be evident within 10 minutes. In extreme cases all the water in the beaker becomes cloudy, leaving only a coarse residue in a cloud of clay.*
Class 2	*Air-dried crumbs of soil show a moderate to slight reaction. A moderate reaction consists of an easily recognizable cloud of colloids in suspension, usually spreading in thin streaks on the bottom of the beaker. A slight reaction consists of the bare hint of cloud in water at the surface of the crumbs.*
Class 3	*The soil remoulded at the plastic limit disperses in water.*
Class 4	*The remoulded soil does not disperse in water. Calcium carbonate (calcite) or calcium sulfate (gypsum) is present.*
Class 5	*The remoulded soil does not disperse in water and the 1:5 soil/water suspension remains dispersed after 10 minutes.*
Class 6	*The remoulded soil does not disperse in water and the 1:5 soil/water suspension begins to floculate within 10 minutes.*
Class 7	*The air-dried crumbs of soil remain coherent in water and swell.*
Class 8	*The air-dried crumbs of soil remain coherent in water and do not swell.*

Definitions:
ND = Not determined

Test performed by: RD
Result reviewed by: DBergen
Date reported: **08/06/2018**

Cert. ref.: 1896865-002__TRA18-0129_Emerson_LADL2018052811_R016382
Approved signatory:

NATA

NATA accreditation number: 1961 - Site:1954 - Adelaide
Accredited for compliance with ISO/IEC 17025 - Testing
THIS DOCUMENT SHALL ONLY BE REPRODUCED IN FULL

Daniel Bergen - Laboratory Technician

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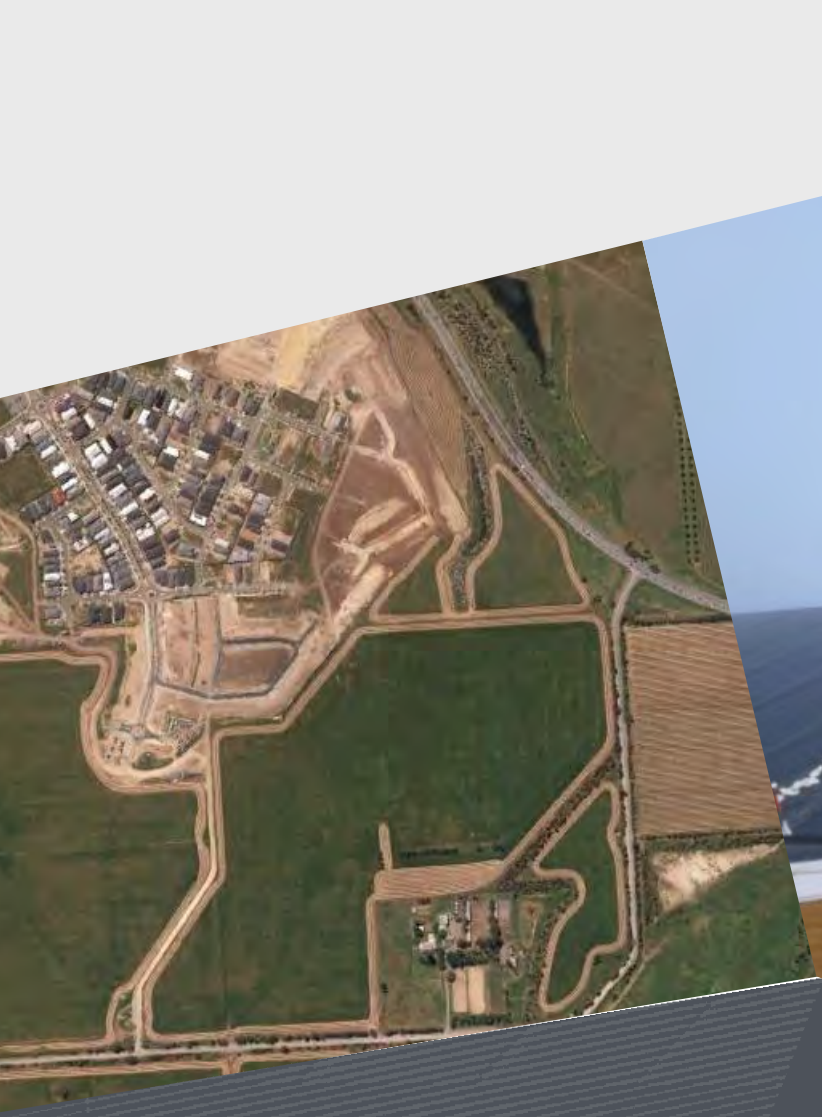
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Construction Report

SRWRA Storage Seaford

Reference No. WBWC PO-0073
Prepared for Water Utilities Australia
31 October 2018

3005647

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1 Introduction

SMEC has been engaged by Water Utilities Australia (WUA) to prepare a construction excavation method Report for a new 600ML storage at Seaford Heights. The Willunga Basin Water storage for the Southern Region Waste Resource Authority (SRWRA) is currently in the Concept Design Phase with the work being completed by HydroPlan.

As the storage is located upstream of a residential population it is recognised that construction of the storage has potential implications for the surrounding residents. As such a Construction method assessment was undertaken based on the outcomes of a geotechnical investigation report:

- Geotechnical Investigations Report Draft (SMEC, June 2018)

Details of outcomes of the Construction Method Assessment are presented below.

2 Construction Activities

The Works associated with construction of the Seaford Storage are envisaged to comprise the following:

- Stripping of topsoil and unsuitable materials from embankment and reservoir footprint
- Excavation and preparation of foundation
- Embankment construction
- Inlet/Outlet works construction
- Overflow (spillway) construction
- Clearing of vegetation and stripping of topsoil along the spillway outfall chute
- Prepare surface for membrane
- Placement, welding and testing of geomembrane liner
- Landscaping

3 Construction Method

The results of the Draft Geotechnical Report identified the following sub-surface lithology

Table 2: Summary of sub-surface lithology

UNIT	BH1	BH2	BH3	BH4
Top Soil	0.0 m to ≈0.2 m	0.0 m to ≈0.2 m	0.0 m to ≈0.2 m	0.0 m to ≈0.2 m
Upper Clay	≈0.2 m - ≈2.5 m	≈0.2 m - 1.3 m	≈0.2 m - ≈2.5 m	≈0.2 m - ≈3.6 m
Hindmarsh / Ngalinga Clay	≈2.5 m - 7.5 m	Not Encountered	≈2.5 m - 7.8 m	Not Encountered
Clayey Sand	7.5 m – 8.0 m (EOH)	Not Encountered	7.8 - 8.06 m (EOH)	Not Encountered
Residual Soil		1.3 m – 1.6 m		3.6 m - 4.9 m
Siltstone / Sandstone		1.6 m – 8.1 m (EOH)		4.9 m - 8.0 m (EOH)

No groundwater was encountered within the depth investigated.

As noted in the Draft Geotechnical Investigations Report the natural clay soils encountered in the boreholes are expected to be generally excavatable using conventional machinery such as excavators and dozers. Slower production rates would be expected in the residual soils and the very low strength weathered rock. Should the medium strength siltstone unit be encountered the use of specialist rock breaking equipment may be required. The need for the use of drill and blast techniques for excavation of this unit is not considered likely.

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Craig Heidenreich
General Manager
Water Utilities Australia
Willunga Basin Water Company
CHeidenreich@wua.com.au

28 November 2018

Dear Craig

Re: Odour Assessment – SRWRA Treated Water Storage Dam

This letter report provides an odour assessment of a proposed 600 ML treated water storage dam at Seaford. The assessment is based on field odour intensity observations at four treated water storage dams in the area of Noarlunga, Willunga and Aldinga on 16 August 2018.

This letter report has been updated based on client comments and an updated dam layout plan.

If you require any clarification or further information, then please let me know.

Sincerely



Johan Meline CAQP, MIEAust
Principal Consultant

SRWRA Treated Water Storage Dam Odour Assessment

Background and Introduction

Willunga Basin Water Company is planning for a new treated water storage dam at Seaford Heights near the existing Quarry Road storage dam. The location is south of Victor Harbor Road, west of Ostrich Farm Road, north of the SRWRA landfill and southeast of a new residential development, as shown in Figure 1 and Figure 2. Plans of the facility concept design are included as an attachment.

The capacity of the proposed dam is 600 ML and the purpose of the development is to provide Willunga Basin Water with additional winter storage capacity of water for irrigation purposes, to service nearby vineyards. The dam will contain treated water from Christies Beach wastewater treatment plant. Treated water from the Christies Beach treatment plant is currently stored and distributed for irrigation across the region by Willunga Basin Water. One storage facility is the Quarry Road dam to the north of the proposed location.

To address potential concerns regarding odour from the treated water storage dam, Willunga Basin Water Company engaged ERM to perform an odour assessment. As there is no South Australian recommended evaluation (buffer/separation) distance, site specific assessment is recommended. The odour assessment was based on field odour observations at current treated water storage facilities in the area of the proposed dam location. Dispersion modelling was not performed for the assessment since it is difficult to characterise emissions from low level non offensive odour sources[1].

The nearest existing sensitive receptor location is a residence to the south of the dam at a distance of 105 m from the water edge of the proposed dam maximum fill height.

The closest sensitive future receptors to the dam will be residents at the new residential development to the northwest at a distance of approximately 78 m from the water edge of the proposed dam maximum fill height.

The land proposed for the dam is in the Primary Production and Deferred Urban Zone.

[1] Odour impacts from low level non offensive odour sources, such as treated water storage lagoons, typically produce over predictions in separation distance requirements in dispersion modelling.

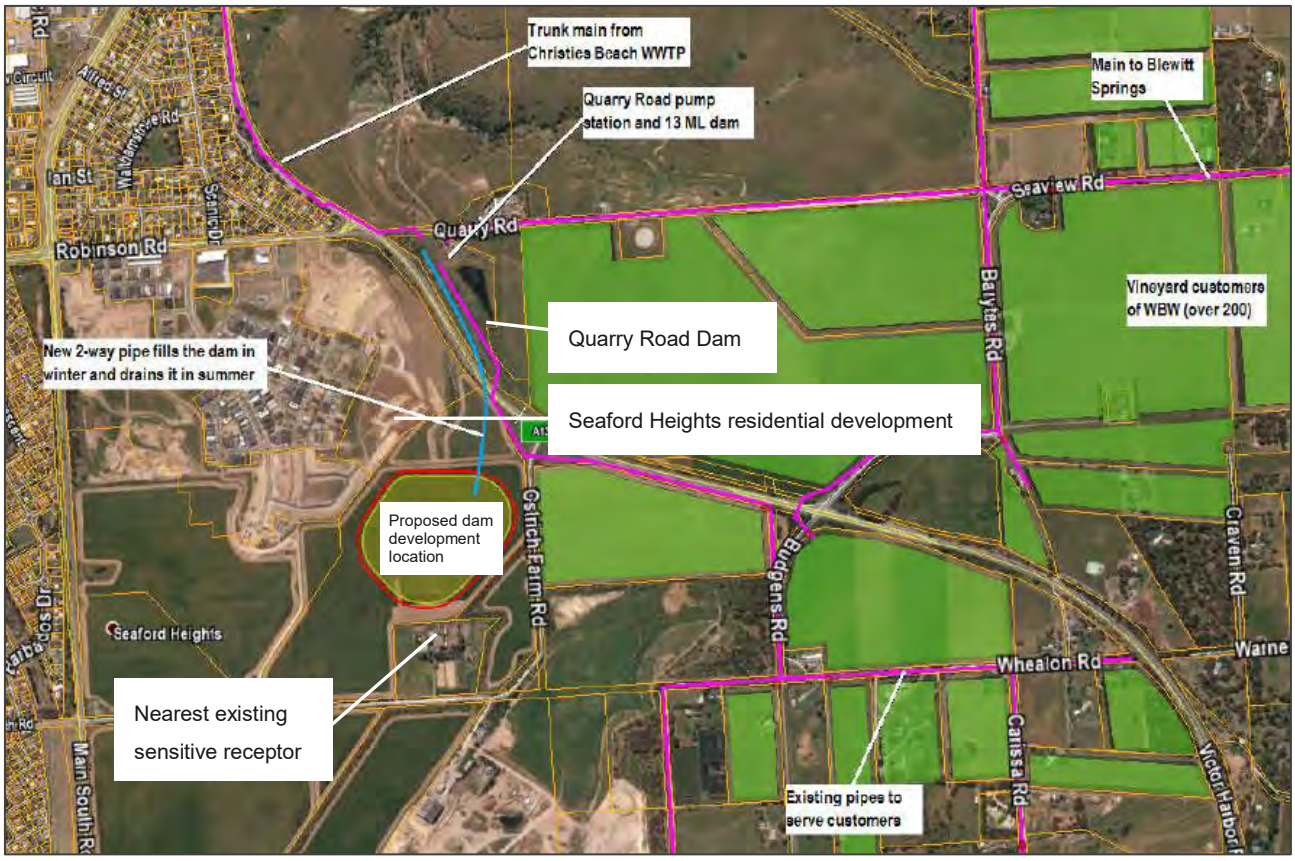


Figure 1: *SRWRA treated water storage dam site location*

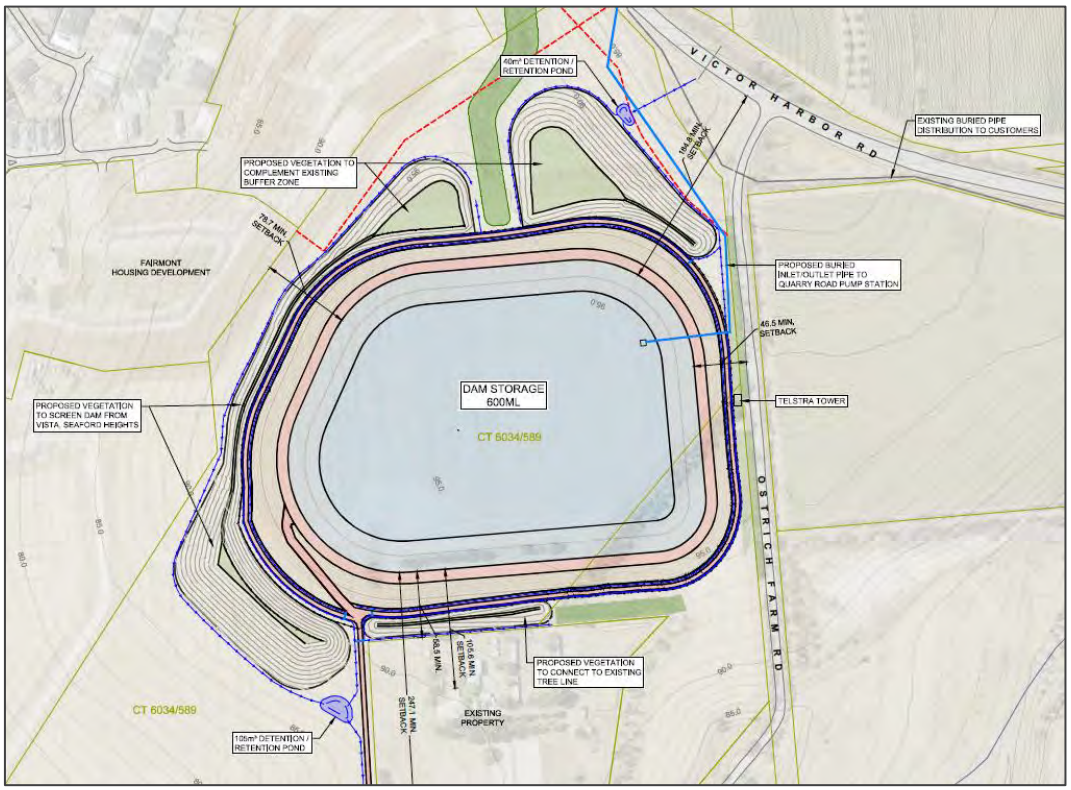


Figure 2: *SRWRA treated water storage dam site layout (see attachment for full plan)*

Odour Assessment Methodology

The odour assessment was based on field odour observations of existing nearby treated water storage dams. The results from the observations was evaluated against the separation distance to the nearest sensitive receptors, general settings of the area and wind data.

Field Odour Observations Assessment Methodology

The field odour observations methodology applied for the assessment was a modified version of the German Standard VDI 3490 (1993) method for odour surveys. The method standardises the odour logging approach by the adoption of a standard scale for describing odour intensity, as detailed in the German Standard VDI 3882, which relates to odour measurement. This method was selected as it enables the evaluation of odour over time rather than single point in time with discrete observations.

The German standard describes a procedure for logging odour in the field which involves noting the odour intensity based on a scale of 0 to 6 (see Table 1) every 10 seconds over a 10 minute period for a number of locations. In addition to making intensity observations, the observer also notes the character of the odour/odours observed, if that can be determined.

Table 1: *Odour intensity scale with interpretation*

Perceived Odour Strength	Intensity Rating	Interpretation Source: VDI 3490 (1993) and modified interpretations from Pitt (2014)[2]
Extremely Strong	6	In normal circumstances, this should be very rare in a field situation. For an offensive type of odour, the reaction would be to immediately mitigate against further exposure until the exposure level is reduced. The odour cannot be tolerated.
Very Strong	5	The odour character is clearly recognisable. For an offensive type of odour, exposure to this level is considered unpleasant/undesirable to the point that action to mitigate against further exposure is considered or taken.
Strong	4	The odour character is clearly recognisable. For an offensive type of odour, exposure to this level would be considered unpleasant/undesirable.
Distinct	3	The odour character is clearly recognisable. Note that this must still apply even if in a different context or situation - for example, not knowing or expecting what type of odour may be present. The odour is tolerable – even for an offensive odour.
Weak	2	A detectable weak odour stronger than very weak and less strong than distinct.
Very Weak	1	Odour only just detectable.
Not Perceptible	0	No odour present.

Locations for the field odour observations were selected to cover one upwind location for reference of background odour and downwind locations at various distances from the targeted odour source.

In addition to recording odour intensity observations, wind conditions (wind direction and wind speed) were also recorded for each observation.

The results of the field odour intensity observations are summarised in the results section below. Result pie charts of the intensity observations for each observation location were plotted on an aerial image along with the wind direction at the time of the observation. This provides an overview of the observation

[2] Pitt, D. (2014). Field odour assessments for estimating odour concentrations. Air Quality and Climate Change, 48(1), 24-32. VDI. (1993). Determination of odorants in ambient air by field inspections intensity VDI3940. Dusseldorf: Kommission Reinhaltung der Luft im VDI und DIN.

results summarising where odour was observed as well as the level of odour observed, frequency of different odour intensities and the wind directions.

Wind Data

Local wind data is relevant to consider in odour assessments as it indicates where impacts will occur. Annual prevailing wind directions as well as time of day and seasonal prevailing wind directions are relevant to consider from a potential exposure point of view. Wind data from the Noarlunga BoM weather station, the nearest weather station to site, is presented below.

Separation Distance Guidelines

Relevant SA EPA guidelines on separation distance requirements include:

- Evaluation Distances for Effective Air Quality and Noise Management (SA EPA, 2016)[3]
- Wastewater Lagoon Construction (SA EPA, 2014)[4]

The evaluation distances guideline states:

> *There is no recommended evaluation distance for recycled water storage lagoons, so a site-specific assessment is recommended.*

This statement is further expanded on in the wastewater lagoon construction guideline:

> *Separation distances for recycled water storage lagoons are not specified. This is because air (odour) and noise issues are not generally associated with these lagoons, providing wastewater has been treated to minimise odour and they contain no mechanical treatment processes which generate noise. For recycled water storage lagoons a site-specific assessment should be undertaken to determine appropriate separation from sensitive receptors.*

Wind Data

Wind data for the Noarlunga BoM weather station, approximately 4 km to the north of the proposed SRWRA storage dam location, is presented in Figure 3 to Figure 5. The data[5] shows annual prevailing wind directions as north (N), east (E) and southeast (SE). These are broken down as follows:

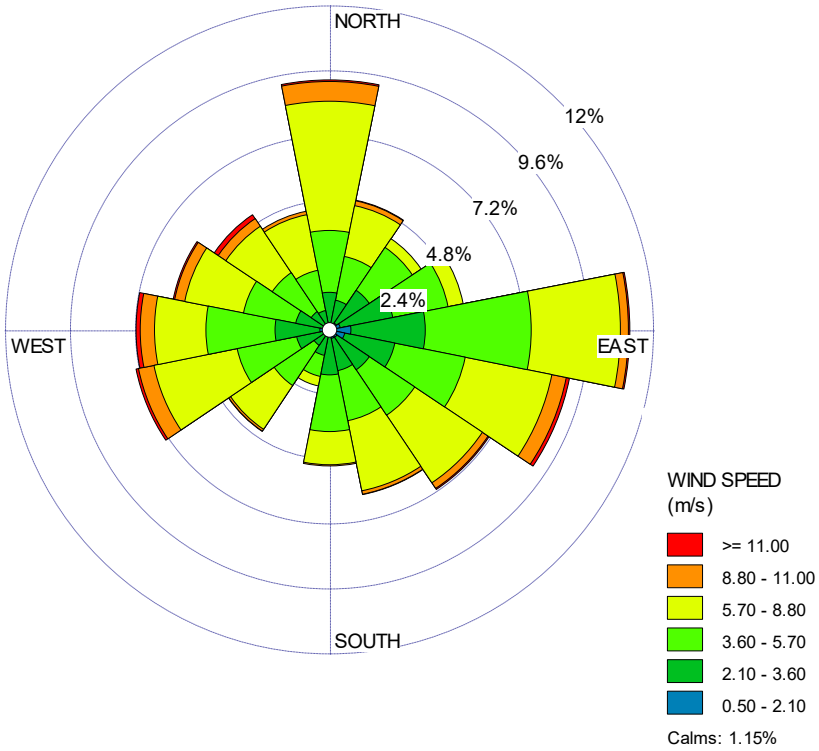
- The prevailing wind direction in summer months is SE.
- The prevailing wind direction in autumn months is E.
- The prevailing wind direction in winter months is N.
- Overnight prevailing wind directions are E to SE.
- Day time prevailing wind directions are N and E in mornings and W with afternoon sea breezes.

For the nearest future sensitive receptors to the NW (the Seaford heights residential development), there is potential exposure with SE winds, especially in summer months. However, it should be observed that Noarlunga BoM station is located in a windy location (very low frequency of low wind speeds) and that the proposed SRWRA storage dam site location is located on hilltop at a higher elevation than the Noarlunga weather station, which should give greater exposure to winds. This means that the site location can be expected to be windier than Noarlunga and this provides good dispersion conditions.

[3] SA EPA. (2016). Evaluation distances for effective air quality and noise management.
[4] SA EPA. (2014). Wastewater Lagoons Construction.
[5] Wind roses for 2009 included

The concept design drawings (see attached) show that there will be a banks (at the hill crest) between the storage dam and the nearby sensitive receptors. From this and the hilltop location, it follows that there should be no reason to suspect that there would be any directed drainage flows (and associated odour issues) in the direction towards the nearest sensitive receptors. The prevailing N winds show potential for exposure of the sensitive receptor to the south, however the N prevailing winds occur during wintertime daytime conditions with higher wind speeds in good dispersion conditions.

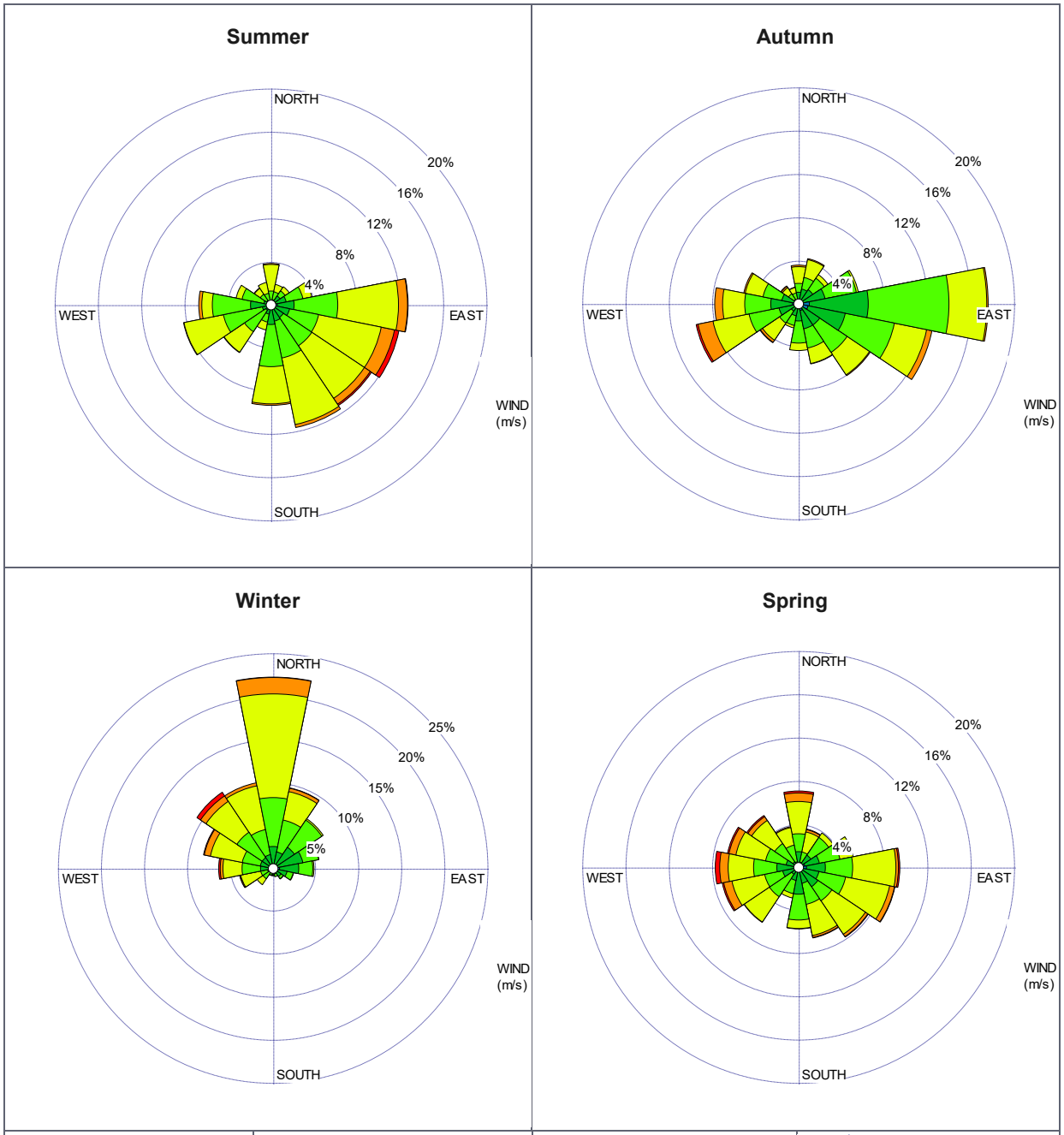
While there is potential exposure of the nearby sensitive receptors (with prevailing SE and N winds for part of the year), dispersion conditions at the elevated site location should be good and the residential receptors are not in locations, relative to the storage dam, that would pose any particular exposure risk[6].



Location: Noarlunga BoM	**Data Period:** 2009 (99.6% data availability)	**Data Type:** Observation data
Calm Winds: 1.2%	**Average Wind Speed:** 4.9 m/s	**Plot:** J Meline

Figure 3: *Annual wind rose for Noarlunga BoM*

[6] Examples of this would be the dam located in valley where there could be cold air drainage transporting odour to down gradient sensitive receptors or a situation with receptors on a hillside above the dam location where winds could blow an odour plume uphill and towards ground and receptors.

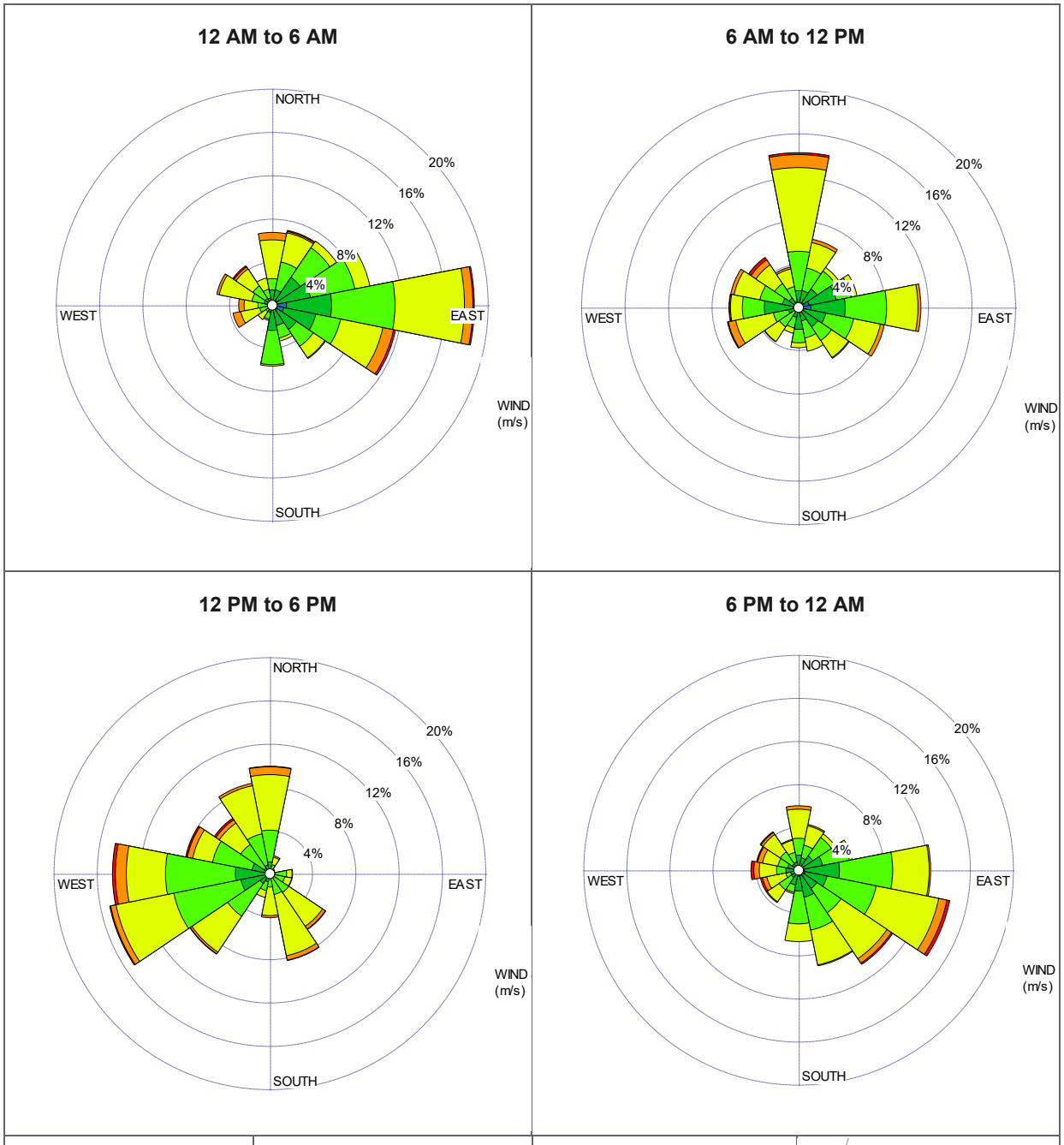


Period	Average wind speed (m/s)	Calm winds frequency
Summer	5.2	0.8%
Autumn	4.4	1.9%
Winter	5.0	1.1%
Spring	5.2	0.8%

WIND SPEED (m/s)
>= 11.10
8.80 - 11.10
5.70 - 8.80
3.60 - 5.70
2.10 - 3.60
0.50 - 2.10
Calms: 0.32%

Location:	Data Period:	Data Type:	Plot:
Noarlunga BoM	2009	Observation data	J Meline

Figure 4: *Seasonal wind roses for Noarlunga BoM*



Period	Average wind speed (m/s)	Calm winds frequency
12 AM to 6 AM	4.7	1.7%
6 AM to 12 PM	4.8	0.8%
12 PM to 6 PM	5.4	0.3%
6 PM to 12 AM	4.9	1.8%

Location:	Data Period:	Data Type:	Plot:
Noarlunga BoM	2009	Observation	J Meline

Figure 5: *Time of day wind roses for Noarlunga BoM*

Field Odour Intensity Observation Results

Field odour observations were performed on 16 August 2018 at the following treated water storage dams:

- Aldinga Storage Basin (south of the Aldinga WWTP)
- Quarry Road treated water storage dam (just north of the proposed SRWRA storage location)
- Little Road treated water storage dams (northwest of Willunga)

The log sheets for each observation location are provides as attachments.

General Observations

Odour from the treated water storage dams is recognisable, but not perceived as offensive, and typically present intermittently at low levels even very close to the dams. While the treated water is a product from a wastewater treatment plant, the odour from the storage dams is not perceived as wastewater related. The character of the odour of the treated water is closer in resemblance to muddy lake or pond water.

Aldinga Storage Basin

Site access was not available for the Aldinga Storage Basin south of the Aldinga WWTP. Odour observations were collected around the site perimeter along Plains and Hahn Road. Observations were performed early morning in near calm conditions (<0.5 m/s wind speed) with air movement from the north. There was no background odour observed (at upwind location) and no odour observed south (downwind) of the storage basin. The distance of observation from the treated water storage edge to the observation locations was approximately 110 m. The field odour observation results are summarised in Figure 6.

Quarry Road Treated Water Storage Dam

The water stored is treated water from Christies Beach WWTP, which is the same as for the proposed SRWRA storage dam. Conditions at the time of the observations were light WSW winds. The observations showed intermittent very weak to weak odours downwind from the dam with no odour observed for most of the durations. Closer to the water edge, odour was detected more frequently (about a quarter of the time) than at the site boundary. Very little odour was observed at the site boundary at distances of approximately 20 m to 40 m from the dam water edge.

Overall observations were perceived as low level odour and not of an offensive nature. The field odour observation results are summarised in Figure 7.

Little Road Treated Water Storage Dams

The water currently stored is treated water from the onsite Onkaparinga Council WWTP, but it is blended with Christies Beach water later in each season. Although the current water is not identical to the Christies Beach treated water, it is treated to the same quality as for the proposed storage dam.

Conditions at the time of the observations were light NW winds and odour observations were performed to the east of the storage dam along the boundary fence line and closer to the dam location to collect data on variations in the odour observations with distance from the water edge. The observations showed intermittent very weak to weak odours downwind from the dam with no odour observed for most of the durations. Closer to the water edge, odour was detected more frequently. Very little odour was observed at an approximate distance of 50 m from the dam water edge and no odour was observed at a distance of approximately 90 m from the dam water edge.

At the storage dam located south of the treatment plant at the site there was no odour observed at the downwind dam water edge. The field odour observation results are summarised in Figure 8.

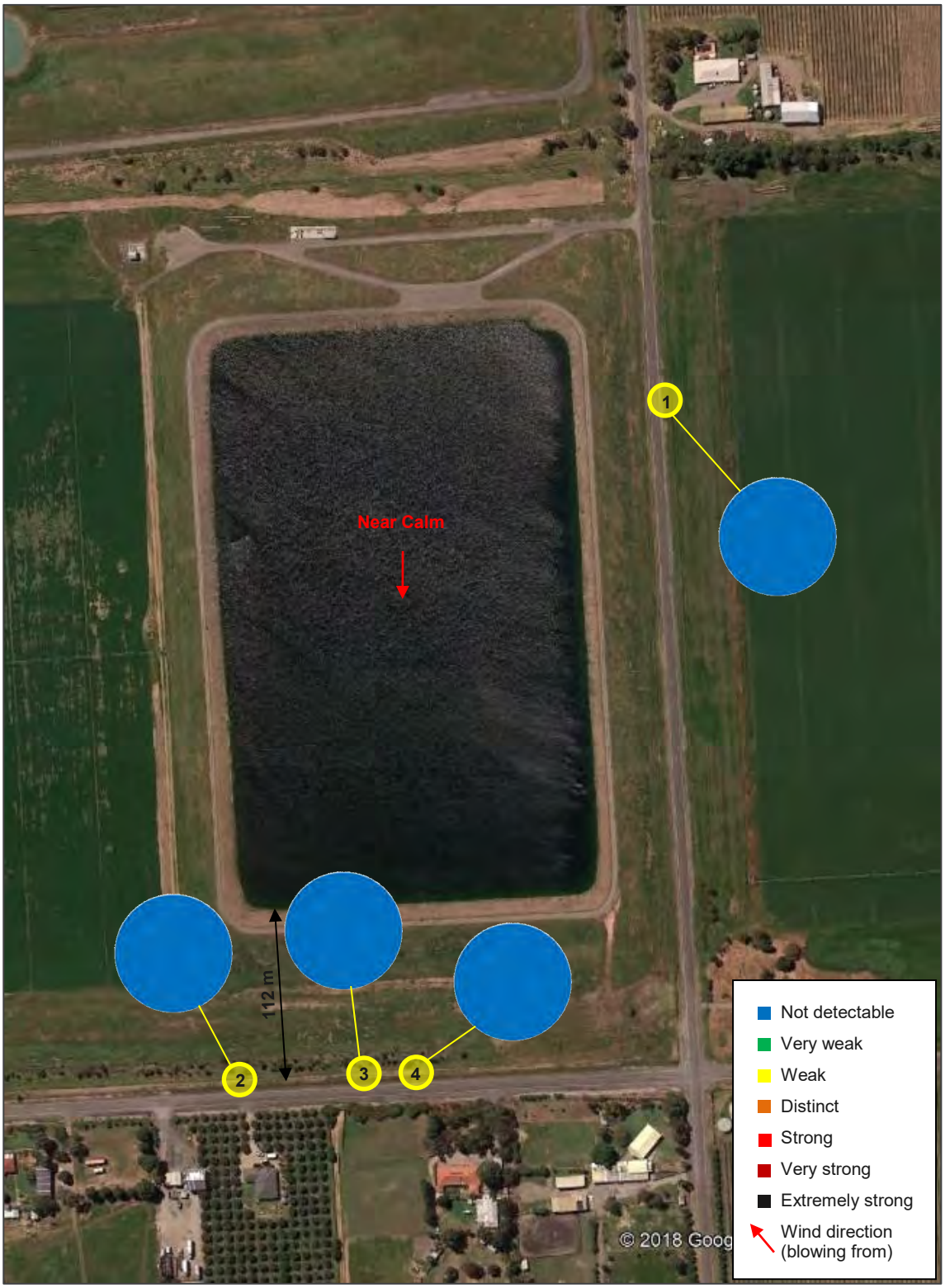


Figure 6: *Aldinga Storage Basin field odour observation results*

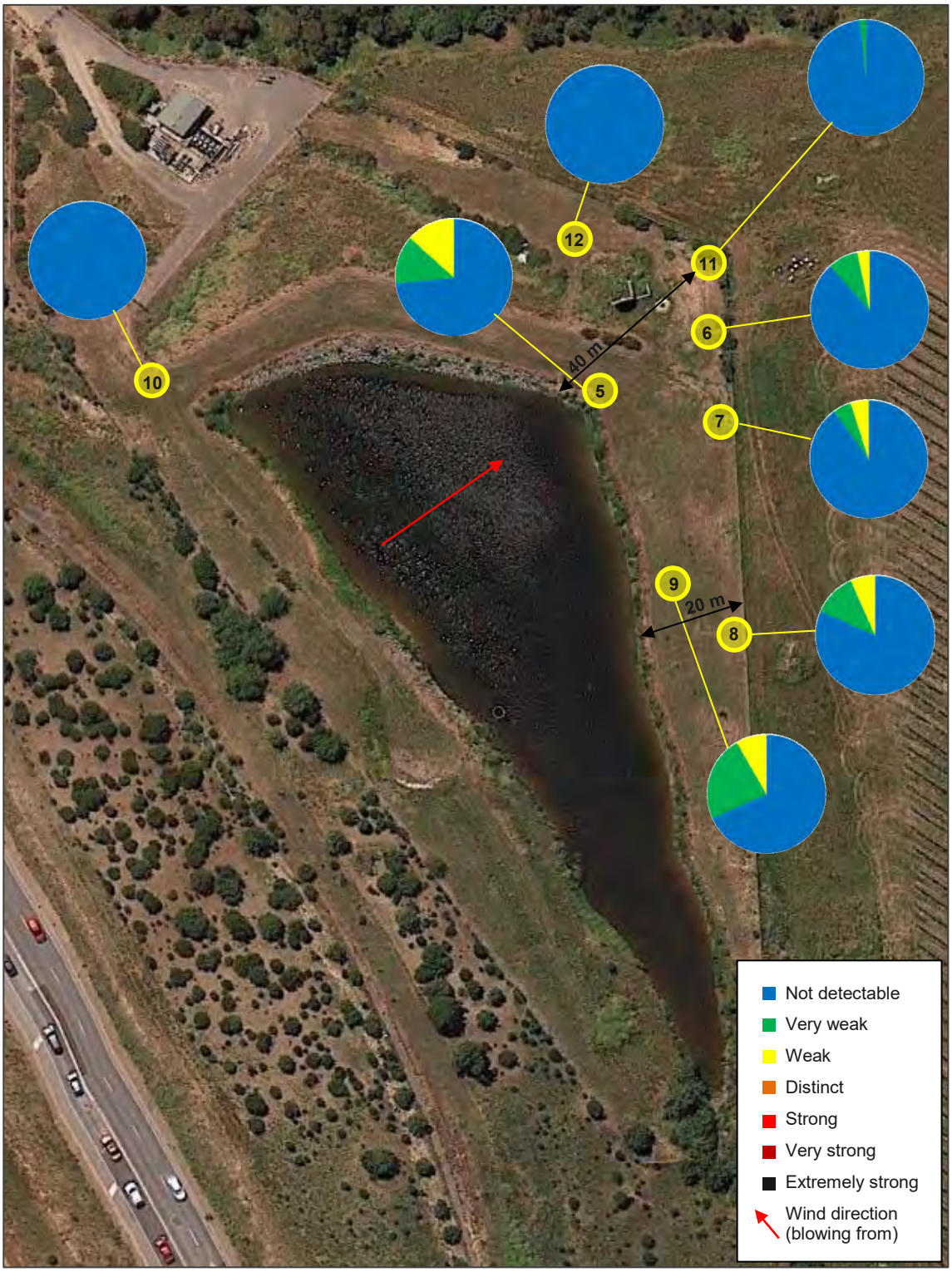


Figure 7: *Quarry Road treated water storage dam field odour observation results*

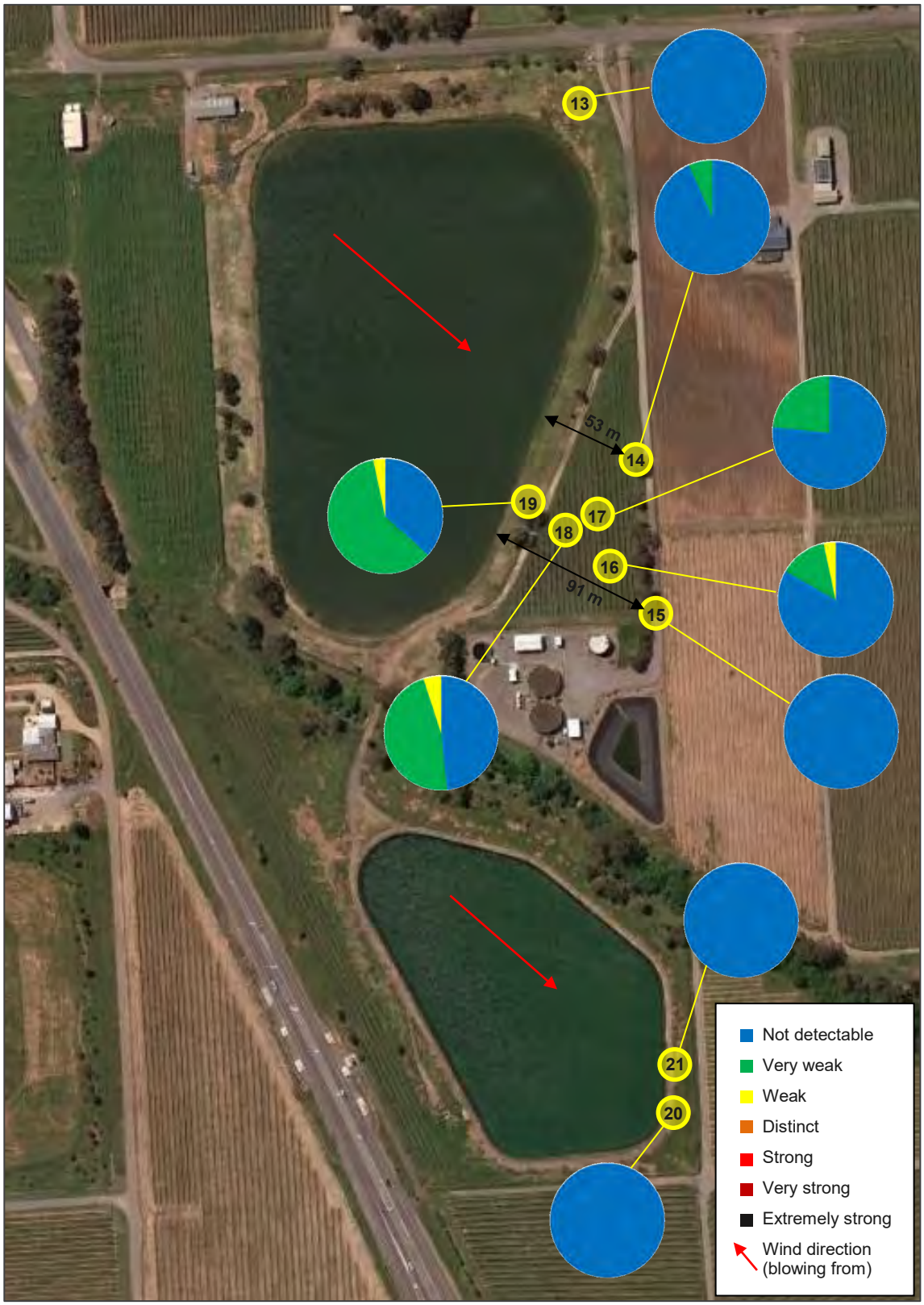


Figure 8: *Little Road treated water storage dams field odour observation results*

Conclusions and Recommendations

The field odour observations showed the following:

- There is odour associated with treated water storage dams. However, the character of the odour is not perceived as offensive, and it is not a wastewater related odour.
- The levels of odour observed were mostly low level and intermittent, especially at distance from the sources.
- At most locations no odour was observed for most of the time.
- No distinct or strong intensity odours were observed.

The review of the dam location and wind data review showed the following:

- The nearest sensitive receptors at the Seaford Height residential development, currently under construction, is at a distance of approximately 78 m from the water edge of the proposed dam maximum fill height.
- The nearest existing sensitive receptor location is a residence to the south of the dam at a distance of 105 m from the water edge of the proposed dam maximum fill height.
- The Seaford Heights residential development is in the summer time prevailing downwind wind direction and the sensitive receptor to the south is in the winter daytime prevailing downwind wind direction. However, dispersion conditions at the elevated hilltop location should be very good given the elevation and windy conditions.

From the field odour observations and the assessment it cannot be concluded that there will be no odour at the nearest sensitive receptor locations at the Seaford heights residential development as a result of the construction of the treated water storage dam as proposed. However, what the assessment shows is that any odour would be very low level (low odour concentration and intermittent) and not of an offensive nature.

Dispersion modelling was not performed for the assessment since it is difficult to characterise emissions and odour impacts from low level non offensive odour sources to then produce impact predictions that could be used for realistic separation distance requirements. However, for any dispersion modelling the applicable odour assessment criteria for the location would likely be 2 odour units. This means that a very low level of odour is acceptable at the location.

In accordance with operations to “good practice”, it is recommended that an Operations Management Plan, that includes odour management, be developed for the treated water storage dam. The Operations Management Plan should include routine water quality monitoring protocols and site inspections specifically targeting observation of odour for monitoring of performance. For operations and mitigations, details should be provided on preventative measures for maintenance of water quality and an incident response plan (should an odour event occur) should be included.

With an effective Operations Management Plan in place, there is a low risk of elevated odour from the proposed treated water storage.

EXISTING QUARRY ROAD DAM AND PUMPING STATION

NORTH

N 6102700 E 272500

N 6102600 E 272500

N 6102500 E 272500

N 6102400 E 272500

BUFFER ZONE LANDSCAPING AREA AS PER "LAND MANAGEMENT AGREEMENT" DRAWING No. 1-3255

BUFFER LAND AS PER "LAND MANAGEMENT AGREEMENT" ANNEXURE C PLAN No. GP21/2011

30.0

35m OFFSET FROM EXISTING BOUNDARY

ISSUE #3 DRAINAGE

PROPOSED VEGETATION TO COMPLEMENT EXISTING BUFFER ZONE

TOP OF MOUND 102.00m

TOP OF MOUND 102.00m

V I C T O R H A R B O R R D

EXISTING 500mm BURIED PIPE DISTRIBUTION TO CUSTOMERS

ISSUE #1 LOW POINT

PROPOSED 500mm BURIED INLET-OUTLET PIPE TO QUARRY ROAD PUMP STATION

ISSUE #4 LOW POINT

F99.50m TOP OF BANK 10m WIDE

F90.95m BOTTOM OF DAM

1:3 INTERNAL BATTER

MOUND TOTAL FILL = 180,000m3 (NO FILL FACTOR)

324.5

280.0

4.65m FILL

7.6m FILL

4.65m CUT

6.0m FILL

PROPOSED ENTRANCE ADJACENT TO PROPOSED TELSTRA TOWER

O S T R I C H F A R M R D

TOE OF BATTER

TOP OF MOUND 101.50m

7.4m FILL

6.0m FILL

4.15m FILL

CT 6034/587 BOUNDARY

CT 6034/589 BOUNDARY

ISSUE #2 LOW POINT

PROPOSED VEGETATION CONNECTING TO EXISTING TREE LINE

B A K E W E L L D R

Smart Approved WaterMark

SITEWORKS LEGEND

- PROPERTY LINE
- PROPOSED PIPELINE
- PROPOSED SWALE
- EXISTING PIPELINE
- BUFFER LAND BOUNDARY LINE
- N 6102500 E 272500 — COORDINATES AS SHOWN ON DRAWING No. "1-3255" OF THE LAND MANAGEMENT AGREEMENT

FINISHED SURFACE LEGEND

- RUBBLE AREA
- STORAGE AREA (PLASTIC LINED)
- OUTSIDE BATTER AREA

VEGETATION LEGEND

EXTENDED VEGETATION AREA:
(FOR SCREENING - INDICATIVE ONLY)

EXAMPLE:



NOTE: VEGETATION PLAN TO BE AGREED WITH BIODIVERSITY McLAREN VALE AND DEW. VEGETATION TO SCREEN A 1.8m HIGH SECURITY FENCE ON THE INTERNAL SIDE OF EXTENDED VEGETATION ALIGNMENT.

EXISTING VEGETATION AREA:

EXAMPLES:





-20 0 20 40 60 80 100 200m

SCALE 1:2000 ORIGINAL SIZE A1

REV	ISSUED	D.DWN	APRVD	REVISION DESCRIPTION
0	20/09/2018	JT	JG/BH	FOR DISCUSSION
-				-

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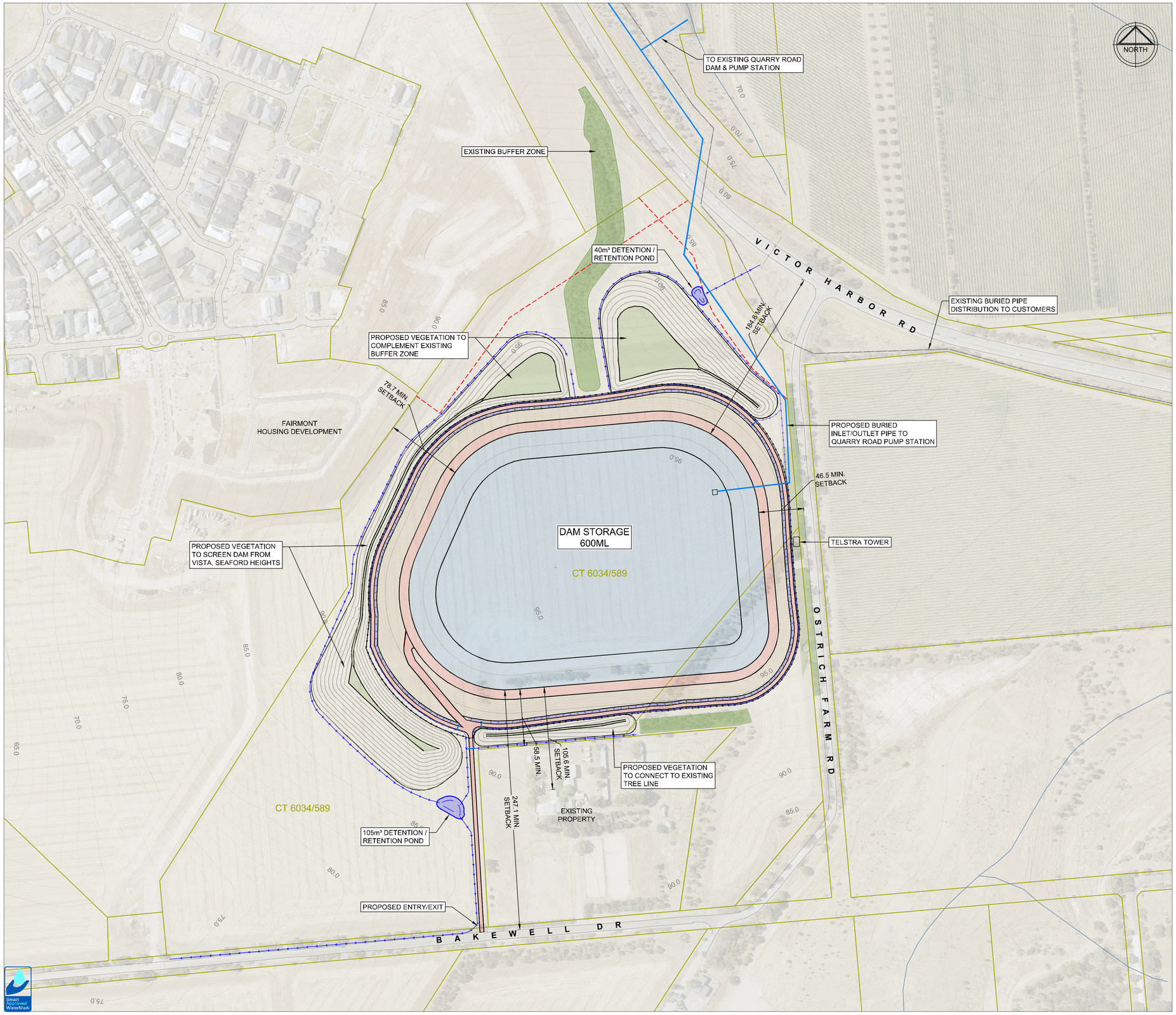
The arrangement and general details as shown on this drawing are essentially diagrammatic and must be applied to the circumstances as found on site.

DES/DRAWN:	JT
CHECKED:	BH
APPROVED:	JG
DATE:	29/03/2018
DRAFT REF:	2-WBW-d4

CLIENT: WILLUNGA BASIN WATER

PROJECT: SRWRA STORAGE
CONCEPT DESIGN PLAN WITH MOUNDS

DRAWING No.	SHEET	OF	REVISION
14689-SK017	1	3	0



SITEWORKS LEGEND

- PROPERTY LINE
- PROPOSED PIPELINE
- PROPOSED SWALE
- EXISTING PIPELINE
- BUFFER LAND BOUNDARY LINE

FINISHED SURFACE LEGEND

- RUBBLE AREA
- STORAGE AREA (PLASTIC LINED)
- OUTSIDE BATTER AREA

VEGETATION LEGEND

EXTENDED VEGETATION AREA:
(FOR SCREENING - INDICATIVE ONLY)

EXAMPLE:



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EXISTING VEGETATION AREA:

EXAMPLES:





-20 0 20 40 60 80 100 200m

SCALE 1:2000 ORIGINAL SIZE A1

REV	ISSUED	D.DWN	APRVD	REVISION DESCRIPTION
3	16/11/2018	JT	JG/BH	FOR DISCUSSION
2	22/10/2018	JT	JG/BH	FOR DISCUSSION
1	03/10/2018	JT	JG/BH	FOR DISCUSSION
0	20/09/2018	JT	JG/BH	FOR DISCUSSION

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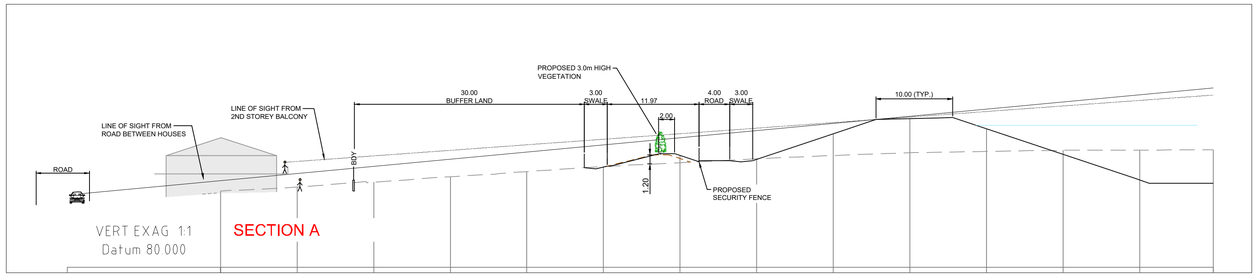
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CHECKED:	BH
APPROVED:	JG
DATE:	29/03/2018
DRAFT REF:	2-WBW-d7

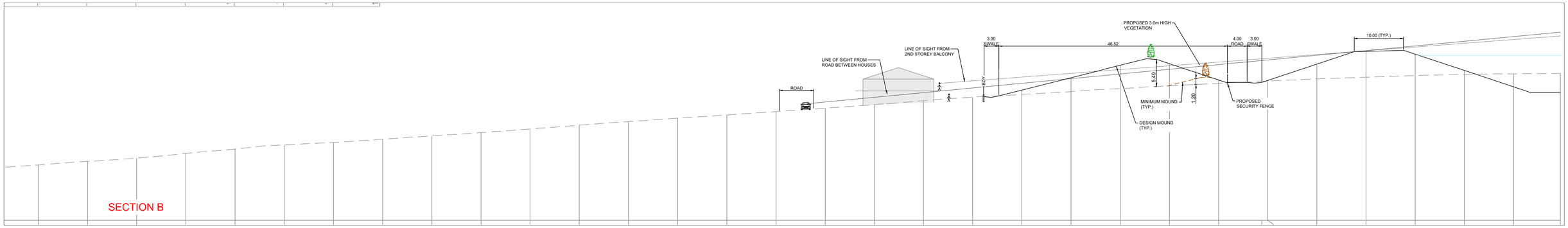
CLIENT: WILLUNGA BASIN WATER

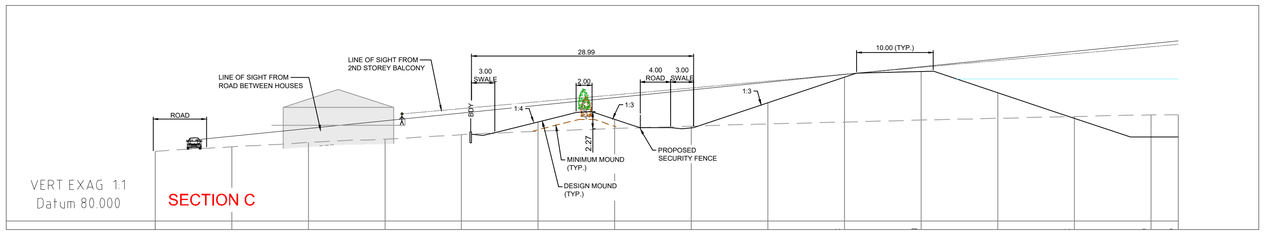
PROJECT: SRWRA STORAGE
CONCEPT DESIGN PLAN WITH MOUNDS

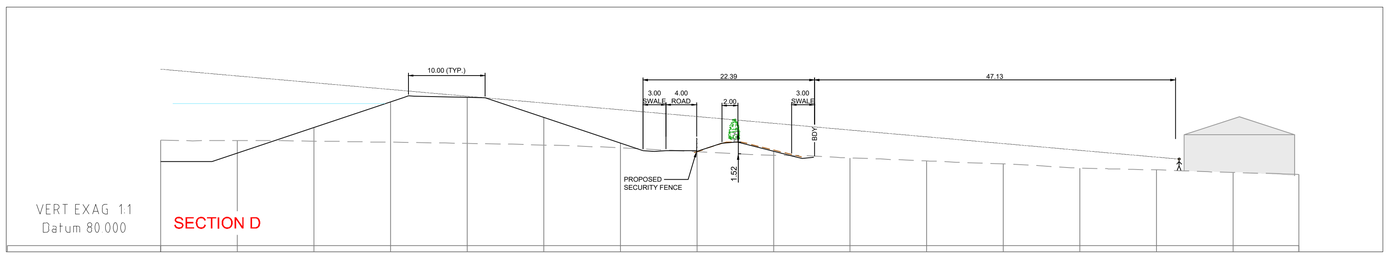
DRAWING No. 14689-SK017 | SHEET 1 OF 1 | REVISION 3

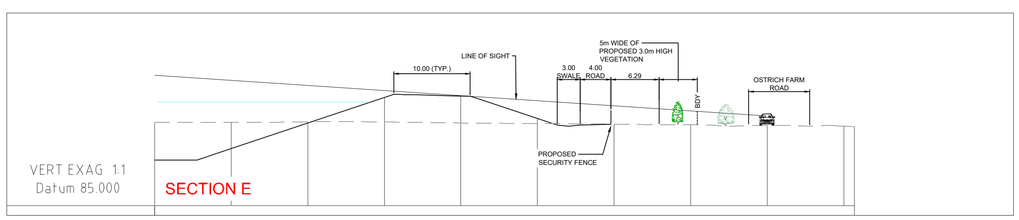
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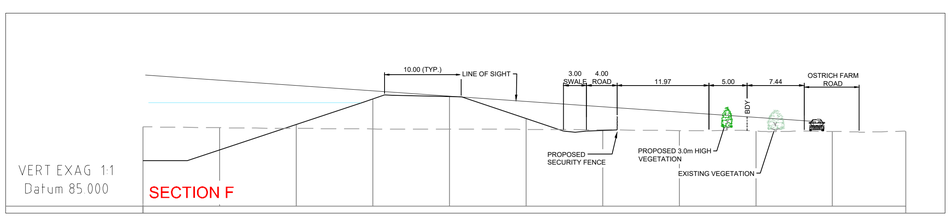












-4 0 4 8 12 16 20 40m

SCALE 1: 400 ORIGINAL SIZE A1

REV	ISSUED	D.DWN	APRVD	REVISION DESCRIPTION
0	??/09/2018	JT	JG/BH	FOR DISCUSSION

REV	ISSUED	D.DWN	APRVD	REVISION DESCRIPTION
-				-

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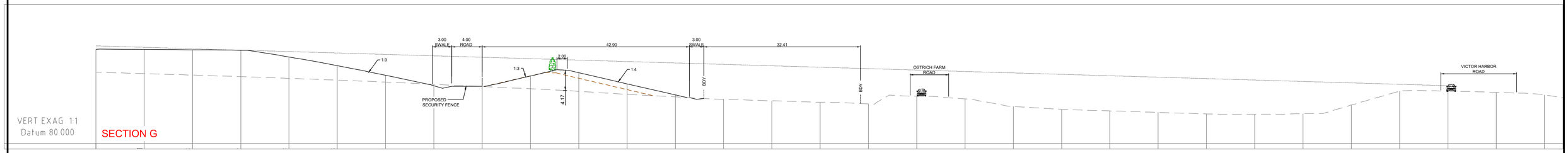
The arrangement and general details as shown on this drawing are essentially diagrammatic and must be applied to the circumstances as found on site.

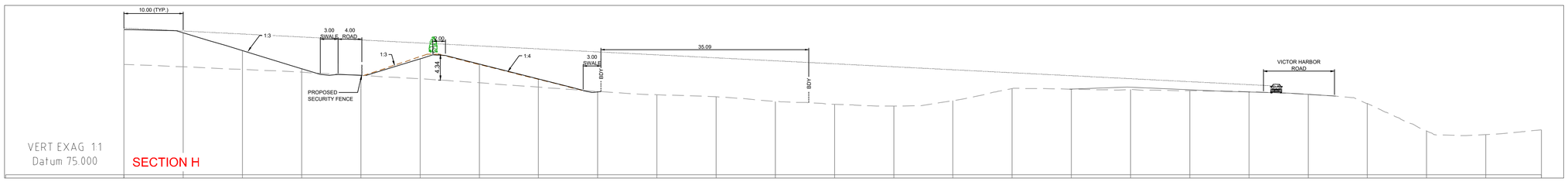
DES/DRAWN:	JT
CHECKED:	BH
APPROVED:	JG
DATE:	29/03/2018
DRAFT REF:	2-WBW-d4

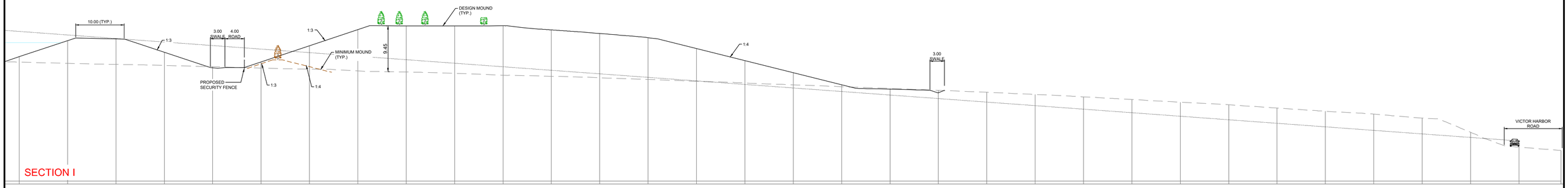
CLIENT: WILLUNGA BASIN WATER

PROJECT: SRWRA STORAGE
CONCEPT DESIGN PLAN WITH SECTION VIEWS

DRAWING No.	SHEET	OF	REVISION
14689-SK017	2	3	0







-4 0 4 8 12 16 20 40m

SCALE 1: 400 ORIGINAL SIZE A1

REV	ISSUED	D.DWN	APRVD	REVISION DESCRIPTION
0	20/09/2018	JT	JG/BH	FOR DISCUSSION
-				-

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DES/DRAWN:	JT
CHECKED:	BH
APPROVED:	JG
DATE:	29/03/2018
DRAFT REF:	2-WBW-d4

CLIENT: WILLUNGA BASIN WATER

PROJECT: SRWRA STORAGE
CONCEPT DESIGN PLAN WITH SECTION VIEWS

DRAWING No.	SHEET	OF	REVISION
14689-SK017	3	3	0

Field Odour Intensity Observation Log Sheet

Panelist Name: Johan Meline
Date: 16/08/2018
Start Time: 6:59
Site Code: 1 Aldinga Storage Basin
GPS Location: X: 271,302 Y: 6,091,617 54H
Intensity Scale:

0	1	2	3	4	5	6
Not Detectable	Very Weak	Weak	Distinct	Strong	Very Strong	Extremely Strong

Perceived Odour Source:
Targerted odour: treated water storage odour

Wind Speed: near calm
Wind Direction: N
Temperature: 9 °C

Photo:
(in Wdir blowing from)



Time	Intensity	Source	Time	Intensity	Source	Time	Intensity	Source
0:10	0		3:30	0		6:50	0	
0:20	0		3:40	0		7:00	0	
0:30	0		3:50	0		7:10	0	
0:40	0		4:00	0		7:20	0	
0:50	0		4:10	0		7:30	0	
1:00	0		4:20	0		7:40	0	
1:10	0		4:30	0		7:50	0	
1:20	0		4:40	0		8:00	0	
1:30	0		4:50	0		8:10	0	
1:40	0		5:00	0		8:20	0	
1:50	0		5:10	0		8:30	0	
2:00	0		5:20	0		8:40	0	
2:10	0		5:30	0		8:50	0	
2:20	0		5:40	0		9:00	0	
2:30	0		5:50	0		9:10	0	
2:40	0		6:00	0		9:20	0	
2:50	0		6:10	0		9:30	0	
3:00	0		6:20	0		9:40	0	
3:10	0		6:30	0		9:50	0	
3:20	0		6:40	0		10:00	0	

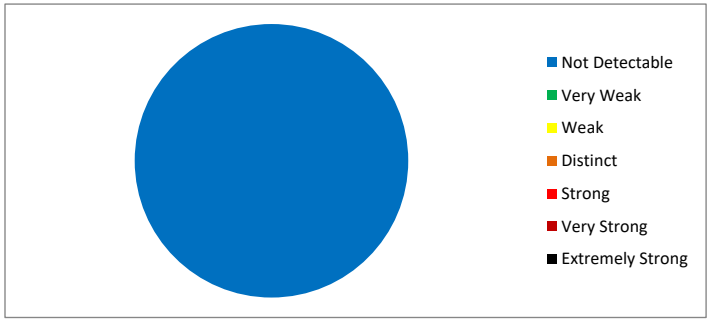
Colour coding of intensity observations:

0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0

Summary odour intensity observations:

Intensity	No obs	%	Descriptor
0	60	100%	Not Detectable
1	0	0%	Very Weak
2	0	0%	Weak
3	0	0%	Distinct
4	0	0%	Strong
5	0	0%	Very Strong
6	0	0%	Extremely Strong
	60	100%	

Plot of percentages of odour intensity observations:



Field Odour Intensity Observation Log Sheet

Panelist Name: Johan Meline
Date: 16/08/2018
Start Time: 7:19
Site Code: 2 Aldinga Storage Basin
GPS Location: X: 271,037 Y: 6,091,175 54H
Intensity Scale:

0	1	2	3	4	5	6
Not Detectable	Very Weak	Weak	Distinct	Strong	Very Strong	Extremely Strong

Perceived Odour Source:
Targerted odour: treated water storage odour

Wind Speed: near calm
Wind Direction: N
Temperature: 9 °C

Photo:
(in Wdir blowing from)



Time	Intensity	Source	Time	Intensity	Source	Time	Intensity	Source
0:10	0		3:30	0		6:50	0	
0:20	0		3:40	0		7:00	0	
0:30	0		3:50	0		7:10	0	
0:40	0		4:00	0		7:20	0	
0:50	0		4:10	0		7:30	0	
1:00	0		4:20	0		7:40	0	
1:10	0		4:30	0		7:50	0	
1:20	0		4:40	0		8:00	0	
1:30	0		4:50	0		8:10	0	
1:40	0		5:00	0		8:20	0	
1:50	0		5:10	0		8:30	0	
2:00	0		5:20	0		8:40	0	
2:10	0		5:30	0		8:50	0	
2:20	0		5:40	0		9:00	0	
2:30	0		5:50	0		9:10	0	
2:40	0		6:00	0		9:20	0	
2:50	0		6:10	0		9:30	0	
3:00	0		6:20	0		9:40	0	
3:10	0		6:30	0		9:50	0	
3:20	0		6:40	0		10:00	0	

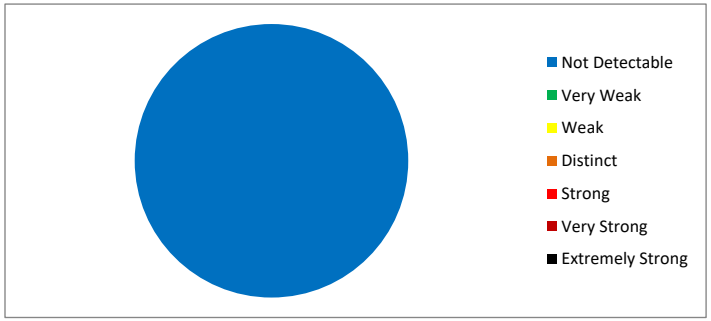
Colour coding of intensity observations:

0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0

Summary odour intensity observations:

Intensity	No obs	%	Descriptor
0	60	100%	Not Detectable
1	0	0%	Very Weak
2	0	0%	Weak
3	0	0%	Distinct
4	0	0%	Strong
5	0	0%	Very Strong
6	0	0%	Extremely Strong
	60	100%	

Plot of percentages of odour intensity observations:



Field Odour Intensity Observation Log Sheet

Panelist Name: Johan Meline
Date: 16/08/2018
Start Time: 7:28
Site Code: 3 Aldinga Storage Basin
GPS Location: X: 271,121 Y: 6,091,184 54H
Intensity Scale:

0	1	2	3	4	5	6
Not Detectable	Very Weak	Weak	Distinct	Strong	Very Strong	Extremely Strong

Perceived Odour Source:
Targerted odour: treated water storage odour

Wind Speed: near calm
Wind Direction: N
Temperature: 9 °C

Photo:
(in Wdir blowing from)



Time	Intensity	Source	Time	Intensity	Source	Time	Intensity	Source
0:10	0		3:30	0		6:50	0	
0:20	0		3:40	0		7:00	0	
0:30	0		3:50	0		7:10	0	
0:40	0		4:00	0		7:20	0	
0:50	0		4:10	0		7:30	0	
1:00	0		4:20	0		7:40	0	
1:10	0		4:30	0		7:50	0	
1:20	0		4:40	0		8:00	0	
1:30	0		4:50	0		8:10	0	
1:40	0		5:00	0		8:20	0	
1:50	0		5:10	0		8:30	0	
2:00	0		5:20	0		8:40	0	
2:10	0		5:30	0		8:50	0	
2:20	0		5:40	0		9:00	0	
2:30	0		5:50	0		9:10	0	
2:40	0		6:00	0		9:20	0	
2:50	0		6:10	0		9:30	0	
3:00	0		6:20	0		9:40	0	
3:10	0		6:30	0		9:50	0	
3:20	0		6:40	0		10:00	0	

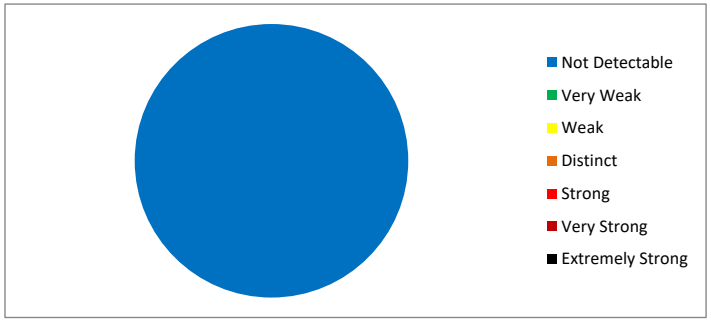
Colour coding of intensity observations:

0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0

Summary odour intensity observations:

Intensity	No obs	%	Descriptor
0	60	100%	Not Detectable
1	0	0%	Very Weak
2	0	0%	Weak
3	0	0%	Distinct
4	0	0%	Strong
5	0	0%	Very Strong
6	0	0%	Extremely Strong
	60	100%	

Plot of percentages of odour intensity observations:



Field Odour Intensity Observation Log Sheet

Panelist Name: Johan Meline
Date: 16/08/2018
Start Time: 8:08
Site Code: 4 Aldinga Storage Basin
GPS Location: X: 271,150 Y: 6,091,185 54H
Intensity Scale:

0	1	2	3	4	5	6
Not Detectable	Very Weak	Weak	Distinct	Strong	Very Strong	Extremely Strong

Perceived Odour Source:
Targerted odour: treated water storage odour

Wind Speed: near calm
Wind Direction: N
Temperature: 10 °C

Photo:
(in Wdir blowing from)



Time	Intensity	Source	Time	Intensity	Source	Time	Intensity	Source
0:10	0		3:30	0		6:50	0	
0:20	0		3:40	0		7:00	0	
0:30	0		3:50	0		7:10	0	
0:40	0		4:00	0		7:20	0	
0:50	0		4:10	0		7:30	0	
1:00	0		4:20	0		7:40	0	
1:10	0		4:30	0		7:50	0	
1:20	0		4:40	0		8:00	0	
1:30	0		4:50	0		8:10	0	
1:40	0		5:00	0		8:20	0	
1:50	0		5:10	0		8:30	0	
2:00	0		5:20	0		8:40	0	
2:10	0		5:30	0		8:50	0	
2:20	0		5:40	0		9:00	0	
2:30	0		5:50	0		9:10	0	
2:40	0		6:00	0		9:20	0	
2:50	0		6:10	0		9:30	0	
3:00	0		6:20	0		9:40	0	
3:10	0		6:30	0		9:50	0	
3:20	0		6:40	0		10:00	0	

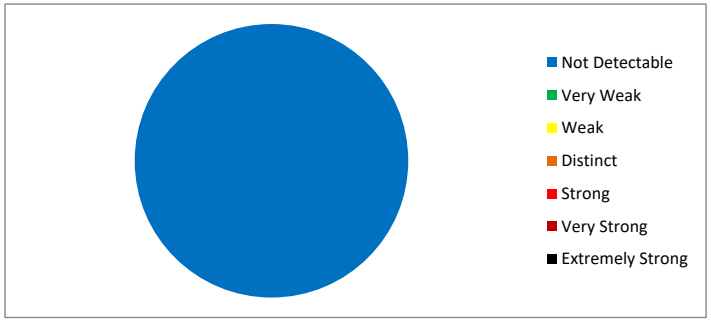
Colour coding of intensity observations:

0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0

Summary odour intensity observations:

Intensity	No obs	%	Descriptor
0	60	100%	Not Detectable
1	0	0%	Very Weak
2	0	0%	Weak
3	0	0%	Distinct
4	0	0%	Strong
5	0	0%	Very Strong
6	0	0%	Extremely Strong
	60	100%	

Plot of percentages of odour intensity observations:



Field Odour Intensity Observation Log Sheet

Panelist Name: Johan Meline
Date: 16/08/2018
Start Time: 9:00
Site Code: 5 Quarry Road Storage Dam
GPS Location: X: 272,574 Y: 6,102,913 54H
Intensity Scale:

0	1	2	3	4	5	6
Not Detectable	Very Weak	Weak	Distinct	Strong	Very Strong	Extremely Strong

Perceived Odour Source:
Targerted odour: treated water storage odour

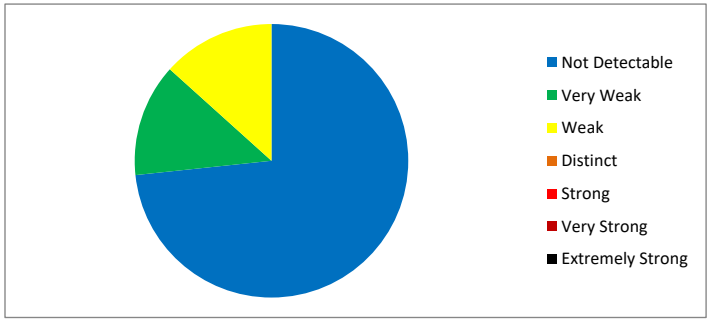
Wind Speed: 1-2 m/s
Wind Direction: WSW
Temperature: 11 °C

Photo:
(in Wdir blowing from)



Time	Intensity	Source	Time	Intensity	Source	Time	Intensity	Source
0:10	0		3:30	2		6:50	1	
0:20	2		3:40	2		7:00	1	
0:30	0		3:50	0		7:10	0	
0:40	1		4:00	1		7:20	0	
0:50	0		4:10	2		7:30	0	
1:00	0		4:20	0		7:40	0	
1:10	0		4:30	0		7:50	0	
1:20	0		4:40	0		8:00	1	
1:30	1		4:50	0		8:10	2	
1:40	0		5:00	0		8:20	1	
1:50	0		5:10	2		8:30	0	
2:00	0		5:20	0		8:40	0	
2:10	0		5:30	0		8:50	0	
2:20	0		5:40	0		9:00	0	
2:30	0		5:50	0		9:10	0	
2:40	0		6:00	0		9:20	0	
2:50	0		6:10	0		9:30	2	
3:00	0		6:20	0		9:40	1	
3:10	0		6:30	0		9:50	0	
3:20	0		6:40	2		10:00	0	

Plot of percentages of odour intensity observations:



Colour coding of intensity observations:

0	0	2	0	2
2	0	0	0	1
0	0	0	0	0
1	0	0	2	0
0	0	0	1	0
0	0	0	1	0
0	0	2	0	0
0	0	0	0	0
1	2	0	0	2
0	2	0	0	1
0	0	0	0	0
0	1	0	1	0

Summary odour intensity observations:

Intensity	No obs	%	Descriptor
0	44	73%	Not Detectable
1	8	13%	Very Weak
2	8	13%	Weak
3	0	0%	Distinct
4	0	0%	Strong
5	0	0%	Very Strong
6	0	0%	Extremely Strong
	60	100%	

Field Odour Intensity Observation Log Sheet

Panelist Name: Johan Meline
Date: 16/08/2018
Start Time: 9:11
Site Code: 6 Quarry Road Storage Dam
GPS Location: X: 272,596 Y: 6,102,920 54H
Intensity Scale:

0	1	2	3	4	5	6
Not Detectable	Very Weak	Weak	Distinct	Strong	Very Strong	Extremely Strong

Perceived Odour Source:
Targerted odour: treated water storage odour

Wind Speed: 1-2 m/s
Wind Direction: WSW
Temperature: 11 °C

Photo:
(in Wdir blowing from)



Time	Intensity	Source	Time	Intensity	Source	Time	Intensity	Source
0:10	0		3:30	0		6:50	0	
0:20	0		3:40	0		7:00	0	
0:30	0		3:50	0		7:10	2	
0:40	0		4:00	0		7:20	1	
0:50	0		4:10	0		7:30	1	
1:00	0		4:20	0		7:40	0	
1:10	0		4:30	0		7:50	0	
1:20	1		4:40	0		8:00	0	
1:30	0		4:50	0		8:10	0	
1:40	0		5:00	0		8:20	0	
1:50	0		5:10	0		8:30	0	
2:00	0		5:20	0		8:40	0	
2:10	0		5:30	0		8:50	0	
2:20	0		5:40	0		9:00	0	
2:30	1		5:50	0		9:10	0	
2:40	0		6:00	1		9:20	0	
2:50	0		6:10	2		9:30	0	
3:00	0		6:20	0		9:40	0	
3:10	0		6:30	0		9:50	0	
3:20	0		6:40	0		10:00	0	

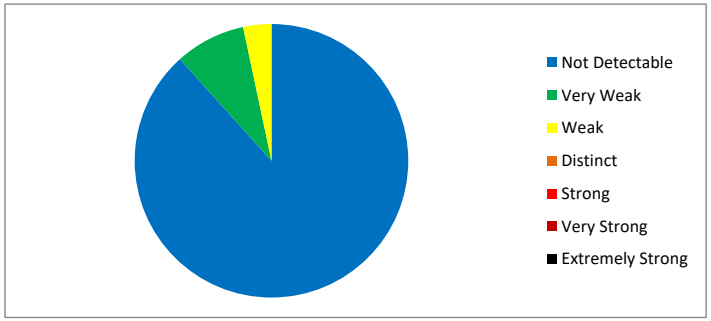
Colour coding of intensity observations:

0	0	0	2	0
0	0	0	0	0
0	1	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	2	0
1	0	0	1	0
0	0	0	1	0
0	0	0	0	0
0	0	0	0	0
0	0	1	0	0

Summary odour intensity observations:

Intensity	No obs	%	Descriptor
0	53	88%	Not Detectable
1	5	8%	Very Weak
2	2	3%	Weak
3	0	0%	Distinct
4	0	0%	Strong
5	0	0%	Very Strong
6	0	0%	Extremely Strong
	60	100%	

Plot of percentages of odour intensity observations:



Field Odour Intensity Observation Log Sheet

Panelist Name: Johan Meline
Date: 16/08/2018
Start Time: 9:22
Site Code: 7 Quarry Road Storage Dam
GPS Location: X: 272,599 Y: 6,102,903 54H
Intensity Scale:

0	1	2	3	4	5	6
Not Detectable	Very Weak	Weak	Distinct	Strong	Very Strong	Extremely Strong

Perceived Odour Source:
Targerted odour: treated water storage odour

Wind Speed: 1-2 m/s
Wind Direction: WSW
Temperature: 12 °C

Photo:
(in Wdir blowing from)



Time	Intensity	Source	Time	Intensity	Source	Time	Intensity	Source
0:10	2		3:30	0		6:50	0	
0:20	2		3:40	0		7:00	0	
0:30	0		3:50	0		7:10	0	
0:40	0		4:00	0		7:20	0	
0:50	0		4:10	0		7:30	0	
1:00	0		4:20	0		7:40	0	
1:10	0		4:30	0		7:50	0	
1:20	0		4:40	1		8:00	0	
1:30	0		4:50	0		8:10	1	
1:40	0		5:00	0		8:20	0	
1:50	0		5:10	0		8:30	0	
2:00	0		5:20	0		8:40	0	
2:10	0		5:30	0		8:50	0	
2:20	2		5:40	0		9:00	0	
2:30	0		5:50	0		9:10	0	
2:40	0		6:00	1		9:20	0	
2:50	0		6:10	0		9:30	0	
3:00	0		6:20	0		9:40	0	
3:10	0		6:30	0		9:50	0	
3:20	0		6:40	0		10:00	0	

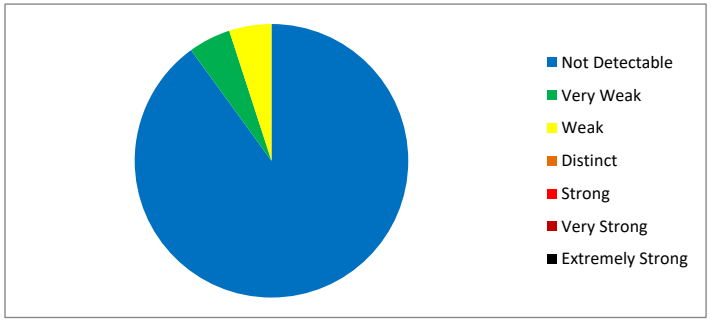
Colour coding of intensity observations:

2	0	0	0	1
2	2	0	0	0
0	0	0	0	0
0	0	1	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	1	0	0

Summary odour intensity observations:

Intensity	No obs	%	Descriptor
0	54	90%	Not Detectable
1	3	5%	Very Weak
2	3	5%	Weak
3	0	0%	Distinct
4	0	0%	Strong
5	0	0%	Very Strong
6	0	0%	Extremely Strong
	60	100%	

Plot of percentages of odour intensity observations:



Field Odour Intensity Observation Log Sheet

Panelist Name: Johan Meline
Date: 16/08/2018
Start Time: 9:34
Site Code: 8 Quarry Road Storage Dam
GPS Location: X: 272,601 Y: 6,102,864 54H
Intensity Scale:

0	1	2	3	4	5	6
Not Detectable	Very Weak	Weak	Distinct	Strong	Very Strong	Extremely Strong

Perceived Odour Source:
Targerted odour: treated water storage odour

Wind Speed: 1-2 m/s
Wind Direction: WSW
Temperature: 12 °C

Photo:
(in Wdir blowing from)



Time	Intensity	Source	Time	Intensity	Source	Time	Intensity	Source
0:10	0		3:30	1		6:50	0	
0:20	0		3:40	2		7:00	1	
0:30	0		3:50	1		7:10	0	
0:40	2		4:00	0		7:20	0	
0:50	2		4:10	0		7:30	0	
1:00	0		4:20	0		7:40	0	
1:10	0		4:30	1		7:50	0	
1:20	0		4:40	0		8:00	0	
1:30	0		4:50	0		8:10	0	
1:40	0		5:00	0		8:20	0	
1:50	1		5:10	0		8:30	0	
2:00	0		5:20	0		8:40	0	
2:10	0		5:30	0		8:50	0	
2:20	0		5:40	0		9:00	0	
2:30	1		5:50	0		9:10	0	
2:40	0		6:00	0		9:20	0	
2:50	0		6:10	2		9:30	0	
3:00	0		6:20	0		9:40	1	
3:10	0		6:30	0		9:50	0	
3:20	0		6:40	0		10:00	0	

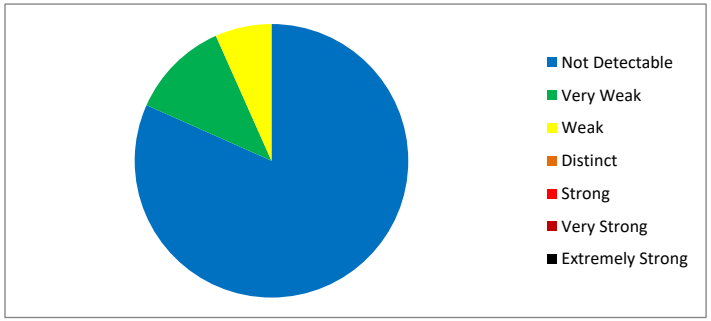
Colour coding of intensity observations:

0	0	0	2	0
0	0	0	0	0
0	1	1	0	0
2	0	0	0	0
2	0	0	0	0
0	0	0	1	0
0	0	0	0	0
0	0	0	0	0
0	1	0	0	0
0	2	0	0	1
1	1	0	0	0
0	0	0	0	0

Summary odour intensity observations:

Intensity	No obs	%	Descriptor
0	49	82%	Not Detectable
1	7	12%	Very Weak
2	4	7%	Weak
3	0	0%	Distinct
4	0	0%	Strong
5	0	0%	Very Strong
6	0	0%	Extremely Strong
	60	100%	

Plot of percentages of odour intensity observations:



Field Odour Intensity Observation Log Sheet

Panelist Name: Johan Meline
Date: 16/08/2018
Start Time: 9:45
Site Code: 9 Quarry Road Storage Dam
GPS Location: X: 272,587 Y: 6,102,873 54H
Intensity Scale:

0	1	2	3	4	5	6
Not Detectable	Very Weak	Weak	Distinct	Strong	Very Strong	Extremely Strong

Perceived Odour Source:
Targerted odour: treated water storage odour

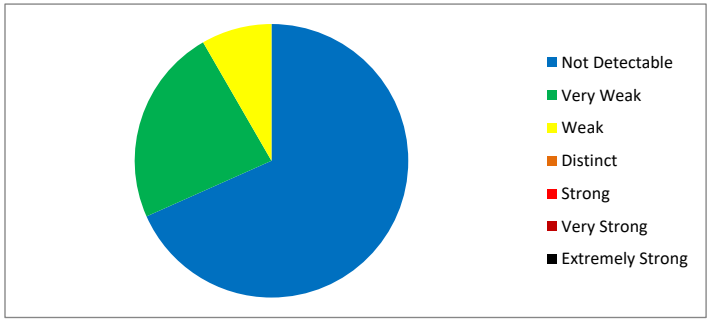
Wind Speed: 1-2 m/s
Wind Direction: WSW
Temperature: 13 °C

Photo:
(in Wdir blowing from)



Time	Intensity	Source	Time	Intensity	Source	Time	Intensity	Source
0:10	0		3:30	0		6:50	1	
0:20	0		3:40	0		7:00	1	
0:30	1		3:50	0		7:10	2	
0:40	1		4:00	1		7:20	0	
0:50	0		4:10	2		7:30	0	
1:00	0		4:20	0		7:40	0	
1:10	0		4:30	1		7:50	0	
1:20	0		4:40	2		8:00	0	
1:30	0		4:50	0		8:10	0	
1:40	0		5:00	0		8:20	0	
1:50	1		5:10	0		8:30	0	
2:00	2		5:20	0		8:40	0	
2:10	1		5:30	0		8:50	0	
2:20	0		5:40	0		9:00	1	
2:30	1		5:50	0		9:10	1	
2:40	0		6:00	0		9:20	0	
2:50	2		6:10	0		9:30	1	
3:00	0		6:20	0		9:40	0	
3:10	0		6:30	0		9:50	1	
3:20	0		6:40	0		10:00	1	

Plot of percentages of odour intensity observations:



Colour coding of intensity observations:

0	1	2	0	0
0	0	0	0	0
1	1	1	0	0
1	0	2	0	0
0	2	0	1	0
0	0	0	1	1
0	0	0	2	1
0	0	0	0	0
0	0	0	0	1
0	0	0	0	0
1	0	0	0	1
2	1	0	0	1

Summary odour intensity observations:

Intensity	No obs	%	Descriptor
0	41	68%	Not Detectable
1	14	23%	Very Weak
2	5	8%	Weak
3	0	0%	Distinct
4	0	0%	Strong
5	0	0%	Very Strong
6	0	0%	Extremely Strong
	60	100%	

Field Odour Intensity Observation Log Sheet

Panelist Name: Johan Meline
Date: 16/08/2018
Start Time: 9:57
Site Code: 10 Quarry Road Storage Dam
GPS Location: X: 272,487 Y: 6,102,910 54H
Intensity Scale:

0	1	2	3	4	5	6
Not Detectable	Very Weak	Weak	Distinct	Strong	Very Strong	Extremely Strong

Perceived Odour Source:
Targerted odour: treated water storage odour

Wind Speed: 1-2 m/s
Wind Direction: WSW
Temperature: 13 °C

Photo:
(in Wdir blowing from)



Time	Intensity	Source	Time	Intensity	Source	Time	Intensity	Source
0:10	0		3:30	0		6:50	0	
0:20	0		3:40	0		7:00	0	
0:30	0		3:50	0		7:10	0	
0:40	0		4:00	0		7:20	0	
0:50	0		4:10	0		7:30	0	
1:00	0		4:20	0		7:40	0	
1:10	0		4:30	0		7:50	0	
1:20	0		4:40	0		8:00	0	
1:30	0		4:50	0		8:10	0	
1:40	0		5:00	0		8:20	0	
1:50	0		5:10	0		8:30	0	
2:00	0		5:20	0		8:40	0	
2:10	0		5:30	0		8:50	0	
2:20	0		5:40	0		9:00	0	
2:30	0		5:50	0		9:10	0	
2:40	0		6:00	0		9:20	0	
2:50	0		6:10	0		9:30	0	
3:00	0		6:20	0		9:40	0	
3:10	0		6:30	0		9:50	0	
3:20	0		6:40	0		10:00	0	

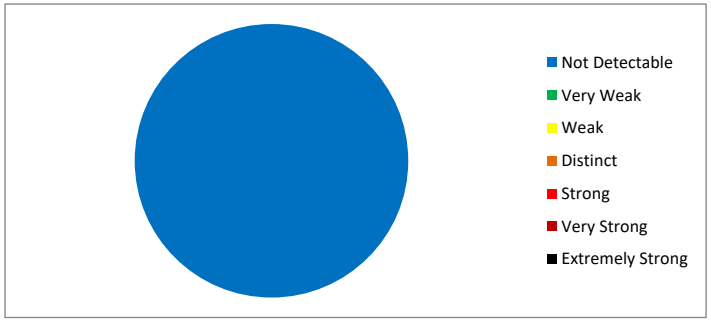
Colour coding of intensity observations:

0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0

Summary odour intensity observations:

Intensity	No obs	%	Descriptor
0	60	100%	Not Detectable
1	0	0%	Very Weak
2	0	0%	Weak
3	0	0%	Distinct
4	0	0%	Strong
5	0	0%	Very Strong
6	0	0%	Extremely Strong
	60	100%	

Plot of percentages of odour intensity observations:



Field Odour Intensity Observation Log Sheet

Panelist Name: Johan Meline
Date: 16/08/2018
Start Time: 10:10
Site Code: 11 Quarry Road Storage Dam
GPS Location: X: 272,597 Y: 6,102,935 54H
Intensity Scale:

0	1	2	3	4	5	6
Not Detectable	Very Weak	Weak	Distinct	Strong	Very Strong	Extremely Strong

Perceived Odour Source:
Targerted odour: treated water storage odour

Wind Speed: 1-2 m/s
Wind Direction: WSW
Temperature: 13 °C

Photo:
(in Wdir blowing from)



Time	Intensity	Source	Time	Intensity	Source	Time	Intensity	Source
0:10	0		3:30	0		6:50	0	
0:20	0		3:40	0		7:00	0	
0:30	0		3:50	0		7:10	1	
0:40	0		4:00	0		7:20	0	
0:50	0		4:10	0		7:30	0	
1:00	0		4:20	0		7:40	0	
1:10	0		4:30	0		7:50	0	
1:20	0		4:40	0		8:00	0	
1:30	0		4:50	0		8:10	0	
1:40	0		5:00	0		8:20	0	
1:50	0		5:10	0		8:30	0	
2:00	0		5:20	0		8:40	0	
2:10	0		5:30	0		8:50	0	
2:20	0		5:40	0		9:00	0	
2:30	0		5:50	0		9:10	0	
2:40	0		6:00	0		9:20	0	
2:50	0		6:10	0		9:30	0	
3:00	0		6:20	0		9:40	0	
3:10	0		6:30	0		9:50	0	
3:20	0		6:40	0		10:00	0	

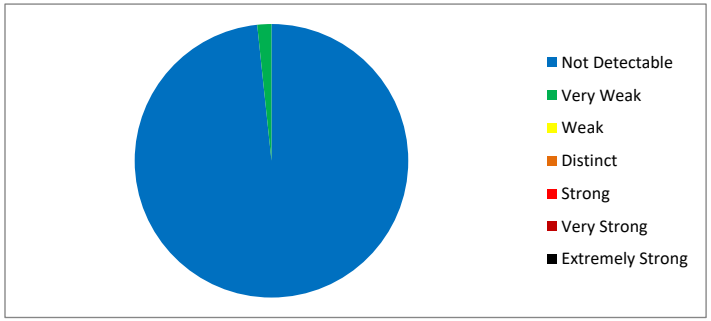
Colour coding of intensity observations:

0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	1	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0

Summary odour intensity observations:

Intensity	No obs	%	Descriptor
0	59	98%	Not Detectable
1	1	2%	Very Weak
2	0	0%	Weak
3	0	0%	Distinct
4	0	0%	Strong
5	0	0%	Very Strong
6	0	0%	Extremely Strong
	60	100%	

Plot of percentages of odour intensity observations:



Field Odour Intensity Observation Log Sheet

Panelist Name: Johan Meline
Date: 16/08/2018
Start Time: 10:21
Site Code: 12 Quarry Road Storage Dam
GPS Location: X: 272,566 Y: 6,102,937 54H
Intensity Scale:

0	1	2	3	4	5	6
Not Detectable	Very Weak	Weak	Distinct	Strong	Very Strong	Extremely Strong

Perceived Odour Source:
Targerted odour: treated water storage odour

Wind Speed: 1-2 m/s
Wind Direction: WSW
Temperature: 13 °C

Photo:
(in Wdir blowing from)



Time	Intensity	Source	Time	Intensity	Source	Time	Intensity	Source
0:10	0		3:30	0		6:50	0	
0:20	0		3:40	0		7:00	0	
0:30	0		3:50	0		7:10	0	
0:40	0		4:00	0		7:20	0	
0:50	0		4:10	0		7:30	0	
1:00	0		4:20	0		7:40	0	
1:10	0		4:30	0		7:50	0	
1:20	0		4:40	0		8:00	0	
1:30	0		4:50	0		8:10	0	
1:40	0		5:00	0		8:20	0	
1:50	0		5:10	0		8:30	0	
2:00	0		5:20	0		8:40	0	
2:10	0		5:30	0		8:50	0	
2:20	0		5:40	0		9:00	0	
2:30	0		5:50	0		9:10	0	
2:40	0		6:00	0		9:20	0	
2:50	0		6:10	0		9:30	0	
3:00	0		6:20	0		9:40	0	
3:10	0		6:30	0		9:50	0	
3:20	0		6:40	0		10:00	0	

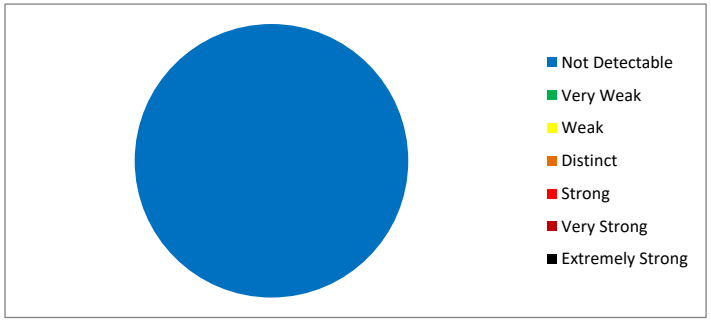
Colour coding of intensity observations:

0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0

Summary odour intensity observations:

Intensity	No obs	%	Descriptor
0	60	100%	Not Detectable
1	0	0%	Very Weak
2	0	0%	Weak
3	0	0%	Distinct
4	0	0%	Strong
5	0	0%	Very Strong
6	0	0%	Extremely Strong
	60	100%	

Plot of percentages of odour intensity observations:



Field Odour Intensity Observation Log Sheet

Panelist Name: Johan Meline
Date: 16/08/2018
Start Time: 14:41
Site Code: 13 Little Road Storage Dam
GPS Location: X: 275,942 Y: 6,095,083 54H
Intensity Scale:

0	1	2	3	4	5	6
Not Detectable	Very Weak	Weak	Distinct	Strong	Very Strong	Extremely Strong

Perceived Odour Source:
Targerted odour: treated water storage odour

Wind Speed: 1-3 m/s
Wind Direction: NW
Temperature: 13 °C

Photo:
(in Wdir blowing from)



Time	Intensity	Source	Time	Intensity	Source	Time	Intensity	Source
0:10	0		3:30	0		6:50	0	
0:20	0		3:40	0		7:00	0	
0:30	0		3:50	0		7:10	0	
0:40	0		4:00	0		7:20	0	
0:50	0		4:10	0		7:30	0	
1:00	0		4:20	0		7:40	0	
1:10	0		4:30	0		7:50	0	
1:20	0		4:40	0		8:00	0	
1:30	0		4:50	0		8:10	0	
1:40	0		5:00	0		8:20	0	
1:50	0		5:10	0		8:30	0	
2:00	0		5:20	0		8:40	0	
2:10	0		5:30	0		8:50	0	
2:20	0		5:40	0		9:00	0	
2:30	0		5:50	0		9:10	0	
2:40	0		6:00	0		9:20	0	
2:50	0		6:10	0		9:30	0	
3:00	0		6:20	0		9:40	0	
3:10	0		6:30	0		9:50	0	
3:20	0		6:40	0		10:00	0	

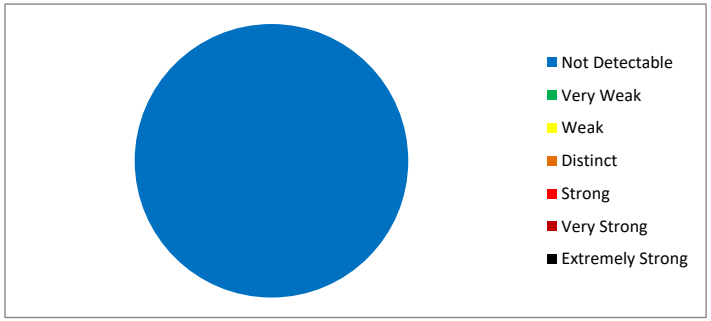
Colour coding of intensity observations:

0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0

Summary odour intensity observations:

Intensity	No obs	%	Descriptor
0	60	100%	Not Detectable
1	0	0%	Very Weak
2	0	0%	Weak
3	0	0%	Distinct
4	0	0%	Strong
5	0	0%	Very Strong
6	0	0%	Extremely Strong
	60	100%	

Plot of percentages of odour intensity observations:



Field Odour Intensity Observation Log Sheet

Panelist Name: Johan Meline
Date: 16/08/2018
Start Time: 14:59
Site Code: 14 Little Road Storage Dam
GPS Location: X: 275,983 Y: 6,094,910 54H
Intensity Scale:

0	1	2	3	4	5	6
Not Detectable	Very Weak	Weak	Distinct	Strong	Very Strong	Extremely Strong

Perceived Odour Source:
Targerted odour: treated water storage odour

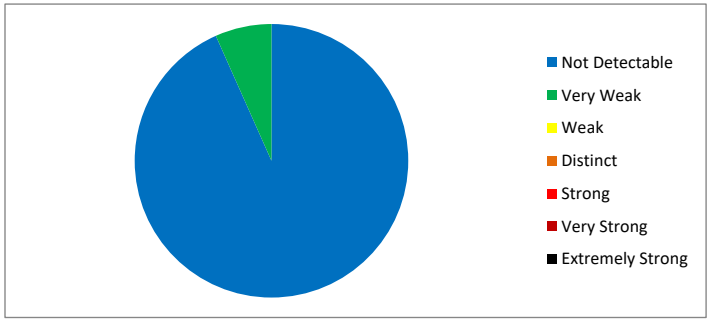
Wind Speed: 1-3 m/s
Wind Direction: NW
Temperature: 13 °C

Photo:
(in Wdir blowing from)



Time	Intensity	Source	Time	Intensity	Source	Time	Intensity	Source
0:10	0		3:30	0		6:50	0	
0:20	0		3:40	0		7:00	0	
0:30	0		3:50	0		7:10	0	
0:40	0		4:00	0		7:20	0	
0:50	0		4:10	0		7:30	0	
1:00	0		4:20	0		7:40	1	
1:10	0		4:30	1		7:50	0	
1:20	0		4:40	0		8:00	0	
1:30	0		4:50	0		8:10	0	
1:40	0		5:00	0		8:20	0	
1:50	0		5:10	0		8:30	0	
2:00	0		5:20	0		8:40	0	
2:10	0		5:30	0		8:50	0	
2:20	0		5:40	0		9:00	0	
2:30	0		5:50	0		9:10	0	
2:40	0		6:00	0		9:20	0	
2:50	0		6:10	1		9:30	0	
3:00	0		6:20	0		9:40	0	
3:10	1		6:30	0		9:50	0	
3:20	0		6:40	0		10:00	0	

Plot of percentages of odour intensity observations:



Colour coding of intensity observations:

0	0	0	1	0
0	0	0	0	0
0	0	1	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	1	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	1	0
0	0	0	0	0
0	0	0	0	0

Summary odour intensity observations:

Intensity	No obs	%	Descriptor
0	56	93%	Not Detectable
1	4	7%	Very Weak
2	0	0%	Weak
3	0	0%	Distinct
4	0	0%	Strong
5	0	0%	Very Strong
6	0	0%	Extremely Strong
	60	100%	

Field Odour Intensity Observation Log Sheet

Panelist Name: Johan Meline
Date: 16/08/2018
Start Time: 15:10
Site Code: 15 Little Road Storage Dam
GPS Location: X: 275,997 Y: 6,094,837 54H
Intensity Scale:

0	1	2	3	4	5	6
Not Detectable	Very Weak	Weak	Distinct	Strong	Very Strong	Extremely Strong

Perceived Odour Source:
Targerted odour: treated water storage odour

Wind Speed: 1-3 m/s
Wind Direction: NW
Temperature: 13 °C

Photo:
(in Wdir blowing from)



Time	Intensity	Source	Time	Intensity	Source	Time	Intensity	Source
0:10	0		3:30	0		6:50	0	
0:20	0		3:40	0		7:00	0	
0:30	0		3:50	0		7:10	0	
0:40	0		4:00	0		7:20	0	
0:50	0		4:10	0		7:30	0	
1:00	0		4:20	0		7:40	0	
1:10	0		4:30	0		7:50	0	
1:20	0		4:40	0		8:00	0	
1:30	0		4:50	0		8:10	0	
1:40	0		5:00	0		8:20	0	
1:50	0		5:10	0		8:30	0	
2:00	0		5:20	0		8:40	0	
2:10	0		5:30	0		8:50	0	
2:20	0		5:40	0		9:00	0	
2:30	0		5:50	0		9:10	0	
2:40	0		6:00	0		9:20	0	
2:50	0		6:10	0		9:30	0	
3:00	0		6:20	0		9:40	0	
3:10	0		6:30	0		9:50	0	
3:20	0		6:40	0		10:00	0	

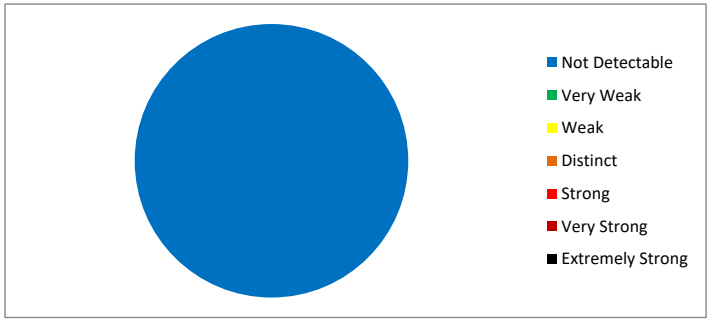
Colour coding of intensity observations:

0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0

Summary odour intensity observations:

Intensity	No obs	%	Descriptor
0	60	100%	Not Detectable
1	0	0%	Very Weak
2	0	0%	Weak
3	0	0%	Distinct
4	0	0%	Strong
5	0	0%	Very Strong
6	0	0%	Extremely Strong
	60	100%	

Plot of percentages of odour intensity observations:



Field Odour Intensity Observation Log Sheet

Panelist Name: Johan Meline
Date: 16/08/2018
Start Time: 15:21
Site Code: 16 Little Road Storage Dam
GPS Location: X: 275,968 Y: 6,094,862 54H
Intensity Scale:

0	1	2	3	4	5	6
Not Detectable	Very Weak	Weak	Distinct	Strong	Very Strong	Extremely Strong

Perceived Odour Source:
Targerted odour: treated water storage odour

Wind Speed: 1-3 m/s
Wind Direction: NW
Temperature: 13 °C

Photo:
(in Wdir blowing from)



Time	Intensity	Source	Time	Intensity	Source	Time	Intensity	Source
0:10	1		3:30	0		6:50	0	
0:20	2		3:40	1		7:00	0	
0:30	0		3:50	0		7:10	0	
0:40	1		4:00	0		7:20	0	
0:50	0		4:10	1		7:30	0	
1:00	0		4:20	1		7:40	0	
1:10	0		4:30	0		7:50	0	
1:20	0		4:40	0		8:00	0	
1:30	0		4:50	0		8:10	1	
1:40	0		5:00	0		8:20	0	
1:50	0		5:10	0		8:30	0	
2:00	0		5:20	0		8:40	2	
2:10	0		5:30	0		8:50	0	
2:20	0		5:40	0		9:00	0	
2:30	0		5:50	0		9:10	0	
2:40	0		6:00	0		9:20	0	
2:50	0		6:10	0		9:30	0	
3:00	0		6:20	0		9:40	0	
3:10	0		6:30	1		9:50	0	
3:20	0		6:40	1		10:00	0	

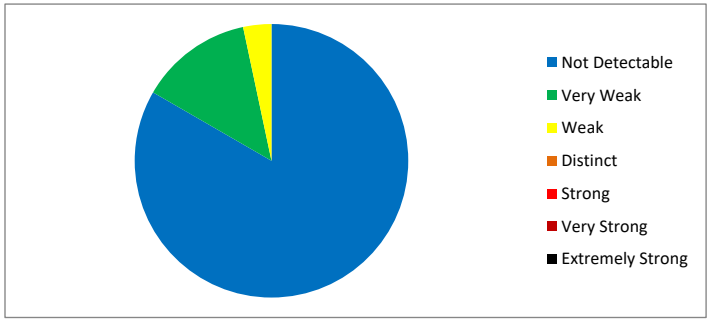
Colour coding of intensity observations:

1	0	1	0	1
2	0	1	0	0
0	0	0	1	0
1	0	0	1	2
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	1	0	0	0
0	0	0	0	0
0	0	0	0	0

Summary odour intensity observations:

Intensity	No obs	%	Descriptor
0	50	83%	Not Detectable
1	8	13%	Very Weak
2	2	3%	Weak
3	0	0%	Distinct
4	0	0%	Strong
5	0	0%	Very Strong
6	0	0%	Extremely Strong
	60	100%	

Plot of percentages of odour intensity observations:



Field Odour Intensity Observation Log Sheet

Panelist Name: Johan Meline
Date: 16/08/2018
Start Time: 15:37
Site Code: 17 Little Road Storage Dam
GPS Location: X: 275,959 Y: 6,094,885 54H
Intensity Scale:

0	1	2	3	4	5	6
Not Detectable	Very Weak	Weak	Distinct	Strong	Very Strong	Extremely Strong

Perceived Odour Source:
Targerted odour: treated water storage odour

Wind Speed: 1-3 m/s
Wind Direction: NW
Temperature: 12 °C

Photo:
(in Wdir blowing from)



Time	Intensity	Source	Time	Intensity	Source	Time	Intensity	Source
0:10	0		3:30	1		6:50	0	
0:20	0		3:40	0		7:00	1	
0:30	0		3:50	0		7:10	1	
0:40	1		4:00	0		7:20	0	
0:50	0		4:10	0		7:30	0	
1:00	0		4:20	0		7:40	1	
1:10	0		4:30	1		7:50	0	
1:20	0		4:40	0		8:00	0	
1:30	0		4:50	0		8:10	0	
1:40	0		5:00	0		8:20	0	
1:50	1		5:10	0		8:30	0	
2:00	1		5:20	0		8:40	0	
2:10	1		5:30	0		8:50	0	
2:20	1		5:40	1		9:00	0	
2:30	1		5:50	0		9:10	0	
2:40	0		6:00	0		9:20	0	
2:50	0		6:10	0		9:30	1	
3:00	0		6:20	0		9:40	0	
3:10	1		6:30	0		9:50	0	
3:20	0		6:40	0		10:00	0	

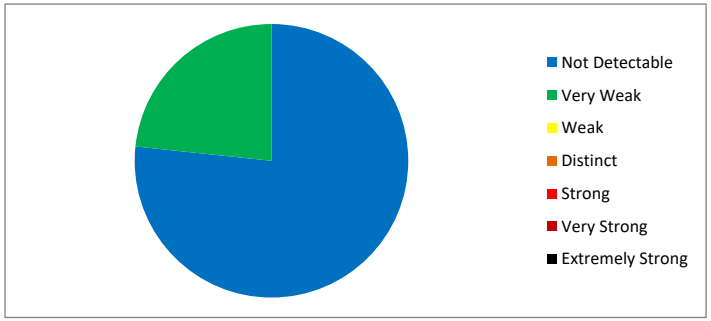
Colour coding of intensity observations:

0	1	0	0	0
0	1	0	0	0
0	1	1	0	0
1	0	0	0	0
0	0	0	0	0
0	0	0	1	0
0	1	0	1	0
0	0	0	0	0
0	1	0	0	1
0	0	1	1	0
1	0	0	0	0
1	0	0	0	0

Summary odour intensity observations:

Intensity	No obs	%	Descriptor
0	46	77%	Not Detectable
1	14	23%	Very Weak
2	0	0%	Weak
3	0	0%	Distinct
4	0	0%	Strong
5	0	0%	Very Strong
6	0	0%	Extremely Strong
	60	100%	

Plot of percentages of odour intensity observations:



Field Odour Intensity Observation Log Sheet

Panelist Name: Johan Meline
Date: 16/08/2018
Start Time: 15:50
Site Code: 18 Little Road Storage Dam
GPS Location: X: 275,949 Y: 6,094,881 54H
Intensity Scale:

0	1	2	3	4	5	6
Not Detectable	Very Weak	Weak	Distinct	Strong	Very Strong	Extremely Strong

Perceived Odour Source:
Targerted odour: treated water storage odour

Wind Speed: 1-3 m/s
Wind Direction: NW
Temperature: 12 °C

Photo:
(in Wdir blowing from)



Time	Intensity	Source	Time	Intensity	Source	Time	Intensity	Source
0:10	0		3:30	1		6:50	0	
0:20	0		3:40	0		7:00	1	
0:30	1		3:50	0		7:10	0	
0:40	1		4:00	0		7:20	0	
0:50	0		4:10	1		7:30	0	
1:00	1		4:20	0		7:40	2	
1:10	0		4:30	0		7:50	1	
1:20	0		4:40	1		8:00	0	
1:30	0		4:50	2		8:10	0	
1:40	0		5:00	1		8:20	0	
1:50	1		5:10	0		8:30	1	
2:00	1		5:20	1		8:40	1	
2:10	1		5:30	1		8:50	1	
2:20	2		5:40	1		9:00	0	
2:30	0		5:50	0		9:10	1	
2:40	1		6:00	0		9:20	1	
2:50	0		6:10	0		9:30	1	
3:00	0		6:20	1		9:40	0	
3:10	1		6:30	1		9:50	1	
3:20	1		6:40	1		10:00	0	

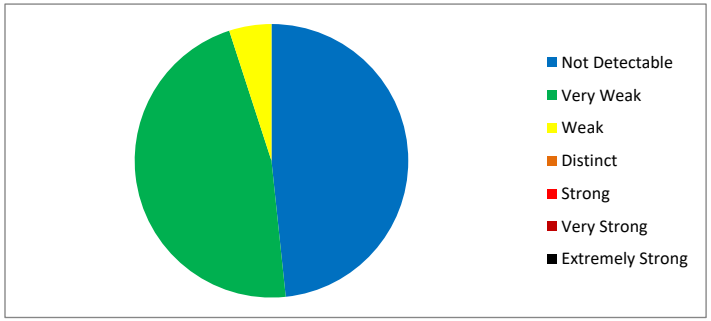
Colour coding of intensity observations:

0	1	1	0	0
0	2	0	1	0
1	0	0	1	1
1	1	1	1	1
0	0	2	0	1
1	0	1	1	0
0	1	0	0	1
0	1	1	0	1
0	1	1	0	1
0	0	1	2	0
1	0	0	1	1
1	0	0	0	0

Summary odour intensity observations:

Intensity	No obs	%	Descriptor
0	29	48%	Not Detectable
1	28	47%	Very Weak
2	3	5%	Weak
3	0	0%	Distinct
4	0	0%	Strong
5	0	0%	Very Strong
6	0	0%	Extremely Strong
	60	100%	

Plot of percentages of odour intensity observations:



Field Odour Intensity Observation Log Sheet

Panelist Name: Johan Meline
Date: 16/08/2018
Start Time: 16:01
Site Code: 19 Little Road Storage Dam
GPS Location: X: 275,930 Y: 6,094,889 54H
Intensity Scale:

0	1	2	3	4	5	6
Not Detectable	Very Weak	Weak	Distinct	Strong	Very Strong	Extremely Strong

Perceived Odour Source:
Targerted odour: treated water storage odour

Wind Speed: 2-4 m/s
Wind Direction: NW
Temperature: 12 °C

Photo:
(in Wdir blowing from)



Time	Intensity	Source	Time	Intensity	Source	Time	Intensity	Source
0:10	1		3:30	0		6:50	0	
0:20	1		3:40	2		7:00	0	
0:30	1		3:50	1		7:10	0	
0:40	1		4:00	1		7:20	0	
0:50	1		4:10	1		7:30	1	
1:00	1		4:20	1		7:40	1	
1:10	1		4:30	0		7:50	1	
1:20	1		4:40	1		8:00	1	
1:30	1		4:50	1		8:10	1	
1:40	1		5:00	1		8:20	1	
1:50	1		5:10	0		8:30	1	
2:00	1		5:20	1		8:40	0	
2:10	0		5:30	1		8:50	0	
2:20	0		5:40	2		9:00	0	
2:30	0		5:50	1		9:10	0	
2:40	1		6:00	1		9:20	0	
2:50	0		6:10	1		9:30	0	
3:00	1		6:20	0		9:40	1	
3:10	1		6:30	0		9:50	0	
3:20	1		6:40	0		10:00	0	

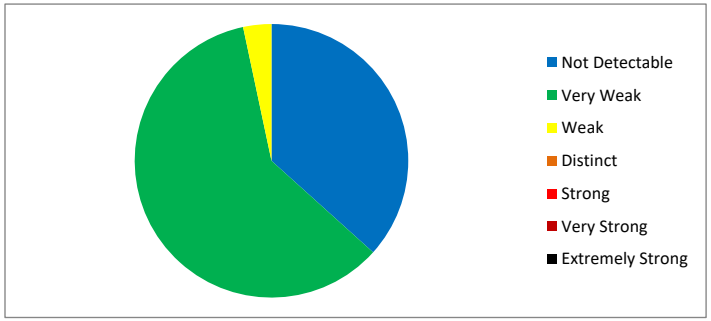
Colour coding of intensity observations:

1	0	1	1	1
1	0	1	0	1
1	0	0	0	1
1	1	1	0	0
1	0	1	0	0
1	1	1	0	0
1	1	0	0	0
1	1	1	0	0
1	0	1	1	0
1	2	2	1	1
1	1	1	1	0
1	1	1	1	0

Summary odour intensity observations:

Intensity	No obs	%	Descriptor
0	22	37%	Not Detectable
1	36	60%	Very Weak
2	2	3%	Weak
3	0	0%	Distinct
4	0	0%	Strong
5	0	0%	Very Strong
6	0	0%	Extremely Strong
	60	100%	

Plot of percentages of odour intensity observations:



Field Odour Intensity Observation Log Sheet

Panelist Name: Johan Meline
Date: 16/08/2018
Start Time: 16:47
Site Code: 20 Little Road Storage Dam
GPS Location: X: 276,008 Y: 6,094,582 54H
Intensity Scale:

0	1	2	3	4	5	6
Not Detectable	Very Weak	Weak	Distinct	Strong	Very Strong	Extremely Strong

Perceived Odour Source:
Targerted odour: treated water storage odour

Wind Speed: 2 m/s
Wind Direction: NW
Temperature: 12 °C

Photo:
(in Wdir blowing from)



Time	Intensity	Source	Time	Intensity	Source	Time	Intensity	Source
0:10	0		3:30	0		6:50	0	
0:20	0		3:40	0		7:00	0	
0:30	0		3:50	0		7:10	0	
0:40	0		4:00	0		7:20	0	
0:50	0		4:10	0		7:30	0	
1:00	0		4:20	0		7:40	0	
1:10	0		4:30	0		7:50	0	
1:20	0		4:40	0		8:00	0	
1:30	0		4:50	0		8:10	0	
1:40	0		5:00	0		8:20	0	
1:50	0		5:10	0		8:30	0	
2:00	0		5:20	0		8:40	0	
2:10	0		5:30	0		8:50	0	
2:20	0		5:40	0		9:00	0	
2:30	0		5:50	0		9:10	0	
2:40	0		6:00	0		9:20	0	
2:50	0		6:10	0		9:30	0	
3:00	0		6:20	0		9:40	0	
3:10	0		6:30	0		9:50	0	
3:20	0		6:40	0		10:00	0	

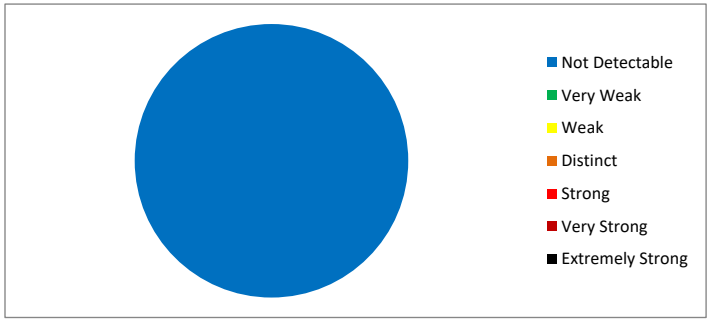
Colour coding of intensity observations:

0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0

Summary odour intensity observations:

Intensity	No obs	%	Descriptor
0	60	100%	Not Detectable
1	0	0%	Very Weak
2	0	0%	Weak
3	0	0%	Distinct
4	0	0%	Strong
5	0	0%	Very Strong
6	0	0%	Extremely Strong
	60	100%	

Plot of percentages of odour intensity observations:



Field Odour Intensity Observation Log Sheet

Panelist Name: Johan Meline
Date: 16/08/2018
Start Time: 16:58
Site Code: 21 Little Road Storage Dam
GPS Location: X: 276,009 Y: 6,094,603 54H
Intensity Scale:

0	1	2	3	4	5	6
Not Detectable	Very Weak	Weak	Distinct	Strong	Very Strong	Extremely Strong

Perceived Odour Source:
Targerted odour: treated water storage odour

Wind Speed: 2-3 m/s
Wind Direction: NW
Temperature: 12 °C

Photo:
(in Wdir blowing from)



Time	Intensity	Source	Time	Intensity	Source	Time	Intensity	Source
0:10	0		3:30	0		6:50	0	
0:20	0		3:40	0		7:00	0	
0:30	0		3:50	0		7:10	0	
0:40	0		4:00	0		7:20	0	
0:50	0		4:10	0		7:30	0	
1:00	0		4:20	0		7:40	0	
1:10	0		4:30	0		7:50	0	
1:20	0		4:40	0		8:00	0	
1:30	0		4:50	0		8:10	0	
1:40	0		5:00	0		8:20	0	
1:50	0		5:10	0		8:30	0	
2:00	0		5:20	0		8:40	0	
2:10	0		5:30	0		8:50	0	
2:20	0		5:40	0		9:00	0	
2:30	0		5:50	0		9:10	0	
2:40	0		6:00	0		9:20	0	
2:50	0		6:10	0		9:30	0	
3:00	0		6:20	0		9:40	0	
3:10	0		6:30	0		9:50	0	
3:20	0		6:40	0		10:00	0	

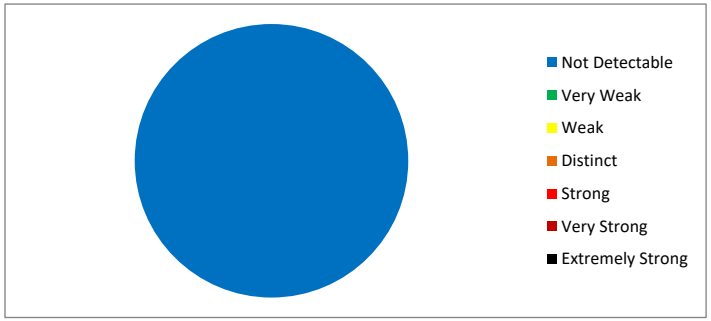
Colour coding of intensity observations:

0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0
0	0	0	0	0

Summary odour intensity observations:

Intensity	No obs	%	Descriptor
0	60	100%	Not Detectable
1	0	0%	Very Weak
2	0	0%	Weak
3	0	0%	Distinct
4	0	0%	Strong
5	0	0%	Very Strong
6	0	0%	Extremely Strong
	60	100%	

Plot of percentages of odour intensity observations:



Government of South Australia
SA Health

eA985824

Public Health Services
Citi Centre Building
11 Hindmarsh Square
Adelaide SA 5000
PO Box 6
Rundle Mall SA 5000
DX 243
Tel 08 8226 7100
Fax 08 8226 7102
ABN 97 643 356 590
www.health.sa.gov.au

Mr Craig Heidenreich
General Manager
Willunga Basin Water Company Pty Ltd
178 Main Road
MCLAREN VALE SA 5171

Dear Mr Heidenreich,

VARIATION TO THE APPROVAL FOR THE USE OF RECYCLED WATER THROUGH THE WILLUNGA BASIN PIPELINE SYSTEM BY WILLUNGA BASIN WATER COMPANY

Pursuant to the South Australian Public Health (Wastewater) Regulations 2013, the approval granted to Willunga Basin Water Company (WBWC) for the use of recycled water through the Willunga Basin Pipeline [7 October 2016] has been varied to include additional uses. These are dust suppression, municipal irrigation and private landscape irrigation in accord with the information submitted to the Department for Health and Ageing in September 2017. Clauses 2, 4 and 5 have been varied as below:

2. The recycled water can be used for the following
   - drip irrigation of grapevines, fruit trees, nut crops and flowers.
   - dust suppression with restricted public access
   - restricted municipal spray irrigation
   - restricted spray irrigation of gardens and landscapes.

   There is to be no direct contact of the recycled water with any grapes, nuts or fruit harvested and supplied for human consumption without further processing. Spray irrigation is not to be used for food crops. Additional uses of the recycled water require prior approval from the Department for Health and Ageing.

4. With regard to access and signage;
   4.1 Public access is to be prevented during spray irrigation and dust suppression activities
   4.2 The irrigated areas are to be signposted to indicate recycled water is being used for irrigation – do not drink
   4.3 Accessible taps and fittings are to be marked to indicate recycled water-do not drink
   4.4 Recycled water for dust suppression should be carted in a dedicated vehicle/vessel and marked to indicate that the contents are not suitable for drinking.

5. Spray and spray drift from irrigation is to be contained within the boundaries of the irrigation site and runoff and ponding of recycled water is to be prevented. Irrigation should not be undertaken in windy conditions.

All other conditions remain the same. A copy of the amended approval is attached.

Approved by Date 29 September 2017



Dr David Cunliffe
Principal Water Quality Advisor, Public Health

Delegate of the Minister for Health, pursuant to the South Australian Public Health (Wastewater) Regulations 2013

Government of South Australia
SA Health

eA985824

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Mr Craig Heidenreich
General Manager
Willunga Basin Water Company Pty Ltd
178 Main Road
MCLAREN VALE SA 5171

Dear Mr Heidenreich,

VARIATION TO THE APPROVAL FOR THE USE OF RECYCLED WATER THROUGH THE WILLUNGA BASIN PIPELINE SYSTEM BY WILLUNGA BASIN WATER COMPANY

Pursuant to the South Australian Public Health (Wastewater) Regulations 2013, approval is granted to Willunga Basin Water Company (WBWC) for the use of recycled water through the Willunga Basin Pipeline. The approval issued to WBWC on 7 October 2016 has been rescinded and is now replaced by this approval. The approval is subject to the following conditions:

1. The Willunga Basin Water Company will take responsibility for the operation of the scheme including the proper use of recycled water by each participant.

2. The recycled water is only to be used for the following
   - drip irrigation of grapevines, fruit trees, nut crops and flowers
   - dust suppression with restricted public access
   - restricted municipal spray irrigation
   - restricted spray irrigation of landscapes and gardens

   There is to be no direct contact of the recycled water with any grapes, nuts or fruit harvested and supplied for human consumption without further processing. Spray irrigation is no to be used for food crops. Additional uses of the recycled water require prior approval from the Department for Health and Ageing.

3. The Willunga Basin Water Company is to provide the Department for Health and Ageing with a list of properties or sites irrigated with recycled water on an annual (financial year) basis.

4. With regard to access and signage;
   4.1 Public access is to be prevented during spray irrigation and dust suppression activities
   4.2 The irrigated areas are to be signposted to indicate recycled water is being used for irrigation – do not drink
   4.3 Accessible taps and fittings are to be marked to indicate recycled water-do not drink.
   4.4 Recycled water for dust suppression should be carted in a dedicated vehicle/vessel and marked to indicate that the contents are not suitable for drinking.

5. Spray and spray drift from irrigation is to be contained within the boundaries of the irrigation site and runoff and ponding of recycled water is to be prevented. Irrigation should not be undertaken in windy conditions.

6. The sources of the water distributed by the pipeline are
   6.1 the Christies Beach Wastewater Treatment Plant
   6.2 the Willunga Wastewater Treatment Plant
   6.3 the Aldinga Wastewater Treatment Plant and
   6.4 the Sellicks Beach Wastewater Treatment Plant.

   These source waters are to contain ≤100 *E.coli* per 100 mL (median value). Water from Christies Beach, Willunga and Sellicks Beach is to contain ≤20 mg/L BOD_5 (mean value) and ≤30 mg/L suspended solids (mean value) while water from Aldinga is to contain ≤20 mg/L soluble BOD_5 (mean value). Water produced by Sellicks Beach will have a total chlorine residual of ≥1 mg/L. Water quality will be tested by the suppliers.

7. Recycled water from the irrigation system must not be allowed to contaminate potable water outlets. There will be no cross connections with any other water supply without backflow prevention to protect that supply as specified in AS3500 and in the case of public mains water supplies without approval from the South Australian Water Corporation.

8. The recycled water distribution system including associated fittings is to be marked or colour coded to indicate the carriage of reclaimed (or recycled) water. Leakage of water from the pipeline is to be prevented and drainage is only to be undertaken in a manner approved by the Environment Protection Agency and the Department for Health and Ageing.

9. Storage dams within the recycled water distribution system are to be sealed to prevent leakage of recycled water, will be protected from stormwater and will not be allowed to overtop the embankments. The storages are to incorporate minimum embankment freeboards of 600 mm above design storage capacity.

   The storages are not to provide a source of offensive odours or nuisance conditions including breeding of vectors such as mosquitoes. The storages are to be protected against ingress of human and animal waste and stock access is to be prevented. The storages are to be enclosed by man-proof

fencing and are to be signposted other to indicate, reclaimed (or recycled) water storage – no swimming.

10. All employees, irrigators and others who could potentially be exposed to recycled water are to be instructed in appropriate health and safety procedures pursuant to the *Work Health and Safety Act 2012*.

11. Non-compliance with any of the conditions for approval is to be rectified immediately and is to be reported to the Department for Health and Ageing as soon as practicable and within 24 hours of the failure being detected.

12. Pursuant to the South Australian Public Health (Wastewater) Regulations 2013, the Department for Health and Ageing reserves the right to revoke all or any of the approval conditions and require the repair, replacement, rectification, alteration of the system or part thereof:
    - 12.1 at any time should the system or component thereof not be manufactured, installed and/or operated in accordance with the approval conditions; or
    - 12.2 at any time the system is defective and not able to perform the function for which the approval is issued; or
    - 12.3 it is operated in a manner that is prejudicial to public and environmental health or raises environmental nuisance.

Approved by

Date 29 September 2017



Dr David Cunliffe
Principal Water Quality Advisor, Public Health

Delegate of the Minister for Health, pursuant to the South Australian Public Health (Wastewater) Regulations 2013.

NOTE 1: The approval issued does not alleviate responsibilities for obtaining relevant approvals, permits or licenses under other Acts or Regulations.

From:	Craig Heidenreich
To:	Richard Dwyer
Subject:	FW: Proposed Water Storage Facility
Date:	Thursday, 24 January 2019 12:22:15 PM
Attachments:	image003.png image004.png

FYI -

Craig Heidenreich
General Manager | Water Utilities Australia

Water Utilities Australia

Telephone +61 8 7999 8555
Mobile +61 439 399 974
Address Suite 1005, 147 Pirie Street, Adelaide SA 5000
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From: Health:Public Health Water Quality <waterquality@sa.gov.au>
Sent: Wednesday, 22 August 2018 8:44 AM
To: Craig Heidenreich <CHeidenreich@wua.com.au>
Cc: Health:Public Health Water Quality <waterquality@sa.gov.au>
Subject: RE: Proposed Water Storage Facility

Hi Craig

As outlined in your proposal there are no fundamental differences from a public health perspective between the Bowering Hill Dam and the new proposal. SA Health considers that based on the proposed design the storage does not present any significant public health risks

Best Regards

David Cunliffe

Dr David Cunliffe
Principal Water Quality Adviser
Public Health Services
SA Health
david.cunliffe@sa.gov.au
61 8 8226 7153

From: Craig Heidenreich [mailto:CHeidenreich@wua.com.au]
Sent: Thursday, 2 August 2018 4:42 PM
To: Cunliffe, David (Health)

Cc: Health:Public Health Water Quality
Subject: RE: Proposed Water Storage Facility

Hi David,

The Bowering Hill Dam did not proceed due to the inability of WBWC to secure access to the land. We did not progress through the Development Application process in full. We have subsequently investigated another site which is adjacent to WBWC's existing Quarry Road Pump Station. The proposal incorporated a 600ML treated water storage dam and drawings of the proposed dam are attached.

As with the Bowering Hill Dam the storage is around 9m deep and incorporates a 1:3 internal batter for the dam walls and due to different soil conditions the facility will be plastic lined with an under-drain system for leak protection.

The site is adjacent to the Seaford Vista housing estate with the top of bank being set-back 57m from the boundary of the estate. A native buffer planting is proposed around the storage dam as shown on the drawings. Attached is a regional map showing the proposed site relative to the housing estate.

The only difference fundamental between the Bowering Hill proposal and this proposal is the proximity to the Seaford Vista housing estate.

Can you advise SA Health's position on this proposal noting your prior advice on the Bowering Hill proposal.

Please advise if you would like to meet to discuss this proposal before responding.

Regards, Craig.

Craig Heidenreich
General Manager | Water Utilities Australia

Water Utilities Australia

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From: Cunliffe, David (Health) <David.Cunliffe@sa.gov.au>
Sent: Wednesday, 19 July 2017 2:41 PM

To: Craig Heidenreich <CHeidenreich@wua.com.au>
Cc: Health:Public Health Water Quality <waterquality@sa.gov.au>
Subject: RE: Proposed Water Storage Facility

Hi Craig,

Based on the information provided the Bowering Hill Dam should represent a low risk for supporting mosquito breeding.

The key to reducing risk is incorporation of specific design features. Past experience in South Australia has shown that these design features are effective in controlling/preventing mosquito growth in storages that collect or hold recycled water. The design features that you have described for Bowering Hill Dam are consistent with those required to minimise mosquito breeding. It is suggested that this could be confirmed by regular visits to the storage particularly during the first year of operation.

Best Regards

David Cunliffe

Dr David Cunliffe
Principal Water Quality Adviser
Public Health Services
SA Health
david.cunliffe@sa.gov.au
61 8 8226 7153

From: Craig Heidenreich [mailto:CHeidenreich@wua.com.au]
Sent: Wednesday, 19 July 2017 11:38 AM
To: Cunliffe, David (Health)
Cc: Health:Public Health Water Quality
Subject: Proposed Water Storage Facility
Importance: High

Hi David,

Willunga Basin Water are currently planning an expansion of the supply infrastructure for the McLaren Vale Region. The plans currently contemplate a large above ground water storage located on the corner of Iverene Road and Old Coach Road north of Aldinga.
We have a website that has been developed for consultation which is www.boweringhilldam.org.au which has information on the exact location, design, etc. The design on this site contemplates a 1,200ML storage and while this is not necessarily the final design, the information is indicative of the facility we are considering.

I note the condition below in WBWC's current SA Health Approval dated 7 October 2017.

9. Storage dams within the recycled water distribution system are to be sealed to prevent leakage of recycled water, will be protected from stormwater and will not be allowed to overtop the embankments. The storages are to incorporate minimum embankment freeboards of 600 mm above design storage capacity.

   The storages are not to provide a source of offensive odours or nuisance conditions including breeding of vectors such as mosquitoes. The storages are to be protected against ingress of human and animal waste and stock access is to be prevented. The storages are to be enclosed by man-proof fencing and are to be signposted other to indicate, reclaimed (or recycled) water storage – no swimming.

There is some concern in the local community on a number of issues and one particular issue is the potential for mosquito and associated virus outbreaks and would like some feedback on experiences SA Health has had when these treated wastewater storages have been constructed elsewhere across the state.

SA Health have published a guidance document on mosquito management called the "South Australian Integrated Mosquito Management Resource Package 2006". This document provides some guidance for the construction of man-made water storages which includes the following recommendations:

- **Construction should occur away from "people intensive" areas such as high density residential area, schools and aged care facilities**.

The Bowering Hill Dam is located at least 1 km from a high density residential area, school or aged care facility. There is a caravan park approximately 800m to the west of the land and there are 6 properties within 500m of the site.

- **Wetlands should be constructed in open areas subject to wind action.**

The Bowering Hill Dams are at the top of a rise and will be exposed to wind action in particular sea breezes given its proximity to the coast.

- **Shallow water and dense vegetation is attractive to mosquitos whereas deeper, open water bodies with steep margins free from vegetation are less appealing as a habitat source.**
- **Wetlands should be greater than 60cm in depth overall and with steep sides to discourage mosquito breeding.**

The Bowering Hill Dam is 9m deep with a 1 in 3 internal bank gradient. The banks will be rock lined and will be kept free from vegetation. The design will be almost identical to the design of the 850ML storage dam at the Aldinga WWTP.

- **Choose vegetation that will not vigorously invade the water body or the surrounding banks and requires minimal maintenance.**

The Bowering Hill Dam will be rock lined and will be filled and emptied on an annual basis. By

having the water level move up and down regularly any mosquito larvae that might build up on the rock lining will be exposed to sunlight. The draining of the dams occurs in summer when water demand is high and the exposure of the larvae to sunlight will be most effective. This will also limit grass growth and enable spraying to occur to minimise grass growth.

I also note the requirement for the facility not to provide a source of offensive odours. The treated wastewater to be stored in the lagoon will be from Christies Beach WWTP which has been stored at the Aldinga site for a number of years. Due to the co-location of the storage with the Aldinga wastewater treatment plant there is some confusion in the community around the odours that arise from the wastewater plant which has sludge lagoons etc. as compared to a stand-alone treated wastewater storage facility. From an operational perspective, WBWC is inclined to draw water from the storages and not leave stored water to accumulate for a number of years due to the impact of long term evaporation on water salinity which is an issue for our customers. In the case of this storage we can choose to use this water rather than drawing water from CBWWTP in wetter years to ensure we continually turn over the storage contents to avoid excessive aged water accumulating.

In regard to access the suite will be secured with a 6ft high fence and suitable signage will be applied consistent with our other facilities.

Given the current reference sites for large water storages in McLaren Vale are co-located with wastewater treatment facilities (i.e. Aldinga and Willunga), can you comment on SA Health's position on this proposed water storage facility in particular with regard to the potential risk of mosquito's or other public health related diseases and the risk of odours from such a facility where they have been constructed elsewhere across the state.

Thanks, Craig.

Craig Heidenreich
General Manager | Water Utilities Australia

Water Utilities Australia

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Reference Number:
ATS5240-BakDrPTA

24 September 2018

Ekistics
Attn: Richard Dwyer Managing Director
PO Box 32
Goodwood SA 5034

Dear Richard,

Re: Bakewell Drive, Seaford Heights – Regulated and Significant Trees

I have inspected the trees noted at the above address on Monday 24 September 2018 and made observations in relation to their legislative control status under the *Development Act 1993* pertaining to Regulated and Significant Trees and the *Native Vegetation Act 1991.*

There are approximately 200 juvenile trees located within the windbreak and a row of mature olive trees also noted at site. The juvenile trees are planted specimens and are all less than two metres in circumference, these trees are therefore not controlled by the *Development Act 1993* or the *Native Vegetation Act 1991.*

The mature olive trees within the site have been planted for the purpose of fruit production; these trees are exempt from control as per the *Development Act 1993*. As the trees are planted specimens they are not identified as native vegetation. The trees are not controlled by the *Development Act 1993* or the *Native Vegetation Act 1991* and therefore their removal is permitted and no approval from the local council or the Native Vegetation Council is required.

Thank you for the opportunity to provide this information. Should you have any questions or require further information, please contact me and I will be happy to assist.

Yours sincerely

JASON WILLIAMS
Consulting Arboriculturist
Diploma of Arboriculture
Graduate Certificate in Arboriculture
ISA- Tree Risk Assessment Qualified
Arboriculture Australia Licensed Consulting Arborist AL-2703

Tree Location



Arborman Tree Solutions Pty Ltd – Professionals in Arboriculture
23 Aberdeen Street
Port Adelaide SA 5015

Phone: (08) 8240 5555
Mobile: 0418 812 967
Email: arborman@arborman.com.au

Identified Trees



Mature olive trees

Planted trees within the windbreak



Arborman Tree Solutions Pty Ltd – Professionals in Arboriculture
23 Aberdeen Street
Port Adelaide SA 5015

Phone: (08) 8240 5555
Mobile: 0418 812 967
Email: arborman@arborman.com.au

18SHD (Seaford Heights Dam)

Visual Impact Assessment of the Proposed SRWRA Water Storage at Seaford Heights

Prepared for Water Utilities Australia

By Warwick Digby Charles Keates

17 October 2018

WAX DESIGN Ltd Pty ACN 117 346 264
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© October 18

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1 Introduction and Background

1.1 Relevant Experience of Warwick Keates

1.1.1 Warwick is a director of WAX Design with over 25 years' experience in Landscape Architecture practising in South Australia, Australia, Middle East and the United Kingdom. During this period of time, he has prepared numerous visual impact and landscape assessments for Planning Appeals, Expert Witness Statements and Environmental Impact Assessments.

1.1.2 Warwick has prepared visual assessments for a variety of developments, including major road corridors, telecommunication towers, residential developments, significant trees, wind farms and numerous mine expansions. During the course of his employment, he has appeared as an expert witness before the Environment, Resources and Development Court and Development Assessment Commission on numerous occasions. Warwick has also made presentations at Parliamentary Hearings, both in Australia and the United Kingdom and presented a number of papers on visual impact assessment.

1.2 Qualifications

1.2.1 Graduate Diploma in Landscape Architecture 1990, Leeds Polytechnic, UK

1.2.2 Bachelor of Landscape Architecture (Honours) 1988, Leeds Polytechnic, UK

1.3 Affiliations

1.3.1 Associate Member of the Australian Institute of Landscape Architects (Past President of the South Australian Chapter)

1.3.2 Registered Landscape Architect

1.3.3 Member of the Landscape Institute (United Kingdom)

1.4 Visual Impact Assessment Methodology

1.4.1 The visual assessment methodology uses site observations and Global Positioning System (GPS) to identify the extent to which the proposed development is visible in the locality and over what distance. Using the GPS and site investigations the location and visual extent of the subject land within the locality were assessed.

1.4.2 This methodology quantifies where the subject land is in the locality (relative distance between proposed development and viewpoint) and whether it is visible and to what extent.

1.4.3 The visual character and extent are assessed and discussed in Section 3 of this report. This allows a detailed understanding to the visual effect of the proposed development to be developed.

1.4.4 The visual assessment contained in this report has been undertaken on site. It should be noted that due to the differences between viewing the subject land on site in person and the constraints of reproducing this photographically at a smaller scale and on paper, the site photos and photomontages contained in this report can only give an indication of the visual effects and should be taken into consideration alongside the visual assessment discussion and analysis.

1.5 Relevant Documents

1.5.1 In forming my opinion and the preparation of the Visual Impact Assessment, I have viewed the following documentation:

1 Introduction and Background

- Hydroplan Drawing No. 14689-SK017. Date 29 March 2018. Concept Plan
- Ekistics DPTI Sponsor Request, dated 9 August 2018
- Arborman Tree Solutions Report, dated 24 September 2018

1.6 Locality

1.6.1 In assessing the landscape character of the site, a landscape character locality has been determined in which the subject land sits. This includes the following as indicated in Figure 1:

- The edge of Robinson Road to the north of the subject land
- Land to the north, incorporating the Onkaparinga River Valley
- The surrounding vineyards and hills to the east, including the Victor Harbor Road corridor
- The northern portion of the SRWRA landfill site and the local ridgelines and fields
- Main South Road and associated residential development forming the western edge



Figure 1: Locality plan

2 Landscape Character and Site Context

2.1 Description of Development

2.1.1 The proposed development is currently in the concept design phase and entails the development of a 600mL water storage dam. The proposed dam will measure 325 metres in length, 295m in width and 8.5 metres in depth.

2.1.2 The dam will be constructed as a 'turkey's nest' with the top of the dam embankment elevated above the natural ground level of the subject land. The dam will sit approximately 5 metres higher than the existing ground level.

2.1.3 As a result of the sloping site, the dam embankments vary in height above ground level, varying between 4.15m to 7.60m.

2.1.4 The dam will be constructed with a 1 in 3 internal batter which will be plastic lined. There will be an external 1 in 3 slope surrounding the dam which will be constructed with compacted earth. At the base of this dam embankment will be an access road, security fencing and a swale to collect stormwater runoff.

2.1.5 Adjacent the dam embankment and access road will be a series of constructed earth mounds of varying heights (depending on existing ground level) between 1.4m – 7.8m at a slope of 1 in 4. These will be constructed using the excess fill excavated for the dam and will be vegetated with plants and trees in order to minimise visual impacts of the dam embankment. At the base of the mounds opposite the dam embankment, there will be a 3m wide swale which will collect stormwater runoff and direct it towards detention basins and off of the subject land.

2.1.6 The proposed mounds will be vegetated with site appropriate plant species which are currently present within the existing landscape buffer. These will grow to a mature height which will help to facilitate the visual management of the development.

2.2 The Site Context

2.2.1 The subject land is located on Bakewell Drive, Seaford Heights and comprises portion of Certificate of Title Volume 6034 Folio 589 (Allotment 108 of Deposited Plan 80592) and Certificate of Title Volume 5829 Folio 936 (Allotment 102 of Deposited Plan 46795). The subject land is proposed to include a 600mL water storage dam developed on a portion of the allotment. The subject land is located within the Onkaparinga Council area.

2.2.2 The subject land is formed by a wide gently sloping hilltop and ridgeline that extends in a north-south direction, parallel to the coastline. There are no discernible features and the land contains few topographic or vegetation elements. The existing land cover is arable cropping which results in seasonal variations in vegetation retention, harvesting and other agricultural operations on the land.

2.2.3 The existing landscape character of the locality is defined by the undulating agricultural landscape which contains vineyards, fields, valleys and significant belts of vegetation located on large allotments that follow the underlying topography of the hills environment.

2.2.4 The allotments typically include areas of vegetation along the cadastral boundaries with cleared land to allow for cropping or wine production.

2.2.5 The northern edge of the locality falls away to form the Onkaparinga River Valley resulting in panoramic views to the ocean and the suburbs of Old Noarlunga and Seaford.

2.2.6 To the west, a new residential subdivision is currently being developed by the Fairmont Group. The Vista development will include over 1,100 residential allotments. The development is located on a sloping allotment which falls away to the west towards the coast. The development is directly adjacent the subject land to the west.



Figure 2: View looking west towards the wide ridgeline of the subject land

2 Landscape Character and Site Context

2.3 The Subject Land and Development

2.3.1 The subject land is approximately 21 hectares in size and is currently used for primary production in the form of agricultural cropping.

2.3.2 Located on a portion of the allotment to the north is a landscape buffer. This area of vegetation was established under a Land Management Agreement to provide a buffer between the residential edge of the Vista development and McLaren Vale. The primary function of the vegetation is to interrupt views from Victor Harbor Road towards the urban edge of Seaford Heights to maintain the rural landscape character of McLaren Vale and reduce the impacts of urban development.

2.3.3 The mounding and vegetation provides a low screen 2-3m in height. The variety of species is well established and the visual effect provides significant amenity and visual screening to the locality.



Figure 3: Landscape buffer

2.3.4 The subject land contains a belt of mature Olive trees towards the southern boundary. There are no regulated or significant trees located on the subject land according to a report provided by Arborman Tree Solutions dated 24 September 2018. Other than vegetation along the cadastral boundaries, the vast majority of the subject land has been cleared to enable agricultural cropping.

2.3.5 The topography of the subject land is formed by a wide rolling hill, with the site of the proposed development at a high point above surrounding allotments. This increases the visual prominence of the subject land across the wider locality.

2 Landscape Character and Site Context

2.4 Adjoining Properties and Landscape Context

2.4.1 The Vista development is located to the west of the subject land and includes numerous residential allotments of various sizes, small areas of public open space and a neighbourhood centre. The underlying topography of the site has resulted in the construction of high retaining walls (up to 2m) across the eastern half of the site as well as benching to allow for level residential allotments. Retaining walls are located on the boundary between the subject land and the Vista development. This limits views from Vista into the subject land as residential rooflines, retaining walls and fencing disrupt views forming a built form boundary to the western edge of the subject land.

2.4.2 The property to the south at Allotment 10, Bakewell Road is the State Heritage listed Ostrich Farm which is situated on approximately 4 hectares of land. The property contains the original farm house as well as horse stables and training yards. The locations of these structures are in close proximity to the boundary with the subject land which forms a landscape backdrop to the property.

2.4.3 Ostrich farm is located at a lower elevation to the subject land and such has views of the subject land which rises to the north and north west.



Figure 4: Ostrich Farm

2.4.4 On the southern side of Bakewell Road is the SRWRA landfill site which is responsible for providing and operating waste management operations for the Onkaparinga, Marion and Holdfast Bay Councils. The landfill site is located on land which is significantly lower than the subject land and Ostrich Farm. The development of screening mounds and buffer planting means that the SRWRA landfill site is not visible form the subject land.

3 Visual Assessment

3.1.1 The visual assessment considers the visibility of the proposed development and the contribution to the amenity of the locality that the proposed development will make. This assessment has been considered in relation to the viewpoints indicated in Appendix A.

3.2 Description of development, form and landscape

3.2.1 The visual character of the subject land to the south is defined by the Victor Harbor Road corridor from the intersection with Main South Road (indicated in Figure 5) where there are glimpsed views towards the subject land and the proposed development. The embankment of the proposed dam will sit at a height 4.45 metres above the existing ground level at this point, forming a new elevated landform backdrop. While the development of the dam embankment will create a new landform, the associated vegetated landscape mounds surrounding the development will add to the existing screening provided by the landscape buffer that has been developed in association with the Vista development.

3.2.2 Further along Victor Harbor Road, the visual character to the south is dominated by the Vista development which creates significant visual change within the local area. The undulating agricultural landscape which contains vineyards, open fields, valleys and significant belts of vegetation is replaced by a modified landform of benching, fence lines and patches of modified open space that facilitates the residential development, contrasting with the rural character of the landscape.



Figure 5: Victor Harbor Road looking south

3.2.3 At the intersection of Ostrich Farm Road and Victor Harbor Road, the existing landscape character is defined by the gently undulating landforms that create a rolling landscape that is typical of the locality. The existing vegetation colour is defined by arable cropping with belts of vegetation to cadastral boundaries and roads.

3.2.4 Ostrich Farm Road is lined on both sides with established vegetation ranging in height between 6m-10m. This creates a significant screen to the road corridor with glimpsed views into the adjoining fields and towards the proposed development. The proposed dam embankment will result in a significant modification to the existing land form. The new landform associated with the proposed dam will be visual up to 6.25 metres above the existing highest point of the subject land.



Figure 6: Ostrich Farm Road at the intersection with Victor Harbor Road.

3 Visual Impact Assessment



Figure 7: Ostrich Farm Road illustrating screening vegetation to road corridor

3.2.5 At the corner of Ostrich Farm and Victor Harbor Road, the road sits on a 5 metre high road embankment elevated above the surrounding land. The local embankments associated with the road corridor typically measure between 4 metres and 6 metres. These landforms impact the visual character of the locality particularly to the east of the subject land. The profile of the existing landform is typically 1:2, rather than the slope profiles that are proposed for the dam embankment.

3.2.6 To the north-west of the subject land, Victor Harbor Road passes through a cutting close to the northern boundary of the subject land and the existing landscape buffer. Travelling south, the subject land forms part of the local rural landscape and the entrance to McLaren Vale. To the east, the landscape is dominated by the undulating landscape and vineyards of the McLaren Vale and to the west, including the subject land, the agricultural cropping and gently sloping profile of the fields.



Figure 8: View of the subject land from Victor Harbor Road

3.2.7 Adjacent the subject land, Victor Harbor Road has a speed limit of 80km/hr which means that the duration of visibility of the subject land is significantly limited for a number of seconds with the views being oblique to the west. The existing landscape character is recognised as part of the agricultural landscape and there are few visual attractors from the viewpoint that draw your attention to the subject land.

3.2.8 The topography and elevation of the road corridor provides distant views north across the Onkaparinga Valley towards the coast. The progressive development of the Onkaparinga basin is clearly visible, including the infrastructure associated with the Seaford Rail Link. These views remain the dominant focus of the road corridor and visual character.



Figure 9: View from Victor Harbor Road which sits on a 5m high embankment, north across the Onkaparinga Valley. The subject site is located behind.

3.2.9 It is important to note that within the locality of the viewpoint and the subject land there are a number of modified landforms associated with the road corridor including 6-7 metre high cutting embankments as well as fill embankments. The landscape character is defined by the underlying agricultural land use with views to adjacent fields that contain vineyards and shelter belt planting.

3.2.10 The visual screening associated with the tree lined cadastral boundary to the adjacent vineyards as well as local landforms associated with the road corridor provide a degree of screening to the south western edge of the road corridor.

3.2.11 When viewed from Bakewell Road, the existing landscape character of the subject land is defined by the rolling agricultural landscape that exists around the subject land and to the west and south west of the development.

3.2.12 The elevated topography of the subject land forms a rolling hilltop with a wide gently sloping profile which forms the horizon line to the north. Vegetation associated with the Ostrich Farm is notable to the north and west of the site when view from Bakewell Road.

3.2.13 From Bakewell Road, the subject land forms the horizon to the locality with a single land cover creating a visual monoculture. Views are mid-range extending over a few hundred metres. This visual character will continue after the development of the dam with views extending over several hundred metres. While the depth of field and topography will be altered, the establishment of landscape mounds with trees and shrubs will significantly increase the landscape amenity and visual diversity in the locality.

3.2.14 From Bakewell Road, the proposed development will be viewed as an increase in the landform associated with the hill. The extent of the sloped profile and arrangement of the vegetation will result in a defined belt of vegetation forming a new horizon line located approximately 7.8 metres above the existing landform, with an existing ground level RL89.20 and proposed level RL97.00.

3.2.15 In many regards the visual effect will be the addition of a high belt of vegetation above the existing agricultural ridgeline. The extent of cropping may be retained or slightly modified with additional vegetation being located above or on the existing horizon line.



Figure 10: View looking north-east from the northern edge of Bakewell Road

3.2.16 From Ostrich Farm, there are views of the southern edge of the subject land. These views contain a number of mature planted olive trees of a height of between 6-10 metres. The trees provide a visual buffer within the landscape screening views north and south from a vegetated horizon line.

3.2.17 The development of the site will result in the removal of these planted olive trees however the proposed land form of the dam embankment will provide opportunities for additional landforms and vegetation screening. The proposed development will introduce new landscape elements into the landscape above the existing horizon line. While the modification of the topography and vegetation is likely to create a moderate degree of visual change, due to its elevated location, the profiling of the proposed landform and screening vegetation will significantly reduce the visual effect. At the same time, the vegetated landscape mounds will increase the landscape character and amenity replacing the arable skyline with an undulating vegetative screen.

3.2.18 From locations along Main South Road close to Bakewell Road, the site of the proposed development will not be visible as local ridgelines create screens. It is also important to note that the land to the west of the subject land will be redeveloped as part of the Vista development. This will result in retaining walls, buildings and road corridors altering the landscape and limiting the visibility towards the proposed development from Main South Road. As stated previously, the proposed development will create an elevated vegetated horizon line which is complimentary to the existing landscape character.

3.2.19 The built form development along Robinson Road which forms the northern edge of the Vista development creates a defined urban form. The two storey dwellings and large commercial buildings reduce the visibility of the subject land forming an urban corridor. Views and the visual character are focused along the road corridor.

3.2.20 At the highest point of the Vista development, the subject land is screened by the existing retaining walls and fencing. It is important to note that the houses to the eastern side of roads such as Cotterell Road are permitted to be two storeys and therefore may have the potential to look over the adjoining retaining walls and onto the proposed landscape mounds. The orientation of the houses as well as the allotments focus views to the west towards the coastline. It is anticipated that bedrooms or study's or utility rooms would be located to the rear of the property with potential views to the proposed landscape mounds and the south east.



Figure 11: View from Cotterell Road allotments with fence line forming boundary with the subject land

3.2.21 The current allotment boundary of Vista and the subject land contains a Colorbond fence sitting on a retaining wall which results in the fence sky lining line along the local horizon. The proposed development will alter the local topography creating a vegetated screen above the fence line. This will result in an elevated landscape skyline which will significantly offset the visual effect of the current fence in terms of landscape character and amenity. Furthermore, the proposed vegetation treatments of the dam embankment will provide a landscape backdrop that will offset the uniformity and urban form of the existing fence line on future houses.

3.2.22 Throughout Vista, the visual character is contained. Views typically exist along road corridors, however, the urban form of the development results in short road lengths before the road changes alignment reducing the visual corridor. The elevated topography creates a stepped built form increasing the visual containment of the buildings throughout Vista. The result is that the rooflines form the horizon line rather than the surrounding landscape character or the subject land. Views to the surrounding landscape to the north, south and east are extensively screened with glimpsed views to the southern vales afforded due to the lack of current development.

3.2.23 When the residential development is fully complete, the sense of visual enclosure will increase with limited views to the surrounding landscape. The existing topography, resulting residential development and presence of the coastline to the west increases the visual character and built form focus to the west away from the subject land.



Figure 12: Views from Cotterell Road towards the coast, the subject land is located directly behind this viewpoint

3.2.24 There are glimpsed views towards the subject land at the intersection of Main South Road and Robinson Road. While the subject land is not currently visible behind the linear form of the boundary fencing, the proposed development will form an elevated topography behind the fence line. The fence line forms a horizontal visual element that reinforces the residential edge of the Vista development.

3.2.25 The potential introduction of an elevated vegetated landform will reduce the visual effect and dominance of the urban form to the east. With appropriate landscape treatments the interface between the Vista development and the McLaren Vale edge will be reduced with a visual layering creating a backdrop of trees and shrubs rather than the defined horizon line of the fencing and rooflines.

3 Visual Impact Assessment



Figure 13: Views from the intersection of Main South Road and Robinson Road

3.3 Management of Visual Impacts

3.3.1 The visual effect of the proposed development will be mitigated through the addition of a series of vegetated landscape mounds in front of the dam embankments. The mounds will be constructed using the excess fill created during the excavation of the dam and will be located directly adjacent the dam embankment. The slope of each mound is 1 in 4 and varies in height between 1.6m-7.8m. A plan of the proposed development is located in Appendix C.

3.3.2 The mounds have been designed in positions which disrupt views of the dam embankment from viewpoints along Victor Harbor Road and Bakewell Road as well as the Vista development. The mounds will respond to the local topography and landscape character by presenting as a series of hills with vegetation. A list of the proposed species is located in Appendix B.

3.3.3 The landscape treatments, selected boundary treatments and species selection will reduce and limit the visibility of the dam embankment from viewpoints on Victor Harbor Road and Bakewell Road.

3.3.4 The introduction of the new landscape into the locality will be seen within the context of the wider landscape character. Existing ridgelines and hills to the north and east are covered with belts of vegetation and trees that provide amenity to the local landscape character. The proposed mounds and vegetated treatments aim to replicate these existing landscape characters providing areas of vegetation over elevated landforms.

3.3.5 The proposed development will create an extension of the existing vegetation buffer and vegetated horizon line when viewed from Main South Road and the Vista development. In many regards the Vista development provides the dominant visual impact along the Main South Road corridor.

3 Visual Impact Assessment

3.3.6 The development of the proposed site offers the opportunity to increase the vegetation character and screening associated with the land management agreement buffer planting area. The use of native species as well as tree and shrub species will significantly increase the landscape amenity, removing the monoculture of the existing arable cropping and replacing it with a diverse native vegetation character that will increase the visual amenity as well as provide increased habitat biodiversity.

3.3.7 As the dam will be elevated above the surrounding locality, the water within the dam will not be visible from any external points and in combination with the proposed landscape mounds, there will not be any indication that the subject land contains a water storage dam.

4 Development Plan Assessment

4.1 Relevant Development Plan provisions

4.1.1 The following provisions of the Onkaparinga Council Development Plan (consolidated 20 February 2018) have been considered as the most relevant to the assessment of the visual impact of the proposed development.

4.2 Primary Production Zone

4.2.1 Objectives:

4 Protection of primary production from encroachment by incompatible land uses and protection of scenic qualities or rural landscapes

6 The enhancement of the rural character, key scenic routes, scenic surrounds to townships, amenity and prominent landscape for the enjoyment of residents.

4.2.2 Principles of Development Control:

4 Development within the zone should be compatible with its use as a water catchment and storage area and with is values as an area of agricultural production and scenic beauty.

6 Development which would remove productive land from agriculture or diminish its overall productivity for primary production should not be undertaken unless the land is required for essential public purposes.

16 The excavation and/or filling of land should:

(a) be kept to a minimum and be limited to no greater than 1.5 metres so as to preserve the natural form of the land and the native vegetation.

(b) only be undertaken in order to reduce the visual impact of buildings, including structures, or in order to construct water storage facilities for use on the allotment.

(d) result in stable scree slopes which are covered with top soil and landscaped so as to preserve and enhance the natural character or assist in the re-establishment of the natural character of the region.

40 Excavation and earthworks should take place in a manner that is not extensively visible from surrounding localities.

41 The appearance of land, buildings and objects should not impair the amenity of the locality in which they are situated.

42 The rural character, comprising natural features and man-made activities, should be preserved by careful siting, design and landscaping of new building development and/or intensive land uses.

61 Landscape buffers located adjacent a residential or urban zone should be designed taking into account the nature, source and frequency of potential adverse impacts; prevailing winds in the locality; topography of the area; existing vegetation and the presence of potentially sensitive adjacent uses.

Assessment

4.2.3 The proposed development will incorporate a series of landscape mounds surrounding the perimeter of the water storage dam. These will be constructed with the excess fill created by excavating the site of the dam and will enable views of the dam embankment to be screened by vegetation which replicate the topography and landscape vegetation cover within the locality. This will ensure the protection of the scenic qualities of the locality and enhancement of the landscape character, as well as providing additional amenity to the subject land.

4.2.4 The dam will be compatible with the use of the area as a water catchment and storage area, whilst maintaining scenic quality within the locality.

4.2.5 The zone mentions that the excavation and/or filling of land should not exceed 1.5 metres above the natural ground level so as to preserve the natural form of the land and the native vegetation. The proposal includes mounds up to 7.8 metres in height. Whilst this is larger than anticipated in the zone, they are being constructed in response to the underlying topography of the land and will be used to introduce significantly areas of native vegetation to the subject land. The construction of the dam will result in large amounts of excess fill which will be used in the mounds, reducing the visual impact of the dam embankment and protecting the character of the locality.

4.2.6 The neighbouring residential zone has been taken into consideration when designing the location and size of the landscape mounds to reduce views of the dam embankment from these areas. The proposed design incorporated a series of vegetated landscape mounds which will increase the landscape amenity and will provide a vegetated backdrop to the residential zone when viewed from the west.

4.3 Siting and Visibility

4.3.1 Objectives:

1 Protection of scenically attractive areas, particularly natural, rural and coastal landscapes.

4.3.2 Principles of Development Control:

1 Development should be sited and designed to minimise its visual impact on:

(a) The natural, rural or heritage character of the area

(b) Areas of high visual or scenic value, particularly rural and coastal areas

(c) Views from the coast, near-shore waters, public reserves, tourist routes and walking trails

Assessment

4.3.3 The development seeks to protect the scenically attractive entrance to the McLaren Vale region by incorporating the landscape mounds surrounding the development to the north, west and south. The existing belt of established trees along Ostrich Farm Road to the east will limit views to the dam from this direction. The landscape mounds seek to increase and complement the amenity of the area and the natural character of the Onkaparinga Valley.

4 Development Plan Assessment

4.4 Character Preservation District Overlay

4.4.1 Objectives:

1 A district where:

(a) scenic and rural landscapes are highly valued, retained and protected

(b) development near entrances to towns and settlements does not diminish the rural setting, character and heritage values associated with those towns and settlements.

4.4.2 Objectives:

1 Development in the district should:

(a) when located near townships, contribute towards and maintain the identity of those townships

(b) retain the predominant rural landscape character and function

Assessment

4.4.3 With the development being located at the entrance to the McLaren Vale region, it is important to maintain the scenic qualities of the Character Preservation District. This has been taken into consideration with the design and location of each of the landscape mounds which seek protect and retain the rural landscape character and disrupting views towards the dam.

4.4.4 The landscape treatments include a series of mounds which will be constructed adjacent the dam embankment and will disrupt views of the embankment. The mounds will be planted with native vegetation and will increase the amenity of the proposed development from viewpoints on Victor Harbor Road and Bakewell Road. This approach replaces the existing arable cropping land with trees and shrubs to reflect the pockets of remnant vegetation east of Victor Harbor Road.

5 Conclusion and Opinion

5 Conclusion and Opinion

5.1.1 The assessment of the landscape character surrounding the subject land provides an understanding of the locality. The subject land is situated in the Primary Production Zone within the Onkaparinga Council, adjacent a residential housing development and other primary production allotments. The topography of the subject land varies, with a wide ridgeline forming a high point within the subject land. This results in the location of the dam being at a higher elevation than surrounding allotments, increasing the potential visibility of the development within the locality.

5.1.2 The visual assessment that has been undertaken highlights the potential issues associated with the visual effect of the dam within the defined locality. The 'turkey's nest' style of development and the elevation of the subject land results in the dam embankment being visible from certain areas within the locality. Engineering requirements state that these embankments must be free of vegetation. To lessen the visual impact of the dam embankments on the surrounding locality, a series of landscape mounds have been designed to the north, west and southern extents of the dam embankment using the excess fill created from excavating the dam. This allows for extensive planting of native vegetation and trees on the landscape mounds which reflects the rural and remnant vegetation of the surrounding locality.

5.1.3 Any potential views towards the dam embankment will be disrupted by the addition of these vegetated landscape mounds. Whilst the extent of mounding is quite large, with mounds ranging between 1.6m-7.8m above ground with a slope profile of 1 in 4, this is directly related to the scale of the proposed development and is required to adequately screen views towards the dam. The designs of the landscape mounds have taken into account the natural topography of the area and will replicate this through the addition of vegetated hills within the locality. .

5.1.4 The assessment acknowledges that the proposed dam embankment is of a larger form than surrounding topographic features or development in the locality. This could result in the embankment being visually prominent from viewpoints along Victor Harbor Road, Bakewell Drive and Vista without other design measures such as the landscape mounds. This approach will enhance the rural character of the locality with the planting of large areas of native vegetation.

5.1.5 The design and built form of the Vista development contains large retaining walls, fencing and roof lines which visually detract from the existing rural character of the area. Views towards the subject land from Vista are constrained by residential built form and the alignment of the road network, which provide small glimpses of the subject land. These will be further limited with the construction of more housing. The proposal will result in an elevated vegetated backdrop above the existing fence line which will significantly offset the visual effect of the current fencing and built form in terms of landscape character and amenity.

5.1.6 In conclusion, the development of a series of vegetated landscape mounds to the north, west and south as well as the retention of the existing tree line to the east. These landscape elements will adequately screen the proposed development from views on Victor Harbor Road, Bakewell Drive and from Vista. The subject land will be viewed as a series of landscape mounds with vegetated ridges above the existing arable land. This is reminiscent of the surrounding locality which contains many vegetated ridges, hills, vineyards and cropping land.

5 Conclusion and Opinion

I declare that I have made all enquiries which I believe are desirable and appropriate and that no matters of significance which I regard as relevant have, to my knowledge, been withheld as part of the preparation of this report.



Warwick Keates, BA (Hons), Grad.Dip.LA, MLI, AAILA

17 October 2018

Appendix A

Appendix A: GPS Locations

Waypoint (red) superimposed on Google Earth mapping



Figure 14: GPS Location and Tracks superimposed on Google Earth mapping

Appendix B

Appendix B: Proposed plant species

PLANT SPECIES

Project No. 18SHD Date of Issue 17/10/18

Trees



Acacia pycnantha

Width x height: 6m x 6m
Growing rate: FG
Density/Spacing: Specimen
Supply size: Tube

Description: fast growing shrub or small tree, which can be grown on recharge sites and a wide range of shallow soils



Allocasuarina verticillata

Width x height: 6m x 8m
Growing rate: MG
Density/Spacing: Specimen
Supply size: 45L

Description: A tree that can be grown on a range of sites. It is considered to have moderate growth rates and is a useful windbreak or shelterbelt species.



Bursaria spinosa

Width x height: 3m x 4m
Growing rate: FG
Density/Spacing: Specimen
Supply size: 140mm

Description: Once established bursarias are extremely hardy and will last 30-50 years.



Callitris gracilis

Width x height: 8m x 20m
Growing rate: MG
Density/Spacing: Specimen
Supply size: 45L

Description: The native pine can be used as a shelter tree, for shade or a windbreak, for stabilisation of dune country or as an excellent feature tree for large gardens or parks.



Dodonaea viscosa

Width x height: 3m x 4m
Growing rate: FG
Density/Spacing: 1 per m^2
Supply size: 140mm

Description: A relatively fast growing shrub with an ability to pioneer degraded sites. Many of the subspecies are extemely frost and drought tolerant and are also considered a valuable source of pollen.



Eucalyptus porosa

Width x height: 12m x 14m
Growing rate:
Density/Spacing: Specimen
Supply size: 45L

Description: A robust, dark-barked mallee which can grow into an impressive single-trunked tree.

Maximum width x maximum height e.g.4m x4m

PLANT SPECIES

Project No. 18SHD Date of Issue 17/10/18

Trees



Pittosporum angustifolium

Width x height: 5m x 10m
Growing rate: SG
Density/Spacing: Specimen
Supply size: 140mm

Description: Usually attains about 6 m in height but is reported to grow up to 10 m tall. It grows across a wide range of habitats, often on sandy soils.



Melaleuca lanceolata

Width x height: 5m x 8m
Growing rate: FG
Density/Spacing: Specimen
Supply size: 200mm

Description: A relatively fast growing species. Has a dense canopy. Natural stands provide a particularly useful shelter as a windbreak on windy, near coastal sites.

Understorey



Acacia acinacea

Width x height: 4m x 2.5m
Growing rate: FG
Density/Spacing: 1 per m^2
Supply size: 140-250mm

Description: A fast growing, frost and drought tolerant,

in demand in revegetation programs in some parts of it range for its ability to pioneer degraded sites.



Adriana quadripartita

Width x height: 3m x 2m
Growing rate:
Density/Spacing: 1 per m^2
Supply size: 240-250mm

Description: A shrub species which is endemic to southern Australia.



Atriplex semibaccata

Width x height: 3m x 0.3m
Growing rate: FG
Density/Spacing: 2 per m^2
Supply size: 140-250mm

Description: Soil and erosion control. Effective weed control.



Enchylaena tomentosa

Width x height: 1.5m x 1m
Growing rate:
Density/Spacing: 3 per m^2
Supply size: 140-250mm

Description: Extremely hardy low shrub or ground cover for areas of neglect, particularly tolerant of coastal locations and calcareous soils.

Maximum width x maximum height e.g.4m x4m

PLANT SPECIES

Project No. 18SHD Date of Issue 17/10/18

Understorey



Goodenia albiflora

Width x height: 1m x 1m
Growing rate:
Density/Spacing: 3 per m^2
Supply size: 140-250mm

Description: A hardy and contrasting foliage plant.



Olearia ramulosa

Width x height: 1m x 1.5m
Growing rate:
Density/Spacing: 2 per m^2
Supply size: 140-250mm

Description: A dense, formal, rounded, aromatic shrub with

late autumn.



Rhagodia candolleana

Width x height: 2m x 1m
Growing rate:
Density/Spacing: 2 per m^2
Supply size: 140-250mm

Description: Can be used as a background shrub in mixed planting, suitable for coastal locations as a wind-break and soil control.



Rhagodia parabolica

Width x height: 5m x 3m
Growing rate: MG
Density/Spacing: 1 per m^2
Supply size: 140-250mm

Description: A pale, grey-green, desnely foliaged speading shrub with wide upright branches.



Myoporum parvifolium

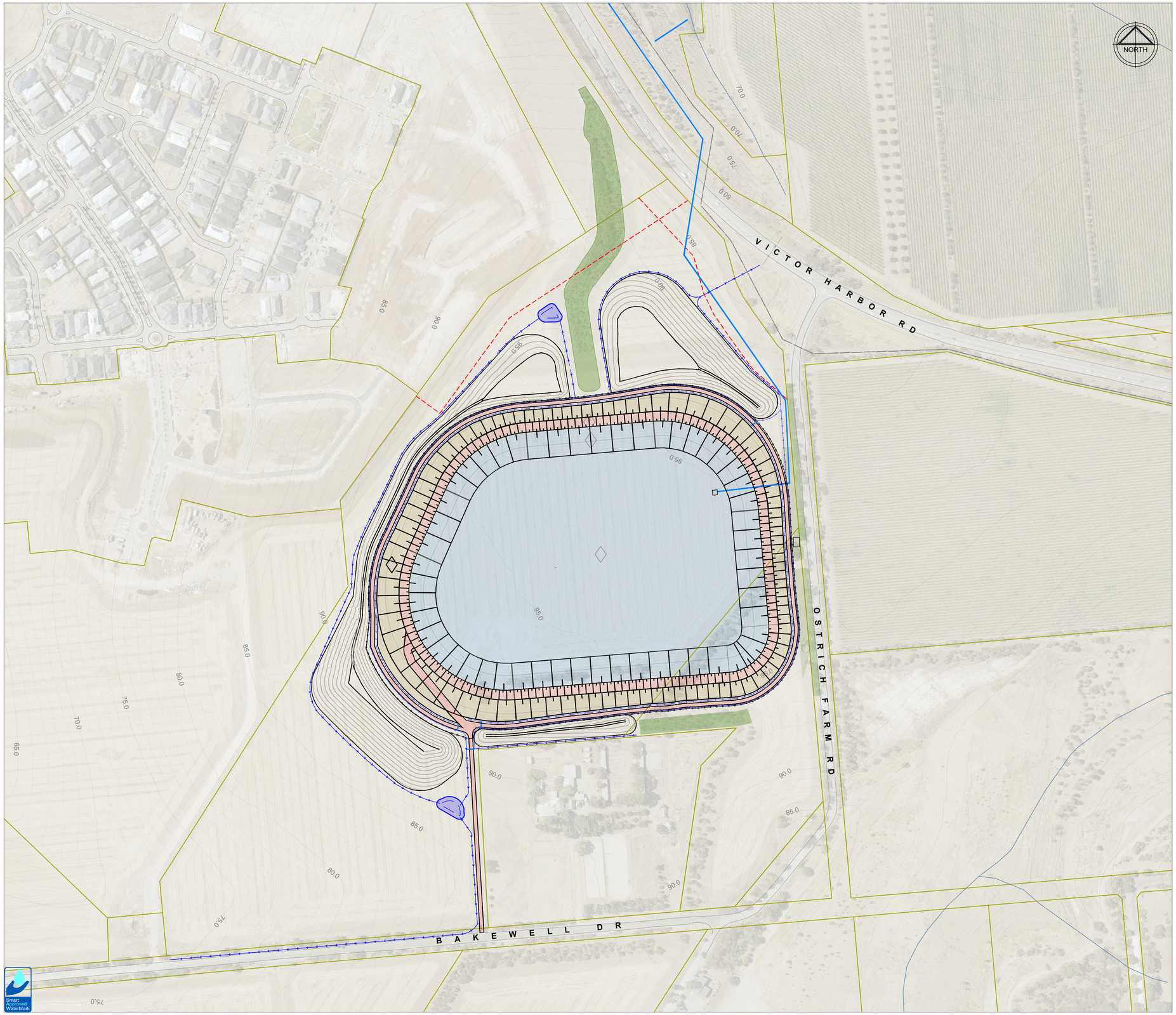
Width x height: 2m x 0.2m
Growing rate: FG
Density/Spacing: 1 per m^2
Supply size: 140-250mm

Description: Extremely hardy weed-suppressing ground cover for embankments, verges, streetscapes and high
Acts as a living mulch and weed suppressor.

Maximum width x maximum height e.g.4m x4m

Appendix C

Appendix C: Concept Design prepared by Hydroplan



SITEWORKS LEGEND

- PROPERTY LINE
- PROPOSED PIPELINE
- PROPOSED SWALE
- EXISTING PIPELINE
- BUFFER LAND BOUNDARY LINE
- N 6102500 E 272500 — COORDINATES AS SHOWN ON DRAWING No. "1-3255" OF THE LAND MANAGEMENT AGREEMENT

FINISHED SURFACE LEGEND

- RUBBLE AREA
- STORAGE AREA (PLASTIC LINED)
- OUTSIDE BATTER AREA

VEGETATION LEGEND

EXTENDED VEGETATION AREA:
(FOR SCREENING - INDICATIVE ONLY)

EXAMPLE:



NOTE: VEGETATION PLAN TO BE AGREED WITH BIODIVERSITY McLAREN VALE AND DEW. VEGETATION TO SCREEN A 1.8m HIGH SECURITY FENCE ON THE INTERNAL SIDE OF EXTENDED VEGETATION ALIGNMENT.

EXISTING VEGETATION AREA:

EXAMPLES:





-20 0 20 40 60 80 100 200m

SCALE 1:2000 ORIGINAL SIZE A1

REV	ISSUED	D.DWN	APRVD	REVISION DESCRIPTION
1	08/10/2018	JT	JG/BH	FOR DISCUSSION
0	20/09/2018	JT	JG/BH	FOR DISCUSSION

REV	ISSUED	D.DWN	APRVD	REVISION DESCRIPTION
-				-

HYDROPLAN

http://hydroplan.com.au

PERTH ADELAIDE SYDNEY BRISBANE BEIJING

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The arrangement and general details as shown on this drawing are essentially diagrammatic and must be applied to the circumstances as found on site.

DES/DRAWN:	JT
CHECKED:	BH
APPROVED:	JG
DATE:	29/03/2018
DRAFT REF:	2-WBW-d4

CLIENT: WILLUNGA BASIN WATER

PROJECT: SRWRA STORAGE
CONCEPT DESIGN PLAN WITH MOUNDS

DRAWING No.	SHEET	OF	REVISION
14689-SK017	1	1	1

Appendix D

Appendix D: Curriculum Vitea of Warwick Keates

WAX

WARWICK KEATES

DIRECTOR
LANDSCAPE ARCHITECTURE AND URBAN DESIGN



Warwick Keates is a landscape architect and urban designer with over twenty five years experience in private practice, academia and government. During this time, he has developed a diverse range of skills, working on awarded projects in the United Kingdom, Middle East and Australia. This experience has provided Warwick with a detailed understanding of the complex requirements associated with landscape and urban projects as well as the need for sensitive, high-quality design solutions.

Warwick is a Director of WAX Design and has worked in all aspects of the profession, including master plans for urban and civic spaces, placemaking programmes and open space strategies, as well as design for numerous parks and playspaces. His ability to actively listen and closely collaborate with clients, other professionals and the community, provides Warwick with a complete understanding of landscape and urban design, with respect to the creation of exceptional places that meet the needs of end users.

Qualification

Graduate Diploma in Landscape Architecture,
Leeds Polytechnic (United Kingdom) 1990
Bachelor of Arts (Hons) in Landscape Architecture, Leeds Polytechnic (UK) 1988

Professional Affiliations

Associate of the Australian Institute of Landscape Architects
Chartered Member of the Landscape Institute (UK) 1995

Specialist Expertise

Reserve and Play Space Design
Urban Design and Planning
Open Space Assessment and Planning
Large Scale Master Planning
Visual Impact Assessment
Global Information Systems (GIS)
Computer Aided Design and 3D Modelling
Consultation and Facilitation

Other Appointments

Member of the Community Participation and Sustainability Advisory Committee
Part Lecturer Adelaide University
Art for Public Places (panel member)

Relevant Experience

Victor Harbor Mainstreet Upgrade
Willunga Mainstreet Beautification Project
Rundle Street Arts Masterplan
Salisbury City Centre Urban Design Strategy
Gawler Town Centre Integrated Urban Design Precincts
Flinders University Landscape Masterplan
Inner West Precinct Place Making Strategy
Salisbury Oval Masterplan
Edwardstown Oval Redevelopment
Klemzig Recreation Ground Masterplan
Marion Sports Facility Masterplan
Bonython Park Playspace
Charles Sturt Open Space Strategy
Hazelwood Park Playspace
JB Ware Reserve Upgrade & Playspace
Kadina Mainstreet Masterplan
Nature's Playground, Adelaide Zoo
Suneden Special School Sensory
West Torrens Open Space and Urban Design Strategy

Appendix E

Appendix E: Visualisations and Landscape Masterplan

SEAFORD HEIGHTS DAM

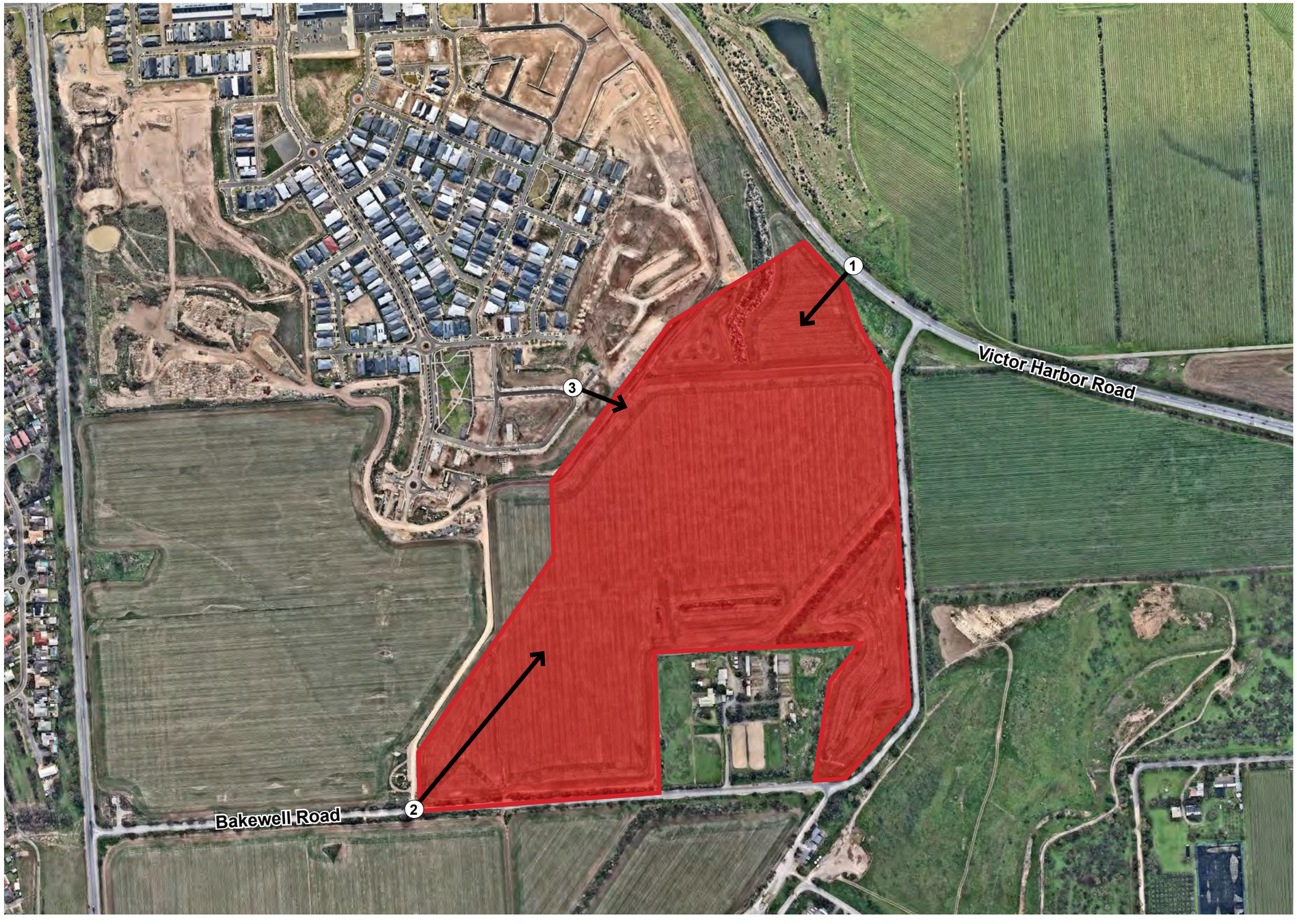
VISUALISATIONS

17 OCTOBER 2018

WAX

SEAFORD HEIGHTS DAM

1.1 VIEWPOINT LOCATIONS



KEY

Subject Site

Viewpoints

200m

SEAFORD HEIGHTS DAM

1.2 VIEWPOINT 1- VICTOR HARBOR ROAD



Existing viewpoint



Artists impression of proposed development superimposed on to existing viewpoint.

SEAFORD HEIGHTS DAM

1.3 VIEWPOINT 1- VICTOR HARBOR ROAD



Existing viewpoint



Artists impression of proposed development superimposed on to existing viewpoint.

SEAFORD HEIGHTS DAM

1.4 VIEWPOINT 2- BAKEWELL ROAD



Existing viewpoint



Artists impression of proposed development superimposed on to existing viewpoint.

SEAFORD HEIGHTS DAM

1.5 VIEWPOINT 2- BAKEWELL ROAD



Existing viewpoint



Artists impression of proposed development superimposed on to existing viewpoint.

SEAFORD HEIGHTS DAM

1.6 VIEWPOINT 3- CORNER EDISON AND COTTERELL ROAD



Existing viewpoint



Artists impression of proposed development superimposed on to existing viewpoint.

SEAFORD HEIGHTS DAM

1.7 VIEWPOINT 3- CORNER EDISON AND COTTERELL ROAD



Existing viewpoint

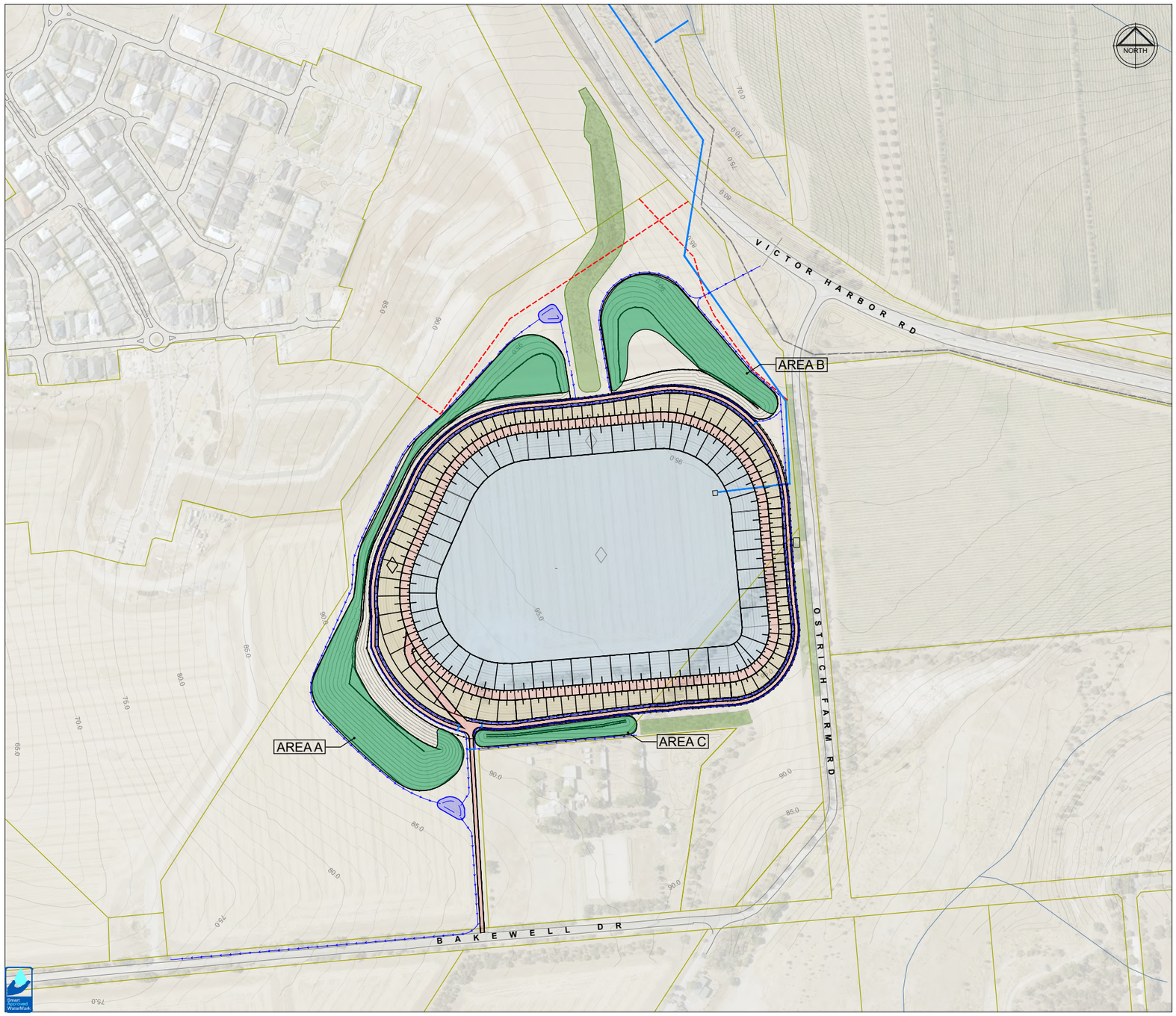


Artists impression of proposed development superimposed on to existing viewpoint.

SEAFORD HEIGHTS DAM

LANDSCAPE MASTERPLAN

WAX



SITEWORKS LEGEND

- PROPERTY LINE
- PROPOSED PIPELINE
- PROPOSED SWALE
- EXISTING PIPELINE
- BUFFER LAND BOUNDARY LINE
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VEGETATION LEGEND

EXTENDED VEGETATION AREA:
(FOR SCREENING - INDICATIVE ONLY)

EXAMPLE:

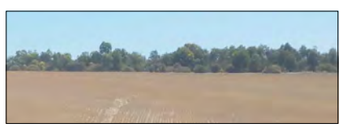


NOTE: VEGETATION PLAN TO BE AGREED WITH BIODIVERSITY McLAREN VALE AND DEW. VEGETATION TO SCREEN A 1.8m HIGH SECURITY FENCE ON THE INTERNAL SIDE OF EXTENDED VEGETATION ALIGNMENT.

EXISTING VEGETATION AREA:

EXAMPLES:





PLANT SPECIES

MASS MIX PLANTING ON MOUNDS USING TUBE STOCK OR SIMILAR, PLANTED ON GROUPS OF 5-7 OF THE SAME SPECIES @ 800MM CTRS

PLANT SPECIES MIX

TREE SPECIES MIX 1 (24%)

ALLOCASUARINA VERTICILLATA 4%
CALLITRIS GRACILIS 4%
EUCALYPTUS MICROCARPA 4%
EUCALYPTUS POROSA 4%
PITTOSPORUM PHILLYREOIDES 4%
MELALEUCA LANCEOLATE 4%

TREE SPECIES MIX 2 (36%)

ACACIA PYCNANTHA 12%
BURSARIA SPINOSE 12%
DODONAEA VISCOSA 12%

UNDERSTOREY SPECIES MIX (40%)

ACACIA ACINACEA 5%
ADRIANA QUADRIPARTITE 5%
ARIPLEX SEMIBACCATA 5%
ENCHYLAENA TOMENTOSA 5%
GOODENIA ALBIFLORA 5%
OLEARIA RAMULOSA 5%
RHAGODIA CANDOLLEANA 5%
RHAGODIA PARABOLICA 5%

AREA A = 17,795.72m²
AREA B = 10.153.30m²
AREA C = 2,893.03m²

-20 0 20 40 60 80 100 200m

SCALE 1:2000 ORIGINAL SIZE A1

Seaford Heights Water Storage

Stormwater Management Plan

Willunga Basin Water Company

December 2018

Ref No. 20181776R001B

Tonkin CONSULTING

Document History and Status

Rev	Description	Author	Reviewed	Approved	Date
A	Draft for client comment	MM	OO	OO	07 December 2018
A	Final – for use	MM	OO	OO	14 December 2018

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Appendices

Appendix A Hydroplan concept design

1 Introduction

1.1 Background

Willunga Basin Water Company (WBWC) is proposing to construct a 600 ML water storage at Seaford Heights and is seeking a stormwater management plan (SMP) to support the development application for the project.

A concept plan for the proposed works has been developed by Hydroplan (Rev 2, Appendix A). The concept shows a preliminary drainage design for the site and incorporates three outfall locations for discharge of stormwater from the site. This concept has been used as the basis to develop the SMP.

1.2 Site description

The site of the proposed water storage is bounded by Victor Harbor Road to the north, Ostrich Farm Road to the east and Bakewell Drive to the south, as shown on the locality plan in Figure 1.1.

The proposed location of the storage is situated at the top of a high point, resulting in a 'turkey nest' configuration. Observations made during a site visit combined with review of the available topographic information (2 m contours) indicates that runoff currently discharges from this high point via overland flow paths to a number of outfall locations, including the locations described below:

- South-western corner of the site, adjacent to the intersection of Bakewell Drive and the new access road (Figure 1.2).
- South-eastern corner of the site, at the intersection of Bakewell Drive and Ostrich Farm Road.
- An existing storage pond located in the north-eastern corner, adjacent to Victor Harbor Road (Figure 1.3).

Review of the topography of the site shows longitudinal grades varying between 1% and 6%. The site is predominantly agricultural in nature, however is bordered by a new residential development to the north-west and a rural residential lot to the south.

1.3 This report

This report provides a recommendation for the management of stormwater discharged from the developed site. Consideration is given to the requirements of the City of Onkaparinga (Council) as well as other relevant authorities. Details of the analyses that have been undertaken are also included.



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Data Acknowledgement:
Aerial imagery from MetroMap, 2017
Cadastre layer from PBI, 2015
Storage basin concept from Hydroplan, 2018
Roads layer from Data SA, 2018

Willunga Basin Water Company

SEAFORD HEIGHTS WATER STORAGE SMP
LOCALITY PLAN

Figure 1.1



Figure 1.2 Looking east along Bakewell Drive from the low spot in the south-western corner



Figure 1.3 Existing storage pond in the north-eastern corner adjacent Victor Harbor Road

2 Relevant policies

The site of the proposed basin is located in an area over which several policies apply. The policies, and their potential impact on the operations of the storage, are discussed in the following sections. The recommendations outlined in this SMP consider the requirements of each of these policies.

2.1 Onkaparinga Council Development Plan

Council's development plan outlines the expectations for the management of stormwater from new developments. Review of the development plan identified the following criteria that are relevant to the preparation of this SMP:

- Development, including earthworks associated with development, should not do any of the following:
  - Impede the flow of floodwaters through the land or other surrounding land.
  - Increase the potential hazard risk to public safety of persons during a flood event.
  - Increase the risk of flooding of other land.
  - Obstruct a watercourse.
- Water discharged from a development site should:
  - Not exceed the rate of discharge from the site as it existed in pre-development conditions.
  - Be of a physical, chemical and biological condition equivalent to or better than its pre-developed state.
- Development should include stormwater management systems to mitigate peak flows and manage the rate and duration of stormwater discharges from the site to ensure the carrying capacities of downstream systems are not overloaded.

2.2 Western Mount Lofty Ranges Water Allocation Plan

The site of the development is within the Western Mount Lofty Ranges (WMLR) Prescribed Water Resources Area (PWRA). Specifically, the site is within Surface Water Management Zone (SWMZ) O_OM12 within the catchment of the Onkaparinga River. The development is therefore subject to the requirements of the WMLR water allocation plan (WAP). The WAP sets the amount of water that will be available, how that water may be allocated to users, and the types of activities that are permitted with that water.

The WAP sets out the maximum amount of surface water and watercourse water that can be taken within an SWMZ. The limit aims to ensure sufficient flows for environmental water provisions as well as for downstream users. Each SWMZ also has a diversion limit which is the "total volume of surface water that can be collected or diverted by all dams and/or intercepted by existing and new commercial forests."

The extraction and diversion limits for SWMZ O_OM12, as set out in the WAP are as follows:

- Surface water extraction – 63 ML/year
- Main watercourse (Onkaparinga River) extraction – 2205 ML/year
- Diversion limit – 125 ML/year.

The storage is located on a high point and will not capture surface runoff. Modelling of the proposed development using the MUSIC model (refer Section 4.3 for details) shows that the development will not result in a reduced runoff volume from the site. It is therefore unlikely that WBWC will need a licence for the facility under the WMLR WAP.

2.3 McLaren Vale Water Allocation Plan

The site is situated within the McLaren Vale Prescribed Wells Area, and hence is subject to the conditions of the McLaren Vale Water Allocation Plan. This WAP pertains to the taking and use of groundwater.

A licence would only be required if extraction from groundwater was proposed as part of the operations of the storage.

3 Hydrological modelling

Hydrological modelling was undertaken to provide estimates of pre- and post-development peak flows leaving the site. The hydrological assessment is based upon the recommendations and guidance provided within the 2016 edition of Australian Rainfall and Runoff (ARR2016) and is consistent with the specifications of Council's Stormwater Management Design Guide (SMDG).

The modelling was undertaken using the DRAINS software package (version 2018.09). The model was run for all durations from five minutes to 168 hours. As recommended in ARR2016, for each duration the model was run for an ensemble of ten rainfall patterns using the latest (2016) intensity-frequency-duration (IFD) data.

Consistent with Council's requirements the model was run for a minor (10% annual exceedance probability (AEP)) and major (1% AEP) rainfall event.

3.1 Hydrological modelling parameters

The sub-catchments within the study area have been modelled in DRAINS using an ILSAX-type hydrological model. The model parameters provided in Table 3.1 have been adopted and are consistent with the values recommended in the SMDG. No supplementary areas were used, in accordance with the SMDG.

Table 3.1 DRAINS model parameters

Parameter	Value
Paved area depression storage (equivalent to an impervious area initial loss)	1 mm
Grassed area depression storage (equivalent to a pervious area initial loss)	5 mm
Soil type	3
Antecedent moisture content	2.5

3.2 Catchment characteristics

3.2.1 Sub-catchment definition

In the absence of a digital elevation model of the site, sub-catchments were delineated using topographical data available from ESRI satellite.

The Hydroplan concept (Appendix A) shows three discharge points from the site. Review of the topography of the site combined with observations made during the site visit identified a low point at the south-eastern corner (the intersection of Ostrich Farm Road and Bakewell Drive). The concept plan does not show a discharge at this location, but there appears to be an existing natural flow path to this area of the site.

The concept drainage design would require a section of the swale on the southern side of the storage to be constructed against the natural grade to allow runoff to drain to the outfall location to the west. This would result in a deep swale. It is therefore recommended that the drainage design be revised to incorporate a fourth outfall location at the south-eastern low point. This would utilise the natural fall of the land and would keep the post-development flow regime as close as possible to the existing flow regime. The SMP detailed in this report assumes that, consistent with the existing flow paths, there will be four discharge points from the site.

The sub-catchments contributing to each of the proposed four discharge locations were defined for the pre-development (Figure 3.1) and post-development (Figure 3.2) scenarios. A summary of the catchment areas is provided in Table 3.2. The reduction in catchment size for the post-development scenario is due to the fact that the storage will capture and retain all water that falls onto its surface.



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Data Acknowledgement:
Aerial imagery from MetroMap, 2017
Roads layer from Data SA, 2018

Willunga Basin Water Company

SEAFORD HEIGHTS WATER STORAGE SMP
PRE-DEVELOPMENT SUB-CATCHMENT PLAN

Figure 3.1



50 0 50 100 150 m

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Date: 2018-12-13
Drawn: MM

Data Acknowledgement:
Aerial imagery from MetroMap, 2017
Storage basin concept from Hydroplan, 2018
Roads layer from Data SA, 2018

Willunga Basin Water Company

SEAFORD HEIGHTS WATER STORAGE SMP
POST-DEVELOPMENT SUB-CATCHMENT PLAN

Figure 3.2

Table 3.2 Sub-catchment areas

Sub-catchment	Pre-development (ha)	Post-development (ha)
North-east	5.26	3.62
North-west	1.76	1.19
Southern	12.68	11.52
South-east	11.73	6.56

3.2.2 Estimates of impervious area

The ILSAX hydrological model used in DRAINS requires users to estimate the proportion of impervious and pervious areas for each sub-catchment. Review of aerial imagery indicates that the current (pre-development) site is entirely pervious. This was confirmed during an inspection of the site.

Following development of the proposed storage basin, a compacted rubble track with an approximate width of 10 m will line the upper circumference of the basin. It is estimated that this represents approximately 5% of the total area. The track would normally be modelled in DRAINS as a supplementary area, however as the Council SMDG specifies that supplementary areas are not to be used, the compacted rubble portion of each catchment was modelled as a directly connected impervious area.

The modelling assumes a 0% impervious fraction for all catchments pre-development and 5% impervious for all catchments post-development.

3.2.3 Time of concentration

The times of concentration for each sub-catchment were estimated based on flow path lengths and slopes. The estimates assumed a Manning's roughness coefficient (n) of 0.035.

The estimated times of concentration are shown in Table 3.3. As is to be expected the steeper batter slopes and more formalised drainage paths (swales) result in lower times of concentration for the smaller sub-catchments in the post-development scenario.

Table 3.3 Times of concentration (minutes)

Sub-catchment	Pre-development	Post-development
North-east	18	12
North-west	19	15
Southern	26	26
South-east	25	16

3.3 Peak flows

The estimates of peak flows for each of the sub-catchments is summarised in Table 3.4.

Table 3.4 Modelled flowrates (L/s) for each sub-catchment

Sub-catchment	Pre-development 10% AEP	Post-development 10% AEP	Pre-development 1% AEP	Post-development 1% AEP
North-east	37	36	384	382
North-west	12	12	126	102
Southern	82	115	798	740
South-east	80	66	738	536

The results show that the post-development major and minor event flow rates for the north-east, north-west and south-east sub-catchments do not exceed the flowrates for the pre-development scenario. The slight increase in impervious area is off-set by the reduction in catchment size.

The modelling indicates that runoff from the southern catchment is higher for the post-development scenario. Measures to reduce the peak flows from this catchment will therefore be required.

4 Stormwater management plan

The DRAINS model described in the previous section was used to develop stormwater management measures required to meet Council's requirements. A summary of the recommended measures is provided in the following sections.

4.1 Detention basin

The modelling indicates that the development of the storage and associated works will result in an increase in the peak flow from the southern catchment in a 10% AEP event. A detention basin is therefore required.

The Council SMDG specifies that detention basins are to be designed with maximum side slopes of 1V:5H or flatter and a maximum water depth of 1.2 m in the 1% AEP event.

The DRAINS model was used to determine the following detention basin requirements:

- Basin volume: 60 m^3
- Basin depth: 0.6 m
- Outlet pipe diameter: 375 mm

The modelling indicates that the basin configuration described above reduces the 10% AEP peak flows from the southern catchment to 74 L/s which is less than the pre-development peak flows (82 L/s).

The basin will overtop in high flow events and hence scour protection should be provided on the crest and outside of the downstream batters.

4.2 Swales

Drainage swales will be constructed around the circumference of the new storage to divert runoff to each outfall location. As part of this SMP, swale sizes to convey flows from the 1% AEP event have been determined using Manning's calculations. The calculations assume the swales will have a trapezoidal cross section with a base width of 0.3 m and 1V:3H side slopes. It is assumed that the swales will be grassed (Manning's roughness value of 0.035).

A summary of the minimum dimensions required for each swale are provided in Table 4.1

Table 4.1 Minimum swale dimension

Sub-catchment	1% AEP design flow (L/s)	Depth
North-east	382	0.3
North-west	102	0.2
Southern	740	0.4
South-east	536	0.4

4.3 Water quality measures

It is not considered that the operation of the storage on the site will impact the water quality of runoff from the site.

Further, the design of the storage incorporates a number of features that will reduce pollutant loads leaving the site. Specifically:

- The batters of the storage will be grassed which will act as buffer strips.
- The grassed swales used to convey flows to the discharge points will provide further treatment of the flow.

- The detention basin will provide additional water quality improvement for flows from the southern catchment.

A MUSIC (Model for Urban Stormwater Improvement Conceptualisation) model was developed to provide an understanding of the likely quality of stormwater runoff from the site.

4.3.1 Council requirements

Council's SMDG specifies the following pollutant reduction targets for development:

- Total suspended solids (TSS): 80%
- Total phosphorus (TP): 60%
- Total nitrogen (TN): 45%
- Gross pollutants (GP): 90%

4.3.2 Model set-up

The definition of catchment areas and characteristics was based on the catchments defined during the development of the DRAINS hydrological model. Rainfall and evaporation data were obtained from the Council meteorological template, which sources six-minute rainfall and daily evapotranspiration data from the Noarlunga weather station (station number 023885). The model incorporates the features of the development that will contribute to water quality improvement as described above. The layout of the model is shown in Figure 4.1.

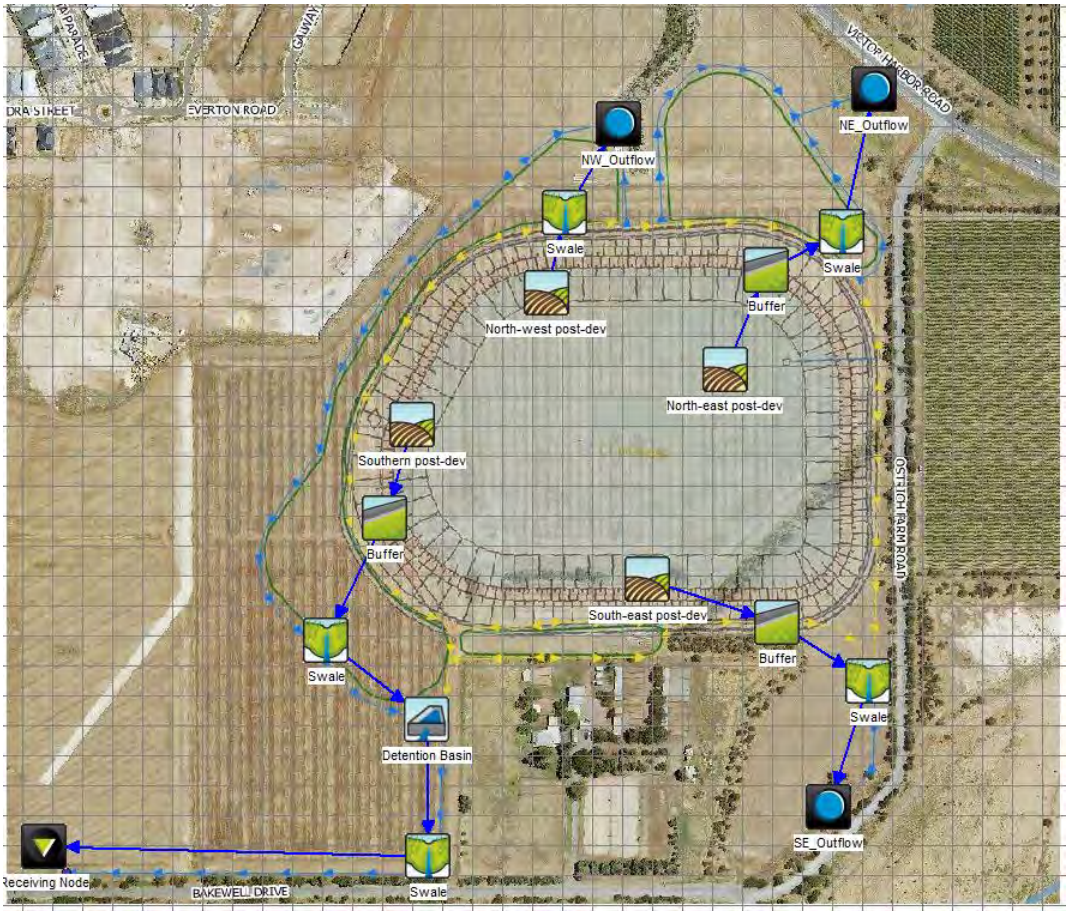


Figure 4.1 MUSIC model

A summary of the modelled pollutant reductions for each catchment is provided in Table 4.2. It can be seen that the features incorporated into the design provide a significant reduction in pollutant loads, with the whole of site reductions exceeding Council's guidelines.

Table 4.2 Modelled pollutant reductions for the site

Catchment	TSS	TP	TN	GP
North-east	99%	74%	57%	100%
North-west	92%	75%	55%	100%
Southern	93%	75%	60%	100%
South-east	90%	72%	33%	100%
Whole of site	**92%**	**74%**	**51%**	**100%**

Based on considerations of the nature of the development, and the results of the MUSIC modelling, it can be concluded that the development will not negatively impact the water quality of downstream receiving waters.

4.4 Stormwater management plan

A GIS-based plan detailing the recommended stormwater management measures to manage stormwater discharged from the site is shown in Figure 4.2.

The key features of the stormwater management strategy include:

- The use of grassed swales to convey flows to the discharge points.
- A detention basin to limit peak flow rates from the southern catchment.
- Vegetated batters.

The modelling undertaken as part of the development of this SMP confirms that the proposed measures comply with Council's requirements.



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Drawn: MM

Data Acknowledgement:
Aerial imagery from MetroMap, 2017
Storage basin concept from Hydroplan, 2018
Roads layer from Data SA, 2018

Willunga Basin Water Company

SEAFORD HEIGHTS WATER STORAGE SMP
STORMWATER MANAGEMENT PLAN

Figure 4.2

5 Construction – erosion and sediment control

During construction of the proposed storage, the water quality of site runoff should be managed to ensure that sediment is not transported into any downstream receiving waters. A soil erosion and drainage management plan (SEDMP) should be prepared by the contractor prior to the commencement of construction.

5.1 Preliminary erosion hazard assessment

A preliminary assessment of erosion hazard has been undertaken using the International Erosion Control Association Guidelines for Best Practice Erosion and Sediment Control (IECA, 2008).

A summary of the key parameters of the assessment is provided in Table 5.1.

Table 5.1 Erosion hazard assessment

Condition		Score[1]
Average slope of disturbance area	1-6%	2
Soil classification	Silty Clay	3
Emerson (Dispersion) class number	Not assessed	4
Duration of soil disturbance	4-6 months	4
Area of disturbance	13.4 ha	6
Waterway disturbance	No disturbance	0

[1] Score based on IECA (2008) Table F4

Based on the preliminary assessment the site is likely to be considered 'high risk' for erosion during construction and will require a detailed SEDMP. The area of the disturbance alone would trigger this requirement.

5.2 Likely requirements for erosion and sediment control

Development of a detailed SEDMP is beyond the scope of the SMP. The measures specified in the SEDMP will be required to address:

- Effective control of surface runoff entering and leaving the site.
- Erosion control works and measures to minimise the amount of site erosion.
- Sediment collection devices to prevent sediment leaving the site.
- Provision for stockpiles to be stored within the sediment barrier.
- Rehabilitation of all disturbed areas as soon as possible – temporary vegetation may be required.
- Maintenance of the erosion control and sediment collection devices.

Potential measures may include:

- Sedimentation basins.
- Sediment fences.
- Staging of construction.
- Sediment control at site entry and exit points.
- Management of stockpiles (covering).
- Temporary erosion protection during vegetation establishment.

The SEDMP will also need to specify maintenance requirements for the control measures. All sediment and erosion control measures should be inspected at least weekly and after any significant rain. Any necessary repairs (areas of erosion, torn sections of sediment fence etc.) should be addressed immediately.

6 References

City of Onkaparinga 2017, *Stormwater Management Design Guide*.

Commonwealth of Australia (Geoscience Australia) 2016, *Australian Rainfall and Runoff: A Guide to Flood Estimation*.

Environmental Protection Agency 2004, *Handbook for Pollution Avoidance on Commercial and Residential Building Sites 2nd ed.*, Government of South Australia.

International Erosion Control Association (IECA) Australasia 2008, *Best Practice Erosion & Sediment Control*, IECA, Australia.

Appendix A

Hydroplan concept design



SITEWORKS LEGEND

- PROPERTY LINE
- PROPOSED PIPELINE
- PROPOSED SWALE
- EXISTING PIPELINE
- BUFFER LAND BOUNDARY LINE

FINISHED SURFACE LEGEND

- RUBBLE AREA
- STORAGE AREA (PLASTIC LINED)
- OUTSIDE BATTER AREA

VEGETATION LEGEND

EXTENDED VEGETATION AREA:
(FOR SCREENING - INDICATIVE ONLY)

EXAMPLE:



NOTE: VEGETATION PLAN TO BE AGREED WITH BIODIVERSITY McLAREN VALE AND DEW. VEGETATION TO SCREEN A 1.8m HIGH SECURITY FENCE ON THE INTERNAL SIDE OF EXTENDED VEGETATION ALIGNMENT.

EXISTING VEGETATION AREA:

EXAMPLES:





-20 0 20 40 60 80 100 200m

SCALE 1:2000 ORIGINAL SIZE A1

REV	ISSUED	D.DWN	APRVD	REVISION DESCRIPTION
2	22/10/2018	JT	JG/BH	FOR DISCUSSION
1	03/10/2018	JT	JG/BH	FOR DISCUSSION
0	20/09/2018	JT	JG/BH	FOR DISCUSSION

REV	ISSUED	D.DWN	APRVD	REVISION DESCRIPTION
-				-

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The arrangement and general details as shown on this drawing are essentially diagrammatic and must be applied to the circumstances as found on site.

DES/DRAWN:	JT
CHECKED:	BH
APPROVED:	JG
DATE:	29/03/2018
DRAFT REF:	2-WBW-d4

CLIENT: WILLUNGA BASIN WATER

PROJECT: SRWRA STORAGE
CONCEPT DESIGN PLAN WITH MOUNDS

DRAWING No. 14689-SK017 | SHEET 1 OF 1 | REVISION 2

Drawing file: Z:\WBW\14689 SRWRA Dam\Drawings\SK013-15 (STAGE 4 Mounds).dwg - 03/10/2018 11:13 AM Original Size: ISO FULL BLEED A1 (841.00 X 594.00 MM)

Development Deed

South Australian Housing Trust

and

Urban Renewal Authority

and

Southern Region Waste Resource Authority

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Date	7 November 2017
Parties	
1.	**South Australian Housing Trust** (ABN 17 545 435 789) a body corporate pursuant to the South Australian Housing Trust Act 1994 of Level 5 Riverside Centre, North Terrace, Adelaide SA 5000 (***SAHT***)
2.	**Urban Renewal Authority** (ABN 86 832 349 553) of Level 9 (West) Riverside Centre, North Terrace, Adelaide SA 5000 (***URA***)
3.	**Southern Region Waste Resource Authority** of 112 Bakewell Drive, Seaford Heights SA 5169 (***SRWRA***)
Recitals	
A	SAHT and URA are the registered proprietors of the whole of the land which is comprised and described in Certificate of Title Volume 6175 Folio 501, Certificate of Title Volume 6034 Folio 589 and Certificate of Title Volume 5403 Folio 181 (***Land***).
B	SRWRA proposes to purchase the Land from SAHT and URA.
C	The Land is in proximity to land that is used for residential purposes and land that is proposed to be developed for residential purposes (***Residential Land***).
D	The Parties have agreed to enter into this Deed for the purposes of limiting the impact of the development of the Land on the amenity of the Residential Land.

It is agreed as follows.

1. Recitals

The Parties agree that the Recitals are true and correct and form part of this Deed.

2. Definitions and Interpretation

In the interpretation of this Deed, unless the contrary intention appears or the context otherwise requires:

(a) **Business Day** means any day other than a Saturday, Sunday or public holiday;

(b) **Government Agency** means any government department or any statutory, public, municipal, local or other authority charged with the responsibility for administering any relevant legislation, regulations, ordinances or by laws;

(c) **Land** means the whole of the land which is comprised and described in Certificate of Title Volume 6175 Folio 501, Certificate of Title Volume 6034 Folio 589 and Certificate of Title Volume 5403 Folio 181;

(d) **waste** means any discarded, rejected, abandoned, unwanted or surplus matter,

(i) whether or not intended for sale or for recycling, reprocessing, recovery or purification by a separate operation from that which produced the matter; and

(ii) whether of value or not,

but for the avoidance of doubt does not include landscaping materials derived from green waste;

(e) singular includes plural and vice versa and any gender includes every gender;

(f) references to a person include a corporation, association, partnership, Government Agency or other legal entity;

(g) references to statutes include statutes amending, consolidating or replacing the statutes referred to and all regulations, orders-in-council, rules, by laws and ordinances made under those statutes;

(h) references to sections of statutes or terms defined in statutes refer to corresponding sections or defined terms in amended, consolidated or replacement statutes;

(i) headings and the table of contents are used for convenience only and are to be disregarded;

(j) where any word or phrase is given a defined meaning, any other grammatical form of that word or phrase has a corresponding meaning;

(k) a reference to two (2) or more persons means those persons jointly and severally;

(l) a reference to a Party includes:

(i) the successors and permitted assigns of that Party;

(ii) that Party acting in a trustee or other representative capacity;

(m) a reference to including is not and must not be treated as a word of limitation;

(n) a provision of this Deed must not be construed to the disadvantage of a Party because that Party (or its advisers) was responsible for the preparation of the Deed (or a portion of the Deed);

(o) if any term of this Deed is legally unenforceable or made inapplicable, it will be severed or read down, but so as to maintain (as far as possible) all other terms of this Deed (unless to do so would change the underlying principal commercial purposes of this Deed).

3. Development of Land

SRWRA must not cause, suffer or permit the receipt, handling, storage or disposal of waste on the Land.

4. Default

(a) If either party (***Defaulting Party***), is in Default the other party (***Non-Defaulting Party***) may give the Defaulting Party a written notice (***Default Notice***) specifying:

(i) the nature and extent of the Default that has occurred; and

(ii) the act, matter or thing that the Defaulting Party must do or refrain from doing in order to rectify the Default.

(b) Upon receipt of a Default Notice, the Defaulting Party has such reasonable time as may be specified in the Notice in which to rectify the Default in the manner specified in the Default notice.

(c) The period specified in a Default Notice for the rectification of a Default must not be less than 10 Business Days, unless the Defaulting Party can comply with the Default Notice by refraining from engaging in a specified act or activity.

(d) The Defaulting Party must diligently pursue the rectification of a Default during the period specified in a Default Notice given to the Defaulting Party under this clause in respect of the Default. If the Defaulting Party does not diligently pursue the rectification of the Default at any time during that period, the Non-Defaulting Party may forthwith exercise its rights under clause (e).

(e) If the Defaulting Party does not rectify the Default in the manner specified in the Default notice within the period specified in the Default Notice, the Non-Defaulting Party may undertake or cause to be undertaken such actions as are reasonably required to rectify the Default and recover the costs of doing so as a debt from the Defaulting Party.

(f) The rights of the Non-Defaulting Party to take other action (including instituting legal proceedings) to restrain the Default or to require the Defaulting Party to specifically perform the Defaulting Party's obligations under this Deed are not affected by reason that the Non-Defaulting Party has given the Defaulting Party a Default notice in relation to the Default.

(g) This clause does not affect any right either party may have to terminate this Deed.

(h) The Non-Defaulting Party may, without prejudice to any of its other rights under this clause, if the Defaulting Party does not comply with a Default notice, commence legal proceedings for damages against the Defaulting Party and the Defaulting Party must indemnify the party not in default in respect of any costs incurred by the Council arising from the commencement of those proceedings.

5. Waiver

The failure of a Party at any time to insist on performance of any obligation under this Deed of another Party is not a waiver of its right:

(a) to insist on performance of, or claim damages for breach of, that obligation unless that Party acknowledges in writing that the failure is a waiver; and

(b) at any other time to insist on performance of that or any other obligation of that other Party under this Deed.

6. Termination

(a) The parties may terminate this Deed at any time by mutual agreement entered into in writing.

(b) Subject to clause (c) below and any other provisions of this Deed which are expressed to survive termination, this Deed continues until terminated in accordance with this Deed.

(c) If this Deed is taken to be terminated each of the parties is discharged from any obligation or liability under this Deed other than any liability for a breach of or failure to comply with any obligation under this Deed by the party before its termination.

7. Notice

(a) Each Party notifying or giving notice under this Deed must do so:

(i) in writing;

(ii) addressed to the address of the recipient as specified in this Deed, as altered from time to time by notice given in accordance with this clause:

and

(iii) hand delivered or sent by prepaid post to that address or sent by facsimile transmission.

(b) A notice given in accordance with clause (a) is received:

(i) if hand delivered, on the date of delivery;

(ii) if sent by prepaid post, five (5) days after the date of posting; and

(iii) if sent by facsimile transmission, on the day the transmission is sent (but only if the sender has a confirmation report specifying a facsimile number of the recipient, the number of pages sent and the date of transmission).

8. Transfer

SRWRA must not transfer the Land to any person (***Transferee***) unless the Transferee enters into a deed with SAHT and URA under which the Transferee covenants to be bound by the terms of this Deed and SRWRA will remain liable for any obligation it has under this Deed until the Transferee covenants to be bound by this Deed.

9. Amendment

All additions, amendments or modifications to this Deed (including any Appendix of this Deed) may be made in writing and signed by a duly authorised

representative of the Parties. All such additions, amendments or modifications must be dated, numbered, and attached to or appended to this Deed.

10. Miscellaneous

(a) This Deed is governed by the law applicable in South Australia.

(b) This Deed (including all its Appendices) constitutes the entire agreement between the Parties as to its subject matter and supersedes all prior representations and agreements in connection with that subject matter.

(c) Each Party must:

(i) do or cause to be done all things necessary or desirable to give effect to the performance of this Deed (including signing all such documents as may be required by this Deed); and

(ii) refrain from doing anything that could hinder performance of this Deed.

Executed as a Deed

Sealed under the authority of
SOUTH AUSTRALIAN HOUSING TRUST

.....
Authorised Signatory

NORM SWANSSON - Manager Conveyancing
Print Name:

.....
Authorised Signatory

Julie Waters - Manager Sales & Acquisitions
Print Name:

SIGNED for and on behalf of the **URBAN RENEWAL AUTHORITY trading as Renewal SA** by its duly constituted Attorney pursuant to Power of Attorney ~~[INSERT]~~, who has not received a notice of the revocation of that Power of Attorney in the presence of:

2/2015

7 November 2017

.....
Attorney

Michael Buchan
.....
Full Name of Attorney
Address:
C/- Urban Renewal Authority
Level 9 Riverside Centre
North Terrace Adelaide SA 5000
Tel.8207 1300

.....
Witness

Courtney Amelia Tyler
.....
Full Name of Witness
Address:
C/- Urban Renewal Authority
Level 9 Riverside Centre
North Terrace Adelaide SA 5000
Tel.8207 1300

EXECUTED BY THE PURCHASER on 18TH day of SEPTEMBER 2017

THE COMMON SEAL of
SOUTHERN REGION WASTE RESOURCE AUTHORITY
was affixed in the presence of:

.....
Chairperson

.....
Board Member

SOUTHERN REGION WASTE RESOURCE AUTHORITY
Common Seal

DATED 23rd DAY OF OCTOBER 2017

LAND MANAGEMENT AGREEMENT

BETWEEN

MINISTER FOR PLANNING ("MINISTER")

-AND-

SOUTHERN REGION WASTE RESOURCE AUTHORITY (ABN 37 443 975 085)
("OWNER")

Government
of South Australia

CROWN SOLICITOR
Level 9, 45 Pirie Street, Adelaide SA 5000

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4. TERM 3
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6. RESTRICTIONS ON LEASING AND OTHER DEALINGS 4
7. SEVERANCE 4
8. ENTIRE AGREEMENT 4
9. MODIFICATION 4
10. WAIVER 4

LAND MANAGEMENT AGREEMENT dated ~~day of~~ 23rd October 2017

PARTIES:

MINISTER FOR PLANNING of a body corporate pursuant to the *Administrative Arrangements Act 1994* (SA) of 9th Floor Terrace Towers, 178 North Terrace, Adelaide 5000 in the State of South Australia (**"MINISTER"**)

AND

SOUTHERN REGION WASTE RESOURCE AUTHORITY of PO Box 2414 McLaren Vale SA 5171 (**"OWNER"**)

RECITALS:

A. The Owner is the registered proprietor of the whole of the land which is comprised and described in Certificate of Title Volume 6034 Folio 589 (**"Land"**).

B. The Minister for Planning and the Owner have agreed to enter into this Agreement pursuant to section 57(1) of the *Development Act 1993* (SA) (**"the Act"**) in relation to the development, management, preservation and conservation of the Land subject to the terms and conditions as expressed in this agreement.

C. This Land Management Agreement is executed as a Deed and applies to the whole of the Land.

IT IS AGREED:

1. **RECITALS**

That the matters recited above are true and accurate and shall form part of this agreement.

2. **DEFINITIONS**

In this agreement, unless otherwise provided:

2.1 "**Act**" has the meaning given in Recitals paragraph B above;

2.2 "**Buffer Land**" means the area delineated as A on the plan attached to this agreement as Annexure C

2.3 "**Buffer Zone Landscaping**" means the landscaping and vegetation that has been established on the Buffer Zone Landscaping Area in accordance with the attached landscape drawings which form Annexure A to screen urban development and to interrupt sight lines from Victor Harbor Road and reference to Buffer Zone Landscaping includes reference to any portion of it;

2.4 "**Buffer Zone Landscaping Area**" means the landscaped and vegetated area where the Buffer Zone Landscaping exists and which is bounded in blue on the plan attached to this agreement as Annexure B

2.5 "**Land**" has the meaning given in Recitals paragraph A above;

2.6 "**Laws**" shall mean and include all present and future legislation (both State and Federal) and all amendments to them and re-enactments of them and all regulations, by-laws and orders made pursuant to them;

2.7 "**LTO**" means the Land Titles Office of South Australia;

2.8 "**Minister**" means the Minister to whom the Act is committed from time to time and includes his or her authorised agents or delegates;

2.9 "**Owner**" means the person and/or company registered or entitled to be registered as the proprietor of an estate in fee simple to the Land or to each and every one of all separate allotments into which the Land may be divided after the date of this Agreement (subject however to such encumbrances, liens and interests as are registered and notified by memoranda endorsed on the Certificate of Title thereof) and where the Owner consists of more than one person means each and every one or more of such persons jointly and each of them severally;

3. **INTERPRETATION**

3.1 In this agreement, unless a contrary intention is evident:

3.1.1 a reference to any legislation or to any provision of any legislation includes:

(a) all legislation, regulations, proclamations, ordinances, by-laws and instruments issued under that legislation or provision; and

(b) any modification, consolidation, amendment, re-enactment or substitution of that legislation or provision;

3.2 a reference to a party includes that party's administrators, successors, heirs and permitted assigns;

3.3 a reference to two or more persons is a reference to those persons jointly and severally;

3.4 a reference to a clause or schedule is a reference to a clause of, or a schedule to, this agreement;

3.5 a reference to a clause number is a reference to all of its sub-clauses; and

3.6 the clause headings are for convenient reference only and they do not form part of this agreement.

4. TERM

This agreement commences from the moment it is duly registered at the LTO pursuant to Section 57(5) of the Act and continues until terminated in accordance with this agreement.

5. MANAGEMENT OF LAND

5.1 The Owner must:

5.1.1 not cause, suffer or permit interference with, damage to or removal or destruction of the Buffer Zone Landscaping;

5.1.2 re-plant, re-establish or re-construct any part of the Buffer Zone Landscaping in the event that there is any damage to, or destruction of the Buffer Zone Landscaping on the Buffer Zone Landscaping Area or the removal of any vegetation or soil from the Buffer Zone Landscaping Area; and

5.1.3 not permit the doing or omission of any act, matter or thing on the Buffer Zone Landscaping Area which has the potential to cause such act, matter or thing in 5.1.1 or 5.1.2;

as it relates to the Land and without the prior written approval of the Minister.

5.2 The Owner must:

5.2.1 ensure that the Buffer Land is maintained as primarily a passive vegetated area to screen development and interrupt site lines from Victor Harbor Road; and

5.2.2 obtain the consent of the Developer for any change in the use of the Buffer Land as described in 5.2.1.

5.3 In this clause 5, "Developer" means Fairmont Land Holdings Pty Ltd (ACN 098 486 429), LandSA Pty Ltd (ABN 47 079 317 623) and MSP Property Holdings Pty Ltd (ACN 110 753 707) and each of their successors and permitted assigns in respect of the deed entitled Development Deed – Seaford Heights 2008 dated 29 May 2009 and as subsequently varied.

6. RESTRICTIONS ON LEASING AND OTHER DEALINGS

The Owner must not grant, or agree to grant, any lease, licence, easement (including a right of way) or other right of any nature whatsoever which may give any person the right to possession or control of or entry on to the Land which right would enable such person to breach any of the obligations imposed on the Owner by this agreement unless such grant:

6.1 is in writing; and

6.2 contains as an essential term a covenant by the grantee not to do, or omit to do (or suffer or permit any other person to do or omit to do) any act, matter or thing which would constitute a breach by the Owner of the Owner's obligations under this agreement if the Owner itself performed (or omitted to perform) the act.

7. SEVERANCE

7.1 Each word, phrase, sentence, paragraph and clause of this agreement is severable.

7.2 If a court determines that a part of this agreement is unenforceable, invalid, illegal or void that court may sever that part.

7.3 Severance of a part of this agreement will not affect any other part of this agreement.

8. ENTIRE AGREEMENT

8.1 This agreement contains the entire agreement between the parties with respect to its subject matter.

8.2 This agreement supersedes any prior agreement, understanding or representation of the parties on the subject matter.

9. MODIFICATION

9.1 Any modification of this agreement must be in writing and signed by each party.

9.2 Modifications must be enacted in accordance with the provisions of the Act which apply to changes or alterations of Land Management Agreements.

10. WAIVER

10.1 A waiver of any provision of this Agreement must both be in writing and be signed by the parties or by a person duly authorised to sign such a document on a party's behalf.

10.2 No waiver by a party of a breach of a term or condition contained in this agreement shall operate as a waiver of any breach of the same or any other term or condition contained in this agreement.

10.3 No forbearance, delay or indulgence by any party in enforcing the provisions of this agreement shall prejudice or restrict the rights of that party.

EXECUTED AS A DEED BY

THE COMMON SEAL of
SOUTHERN REGION WASTE RESOURCE AUTHORITY
was affixed in the presence of:

.....
Chairperson

.....
Board Member

SOUTHERN REGION WASTE RESOURCE AUTHORITY
Common Seal

THE COMMON SEAL of MINISTER FOR PLANNING)
was hereto affixed in the presence of:)

.....
Witness

[Print Name: CHELSEA KATE LUCAS]

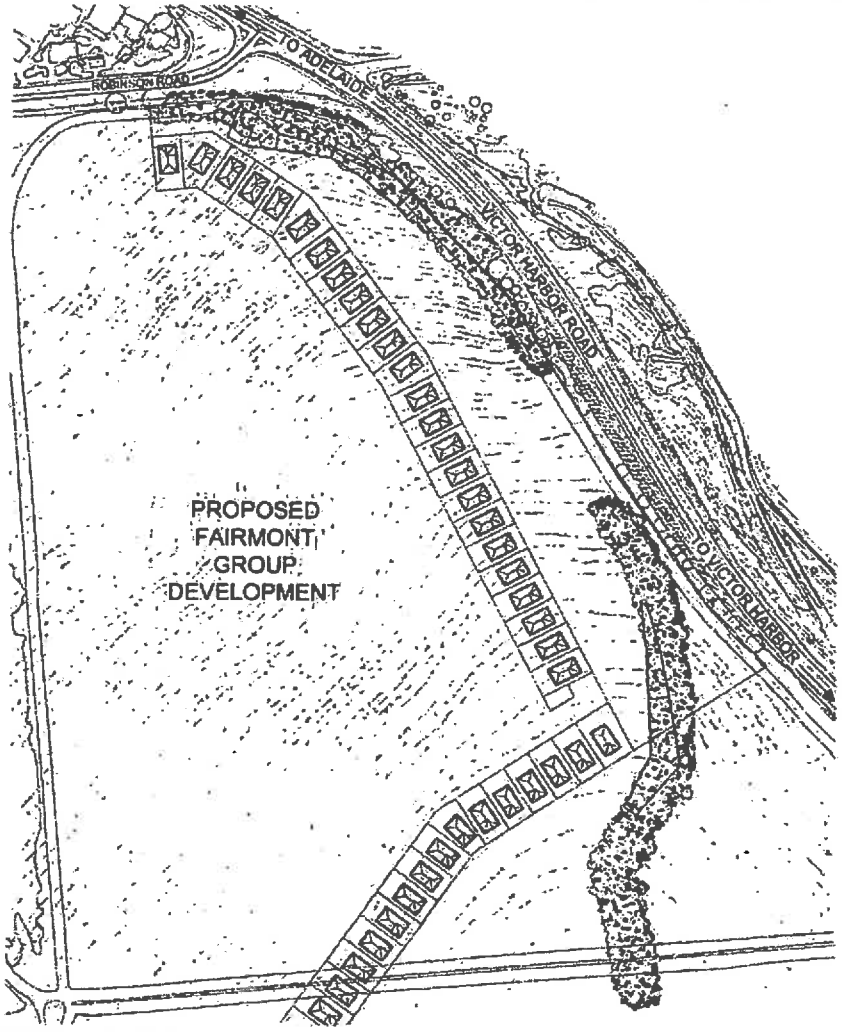
MINISTER FOR PLANNING
COMMON SEAL
SOUTH AUSTRALIA

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ANNEXURE A

Buffer Zone Landscaping

SEAFORD HEIGHTS VEGETATIVE BUFFER
LANDSCAPE CONSTRUCTION



LANDSCAPE CONSTRUCTION DRAWING SET

DRAWING 1-3255	SHEET 500	LOCATION MAP
DRAWING 1-3255	SHEET 501	PLANT LAYOUT 1
DRAWING 1-3255	SHEET 502	PLANT LAYOUT 2
DRAWING 1-3255	SHEET 503	PLANT LAYOUT 3
DRAWING 1-3255	SHEET 504	MOUND LAYOUT 1
DRAWING 1-3255	SHEET 505	MOUND LAYOUT 2

No. | AMENDMENT DESCRIPTION | BY | CHECK | ACCEPTANCE | DATE

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ALL DIMENSIONS ARE IN METRES UNLESS SHOWN OTHERWISE

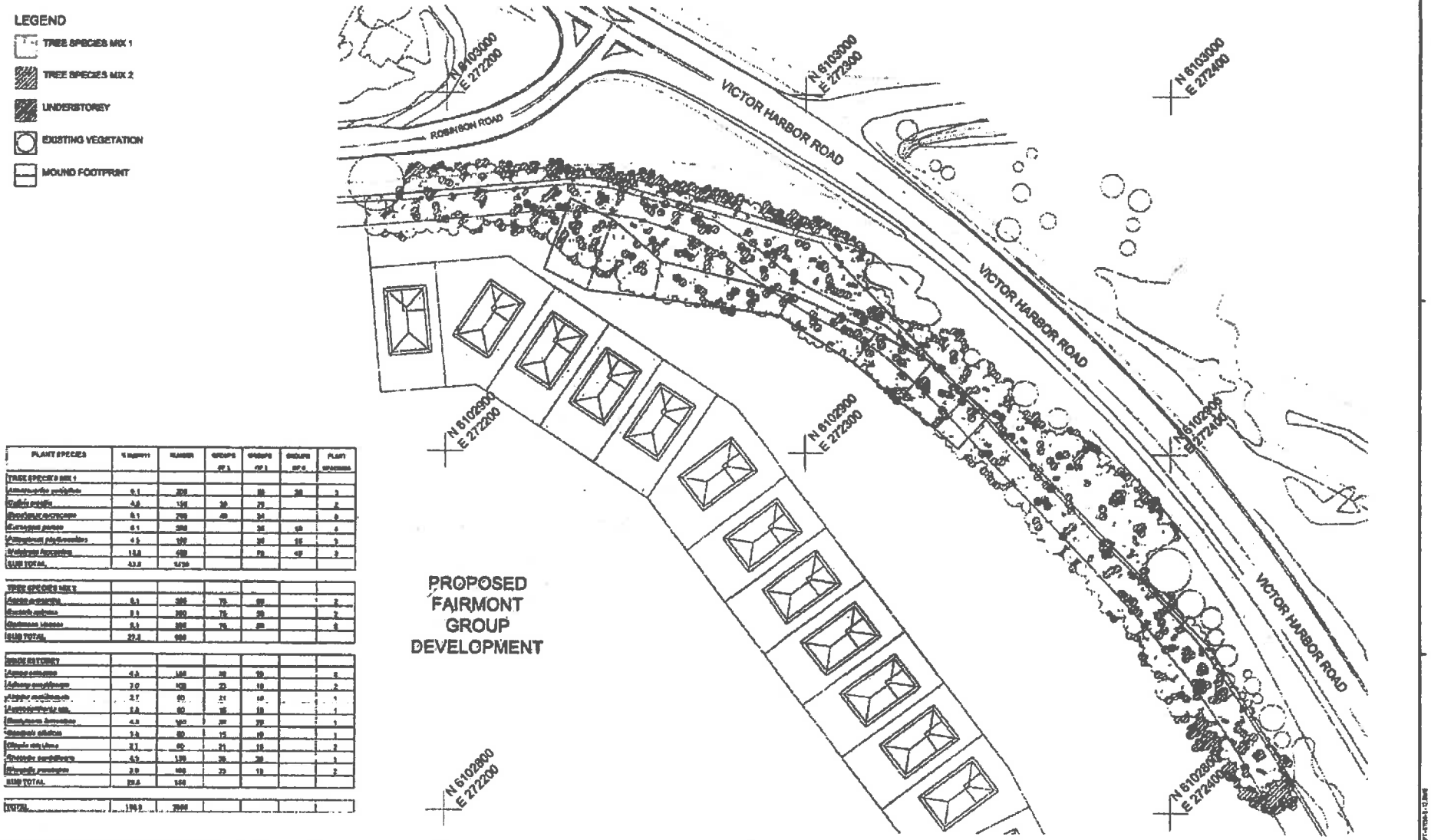
Government of South Australia
Department of Planning, Transport and Infrastructure

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DESIGN No.: | SURVEY No.:
PROJECT START ROAD NUMBER (KEY AREA):
PROJECT END ROAD NUMBER (KEY AREA):
SCALE: NTS

4760
VICTOR-HARBOR-ROAD
SEAFORD-HEIGHTS
LANDSCAPE-CONSTRUCTION
LOCATION-MAP

DESIGNED KH | DRAWN KH | ACCEPTED FOR DEPT: XXXXXXXXXXXX | ACCEPTED FOR NAME No.: #XXXXXXXX | DRAWING No.: 1-3255 | SHEET No.: 500 | AMEND No.: 00
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PLANT SPECIES	% MIXTURE	NUMBER	GROUPS OF 1	GROUPS OF 3	GROUPS OF 5	PLANT SPACINGS
TREE SPECIES MIX 1						
	5.1	200		66	30	3
	4.0	156	36	70		2
	5.1	200	40	54		3
	5.1	200		36	40	4
	4.1	160		36	16	3
	13.8	480		78	42	3
SUB TOTAL	43.8	1196				

TREE SPECIES MIX 2						
	5.1	200	76	66		2
	5.1	200	76	66		2
	5.1	200	76	66		2
SUB TOTAL	22.8	600				

UNDERSTOREY						
	4.1	160	36	70		2
	2.0	120	72	18		2
	2.7	80	21	18		1
	2.8	80	36	18		1
	4.0	160	36	70		1
	2.8	80	72	18		1
	2.1	80	21	18		2
	4.0	120	36	36		1
	2.0	120	72	18		2
SUB TOTAL	29.6	1040				

TOTAL	196.2	2840				

NO.	AMENDMENT DESCRIPTION	BY	CHECK	ACCEPTANCE	DATE

Government of South Australia
Department of Planning, Transport and Infrastructure

PROJECT No.: 201200084 | FILE No.: 2011/16858
REVISION No.: | SURVEY No.:
PROJECT START DATE: | PROJECT END DATE:
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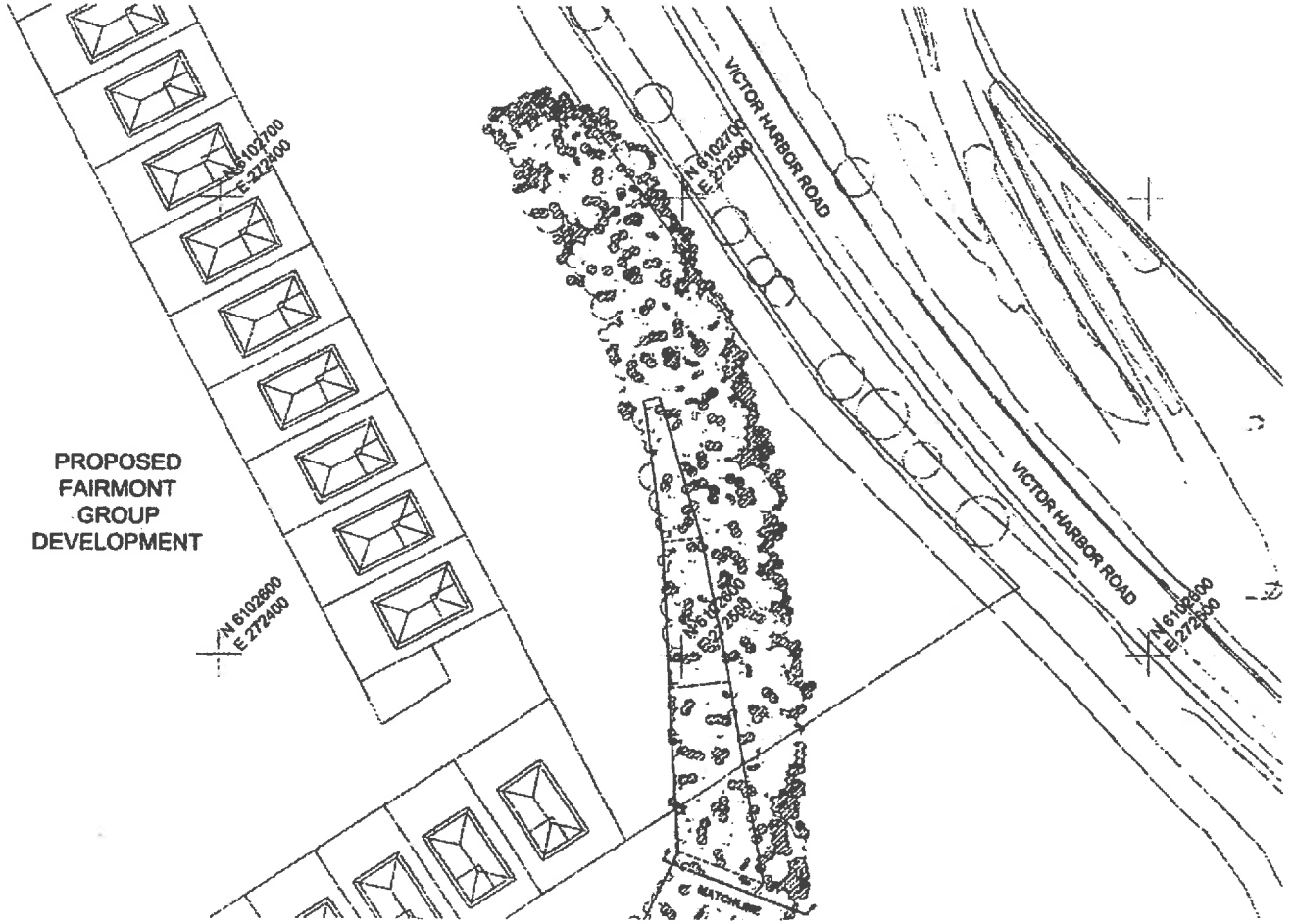
4760
VICTOR-HARBOR-ROAD
SEAFORD-HEIGHTS
LANDSCAPE-CONSTRUCTION
PLANT-LAYOUT-1

DESIGNED: KH ORIGIN MA | DRAWN: KH ORIGIN MA | ACTIVITY/TASK USE: XXXXXXXXXXXXX TYPE D YYYYYY YYYYY DATE XXXXXXXX
DRAWING NAME FORM SHEET No: #XXXXXXXX | DRAWING No.: 1-3255 | SHEET No.: 501 | ADDED No.: 00
IN ACCORDANCE WITH SPEC | UNCONTROLLED COPY WHEN PRINTED

ALL DIMENSIONS ARE IN METRES UNLESS SHOWN OTHERWISE

LEGEND

- TREE SPECIES MIX 1
- TREE SPECIES MIX 2
- UNDERSTOREY
- EXISTING VEGETATION
- MOUND FOOTPRINT



PLANT SPECIES	% (approx)	NUMBER	GROUPS OF 3	GROUPS OF 5	GROUPS OF 9	PLANT SPACINGS
TREE SPECIES MIX 1						
Allocasuarina verticillata	9.1	309		30	36	3
Callitris gracilis	4.6	156	36	75		2
Eucalyptus leucoxylon	9.1	309	48	24		6
Eucalyptus porosa	9.1	309		36	45	4
Melaleuca decussata	4.5	156		33	12	3
Melaleuca lanceolata	13.6	456		75	48	3
SUB TOTAL	49.9	1419				
TREE SPECIE S MIX 2						
Acacia pycnantha	9.1	309	72	36		2
Acacia spinosa	9.1	309	72	30		2
Dodonaea viscosa	9.1	309	72	60		2
SUB TOTAL	27.3	888				
UNDERSTOREY						
Acacia oswaldii	4.5	156	36	75		2
Acacia paradoxa	3.0	108	33	18		2
Atriplex stipitata	2.7	96	24	66		1
Austrodanthonia spp.	1.8	66	18	30		1
Dianella revoluta	4.5	160	36	75		1
Goodenia albiflora	1.8	66	18	30		1
Olearia ramulosa	2.7	96	21	18		2
Rhagodia parabolica	4.5	156	36	75		1
Rhagodia preissleri	3.6	108	33	18		2
SUB TOTAL	29.6	950				
TOTAL	106.8	3269				

AMENDMENT DESCRIPTION	BY	CHECK	ACCEPTANCE	DATE

All dimensions are in metres unless shown otherwise

Government of South Australia
Department of Planning, Transport and Infrastructure

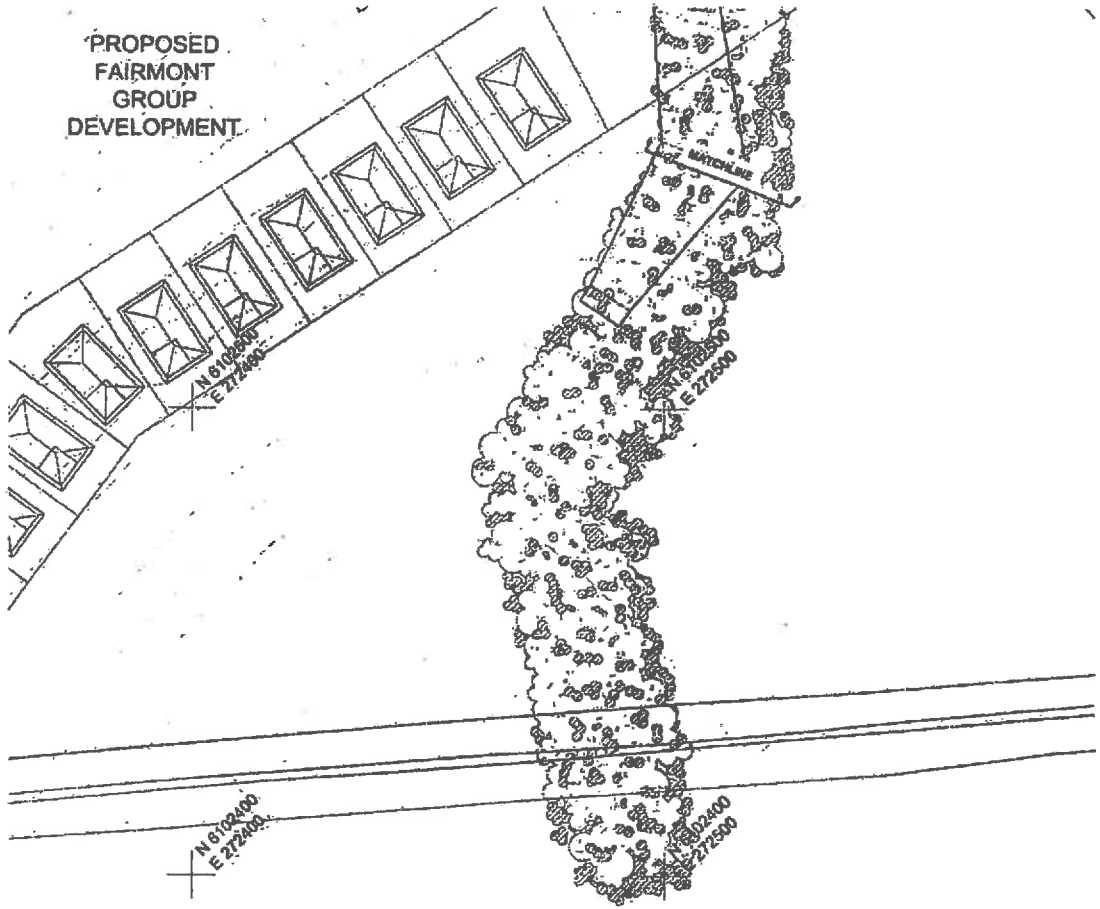
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DESIGN No.: | SURVEY No.:
PROJECT START ROAD CHAINAGE DISTANCE:
PROJECT END ROAD CHAINAGE DISTANCE:
SCALE: SCALE 1:500 @ A1

4760
VICTOR-HARBOR-ROAD
SEAFORD-HEIGHTS
LANDSCAPE-CONSTRUCTION
PLANT-LAYOUT-2

DESIGNED	DRAWN	ACCEPTED FOR PUBLIC USE	ACCEPTANCE FROM PARTY No.	SURVEY No.	SHEET No.	AMEND No.
KH	KH	XXXXXXXXXXXX	#XXXXXXXX	1-3255	502	00
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LEGEND

- TREE SPECIES MIX 1
- TREE SPECIES MIX 2
- UNDERSTOREY
- EXISTING VEGETATION
- MOUND FOOTPRINT



PLANT SPECIES	% planting	NUMBERS	GROUPS (m²)	GROUPS (m²)	GROUPS (m²)	PLANT (spacing)
TREE SPECIES MIX 1						
Allocasuarina verticillata	0.1	300		30	30	2
Casuarina pusilla	4.5	150	30	20		2
Eucalyptus calycogona	0.1	300	40	24		4
Eucalyptus porosa	0.1	300		20	15	4
Pittosporum phillyreoides	4.5	150		25	15	2
Melaleuca lanceolata	13.8	450		75	60	3
SUB TOTAL	43.0	1,650				
TREE SPECIES MIX 2						
Acacia paradoxa	9.1	300	75	30		2
Melaleuca pubescens	9.1	300	75	150		3
Santalum acuminatum	9.1	300	75	300		3
SUB TOTAL	27.3	900				
UNDERSTOREY						
Acacia cultriformis	4.5	150	30	30		2
Acacia paradoxa	3.0	100	75	15		2
Acacia verticillata	2.7	90	61	15		1
Agonis flexuosa 'Nana'	1.4	40	15	10		1
Correa reflexa var. reflexa	4.5	150	30	30		1
Dianella revoluta	3.0	60	15	10		1
Myoporum parvifolium	2.7	90	31	15		2
Rhagodia candolleana	4.5	150	30	30		1
Rhagodia parabolica	3.0	100	20	10		2
SUB TOTAL	33.8	930				
TOTAL	100.0	2,580				

No.	AMENDMENT DESCRIPTION	BY	CHECK	ACCEPTANCE	DATE

Government of South Australia
Department of Planning, Transport and Infrastructure

PROJECT No.: 201200084 | FILE No.: 2011/16383
DESIGN No.: | SURVEY No.:

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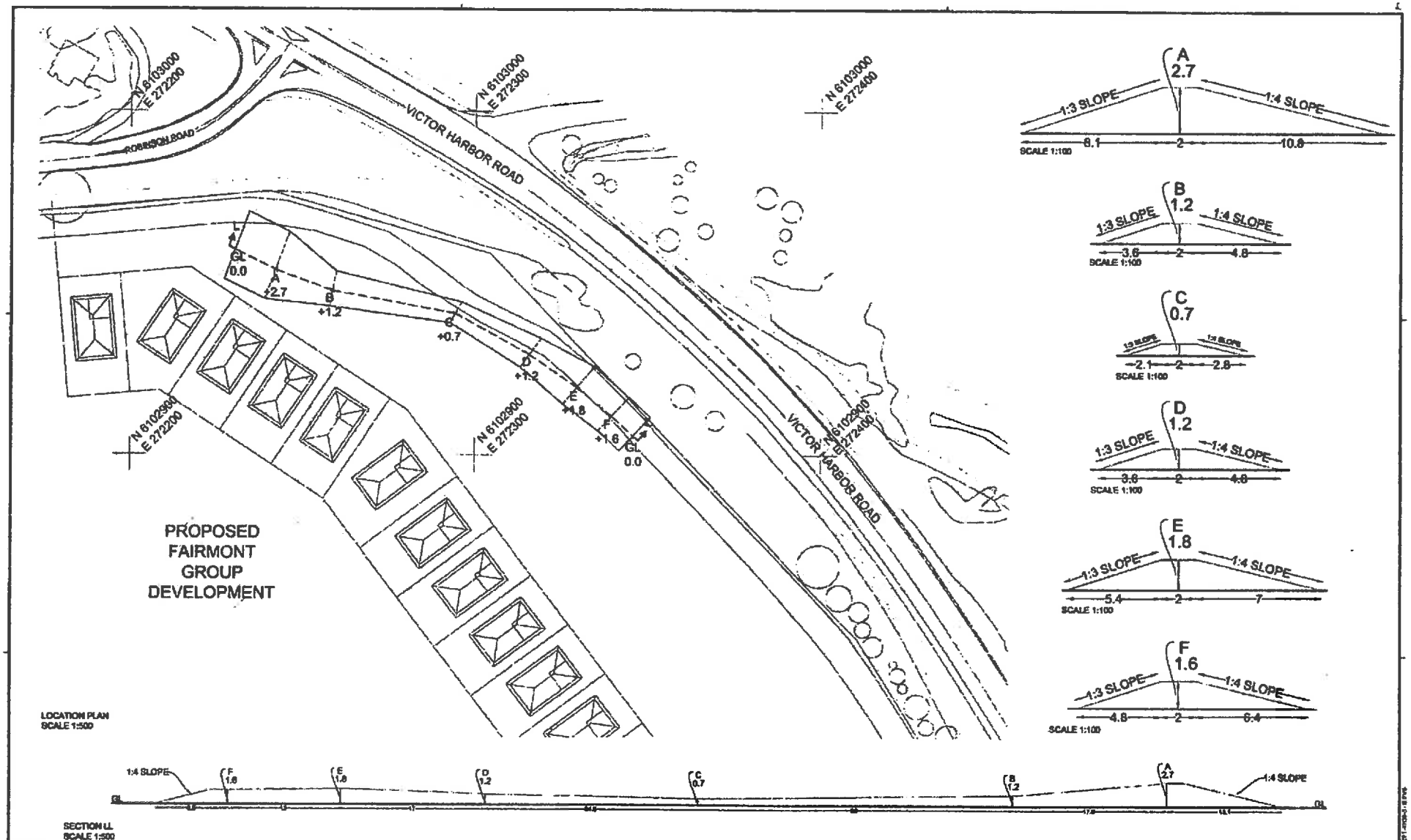
DESIGNED: KH OKEEFE MA | DRAWN: KH OKEEFE MA | APPROVED (TRAN): XXXXXXXXXXXX (TRAN SYSTEMS CODE): XXXXXXXX

4760
VICTOR-HARBOR-ROAD
SEAFORD-HEIGHTS
LANDSCAPE-CONSTRUCTION
PLANT-LAYOUT-3

ACCEPTANCE SET No.: #XXXXXXXX | DRAWING No.: 1-3255 | SHEET No.: 503 | ISSUE No.: 00

IN ACCORDANCE WITH SPEC

UNCONTROLLED COPY WHEN PRINTED



NO.	AMENDMENT DESCRIPTION	BY	CHECK	ACCEPTANCE	DATE

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Government of South Australia
Department of Planning, Transport and Infrastructure

PROJECT No. 2012000864 | FILE No. 2011/16589

4760
VICTOR-HARBOR-ROAD
SEAFORD-HEIGHTS
LANDSCAPE-CONSTRUCTION
MOUND-LAYOUT-1

SignNum

DESIGNED KH | DRAWN KH | ACCEPTED FOR ISSUE XXXXXXXXXXXX | ACCEPTANCE Ref. and No. #XXXXXXXX | DRAWING No. 1-3255 | SHEET No. 504 | AMEND No. 00

DRAWN MA | CHECKED MA | TITLE XXXXXXXXXX | DATE XXXXXXXX | IS ACCEPTABLE WITH EPPO

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TYPE OF DOCUMENT

APPLICATION TO NOTE LAND MANAGEMENT AGREEMENT

PRIVACY COLLECTION STATEMENT: The information in this form is collected under statutory authority and is used for maintaining publicly searchable registers and indexes. It may also be used for authorised purposes in accordance with Government legislation and policy requirements.

(Pursuant to s 57(5) of the Development Act 1993)

To the Registrar-General:

1. The MINISTER FOR PLANNING a body corporate constituted by a proclamation made pursuant to s 7(1) of the *Administrative Arrangements Act 1994* ("the Minister") of 11th Floor 45 Pirie Street Adelaide South Australia 5000 has entered into the attached Land Management Agreement dated the 23rd day of October 2017 ("the Agreement") with SOUTHERN WASTE RESOURCE AUTHORITY (ABN 37 443 975 085) of Post Office Box 2414 McLaren Vale 5171 pursuant to Section 57(1) of the *Development Act 1993* ("the Act").

2. The Agreement relates to the whole of the land comprised in Certificate of Title Volume 6034 Folio 589 ("the Land").

NOW THEREFORE the Minister applies pursuant to s 57(5) of the Act to note the Agreement against the Land.

Dated 21 6+ day of November 2017

THE COMMON SEAL of MINISTER FOR PLANNING was hereto affixed)
in the presence of:)

MINISTER FOR PLANNING COMMON SEAL SOUTH AUSTRALIA

.....
Signature of Witness

CHELSEA KATE LUCAS
Full Name of Witness

45 PIRIE STREET
ADELAIDE SA 5000
8204 1495

FOR THIS MAIN CUR Orig: TE AG 12835643

11:39 28-Nov-2017
4 of 4

LANDS TITLES REGISTRATION OFFICE

SOUTH AUSTRALIA

FORM APPROVED BY THE REGISTRAR-GENERAL

PRIORITY NOTICE ID	

BELOW THIS LINE FOR OFFICE & STAMP DUTY PURPOSES ONLY

SERIES NO	PREFIX
4	AG

AGENT CODE

LODGED BY: MCDC

CORRECTION TO:

SOUTH AUSTRALIAN HOUSING TRUST SAHT

SUPPORTING DOCUMENTATION LODGED WITH INSTRUMENT (COPIES ONLY)

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4 .....

5 .....

CORRECTION	PASSED
	S
REGISTERED	BJ Scholtz
5 - DEC 2017	REGISTRAR-GENERAL

July 5, 2018

CARRINGTON CHAMBERS
BARRISTERS

48 Carrington Street
Adelaide SA 5000
(T) 08 8212 4511
(F) 08 8231 6080

O'Loughlins
Lawyers
Level 2, 99 Frome Street
Adelaide SA 5000

Attention: James Frearson-Lea

Dear James

Willunga Basin Water Co Pty Ltd

You have asked for my opinion on certain issues arising from a proposal by your client Willunga Basin Water Co. Pty Ltd (**WBW**) to construct and use a dam on land at Seaford Heights for the storage of recycled water.

Current operations

WBW is in the business of distributing recycled water principally to customers engaged in primary production within the Willunga Basin.

WBW presently sources its recycled water from the Christies Beach Wastewater Treatment Plant (**Christies Beach WWTP**) operated by SA Water.

SA Water receives sewage at the Christies Beach WWTP, and then subjects that sewage to sequential treatment including primary sedimentation/settling; activated sludge secondary treatment; secondary sedimentation/settling and chlorination.

Following treatment by SA Water, the treated water is either discharged to the sea at Christies Beach, or it is diverted by pipe to a storage dam on adjacent land operated by WBW.

WBW pays a commercial rate to SA Water for the purchase of the recycled water which is diverted to its Christies Beach dam.

Liability limited by a scheme approved under professional standards legislation.

The recycled water purchased from SA Water is pumped several kilometres from WBW's Christies Beach dam to WBW's site at Quarry Road Seaford Heights via a trunk main. The Quarry Road site includes a 13ML storage dam and a pump station. From the Quarry Road site, WBW distributes the recycled water to customers in the Willunga Basin via an existing network of pipes. The customers generally use the recycled water for the irrigation of crops.

SA Health has granted to SA Water a licence under the *Public and Environmental Health (Waste Control) Regulations* for the supply of recycled water from the Christies Beach WWTP, subject to conditions directed to achieving water quality requirements.

Proposal for additional storage dam

WBW proposes to construct a 700ML dam at Lot 108 in Deposited Plan 80592 at Seaford Heights (**Lot 108**). Lot 108 is conveniently located near the Quarry Road dam and pump station. Recycled water received at Quarry Road will be pumped to the proposed dam at Lot 108 for storage, and pumped back to the Quarry Road site when it is needed for sale to customers.

Lot 108 is presently owned by Southern Region Waste Resources Authority (**SRWRA**). WBW and SRWRA propose to enter into a lease whereby WBW will take possession of Lot 108, construct the dam and use the dam for the purposes of its recycled water distribution business.

The purpose of the dam on Lot 108 will be to take and store recycled water purchased from SA Water at the Christies Beach WWTP at times when there is low demand for irrigation water from WBW's customers, and then distribute that recycled water to customers in times of high demand. It is expected that the dam would be filled over the winter months when demand for irrigation water is low, and will progressively be emptied over the summer months when demand for irrigation water is high.

The dam on Lot 108 will be filled and emptied using the existing pumping infrastructure at the existing WBW site at Quarry Road.

In terms of composition and quality, there will be no difference between the water held in the dam on Lot 108 and the water currently being distributed by WBW using its existing infrastructure and systems. The purpose of the dam is simply to provide additional storage capacity within the distribution system to augment WBW's ability to provide irrigation water in summer.

The legal issue

SRWRA bought Lot 108 from the South Australian Housing Trust and the Urban Renewal Authority in about 2017. At about the time of the sale, the vendors and SRWRA executed a 'Development Deed' dated 7 November 2017. The Deed recites that its purpose is to limit the impact of the development of the land to which it relates on the amenity of nearby land that is used for residential purposes or that is proposed to be developed for residential purposes.

From my reading of the Development Deed clause 3 is its only operative clause. Clause 3 reads as follows:

> 3 *SRWRA must not cause, suffer or permit the receipt, handling, storage or disposal of waste on the Land.*

In the Development Deed, 'Land' is defined to include Lot 108.

Further the Deed contains the following definition of 'waste':

> **waste** means any discarded, rejected, abandoned, unwanted, or surplus matter,
>
> (I) whether or not intended for sale or for recycling, reprocessing, recovery or purification by a separate operation from that which produced the matter; and
>
> (ii) whether of value or not,
>
> but for the avoidance of doubt does not include landscaping materials derived from green waste.

A question has arisen whether the storage of recycled water sourced from the Christies Beach WWTP in a dam to be constructed on Lot 108 would be contrary to clause 3 of the Development Deed. This issue comes down to whether or not the recycled water is 'waste' as defined in the Development Deed.

Discussion

Clause 3 of the Development Deed would only be contravened if the recycled water held in the dam proposed on Lot 108 met the definition of 'waste' set out in the Development Deed.

That definition is in all material respects the same as the definition of 'waste' as it was found in section 3(1) of the *Environment Protection Act 1993* (SA) (the **EP Act**) at the time the Development Deed was executed and before an amendment to the definition in the EP Act in November 2017.[1]

The definition of waste in the EP Act was the subject of an appeal heard by the Full Court of the Supreme Court of South Australia in the matter of *Wood v Adelaide Resource Recovery Pty Ltd* in 2017.[2] That appeal was concerned with a licenced waste depot at which construction and demolition waste was 'processed' into a form of alternative fuel suitable for use in some

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[1]The definition in the EP Act allowed for the definition to be enlarged by the inclusion of additional forms of waste by way of regulation or environment protection policy. This aspect of the EP Act definition is absent from the definition in the Development Deed. The EP Act definition also makes no reference to landscaping materials derived from green waste. Neither of these aspects of the definition are relevant for present purposes.

[2][2017] SASCFC 13. This decision was published on 20 February 2017.

industrial activities. The question was whether the construction and demolition waste had ceased to be waste for the purposes of the definition on account of it having been 'processed' into a product.

The Court ultimately held that on the facts of the case there had not been sufficient processing of the waste to convert it into a product. However, as the nature of the materials bore no resemblance to the irrigation water with which we are concerned here, the importance of the Full Court case lies in the principles discussed by the Court in determining whether materials are waste for the purposes of the definition, or alternatively whether they are a product.

The Court said:

> *[44] In ordinary parlance, waste is a purposive concept. It is a relative and not absolute concept. It is not an inherent characteristic of material that it comprises waste: it must be assessed from the perspective of a person whose purpose is to be considered at the relevant time. Waste is the antithesis of a product in ordinary parlance.*
>
> *[45] This dichotomy between waste and a product is reflected in the first limb of the definition of "waste" in the Act. If material that was waste has been used to make or has otherwise become a product, by a combination of what it says and does not say the definition treats the material as no longer being waste. Thus, the definition explicitly provides that the mere fact that the material is intended for sale, recycling, reprocessing, recovery or purification does not prevent it being waste if it falls within the first part of the limb. Conversely, the definition implicitly provides that if the material has actually been sold, recycled, reprocessed, recovered or purified such that it is now a product, it is no longer waste.*
>
> *[46] The conversion of unwanted waste into a product of value may be a complex process over an extended time period. In many cases, it will be a question of fact and degree to determine the point at which waste has changed its character and become a product. However, the mere fact that there may be questions of judgment involved in determining the precise point at which this occurs does not detract from the dichotomy evident in the definition between waste and a product. The definition makes plain that mere intention to convert waste into a product will not suffice: the enquiry is into objective fact.*

Because the definition of waste in the Development Deed is relevantly in the same terms as the definition of waste in the EP Act, in my view the Full Court's statements of principle in paragraphs [44] - [46] quoted above have application to the definition in the Development Deed, and are therefore likely to be decisive in determining the question whether the recycled water in the proposed dam will be 'waste'.

Paragraph [44] of the Full Court's decision requires the identification of the person whose purpose will determine the status of the material. In this case, in my view, that person will be WBW as the occupier of Lot 108 and the operator of the dam to be built there. It will not be

SRWRA, who will merely hold ownership of the land and will not be involved in any handling of the water. It will plainly not be SA Water, whose involvement with the water ceases when it is sold to WBW and piped from the Christies Beach WWTP into WBW's holding dam at Christies Beach.

Further, in the hands of WBW at Lot 108, the recycled water is neither discarded, rejected, abandoned, unwanted nor surplus. On the contrary, the water is a valuable resource for which WBW has paid a commercial rate to acquire title, and for the purpose of re-selling at a profit. Clearly, in the hands of WBW the recycled water is not waste within the definition.

Paragraph [45] recognises that material that was formally waste may be turned into a product, and once this occurs it is no longer waste. In the circumstances of this case, the sewage received by SA Water at Christies Beach is undoubtedly waste. However that sewage is processed by SA Water at the Christies Beach WWTP, and reusable water emerges from those processes. The principles discussed by the Full Court in paragraph [45] suggest that in the hands of SA Water the recycled water may still be waste, despite the fact that it is intended to be sold to WBW, because mere intention to sell is not sufficient to convert something from waste into a non-waste. However the last sentence of paragraph [45] makes it clear that upon actual sale of the processed material to a customer, then that material ' *...is now a product, it is no longer waste.*'

Thus it is clear that upon delivery from SA Water to WBW, the recycled water becomes a product, and is no longer waste.

It can further be seen that in accordance with the principles identified by the Full Court, the mere transportation of the recycled water from WBW's Christies Beach storage to the proposed dam at Lot 108 will not change the status of the water, and will certainly not convert the water into waste.

Paragraph [46] refers to the possibility of conversion of waste into a product over time and by a complex process. In my view, the relevant time frame and processes occur at SA Water's Christies Beach WWTP, and the point at which the water changes its character from waste to product occurs when the recycled water is diverted into WBW's storage dam at Christies Beach. At that point there is something more than mere intention on the part of SA Water. The water is sold for value, and a change in ownership takes place.

Summary

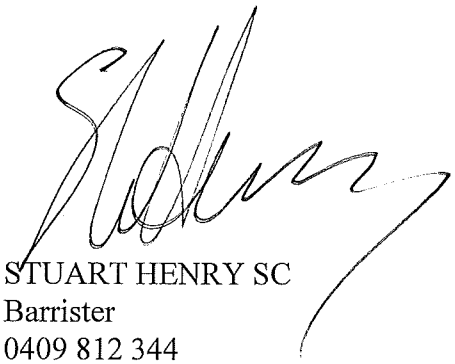
The definition of 'waste' in the Development Deed is framed in terms relevantly identical to the old definition of 'waste' in the EP Act. As such, the Full Court's decision in *Woods v Adelaide Resource Recovery* sets out the relevant principles for determining whether the recycled water to be held in the proposed dam on Lot 108 will be 'waste' for the purposes of the Deed.

It is plain from the Full Court's decision that material may be transformed from waste into a product through the application of industrial processes, and that if such a product is sold to a customer who wishes to put the product to some use, then the product is not waste.

In my view, this is exactly the situation involving WBW and the proposed dam at Lot 108. WBW buys the recycled water from SA Water. WBW values the recycled water because WBW is able to sell the recycled water to its customer at a profit.

The recycled water is not, in my view, a form of 'waste' for the purposes of the Development Deed.

Yours sincerely



STUART HENRY SC
Barrister
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From the office of the Mayor
City of Onkaparinga

4 April 2019

Laura Ferber
State Commission Assessment Panel
GPO Box 1815
ADELAIDE SA 5001

Dear Laura

Development Application No.	:	145/(V)7004/2019
Proposed Development	:	Construction of a 600 mega litre treated water storage dam with associated bulk earthworks, stormwater detention basin, inlet-outlet pipe, landscape screening, security fencing and signage at lots 102 and 108 Bakewell Drive, Seaford Heights
Location of Proposed Development	:	Lot 102 and 108 Bakewell Drive, Seaford Heights
Property Identification	:	Lot 102 in DP 46795, Lot 108 in DP 80592

Thank you for forwarding the above development application for our review and comments to the State Commission Assessment Panel (SCAP) as the relevant authority. The following report has been considered and endorsed by the Council at its meeting held 19 March 2019.

We are familiar with the development site and preliminary plans from working with the applicant/developer during pre-lodgement discussions. We are also aware the developer has communicated with Fairland Developments (Seaford Heights Developer) in respect to its proposal to aid in discussing and reviewing any issues that neighbouring residents may have.

Council is generally supportive of the proposed development, and makes the following comments for the SCAP's consideration.

Land Use
The subject land is located on the periphery of the Primary Production Zone of council's Development Plan, with portion of the site within the Deferred Urban Zone. The Primary Production Zone desires for land uses that are generally associated with primary production and agricultural activities and subordinates associated uses, as well as support tourism for the greater McLaren Vale region.

The proposed land use is considered an acceptable land use, which is described in the Ekistics Planning Report, "as an effective buffer between the Seaford Heights land development and the longstanding land fill operations on the adjacent SRWRA site to the south-east". Further to this, the proposed dam will provide a more sustainable water resource to support existing vineyards during the summer months.

The site is currently used for cropping, which will still continue on the site however, the excavation and size of the dam, together with areas to be landscaped will utilise much of the site. The batter slopes of the dam are to be 1:3, which could also support cropping if in the future that was considered appropriate to continue. The loss of land use for cropping is compensated with the provision of water that can support the intensification of primary production for the greater region.

Dam Design

Council is generally supportive of the proposed dam design. The excavation proposed is up to 8.5m at its lowest point, with the dam positioned centrally between the State Heritage buildings sited toward the front of the subject land with sufficient separation from the rear northern boundary to construct embankments and establish landscaping.

The significant amount of excavation proposed adequately reduces the vertical profile of the dam, as represented in the "Seaford Heights Dam – Visualisations" dated 17 October 2018 that forms part of the application documents.

The proposed dam and water storage does not require an Environment Protection Authority licence however, the applicant has confirmed it will be constructed in accordance with the relevant 'EPA Guideline EPA509/14- Wastewater Lagoon Construction'. In addition to this, appropriate on-site construction supervision will occur.

During the design phase, consideration will need to be given to existing site conditions and the performance of the dam under various flood conditions, which will guide treatments, measures to ensure adequate stability and integrity. Further, design needs to be considerate of deformations, seepage, piezometric conditions and the like, which the applicant has correctly noted in their planning report.

The 1:3 batters proposed for the embankments of the dam are confirmed as being suitable for this type of construction.

Landscaping and embankments

The excess fill that will result from the excavation of the dam is to be used to create landscaped embankments around the dam, with particular focus on screening it from Victor Harbor Road, the Seaford Heights residential development and Bakewell Drive.

The Primary Production Zone desires for excavation to be kept to less than 1.5m however, this should be applied with consideration of the scale of the project and other provisions, which seek for development to harmonise with the rural landscape. As noted above, the excavation proposed assists with reducing the vertical profile of the dam, and use of the excess soil to create embankments up to 7.8m in height in some areas will adequately screen the dam almost completely from view and provide an attractive backdrop to the Seaford Heights development.

An arborist report provided by the applicant has confirmed that there are no regulated or significant trees on the land, nor any presence of native vegetation pursuant to *the Native Vegetation Act 1991*.

The landscaping as proposed in the landscape master plan includes a good mix of larger trees, and ground covers that are native. The larger trees proposed have mature heights exceeding 12m and canopy spans of 4m and greater.

The following condition is recommended to be imposed on any approval granted by the SCAP, to support the proposed landscaping plan:
"All plants, shrubs, trees and lawn and/or ground cover shall be maintained in good condition at all times and established within 6 months of completion of construction of the dam. Any seriously diseased, dying or dead vegetation shall be promptly replaced to the reasonable satisfaction of council".

Interface Between Land Uses
Given the proximity of the dam to the neighbouring Seaford Heights development consideration needs to be given to the potential amenity impacts that may arise from the development. Specifically, the following provision of the Onkaparinga Development Plan is relevant in this regard.

1 Development should not detrimentally affect the amenity of the locality or cause unreasonable interference through any of the following:
(a) the emission of effluent, odour, smoke, fumes, dust or other airborne pollutants
(b) noise
(c) vibration
(d) electrical interference
(e) light spill
(f) glare
(g) hours of operation
(h) traffic impacts.

An odour assessment was undertaken by ERM, on behalf of the applicant, based on other current wastewater treatment facilities within proximity to the subject land. Findings revealed that the odour was closer to a muddy lake or pond water and although present, was not considered offensive and the odour is also not wastewater related. Further, the levels of odour were mostly low and intermittent, at most locations no odour was observed for the majority of the time and there was no recording of distinct strong odours. Conclusions from the study led to the determination that no odour will be detected at the neighbouring Seaford Heights development.

The dam will be emptied using existing pumping infrastructure located on Quarry Road and accordingly no noise will be generated on the site when this occurs. Further, as no pump station required with the dam on the subject land there will be no ongoing noise associated with it.

As noted above, the landscaping, embankments and design of the dam will harmonise with the rural landscape and not create an unattractive view from any public vantage points. The landscaping is considered to improve the visual backdrop to the Seaford Heights development.

The site will be suitably fenced to ensure that persons cannot obtain access to the dam or landscaping areas.

Character Preservation District
The subject land is contained with the McLaren Vale Character Preservation District in the Development Plan and is subject to the Character Preservation (McLaren Vale) Act 2012. Section 6 of the Act requires consideration of the following:

- To recognise, protect and enhance the special character of the district while at the same time providing for the economic, social and physical wellbeing of the community.
- To ensure that activities that are unacceptable in view of their adverse effects on the special character of the district are prevented from proceeding.
- To ensure that future development does not detract from the special character of the district.
- Otherwise to ensure the preservation of the special character of the district.

Section 7 of the Act identifies the following character values of the district:

- the rural and natural landscape and visual amenity of the district
- the heritage attributes of the district
- the built form of the townships as they relate to the district
- the viticultural, agricultural and associated industries of the district
- the scenic and tourism attributes of the district.

The proposed water storage dam is considered to be consistent with the objectives of the Act, in that the proposal indirectly supports the scenic and tourism attributes of the district, does not impede viticultural or agricultural activities on surrounding land and will not impact on any heritage or special characteristics of the district, subject to the comments of the State Heritage Department of DEW.

State Heritage (DEW)
The application is to be referred to the State Heritage branch of the Department for Environment and Water pursuant to Schedule 8 of the *Development Regulations 2008*.

Consideration needs to be given to the visual impact of the proposed dam on the State Heritage listed Homestead and Barn, and whether the proposal materially affects these items.

With the dam positioned well behind the heritage buildings it will not obscure any view of them from Bakewell Drive. Further, with the dam being excavated into the site and heavily landscaped between the dam and the heritage buildings, this is considered to minimise visual imposition.

The SCAP should take due consideration to the following provision within the Onkaparinga Development Plan.

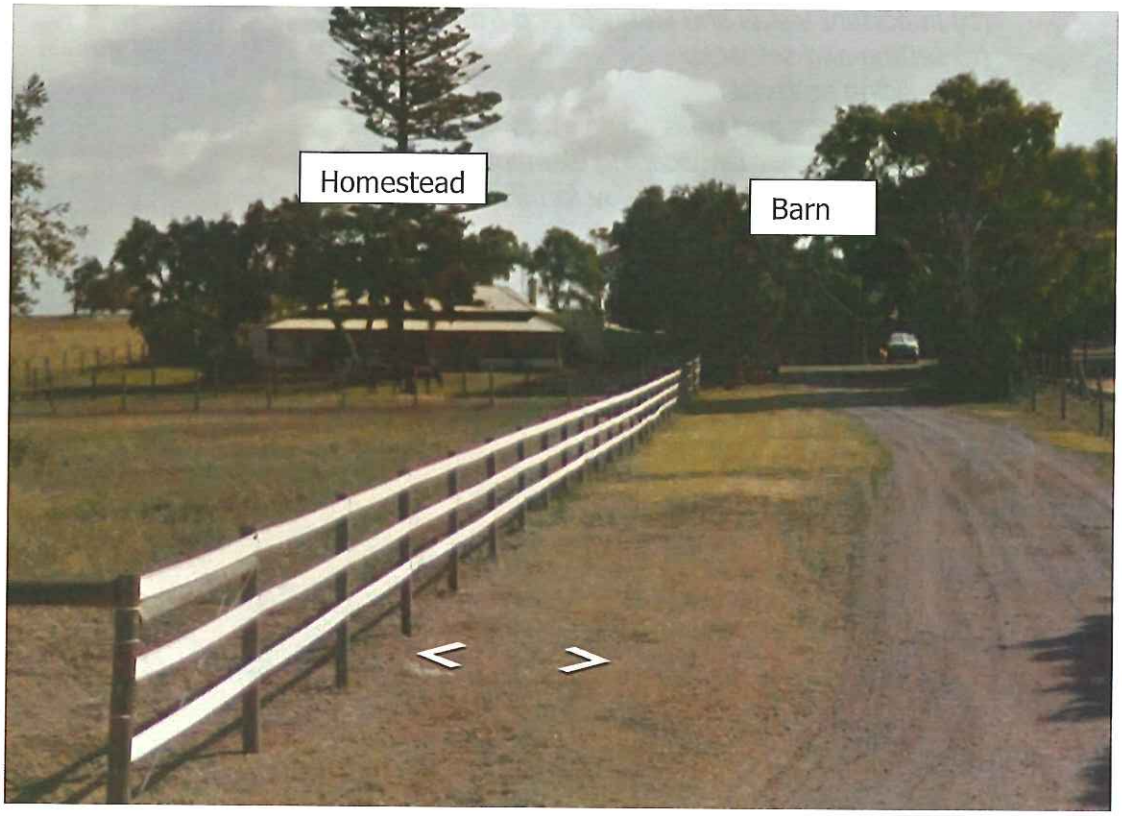
General Section Heritage Places

3 Development of a State or local heritage place should retain those elements contributing to its heritage value, which may include (but not be limited to):
(a) principal elevations

(b) important vistas and views to and from the place
(c) setting and setbacks
(d) building materials
(e) outbuildings and walls
(f) trees and other landscaping elements
(g) access conditions (driveway form/width/material)
(h) architectural treatments
(i) the use of the place.



Heritage Items Marked in RED



Land Management Agreement (LMA)
The buffer strip of landscaping established in the northern corner of the site which extends into the Seaford Heights development site is not impacted by the proposal. The dam and associated landscaping and embankments are well separated from the buffer strip and the applicant is conscious of the requirement to maintaining this. The buffer strip was planted to improve the visual outlook onto the Seaford Heights development site when viewed from Victor Harbor Road, and to provide a separation between the urban and township boundaries.

This buffer landscaping is the subject of a Land Management Agreement, implemented by Renewal SA at the time of the Seaford Heights Development with Fairmont Homes. As the SRWRA is the owner of this land, it is obligated by the requirements of the LMA, being an agreement with the Minister for Planning. WWBC will take over the management of the landscaping requirement of the LM[illegible]inistrative changes to the LMA will be required to be made in the event t[illegible]pproved by the SCAP.

Homestead

Conclusion
In summary, the proposed storage dam exhibits the following positive attributes to warrant approval:

- The land use is considered an appropriate use of land effectively set aside as a buffer, with the dam contributing to the intensification of established primary production uses within the McLaren Vale region.
- The proposed dam design will require extensive excavation of up to 8.5m, which assists with minimising its visual intrusion of the landscape.

- The landscaping and proposed embankments will complement the development and improve the visual outlook of the dam from public vantage points, including Bakewell Drive, Victor Harbor Road and the Seaford Heights development.
- The landscaping species are native and a good mix of tall trees, shrubs and ground covers.
- No unreasonable amenity issues are considered to be created by the proposal, with no pump stations associated with the development situated on the subject land that may create noise nuisance and odour modelling provided by the applicant confirms that any odours that may be present within the Seaford Heights Development will not be unreasonable.

Should the SCAP be of the view the application is of sufficient merit to approve, we request to be consulted on any proposed reserved matters and conditions, however, we recommend the following conditions and notes be included on any approval:

1. All development shall be completed and maintained generally in accordance with Drawings. The development shall be completed and maintained in accordance with the following plans and documents:
    - Ekistics Planning Report and attachments dated 23 January 2019
    - Site Plan drafted by Hydroplan "SRWRA Storage Concept Design Plan with Mounds" drawing no. 14689-SK017 dated 29 March 2018
    - SMEC Geotechnical Investigation Report dated 18 June 2018 (Revision A)
    - SRWRA Treated Water Odour Assessment prepared by ERM dated 28 November 2018

    and any other plans and documents submitted with and forming part of the development application, except where varied by the following conditions.

2. That effective measures be implemented during the construction of the development and on-going use of the land in accordance with this consent to:
    - Prevent silt run-off from the land to adjoining properties, roads and drains.
    - Control dust arising from the construction and other activities, so as not to, in the opinion of council, be a nuisance to residents or occupiers on adjacent or nearby land.
    - Ensure that soil or mud is not transferred onto the adjacent roadways by vehicles leaving the site.
    - Ensure that all litter and building waste is contained on the subject site in a suitable covered bin or enclosure.
    - Ensure that no sound is emitted from any device, plant or equipment or from any source or activity to become an unreasonable nuisance, in the opinion of council, to the occupiers of adjacent land.

3. A construction management plan which addresses the mitigation or minimisation of impacts (especially from noise, dust and sediment) must be prepared and submitted to the satisfaction of the City of Onkaparinga and must be implemented during the construction phase. Dust generated by machinery and vehicular movement during site works, and any open stockpiling of soil or building materials at the site, must be suppressed by regular application of water or other suppression methods to ensure that dust generation does not become a nuisance off site. Potential impacts of soil

sediment and pollutants leaving the site or entering watercourses during the development of the site shall be mitigated/minimised.

4. During construction and at all times thereafter, stormwater generated from the development shall be diverted away from all buildings, shall not pond against or near the footings and shall not be discharged or flow onto adjoining land. Where drainage is directed to the street water table, this shall be by way of a council approved stormwater drainage system.

5. All plants, shrubs, trees and lawn and/or ground cover shall be maintained in good condition at all times and established within 6 months of completion of construction of the dam. Any seriously diseased, dying or dead vegetation shall be promptly replaced to the reasonable satisfaction of council.

6. A Soil Erosion and Drainage Management Plan (SEDMP) prepared in accordance with the "Stormwater Pollution Prevention Code of Practice for Local, State and Federal Government", issued by the EPA, and to the reasonable satisfaction of the council, shall be put in place prior to the commencement of any site works and shall include, but not be restricted to, a temporary construction exit and silt fences. The measures are to prevent material from being washed or otherwise transported from the site. These silt control measures shall be maintained in good working order during construction and be maintained for a period of 12 months. At practical completion a decision will be made by council with regard to the sections of the silt control measures which need to be retained and maintained by the developer during the 12 month maintenance period applying to the SEDMP.

7. No blasting or explosives shall be used for the excavation of the dam, so as to minimise disruption to any building work that is already established in the Seaford Heights Development and to minimise other amenity impacts.

8. The development shall not detrimentally affect the occupiers of adjoining land, in the opinion of Council, by the emission of noise, vibration, smell, fumes, smoke, vapour, steam, soot, ash, dust, waste water, waste products, grit, oil or spilled light.

NOTES

1. The proponent is reminded of Clause 23 under Part 6 of the Environment Protection (Noise) Policy 2007. The clause states that construction activity must not occur on a Sunday or other public holiday; and on any other day except between 7am and 7pm. Exceptions to this requirement are prescribed in Clause 23(1) b of the Environment Protection (Noise) Policy 2007.

2. The applicant is to contact council's Property Transaction team to arrange for a permit prior to commencing any construction activities on council land.

3. The applicant is reminded of its general environmental duty, as required by Section 25 of the Environment Protection Act, to take all reasonable and practical measures to ensure the activities on the whole site, including during construction, do not pollute the environment in a way which causes or may cause environmental harm.

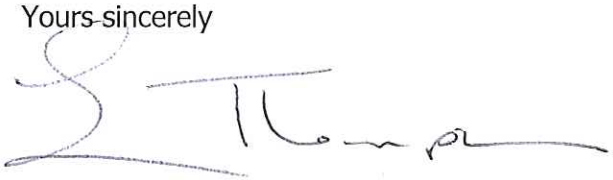
4. Any information sheets, guideline documents, codes of practice, technical bulletins etc that are referenced in this response can be accessed on the following web site: http://www.epa.sa.gov.au

5. Construction activities must be undertaken in accordance with Division 1 of Part 6 of the Environment Protection (Noise) Policy 2007 at all times. Further information can be found at: http://www.epa.sa.gov.au/environmental_info/noise

We wish to reiterate that council is willing to work with the developers and the SCAP to ensure that a quality outcome is delivered for the community.

Please contact John Mason (Senior Development Officer – Planning) on 8384 0549 or john.mason@onkaparinga.sa.gov.au if further information is required.

Yours sincerely



Erin Thompson
Mayor

Government of South Australia
Department for Environment and Water

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Ref: SH/14427D
Date: 20 March 2019

Ms Alison Gill
Secretary - Ms Alison Gill
State Commission Assessment Panel
GPO Box 1815
Adelaide 5001

Attention: Simon Nelder

Dear Mr Nelder

DESCRIPTION: FORMER NOARLUNGA OSTRICH FARM, INCLUDING FORMER PRIOR'S COURT HOMESTEAD (1850S SECTION ONLY) AND BARN CONSTRUCTION OF A 600ML TREATED WATER STORAGE DAM WITH ASSOCIATED BULK EARTHWORKS, STORMWATER DETENTION BASIN, INLET-OUTLET PIPE (BURIED) AT LOT 108 BAKEWELL DR/ LOT 102 OSTRICH FARM RD

SEAFORD HEIGHTS

Application number:	145/V004/19
Referral received:	4/02/2019
State heritage place:	Former Noarlunga Ostrich Farm, including former Prior's Court Homestead (1850s section only) and Barn, Wheaton Road SEAFORD HEIGHTS
Documentation:	As lodged

The above application has been referred to the Minister for Environment and Water in accordance with Section 49 of the *Development Act 1993* as development that directly affects a State heritage place or, in the opinion of the relevant authority, materially affects the context within which a State heritage place is situated.

The proposed development is considered to be acceptable in relation to the above State heritage place for the following reason/s.

- The proposed development is for a large, 600 mega litre, raised water storage dam to be constructed on slightly elevated land behind the former Ostrich Farm Homestead.
- The vegetated outer row of mounds proposed to be constructed to ameliorate the visual impact of such a large civil structure are a considerable distance back from the main homestead and no demolition of any outbuildings are envisaged.
- Heritage South Australia has received clarification advice on the plans and is satisfied that the impact upon the heritage values of the place would be minimised by the distance to mounds and the height of the dam in the open landscape has been sufficiently ameliorated.

General notes

1. Any changes to the proposal for which planning consent is sought or granted may give rise to heritage impacts requiring further consultation with the Department for Environment and Water, or an additional referral to the Minister for Environment and Water. Such changes would include for example (a) an application to vary the planning consent, or (b) Building

Rules documentation that incorporates differences from the proposal as documented in the planning application.

2. In accordance with Regulation 43 of the *Development Regulations 2008*, please send the Department for Environment and Water a copy of the Decision Notification.

3. The relevant planning authority is requested to inform the applicant of the following requirements of the *Heritage Places Act 1993.*
   (a) If an archaeological artefact believed to be of heritage significance is encountered during excavation works, disturbance in the vicinity shall cease and the SA Heritage Council shall be notified.
   (b) Where it is known in advance (or there is reasonable cause to suspect) that significant archaeological artefacts may be encountered, a permit is required prior to commencing excavation works.

   For further information, contact the Department for Environment and Water.

4. The relevant planning authority is requested to inform the applicant of the following requirements of the *Aboriginal Heritage Act 1988.*
   (a) If Aboriginal sites, objects or remains are discovered during excavation works, the Aboriginal Heritage Branch of the Aboriginal Affairs and Reconciliation Division of the Department of the Premier and Cabinet (as delegate of the Minister) should be notified under Section 20 of the *Aboriginal Heritage Act 1988*.

Any enquiries in relation to this application should be directed to Kevin O'Sullivan on telephone (08) 8124 4922 or e-mail DEW.StateHeritageDA@sa.gov.au.

Yours sincerely



Kevin O'Sullivan
Senior Conservation Architect
Department for Environment and Water
as delegate of the
MINISTER FOR ENVIRONMENT AND WATER

Government of South Australia
Department for Environment and Water

Coastal Management Branch
Level 4
81-95 Waymouth Street
Adelaide SA 5000
GPO Box 1047
Adelaide SA 5001
Australia
Ph: +61 8 8463 6850
www.environment.sa.gov.au

F0002273101

18 March 2019

Simon Neldner
Planning Officer
State Commission Assessment Panel
GPO Box 1815
ADELAIDE SA 5001

Dear Simon

Development Application No:	145/V004/19
Applicant:	DPTI c/- Willunga Basin Water Company
Proposal:	Construction of a 600ML treated water storage dam with associated bulk earthworks, stormwater detention basin, inlet-outlet pipe (buried), landscape screening, security fencing, and signage
Location:	D80592 A108 CT 6034/589 & D46795 A102 CT 5829/936, Bakewell Drive & Ostrich Farm Road, Seaford Heights
Planning Authority:	State Commission Assessment Panel
Date received by DEW:	4 February 2019

Thank you for referring the above mentioned development application to the Chief Executive of the Department of the Minister responsible for the administration of the *Natural Resources Management Act 2004* (NRM Act) in accordance with Section 49(7a) of the *Development Act 1993.*

The subject land is situated within the Western Mount Lofty Ranges (WMLR) Prescribed Water Resources Area (PWRA) established under the NRM Act. Taking water from this area for irrigation or industry purposes over and above any allocation already granted under the NRM Act requires a referral of the development application to the Department for a 'regard' response pursuant to Schedule 8, Item 12A of the *Development Regulations 2008*.

ASSESSMENT

Department for Environment and Water staff have reviewed the proposal and determined that the application does not warrant a mandatory referral under Item 12A, given that the proposed 600ML dam will:

- be used solely for the storage of treated wastewater;
- be of a turkey nest construction, situated on a hill top; and
- not collect or store water flowing over land or any other prescribed water resource.

Further, the proposed facility, including the stormwater management system, will involve no nett taking or retention of surface water and will therefore not require a water licence under the NRM Act.

As such, the Department has no specific comments to make on the application in relation to NRM Act requirements. It is noted that the application has also been referred to the Heritage SA branch of the Department.

RECOMMENDATION

It is recommended that the following notes be attached to any approval:

Notes

1. The applicant is reminded of their duty to act reasonably in relation to the management of natural resources within the State, in accordance with Section 9 of the *Natural Resources Management Act 2004*.

2. It is important to note that the following applies to the subject land under the *Natural Resources Management Act 2004*:
   - The *Prescription of the Water Resources in the Western Mount Lofty Ranges*, which requires those that are or are proposing to use surface, watercourse and/or underground water for any purpose – other than stock and domestic use – at any time in the future, to apply for a water licence with the Department for Environment and Water (DEW);
   - Dams of 5ML or greater volume, used for stock and domestic purposes, also require a licence;
   - If there is a proposal to take surface water, watercourse water or underground water, or if there are any existing water uses that may be impacted by the development, the interested parties should contact the DEW Water Licensing Branch on 8463 6876 or visit: https://www.environment.sa.gov.au/topics/water/water-licences-and-permits.

3. Effective measures should be implemented during the works and on-going use of the land in order to prevent soil, silt, sediments or other pollutants leaving the site and entering adjoining properties, roads, water bodies and drains, including (but not limited to):
   a. use of erosion and sediment control measures such as catch/diversion drains, filter fences, sediment fences, sediment traps and basins, re-vegetation and straw bale barriers;
   b. ensuring vehicles leaving the site do not transfer soil or mud onto adjacent roadways;
   c. stockpiling topsoil carefully so it is not susceptible to wind erosion;
   d. control dust arising from construction and other activities, so as not to be a nuisance to residents or occupiers on adjoining or nearby properties;
   e. cover all exposed faces and spoil on and around scarred areas with suitable ground cover.
   f. ensure that there are post construction arrangements for on-site pollutant and contaminant management in accordance with EPA Guidelines.

4. Prior to the clearance of any native vegetation, the applicant should consult the Native Vegetation Council to determine relevant requirements under the *Native Vegetation Act 1991* and its Regulations, which may include the provision of a Significant Environmental Benefit. Note that 'clearance' means any activity that could cause any substantial damage to native plants, including cutting down and removing plants, burning, poisoning, slashing of understorey, removal or trimming of branches, severing roots, drainage and reclamation of wetlands, and in some circumstances grazing by animals. For further information contact the Native Vegetation Council on telephone 8303 9777 or visit: http://www.nvc.sa.gov.au.

5. The applicant is encouraged to incorporate locally indigenous plant species into any landscaping, screen planting or revegetation activities at the site to enhance the natural character of the locality, stabilise soils and provide habitat for native species. For information on appropriate species to be planted, please contact State Flora at Bremer Road, Murray Bridge on telephone 8539 2105, or within Belair National Park on telephone 8278 7777 or visit: http://www.stateflora.sa.gov.au.

6. This approval does not obviate any considerations that may apply to the *Environment Protection and Biodiversity Conservation Act 1999* (Cth). For further information visit: http://www.environment.gov.au/epbc.

In determining this response I have had regard to, and have sought to further, the Objects of the *Natural Resources Management Act 2004*.

Any comments or queries relating to the contents of this correspondence, and a copy of the decision notification form, may be directed to: DEW.planning@sa.gov.au.

Yours sincerely



Murray Townsend
Manager
Coastal Management Branch

In reply please quote 2019/00339, *Process ID:* 561849
Enquiries to Reece Loughron
Telephone (08) 7109 7876
E-mail dpti.luc@sa.gov.au

Government of South Australia
Department of Planning, Transport and Infrastructure

POLICY, STRATEGY AND PROGRAM DEVELOPMENT

Transport Assessment and Policy Reform

GPO Box 1533
Adelaide SA 5001

ABN 92 366 288 135

24 April 2019

State Commission Assessment Panel
C/- Mr Simon Neldner
Department for Planning, Transport and Infrastructure
GPO Box 1815
ADELAIDE SA 5001

Dear Mr Neldner,

SECTION 49 DEVELOPMENT ACT – CROWN DEVELOPMENT
SCHEDULE 8 - REFERRAL RESPONSE

Development No.	145/V004/19
Applicant	Willunga Basin Water Company Pty Ltd
Location	Victor Harbor Road, Ostrich Farm Road and Bakewell Drive, Seaford Heights, Lot 108 in DP 80592 and Lot 102 in DP 46795, CT 6034/589 and CT 5829/936.
Proposal	Construction of a 600ML treated water storage dam with associated bulk earthworks, stormwater detention basin, inlet-outlet pipe (buried), landscape screening, security fencing, and signage. Access to the development site will be from Bakewell Drive, Seaford Heights.

The above development proposal was referred to the Commissioner of Highways (CoH) by the State Commission Assessment Panel for advice to assist in its report to the Minister for Planning in accordance with the requirements of Section 49(7a) of the *Development Act 1993*.

The following response is provided in accordance with Section 49(7a) of the *Development Act 1993* and Schedule 8 of the *Development Regulations 2008*.

CONSIDERATION

The subject site abuts Victor Harbor Road, an arterial road under the care, control and management of the CoH and Ostrich Farm Road and Bakewell Drive, local roads under the care, control and management of the City of Onkaparinga. The adjacent section of Victor Harbor Road is identified as a Major Traffic Route, Primary Freight Route and Major Cycling Route in the Department of Planning, Transport and Infrastructure's (DPTI's) '*A Functional Hierarchy for South Australia's Land Transport Network*'. At this location, Victor Harbor Road carries approximately 21,900 vehicles per day (5% commercial vehicles) and has a posted speed limit of 80 km/h.

Road Widening

The Metropolitan Adelaide Road Widening Plan shows a possible requirement for a strip of land up to 35 metres in width from the Victor Harbor Road frontage of this site for possible future road purposes. The consent of the CoH under the *Metropolitan Adelaide Road Widening Plan Act 1972* is required to all new building works located on or within 6 metres of the possible requirement.

The Planning Statement prepared by Ekistics (REF# 00664-001, dated 23 January 2019) identifies that the closest batter slope to Victor Harbor Road will be setback 35 metres from the existing property boundary (refer Draft Ref: 2-WBW-d4, Drawing No. 14689-SK017, Sheet 1, Revision 0 dated 20 September 2018 and Section 5.6.1). This setback is acceptable to DPTI.

It should be noted that the Australian Government has announced $73.6 million funding of the duplication of Victor Harbor Road between Main South Road and McLaren Vale, linking to the McLaren Vale overpass.

Control of Access

The subject site abuts a section of Victor Harbor Road and Ostrich Farm Road that were proclaimed controlled-access roads on 6 December 1973 pursuant to Part 2A of the *Highways Act 1926*. Departmental records show that there is no proclaimed or permitted means of access by which persons and vehicles may directly enter or leave the controlled-access roads from/to this site. All access is to be gained via the abutting local road network, clear of the controlled-access sections.

Access and Road Safety

The Planning Statement addresses the broad traffic implications and construction requirements (refer Sections 5.3.4 and 5.6). Vehicle access is proposed via Bakewell Drive. It is anticipated that the majority of traffic movements would be via the Main South Road/Bakewell Drive junction given that right turn movements from Victor Harbor Road to Ostrich Farm Road are prohibited. It is noted that the ongoing traffic implications (post construction) will be very low and thus the main traffic issues that need to be addressed are during the construction phase.

The Planning Statement (page 33) indicates that the dam wall batters (and landscaping mounds) will be excavated within the subject site. Furthermore, it is not expected that material will be moved from the site and the larger construction vehicles will remain on-site during the construction phase. The Statement also identifies that once a contractor has been engaged a Traffic Management Plan (TMP) will be prepared. The TMP will assess the need to install work-zone traffic management along Bakewell Drive during construction. This is acceptable to DPTI.

Underground Pipeline

The Planning Statement identifies that an existing pipe that crosses Victor Harbor Road will be retained and that a separate transfer pipe (500mm in diameter) will be installed to cater for the additional demands and avoid the need for pumping of water from the proposed dam site.

While no objections are raised to the new pipeline, it will be constructed within the road widening requirement and across Victor Harbor Road and thus has the potential to be impacted by the proposed duplication of the adjacent section of Victor Harbor Road. It is requested that DPTI be consulted in the final design of the pipeline to ensure the pipeline design takes into account the proposed duplication of the adjacent section of Victor Harbor Road.

ADVICE

Whilst there are no in-principle objections to the proposed development, the planning authority is directed to attach the following conditions to any approval:

1. The proposed development shall be in general accordance with Draft Ref: 2-WBW-d4, Drawing No. 14689-SK017, Sheet 1, Revision 0 dated 20 September 2018) that shows that the development is off-set 35 metres from the Victor Harbor Road property boundary.

The planning authority is advised to attach the following conditions to any approval:

1. All access to the site shall be gained via Bakewell Drive in general accordance with Draft Ref: 2-WBW-d7, Drawing No.14689-SK017, Sheet 1, Revision 4 dated 19 December 2018. No direct access to Victor Harbor Road shall be permitted.

2. Prior to construction within the site, a Traffic Management Plan (TMP) shall be prepared in consultation with the Commissioner of Highways and the City of Onkaparinga for approval by the Minister for Planning. The TMP shall show all traffic devices to be utilised (including variable message signs) and any proposed traffic restrictions. All access to the subject site shall be in accordance with the TMP.

3. Any infrastructure within the road reserve that is demolished, altered, removed or damaged during the construction of the project shall be reinstated to the satisfaction of the relevant asset owner, with all costs being borne by the applicant.

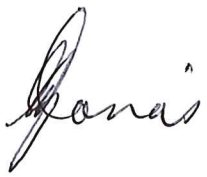
4. Stormwater run-off shall be collected on-site and discharged without jeopardising the safety and integrity of the adjacent roads. Any alterations to the road drainage infrastructure required to facilitate this shall be at the applicant's expense.

The following notes provide important information for the benefit of the applicant and are required to be included in any approval:

1. The Metropolitan Adelaide Road Widening Plan shows a possible requirement for a strip of land up to 35 metres in width from the Victor Harbor Road frontage of this site for possible future road purposes. The consent of the Commissioner of Highways under the *Metropolitan Adelaide Road Widening Plan Act 1972* is required to all new building works located on or within 6 metres of the possible requirement.

2. The proposed 500mm inlet/outlet pipe shown on Draft Ref: 2-WBW-d4, Drawing No. 14689-SK017, Sheet 1, Revision 0 dated 20 September 2018 will be constructed within the road widening requirement and across Victor Harbor Road and thus has the potential to be impacted by the proposed duplication of the adjacent section of Victor Harbor Road. DPTI should be consulted in the final design of the pipeline to ensure the pipeline design takes into account the proposed duplication of the adjacent section of Victor Harbor Road. Furthermore, the applicant must notify DPTI's Traffic Management Centre on telephone 1800 018 313 prior to undertaking any works that would impact the arterial road network.

Yours sincerely,



for **MANAGER, TRANSPORT ASSESSMENT AND POLICY REFORM**
for **COMMISSIONER OF HIGHWAYS**

A copy of the decision notification form should be forwarded to dpti.developmentapplications@sa.gov.au

DEVELOPMENT ACT, 1993
S49/S49A – CROWN DEVELOPMENT
REPRESENTATION ON APPLICATION

Applicant:	Willunga Basin Water Company Pty Ltd
Development Number:	145/V004/19
Nature of Development:	Construction of a 600ML treated water storage dam with associated bulk earthworks, stormwater detention basin, inlet-outlet pipe (buried), landscape mounding and screening, security fencing, and signage
Zone / Policy Area:	Primary Production Zone & Deferred Urban Zone
Subject Land:	Bakewell Drive and Ostrich Farm Road, Seaford Heights
Contact Officer:	Laura Kerber
Phone Number:	08 7109 7073
Close Date:	12 March 2019

My Name: Scott Searle My phone number: 0400116533

Primary method(s) of contact: Email: scotts@fairland.com.au

Postal Address: _____ Postcode: _____

You may be contacted via your nominated PRIMARY METHOD(s) OF CONTACT if you indicate below that you wish to be heard by the State Commission Assessment Panel in support of your submission.

My interests are: *(please tick one)*

- ☐ owner of local property
- ☐ occupier of local property
- ☑ a representative of a company/other organisation affected by the proposal
- ☐ a private citizen

The address of the property affected is: _____ Postcode _____

Lot 4000 Main South Road, Seaford Heights (CT 6206/108)

My interests are: *(please tick one)*

- ☐ I support the development
- ☐ I support the development with some concerns
- ☑ I oppose the development

The specific aspects of the application to which I make comment on are: See attached letter

I: *(please tick one)*

- ☑ wish to be heard in support of my submission
- ☐ do not wish to be heard in support of my submission *(Please tick one)*

By: *(please tick one)*

- ☐ appearing personally
- ☑ being represented by the following person Michael Osborn *(Please tick one)*

Signature: _____

Date: 12/3/19

Return Address: The Secretary, State Commission Assessment Panel, GPO Box 1815, Adelaide, SA 5001 /or Email: scapreps@sa.gov.au

65292-001

12 March 2019

FYFE

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DEVELOPMENT
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FYFE PTY LTD
ABN 57 008 116 130

Ms Laura Kerber
C/- The Secretary
State Commission Assessment Panel
GPO Box 1815
ADELAIDE SA 5001

Dear Laura,

REPRESENTATION RELATING TO DEVELOPMENT APPLICATION 145/V004/19

We refer to the above development application and advise that we have been requested by the owners of adjacent land, Fairmont Land Holdings Pty Ltd, Land SA Pty Ltd and MSP Property Holdings Pty Ltd, to provide an opinion in relation to the merits of the proposal and to prepare this representation on its behalf. For the purposes of this development, the above land holders are represented under the branding of Fairland and as such is utilised as reference within this representation.

Interest of Fairland

As highlighted, Fairland represents is the owner of the land located immediately to the west of the subject land upon which it is developing new master planned community, which is known and marketed as Vista. Fairland is part of the Fairmont Group.

The Fairmont Group has had an interest in the land since 2008, when they were announced as the successful tender to purchase and develop the land which was owned by the Land Management Corporation (now trading as Renewal SA).

As part of the obligations arising from the sale and acquisition of the land, the Fairmont Group is required amongst other matters to:

- Prepare a Master Plan for the development of the land in consultation with relevant stakeholders; and
- Enter into a Deed/LMA in respect to the future development of the land.

The Fairmont Group via Fairland is required to report to Renewal SA regarding adherence to the obligation of the Development Deed including the tracking of staging, land values and the potential affect of market conditions/locational elements which might impact upon the development.

The Master Plan provides for the development of approximately 1200 dwellings, together with a mixed use Neighbourhood Centre. To date, over 400 allotments have been developed, including the Neighbourhood Centre adjacent Robinson Road. Over the next 18 months, future residential stages immediately adjacent to the subject land will be developed and released to the market.

The location of the subject land, relative to Vista is included as Figure 1 on the following page. It is evident that the subject land and the Vista estate share a common boundary. It is also evident from Figure 1, that the proposed dam is located between 29 and 56 metres from the common boundary.

UDIA 2017 SA Awards for Excellence Professional Consulting WINNER

35 YEARS DEVELOPING CAREERS & PROJECTS

A copy of the current Master Plan for Vista is included as Figure 2. It is clearly evident from both Figure 1and Figure 2 that future residential development is anticipated to the eastern boundary of the Vista estate.

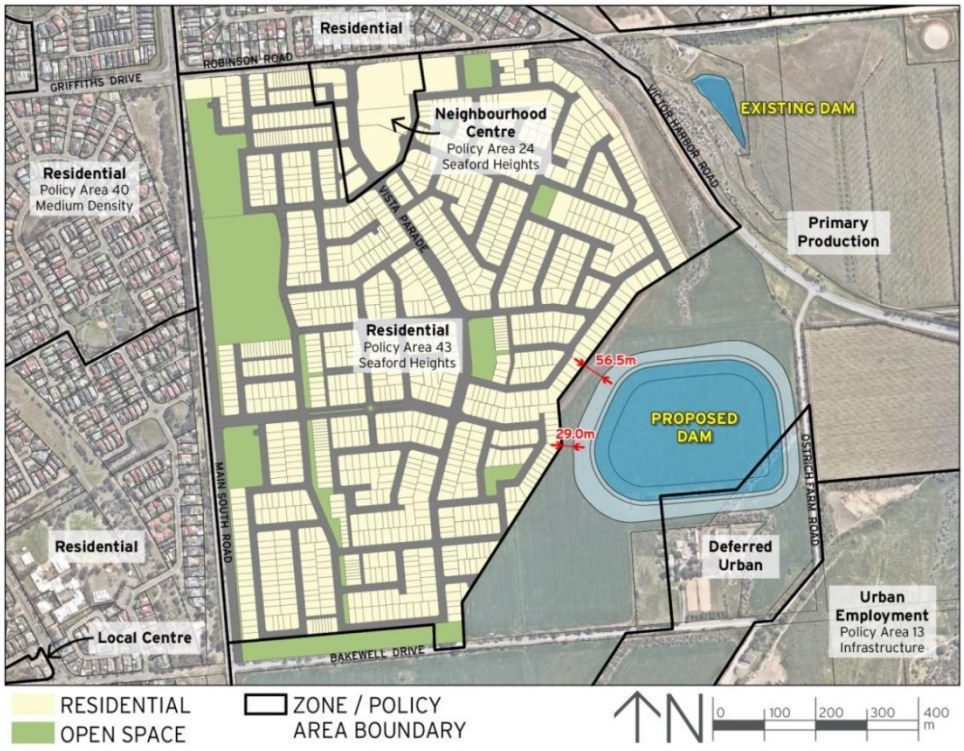


Figure 1: Subject Land and Locality Plan



Figure 2: Master Plan for Vista

Development Deed and Land Management Agreement

As highlighted in the application, a Development Deed applies to the subject land, together with some adjoining land, which requires that '*SRWRA must not cause, suffer or permit the receipt, handling, storage or disposal of waste on the land*'.

The Fairmont Group reserves its rights in respect to any further submission in respect to the proposed development and if it constitutes the receipt, handling, storage or disposal of waste.

Further, a Land Management Agreement (LMA) also applies to the following Certificates of Title:

- Volume 6175 Folio 501; and
- Volume 6034 Folio 589.

The land for which the above represents, comprises the area defined as Buffer Land and the Buffer Zone Landscaping Area. Key obligations of the LMA include:

5.1 The Owner must:

5.1.1 not cause, suffer or permit interference with, damage to or removal or destruction of the Buffer Zone landscaping;

5.1.2 re-plant, re-establish or reconstruct any part of the Buffer Zone Landscaping in the event that there is any damage to, or destruction of the Buffer Zone Landscaping on the Buffer Zone Landscaping Area or the removal of any vegetation or soil from the Buffer Zone Landscaping Area; and

5.1.3 not permit the doing or omission of any act, matter or thing on the Buffer Zone Landscaping Area which has the potential to cause such act, matter or thing in 5.1.1 or 5.1.2;

as it relates to the Land and without the prior written approval of the Minister.

5.2 The owner must:

5.2.1 ensure that the Buffer Land is maintained as primarily a passive vegetated area to screen development and interrupt site sites from Victor Harbor Road; and

5.2.2 obtain the consent of the Developer for any change in the use of the Buffer Land as described in 5.2.1

The extent of the land subject to the LMA is shown by Figure 3. We have also overlaid elements of the proposal plans (noting there are inconsistent plans lodged as part of the DA) to show the interface of the proposal with the Buffer Land and the Buffer Zone Landscaping Area.

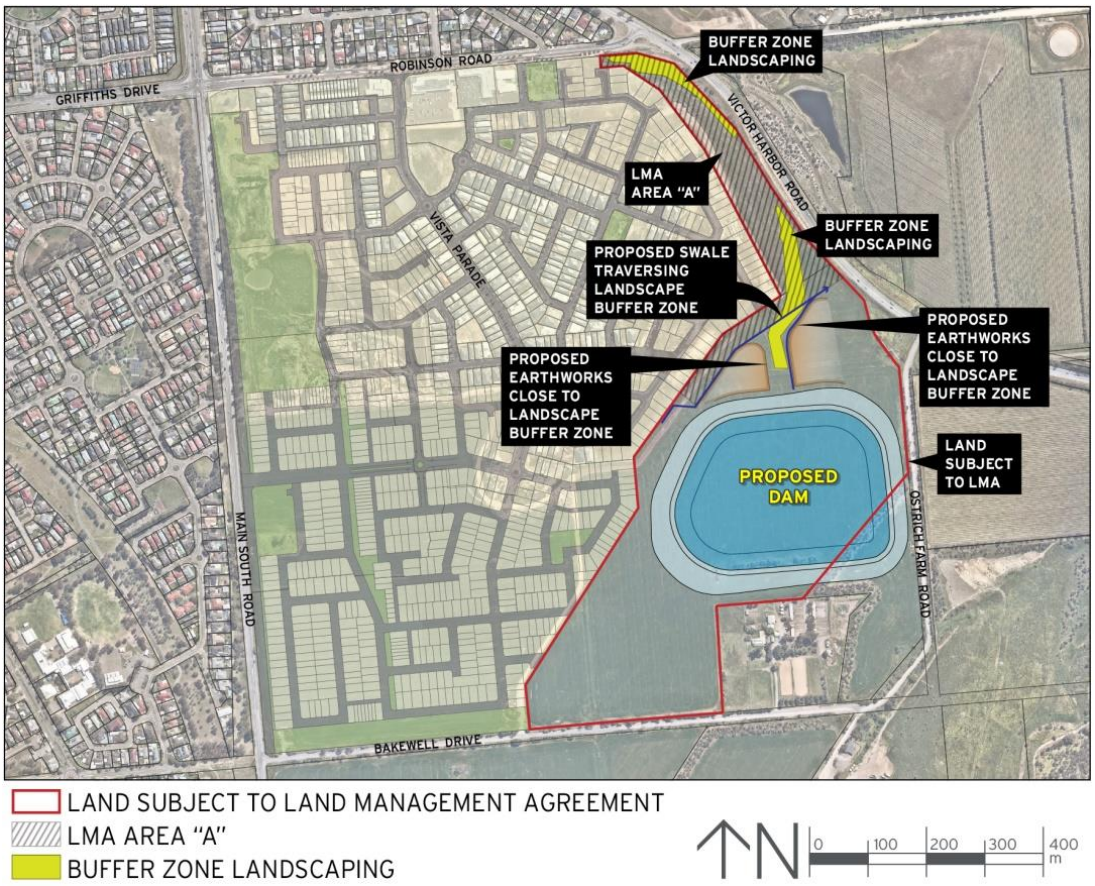


Figure 3: Extent of LMA

In our opinion, the proposed development comprises a change of use of land, both from a Development Act definition perspective and from a physical outcome perspective, by way of including significant earthworks and swales associated with the construction of the treated waste water storage dam.

More particularly, we consider that the very essence of the LMA, which seeks to maintain a primarily passive vegetation area, as both a buffer to sensitive residential land uses and as a protection to the gateway of McLaren Vale, is disregarded by the proposal.

Given the above, it is considered that prior to any assessment of the proposal is carried out that further queries relating to the adherence to the LMA should be considered such as:

- Noting ambiguity in various plans, on at least one plan included in the DA, a swale is shown to clearly dissect the Buffer Zone Landscaping Area, at odds with Clause 5.1.1 and 5.2.1 (unless approval to vary issued by the Minister);
- Even if a swale was to be diverted to not cross the Buffer Zone Landscaping Area, the close proximity of significant building works clearly has potential impact on the Buffer Zone Landscaping Area, with greater setbacks needed to avoid potential risk. From a construction perspective there seems very minimal room and therefore very minimal probability that the Buffer Zone Landscaping Area will be maintained. More detailed and consistent plans should be supplied in order to confirm appropriate separation is proposed;

- The Buffer Land forms the land which is the subject of this application (identified as part of the overall site and specifically incorporating the swale), with the proposal representing a change of use of this land. Whilst preliminary consultation has occurred with the adjoining owner's representatives - Fairland, such has not included a formal request to obtain their consent for the any change of use of the Buffer Land, as required by Clause 5.2.2.

Without the consent of Fairland, the application is considered to breach the obligations of the LMA.

Summary of Key Issues

Following a review of the proposed development, a number of issues arise of concern to Fairland. These include:

- Potential variation with the Development Deed in respect to land use;
- Variation with the LMA in respect to interference with the Buffer Zone Landscaping Area and the need to seek the consent of the Fairmont Group in respect to a change of use of the Buffer Land;
- The proposed land use is clearly not consistent with the expectations of either the Deferred Urban Zone or the Primary Production Zone;
- The proposal, representing a major form of infrastructure (9 hectares in surface area), removes land currently used for primary production purposes, with no justification provided in terms of analysing the productive capacity of the land;
- The proposal is for a built form and scale which is not compatible with the expectations of the McLaren Vale Character Preservation District;
- The nature and scale of the proposed development is incompatible with the actual and perceived amenity expectations of the adjacent Residential Zone. The amenity implications relate to potential visual impact from future planned stages of Vista;
- The application does not demonstrate that the spillway and freeboard will not result in flooding to adjoining properties in a 1 in 100 average recurrence interval storm event;
- The separation distance between the planned and approved Vista estate is minimal and less than typical separation distances planned between urban and non-urban interfaces; and
- Whilst the applicant has agreed to conditions for future construction and traffic management plans, it is considered that given the proximity of sensitive uses to the site that there is a fundamental requirement to seek specific management criteria for the application. Fairland request communication and input into the preparation of the Construction and Environment Management Plan (CEMP) referred to in the application documentation, in order to provide surety to existing and future land owners of the adjoining residential estate. The State Heritage Unit may also benefit from the CEMP to assess the impacts of vibration during construction on the adjacent State Heritage Place.

Detailed Submission

Land Use

The Planning Report which accompanies the development application seeks to justify the land use and inconsistency with such a use with the objectives of the Primary Production and Deferred Urban Zones, through drawing a relationship between the storage and supply of water which supports primary production activities. Whilst such a general connection is not disputed, the reality of the proposal is that:

- Approximately 9 hectares of land will be removed from primary production in order to provide a storage facility for the recycled water. This area of land is hardly a "small amount" of land;
- No information has been supplied in respect to land capability and the economic value of the land from a primary production perspective; and
- No explanation has been provided in respect to the consideration of alternate sites, on land either not used or zoned for primary production activities, or with a demonstrably lower capacity to support primary production activities.

In our opinion, the expectations of the Development Plan are clear. In particular:

- The Primary Production Zone should directly be used for primary production purposes;
- Any supporting infrastructure anticipated in the Primary Production Zone would in our opinion not be of the scale proposed; and
- The Deferred Urban Zone is set aside for future urban use. The scale of the proposed development is not an urban use, but rather is a large scale form of infrastructure which would in effect prevent and alienate the use of the land for urban purposes.

In support of this notion, we refer to the following specific Objectives of the Primary Production Zone:

1 *The long term continuation of primary production where natural resources are not jeopardised.*

2 *Economically productive, efficient and environmentally sustainable primary production.*

6 *The enhancement of the rural character, key scenic routes, scenic surrounds to townships, amenity and prominent landscape for the enjoyment of residents and visitors.*

The proposed development is inconsistent with the above Objectives due to:

- Removing land currently used for primary production contrary to Objective 1 and 2; and
- The proposed development will not enhance the rural character or key scenic routes but instead proposes a substantial alteration to the existing landscape comprising some 180,000 cubic metres of fill to construct the dam walls which will exceed 7.5 metres in height.

Inconsistencies between the plans also suggest that the landscaping earth mounding may exceed 10 metres in height by illustrating a design level of 101.5m with an existing contour of 90m below. It is acknowledged however that the Visual Impact Assessment (VIA) suggests that the landscape mounding will generally be between 1.6 and 7.8 metres in height. This assessment is supported by the section drawings.

The Desired Character for the Primary Production Zone, in part states:

> *Much of the area is suitable for a range of agricultural production, notably vines, grazing, cropping, almonds, strawberries and other similar foods including niche market products.*

Despite the volume of information presented in the Development Application, no assessment has been made in respect to the productive capacity of the land.

Principles 5 and 6 of the Primary Production Zone state:

5 *Development should ensure that genuine agricultural activities are not prejudiced.*

6 *Development which would remove productive land from agriculture or diminish its overall productivity for primary production should not be undertaken unless the land is required for essential public purposes.*

We acknowledge that Principle 6 recognises a circumstance when land can be removed from primary production. However we would not regard the storage of recycled water, whilst holistically a desirable facility, is not what the Development Plan would anticipate as being an essential public purpose.

Moreover, we suggest that the Development Plan would anticipate a balanced assessment that demonstrates that no reasonable alternative exists. Such goes to the core of the need for a site option/land capability assessment.

The proposed development is also partially positioned within the Deferred Urban Zone.

In respect to the Deferred Urban Zone, we note the following Objectives:

1 *A zone accommodating a restricted range of rural uses that are not prejudicial to development of the land for urban purposes and maintain the rural appearance of the zone.*

2 *A zone comprising land to be used primarily for broad-acre cropping and grazing purposes until required for future urban expansion.*

3 *Prevention of development likely to be incompatible with long-term urban development, or likely to be detrimental to the orderly and efficient servicing and conversion of the land for urban use.*

Further to the above, Principle 1 of the Deferred Urban Zone states:

1 *The following forms of development are envisaged in the zone:*

- broad-acre cropping
- grazing

We note that this is a very limited range of uses.

The Desired Character for the Deferred Urban Zone, in part states:

> *The zone primarily comprises land for future urban expansion. While the zoning is to be regarded as a holding measure with its ultimate use not yet determined, development within the zone will generally comprise low-scale agricultural uses that do not prejudice the orderly conversion of the land for residential purposes.*

We recognise that the Deferred Urban Zone is currently located within the boundary of the McLaren Vale Character Preservation District, which as expressed in the Planning Report prepared on behalf of the applicant, suggests that the land may be unlikely to be used for urban purposes in the foreseeable future.

Notwithstanding this, we do note that the Act requires the State Planning Commission to undertake a review of the *Character Preservation (McLaren Vale) Act 2012* every five years, and as such there is a mechanism in place whereby the land could be considered for urban use in the future, should the boundary of the McLaren Vale Character Preservation District be amended in this location. The recent review completed in 2018 recommended that a further review of these boundaries occur as part of the Planning and Design Code preparation.

Notwithstanding this strategic planning overlay's, the City of Onkaparinga Development Plan, the relevant planning instrument for this application, does not at this stage discount the use of the land for urban purposes in the future.

What is clear is the investment and development of the proposed water storage facility is likely to eliminate any prospect of the land being used for ongoing primary production or urban purposes, should the McLaren Vale Character Preservation District be amended.

Strategic Considerations

In 2013, the State Government recognised the importance of preserving the State's agricultural lands by introducing an addendum to the 30 Year Plan for Greater Adelaide.

The 30 Year Plan (2017 Update) makes specific reference to the strategic need to protect our valuable agricultural, tourism and environmental assets. It states (underlining our emphasis):

> *'The Planning, Development and Infrastructure Act 2016 (PDI Act) introduced legislated Environment and Food Production Areas (EFPAs) to protect our food bowl, tourism assets, valuable rural areas, landscape values and environmental resources, and to guide Adelaide's future urban form.*
>
> *In response to this Act, this Update focuses on enabling new development within our existing urban footprint. By doing so, we will help create opportunities for housing choice; reduce costs to new homebuyers; protect our iconic agricultural landscapes; ensure jobs are available and accessible; and reduce the burden on taxpayers for future infrastructure.*
>
> *It is important that we maintain Adelaide's unique qualities as a city conveniently located a relatively short distance from an international airport, one of Australia's largest stretches of coastline, world-renowned wine regions and unique landscapes. We are already being recognised for our foresight in doing this. There is growing concern in Sydney and Melbourne that they are losing their valuable food production areas and their populations are being further dispersed from their workplaces.'*

To enforce the need to protect primary production land, the *Planning, Development and Infrastructure Act 2016* itself requires that '*the Commission must ensure that areas of rural, landscape, environmental or food production significance within Greater Adelaide are protected from urban encroachment*' (at section 7, subsection (3) and subsection (6)).

Whilst it is acknowledged that the land is not within the Environment and Food Production Area (EFPA), should an area be removed from the McLaren Vale Character Preservation District, it will be automatically included in the EFPA pursuant to section 7(4).

In our view, such clearly demonstrates the strategic need to protect primary production within the Character Preservation District from further encroachment.

The proposed treated water storage dam will however remove more than 9 hectares of primary production land contrary to the 30 Year Plan and the intent of the *Planning, Development and Infrastructure Act 2016*. Despite this, no justification has been provided with respect to the land capability or its economic value from a primary production perspective.

Scale

The Primary Production Zone provides clear guidance in respect to scale and siting of development in rural areas, as demonstrated by the Principles below:

10 Buildings should not impair the character of rural areas by reason of their scale or siting.

16 The excavation and/or filling of land should:

(a) be kept to a minimum and be limited to no greater than 1.5 metres so as to preserve the natural form of the land and the native vegetation

(b) only be undertaken in order to reduce the visual impact of buildings, including structures, or in order to construct water storage facilities for use on the allotment

(c) only be undertaken if the resultant slope can be stabilised to prevent erosion

(d) result in stable scree slopes which are covered with top soil and landscaped so as to preserve and enhance the natural character or assist in the re-establishment of the natural character of the region.

19 Buildings, including structures, should be located in unobtrusive locations and, in particular, should be located:

(a) on an excavated rather than a filled site in order to reduce the vertical profile of the building

(b) in such a way as to maximise the retention of existing native vegetation and the protection and retention of watercourses.

40 Excavation and earthworks should take place in a manner that is not extensively visible from surrounding localities.

The proposed treated water storage dam will be situated within 200 metres of a key tourist route and is considerable in size. In particular, the dam will span some 330 metres long, 265 metres wide and will have walls more than 7.5 metres in height above existing ground level.

The excavation and fill is not limited to a maximum of 1.5 metres and will not be undertaken to reduce the visual impact of a building. In contrast, the proposed development proposes earthworks at a scale more than five times the height sought as a maximum within the Primary Production Zone. A 500% deviation from the height sought by the planning provisions cannot be considered as minor, nor can it be excused as simply an operational requirement given the proposed development is not anticipated in this location.

It is evidently substantial in scale and is situated within a highly visible location, and will impair the open rural locality due to both the scale and siting, contrary to PDC 10.

Despite substantially exceeding the parameters within PDC 16, the proposed development is situated on a ridgeline, adjacent a scenic tourist route and the Residential Zone. As a result, the VIA included within the application confirms that the proposed development will be visible above the existing ridgeline and that the '*proposed dam embankment will result in a significant modification to the existing land form'* (at 3.2.4 and reiterated at 3.2.1, 3.2.14, 3.2.15 and 3.2.24). In particular, the VIA confirms that the proposed development will have a visual impact in the following locations:

- '*The embankment of the proposed dam will sit at a height 4.45 metres above the existing ground level*' when viewing the site from Victor Harbor Road looking south;
- '*The new landform associated with the proposed dam will be visual up to 6.25 metres above the existing highest point of the subject land*' from Ostrich Farm Road;
- *'From Bakewell Road, the proposed development will be viewed as an increase in the landform associated with the hill. The extent of the sloped profile and arrangement of the vegetation will result in a defined belt of vegetation forming a new horizon line located approximately 7.8 metres above the existing landform';*
- The dam will result in the removal of a number of mature planted olive trees that provide a backdrop to the State Heritage Ostrich Farm and '*will introduce new landscape elements into the landscape above the existing horizon line'* behind the State Heritage Place;
- The '*proposed development will form an elevated topography behind the fence line'* along the eastern boundary of Vista when viewed from the Main South Road and Robinson Road intersection;
- The dam visualisations show that the dam will protrude over the existing fence line along the eastern boundary of Vista when viewed from the corner of Edison and Cotterell Road within Vista.

An assessment has critically not been undertaken from the future stages of the Vista development and consequently does not appear to have properly considered the impacts to adjacent land. The section drawings and VIA rely on two storey dwellings being developed adjacent the shared boundary to minimise the visual impact of the dam on the remainder of the estate. This is an uncertainty and moreover is an inappropriate design response whereby independent developments by third parties are required to adequately screen the proposal when viewed from surrounding land.

Landscaping is proposed to manage the visual impact of the dam on the landscape and the adjacent residential development and due to the significant scale of the dam, the proposed landscaping is proposed on elevated mounds. The extent of landscaping proposed to 'screen' the scale of the proposed dam reinforces that the scale is inherently unsuitable and will have an adverse impact on the amenity of the locality. Notwithstanding this, '*landscaping should not be relied upon to render appropriate a proposal which is otherwise inappropriate*' (Commissioner Rumsby and Commissioner Hamnett in *Paior & Anor V The Corporation Of The City Of Marion & Anor* [2017] *SAERDC 4* in 147).

Further to the above, in 2012, the *Character Preservation (McLaren Vale) Act 2012* was introduced to ensure that the heritage and cultural significance of the Barossa Valley and McLaren Vale regions were preserved for future generations.

It requires relevant authorities to further the objects of the Act when undertaking development assessment (pursuant to Section 6(2) of the *Character Preservation (McLaren Vale) Act 2012*).

These objects are as follows:

(1) The objects of this Act are—

a) to recognise, protect and enhance the special character of the district while at the same time providing for the economic, social and physical well being of the community; and

b) to ensure that activities that are unacceptable in view of their adverse effects on the special character of the district are prevented from proceeding; and

c) to ensure that future development does not detract from the special character of the district; and

d) otherwise to ensure the preservation of the special character of the district.

To reinforce the above, the following policies have also been inserted into the Onkaparinga Development Plan in relation to the Character Preservation District Overlay:

Objective 1: A district where:

(a) scenic and rural landscapes are highly valued, retained and protected

(b) development near entrances to towns and settlements does not diminish the rural setting, character and heritage values associated with those towns and settlements

(c) the long term use of land for primary production and associated value adding enterprises is assured and promoted

(d) activities positively contribute to tourism

(e) the heritage attributes of the district are preserved

(f) buildings and structures complement the landscape.

PDC 1: Development in the district should:

a) when located near townships, contribute towards and maintain the identity of those townships

b) retain the predominant rural landscape character and function

c) foster primary production and associated value adding enterprises and tourism activities.

The proposed scale is clearly not anticipated within the Character Preservation District and will require substantial modifications to the existing landscape.

In our opinion, the proposed development is at odds with the above objects of the Act and the policies within the Development Plan for the following reasons:

- The proposed development comprises a substantial alteration to the existing landform, does not minimise the excavation and filling of land and exceeds the anticipated maximum of 1.5 metres by up to five times;

- It does not seek to complement, retain or protect the rural landscape;
- It will not secure the long term use of the land for primary production but rather will remove more than 9 hectares from being utilised for primary production purposes;
- It adjacent a key tourist route (Victor Harbour Road);
- It is within 70 metres of the State Heritage listed former Ostrich Farm and Prior's Court Homestead and will potentially impact the setting of this heritage place; and
- It is situated on an elevated ridgeline and is not in an obtrusive location.

Due to the above, the proposed development does not protect and enhance the special character of the district and in the absence of established vegetation buffers, is likely to adversely affect the character of the District.

Based on the above, the built form and scale is clearly not compatible with the expectations of the McLaren Vale Character Preservation District, especially in such a sensitive location. In our opinion, the scale of the development would need to be substantially reduced to further the objects of the *Character Preservation (McLaren Vale) Act 2012* and satisfy section 6(2) of same.

Impact on Residential Amenity

The proposed development directly abuts the Residential Zone to the east and the 78.7 metres setback indicated on the site plan and within the Planning Report does not accurately represent the separation of the proposed development from the Residential Zone.

In reality, the crest of the western edge of the dam is less approximately 56 metres from the Residential Zone and the toe of the dam wall batter is less than 30 metres from the zone boundary (confirmed by the Hydroplan Section Views).

The Vista Master Plan (included as Figure 2 above) clearly anticipates dwellings adjacent the shared allotment boundary. Due to the proposed development's scale and proximity, the dam wall will potentially be visible from the future dwellings along the eastern boundary. It is acknowledged that whilst the future development of dwellings may screen the dam from the public realm within the balance of the Vista development, we consider the reliance upon such development to be a fundamentally inappropriate design response.

As discussed above, the Development Plan expects the retention of an open rural amenity in this location. The proposed development will not maintain the open rural character of the locality and will substantially alter the land form within 60 metres of the Residential Zone boundary. To reduce this impact, landscaping and associated mounds have been proposed in an attempt to remedy the otherwise inappropriate scale of the dam. In particular, the scale of the dam is so significant, that landscaping mounds have been proposed to elevate the height of the proposed vegetation.

In terms of other potential impacts on residential amenity, the odour report prepared by ERM as part of the application could not conclude there will be no odour and that it will be present from time to time. The ERM report also suggests the nearest future sensitive receptor is 78m away. As mentioned, we note that is distance is more in the order of 56 metres and therefore the assessment by ERM may need further review.

We note that a key reason for the Buffer Zone Landscaping Area identified in the LMA was to ensure that sensitive residential uses in the Vista development are protect from the future use of the SWARA land. The provision of minimal setbacks and separation is at odds with this intent.

In relation to the interface between Residential and Primary Production Zones, Primary Production Zone Principle 60 states the following:

60 *Development should reduce conflict between residential zones, townships and rural uses by complying with (a) and (c) or (b) and (c):*

(a) where aerial spraying is required, providing a separation distance of 300 metres to a residential or urban zone

(b) the provision of a vegetated buffer of a minimum width of 40 metres which satisfies all of the following:

(i) which contains random plantings of fast growing and hardy native or indigenous varieties of tree and shrub species of differing growth habits, at spacings of 4 to 5 metres

(ii) with species selected with foliage from the base to the crown with long, thin and rough foliage to facilitate the more efficient capture of spray droplets

(iii) which provides a semi-permeable barrier with a porosity of 0.5, to allow air to pass through the buffer

(iv) which attains a mature height of 1.5 times the spray height

(v) which is provided with a suitable watering system and access tracks either side for fire protection and access

(c) not storing refuse or organic waste within 150 metres of residential or urban zones.

The proposed development will not create a 40 metre wide vegetation buffer between the proposed dam and the Vista development and will be as close as 30 metres in some locations. Whilst it encroaches on the buffer area envisaged by the Development Plan, the significant scale of the proposed dam suggests that a greater separation distance would in fact be appropriate.

Based on the assessment above, in our opinion, the nature and scale of the proposed development is incompatible with the amenity expectations of the adjacent Residential Zone.

Flooding Assessment

The design of a spillway (for overflow) and freeboard is integral to understanding whether a dam will increase the risk of flooding to adjoining allotments in a storm event. The Council's Development Plan under the heading Hazards requires that such be considered:

PDC 7: Development, including earthworks associated with development, should not do any of the following:

(b) increase the potential hazard risk to public safety of persons during a flood event

(e) increase the risk of flooding of other land

The Planning Report included with the application notes that assessment of the spill way and freeboard will form part of detailed design at a later stage. However, managing the overflow from a 600ML treated water storage dam is considered to be fundamental to the risk assessment and therefore merits of the application and is not appropriate to attach as a reserve matter for later consideration.

On this basis, Fairmont request that a flood assessment be undertaken in order to demonstrate that overflow resulting from a 1 in 100 year Average Recurrence Interval (ARI) Event will not increase potential hazard risk to public safety or increase the risk of flooding to other land downstream. Particularly in this instance as a residential estate will be situated downstream from the dam.

SA Health

Concern is raised in respect to the endorsement of the proposal SA Health, noting that the correspondence contained in Appendix 11 of the Planning Report makes significant reference to the previous consideration of a similar proposal at Bowering Hill. The subject proposal is significantly different from a residential interface perspective, with the 1200 dwellings proposed at Vista a potentially 'people intensive location'.

Construction and Environment Management Plan

Whilst a Construction and Environment Management Plan (CEMP) is not generally a planning assessment consideration, the dam will require substantial earthworks within close proximity to sensitive land uses. These construction activities have the potential to have a significant impact on the amenity of these dwellings relating to noise, dust and vibration and in turn, result in ongoing interface issues between residents, Fairland and the Willunga Basin Water Company Pty Ltd without careful management and collaboration.

Should the development be approved, Fairland request the opportunity for communication and input into the preparation of the CEMP in order to minimise the impact of the construction phase on the adjoining residents and in turn, minimise the opportunities for complaints from residents during the construction. Fairland would prefer that the CEMP be prepared and negotiated ahead of any approval.

Summary

Fairland have concerns that the proposed development is at variance both the intent and specific requirements of the Development Deed and LMA which apply to the subject land. In particular, there is a potential variation with the Development Deed in respect to land use (relating to waste), and a clear departure from the LMA in respect to:

- interference with the Buffer Zone Landscaping Area; and
- the need to seek the consent of the Fairmont Group in respect to a change of use of the Buffer Land.

In our opinion, the proposed location and scale of the proposed development is at odds with the intent of the Primary Production Zone and does not seek to further the objectives of the *Character Preservation (McLaren Vale) Act 2012*. In particular, the proposed development is considered to be at odds with the Development Plan in the following ways:

- The proposed development is not consistent with the expectations of the Primary Production Zone, namely Zone Objectives 1, 2 and 4;
- The proposal represents a major form of infrastructure which removes land currently used for primary production purposes, with no justification provided in terms of the productive capacity of the land contrary to Zone Objectives 1, 2 and 4;

- A built form and scale which is not compatible with the objects of the *Character Preservation (McLaren Vale) Act 2012* or the Character Preservation District Overlay Objectives;
- The nature and scale of the proposed development is incompatible with the visual amenity expectations of the adjacent Residential Zone; and
- The potential for the development to cause flooding in a 1 in 100 year storm event to residential land downstream has not been considered contrary to Hazards PDC 7.

In addition, the potential for the construction phase to have considerable impacts in terms of noise, dust and odour has not been considered despite the proximity to residential development.

To address the above concerns, Fairland request that the following occur:

- A land capability assessment occur and it be demonstrated that no alternative site, with reduced visual impact, exists;
- That the scale of the dam (length, width and height) be reduced to:
    - Retain land for primary production purposes;
    - Align with the objects of the *Character Preservation (McLaren Vale) Act 2012* by reducing the impact on the landscape and tourist route; and
    - Reduce the visual impact on the adjoining Residential Zone and future development;
- Increase the setback to the Residential Zone to reduce the visual appearance of the dam from future dwellings;
- A flood assessment be provided that demonstrates the design of the spillway and freeboard will not increase the risk of flooding to adjoining allotments; and
- Fairland be offered the opportunity to have input into the preparation of the CEMP, ahead of planning consent being issued.

Please note that Fairland **wish to be heard by the State Commission Assessment Panel** in support of their representation.

Please do not hesitate to contact me should you have any questions arising.

Yours sincerely

Michael Osborn
National Planning Manager

From: kyle hardy [mailto:kyle.hardyy@gmail.com]
Sent: Thursday, 7 March 2019 4:34 PM
To: DPTI:State Commission Assessment Panel <scapadmin@sa.gov.au>
Subject: Seaford Heights Dam Development

To whom this may concern,

In regards to the potential planning of the Seaford Heights Dam, I have had a detailed read through the report and have found a section referring to the South Australian Integrated Mosquito Management Resource Package of 2006 on page 21. This page refers to the dam being built around "People Intensive" areas. However they are looking to build this dam right next to the current Seaford Vista housing development. I have attached a photo of the said area in question.

In the report there is also a section where it is referring to no current plan in South Australia to manage said smells that may come from development that could be affect people living in this development such as myself. There would also be a lot more fly's and insects coming to the area since South Australia does not have a management process for this unlike many other states.

I believe this dam would be better suited if it was relocated away from any housing developments or existing buildings and put near where the Mclaren Vale vineries that this dam is supposed to be used for.

Thanks for taking this into consideration process for the planning.

Kyle Hardy
73 Vista Parade, Seaford Heights, 5169

1. Eliminating /avoiding risk using:

1.1 Planning controls

For example:

- *Preventing the creation of potential 'new' breeding sites during construction and infrastructure development, e.g. through the appropriate design of permanent or temporary retention/detention basins.*
- *Consideration given to the appropriate location of 'people-intensive' development and activities such as residential areas, schools, hospitals, child and aged care facilities, light industry, tourism, and recreational.*
- *Consideration given to the location of animal intensive areas and development or activities, e.g. animal husbandry such as cattle lots, chicken farms.*
- *Zoning to help protect the community against inappropriate development and activities, e.g. avoiding people-intensive development in close proximity to mangrove/salt marsh regions.*

Secretary
State Commission Assessment Panel
GPO Box 1815
Adelaide, SA, 5001
Via: scapreps@sa.gov.au

7th March 2019

Dear Secretary,

RE: Development Number: 145/V004/19 – WBWC 600ML Treated Water Storage Dam
I write to you on behalf of the McLaren Vale Grape Wine & Tourism Association (MVGWTA) – the peak body representing more than 550 businesses and over $500m in farm-gate value – encompassing all grape-growers, winemakers and tourism providers in one of Australia's most valuable wine tourism regions – McLaren Vale, South Australia.

MVGWTA's primary purpose is to grow value and equity in 'brand McLaren Vale' thereby ensuring long-term sustainability of our grape, wine and tourism industries in the McLaren Vale region. We achieve this through domestic and international marketing and promotion, industry development and training, as well as through advocacy and consultation where appropriate.

Sustainable water supplies are critical to the long-term success of the McLaren Vale Wine Region. Over the past 20 years, Willunga Basin Water Company ("WBWC") has played a significant role in securing a drought resilient water supply to our region, which has enabled McLaren Vale to expand its production and position itself as the most sustainable wine growing region in Australia.

Despite the success of the WBWC supply network and the sustainable practices of our region's irrigators, groundwater sources across our region continue to deteriorate due increasing salinity levels. The increasing salinity levels in McLaren Vale's groundwater supplies pose a significant threat to our region's annual $75m grape crop, both in terms of available water supply required for primary industry production, and, the quality of the grapes grown. The increase in supply of water through the WBWC will enable irrigators to reduce their reliance on groundwater, which will help to improve the sustainability of this resource whilst allowing irrigators to continue to grow and expand their businesses.

The Sustainable Australia Winegrowing ('SAW') Program was established by MVGWTA to assist growers in improving their on-farm practices. Water Management is a significant element within the Program, and the water supplied by WBWC directly supports the philosophy of the SAW Program.

MVGWTA formally supports the proposed 600ML Storage Dam as the development directly supports our primary purpose. This development will help to secure our region's water supplies and continue to demonstrate McLaren Vale's leadership in sustainable water management, internationally.

I welcome the opportunity to discuss the merits of this development for McLaren Vale.

Sincerely,

Jennifer Lynch
General Manager, MVGWTA

Your Ref:

Our Ref:

12 March 2019

Laura Ferber
State Commission Assessment Panel
GPO Box 1815
ADELAIDE SA 5000

Dear Laura

145/V004/2019 Construction of treated water storage dam with associated bulk earthworks, stormwater detention basin, inlet-outlet pipe (buried), landscape mounding and screening, security fencing, and signage.

The Council at its meeting of 19 March 2019 will consider a report from staff and a draft submission, as council's comments, which will be provided to SCAP in accordance with Section 49, Clause 5 of the *Development Act 1993*.

We have further lodged this representation as part of the category 3 process, and seek to be heard before the SCAP in support of our comments.

We are generally supportive of the proposal, and wish to further expand on our comments that will be endorsed by council, which relate to:

- design and landscaping
- amenity and flooding
- security and fencing
- LMA considerations.

If you have queries relating to the submission then please contact John Mason – Senior Development Officer – Planning on 8384 0549.

Yours sincerely

Renee Mitchell
Manager Development Services

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Noarlunga Centre
South Australia 5168
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Noarlunga Centre
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Woodcroft office
175 Bains Road
Morphett Vale
Telephone (08) 8384 0666
Facsimile (08) 8382 8744

DEVELOPMENT ACT, 1993
S49/S49A – CROWN DEVELOPMENT
REPRESENTATION ON APPLICATION

Applicant:	Willunga Basin Water Company Pty Ltd
Development Number:	145/V004/19
Nature of Development:	Construction of a 600ML treated water storage dam with associated bulk earthworks, stormwater detention basin, inlet-outlet pipe (buried), landscape mounding and screening, security fencing, and signage
Zone / Policy Area:	Primary Production Zone & Deferred Urban Zone
Subject Land:	Bakewell Drive and Ostrich Farm Road, Seaford Heights
Contact Officer:	Laura Kerber
Phone Number:	08 7109 7073
Close Date:	12 March 2019

My Name: Renee Mitchell (Manager Development Services – City of Onkaparinga)

My phone number: 8384 0584 (contact John Mason on 8384 0549)

Primary method(s) of contact:

Email: renee.mitchell@onkaparinga.sa.gov.au

Postal Address: PO Box 1

NOARLUNGA CENTRE Postcode: 5168

You may be contacted via your nominated PRIMARY METHOD(s) OF CONTACT if you indicate below that you wish to be heard by the State Commission Assessment Panel in support of your submission.

My interests are: *(please tick one)*

- [x] owner of local property
- [ ] occupier of local property
- [x] a representative of a company/other organisation affected by the proposal
- [ ] a private citizen

The address of the property affected is:

City of Onkaparinga is a constituent council of the regional subsidiary SRWRA, being the owner of land identified as lots 102 Ostrich Farm Road and lot 108 Bakewell Drive, Seaford Heights.

Postcode

My interests are: *(please tick one)*

- [ ] I support the development
- [x] I support the development with some concerns
- [ ] I oppose the development

The specific aspects of the application to which I make comment on are: Refer attached letter dated 12 March 2019

I: *(please tick one)*

- [x] wish to be heard in support of my submission
- [ ] do not wish to be heard in support of my submission *(Please tick one)*

By: *(please tick one)*

- [x] appearing personally
- [ ] being represented by the following person *(Please tick one)*

Signature:

Date: 12/3/19

Return Address: The Secretary, State Commission Assessment Panel, GPO Box 1815, Adelaide, SA 5001 /or **Email:** scapreps@sa.gov.au

ekistics

3 May 2019 REF No.: 00664-004

Department of Planning, Transport and Infrastructure

GPO Box 1815

ADELAIDE SA 5001

Attention: Simon Neldner – Team Leader – Crown and Major Developments

By Email: simon.neldner@sa.gov.au

Dear Simon,

RE: DA 145/V004/19 – PROPOSED 600ML TREATED WATER STORAGE DAM - RESPONSE TO REPRESENTATIONS & PROVISION OF AMENDED PLANS FOR DEVELOPMENT

1. Background

We refer to the proposed development application for a proposed 600ML treated water storage dam at Bakewell Drive and Ostrich Farm Road, Seaford Heights (DA145/V004/19).

The development application is sponsored as 'public infrastructure' by the Minister for Transport, Infrastructure and Local Government under Section 49 of the *Development Act, 1993* and is more formally described as a '*600ML treated water storage dam with associated bulk earthworks, stormwater detention basin, inlet-outlet pipe (buried), landscape mounding and screening, security fencing and signage*.'

Public notification of the development application has been undertaken and was completed on 12 March 2019. A total of four (4) valid representations were received in relation to the public notification of the application.

This correspondence serves to respond to the representations received in relation to the development application. It also serves to provide amended plans for development including:

- A slight increase in the setback of proposed landscape mounds and pipe infrastructure away from the Victor Harbor Road alignment; and
- Incorporation of an overflow structure into the dam design.

Each matter is addressed respectively below.

2. Public Consultation

2.1 Summary of Representations

It is noted that four (4) representations were received in total during the formal public consultation process with two (2) representations provided in support of the development and two (2) representations received in opposition to the development.

In addition, we confirm that the applicant received separate written confirmation from Geoff Hayter from the 'Friends of Willunga Basin' (FOWB) on Tuesday 19 February 2019 stating:

> *'Just to let you know, FOWB is aware that an application for development approval has been lodged for a water lagoon at Seaford Rise.*
>
> *Having viewed the application, FOWB sees no need to make a representation in respect of it – noting that we only tend to do so when we are speaking against a proposal.*
>
> *In this case though, we think the proposed lagoon is a reasonable solution to an identified need'*
>
> *Good luck with it."*

A copy of the correspondence from the 'Friends of Willunga Basin' is attached in ***Appendix 1***.

The comments received from the representors during the public notification of the development application are summarised in ***Table 2.1*** below.

A detailed response to each issue raised in association with the public notification of the application is provided in Section 2.2 below.

Table 2.1 *Summary of Representations*

#	Formal Submission	Support Proposal (Yes/No)	Seeking to Present Verbally (Yes/No)	Address	Summary of Comments
1	Jennifer Lynch – General Manager McLaren Vale Grape Wine & Tourism Association	Yes	Yes	796 Main Road, Mclaren Vale	• Supports development • Willunga Basin Water Authority plays a significant role in securing drought resilient water supply to McLaren Vale and has enabled the region to expand its production and position itself as the most sustainable wine growing region in Australia • Ground water sources across McLaren Vale continue to deteriorate due to increased salinity levels which poses a significant threat to the regions annual $75 grape crop (quantity and quality of production).

#	Formal Submission	Support Proposal (Yes/No)	Seeking to Present Verbally (Yes/No)	Address	Summary of Comments
					• Increased water supply will enable irrigators to reduce their reliance on groundwater, improve sustainability of this resource and allow irrigators to continue to grow and expand their businesses. • The development will directly support primary production utilizing sustainable resources
2	Renee Mitchell (Manager Development Services) City Of Onkaparinga	Yes (with some concerns)	Yes	Ramsay Place, Noarlunga Centre	• Generally supportive of the proposal
3	Kyle Hardy	No	Not stated	73 Vista Parade, Seaford Heights, 5169	• Mosquito Management and proximity of the proposed dam to 'People Intensive' areas • Smells (odour) from the dam that could impact on adjoining residents • Increase in flies and insects coming to the area • Suggests dam would be better suited if it was relocated away from any housing developments
4	Scott Searle - Fairland	No	Yes	Lot 4000 Main South Road, Seaford Heights	• Submission by Michael Osborne – National Planning Manager – Fyfe. • Concerns regarding inconsistencies in plans lodged as part of the DA • Concern with possible or perceived breach of 'Development Deed' and 'Land Management Agreement' applying to the land • Development not consistent with expectations of the Deferred Urban Zone or Primary Production Zone • Proposal removes land currently used for primary production purposes with no justification

#	Formal Submission	Support Proposal (Yes/No)	Seeking to Present Verbally (Yes/No)	Address	Summary of Comments
					• Built form and scale not compatible with the expectations of the McLaren Vale Character Preservation District • Nature and Scale of Development not compatible with actual and perceived amenity expectations of adjacent Residential Zone • Potential Visual Impact of dam • Application does not demonstrate that the spillway and freeboard will not result in flooding to adjoining properties in a 1 in 100 ARI storm event • Inadequate separation distance with adjoining Vista Estate • The ERM Odour Assessment inaccurately identifies the actual separation distance of the dam from the adjoining Vista Estate (56 metre separation rather than stated 78 metre separation) • Need for Construction Environmental Management Plan (CEMP) with input from Fairland & State Heritage Unit

2.2 Response to Representations

A response to the key issues raised by representors is provided below.

2.2.1 Support for the Proposal

Onkaparinga Council

The City of Onkaparinga Council provided a written representation on 12 March 2019 advising that Council was '*… generally supportive of the proposal*'.

Following the receipt of representations, we note that the City of Onkaparinga Council also considered the development application at a Council meeting held on 19 March 2019. At this meeting, the Council resolved to endorse a Draft letter to the State Commission Assessment Panel as follows:

MOVED Cr Greaves. That Council endorses the draft letter to the State Commission Assessment Panel (attachment 3 to the agenda report), as the relevant planning authority for the assessment of Development Application 145/V004/2019, for the proposed 600 mega litre treated water storage dam with associated bulk earthworks, stormwater detention basin, inlet-outlet pipe, landscape screening, security fencing and signage at lots 102 and 108 Bakewell Drive, Seaford Heights. Seconded by Cr O'Brien.

The Draft (endorsed) letter from to the Onkaparinga Council to the State Commission Assessment Panel (SCAP) states that:

In summary, the proposed storage dam exhibits the following positive attributes to warrant approval:

- *The land use is considered an appropriate use of land effectively set aside as a buffer, with the dam contributing to the intensification of established primary production uses within the McLaren Vale region.*
- *The proposed dam design will require extensive excavation of up to 8.5m, which assists with minimising its visual intrusion of the landscape.*
- *The landscaping and proposed embankments will complement the development and improve the visual outlook of the dam from public vantage points, including Bakewell Drive, Victor Harbor Road and the Seaford Heights development.*
- *The landscaping species are native and a good mix of tall trees, shrubs and ground covers.*
- *No unreasonable amenity issues are considered to be created by the proposal, with no pump stations associated with the development situated on the subject land that may create noise nuisance and odour modelling provided by the applicant confirms that any odours that may be present within the Seaford Heights land development will not be unreasonable.*

[our emphasis]

Accordingly, in addition to the correspondence provided by Council's administration in support of the development application dated 12 March 2019, the Onkaparinga Council has since provided further written correspondence to SCAP confirming that the proposed development warrants approval.

The McLaren Vale Grape Wine and Tourism Association (MVGWTA)

The McLaren Vale Grape Wine and Tourism Association (MVGWTA) is a peak body representing more than 550 businesses and over $500M in farm-gate value – encompassing all grape growers, winemakers and tourist providers in McLaren Vale, South Australia.

The MVGWTA formally supports the proposed dam and states that '*The development will help to secure our region's water supplies and continue to demonstrate McLaren Vale's leadership in sustainable water management, internationally*'.

2.2.2 Management of Mosquitoes & Insects

A representor has raised concerns with an increase in insects associated with the proposed dam including the management of mosquitos given the proximity of the proposed dam to the Seaford Heights Vista Estate.

As discussed within the Planning Statement, the applicant has consulted with SA Health on the construction of the dam and SA health advised that the design of the dam was consistent with SA Health's requirements for minimising impacts associated with nuisance vectors such as mosquitos.

The design of the proposed dam has been informed by the '*South Australian Integrated Mosquito Management Resource Package, 2006*' which has been prepared by SA Health as an informative guide for Mosquito Management Practitioners.

Proposed elements and design features of the proposed dam that will effectively assist with the management of mosquitos and vectors include:

- The topography of the subject site forms a rolling hilltop that is open with good wind dispersion conditions on an elevated site;
- The proposed dam will not be attractive to mosquitoes nor will it offer shelter for both adult mosquitoes or larvae given it is a relatively large, deep and open water body which will be lined with a high-density polyethylene (HDPE) and will incorporate step margins free from vegetation;
- The proposed dam will be recurrently filled and emptied which will assist to enhance water quality and prevent the water from becoming stagnant and attractive to mosquitoes; and
- The proposed water storage dam would be regularly accessed for monitoring and maintenance with a weekly inspection and a biannual program of vegetation control.

2.2.3 Odour Impact on Residents

A representor has raised concerns with the potential impact of smells and odour that may arise from the development. Fairland has also raised concerns with the nominated separation distance of the proposed dam to the nearest sensitive receptor stating that the separation distance is more in the order of 56 metres rather than the 78 metres stated in the ERM odour Assessment.

As discussed within the Planning Statement, an 'Odour Assessment' of the water storage dam has been undertaken by ERM which was based on field odour observations at current treated water storage facilities in the area of the proposed dam location.

The results from the observations were evaluated against the separation distance to the nearest sensitive receptors, general settings of the area as well as wind data.

The field odour observations methodology applied for the assessment was a modified version of the German Standard VDI 3490 (1993) method for odour surveys. The method standardises the odour logging approach by the adoption of a standard scale for describing odour intensity, as detailed in the German Standard VDI 3882,

which relates to odour measurement. This method was selected as it enables the evaluation of odour over time rather than a single point in time with discrete observations.

Locations for the field odour observations were selected to cover one upwind location for reference of background odour and downwind locations at various distances from the targeted odour source. In addition to recording odour intensity observations, wind conditions (wind direction and wind speed) were also recorded for each observation.

Based on field odour observations from other dams (i.e. The Aldinga Storage Dam, Quarry Road Treated water storage dam and Little Road treated water storage dams) ERM noted that odour from the treated water storage dams is recognisable, but not perceived as offensive, and typically present intermittently at low levels even very close to the dams. While the treated water is a product from a wastewater treatment plant, the odour from the storage dams is not perceived as wastewater related. The character of the odour of the treated water is closer in resemblance to muddy lake or pond water.

The field odour observations undertaken by ERM showed the following:

- There is odour associated with treated water storage dams. However, the character of the odour is not perceived as offensive, and it is not a wastewater related odour;
- The levels of odour observed were mostly low level and intermittent, especially at distance from the sources;
- At most locations no odour was observed for most of the time; and
- No distinct or strong intensity odours were observed.

The ERM assessment also incorporated an analysis of local wind data as this indicates where impacts will occur. ERM state that '*While there is potential exposure of the nearby sensitive receptors (with prevailing SE and N winds for part of the year), dispersion conditions at the elevated site location should be good and the residential receptors are not in locations, relative to the storage dam, that would pose any particular exposure risk*.'

Based on the field odour observations and the assessment, ERM noted that it cannot be concluded that there will be no odour at the nearest sensitive receptor locations at the Seaford Heights residential development as a result of the construction of the treated water storage dam as proposed. However, ERM concluded that the assessment shows that any odour would be very low level (low odour concentration and intermittent) and not of an offensive nature.

In response to Fairland's concern that the separation distance between the closest sensitive receptor and the proposed dam is more in the order of 56 metres, ERM have considered this matter and advise that "*if the distance was 56m there would be no material change to the risk of odour or our conclusion*." (Refer to email correspondence attached in Appendix 2)

ERM recommends that an 'Operations Management Plan', that includes odour management, be developed for the treated water storage dam. Accordingly, the applicant will prepare an Operations Management Plan in

association with the detailed design of the dam and this will include a requirement for routine water quality monitoring protocols and site inspections specifically targeting observation of odour for monitoring of performance. The Operations Management Plan will also provide information on preventative measures for maintenance of water quality and an incident response plan (should an odour event occur).

ERM concludes that '*With an effective Operations Management Plan in place, there is a low risk of elevated odour from the proposed treated water storage*'.

2.2.4 Inconsistences with Plans

Fairland has raised concerns regarding inconsistencies in plans lodged as part of the Development application. No clear information has however been provided or offered on what plans are inconsistent and any implications of any inconsistencies.

The proposed plans for development attached at Appendix 6 of the original 'Planning Statement' represent the proposed plans for development.

2.2.5 Legal Deeds and Agreements

Fairland has raised concerns with a possible or perceived breach of and existing 'Development Deed' and 'Land Management Agreement' applying to the land.

Development Deed

SRWRA purchased the land from the South Australian Housing Trust and the Urban Renewal Authority in 2017 and at the time of purchase the vendors and SRWRA executed a 'Development Deed' dated 7 November 2017. The deed recites that its purpose is to limit the impact of any development of the land on the amenity of nearby land that is used for residential purposes (or that is proposed to be used for residential purposes). A copy of this Development Deed was attached at Appendix 3 of the Original 'Planning Statement'.

Under the terms of the Lease with SRWRA, WBWC will effectively take on the obligations of the Development Deed.

Pursuant to Clause 3 of this Deed '*SRWRA must not cause, suffer or permit the receipt, handling, storage or disposal of waste on the Land*'.

Fairland has stated that the development represents a potential variation from the Development Deed in respect to the use of the land relating to waste. As stated in the original Planning Statement, an independent legal opinion has been obtained from Stuart Henry SC (Barrister) dated 5 July 2018 and addresses the question of whether the storage of treated water sourced from the Christies Beach WWTP in a dam to be constructed on the subject site would be contrary to Clause 3 of the Development Deed (i.e. whether or not the treated water is 'waste' as defined in the Development Deed).

The Legal opinion confirms that upon delivery from SA Water to WBWC, the treated water becomes a product, and is no longer waste. The Legal opinion is attached at Appendix 4 of the original Planning Statement and

concludes that '*The recycled water is not, in my view, a form of 'waste' for the purposes of the Development Deed'.*

Land Management Agreement (LMA)

A Land Management Agreement (LMA) between the Minister for Planning and the land Owner (SRWRA) also applies to the land and was attached at Appendix 5 of the original Planning Statement.

The purpose of this agreement (executed as a Deed applying to the whole of Certificate of Title Volume 6034 Folio 589) is to ensure that the land owner does not cause, suffer or permit interference with, damage or removal or destruction of a landscaped and vegetated area of the site that has been established as a 'Buffer Zone Landscaping Area' to screen urban development from Victor Harbor Road. In addition, the deed identifies separate 'Buffer Land' which is to be maintained as primarily a passive vegetated area to screen development and interrupt site lines from Victor Harbor Road.

Under the LMA the land owner must ensure that the 'Buffer Zone Landscaping Area' is maintained as primarily a passive vegetated area to screen development and interrupt sight lines from Victor Harbor Road.

The land owner must also obtain the consent of Fairmont Land Holdings Pty. Ltd. (now Fairland) for any change in the use of the 'Buffer land' as described and defined in the LMA.

The 'Buffer Zone Landscaping Area' and the 'Buffer Land' are demonstrated spatially in ***Figure 4.2*** and ***Figure 4.3*** respectively.

Under the terms of the Lease with SRWRA, WBWC will effectively take on the obligations of Clause 5 (Management of Land) of this LMA and therefore must not breach this LMA.

Importantly, the proposed development has been designed so that it will '*not cause, suffer or permit interference with, damage to or removal or destruction of the Buffer Zone Landscaping*' in the 'Buffer Zone Landscaping Area' (as defined in Annexure B of the LMA).

Michael Osborne, National Planning Manager at Fyfe has stated that in his opinion the proposed development comprises a change in the use of the land, both from a Development Act perspective and from a physical outcome perspective by way of '*… including significant earthworks and swales associated with the construction of the treated waste water storage dam*'. It is understood that Michal Osborne has formed this opinion on the assumption that a proposed swale will traverse the 'Landscape Buffer Zone' as noted in Figure 3 in the Fairland representation.

It is noted that **the proposed development does not incorporate a proposed swale or any earthworks within either the 'Buffer Zone Landscaping Area' or the 'Buffer Land' as described and defined in the LMA.** This is confirmed by the proposed plans for development attached in Appendix 6 of the original Planning Statement, the final Stormwater Management Plan provided in Appendix 14 of the original planning Statement and the amended plans attached in ***Appendix 3*** of this correspondence.

On this basis, it is our opinion that the proposed development will not result in the change of the use of the 'Buffer Land' as defined within Annexure C of the LMA.

2.2.6 Land Use Suitability

Fairland has raised concerns that the proposed development is not consistent with the expectations of the Deferred Urban Zone or the Primary Production Zone of the Onkaparinga Development Plan.

The suitability of the proposed use of the land for a water storage dam within both the Primary Production Zone and Deferred Urban Zone is discussed within Section 7.2 of the original Planning Statement.

Primary Production Zone:

Water storage dams are common place in Primary Production Zones however a water storage dam of this size and capacity is not specifically contemplated or nominated as an envisaged land use within the Primary Production Zone.

Whilst the proposed water storage dam will result in the removal of some land utilised for primary production cropping, it will provide an additional source of irrigation water to support the growing demand for water from the region's expanding viticulture and horticultural industries within the Primary Production Zone.

The proposed treated water storage dam will enable an additional 600ML of treated water to be distributed by WBWC in summer. Further, the completion of the treated water storage will provide additional treated water to WBWC to expand its pipeline into Blewitt Springs thereby providing an alternate water source to irrigators in this region who are suffering from deteriorating groundwater salinity.

The proposed development therefore directly satisfies Objective 1 and 2 of the Primary Production Zone by contributing to the long-term continuation of primary production within the region without jeopardising natural resources and promoting economically productive, efficient and environmentally sustainable primary production.

In accordance with Objective 5 of the Primary Production Zone the proposed water storage dam will also allow for the sustainable expansion of existing viticulture and horticulture in the region in an environmentally sensitive and sustainable manner. The proposed development will directly extend and expand the economic base of the region with direct regional benefits from the proposed 600ML water storage dam including:

- The preservation/creation of 48 full time on farm jobs and 120 winery jobs;
- The preservation/creation of 3,750 tonnes of premium grape production worth $5.5M in farm gate revenue annually (average price of $1,500/tonne); and
- The preservation /creation of 2.25M bottles of premium wine production annually, worth $33.75M annually in bottled wine sales (average price of $15/bottle)

In accordance with Principle of Development Control 5 of the Primary Production Zone the proposed development will support and not prejudice agricultural activities within the Zone. Further, in accordance with

Principle of Development Control 7 of the Primary Production Zone the proposed storage and ultimate distribution of treated water will assist to conserve water and reduce stress on existing aquifers used for agricultural irrigation whilst providing irrigators with access to a sustainable, good quality, alternate water source.

The proposed development is also compatible with Principle of Development Control 4 of the Primary Production Zone which acknowledges that the Zone is used as a water catchment and storage area and does not prejudice the values of the area in regard to agricultural production and scenic quality.

Whilst the proposed development will remove an existing small portion of land currently used for agriculture, the land will be utilised for a water storage dam which is a form of public infrastructure (for the supply and distribution of water) which is also directly aligned with Principle of Development Control 6 of the Primary Production Zone.

Accordingly, the proposed development is highly aligned with the Primary Production Zone and whilst the proposed development will result in a very small loss of land utilised for primary production cropping it will provide water storage that will support and intensify higher value agricultural use of surrounding primary production land within the McLaren Vale Region.

Deferred Urban Zone:

The Deferred Urban Zone represents a narrow strip of land (approximately 200 metres in width) at the north-west interface with the Southern Regional Waste Resource Authority (SRWRA) which is one of the State's major landfill operations currently receiving over 100,000 tonnes of waste annually. As stated in the Seaford Heights Development Plan Amendment by the Minister dated 26 May 2011, the Deferred Urban Zone provides a buffer to landfill operations on the SRWRA site. Following closure, remediation and management of the SRWRA site (including requirements to suitably manage possible land fill gas migration), the Deferred Urban Zone could arguably be rezoned to accommodate future urban expansion when it is no longer required as a buffer.

Notwithstanding, it is noted that the entirely of the Deferred Urban Zone (in this location) and the surrounding Primary Production Zone is located within the *Heritage and Character Preservation District Overlay* and is subject to the *Character Preservation (McLaren Vale) Act, 2012*. This Act provides measures to protect and enhance the special character of the McLaren Vale region and restricts the creation of additional residential development in the rural areas of the districts to halt urban sprawl to the south of Adelaide's built-up area.

Given the Deferred Urban Zone is now located within the Character Preservation District Overlay and is separated from the Seaford Heights Residential Zone by the Primary Production Zone, it may arguably never be rezoned for urban purposes. Further, the submission from Fairland also acknowledges that an area removed from the McLaren Vale Character Preservation District will automatically be included within the *Environment and Food Production Area* (EFPA) – further demonstrating that it is unlikely to ever be rezoned for future urban purposes (refer to Section 7(4) of the *Planning, Development and Infrastructure Act, 2016*).

The proposed Water Storage Dam therefore represents an appropriate and economic use of the land within the Deferred Urban Zone which acts as an effective 'buffer' between residential Development within the 'Vista' estate and the ongoing land fill operations on the adjacent SRWRA site.

Further, in the unlikely event that the land within the Deferred Urban Zone is ever rezoned for urban purposes, the proposed water storage dam would not result in outward impacts (i.e. noise, odour, air quality etc) that would restrict or prevent the balance of land within this Zone being used for future urban purposes.

2.2.7 Removal of Current Primary Production

Fairland has raised concerns that the proposed development removes land currently used for primary production purposes with no justification.

As stated in ***Section 2.2.6*** above, whilst the proposed development will result in a very small loss of land utilised for primary production cropping it will provide water storage that will support and intensify higher value agricultural use of surrounding primary production land within the McLaren Vale Region.

2.2.8 Built Form and Scale

Fairland has raised a concern that the built form and scale of the proposed development is not compatible with the expectations of the McLaren Vale Character Preservation District and is not compatible with actual and perceived amenity expectations of the adjacent Residential Zone.

The proposed dam will be constructed as a 'turkey's nest' with the top of the dam embankment elevated above the natural ground level of the subject land. The dam will sit approximately 5 metres higher than the existing ground level. As a result of the sloping site, the dam embankments vary in height above ground level, varying between 4.6m to 7.7m.

Adjacent the dam embankment and access road will be a series of constructed earth mounds of varying heights (depending on existing ground level) between 1.5m – 7.8m at a slope of 1 in 4. These will be constructed using the excess fill excavated for the dam and will be vegetated with plants and trees in order to minimise visual impacts of the dam embankment.

The mounds are proposed to be vegetated with site appropriate plant species which are currently present within the existing 'Buffer Zone Landscaping Area' on site.

It is acknowledged that the Primary Production Zone identifies that the excavation and/or filling of land should be kept to a minimum and be limited to no greater than 1.5 metres so as to preserve the natural form of the land and the native vegetation. Whilst the proposed development includes mounds that are larger than anticipated in the zone (up to 7.8 metres in height), they are being constructed in response to the underlying topography of the land and will be used to introduce significant areas of native vegetation. The construction of the dam will result in large amounts of excess fill which will be used to form the mounds, reducing the visual impact of the dam embankment and protecting the character of the locality.

Accordingly, whilst the dam is of a relatively large scale, the proposed built form composition of the dam and associated landscape treatments have been proposed to screen the development and preserve the visual character of the locality.

2.2.9 Visual Impact

Fairland has raised concerns with the potential visual impact of the development from the adjoining Vista Estate.

A 'Visual Impact Assessment' of the development has been prepared by WAX Design and considers the visibility of the proposed development and the contribution to the amenity of the locality that the proposed development will make.

The Visual Impact Assessment is attached in Appendix 13 of the original Planning Statement and confirms that the proposed series of vegetated landscape mounds to the north, west and south as well as the retention of the existing tree line to the east will adequately screen the proposed development from views on Victor Harbor Road, Bakewell Drive and from the adjacent Vista residential housing estate. WAX Design concludes that the subject land will be viewed as a series of landscape mounds with vegetated ridges above the existing arable land which is reminiscent of the surrounding locality which contains many vegetated ridges, hills, vineyards and cropping land.

The Visual Impact Assessment includes a series of photomontages providing an indication of the visual effects of the development at the following three (3) external viewpoints:

1. Victor Harbor Road;
2. Bakewell Drive; and
3. The Vista Residential Housing development (Corner of Edison & Cotterell Road).

Figure 2.1 below nominates the viewpoint locations considered by WAX Design whilst the photomontages are provided in ***Figure 2.2, Figure 2.3*** and ***Figure 2.4*** respectively.

Figure 2.1 *Visual Impact Assessment – Viewpoint locations*



Figure 2.2 *Viewpoint 1 – Victor Harbor Road*



Existing viewpoint



Artists impression of proposed development superimposed on to existing viewpoint.

Figure 2.3: *Viewpoint 2 – Bakewell Road*



Existing viewpoint

Artists impression of proposed development superimposed on to existing viewpoint.

Figure 2.4*: Viewpoint 3 – Vista Estate (Corner of Edison & Cotterell Road)*



Existing viewpoint

Artists impression of proposed development superimposed on to existing viewpoint.

The Visual Impact Assessment therefore clearly demonstrates that the proposed development will be effectively screened through the establishment of native vegetation on landscaped mounds that will provide permanent visual screening of the structure from adjoining properties and roads.

2.2.10 Stormwater Management

Fairland has raised concerns that it has not been demonstrated in the Stormwater Management Plan that the spillway and freeboard of the proposed dam will not result in flooding to adjoining properties in a 1 in 100 ARI storm event.

The proposed development involves a 'turkey's nest' dam with the top of the dam banks elevated above the natural ground level and as such there will be no natural runoff into the dam. On this basis, a flood event model (using a program such as RORB) is not appropriate for this structure as there is no catchment for this storage.

The only natural 'inflows' the SRWRA storage would receive would be via rainfall directly on the storage. SMEC has therefore undertaken a rainfall depth analysis. In accordance with ANCOLD provisions, the structure has been designed to 'manage' the depth of rainfall associated with a 1 in 100,000 Annual Exceedance Probability (AEP) rainfall event. This scenario results in a rainfall depth of 350mm as compared to a 1:100 Average Recurrence Interval (ARI) event that has a 120mm rainfall depth. The dam will therefore need to provide a freeboard depth that ensures that the rainfall from this event can be contained within the storage without water overtopping the dam. Based on the assessment undertaken by SMEC, the proposed minimum freeboard of 600mm is well in excess of the rainfall depth from this event.

An overflow is technically not required to pass flows associated with a rainfall event if the freeboard is sufficient. Notwithstanding, the proposed dam is proposed to incorporate an overflow (primarily for dam safety purposes) that will prevent the dam from overtopping due to either overfilling or through a significant rain event.

With respect to overfilling, the design has allowed for twice the anticipated fill rate of 8ML/d hence allowing for 16ML/d of overflow capacity.

The overflow is designed as an open system set at the design freeboard of 600mm ensuring the design freeboard is preserved during an overfilling or a rain event. The overflow is proposed to be directed in a closed pipe system under Victor Harbor Road allowing any discharge to occur on the northern side of Victor Harbor Road on land owned by Willunga Basin Water Company. The water will discharge through an open outlet pit where it is directed away from built-up areas and can be managed on property owned by WBWC. As the overflow is an open system in that the inlet and outlet are always open, no manual or automatic intervention is possible and the system will operate as soon as the water level in the dam exceeds the minimum freeboard level.

The location of the proposed overflow pipe is nominated on the amended plans for development attached in *Appendix 3*.

Accordingly, there are two relevant scenarios:

- If the storage is at the minimum freeboard level when a 1 in 100 year rainfall event occurs then the overflow will operate and safely pass the flows; and

- If the storage is below the minimum freeboard level when a 1 in 100 year event occurs then the rainfall will be stored by the dam with the depth in the storage increasing slightly.

2.2.11 Separation Distance to Residential Development

Fairland has raised concerns that there is an inadequate separation distance of the proposed water storage dam to the adjoining Vista Estate.

The proposed setback of the dam from adjoining sensitive residential receptors, including the adjoining Vista Estate, is acceptable and appropriate taking into consideration the following evaluation:

- The field odour observations and assessment undertaken by ERM that concludes that any odour from the dam would be very low level (low odour concentration and intermittent) and not of an offensive nature;
- There will be no noise generated on site during the ongoing operation of the dam (with only minor stormwater pumps required to occasionally pump stormwater from on-site detention basins back into the water storage dam during and immediately following rain and storm events);
- The proposed dam design will be consistent with SA Health's requirements for minimising impacts associated with nuisance vectors such as mosquitos; and
- A 'Visual Impact Assessment' of the development has been prepared by WAX Design that confirms that:
    - » the proposed series of vegetated landscape mounds will adequately screen the proposed development from the adjacent Vista Estate;
    - » following development of the dam and the establishment of proposed landscape treatments the subject land will be viewed as a series of landscape mounds with vegetated ridges above the existing arable land which is reminiscent of the surrounding locality which contains many vegetated ridges, hills, vineyards and cropping land;
    - » the proposed development has been designed to create an extension of the existing 'Buffer Zone Landscaping Area' and vegetated horizon line when viewed from the Vista Estate; and
    - » there will not be any indication that the subject land contains a water storage dam as the dam will be elevated above the surrounding locality and suitably screened with proposed landscape mounds.

2.2.12 Construction Environmental Management Plan (CEMP)

Fairland has suggested that they should be offered the opportunity to have input into the preparation of the CEMP, ahead of planning consent being issued.

As stated in Section 5.3.3 of the original Planning Statement, it is envisaged that a Construction Environmental Management Plan (CEMP) will be prepared following receipt of Development Approval and will describe how activities undertaken during the construction phase of development will be managed to avoid or mitigate negative environmental impacts on the site and how those environmental management requirements will be implemented.

It is anticipated that the CEMP will demonstrate how possible air emissions (dust management), noise, waste, water quality and traffic will be managed to prevent impacts on the land subject to development, and on nearby land uses and the natural environment.

The applicant would accept a suitable condition of approval requiring the preparation of a CEMP to the satisfaction of SCAP prior to commencement of construction.

Notwithstanding, it is not anticipated that Fairland, or any other adjoining land owner, would have the right or opportunity to have input into the preparation of the CEMP. Further, it is noted that a condition of approval would not be appropriate and would be invalid if it required some other third party or body (such as Fairland) to be satisfied on a particular matter such as the content of a CEMP.

3. Amended Plans for Development

3.1 Overflow Pipe

As discussed in Section 2.2.10 above, the proposed plans for development have been amended to incorporate an overflow structure into the dam design to prevent the dam from overtopping due to either overfilling or through a significant rain event.

The location of the overflow pipe is nominated on the amended plans attached in ***Appendix 3***.

3.2 Setback From Victor Harbor Road

As noted within the referral correspondence from the Commissioner of Highways, The Metropolitan Road Widening Plan shows a possible requirement for a strip of land up to 35 metres in width from the Victor Harbor Road frontage of this site for possible future road purposes.

Whilst the Commissioner of Highways has confirmed that the setback of the closest batter slope to Victor Harbor Road is acceptable to DPTI, the applicant has resolve to further increase the setback of the landscaped batter slope from Victor Harbour Road to provide greater clearance to this possible future road widening requirement.

In addition, the proposed inlet / outlet pipe and overflow pipe has been generally located outside of this potential 35 metre road widening strip, other than where the pipes are proposed to cross Victor Harbor Road to the north of the site.

The slightly modified setback and configuration of the landscaped batter slope and proposed location of proposed pipe infrastructure is shown spatially on the amended plans prepared by Hydroplan attached in ***Appendix 3***.

We trust that Department now have sufficient information to finalise an assessment of the proposed development application as amended and we request that the application be presented at the next available SCAP meeting for determination.

Should you require further clarification, please do not hesitate to contact the undersigned on (08) 7231 0286 or direct on 0402 344 401

Yours Sincerely



Richard Dwyer
Managing Director

ekistics

Appendix 1. Correspondence from Friends of Willunga Basin

From: Geoff Hayter <geoff.hayter@propad.com.au>
Sent: Tuesday, 19 February 2019 1:47 PM
To: Graham Dooley <GDooley@wua.com.au>; Craig Heidenreich <CHeidenreich@wua.com.au>
Cc: David Gill <david.gill@internode.on.net>; Gavin Malone <gavindmalone@gmail.com>
Subject: SWRA proposal

Graham/Craig

Just to let you know, FOWB is aware that an application for development approval has been lodged for a waste water lagoon at Seaford Rise.

Having viewed the application, FOWB sees no need to make a representation in respect of it – noting that we only tend to do so when we are speaking against a proposal.

In this case though, we think the proposed lagoon is a reasonable solution to an identified need.

Good luck with it.

Cheers

Geoff H

Geoff Hayter
Chair

Mob: 0401 990 592

Friends of Willunga Basin inc.

ekistics

Appendix 2. Correspondence from ERM

(Johan Meline – Principal Consultant)

From: Johan Meline <johan.meline@erm.com>
Sent: Monday, 8 April 2019 3:25 PM
To: Craig Heidenreich <CHeidenreich@wua.com.au>
Subject: RE: SRWRA Treated Water Storage Dam - Odour Assessment

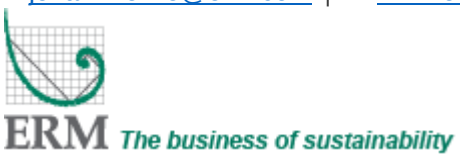
Hi Craig,

If the distance was 56 m there would be no material change to the risk of odour or our conclusion.

Regards
Johan

Johan Meline CAQP, MIEAust
Principal Consultant

ERM
5 Peel Street, Adelaide, SA 5000
M 0431 516 449 | **T** (08) 8332 0960
E johan.meline@erm.com | **W** www.erm.com



ekistics

Appendix 3. Amended Plans (Hydroplan)



SITEWORKS LEGEND

- PROPERTY LINE
- PROPOSED PIPELINE
- PROPOSED SWALE
- EXISTING PIPELINE
- BUFFER LAND BOUNDARY LINE

FINISHED SURFACE LEGEND

- RUBBLE AREA
- STORAGE AREA (PLASTIC LINED)
- OUTSIDE BATTER AREA

VEGETATION LEGEND

EXTENDED VEGETATION AREA:
(FOR SCREENING - INDICATIVE ONLY)

EXAMPLE:



NOTE: VEGETATION PLAN TO BE AGREED WITH BIODIVERSITY McLAREN VALE AND DEW. VEGETATION TO SCREEN A 1.8m HIGH SECURITY FENCE ON THE INTERNAL SIDE OF EXTENDED VEGETATION ALIGNMENT.

EXISTING VEGETATION AREA:

EXAMPLES:





-20 0 20 40 60 80 100 200m

SCALE 1:2000 ORIGINAL SIZE A1

REV	ISSUED	D.DWN	APRVD	REVISION DESCRIPTION	REV	ISSUED	D.DWN	APRVD	REVISION DESCRIPTION
4	19/12/2018	JT	BH	FOR DISCUSSION					
3	16/11/2018	JT	JG/BH	FOR DISCUSSION					
2	22/10/2018	JT	JG/BH	FOR DISCUSSION					
1	03/10/2018	JT	JG/BH	FOR DISCUSSION					
0	20/09/2018	JT	JG/BH	FOR DISCUSSION	5	30/04/2019	QM	BH	REVISED CONCEPT FOR CH

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The arrangement and general details as shown on this drawing are essentially diagrammatic and must be applied to the circumstances as found on site.

DES/DRAWN:	JT
CHECKED:	BH
APPROVED:	JG
DATE:	29/03/2018
DRAFT REF:	2-WBW-d8

CLIENT: WILLUNGA BASIN WATER

PROJECT: SRWRA STORAGE
CONCEPT DESIGN PLAN WITH MOUNDS

DRAWING No.	SHEET	OF	REVISION
14689-SK017	1	1	5

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Development Plan

Onkaparinga Council

Consolidated – 20 December 2018

Please refer to the Onkaparinga Council page at www.sa.gov.au/developmentplans to see any amendments not consolidated.

Government of South Australia
Department of Planning, Transport and Infrastructure

Council Strategic Setting

A Snapshot of our City

(Extracted from the Community Plan 2035 Discussion Paper)

Our city is known for its natural beauty and enviable lifestyle with a growing population currently in excess of 160 000, which makes us the largest council area by population in South Australia. The city includes picturesque hills, the world-class McLaren Vale wine region, 31 kilometres of pristine coastline and a 75 per cent rural area.

Our city has diverse landscapes

Our city covers 518 square kilometres from the industrial areas in the north west of the city, the rural landscapes and townships of the north east, central and southern areas and the urban areas along the coast that stretches from Sellicks Beach to Port Stanvac.

80 per cent of our population live in suburbs north of the Onkaparinga River, 15 per cent along the central and southern coast and there remainder in rural and township areas.

The entire catchments of the Aldinga Washpool, Pedler Creek, Christies Creek, Maslins Creek, Willunga Creek and Sellicks Creek, the lower Onkaparinga River and estuary, most of the Field River and part of the Sturt River catchment falls within the city boundaries. Since European settlement large scale changes in land management have significantly impacted on catchment hydrology within the city.

The Sturt and Onkaparinga Rivers, Tangari Park, the Aldinga Scrub and Washpool are significant natural conservation areas. They link with the ranges, creeks and coasts to form the city's major environmental features. The distribution of native vegetation and fauna has been severely impacted on by changes to our city's landscape over time. Only 5 per cent of pre-European vegetation remains on the plains areas in the city and 26 per cent on the less fertile and less accessible hilly areas.

Our city has a growing and ageing population

Our city is also the largest South Australian council by population (10 per cent of the state's population) and it is growing quickly.

The city's estimated residential population in 2010 was 162 925 and between 2001 and 2010 it is estimated that the city's population grew by 7.9 per cent. The city experienced the largest population increase (2431) compared to the other local government areas in metropolitan Adelaide between 2009–2010. Between 2011 and 2026 the population in the city is projected to growth by 17.9 per cent or almost 30 000 people. This growth will require approximately 20 000 new dwellings.

Compared to the Adelaide average our population is younger, with more children and youth and fewer aged people. However, in most suburbs numbers and proportions of young people have declined while the over fifties population steadily grows. In 2006, 29.1 per cent of the city's population was over 50 years and this percentage has been projected to grow to 35.6 per cent by 2011.

The largest growth between 2011 and 2026 is anticipated in the older age groups of 70–74 and 75–79. The largest declines in growth are projected in the 20–24 and 25–29 age groups.

We are a city with a long, rich and diverse cultural heritage.

Our city is part of the Kaurna country and includes significant cultural heritage areas such as the Tjilbruke sites along the coast that includes Ochre Point and the Washpool. European settlement began in 1837 with townships such as Willunga, Clarendon, Old Reynella and Old Noarlunga establishing around farming activities.

Residential areas in the northern and western part of the city have been steadily developing since the 1960s. 1 per cent of our population are Indigenous, 22 per cent were born overseas, and 90 per cent speak only English at home.

We are a city that has many infrastructure challenges and opportunities

Our city is typical of many urban fringe coastal communities in Australia's major cities. These communities are facing rapid population and urban growth with the resultant infrastructure challenges including:

- insufficient physical infrastructure for existing and future population and visitor needs including roads, sewer, water services, public transport and aged and health and community facilities
- a shortfall in infrastructure and lack of capacity to pay for these shortfalls through existing sources such as grants, rate and developer contributions

Population growth in the region will also place additional demands on energy resources. This growth in the demand for energy requires extra generation or a substantial improvement in the efficiency with which energy is used.

Our city is also the location of key water infrastructure for metropolitan Adelaide including two of Adelaide's major water reservoirs, one of Adelaide's largest wastewater treatment plants and the Adelaide Desalination Plant at Port Stanvac.

The manner in which infrastructure develops over the next twenty years is critical in shaping our city.

We are a city with diverse employment sectors and occupations but with high levels of commuting for work

In June 2009 there were 9604 businesses in the city. The majority of businesses (41.8 per cent) had turnovers of less than $75,000 per annum. Small to medium enterprises located in the Lonsdale, Hackham, Seaford and Aldinga industrial areas are therefore important for our local economy.

The main employment sectors in the city are manufacturing (18.7 per cent), retail (16.4 per cent) health related (12 per cent) education (10 per cent) agriculture (including vineyards) and tourism (7 per cent) construction (6 per cent) public administration and safety (4 per cent).

Occupations are diverse including trades (17 per cent), clerical/ administration (16 per cent) professions (14 per cent), labourers (13 per cent) sales (11 per cent) community services (11 per cent) and managers (10 per cent).

However, 60 per cent of our residents travel outside of the city for their employment.

Our city offers a range of education and training opportunities

The availability of education options for all community members to access is important for creating employment opportunities, participation in community life and forming social connections.

There are 65 schools (48 public and 17 private) in our city. Overall there were 24 202 full time equivalent school enrolments during 2010. This is up by 2.4 per cent on 2009 enrolments.

Community members in the city have the opportunity to access tertiary education through the University and TAFE sector, apprenticeships and traineeships as well as other less formal education providers. The city has two TAFE campuses but no university campus.

Our city offers an extensive range of recreation and sporting opportunities

85 per cent of households in the urban areas are within walking distance (400m) of a reserve and the city has an extensive network of recreational trails and open spaces for walking, cycling and horse riding.

Large regional recreational complexes at Aberfoyle Park, Morphett Vale, Noarlunga Centre, Port Noarlunga, Seaford and Aldinga are augmented by local reserves and parks. Five surf lifesaving clubs are located along the coast and the city is home to the Southern Adelaide Football Club and over 500 sporting clubs.

Our city is a recognised tourism destination

Tourism in the city is based around the acclaimed McLaren Vale wineries, local gourmet food, festivals and events and the spectacular coastline and beaches. Significant events include the Tour Down Under, Fleurieu Art Prize, Sea and Vines Festival and the Fleurieu Folk Festival.

Our city is home to many talented and creative people

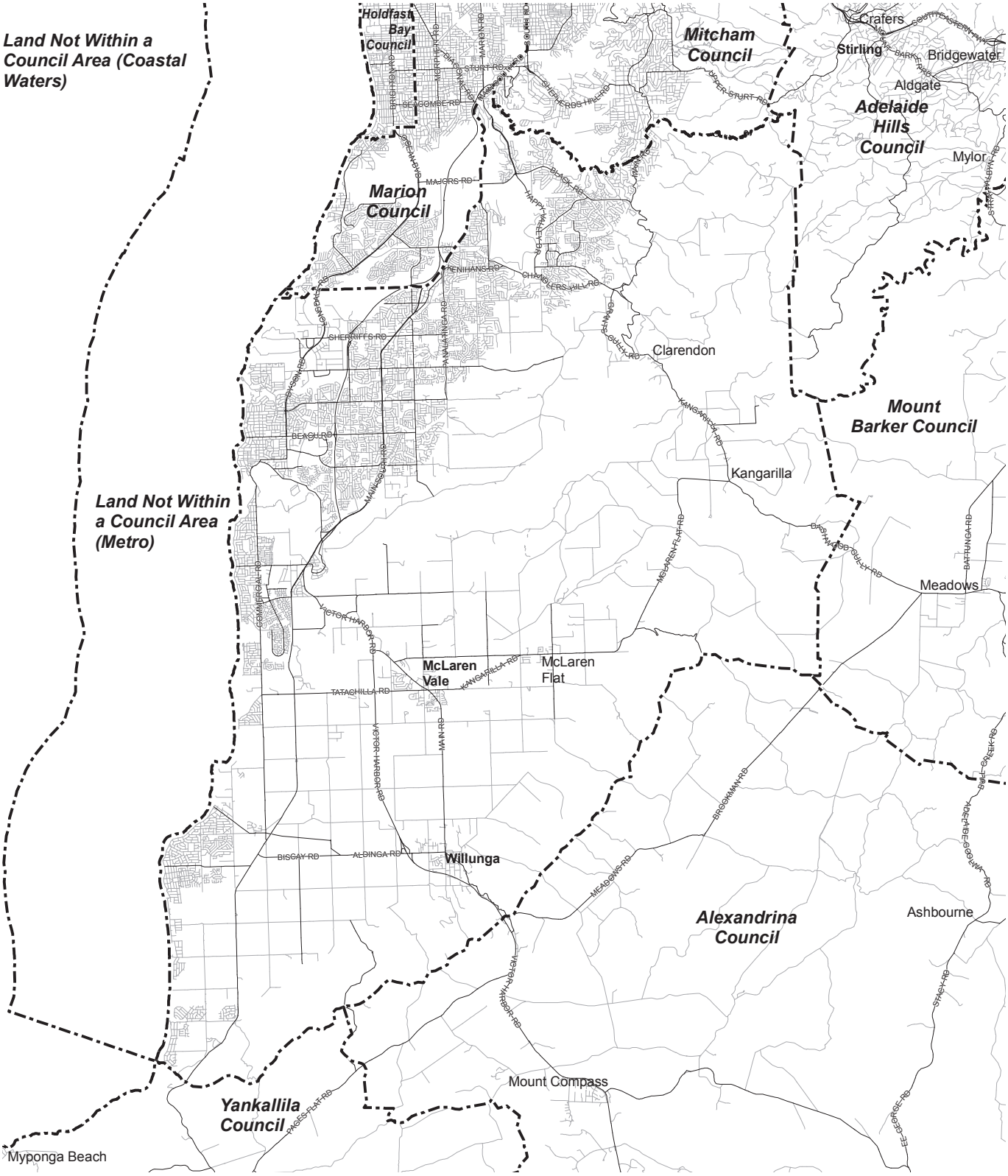
Our region has one of the highest concentrations of artists per capita in Australia. Galleries, studios, exhibitions, theatres, performing groups and festivals are an important part of artistic and cultural life in our city. Some regular events include Poetry Unleashed, the Fleurieu Folk Festival and the SA Writers' Festival.

Planning our City

More than 20 000 additional dwellings in new developments are anticipated over the next 20 years and there are older parts of the city in need of regeneration. This creates challenges for the provision of infrastructure, transport and local services and jobs.

Strategies are targeted at making efficient and sustainable use of urban land, while protecting township boundaries and rural land.

This includes locating new developments in areas where adequate services and infrastructure are in place, with higher density residential development being encouraged in areas close to main roads and public transport corridors, open space, health and shopping facilities. Strategies also provide for the regeneration of older areas close to local centres near public transport.



To identify the precise location of the Development Plan boundary refer to Council Index Map then select the relevant map number.



Value

High : 1159

Low : -15

Council Preface Map

ONKAPARINGA COUNCIL

General Section

Advertisements

OBJECTIVES

1 Urban and rural landscapes that are not disfigured by advertisements and/or advertising hoardings.

2 Advertisements and/or advertising hoardings that do not create a hazard.

3 Advertisements and/or advertising hoardings designed to enhance the appearance of the building and locality.

PRINCIPLES OF DEVELOPMENT CONTROL

1 Advertising and/or advertising hoardings should have regard to the design guidelines contained in *Table Onka/5 - Design Guidelines for Advertisements*.

2 The location, siting, design, materials, size, and shape of advertisements and/or advertising hoardings should be:

(a) consistent with the predominant character of the urban or rural landscape

(b) in harmony with any buildings or sites of historic significance or heritage value in the area

(c) co-ordinated with and complement the architectural form and design of the building they are to be located on.

3 The number of advertisements and/or advertising hoardings associated with a development should be minimised to avoid:

(a) clutter

(b) disorder

(c) untidiness of buildings and their surrounds

(d) driver distraction.

4 Buildings occupied by a number of tenants should exhibit co-ordinated and complementary advertisements and/or advertising hoardings to identify the tenants and their type of business.

5 The content of advertisements should be limited to information relating to the legitimate use of the associated land.

6 Advertisements and/or advertising hoardings should:

(a) be completely contained within the boundaries of the subject allotment

(b) be sited to avoid damage to, or pruning or lopping of on-site landscaping or street trees

(c) not obscure views to vistas or objects of high amenity value.

7 Advertisements and/or advertising hoardings should not be erected on:

(a) a public footpath or veranda post

(b) a road, median strip or traffic island

(c) a vehicle adapted and exhibited primarily as an advertisement

(d) residential land, unless erected to fulfil a statutory requirement or as a complying type of advertisement or advertising hoarding associated with the residential use of the land.

8 Advertisements and/or advertising hoardings attached to buildings should not be sited on the roof or higher than the walls of a building unless the advertisement or advertising hoarding is appropriately designed to form an integrated and complementary extension of the existing building.

9 Advertisements and/or advertising hoardings erected on a veranda or that project from a building wall should:

(a) have a clearance over a footway to allow for safe and convenient pedestrian access

(b) where erected on the side of a veranda, not exceed the width of the veranda or project from the veranda

(c) where erected on the front of a veranda, not exceed the length of the veranda or project from the veranda

(d) where projecting from a wall, have the edge of the advertisement or advertising hoarding abutting the surface of the wall.

10 Advertisements should be designed to conceal their supporting advertising hoarding from view.

11 Advertisements should convey the owner/occupier and/or generic type of business, merchandise or services using simple, clear and concise language, symbols, print style and layout and a small number of colours.

12 Advertisements which perform a secondary role in identifying the business, goods or services should only be readable in the immediate vicinity of the site.

13 Outside of townships and country settlements advertisements other than traffic signs, tourist signs or advertisements on an existing tourist information bay display board, should not be erected in road reserves.

14 The proliferation of advertisements on any one building, site or locality should be discouraged.

15 Advertisements should relate to the land on which they are situated. ‘Third party’ promotional or directional advertisements are not appropriate.

Safety

16 Advertisements and/or advertising hoardings should not create a hazard by:

(a) being so highly illuminated as to cause discomfort to an approaching driver, or to create difficulty in the driver’s perception of the road or persons or objects on the road

(b) being liable to interpretation by drivers as an official traffic sign, or convey to drivers information that might be confused with instructions given by traffic signals or other control devices, or impair the conspicuous nature of traffic signs or signals

(c) distracting drivers from the primary driving task at a location especially where the demands on driver concentration are high

(d) obscuring a driver's view of other road or rail vehicles at/or approaching level crossings, or of pedestrians or of features of the road that are potentially hazardous (eg junctions, bends, changes in width, traffic control devices).

17 Any internally illuminated advertising signs and/or advertising hoardings which utilise LED, LCD or other similar technologies should be located a minimum of 80 metres from traffic signals, level crossings and other important traffic control devices.

Freestanding Advertisements

18 Freestanding advertisements and/or advertising hoardings should be:

(a) limited to only one primary advertisement per site or complex

(b) of a scale and size in keeping with the desired character of the locality and compatible with the development on the site.

19 Freestanding advertisements and/or advertising hoardings for multiple-business tenancy complexes should:

(a) incorporate the name or nature of each business or activity within the site or complex in a single advertisement

(b) be integrally designed and mounted below the more predominant main complex or site identity advertisement.

20 Portable, easel or A-frame advertisements should be displayed only where:

(a) no other appropriate opportunity exists for an adequate co-ordinated and permanently erected advertisement and/or advertising hoarding

(b) they do not obstruct or compromise the safety of pedestrians or vehicle movement

(c) there is no unnecessary duplication or proliferation of advertising information

(d) there is no damage to, or removal of, any landscaping on the site.

21 Portable, easel or A-frame advertisements associated with a development should be displayed only during the hours the development is open for trading.

Flags, Bunting and Streamers

22 Advertisements and/or advertising hoardings incorporating any flags, bunting, streamers, or suspended objects should:

(a) be placed or arranged to complement and accord with the scale of the associated development

(b) other than flags, not be positioned higher than the building they are attached or related to

(c) not be displayed in residential areas.

Advertising Along Arterial Roads

23 Advertising and/or advertising hoardings should not be placed along arterial roads that have a speed limit of 80 km/h or more.

Advertising in Mixed Use and Corridor Zones

24 Advertisements and/or advertising hoardings should be:

(a) no higher than the height of the finished floor level of the second storey of the building to which it relates

(b) where located below canopy level, flush with the wall or projecting horizontally

(c) where located at canopy level, in the form of a facia sign

(d) where located above the canopy, flush with the wall and within the height of the parapet.

25 Advertisements or advertising hoardings should not exceed 25 per cent of the ground floor wall area on the façade the sign is placed.

Crime Prevention

OBJECTIVES

1 A safe, secure, crime resistant environment where land uses are integrated and designed to facilitate community surveillance.

PRINCIPLES OF DEVELOPMENT CONTROL

1 Development should be designed to maximise surveillance of public spaces through the incorporation of clear lines of sight, appropriate lighting and the use of visible permeable barriers wherever practicable.

2 Buildings should be designed to overlook public and communal streets and public open space to allow casual surveillance.

3 Development should provide a robust environment that is resistant to vandalism and graffiti.

4 Development should provide lighting in frequently used public spaces including those:

(a) along dedicated cyclist and pedestrian pathways, laneways and access routes

(b) around public facilities such as toilets, telephones, bus stops, seating, litter bins, automatic teller machines, taxi ranks and car parks.

5 Development, including car park facilities should incorporate signage and lighting that indicate the entrances and pathways to, from and within sites.

6 Landscaping should be used to assist in discouraging crime by:

(a) screen planting areas susceptible to vandalism

(b) planting trees or ground covers, rather than shrubs, alongside footpaths

(c) planting vegetation other than ground covers a minimum distance of 2 metres from footpaths to reduce concealment opportunities.

7 Site planning, buildings, fences, landscaping and other features should clearly differentiate public, communal and private areas.

8 Buildings should be designed to minimise and discourage access between roofs, balconies and windows of adjoining dwellings.

9 Public toilets should be located, sited and designed:

(a) to promote the visibility of people entering and exiting the facility (eg by avoiding recessed entrances and dense shrubbery that obstructs passive surveillance)

(b) near public and community transport links and pedestrian and cyclist networks to maximise visibility.

10 Development should avoid pedestrian entrapment spots and movement predictors (eg routes or paths that are predictable or unchangeable and offer no choice to pedestrians).

Design and Appearance

OBJECTIVES

1 Development of a high design standard and appearance that responds to and reinforces positive aspects of the local environment and built form.

2 Roads, open spaces, paths, buildings and land uses laid out and linked so that they are easy to understand and navigate.

PRINCIPLES OF DEVELOPMENT CONTROL

1 Buildings should reflect the desired character of the locality while incorporating contemporary designs that have regard to the following:

(a) building height, mass and proportion

(b) external materials, patterns, colours and decorative elements

(c) roof form and pitch

(d) façade articulation and detailing

(e) verandas, eaves, parapets and window screens.

2 In repetitive building types, such as row housing, the appearance of building facades should provide some variation, but maintain an overall coherent expression such as by using a family of materials, repeated patterns, façade spacings and the like.

3 Windows and doors, awnings, eaves, verandas or other similar elements should be used to provide variation of light and shadow and contribute to a sense of depth in the building façade.

4 Where a building is sited on or close to a side or rear boundary, the boundary wall should minimise:

(a) the visual impact of the building as viewed from adjacent properties

(b) overshadowing of adjacent properties and allow adequate sunlight access to neighbouring buildings.

5 The external walls and roofs of buildings should not incorporate highly reflective materials which will result in glare to neighbouring properties, drivers or cyclists.

6 Structures located on the roofs of buildings to house plant and equipment should be screened from view and should form an integral part of the building design in relation to external finishes, shaping and colours.

7 Balconies should:

(a) be integrated with the overall form and detail of the building

(b) include balustrade detailing that enables line of sight to the street

(c) be recessed where wind would otherwise make the space unusable

(d) be self-draining and plumbed to minimise runoff

(e) allow views and casual surveillance of the street or any thoroughfare while providing for safety and visual privacy of nearby living spaces and private outdoor areas

(f) be of sufficient size, particularly depth, to accommodate outdoor seating where it acts as the primary area of private open space for a dwelling.

8 Transportable buildings and buildings which are elevated on stumps, posts, piers, columns or the like, should have their suspended footings enclosed around the perimeter of the building, and the use of verandas, pergolas and other suitable architectural detailing to give the appearance of a permanent structure.

Development Adjacent Heritage Places

9 The design of multi-storey buildings should not detract from the form and materials of adjacent State and local heritage places listed in *Table Onka/10 - State Heritage Places or in Table Onka/9 - Local Heritage Places*.

10 Development on land adjacent to a State or local heritage place, as listed in *Table Onka/10 - State Heritage Places or in Table Onka/9 - Local Heritage Places*, should be sited and designed to reinforce the historic character of the place and maintain its visual prominence.

Overshadowing

11 Except where otherwise specified in a zone, policy area or precinct, development should ensure that:

(a) north-facing windows to living rooms of existing dwelling(s) on the same allotment, and on adjacent allotments, receive at least 3 hours of direct sunlight over a portion of their surface between 9 am and 3 pm during the winter solstice (21 June)

(b) ground level private open space of existing dwellings receives direct sunlight for a minimum of 2 hours between 9 am and 3 pm on 21 June to at least the smaller of the following:

(i) half of the existing ground level private open space

(ii) 35 square metres of the existing ground level private open space

(c) where ground level private open space is already overshadowed by an amount greater than allowed in part (b), development should not increase the area overshadowed by more than 20 per cent

(d) overshadowing of upper-level private balconies that provide the primary open space area for a dwelling is minimised

(e) unreasonable overshadowing of existing solar collectors (such as solar hot water systems and photovoltaic cells) is avoided to ensure their efficient ongoing operation.

Visual Privacy

12 Development should minimise direct overlooking of habitable rooms and private open spaces of dwellings through measures such as:

(a) off-setting the location of balconies and windows of habitable rooms with those of other buildings so that views are oblique rather than direct

(b) providing adequate spatial separation between balconies or windows of habitable rooms with those of other buildings

(c) providing screening devices (including fencing, obscure glazing, screens, external ventilation blinds, window hoods and shutters) that are integrated into the building design and have minimal negative effect on residents' or neighbours' amenity.

13 Permanently fixed external screening devices should be designed and coloured to complement the associated building's external materials and finishes.

Relationship to the Street and Public Realm

14 Buildings (other than ancillary buildings, group dwelling(s) or residential flat buildings with no direct street frontage or buildings on allotments with a battle axe configuration or similar) should be designed so that the main façade faces the primary street frontage of the land on which they are situated unless where dwellings are designed to front public open space with a laneway used for vehicle access purposes.

15 Buildings, landscaping, paving and signage should have a co-ordinated appearance that maintains and enhances the visual attractiveness of the locality.

16 Buildings should be designed and sited to avoid extensive areas of uninterrupted walling facing areas exposed to public view or from adjoining dwellings in residential areas.

17 Building design should emphasise pedestrian entry points to provide perceptible and direct access from public street frontages and vehicle parking areas.

18 The ground floor of mixed use buildings should comprise non-residential land uses.

19 In mixed use areas, development facing the street should be designed to activate the street frontage(s):

(a) including features that attract people to the locality such as frequent doors and display windows, retail shopfronts and/or outdoor eating or dining areas

(b) minimising the frontage for fire escapes, service doors, plant and equipment hatches

(c) avoiding undercroft or ground floor vehicle parking that is visible from the primary street frontage

(d) using colour, vertical and horizontal elements, roof overhangs and other design techniques to provide visual interest and reduced massing.

20 Where zero or minor setbacks are desirable, development should incorporate shelter over footpaths to enhance the quality of the pedestrian environment.

Outdoor Storage and Service Areas

21 Outdoor storage, loading and service areas should be:

(a) screened from public view by a combination of built form, solid fencing and/or landscaping

(b) conveniently located and designed to enable the manoeuvring of service and delivery vehicles

(c) sited away from sensitive land uses.

Building Setbacks from Road Boundaries

22 Except in areas where a new character is desired, the setback of buildings from public roads should:

(a) be similar to, or compatible with, setbacks of buildings on adjoining land and other buildings in the locality

(b) contribute positively to the function, appearance and/or desired character of the locality

(c) not result in or contribute to a detrimental impact upon the function, appearance or character of the locality.

23 Except where otherwise specified in a particular zone, policy area or precinct, buildings and structures should be set back from road boundaries having regard to the requirements set out in *Table Onka/2 - Building Setbacks from Road Boundaries*.

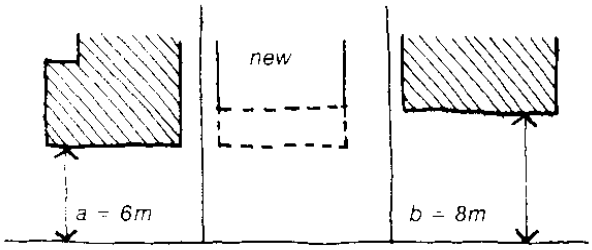
24 Lesser set-back distances to those stipulated in *Table Onka/2 - Building Setbacks from Road Boundaries* may be considered where (a) or (b) or (c) is satisfied:

(a) the set back of the proposed building is consistent with the set back of existing buildings on adjoining or nearby land

(b) the proposed building will be substantially screened by existing vegetation, natural form and features of the land or by the adjacent existing buildings

(c) where the reduced set back will not result in or contribute to a detrimental impact upon the function of the road or the appearance and character of the locality.

25 Except where otherwise specified in a particular zone, policy area, precinct or table the main face of a building should be set back from the primary road frontage in accordance with the following table:

Setback difference between buildings on adjacent allotments	**Setback of new building**
Up to 2 metres	The same setback as one of the adjacent buildings, as illustrated below:  *When b - a≤ 2, setback of new dwelling = a or b*
Greater than 2 metres	At least the average setback of the adjacent buildings

26 Except in areas where a new character is desired or where specified in a zone, policy area or precinct, the setback of development from a secondary street frontage should reflect the setbacks of the adjoining buildings and other buildings in the locality.

27 All setbacks from the road frontage should be additional to the road widening setback established under the *Metropolitan Adelaide Road Widening Plan Act 1972* or any road widening setbacks required by council.

Energy Efficiency

OBJECTIVES

1 Development designed and sited to conserve energy.

2 Development that provides for on-site power generation including photovoltaic cells and wind power.

PRINCIPLES OF DEVELOPMENT CONTROL

1 Development should provide for efficient solar access to buildings and open space all year around.

2 Buildings should be sited and designed:

(a) to orientate living rooms in a northerly direction to ensure adequate natural light and winter sunlight is available to main living rooms to optimise environmental performance

(b) to provide appropriate external shading of walls and windows to prevent excessive heat gain during summer

(c) so that private open spaces associated with the main living rooms face north for exposure to winter sun

(d) minimise overshadowing of main living rooms, balconies and ground level private open space of existing dwellings.

On-site Energy Generation

3 Development should facilitate the efficient use of photovoltaic cells and solar hot water systems by:

(a) taking into account overshadowing from neighbouring buildings

(b) designing roof orientation and pitches to maximise exposure to direct sunlight.

4 Public infrastructure and lighting, should be designed to generate and use renewable energy.

Hazards

OBJECTIVES

1 Maintenance of the natural environment and systems by limiting development in areas susceptible to natural hazard risk.

2 Development located away from areas that are vulnerable to, and cannot be adequately and effectively protected from the risk of natural hazards.

3 Critical community facilities such as hospitals, emergency control centres, major service infrastructure facilities, and emergency service facilities located where they are not exposed to natural hazard risks.

4 Development located and designed to minimise the risks to safety and property from flooding.

5 Development located to minimise the threat and impact of bushfires on life and property.

6 Expansion of existing non-rural uses directed away from areas of high bushfire risk.

7 The environmental values and ecological health of receiving waterways and marine environments protected from the release of acid water resulting from the disturbance of acid sulphate soils.

8 Protection of human health and the environment wherever site contamination has been identified or is suspected to have occurred.

9 Appropriate assessment and remediation of site contamination to ensure land is suitable for the proposed use and provides a safe and healthy living and working environment.

10 Minimisation of harm to life, property and the environment through appropriate location of development and appropriate storage, containment and handling of hazardous materials.

PRINCIPLES OF DEVELOPMENT CONTROL

1 Development should be excluded from areas that are vulnerable to, and cannot be adequately and effectively protected from, the risk of hazards.

2 Development located on land subject to hazards as shown on the *Overlay Maps - Development Constraints* should not occur unless it is sited, designed and undertaken with appropriate precautions being taken against the relevant hazards.

3 There should not be any significant interference with natural processes in order to reduce the exposure of development to the risk of natural hazards.

4 The location of critical community facilities or key infrastructure in areas of high natural hazard risk should be avoided.

Flooding

5 Development should not occur on land where the risk of flooding is likely to be harmful to safety or damage property.

6 Development should not be undertaken in areas liable to inundation by tidal, drainage or flood waters unless the development can achieve all of the following:

(a) it is developed with a public stormwater system capable of catering for a 1-in-100 year average return interval flood event

(b) buildings are designed and constructed to prevent the entry of floodwaters in a 1-in-100 year average return interval flood event.

7 Development, including earthworks associated with development, should not do any of the following:

(a) impede the flow of floodwaters through the land or other surrounding land

(b) increase the potential hazard risk to public safety of persons during a flood event

(c) aggravate the potential for erosion or siltation or lead to the destruction of vegetation during a flood

(d) cause any adverse effect on the floodway function

(e) increase the risk of flooding of other land

(f) obstruct a watercourse.

Bushfire

8 The following bushfire protection principles of development control apply to development of land identified as General, Medium and High bushfire risk areas as shown on the *Bushfire Protection Area BPA Maps - Bushfire Risk*.

9 Development in a Bushfire Protection Area should be in accordance with those provisions of the *Minister's Code: Undertaking development in Bushfire Protection Areas* that are designated as mandatory for Development Plan Consent purposes.

10 Buildings and structures should be located away from areas that pose an unacceptable bushfire risk as a result of one or more of the following:

(a) vegetation cover comprising trees and/or shrubs

(b) poor access

(c) rugged terrain

(d) inability to provide an adequate building protection zone

(e) inability to provide an adequate supply of water for fire fighting purposes.

11 Residential, tourist accommodation and other habitable buildings should:

(a) be sited on the flatter portion of allotments and avoid steep slopes, especially upper slopes, narrow ridge crests and the tops of narrow gullies, and slopes with a northerly or westerly aspect

(b) be sited in areas with low bushfire hazard vegetation and set back at least 20 metres from existing hazardous vegetation

(c) have a dedicated and accessible water supply available at all times for fire fighting.

12 Extensions to existing buildings, outbuildings and other ancillary structures should be sited and constructed using materials to minimise the threat of fire spread to residential, tourist accommodation and other habitable buildings in the event of bushfire.

13 Buildings and structures should be designed and configured to reduce the impact of bushfire through using simple designs that reduce the potential for trapping burning debris against the building or structure, or between the ground and building floor level in the case of transportable buildings.

14 Land division for residential or tourist accommodation purposes within areas of high bushfire risk should be limited to those areas specifically set aside for these uses.

15 Where land division does occur it should be designed to:

(a) minimise the danger to residents, other occupants of buildings and fire fighting personnel

(b) minimise the extent of damage to buildings and other property during a bushfire

(c) ensure each allotment contains a suitable building site that is located away from vegetation that would pose an unacceptable risk in the event of bushfire

(d) ensure provision of a fire hazard separation zone isolating residential allotments from areas that pose an unacceptable bushfire risk by containing the allotments within a perimeter road or through other means that achieve an adequate separation.

16 Vehicle access and driveways to properties and public roads created by land division should be designed and constructed to:

(a) facilitate safe and effective operational use for fire fighting and other emergency vehicles and residents

(b) provide for two-way vehicular access between areas of fire risk and the nearest public road.

17 Olive orchards should be located and developed in a manner that minimises their potential to fuel bushfires.

Salinity

18 Development should not increase the potential for, or result in an increase in, soil and water salinity.

19 Preservation, maintenance and restoration of locally indigenous plant species should be encouraged in areas affected by dry land salinity.

20 Irrigated horticulture and pasture should not increase groundwater induced salinity.

Acid Sulfate Soils

21 Development and activities, including excavation and filling of land, that may lead to the disturbance of potential or actual acid sulfate soils should be avoided unless such disturbances are managed in a way that effectively avoids the potential for harm or damage to any of the following:

(a) the marine and estuarine environment

(b) natural water bodies and wetlands

(c) agricultural or aquaculture activities

(d) buildings, structures and infrastructure

(e) public health.

22 Development, including primary production, aquaculture activities and infrastructure, should not proceed unless it can be demonstrated that the risk of releasing acid water resulting from the disturbance of acid sulfate soils is minimal.

Site Contamination

23 Development, including land division, should not occur where site contamination has occurred unless the site has been assessed and remediated as necessary to ensure that it is suitable and safe for the proposed use.

Containment of Chemical and Hazardous Materials

24 Hazardous materials should be stored and contained in a manner that minimises the risk to public health and safety and the potential for water, land or air contamination.

25 Development that involves the storage and handling of hazardous materials should ensure that these are contained in designated areas that are secure, readily accessible to emergency vehicles, impervious, protected from rain and stormwater intrusion and other measures necessary to prevent:

(a) discharge of polluted water from the site

(b) contamination of land

(c) airborne migration of pollutants

(d) potential interface impacts with sensitive land uses.

Landslip

26 Land identified as being at risk from landslip should not be developed.

27 Development, including associated cut and fill activities, should not lead to an increased danger from land surface instability or to the potential of landslip occurring on the site or on surrounding land.

28 Development on steep slopes should promote the retention and replanting of vegetation as a means of stabilising and reducing the possibility of surface movement or disturbance.

29 Development in areas susceptible to landslip should:

(a) incorporate split level designs to minimise cutting into the slope

(b) ensure that cut and fill and heights of faces are minimised

(c) ensure cut and fill is supported with engineered retaining walls or are battered to appropriate grades

(d) control any erosion that will increase the gradient of the slope and decrease stability

(e) ensure the siting and operation of an effluent drainage field does not contribute to landslip

(f) provide drainage measures to ensure surface stability is not compromised

(g) ensure natural drainage lines are not obstructed.

Heritage Places

OBJECTIVES

1 The conservation of State and local heritage places.

2 The continued use, or adaptive reuse, of State and local heritage places that supports the conservation of their cultural significance.

3 Conservation of the setting of State and local heritage places.

PRINCIPLES OF DEVELOPMENT CONTROL

1 A heritage place spatially located on *Overlay Maps - Heritage* and Character Preservation District and more specifically identified in *Table Onka/10 - State Heritage Places* or in *Table Onka/9 - Local Heritage Places* should not be demolished, destroyed or removed, in total or in part, unless either of the following apply:

(a) that portion of the place to be demolished, destroyed or removed is excluded from the extent of the places identified in the *Table(s)*

(b) the structural condition of the place represents an unacceptable risk to public or private safety.

2 Development affecting those Local Heritage Places indicated in *Table Onka/9 - Local Heritage Places* should conform to the Heritage Protection Guidelines set out in *Table Onka/7 - Historic Conservation Area and Local Heritage Places Design Guidelines*.

3 Development of a State or local heritage place should retain those elements contributing to its heritage value, which may include (but not be limited to):

(a) principal elevations

(b) important vistas and views to and from the place

(c) setting and setbacks

(d) building materials

(e) outbuildings and walls

(f) trees and other landscaping elements

(g) access conditions (driveway form/width/material)

(h) architectural treatments

(i) the use of the place.

4 Development of a State or local heritage place should be compatible with the heritage value of the place.

5 Original unpainted plaster, brickwork, stonework or other masonry of existing State or local heritage places should be preserved, unpainted.

6 New buildings should not be placed or erected between the front street boundary and the façade of existing State or local heritage places.

7 Development that materially affects the context within which the heritage place is situated should be compatible with the heritage place. It is not necessary to replicate historic detailing, however design elements that should be compatible include, but are not limited to:

(a) scale and bulk

(b) width of frontage

(c) boundary setback patterns

(d) proportion and composition of design elements such as rooflines, openings, fencing and landscaping

(e) colour and texture of external materials.

8 Multi-storey additions to a State or local heritage place should be compatible with the heritage value of the place through a range of design solutions such as:

(a) extending into the existing roof space or to the rear of the building

(b) retaining the elements that contribute to the building's heritage value

(c) distinguishing between the existing and new portion of the building

(d) stepping in parts of the building that are taller than the front facade.

9 The introduction of advertisements and signage to a State or local heritage place should:

(a) be placed on discrete elements of its architecture such as parapets and wall panels, below the canopy, or within fascias, and infill end panels and windows

(b) not conceal or obstruct historical detailing of the heritage place

(c) not project beyond the silhouette or skyline of the heritage place

(d) not form a dominant element of the place.

10 The division of land adjacent to or containing a State or local heritage place should occur only where it will:

(a) create an allotment pattern that maintains or reinforces the integrity of the heritage place and the character of the surrounding area

(b) create an allotment or allotments of a size and dimension that can accommodate new development that will reinforce and complement the heritage place and the zone or policy area generally

(c) be of a size and dimension that will enable the siting and setback of new buildings from allotment boundaries so that they do not overshadow, dominate, encroach on or otherwise impact on the setting of the heritage place

(d) provide an area for landscaping of a size and dimension that complements the landscape setting of the heritage place and the landscape character of the locality

(e) enable the State or local heritage place to have a curtilage of a size sufficient to protect its setting.

Industrial Development

OBJECTIVES

1 Industrial, warehouse, storage and transport distribution development on appropriately located land, integrated with transport networks and designed to minimise potential impact on these networks.

2 The development of small scale agricultural industries, wineries, mineral water extraction and processing plants, and home based industries in rural areas.

3 Industrially zoned allotments and uses protected from encroachment by adjoining uses that would reduce industrial development or expansion.

4 Industrial development occurring without adverse effects on the health and amenity of occupiers of land in adjoining zones.

5 Compatibility between industrial uses within industrial zones.

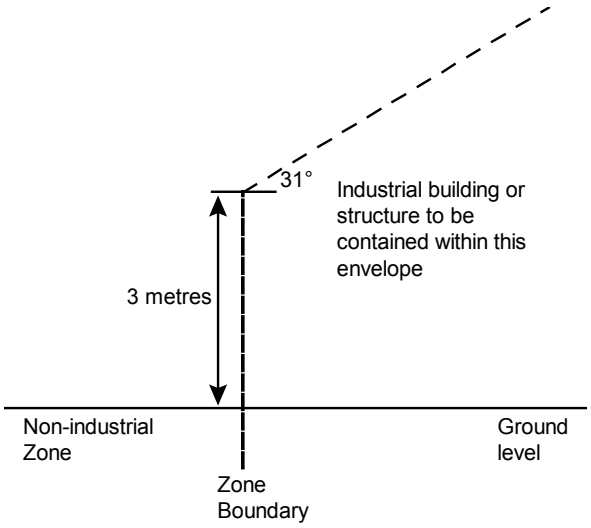
6 The improved amenity of industrial areas.

7 Co-location of industries in townships to enable promotion and implementation of innovative waste recovery practices, methods of power generation and reuse of by-products.

PRINCIPLES OF DEVELOPMENT CONTROL

1 Offices and showrooms associated with industrial, warehouse, storage and transport development should be sited at the front of the building with direct and convenient pedestrian access from the main visitor parking area.

2 Any building or structure on, or abutting the boundary of, a non-industrial zone should be restricted to a height of 3 metres above ground level at the boundary and a plane projected at 31 degrees above the horizontal into the development site from that 3 metre height, as shown in the following diagram:



3 Industrial development should enable all vehicles to enter and exit the site in a forward direction.

4 Industrial development abutting an arterial road, a non-industrial zone boundary, or significant open space should be developed in a manner that does not create adverse visual impacts on the locality.

5 Building facades facing a non-industrial zone, public road, or public open space should:

(c) use a variety of building finishes

(d) not consist solely of metal cladding

(e) contain materials of low reflectivity

(f) incorporate design elements to add visual interest

(g) avoid large expanses of blank walls.

6 Industrial development should minimise significant adverse impact on adjoining uses due to hours of operation, traffic, noise, fumes, smell, dust, paint or other chemical over-spray, vibration, glare or light spill, electronic interference, ash or other harmful or nuisance creating impacts.

7 Landscaping should be incorporated as an integral element of industrial development along non-industrial zone boundaries.

8 Fencing (including colour-coated wire mesh fencing) adjacent to public roads should be setback in one of the following ways:

(a) in line with the building facade

(b) behind the building line

(c) behind a landscaped area that softens its visual impact.

9 Marine aquaculture onshore storage, cooling and processing facilities should not impair the coastline and its visual amenity and should:

(a) be sited, designed, landscaped and developed at a scale and using external materials that minimise any adverse visual impact on the coastal landscape

(b) be sited and designed with appropriate vehicular access arrangement

(c) include appropriate waste treatment and disposal.

Small-scale agricultural industries, home-based industries, mineral water extraction and processing plants, and wineries in rural areas

10 Agricultural industries, home-based industries, mineral water extraction and processing plants, and wineries in rural areas should:

(a) use existing buildings and, in particular, buildings of heritage value, in preference to constructing new buildings

(b) (except for wineries in the **Watershed Protection (Mount Lofty Ranges) Zone**) be setback at least 50 metres from:

(i) any bore, well or watercourse, where a watercourse is identified as a blue line on a current series 1:50 000 government standard topographic map

(ii) a dam or reservoir that collects water flowing in a watercourse

(iii) a lake or wetland through which water flows

(iv) a channel into which water has been diverted

(v) a known spring

(vi) sink hole

(c) be located within the boundary of a single allotment, including any ancillary uses

(d) not result in more than one industry located on an allotment

(e) include a sign that facilitates access to the site that is sited and designed to complement the features of the surrounding area and which:

(i) does not exceed 2 square metres in area

(ii) is limited to one sign per establishment (for agricultural and home-based industries)

(iii) is not internally illuminated.

11 Agricultural industries, home-based industries, mineral water extraction and processing plants, and wineries in rural areas should not:

(a) necessitate significant upgrading of public infrastructure including roads and other utilities

(b) generate traffic beyond the capacity of roads necessary to service the development

(c) result in traffic and/or traffic volumes that would be likely to adversely alter the character and amenity of the locality

(d) be located on land with a slope greater than 20 per cent (1-in-5).

12 Agricultural industries (except for wineries) in rural areas should be small scale, and:

(a) should include at least one of the following activities normally associated with the processing of primary produce:

(i) washing

(ii) grading

(iii) processing (including bottling)

(iv) packing or storage

(b) may include an associated ancillary area for the sale and/or promotion of produce (including display areas)

(c) should have a total combined area for one or any combination of these activities (including ancillary sales area) not exceeding 250 square metres per allotment, with a maximum building area of 150 square metres, including a maximum area of 50 square metres for ancillary sale and display of goods manufactured in the industry

(d) should process primary produce that is grown within the Mount Lofty Ranges Region

(e) should occur only on an allotment where a habitable dwelling exists.

13 Agricultural industries, wineries (except wineries in the **Watershed Protection (Mount Lofty Ranges) Zone**) and mineral water extraction and processing plants should not be located:

(a) on land that is classified as being poorly drained or very poorly drained

(b) within 800 metres of a high water level of a public water supply reservoir

(c) closer than 300 metres (other than a home-based industry) to a dwelling or tourist accommodation that is not in the ownership of the applicant.

14 Home-based industries in rural areas:

(a) should include at least one of the following activities:

(i) arts

(ii) crafts

(iii) tourist

(iv) heritage related activities

(b) may include an ancillary area for the sale or promotion of goods manufactured in the industry (including display areas)

(c) should have a total combined area for one or any combination of these activities (including ancillary sales/promotion area) not exceeding 80 square metres per allotment with a maximum building area of 80 square metres, including a maximum area of 30 square metres for sale of goods made on the allotment by the industry

(d) should not be located further than 50 metres from a habitable dwelling occupied by the proprietor of the industry on the allotment.

15 Mineral water extraction and processing plants in rural areas:

(a) should include at least one of the following activities normally associated with the extraction and processing of mineral water:

(i) extraction

(ii) bottling

(iii) packaging

(iv) storage

(v) distribution

(b) may include ancillary activities of administration and sale and/or promotion of mineral water product

(c) should have a total combined area for one or any combination of these activities (including ancillary sale and/or promotion areas) not exceeding 350 square metres (or 450 square metres in the **Watershed Protection (Mount Lofty Ranges) Zone**) per allotment with a maximum building area of 250 square metres, including a maximum area of 50 square metres for ancillary sale and/or promotion of mineral water product.

16 Wineries in rural areas should:

(a) include at least one of the following activities normally associated with the making of wine:

(i) crushing

(ii) fermenting

(iii) bottling

(iv) maturation/cellaring of wine

(v) ancillary activities of administration, sale and/or promotion of wine product and restaurant

(b) be located within the boundary of a single allotment which adjoins or is on the same allotment as a vineyard

(c) process primary produce that is primarily sourced within the Mount Lofty Ranges Region

(d) only include a restaurant as an ancillary use to the winery

(e) be located not closer than 300 metres to a dwelling or tourist accommodation (that is not in the ownership of the winery applicant) where the crush capacity is equal to or greater than 500 tonnes per annum.

Infrastructure

OBJECTIVES

1 Infrastructure provided in an economical and environmentally sensitive manner.

2 The visual impact of infrastructure facilities managed.

3 The efficient and cost-effective use of existing infrastructure.

PRINCIPLES OF DEVELOPMENT CONTROL

1 Development should only occur where it has access to adequate utilities and services, including:

(a) electricity supply

(b) water supply

(c) drainage and stormwater systems

(d) effluent disposal systems

(e) formed all-weather public roads

(f) telecommunications services

(g) gas services.

2 Development should incorporate any relevant and appropriate social infrastructure, community services and facilities.

3 Development should only occur where it provides, or has access to, relevant easements for the supply of infrastructure.

4 Development should incorporate provision for the supply of infrastructure services to be located within common service trenches where practicable.

5 Development should not occur until adequate and co-ordinated drainage of the land is provided.

6 Development in urban areas should not occur without provision of an adequate reticulated domestic quality mains water supply and an appropriate waste treatment system.

7 In areas where no reticulated water supply is available, buildings whose usage is reliant on a water supply should be equipped with an adequate and reliable on-site water storage system.

8 Urban development should have a direct water supply.

9 Electricity infrastructure should be designed and located to minimise visual and environmental impacts.

10 Utilities and services, including access roads and tracks, should be sited on areas already cleared of native vegetation. If this is not possible, their siting should cause minimal interference or disturbance to existing native vegetation and biodiversity.

11 Utility buildings and structures should be grouped with non-residential development, where possible.

12 Development in proximity to infrastructure facilities should be sited and be of a scale to ensure adequate separation to protect people and property.

13 Incompatible uses should not encroach upon the easements of infrastructure corridors for existing and proposed transmission lines.

14 In urban areas, electricity supply (except transmission lines) serving new development should be installed underground, excluding lines having a capacity greater than or equal to 33kV.

15 Provision should be made for new transmission and distribution substations and overhead major electricity line corridors (having a capacity greater than or equal to 33kV) in areas which have the required buffer distance to protect people and allow for adequate access.

16 Land division for the purpose of residential and other sensitive land uses should not occur within electricity line corridors or existing electricity easements unless the resultant allotments are large enough to enable accommodation of safe clearances and expected structures.

17 Development should not compromise the viability of transmission line corridors and substation sites.

Interface Between Land Uses

OBJECTIVES

1 Development located and designed to minimise adverse impact and conflict between land uses.

2 Protect community health and amenity from adverse impacts of development.

3 Protect desired land uses from the encroachment of incompatible development.

PRINCIPLES OF DEVELOPMENT CONTROL

1 Development should not detrimentally affect the amenity of the locality or cause unreasonable interference through any of the following:

(a) the emission of effluent, odour, smoke, fumes, dust or other airborne pollutants

(b) noise

(c) vibration

(d) electrical interference

(e) light spill

(f) glare

(g) hours of operation

(h) traffic impacts.

2 Development should be sited and designed to minimise negative impacts on existing and potential future land uses desired in the locality.

3 Development adjacent to a **Residential Zone** or residential area within a **Township Zone** should be designed to minimise overlooking and overshadowing of adjacent dwellings and private open space.

4 Residential development adjacent to non-residential zones and land uses should be located, designed and/or sited to protect residents from potential adverse impacts from non-residential activities.

5 Sensitive uses likely to conflict with the continuation of lawfully existing developments and land uses desired for the zone should be designed to minimise negative impacts.

6 Non-residential development on land abutting a residential zone should be designed to minimise noise impacts to achieve adequate levels of compatibility between existing and proposed uses.

Noise Generating Activities

7 Development that emits noise (other than music noise) should include noise attenuation measures that achieve the relevant *Environment Protection (Noise) Policy* criteria when assessed at the nearest existing noise sensitive premises.

8 Development with the potential to emit significant noise (e.g. industry) should incorporate noise attenuation measures that prevent noise from causing unreasonable interference with the amenity of noise sensitive premises.

9 Outdoor areas (such as beer gardens or dining areas) associated with licensed premises should be designed or sited to minimise adverse noise impacts on adjacent existing or future noise sensitive development.

10 Development proposing music should include noise attenuation measures that achieve the following desired noise levels:

Noise level assessment location	Desired noise level
Adjacent existing noise sensitive development property boundary	Less than 8 dB above the level of background noise ($L_{90,15min}$) in any octave band of the sound spectrum and Less than 5 dB(A) above the level of background noise ($LA_{90,15min}$) for the overall (sum of all octave bands) A-weighted level
Adjacent land property boundary	Less than 65dB(Lin) at 63Hz and 70dB(Lin) in all other octave bands of the sound spectrum or Less than 8 dB above the level of background noise ($L_{90,15min}$) in any octave band of the sound spectrum and 5 dB(A) overall (sum of all octave bands) A-weighted level

Air Quality

11 Development with the potential to emit harmful or nuisance-generating air pollution should incorporate air pollution control measures to prevent harm to human health or unreasonable interference with the amenity of sensitive uses within the locality.

12 Chimneys or exhaust flues associated with commercial development (including cafes, restaurants and fast food outlets) should be designed to ensure they do not cause a nuisance or health concerns to nearby sensitive receivers by:

(a) incorporating appropriate treatment technology before exhaust emissions are released to the atmosphere

(b) ensuring that the location and design of chimneys or exhaust flues maximises dispersion and takes into account the location of nearby sensitive uses.

Rural Interface

13 The potential for adverse impacts resulting from rural development should be minimised by:

(a) not locating horticulture or intensive animal keeping on land adjacent to townships

(b) maintaining an adequate separation between horticulture or intensive animal keeping and townships, other sensitive uses and, where desirable, other forms of primary production.

14 Traffic movement, spray drift, dust, noise, odour and the use of frost fans and gas guns associated with primary production should not lead to unreasonable impact on adjacent land uses.

15 Existing primary production and mineral extraction should not be prejudiced by the inappropriate encroachment of sensitive uses such as urban development.

16 Development that is adjacent to land used for primary production (within either the zone or adjacent zones) should include appropriate setbacks and vegetative plantings designed to minimise the potential impacts of chemical spray drift and other impacts associated with primary production.

17 New urban development should allow for a buffer of at least 40 metres wide (inclusive of any fuel break, emergency vehicle access or road) separating urban and rural activities.

18 Development located within 300 metres of facilities for the handling, transportation and storage of bulk commodities should:

(a) not prejudice the continued operation of those facilities

(b) be located, designed and developed having regard to the potential environmental impact arising from the operation of such facilities and the potential extended hours of operation.

Landscaping, Fences and Walls

OBJECTIVES

1 The amenity of land and development enhanced with appropriate planting and other landscaping works, using locally indigenous plant species where possible.

2 Functional fences and walls that enhance the attractiveness of development.

PRINCIPLES OF DEVELOPMENT CONTROL

1 Development should incorporate open space and landscaping and minimise hard paved surfaces in order to:

(a) complement built form and reduce the visual impact of larger buildings (eg taller and broader plantings against taller and bulkier building components)

(b) enhance the appearance of road frontages

(c) screen service yards, loading areas and outdoor storage areas

(d) minimise maintenance and watering requirements

(e) enhance and define outdoor spaces, including car parking areas

(f) maximise shade and shelter

(g) assist in climate control within and around buildings

(h) minimise heat absorption and reflection

(i) maintain privacy

(j) maximise stormwater re-use

(k) complement existing vegetation, including native vegetation

(l) contribute to the viability of ecosystems and species

(m) promote water and biodiversity conservation.

2 Landscaping should:

(a) include the planting of locally indigenous species where appropriate

(b) be of a sufficient mature height and oriented towards the street frontage where it should screen buildings (except for entry doors and foyer areas) and enhance the appearance of development

(c) result in the appropriate clearance from powerlines and other infrastructure being maintained

(d) provide summer shade to reduce urban heat loading and where appropriate allow winter sun penetration and improve micro-climate conditions.

3 Landscaping should ensure that the entry doors or foyers areas of residential development facing the street are clearly visible and be designed to assist wayfinding for residents and visitors.

4 Landscaping should not:

(a) unreasonably restrict solar access to adjoining development

(b) cause damage to buildings, paths and other landscaping from root invasion, soil disturbance or plant overcrowding

(c) introduce pest plants

(d) increase the risk of bushfire

(e) remove opportunities for passive surveillance

(f) increase leaf fall in watercourses

(g) increase the risk of weed invasion

(h) obscure driver sight lines

(i) create a hazard for train or tram drivers by obscuring sight lines at crossovers.

5 Fences and walls, including retaining walls, should:

(a) not result in damage to neighbouring trees

(b) be compatible with the associated development and with existing predominant, attractive fences and walls in the locality

(c) enable some visibility of buildings from and to the street to enhance safety and allow casual surveillance

(d) incorporate articulation or other detailing where there is a large expanse of wall facing the street

(e) assist in highlighting building entrances

(f) be sited and limited in height, to ensure adequate sight lines for motorists and pedestrians especially on corner sites

(g) in the case of side and rear boundaries, be of sufficient height to maintain privacy and/or security without adversely affecting the visual amenity or access to sunlight of adjoining land

(h) be constructed of non-flammable materials.

6 Front fencing should be open in form to allow cross ventilation and access to sunlight.

7 Landscaping for non-residential development should be undertaken in accordance with *Table Onka/6 - Landscaping Guidelines for Non-Residential Development*.

Metropolitan Open Space System

OBJECTIVES

1 A Metropolitan Open Space System (MOSS), in and around metropolitan Adelaide, that:

(a) is comprised of public and private land

(b) is clearly defined and linked

(c) has an open or natural character

(d) provides a visual and scenic contrast to the built urban environment

(e) separates different parts of the metropolitan area.

2 Conservation and restoration of existing and modified habitats.

3 Conservation of sites of scientific or heritage interest.

4 The provision of corridors for the movement of wildlife.

5 A range of recreation and leisure areas including a network of recreation trails integrating MOSS and adjoining land uses.

6 A range of active recreation and sporting facilities of regional or State significance, including facilities that can be used for national and international events.

7 Stormwater management in association with recreation, aquifer recharge and water quality management.

PRINCIPLES OF DEVELOPMENT CONTROL

1 Development should preserve and enhance the natural and open character and amenity of land located within the MOSS shown on *Concept Plan Map Onka/24 - Metropolitan Open Space System*.

2 Development within the MOSS should contribute to the rehabilitation and restoration of aquatic and terrestrial ecosystems and water catchments.

3 Landscaping within MOSS locations should:

(a) incorporate remnant vegetation

(b) use locally indigenous plant species wherever possible

(c) provide shade and windbreaks along cyclist and pedestrian routes and around picnic and barbecue areas, seating and car parking areas

(d) maximise opportunities for passive surveillance along the park.

4 Development on public land within the MOSS should incorporate:

(a) easily identified access points

(b) pedestrian and cycle linkages and horse trails within open spaces and between other open space networks

(c) facilities to provide and support a range of recreation and leisure activities.

Natural Resources

OBJECTIVES

1 Retention, protection and restoration of the natural resources and environment.

2 Protection of the quality and quantity of South Australia's surface waters, including inland, marine and estuarine and underground waters.

3 The ecologically sustainable use of natural resources including water resources, including marine waters, ground water, surface water and watercourses.

4 Natural hydrological systems and environmental flows reinstated, and maintained and enhanced.

5 Development consistent with the principles of water sensitive design.

6 Development sited and designed to:

(a) protect natural ecological systems

(b) achieve the sustainable use of water

(c) protect water quality, including receiving waters

(d) reduce runoff and peak flows and prevent the risk of downstream flooding

(e) minimise demand on reticulated water supplies

(f) maximise the harvest and use of stormwater

(g) protect stormwater from pollution sources.

7 Storage and use of stormwater which avoids adverse impact on public health and safety.

8 Native flora, fauna and ecosystems protected, retained, conserved and restored.

9 Restoration, expansion and linking of existing native vegetation to facilitate habitat corridors for ease of movement of fauna.

10 Minimal disturbance and modification of the natural landform.

11 Protection of the physical, chemical and biological quality of soil resources.

12 Protection of areas prone to erosion or other land degradation processes from inappropriate development.

13 Protection of the scenic qualities of natural and rural landscapes.

PRINCIPLES OF DEVELOPMENT CONTROL

1 Development should be undertaken with minimum impact on the natural environment, including air and water quality, land, soil, biodiversity, and scenically attractive areas.

2 Development should ensure that South Australia's natural assets, such as biodiversity, water and soil, are protected and enhanced.

3 Development should not significantly obstruct or adversely affect sensitive ecological areas such as creeks, wetlands, estuaries and significant seagrass and mangrove communities.

4 Development should be appropriate to land capability and the protection and conservation of water resources and biodiversity.

Water Sensitive Design

5 Development should be designed to maximise conservation, minimise consumption and encourage re-use of water resources.

6 Development should not take place if it results in unsustainable use of surface or underground water resources.

7 Development should be sited and designed to:

(a) capture and re-use stormwater, where practical

(b) minimise surface water runoff

(c) prevent soil erosion and water pollution

(d) protect and enhance natural water flows

(e) protect water quality by providing adequate separation distances from watercourses and other water bodies

(f) not contribute to an increase in salinity levels

(g) avoid the water logging of soil or the release of toxic elements

(h) maintain natural hydrological systems and not adversely affect:

(i) the quantity and quality of groundwater

(ii) the depth and directional flow of groundwater

(iii) the quality and function of natural springs.

8 Water discharged from a development site should:

(a) be of a physical, chemical and biological condition equivalent to or better than its pre-developed state

(b) not exceed the rate of discharge from the site as it existed in pre-development conditions.

9 Development should include stormwater management systems to protect it from damage during a minimum of a 1-in-100 year average return interval flood.

10 Development should have adequate provision to control any stormwater over-flow runoff from the site and should be sited and designed to improve the quality of stormwater and minimise pollutant transfer to receiving waters.

11 Development should include stormwater management systems to mitigate peak flows and manage the rate and duration of stormwater discharges from the site to ensure the carrying capacities of downstream systems are not overloaded.

12 Development should include stormwater management systems to minimise the discharge of sediment, suspended solids, organic matter, nutrients, bacteria, litter and other contaminants to the stormwater system.

13 Stormwater management systems should preserve natural drainage systems, including the associated environmental flows.

14 Stormwater management systems should:

(a) maximise the potential for stormwater harvesting and re-use, either on-site or as close as practicable to the source

(b) utilise, but not be limited to, one or more of the following harvesting methods:

(i) the collection of roof water in tanks

(ii) the discharge to open space, landscaping or garden areas, including strips adjacent to car parks

(iii) the incorporation of detention and retention facilities

(iv) aquifer recharge.

15 Where it is not practicable to detain or dispose of stormwater on site, only clean stormwater runoff should enter the public stormwater drainage system.

16 Artificial wetland systems, including detention and retention basins, should be sited and designed to:

(a) ensure public health and safety is protected

(b) minimise potential public health risks arising from the breeding of mosquitoes.

Water Catchment Areas

17 Development located within any of the following areas should not adversely affect the quality or quantity of water resources:

(a) 'River Murray Protection Area - Tributaries Area' designated on *Concept Plan Map Onka/1 - Development Constraints - Water Management Areas*

(b) 'Prescribed Wells Areas' designated on *Concept Plan Map Onka/1 - Development Constraints - Water Management Areas*

(c) 'Mount Lofty Watershed 1' designated on *Concept Plan Map Onka/2 - Development Constraints Mount Loft Ranges Water Management Areas*

(d) 'Prescribed Water Resource Areas' designated on *Concept Plan Map Onka/2 - Development Constraints Mount Lofty Ranges Water Management Areas*.

18 Development should ensure watercourses and their beds, banks, wetlands and floodplains are not damaged or modified and are retained in their natural state, except where modification is required for essential access or maintenance purposes.

19 No development should occur where its proximity to a swamp or wetland will damage or interfere with the hydrology or water regime of the swamp or wetland.

20 A wetland or low-lying area providing habitat for native flora and fauna should not be drained, except temporarily for essential management purposes to enhance environmental values.

21 Along watercourses, areas of remnant native vegetation, or areas prone to erosion, that are capable of natural regeneration should be fenced off to limit stock access.

22 Development such as cropping, intensive animal keeping, residential, tourism, industry and horticulture, that increases the amount of surface run-off should include a strip of land at least 20 metres wide measured from the top of existing banks on each side of a watercourse that is:

(a) fenced to exclude livestock

(b) kept free of development, including structures, formal roadways or access ways for machinery or any other activity causing soil compaction or significant modification of the natural surface of the land

(c) revegetated with locally indigenous vegetation comprising trees, shrubs and other groundcover plants to filter runoff so as to reduce the impacts on native aquatic ecosystems and to minimise soil loss eroding into the watercourse.

23 Development resulting in the depositing of an object or solid material in a watercourse or floodplain or the removal of bank and bed material should not:

(a) adversely affect the migration of aquatic biota

(b) adversely affect the natural flow regime

(c) cause or contribute to water pollution

(d) result in watercourse or bank erosion

(e) adversely affect native vegetation upstream or downstream that is growing in or adjacent to a watercourse.

24 The location and construction of dams, water tanks and diversion drains should:

(a) occur off watercourse

(b) not take place in ecologically sensitive areas or on erosion prone sites

(c) provide for low flow by-pass mechanisms to allow for migration of aquatic biota

(d) not negatively affect downstream users

(e) minimise in-stream or riparian vegetation loss

(f) incorporate features to improve water quality (eg wetlands and floodplain ecological communities)

(g) protect ecosystems dependent on water resources.

25 Irrigated horticulture and pasture should not increase groundwater induced salinity.

26 Development should comply with the current *Environment Protection (Water Quality) Policy*.

Biodiversity and Native Vegetation

27 Development should retain existing areas of native vegetation and where possible contribute to revegetation using locally indigenous plant species.

28 Development should be designed and sited to minimise the loss and disturbance of native flora and fauna, including marine animals and plants, and their breeding grounds and habitats.

29 Native vegetation should be conserved and its conservation value and function not compromised by development if the native vegetation does any of the following:

(a) provides an important habitat for wildlife or shade and shelter for livestock

(b) has a high plant species diversity or includes rare, vulnerable or endangered plant species or plant associations and communities

(c) provides an important seed bank for locally indigenous vegetation

(d) has high amenity value and/or significantly contributes to the landscape quality of an area, including the screening of buildings and unsightly views

(e) has high value as a remnant of vegetation associations characteristic of a district or region prior to extensive clearance for agriculture

(f) is growing in, or is characteristically associated with a wetland environment.

30 Native vegetation should not be cleared if such clearing is likely to lead to, cause or exacerbate any of the following:

(a) erosion or sediment within water catchments

(b) decreased soil stability

(c) soil or land slip

(d) deterioration in the quality of water in a watercourse or surface water runoff

(e) a local or regional salinity problem

(f) the occurrence or intensity of local or regional flooding.

31 Development that proposes the clearance of native vegetation should address or consider the implications that removing the native vegetation will have on the following:

(a) provision for linkages and wildlife corridors between significant areas of native vegetation

(b) erosion along watercourses and the filtering of suspended solids and nutrients from runoff

(c) the amenity of the locality

(d) bushfire safety

(e) the net loss of native vegetation and other biodiversity.

32 Where native vegetation is to be removed, it should be replaced in a suitable location on the site with locally indigenous vegetation to ensure that there is not a net loss of native vegetation and biodiversity.

33 Development should be located and occur in a manner which:

(a) does not increase the potential for, or result in, the spread of pest plants, or the spread of any non-indigenous plants into areas of native vegetation or a conservation zone

(b) avoids the degradation of remnant native vegetation by any other means including as a result of spray drift, compaction of soil, modification of surface water flows, pollution to groundwater or surface water or change to groundwater levels

(c) incorporates a separation distance and/or buffer area to protect wildlife habitats and other features of nature conservation significance.

34 Development should promote the long-term conservation of vegetation by:

(a) avoiding substantial structures, excavations, and filling of land in close proximity to the trunk of trees and beneath their canopies

(b) minimising impervious surfaces beneath the canopies of trees

(c) taking other effective and reasonable precautions to protect both vegetation and the integrity of structures and essential services.

35 Horticulture involving the growing of olives should be located at least:

(a) 500 metres from:

(i) a national park

(ii) a conservation park

(iii) a wilderness protection area

(iv) the edge of a substantially intact stratum of native vegetation greater than 5 hectares in area

(b) 50 metres from the edge of stands of native vegetation 5 hectares or less in area.

36 Horticulture involving the growing of olives should have at least one locally indigenous tree that will grow to a height of at least 7 metres sited at least every 100 metres around the perimeter of the orchard.

Soil Conservation

37 Development should not have an adverse impact on the natural, physical, chemical or biological quality and characteristics of soil resources.

38 Development should be designed and sited to prevent erosion.

39 Development should take place in a manner that will minimise alteration to the existing landform.

40 Development should minimise the loss of soil from a site through soil erosion or siltation during the construction phase of any development and following the commencement of an activity.

Open Space and Recreation

OBJECTIVES

1 The creation of a network of linked parks, reserves, recreational trails and recreation areas at regional and local levels.

2 Pleasant, functional and accessible open spaces providing a range of physical environments.

3 A wide range of settings for active and passive recreational opportunities.

4 The provision of open space in the following hierarchy:

- State
- Regional
- District
- Neighbourhood
- Local.

PRINCIPLES OF DEVELOPMENT CONTROL

1 Urban development should include public open space and recreation areas.

2 Public open space and recreation areas should be of a size, dimension and location that:

(a) facilitate a range of formal and informal recreation activities

(b) provide for the movement of pedestrians and cyclists

(c) incorporate existing vegetation and natural features, watercourses, wildlife habitat and other sites of natural or cultural value

(d) link habitats, wildlife corridors, public open spaces and existing recreation facilities

(e) enable effective stormwater management

(f) provides for the planting and retention of large trees and vegetation.

3 Open space should be designed to incorporate:

(a) pedestrian, cycle linkages to other open spaces, centres, schools and public transport nodes

(b) park furniture, shaded areas and resting places to enhance pedestrian comfort

(c) safe crossing points where pedestrian routes intersect the road network

(d) easily identified access points

(e) frontage to abutting public roads to optimise pedestrian access and visibility

(f) re-use of stormwater for irrigation purposes

(g) recreational trails where appropriate.

4 Where practical, access points to regional parks should be located close to public transport.

5 District level parks should be at least 3 hectares in size, and provided within 2 kilometres of all households that they serve.

6 Neighbourhood parks should be at least 0.5 hectares and generally closer to 1 hectare in size, and provided within 500 metres of households that they serve.

7 Local parks should be:

(a) a minimum of 0.2 hectares in size

(b) centrally located within a residential area, close to schools, shops and generally within 300 metres of households that they serve.

8 No more than 20 per cent of land allocated as public open space should:

(a) have a slope in excess of 1-in-4

(b) comprise creeks or other drainage areas.

9 Signage should be provided at entrances to and within public open space to provide clear orientation to major points of interest such as the location of public toilets, telephones, safe routes and park activities.

10 Buildings in open space, including structures and associated car parking areas, should be designed, located and of a scale that is unobtrusive and does not detract from the desired open space character.

11 Development in open space should:

(a) be clustered where practical to ensure that the majority of the site remains open

(b) where practical, be developed for multi-purpose use

(c) be constructed to minimise the extent of hard paved areas.

12 Open spaces and recreation areas should be located and designed to maximise safety and security by:

(a) ensuring that within urban areas, their edges are overlooked by housing, commercial or other development that can provide effective informal surveillance

(b) ensuring fenced parks and playgrounds have more than one entrance or exit when fenced

(c) locating play equipment where it can be informally observed by nearby residents and users during times of use

(d) clearly defining the perimeters of play areas

(e) providing lighting around facilities such as toilets, telephones, seating, litter bins, bike storage and car parks

(f) focusing pedestrian and bicycle movement after dark along clearly defined, adequately lit routes with observable entries and exits.

13 Landscaping associated with open space and recreation areas should:

(a) not compromise the drainage function of any drainage channel

(b) provide shade and windbreaks along cyclist and pedestrian routes, around picnic and barbecue areas and seating, and in car parking areas

(c) maximise opportunities for informal surveillance throughout the park

(d) enhance the visual amenity of the area and complement existing buildings

(e) be designed and selected to minimise maintenance costs

(f) provide habitat for local fauna.

14 Development of recreational activities in areas not zoned for that purpose should be compatible with surrounding activities.

15 Recreation facilities development should be sited and designed to minimise negative impacts on the amenity of the locality.

Orderly and Sustainable Development

OBJECTIVES

1 Orderly and economical development that creates a safe, convenient and pleasant environment in which to live.

2 Development occurring in an orderly sequence and in a compact form to enable the efficient provision of public services and facilities.

3 Development that does not jeopardise the continuance of adjoining authorised land uses.

4 Development that does not prejudice the achievement of the provisions of the Development Plan.

5 Development abutting adjoining Council areas having regard to the policies of that Council's Development Plan.

6 Urban development located only in zones designated for such development.

7 Urban development contained within existing townships and settlements and located only in zones designated for such development.

PRINCIPLES OF DEVELOPMENT CONTROL

1 Development should not prejudice the development of a zone for its intended purpose.

2 Land outside of townships and settlements should primarily be used for primary production, conservation purposes.

3 The economic base of the region should be expanded in a sustainable manner.

4 Urban development should form a compact extension to an existing built-up area.

5 Ribbon development should not occur along the coast, water frontages or arterial roads shown in *Overlay Maps - Transport*.

6 Development should be located and staged to achieve the economical provision of public services and infrastructure, and to maximise the use of existing services and infrastructure.

7 Where development is expected to impact upon the existing infrastructure network (including the transport network), development should demonstrate how the undue effect will be addressed.

8 Vacant or underutilised land should be developed in an efficient and co-ordinated manner to not prejudice the orderly development of adjacent land.

9 Development should be undertaken in accordance with the following concept plan maps:

(a) *Concept Plan Map Onka/1 - Development Constraints Water Management Areas*

(b) *Concept Plan Map Onka/2 - Development Constraints Mount Lofty Ranges Water Management Areas*

(c) *Concept Plan Map Onka/3 - MOSS Study Area (Onkaparinga River)*

(d) *Concept Plan Map Onka/4 - Moana*

(e) *Concept Plan Map Onka/6 - Development Sequencing (Aldinga/Sellicks Beach)*

(f) *Concept Plan Map Onka/7 - Development Sequencing (Moana)*

(g) *Concept Plan Map Onka/8 - Aldinga*

(h) *Concept Plan Map Onka/9 - Affected Area (Aldinga/Sellicks Beach)*

(i) *Concept Plan Map Onka/10 - District Centre (Aldinga Beach)*

(j) *Concept Plan Map Onka/11 - District Centre (Beach Road East)*

(k) *Concept Plan Map Onka/12 - District Centre (Beach Road West)*

(l) *Concept Plan Map Onka/13 - District Centre Zone (Seaford)*

(m) *Concept Plan Map Onka/15 - District Centre (Sherriffs Road)*

(n) *Concept Plan Map Onka/16 - Seaford*

(o) *Concept Plan Map Onka/17 - Worthing Mine*

(p) *Concept Plan Map Onka/18 - Living Area*

(q) *Concept Plan Map Onka/19 - Seaford Heights*

(r) *Concept Plan Map Onka/20 - Rural Living Chandlers Hill*

(s) *Concept Plan Map Onka/21 - Broadacre Division (Kangarilla Township)*

(t) *Concept Plan Map Onka/22 - Township Strategy (McLaren Flat Township)*

(u) *Concept Plan Map Onka/23 - Historic Township (Old Noarlunga)*.

(v) *Concept Plan Map Onka/24 - Metropolitan Open Space System*

(w) *Concept Plan Map Onka/25 - Noarlunga Regional Centre*

(x) *Concept Plan Map Onka/26 - Bulky Goods (Seaford Road)*

(y) *Concept Plan Map Onka/27 - Bulky Goods (Sherriffs Road)*

(z) *Concept Plan Map Onka/28 - Hackham / Onkaparinga Hills Infrastructure*

(aa) *Concept Plan Map Onka/31 - Hart Road*.

Regulated Trees

OBJECTIVES

1 The conservation of regulated trees that provide important aesthetic and environmental benefit.

2 Development in balance with preserving regulated trees that demonstrate one or more of the following attributes:

(a) significantly contributes to the character or visual amenity of the local area

(b) indigenous to the local area

(c) a rare or endangered species

(d) an important habitat for native fauna.

PRINCIPLES OF DEVELOPMENT CONTROL

1 Development should have minimum adverse effects on regulated trees.

2 A regulated tree should not be removed or damaged other than where it can be demonstrated that one or more of the following apply:

(a) the tree is diseased and its life expectancy is short

(b) the tree represents an unacceptable risk to public or private safety

(c) the tree is causing damage to a substantial building or structure of value

(d) development that is reasonable and expected would not otherwise be possible

(e) the work is required for the removal of dead wood, treatment of disease, or is in the general interests of the health of the tree.

3 Tree damaging activity other than removal should seek to maintain the aesthetic appearance and structural integrity of the tree.

4 The 'Designated Area' for the purposes of the Urban Trees Fund will comprise the whole of the council area where located outside of High or Medium Bushfire Risk Protection Areas shown on *Bushfire Protection Area BPA Maps - Bushfire Risk*.

Residential Development

OBJECTIVES

1 Safe, convenient, sustainable and healthy living environments that meet the full range of needs and preferences of a diverse community.

2 A diverse range of dwelling types and sizes available to cater for changing demographics, particularly smaller household sizes and supported accommodation.

3 Medium and high density residential development in areas close to activity centres, public and community transport and public open spaces.

4 The revitalisation of residential areas to support the viability of community services and infrastructure.

5 Affordable housing, student housing and housing for aged persons provided in appropriate locations.

6 Increased affordable housing opportunities through land division and the conversion of buildings to a residential use.

PRINCIPLES OF DEVELOPMENT CONTROL

1 Residential allotments and sites should maximise solar orientation and have the area and dimensions to accommodate:

(a) the siting and construction of a dwelling and associated ancillary outbuildings

(b) the provision of landscaping and private open space

(c) convenient and safe vehicle, pedestrian and cycling access and parking

(d) water sensitive design systems that enable the storage, treatment and reuse of stormwater.

2 Residential allotments should be of varying sizes to encourage housing diversity.

Design and Appearance

3 Dwellings and accommodation at ground floor level should contribute to the character of the locality and create active, safe streets by incorporating one or more of the following:

(a) front landscaping or terraces that contribute to the spatial and visual structure of the street while maintaining adequate privacy for occupants

(b) individual entries for ground floor accommodation

(c) opportunities to overlook adjacent public space.

4 Residential development should be designed to ensure living rooms and bedrooms have a pleasant short range visual outlook to private or communal space and avoid truncated views onto adjoining buildings or boundary fencing.

5 Residential development should be designed so that the main façade and entries to dwellings or foyer areas directly face and are clearly visible from their primary street frontage and have access ways to enable visitors to easily identify individual dwellings.

Garages, Carports and Outbuildings

6 Garages, carports and residential outbuildings should have a roof form and pitch, building materials and detailing that complements the design of the associated dwelling.

7 Residential outbuildings, including garages and sheds, should not be constructed unless in association with an existing dwelling.

8 Garages, carports and residential outbuildings should not dominate the streetscape and be designed within the following parameters unless otherwise stated in a zone, policy area or precinct:

Parameter	Value
Maximum floor area	60 square metres
Maximum wall height	3 metres
Maximum building height	5 metres
Minimum setback from a primary road frontage for local roads and streets	Garages and carports sited no closer to the primary road frontage than any part of its associated dwelling and in any other case, be set back a minimum of 5.5 metres Outbuildings should not protrude forward of any part of its associated dwelling
Minimum setback from a secondary road frontage for local roads and streets	0.9 metres or in line with the existing dwelling
Minimum setback from a vehicle access way	0 metres
Maximum length along the boundary	8 metres or 50 per cent of the length along that boundary (which ever is the lesser)
Maximum frontage width of garage or carport with an opening facing a rear access lane	No maximum
Maximum frontage width of garage or carport with an opening facing the street	6 metres or less than 50 per cent of the allotment frontage whichever is the lesser

Site Coverage

9 Site coverage should ensure sufficient space is provided for:

(a) pedestrian and vehicle access and vehicle parking

(b) domestic storage

(c) outdoor clothes drying

(d) rainwater tanks

(e) private open space and landscaping

(f) convenient storage of household waste and recycling receptacles.

Private Open Space

10 Private open space (available for exclusive use by residents of each dwelling) should be provided for each dwelling and should be sited and designed:

(a) to be accessed directly from a habitable rooms of the dwelling

(b) to be generally at ground level (other than for dwellings without ground floor habitable or living rooms) and to the side or rear of a dwelling and screened for privacy

(c) to take advantage of, but not adversely affect, natural features of the site

(d) to minimise overlooking from adjacent buildings

(e) to achieve separation from bedroom windows on adjacent sites

(f) to have a northerly aspect to provide for comfortable year round use

(g) not to be significantly shaded during winter by the associated dwelling or adjacent development

(h) to be partly shaded in summer

(i) to minimise noise or air quality impacts that may arise from traffic, industry or other business activities within the locality

(j) to have sufficient area and shape to be functional, taking into consideration the location of the dwelling, and the dimension and gradient of the site.

11 Dwellings at ground level should provide private open space in accordance with the following table:

Site area per dwelling (square metres)	Minimum area excluding any area at ground level at the front of the dwelling (square metres)	Minimum dimension (metres)	Minimum area provided at the rear or side of the dwelling, directly accessible from a habitable room (square metres)
>500	80, of which 10 may comprise balconies, roof patios and the like, provided they have a minimum dimension of 2 metres	4	24
301 to 500	60, of which 10 may comprise balconies, roof patios and the like, provided they have a minimum dimension of 2 metres	4	16
200 to 300	36, of which 8 may comprise balconies, roof patios and the like, provided they have a minimum dimension of 2 metres	4	16
<200	24, of which 8 may comprise balconies, roof patios and the like, provided they have a minimum dimension of 2 metres	4	16

12 Private open space should not include driveways, effluent drainage areas, rubbish bin storage areas, sites for rainwater tanks and other utility areas, and common areas such as parking areas and communal open space.

13 Private open space at ground level should be designed to provide a consolidated area of deep soil (an area of natural ground which excludes areas where there is a structure underneath, pools and non-permeable paved areas) to:

(a) assist with ease of drainage

(b) allow for effective deep planting

(c) reduce urban heat loading and improve micro-climatic conditions around sites and buildings.

14 Dwellings located above ground level should provide private open space, that is directly accessible from a habitable room, in accordance with the following parameters:

Dwelling type	Minimum area of private open space (square metres)	Minimum dimension of private open space (metres)
Studio (where there is no separate bedroom)	4	1.8
One bedroom dwelling*	8	2.1
Two bedroom dwelling*	11	2.4
Three + bedroom dwelling*	15	2.6

* or room(s) capable of being used as a bedroom

15 A minimum of 50 per cent of the private open space provided (per dwelling) should be open to the sky and free from verandas and/or other structures.

16 Private open space may be substituted for the equivalent area of communal open space (up to a limit of 50 per cent) where:

(a) at least 50 per cent of the communal open space is visually screened from public areas

(b) ground floor communal space is overlooked by habitable rooms to facilitate passive surveillance

(c) it contains landscaping and facilities that are functional, attractive and encourage recreational use

Deep Soil Zones

Note: This Principle of Development Control (PDC) prescribes a measurable design solution as one way of achieving the intent of the PDC. Where this solution is met, it should be taken as meeting the intent of the principle. Alternative design solutions may also achieve the intent of the PDC and, when proposed, should be assessed on their merits.

17 Development should provide deep soil zones for the retention of existing vegetation or the planting of new deep root vegetation, including tall trees with large canopies.

One way of achieving this is in accordance with the following table:

Site Area	Minimum Deep Soil Area	Minimum dimension	Tree Size / Deep Soil Zones
<300m^2	10m^2	1.5 metres	1 small tree / 10m^2 deep soil
300 to 1500m^2	7 per cent site area	3 metres	1 medium tree / 30m^2 deep soil
>1500m^2	7 per cent site area	6 metres	1 large or medium tree / 60m^2 deep soil
Tree size and site area definitions:			
Small tree:	<6 metres mature height and <4 metres canopy spread		
Medium tree:	6 to 12 metres mature height and 4 to 8 metres canopy spread		
Large tree:	12 metres mature height and >8 metres canopy spread		
Site area:	The total area for development site, not average area per dwelling		

Communal Open Space

18 Communal open space should be shared by more than one dwelling, not be publicly accessible and exclude:

(a) private open space

(b) public rights of way

(c) private streets

(d) parking areas and driveways

(e) service and storage areas

(f) narrow or inaccessible strips of land.

19 Communal open space should only be located on elevated gardens or roof tops where the area and overall design is useful for the recreation and amenity needs of residents and where it is designed to:

(a) address acoustic, safety, security and wind effects

(b) minimise overlooking into habitable room windows or onto the useable private open space of other dwellings

(c) facilitate landscaping and food production

(d) be integrated into the overall facade and composition of buildings.

Visual Privacy

20 Except for buildings of 3 or more storeys, upper level windows, balconies, terraces and decks that overlook habitable room windows or private open space of dwellings should maximise visual privacy through the use of measures such as window sill heights of not less than 1.5 metres or permanent screens for balconies, terraces and decks having a height of 1.5 metres above finished floor level.

Noise

21 Noise generated by fixed noise sources such as air conditioning units and pool pumps should be located, designed and attenuated to avoid nuisance to adjoining landowners and occupiers.

22 External noise and artificial light intrusion into bedrooms should be minimised by separating or shielding these rooms from:

(a) active communal recreation areas, parking areas and vehicle access ways

(b) service equipment areas and fixed noise sources on the same or adjacent sites.

Site Facilities and Storage

23 Site facilities for group dwellings, multiple dwellings and residential flat buildings should include:

(a) mail box facilities sited close to the major pedestrian entrance to the site

(b) bicycle parking for residents and visitors for developments containing more than 6 dwellings)

(c) household waste and recyclable storage areas.

24 Residential development should incorporate appropriate, well designed storage under the main roof of a dwelling or garage for household goods such as bicycles or larger items.

25 The arrangement of building services and utilities should be coordinated and achieve the following:

(a) located away from entry point(s) and screened from public view

(b) integrated with the design of the building

(c) grouped together to reduce footprint, where practicable.

26 An appropriately sized, functional and convenient bin (including organics) storage and recycling area should be provided as follows:

(a) in the curtilage of the dwelling (excluding areas of private open space and driveways) and screened from public view

(b) in a garage, carport or outbuilding with appropriate ventilation

(c) within a purpose designed on-site communal facility for residential flat buildings or group dwellings that is screened from public view.

27 The path used to transfer waste and recycling from a storage and recycling area to the kerb should:

(a) ensure that waste transfer is simple and safe at all times

(b) be a minimum path width of 0.9 metres

(c) be free of steps and have a grade of no more than 1-in-10.

Affordable Housing

28 Affordable housing should be well integrated and complementary in design and appearance to other dwellings within the development.

Dependent Accommodation

29 Dependent accommodation (i.e. accommodation where the living unit is connected to the same services of the main dwelling) should be developed on the same allotment as the existing dwelling only where:

(a) the site is of adequate size and configuration and the minimum total site is 450 square metres

(b) the accommodation has a small floor area relative to the associated main dwelling(s)

(c) adequate outdoor space of a minimum of 20 square metres is provided for the use of all occupants

(d) adequate on-site car parking is provided by one additional car parking space being provided on the site

(e) the building is designed to, and comprises colours and materials that will, complement the associated dwelling.

Swimming Pools and Outdoor Spas

30 Swimming pools, outdoor spas and associated ancillary equipment and structures should be sited to protect the privacy and amenity of adjoining residential land.

Significant Trees

OBJECTIVES

1 The conservation of significant trees, in Metropolitan Adelaide, that provide important aesthetic and environmental benefit.

2 The conservation of significant trees in balance with achieving appropriate development.

PRINCIPLES OF DEVELOPMENT CONTROL

1 Development should preserve the following attributes where a significant tree demonstrates at least one of the following attributes:

(a) makes an important contribution to the character or amenity of the local area

(b) is indigenous to the local area and its species is listed under the *National Parks and Wildlife Act 1972* as a rare or endangered native species

(c) represents an important habitat for native fauna

(d) is part of a wildlife corridor of a remnant area of native vegetation

(e) is important to the maintenance of biodiversity in the local environment

(f) forms a notable visual element to the landscape of the local area.

2 Development should be undertaken so that it has a minimum adverse effect on the health of a significant tree.

3 Significant trees should be preserved, and tree damaging activity should not be undertaken, unless:

(a) in the case of tree removal, where at least one of the following apply:

(i) the tree is diseased and its life expectancy is short

(ii) the tree represents an unacceptable risk to public or private safety

(iii) the tree is within 20 metres of a residential, tourist accommodation or habitable building and is a bushfire hazard within a Bushfire Prone Area

(b) the tree is shown to be causing or threatening to cause substantial damage to a substantial building or structure of value

(c) all other reasonable remedial treatments and measures have been determined to be ineffective

(d) it is demonstrated that all reasonable alternative development options and design solutions have been considered to prevent substantial tree damaging activity occurring.

(e) in any other case, any of the following circumstances apply:

(i) the work is required for the removal of dead wood, treatment of disease, or is in the general interests of the health of the tree

(ii) the work is required due to unacceptable risk to public or private safety

(iii) the tree is within 20 metres of a residential, tourist accommodation or habitable building and is a bushfire hazard within a Bushfire Prone Area

(iv) the tree is shown to be causing or threatening to cause damage to a substantial building or structure of value

(v) the aesthetic appearance and structural integrity of the tree is maintained

(vi) it is demonstrated that all reasonable alternative development options and design solutions have been considered to prevent substantial tree-damaging activity occurring.

4 Development involving ground work activities such as excavation, filling, and sealing of surrounding surfaces (whether such work takes place on the site of a significant tree or otherwise) should only be undertaken where the aesthetic appearance, health and integrity of a significant tree, including its root system, will not be adversely affected.

5 Land should not be divided or developed where the division or development would be likely to result in a substantial tree damaging activity occurring to a significant tree.

Siting and Visibility

OBJECTIVES

1 Protection of scenically attractive areas, particularly natural, rural and coastal landscapes.

PRINCIPLES OF DEVELOPMENT CONTROL

1 Development should be sited and designed to minimise its visual impact on:

(a) the natural, rural or heritage character of the area

(b) areas of high visual or scenic value, particularly rural and coastal areas

(c) views from the coast, near-shore waters, public reserves, tourist routes and walking trails

(d) the amenity of public beaches

2 Buildings should be sited in unobtrusive locations and, in particular, should:

(a) be grouped together

(b) where possible be located in such a way as to be screened by existing vegetation when viewed from public roads and especially from the Mount Lofty Ranges Scenic Road as shown on *Overlay Maps - Transport*.

3 Buildings outside of urban areas and in undulating landscapes should be sited in unobtrusive locations and in particular should be:

(a) sited below the ridgeline

(b) sited within valleys or behind spurs

(c) sited in such a way as to not be visible against the skyline when viewed from public roads, and especially from the Mount Lofty Ranges Scenic Road as shown on *Overlay Maps - Transport*

(d) set well back from public roads, particularly when the allotment is on the high side of the road, or especially from to the Mount Lofty Ranges Scenic Road as shown on *Overlay Maps - Transport.*

4 Buildings and structures should be designed to minimise their visual impact in the landscape, in particular:

(a) the profile of buildings should be low and the roof lines should complement the natural form of the land

(b) the mass of buildings should be minimised by variations in wall and roof lines and by floor plans which complement the contours of the land

(c) large eaves, verandas and pergolas should be incorporated into designs so as to create shadowed areas that reduce the bulky appearance of buildings.

5 The nature of external surface materials of buildings should not detract from the visual character and amenity of the landscape.

6 The number of buildings and structures on land outside of urban areas should be limited to that necessary for the efficient management of the land or the harvesting of wind resources for the generation of renewable energy.

7 The number of buildings and structures on land outside of urban areas should be limited to that necessary for the efficient management of the land.

8 Driveways and access tracks should be designed and surfaced to blend sympathetically with the landscape and to minimise interference with natural vegetation and landforms.

9 Development should be screened through the establishment of landscaping using locally indigenous plant species:

(a) around buildings and earthworks to provide a visual screen as well as shade in summer, and protection from prevailing winds

(b) along allotment boundaries to provide permanent screening of buildings and structures when viewed from adjoining properties and public roads

(c) along the verges of new roads and access tracks to provide screening and minimise erosion.

Sloping Land

OBJECTIVES

1 Development on sloping land designed to manage visual impacts, minimise impacts on the natural environment and protect soil stability and water quality.

PRINCIPLES OF DEVELOPMENT CONTROL

1 Development and associated driveways and access tracks should be sited and designed to integrate with the natural topography of the land and minimise the need for earthworks.

2 Development and associated driveways and access tracks, including related earthworks, should be sited, designed and undertaken in a manner that:

(a) minimises their visual impact

(b) reduces the bulk of the buildings and structures

(c) minimises the extent of cut and/or fill

(d) minimises the need for, and the height of, retaining walls

(e) does not cause or contribute to instability of any embankment or cutting

(f) avoids the silting of watercourses

(g) protects development and its surrounds from erosion caused by water runoff.

3 Driveways and access tracks across sloping land should be accessible and have a safe, all-weather trafficable surface.

4 Development sites should not be at risk of landslip.

5 Development on steep land should include site drainage systems to minimise erosion and avoid adverse impacts on slope stability.

6 Steep sloping sites in un-sewered areas should not be developed unless the physical characteristics of the allotments enable the proper siting and operation of an effluent drainage field suitable for the development intended.

7 The cutting and/or filling of land outside townships and urban areas should:

(a) be kept to a minimum and be limited to a maximum depth or height no greater than 1.5 metres so as to preserve the natural form of the land and the native vegetation

(b) only be undertaken in order to reduce the visual impact of buildings, including structures, or in order to construct water storage facilities for use on the allotment

(c) only be undertaken if the resultant slope can be stabilised to prevent erosion

(d) result in stable scree slopes which are covered with top soil and landscaped so as to preserve and enhance the natural character or assist in the re-establishment of the natural character of the area.

Telecommunications Facilities

OBJECTIVES

1 Telecommunications facilities provided to deliver communication services to the community.

2 Telecommunications facilities sited and designed to minimise visual impact on the amenity of the local environment.

PRINCIPLES OF DEVELOPMENT CONTROL

1 Telecommunications facilities should:

(a) be located in a co-ordinated manner to deliver communication services efficiently

(b) use materials and finishes that minimise visual impact

(c) have antennae located as close as practical to the support structure

(d) be located primarily in industrial, commercial, business, office, centre and rural zones

(e) where technically feasible, be co-located with other telecommunications facilities

(f) incorporate landscaping to screen the development, particularly equipment shelters and huts

(g) be designed and sited to minimise the visual impact on the character and amenity of the local environment, in particular visually prominent areas, main focal points and significant vistas.

2 Telecommunications facilities in areas of high visitation and community use should use innovative design techniques (eg sculpture and other artworks) where possible and where the resulting design would positively contribute to the character of the area.

3 Telecommunications facilities should be located in residential zones only if sited and designed to minimise visual impact by:

(a) using existing buildings and vegetation for screening

(b) incorporating the facility within an existing structure that may serve another purpose

(c) taking into account the size, scale, context and characteristics of existing structures, landforms and vegetation so as to complement the local environment.

4 Telecommunications facilities should not have a direct or significant effect on the amenity, character and settings of Historic Conservation Areas, local heritage places, State heritage places or State Heritage Areas.

Transportation and Access

OBJECTIVES

1 A comprehensive, integrated, affordable and efficient air, rail, sea, road, cycle and pedestrian transport system that will:

(a) provide equitable access to a range of public, community and private transport services for all people

(b) ensure a high level of safety

(c) effectively support the economic development of the State

(d) have minimal negative environmental and social impacts

(e) maintain options for the introduction of suitable new transport technologies.

2 Development that:

(a) provides safe and efficient movement for all transport modes

(b) ensures access for vehicles including emergency services, public infrastructure maintenance and commercial vehicles

(c) provides off-street parking

(d) is appropriately located so that it supports and makes best use of existing transport facilities and networks

(e) provides convenient and safe access to public transport stops.

3 A road hierarchy that promotes safe and efficient transportation in an integrated manner throughout the State.

4 Provision of safe, pleasant, accessible, integrated and permeable pedestrian and cycling networks that are connected to the public transport network.

5 Safe and convenient freight and people movement throughout the State.

PRINCIPLES OF DEVELOPMENT CONTROL

Land Use

1 Land uses arranged to support the efficient provision of sustainable transport networks and encourage their use.

Movement Systems

2 Development should be integrated with existing transport networks, particularly major rail, road and public transport corridors as shown on *Location Maps* and *Overlay Maps - Transport*, and designed to minimise its potential impact on the functional performance of the transport network.

3 Transport corridors should be sited and designed so as to not unreasonably interfere with the health and amenity of adjacent sensitive land uses.

4 Roads should be sited and designed to blend with the landscape and be in sympathy with the terrain.

5 Land uses that generate large numbers of visitors such as shopping centres, places of employment, schools, hospitals and medium to high density residential uses should be located so that they can be serviced by the public transport network and encourage walking and cycling.

6 Development generating high levels of traffic, such as schools, shopping centres and other retail areas, and entertainment and sporting facilities should incorporate passenger pick-up and set-down areas. The design of such areas should minimise interference to existing traffic and give priority to pedestrians, cyclists and public and community transport users.

7 The location and design of public and community transport set-down and pick-up points should maximise safety and minimise the isolation and vulnerability of users.

8 Development should provide safe and convenient access for all anticipated modes of transport.

9 Development at intersections, pedestrian and cycle crossings, and crossovers to allotments should maintain or enhance sightlines for motorists, cyclists and pedestrians to ensure safety for all road users and pedestrians.

10 Driveway crossovers affecting pedestrian footpaths should maintain the level and surface colour of the footpath.

11 Driveway crossovers should be arranged and the number minimised to optimise:

(a) the provision of on-street visitor parking (where on-street parking is appropriate)

(b) pedestrian movement and safety

(c) kerbside access for waste collection

(d) retention of existing street trees, stobie poles and street furniture.

12 Development should be designed to discourage commercial and industrial vehicle movements through residential streets and adjacent other sensitive land uses.

13 Industrial/commercial vehicle movements should be separated from passenger vehicle car parking areas.

14 Development should provide for the on-site loading, unloading and turning of all traffic likely to be generated.

Cycling and Walking

15 Development should ensure that a permeable street and path network is established that encourages walking and cycling through the provision of safe, convenient and attractive routes with connections to adjoining streets, paths, open spaces, schools, pedestrian crossing points on arterial roads, public and community transport stops and activity centres.

16 Development should provide access, and accommodate multiple route options, for pedestrians and cyclists by enhancing and integrating with:

(a) open space networks, recreational trails, parks, reserves, and sport and recreation areas

(b) Adelaide's principal cycling network (Bikedirect), which includes arterial roads, local roads and off-road paths as depicted in *Overlay Maps - Transport.*

17 New developments should give priority to and not compromise existing designated bicycle routes.

18 Where development coincides with, intersects or divides a proposed bicycle route or corridor, development should incorporate through-access for cyclists.

19 Development should encourage and facilitate cycling as a mode of transport by incorporating end-of-journey facilities including:

(a) showers, changing facilities and secure lockers

(b) signage indicating the location of bicycle facilities

(c) bicycle parking facilities provided at the rate set out in *Table Onka/4 - Off Street Bicycle Parking Requirements*.

20 On-site secure bicycle parking facilities should be:

(a) located in a prominent place

(b) located at ground floor level

(c) located undercover

(d) located where surveillance is possible

(e) well lit and well signed

(f) close to well used entrances

(g) accessible by cycling along a safe, well lit route.

21 Pedestrian and cycling facilities and networks should be designed and provided in accordance with relevant provisions of the *Australian Standards and Austroads Guides*.

Access

22 Development should have direct access from an all-weather public road.

23 Development should be provided with safe and convenient access which:

(a) avoids unreasonable interference with the flow of traffic on adjoining roads

(b) provides appropriate separation distances from existing roads or level crossings

(c) accommodates the type and volume of traffic likely to be generated by the development or land use and minimises induced traffic through over-provision

(d) is sited and designed to minimise any adverse impacts on the occupants of and visitors to neighbouring properties.

24 Development should not restrict access to publicly owned land such as recreation areas.

25 The number of vehicle access points onto arterial roads shown on *Overlay Maps - Transport* should be minimised and, where possible, access points should be:

(a) limited to local roads (including rear lane access)

(b) shared between developments.

26 Development with access from roads with existing or projected traffic volumes exceeding 6000 vehicles per day should be sited to avoid the need for vehicles to reverse onto or from the road.

27 Development with access from arterial roads or roads as shown on *Overlay Maps - Transport* should be sited to avoid the need for vehicles to reverse onto or from the road.

28 Structures such as canopies and balconies that encroach onto the footpath of an arterial road should not cause visual or physical obstruction to:

(a) signalised intersections

(b) heavy vehicles

(c) street lighting

(d) overhead electricity lines

(e) street trees

(f) bus stops.

29 Driveways, access tracks and parking areas should be designed and constructed to:

(a) follow the natural contours of the land

(b) minimise excavation and/or fill

(c) minimise the potential for erosion from surface runoff

(d) avoid the removal of existing vegetation

(e) be consistent with *Australian Standard AS: 2890 - Parking facilities*.

Access for People with Disabilities

30 Development should be sited and designed to provide convenient access for people with a disability.

31 Where appropriate and practical, development should provide for safe and convenient access to the coast and beaches for disabled persons.

Vehicle Parking

32 Development should provide off-street vehicle parking and specifically marked accessible car parking places to meet anticipated demand in accordance with *Table Onka/3 - Off Street Vehicle Parking Requirements* unless all the following conditions are met:

(a) an agreement is reached between the Council and the applicant for a reduced number of parking spaces

(b) a financial contribution is paid into the Council Car Parking Fund specified by the Council, in accordance with the gazetted rate per car park.

33 Development should be consistent with *Australian Standard AS: 2890 - Parking facilities*.

34 Vehicle parking areas should be sited and designed to:

(a) facilitate safe and convenient pedestrian linkages to the development and areas of significant activity or interest in the vicinity of the development

(b) include safe pedestrian and bicycle linkages that complement the overall pedestrian and cycling network

(c) not inhibit safe and convenient traffic circulation

(d) result in minimal conflict between customer and service vehicles

(e) avoid the necessity to use public roads when moving from one part of a parking area to another

(f) minimise the number of vehicle access points onto public roads

(g) avoid the need for vehicles to reverse onto public roads

(h) where practical, provide the opportunity for shared use of car parking and integration of car parking areas with adjoining development to reduce the total extent of vehicle parking areas and the requirement for access points

(i) not dominate the character and appearance of a site when viewed from public roads and spaces

(j) provide landscaping that will shade and enhance the appearance of the vehicle parking areas

(k) include infrastructure such as underground cabling and connections to power infrastructure that will enable the recharging of electric vehicles.

35 Where vehicle parking areas are not obviously visible or navigated, signs indicating the location and availability of vehicle parking spaces associated with businesses should be displayed at locations readily visible to users.

36 Vehicle parking areas that are likely to be used during non-daylight hours should provide floodlit entry and exit points and site lighting directed and shaded in a manner that will not cause nuisance to adjacent properties or users of the parking area.

37 Vehicle parking areas should be sealed or paved to minimise dust and mud nuisance.

38 To assist with stormwater detention and reduce heat loads in summer, outdoor vehicle parking areas should include landscaping in accordance with *Table Onka/6 - Landscaping Guidelines for Non-Residential Development*.

39 Vehicle parking areas should be line-marked to delineate parking bays, movement aisles and direction of traffic flow.

40 On-site visitor parking spaces should be sited and designed to:

(a) not dominate internal site layout nor be located at the front of a group dwelling or residential flat building development

(b) be clearly defined as visitor spaces and not assigned to a particular dwelling

(c) be accessible to visitors at all times.

Vehicle Parking for Residential Development

41 On-site vehicle parking should be provided having regard to:

(a) the number, nature and size of proposed dwellings

(b) proximity to centre facilities, public and community transport within walking distance of the dwellings

(c) the anticipated mobility and transport requirements of the likely occupants, particularly groups such as aged persons.

42 Vehicle parking areas servicing more than one dwelling should be of a size and location to:

(a) serve users, including pedestrians, cyclists and motorists, efficiently, conveniently and safely

(b) provide adequate space for vehicles, including emergency service vehicles, to manoeuvre between the street and the parking area

(c) reinforce or contribute to attractive streetscapes.

43 The provision of ground level vehicle parking areas, including garages and carports (other than where located along a rear lane access way), should:

(a) not face the primary street frontage

(b) be located to the rear of buildings with access from a shared internal laneway

(c) ensure vehicle park entries are recessed at least 0.5 metres behind the main face of the building.

Vehicle Parking for Mixed Use and Corridor Zones

44 Development should provide off-street vehicle parking and specifically marked accessible car parking places to meet anticipated demand in accordance with *Table Onka/3 - Off Street Vehicle Parking Requirements*.

45 Loading areas and designated parking spaces for service vehicles should:

(a) be provided within the boundary of the site

(b) not be located in areas where there is parking provided for any other purpose.

46 Vehicle parking spaces and multi-level vehicle parking structures within buildings should:

(a) enhance active street frontages by providing land uses such as commercial, retail or other non-car park uses along ground floor street frontages

(b) complement the surrounding built form in terms of height, massing and scale

(c) incorporate facade treatments along major street frontages that are sufficiently enclosed and detailed to complement neighbouring buildings consistent with the desired character of the locality.

47 In mixed use buildings, the provision of vehicle parking may be reduced in number and shared where the operating hours of commercial activities complement the residential use of the site.

Undercroft and Below Ground Garaging and Parking of Vehicles

48 Undercroft and below ground garaging of vehicles should only occur where envisaged in the relevant zone or policy area or precinct and ensure:

(a) the overall height and bulk of the undercroft structure does not adversely impact on streetscape character of the locality or the amenity of adjacent properties

(b) vehicles can safely enter and exit from the site without compromising pedestrian or cyclist safety or causing conflict with other vehicles

(c) driveway gradients provide for safe and functional entry and exit

(d) driveways and adjacent walls, fencing and landscaping are designed to provide adequate sightlines from vehicles to pedestrians using the adjacent footpath

(e) openings to undercroft areas are integrated with the main building so as to minimise visual impact

(f) landscaping, mounding and/or fencing is incorporated to improve its presentation to the street and to adjacent properties

(g) the overall streetscape character of the locality is not adversely impaired (e.g. visual impact, building bulk, front setbacks relative to adjacent development)

(h) the height of the car park ceiling does not exceed 1 metre above the finished ground level.

49 In the case of undercroft and below ground car parks where cars are visible from public areas, adequate screening and landscaping should be provided.

Waste

OBJECTIVES

1 Development that, in order of priority, avoids the production of waste, minimises the production of waste, re-uses waste, recycles waste for re-use, treats waste and disposes of waste in an environmentally sound manner.

2 Development that includes the treatment and management of solid and liquid waste to prevent undesired impacts on the environment including, soil, plant and animal biodiversity, human health and the amenity of the locality.

PRINCIPLES OF DEVELOPMENT CONTROL

1 Development should be sited and designed to prevent or minimise the generation of waste (including wastewater) by applying the following waste management hierarchy in the order of priority as shown below:

(a) avoiding the production of waste

(b) minimising waste production

(c) reusing waste

(d) recycling waste

(e) recovering part of the waste for re-use

(f) treating waste to reduce the potentially degrading impacts

(g) disposing of waste in an environmentally sound manner.

2 The storage, treatment and disposal of waste materials from any development should be achieved without risk to health or impairment of the environment.

3 Development should avoid as far as practical, the discharge or deposit of waste (including wastewater) onto land or into any waters (including processes such as seepage, infiltration or carriage by wind, rain, sea spray, stormwater or by the rising of the water table).

4 Untreated waste should not be discharged to the environment, and in particular to any water body.

5 Development should include appropriately sized area to facilitate the storage of receptacles that will enable the efficient recycling of waste.

6 Development that involves the production and/or collection of waste and/or recyclable material should include designated collection and storage area(s) that are:

(a) screened and separated from adjoining areas

(b) located to avoid impacting on adjoining sensitive environments or land uses

(c) designed to ensure that wastes do not contaminate stormwater or enter the stormwater collection system

(d) located on an impervious sealed area graded to a collection point in order to minimise the movement of any solids or contamination of water

(e) protected from wind and stormwater and sealed to prevent leakage and minimise the emission of odours

(f) stored in such a manner that ensures that all waste is contained within the boundaries of the site until disposed of in an appropriate manner.

Wastewater

7 The disposal of wastewater to land should only occur where methods of wastewater reduction and reuse are unable to remove the need for its disposal, and where its application to the land is environmentally sustainable.

8 Wastewater lagoons should not be sited in any of the following areas:

(a) within land subject to a 1-in-100 year average return interval flood event

(b) within 50 metres of the top of the bank of a watercourse

(c) within 500 metres of the coastal high water mark

(d) where the base of the lagoon would be below any seasonal water table.

9 Artificial wetland systems for the storage of treated wastewater, such as wastewater lagoons, should be:

(a) sufficiently separated from adjoining sensitive uses to minimise potential adverse odour impacts

(b) sited and designed to minimise potential public health risks arising from the breeding of mosquitoes.

Waste Treatment Systems

10 Development that produces any sewage or effluent should be connected to a waste treatment system that complies with (or can comply with) the relevant public and environmental health legislation applying to that type of system.

11 The methods for, and siting of, effluent and waste storage, treatment and disposal systems should minimise the potential for environmental harm and adverse impacts on:

(a) the quality of surface and groundwater resources

(b) public health

(c) the amenity of a locality

(d) sensitive land uses.

12 Waste treatment should only occur where the capacity of the treatment facility is sufficient to accommodate likely maximum daily demands including a contingency for unexpected high flows and breakdowns.

13 Any on-site wastewater treatment system/ re-use system or effluent drainage field should be located within the allotment of the development that it will service.

14 A dedicated on-site effluent disposal area should not include any areas to be used for, or could be reasonably foreseen to be used for, private outdoor open space, driveways, car parking or outbuildings.

15 The spreading or discharging of treated liquid or solid waste onto the ground should only occur where the disposal area consists of soil and vegetation that has the capacity to store and use the waste without contaminating soil or surface or ground water resources or damaging crops.

16 Stock slaughter works, poultry processors, saleyards, piggeries, cattle feedlots, milking sheds, milk processing works, fish processing works, wineries, distilleries, tanneries and fellmongeries, composting works, waste or recycling depots and concrete batching works should have a wastewater management system that is designed so as not to discharge wastes generated by the premises:

(a) into any waters

(b) onto land in a place where it is reasonably likely to enter any waters by processes such as:

(i) seepage

(ii) infiltration

(iii) carriage by wind, rain, sea spray, or stormwater

(iv) the rising of the watertable.

17 Winery waste management systems should be designed to ensure:

(a) surface runoff does not occur from the wastewater irrigation area at any time

(b) wastewater is not irrigated onto waterlogged areas, land within 50 metres of a creek, or swamp or domestic or stock water bore, or land subject to flooding, steeply sloping land, or rocky or highly permeable soil overlaying an unconfined aquifer

(c) wastewater is not irrigated over an area which is within 50 metres of any residence on neighbouring land or 10 metres of any type of publicly owned land

(d) wastewater is released using low trajectory low pressure sprinklers, drip irrigators or agricultural pipe, and is not sprayed more than 1.5 metres into the air or in fine droplets if there is a potential for the spread of diseases from the wastewater

(e) stormwater runoff from areas which are contaminated with grape or grape products is drained to winery waste management systems during vintage periods

(f) stormwater from roofs and clean hard paved surfaces is diverted away from winery waste management systems and disposed of in an environmentally sound manner or used for productive purposes.

Overlay Section

Character Preservation District Overlay

Refer to the *Map Reference Tables* for a list of maps that relate to this overlay.

The following policies apply to the 'Character Preservation District' shown on the relevant *Overlay Maps - Heritage and Character Preservation District*.

INTERPRETATION

Where the Objectives and or Principles of Development Control that apply in relation to the Character Preservation District shown on this Overlay are in conflict with the relevant General Section Objectives and/or Principles of Development Control in the Development Plan, the Overlay will prevail.

OBJECTIVES

1 A district where:

(a) scenic and rural landscapes are highly valued, retained and protected

(b) development near entrances to towns and settlements does not diminish the rural setting, character and heritage values associated with those towns and settlements

(c) the long term use of land for primary production and associated value adding enterprises is assured and promoted

(d) activities positively contribute to tourism

(e) the heritage attributes of the district are preserved

(f) buildings and structures complement the landscape.

2 Residential development is located inside townships, settlements and rural living areas.

3 No expansion of rural living and settlement zones outside township areas.

PRINCIPLES OF DEVELOPMENT CONTROL

Form of Development

1 Development in the district should:

(a) when located near townships, contribute towards and maintain the identity of those townships

(b) retain the predominant rural landscape character and function

(c) foster primary production and associated value adding enterprises and tourism activities.

Strategic Transport Routes Overlay

Refer to the *Map Reference Tables* for a list of maps that relate to this overlay.

The following policies apply to the 'designated area' marked on the relevant *Overlay Map(s) – Strategic Transport Routes*.

INTERPRETATION

Where the Objectives and/or Principles of Development Control that apply in relation to the Strategic Transport Routes Overlay are in conflict with the relevant General Objectives and/or Principles of Development Control in the Development Plan, the overlay will prevail.

OBJECTIVES

1 Development that recognises the importance of strategic transport routes and does not impede traffic flow or create hazardous conditions for pedestrians, cyclists or drivers of vehicles, including emergency services vehicles.

PRINCIPLES OF DEVELOPMENT CONTROL

1 Development adjacent to a strategic transport route should:

(a) avoid the provision of parking on the main carriageway

(b) be accessible via service roads, where possible, that provide:

(i) parking off the main carriageway

(ii) a buffer from the main carriageway for pedestrian and cycle activity

(c) not impede the potential for overhead cabling and associated infrastructure to be established in an existing or proposed tram corridor.

2 Vehicular site access should not be provided along the main street frontage where an alternative access is available.

3 Development adjacent kerbside bus stops should be set back to provide sufficient space for indented bus bays with associated hard stand area, shelter and a minimum 1.2 metre wide continuous accessible path behind the bus shelter.

Zone Section

Deferred Urban Zone

Refer to the *Map Reference Tables* for a list of the maps that relate to this zone.

OBJECTIVES

1 A zone accommodating a restricted range of rural uses that are not prejudicial to development of the land for urban purposes and maintain the rural appearance of the zone.

2 A zone comprising land to be used primarily for broad-acre cropping and grazing purposes until required for future urban expansion.

3 Prevention of development likely to be incompatible with long-term urban development, or likely to be detrimental to the orderly and efficient servicing and conversion of the land for urban use.

4 The provision of interfaces along transport corridors and adjacent rural uses to manage potential sources of impact and accommodate stormwater and wastewater management practices.

5 The protection of the Aldinga Scrub Conservation Park from the adverse impacts of development.

6 Retention of land at Reynella for agricultural purposes, until such time as required for use as a transportation corridor.

7 The provision of essential infrastructure and community services in Aldinga, Aldinga Beach and Sellicks Beach that:

(a) is located and designed to enable integration with existing and/or future residential development

(b) is accessible to existing and proposed residential areas

(c) is in accordance with the centres hierarchy as described in the General Section provisions

(d) facilitates the economic connection to infrastructure and services as required

(e) does not detrimentally impact on the environmental water requirements of the Aldinga Scrub Conservation Park.

8 Development that contributes to the desired character of the zone.

DESIRED CHARACTER

The zone primarily comprises land for future urban expansion. While the zoning is to be regarded as a holding measure with its ultimate use not yet determined, development within the zone will generally comprise low-scale agricultural uses that do not prejudice the orderly conversion of the land for residential purposes.

It is envisaged that development will only occur following the rezoning of the land and the completion of detailed structure planning to ensure an orderly extension of existing urban areas and to prevent the creation of isolated communities that are remote from infrastructure and services.

Aldinga, Aldinga Beach and Sellicks Beach

The progressive rezoning of land within the suburbs of Aldinga, Aldinga Beach and Sellicks Beach will occur in accordance with *Concept Plan Map Onka/6 - Development Sequencing (Aldinga/Sellicks Beach)* in order to maintain an adequate land supply within the region while ensuring undue pressure is not placed on infrastructure and social services. Prior to the rezoning of land identified as 'sequence 1 or 2' as shown on *Concept Plan Map Onka/6 - Development Sequencing (Aldinga/Sellicks Beach)*, greater than 65 per cent of the land area within the preceding sequence will generally be divided into residential allotments and development approval granted for a dwelling on these allotments. The timing of the rezoning of land may vary depending on the rate of development and the provision of community services and infrastructure, such as health, education and police services and sewer, power and water infrastructure.

All development within this area and all rezoning proposals will need to take account of the potential impacts of development on the natural assets of the region and the distinct character of the **Township Zone**, **Port Willunga/Aldinga Policy Area 62**. In particular, future development will ensure the long term protection of the Aldinga Scrub Conservation Park and other important environmental assets.

Development for the purposes of providing essential infrastructure and community services is envisaged within this part of the zone, providing it can be demonstrated that the development is accessible to the community it serves, enables the orderly and economic connection to residential areas as required, is of a scale that does not compromise the centres hierarchy and does not adversely impact on the Aldinga Scrub Conservation Park.

Moana

Within the suburb of Moana, it is expected that development of land for urban purposes will not occur until satisfactory resolution of buffer requirements, inundation issues and management of Aboriginal heritage.

Reynella

The land at Reynella is envisaged to be utilised as a future transportation corridor for the Southern Expressway

Seaford Rise

Within the suburb of Seaford Rise, it is essential that development of land for urban purposes does not occur until it can be demonstrated that the land is no longer required as a buffer to mining and waste operations.

PRINCIPLES OF DEVELOPMENT CONTROL

Land Use

1 The following forms of development are envisaged in the zone:

- broad-acre cropping
- grazing.

2 Development listed as non-complying is generally inappropriate.

3 Development should not be undertaken if it will be prejudicial to the orderly and economic development of future urban land uses within the zone.

4 Dwellings should not be located within Reynella.

5 Urban development should not be undertaken until detailed structure planning has been prepared and implemented for the zone.

6 Development should not be undertaken in the vicinity of known mineral deposits where any of the following applies:

(a) the full extent and significance of such deposits has not been determined

(b) the development would be incompatible with mining operation

(c) the development would add to the cost of extracting the resource.

Form and Character

7 Development should not be undertaken unless it is consistent with the desired character for the zone.

8 Development at Aldinga should be undertaken in accordance with *Concept Plan Map Onka/8 - Aldinga*.

9 Development adjacent the **Port Willunga/Aldinga Policy Area 62** of the **Township Zone**, should protect the historic and landscape character of the adjoining Aldinga township by incorporating sensitive design elements including the use of separation distances, building setbacks and landscaping.

10 At Aldinga, development adjacent Main South Road should provide an effective interface to define rural and future urban uses and reduce the visual impact of residential development when viewed from Main South Road.

11 Development within 60 metres of a rural zone should seek to minimise potential conflict between future urban uses and rural uses by satisfying one of the following:

(a) establishing interfaces with transitional land uses or landscaped buffer to provide sufficient separation for sensitive uses

(b) creating allotments of a suitable size and shape so as to accommodate both the intended use as well as a landscaped buffer

(c) designing and orientating development to provide sufficient protection for sensitive uses.

12 The provision of interfaces adjacent a rural zone should be designed taking into account the:

(a) nature, source and frequency of potentially adverse impacts

(b) prevailing winds in the locality

(c) topography of the area

(d) existing vegetation

(e) potential future uses in the adjacent rural zone.

Land Division

13 Land division should not occur unless it is in the form of an alteration to the boundaries of an allotment and no additional allotments are created in the zone.

14 The alteration of allotment boundaries should only occur in order to achieve one or more of the following:

(a) correct an anomaly in the placement of allotment boundaries with respect to the location of existing buildings or structures

(b) improve the management of the land for the purpose of primary production

(c) enable the provision of public infrastructure.

PROCEDURAL MATTERS

Complying Development

Complying developments are prescribed in Schedule 4 of the *Development Regulations 2008*.

Non-complying Development

Development (including building work, a change in the use of land, or division of an allotment) for the following is non-complying:

Form of development	Exceptions
Advertisement and/or advertising hoarding	
Abattoir	
Amusement machine centre	
Caravan park	
Cemetery	
Commercial forestry	
Community centre	
Consulting room	
Crematorium	
Dairy	
Dwelling	Except a detached dwelling that does not result in more than one dwelling on an allotment.
Educational establishment	
Fuel depot	
Hospital	
Hotel	
Indoor recreation centre	
Industry	
Intensive animal keeping	
Land division	Except where no additional allotments are created partly or wholly within the zone unless one additional allotment is created for the purposes of an educational establishment or primary school, on land identified as 'affected area' in *Concept Plan Map Onka/9 - Affected Area (Aldinga/Sellicks Beach)*.
Motel	
Motor repair station	
Nursing home	
Office	

Form of development	Exceptions
Petrol filling station	
Place of worship	
Pre-school	
Prescribed mining operations	
Residential flat building	
Road transport terminal	
Service trade premises	
Shop	
Stock sales yard	
Stock slaughter works	
Store	
Telecommunications facility which exceeds 40 metres in height	
Tourist accommodation	
Warehouse	
Waste reception, storage, treatment or disposal	
Wrecking yard	

Public Notification

Categories of public notification are prescribed in Schedule 9 of the *Development Regulations 2008*.

Primary Production Zone

Refer to the *Map Reference Tables* for a list of the maps that relate to this zone.

OBJECTIVES

1 The long term continuation of primary production where natural resources are not jeopardised.

2 Economically productive, efficient and environmentally sustainable primary production.

3 Allotments of a size and configuration that promote the efficient use of land for primary production.

4 Protection of primary production from encroachment by incompatible land uses and protection of scenic qualities of rural landscapes.

5 The extension of the economic base of the region in an environmentally sensitive and sustainable manner.

6 The enhancement of the rural character, key scenic routes, scenic surrounds to townships, amenity and prominent landscape for the enjoyment of residents and visitors.

7 The development of a sustainable tourism industry with accommodation, attractions and facilities which relate to and interpret the natural and cultural resources of the region, and increase the opportunities for visitors to stay overnight.

8 Encouragement of the establishment of appropriately scaled 'value added' commercial activities to utilise local rural production, including the establishment of niche market products, within suitable areas and resulting in minimal landscape intrusion and environmental impact.

9 The maintenance and enhancement of the natural resources of the zone.

10 Establishment of flora and fauna corridors to preserve rural character and improve biodiversity.

11 Development that contributes to the desired character of the zone.

DESIRED CHARACTER

The zone is found generally in the eastern half of Council's land area and is characterised by a combination of landscape, soils and climate which imparts, throughout the region, a highly distinctive and rural 'sense of place'. This is of value to visitors attracted by the hills, wineries and associated vineyards, orchards, scenery and nearby beaches.

Demand for the division of rural land in the area is likely, if unimpeded, to accelerate because of relatively convenient travel times for residents working in the city and suburbs of Adelaide. Further conversion of existing productive land for purposes which do not complement efficient rural production is not envisaged in the zone.

Much of the area is suitable for a range of agricultural production, notably vines, grazing, cropping, almonds, strawberries and other similar foods including niche market products. Accommodation of associated 'value added' industries in appropriate locations is envisaged, along with appropriately scaled tourism infrastructure.

Wineries and small scale, low impact agricultural and home based industries are encouraged where they expand the economic base of the zone. Industries will be based upon the processing of agricultural produce primarily from the region. Home based industries will be based on rural, arts, crafts, tourist, cultural or heritage activities appropriate to the region.

Development will complement the zone's character and enhance tourist or heritage activities and be compatible with local areas. Larger scale industries and related activities are more suited to designated industrial or commercial zones within townships or other urban areas.

It is a zone which requires its primary production to be undertaken using environmentally sustainable practices, while maintaining the existing rural character in the long term. It is important that native vegetation, water resources and of riverine corridors through both private and public stewardship are protected to enhance biodiversity.

Willunga Basin

The zone comprises a significant portion of land known as the Willunga Basin, which represents a grouping of catchments. The Willunga Basin is generally comprised of land within Willunga, Aldinga, McLaren Vale, McLaren Flat, and Blewitt Springs. The Willunga Basin is recognised as an important environmental and economic asset.

It will be important to seek the continued protection of the Willunga Basin area, and recognise the landscape as one encompassing a range of rural production activities on land which is to be regarded as a precious and finite resource. The protection of the Willunga Basin is vital for the continuation of the rural and tourism economy in the region. Environmental assets such as the Aldinga Scrub, the Washpool and the Aldinga Reef Aquatic Reserve are also worthy of conservation.

PRINCIPLES OF DEVELOPMENT CONTROL

Land Use

1 The following forms of development are envisaged in the zone:

- bulk handling and storage facility
- commercial forestry
- dairy farming
- farming
- horticulture
- intensive animal keeping
- small scale industry in association with farming
- tourist accommodation (including the diversification of existing farming activities and conversion of farm buildings)
- winery.

2 Development listed as non-complying is generally inappropriate.

3 Development involving the expansion of existing uses which are not in accord with objectives for the zone should not be undertaken.

4 Development within the zone should be compatible with its use as a water catchment and storage area, and with its values as an area of agricultural production and scenic quality.

5 Development should ensure that genuine agricultural activities are not prejudiced.

6 Development which would remove productive land from agriculture or diminish its overall productivity for primary production should not be undertaken unless the land is required for essential public purposes.

7 Primary production should be carried out having regard to water conservation, the preservation of bushland remnants and landscape beauty.

8 Activities which produce strong organic, chemical, or other intractable wastes should not be established in the zone (other than wineries, where the risk to water supply is negligible with appropriate management, design and siting).

9 A shop should be:

(a) ancillary to primary production or processing uses or tourist accommodation or other tourist development

(b) located on the same site as the primary use.

10 Buildings should not impair the character of rural areas by reason of their scale or siting.

Form and Character

11 Development should not be undertaken unless it is consistent with the desired character for the zone.

12 Development should not occur within 500 metres of a National Park, Conservation Park, Wilderness Protection Area or significant stands of native vegetation if it will increase the potential for, or result in, the spread of pest plants.

13 Development should provide an access way of at least 3 metres wide that provides access for emergency vehicles to the rear of the allotment.

14 Development should not detrimentally affect the amenity of its locality or cause nuisance to the community:

(i) by stormwater, or the drainage of run-off from the land

(ii) where the slope and soil structure of the land is unsuitable for septic tank effluent disposal, where required

(iii) by the loss of privacy.

15 Development should not be undertaken if the construction, operation and/or management of such development is likely to result in:

(a) the pollution of surface or ground water

(b) degradation of watercourses or wetlands

(c) unnecessary loss or damage to native vegetation

(d) the denudation of pastures

(e) erosion

(f) the introduction of or an increase in the number of pest plants or vermin

(g) increased risk of flooding or impairment of stream water quality through the disposal of stormwater

(h) sealing of large areas of ground likely to result in increased stormwater run-off.

16 The excavation and/or filling of land should:

(a) be kept to a minimum and be limited to no greater than 1.5 metres so as to preserve the natural form of the land and the native vegetation

(b) only be undertaken in order to reduce the visual impact of buildings, including structures, or in order to construct water storage facilities for use on the allotment

(c) only be undertaken if the resultant slope can be stabilised to prevent erosion

(d) result in stable scree slopes which are covered with top soil and landscaped so as to preserve and enhance the natural character or assist in the re-establishment of the natural character of the region.

17 Driveways and access tracks should follow the contours of the land so as to reduce their visual impact and erosion from water run-off and be surfaced with dark materials.

18 Buildings should primarily be limited to farm buildings, a detached dwelling associated with primary production on the allotment and residential outbuildings that are:

(a) grouped together on the allotment and set back from allotment boundaries to minimise the visual impact of buildings on the landscape as viewed from public roads

(b) screened from public roads and adjacent land by existing vegetation or landscaped buffers.

19 Buildings, including structures, should be located in unobtrusive locations and, in particular, should be located:

(a) on an excavated rather than a filled site in order to reduce the vertical profile of the building

(b) in such a way as to maximise the retention of existing native vegetation and the protection and retention of watercourses.

20 Buildings, including structures, should be designed in such a way and be of such a scale as to be unobtrusive and not detract from the desired rural character of the zone:

(a) the mass of buildings should be minimised by variations in wall and roof lines and by floor plans which complement the contours of the land

(b) large eaves, verandas and pergolas should be incorporated into designs so as to create shadowed areas which reduce the bulky appearance of buildings

(c) the mass of buildings should be minimised by having separate vehicle storage areas.

21 The external materials of buildings should:

(a) have surfaces which are of a low light reflective nature

(b) be of dark natural colours such as brown and green so as to be unobtrusive, blend with a natural rural landscape and minimise any visual intrusion.

22 Buildings, including dwellings and bed and breakfast accommodation should have:

(a) a safe efficient effluent disposal system which will not pollute watercourses or underground water resources or be a risk to health; and

(b) a safe, clean, tidy and unobtrusive area for the storage and disposal of refuse.

23 At Hackham and Old Noarlunga, dwellings should not be sited nearer than 50 metres from the boundary of the **Urban Employment Zone**.

24 The development of olive groves should not give rise to the spread of feral olive growth and in any event should not be established within a one kilometre radius of the Aldinga Scrub Conservation Park.

Residential Development

25 A dwelling should only be developed if:

(a) there is a demonstrated connection with farming or other primary production

(b) the location of the dwelling will not inhibit the continuation of farming, other primary production or other development that is in keeping with the provisions of the zone

(c) it is located more than 500 metres from an existing intensive animal keeping operation unless used in association with that activity

(d) it does not result in more than one dwelling per allotment.

26 Residential development should have due regard to rural land production practices including dust generation, noise, chemical spray drift, hours of operation and traffic movement.

27 The erection of a shed, garage or outbuilding should only be undertaken where either of the following apply:

(a) it is an ancillary use to an existing dwelling or business

(b) it is erected for a period not exceeding 12 months to enable the erection of a dwelling on the same allotment to proceed and both of the following apply:

(i) is used for storage of building materials or tools only

(ii) is removed at the expiration of that period if construction of the dwelling has not been substantially completed.

28 No caravan or motor-powered van should be located on any vacant allotment and used for human habitation unless (a) or (b) or (c) can be satisfied:

(a) it is an ancillary use to an existing dwelling or business

(b) the land forms part of an existing caravan park

(c) the construction of a dwelling has been approved on the same allotment and the caravan or motor-powered van is sited for a period not exceeding six months to enable the erection of the dwelling to proceed. The caravan or motor-powered van is to be removed at the expiration of that period if construction of the dwelling has not been substantially completed.

29 No caravan or motor-powered van should be located on any vacant allotment and used for human habitation unless it is connected to an approved effluent disposal system.

30 Dwellings and Bed and Breakfast accommodation should satisfy all of the following:

(a) not be located in areas subject to inundation by a 1-in-100 year average return interval flood event or sited on land fill which would interfere with the flow of such flood waters

(b) be connected to an approved sewerage or common effluent disposal scheme or have an on-site waste water treatment and disposal method which complies with the relevant State Government standards

(c) not have any part of a septic tank effluent drainage field or any other waste water disposal area (eg irrigation area) located within 50 metres of a watercourse identified on a current series 1:50 000 State Government topographic map

(d) not have a waste water disposal areas located on any land with a slope greater than 20 per cent (1-in-5), or depth to bedrock or seasonal or permanent watertable less than 1.2 metres.

(e) not have a septic tank or any other waste water treatment facility located on land likely to be inundated by a 1-in-10 year average return interval flood event

(f) be sited at least 25 metres from any watercourse identified on a current series 1:50 000 State Government topographic map.

Conservation

31 Development should be undertaken with the minimum effect on natural features, land adjoining water, scenic routes or scientifically attractive areas.

32 Roadside vegetation should be preserved and replanted where practical.

33 Development involving the alteration of natural drainage systems should not be undertaken unless there will be no adverse effects to existing vegetation within adjoining land or roads, and no increase in the risk of flooding of existing development or erosion downstream.

34 Development should not detract from the natural and rural landscape character of the region.

35 Linkages between significant regional recreational and conservation features should be established or enhanced.

36 Native vegetation should not be cleared if either of the following apply:

(a) it is associated with sites of scientific, archaeological, historic or cultural significance, or has significance in its own right

(b) it has existing or possible future value in the provision of shade or as a windbreak.

37 When clearance of vegetation is proposed, consideration should be given to effects of retention on farm management.

Appearance of Land and Buildings

38 Visually prominent structures associated with agricultural activities and intensive animal keeping should not be developed on exposed land and on scenic routes.

39 Alterations or additions to buildings should satisfy both of the following:

(a) be designed and constructed to harmonise with the character of the existing building

(b) be located on the side of the dwelling which minimises the obtrusiveness of the completed building.

40 Excavation and earthworks should take place in a manner that is not extensively visible from surrounding localities.

41 The appearance of land, buildings and objects should not impair the amenity of the locality in which they are situated.

42 The rural character, comprising natural features and man-made activities, should be preserved by careful siting, design and landscaping of new building development and/or intensive land uses.

43 Buildings or structures should be sited unobtrusively and be of a character and design which will harmonise with the landscape.

Tourism Development

44 Tourism developments should be small in scale and designed and sited to be compatible with the local environment.

45 Tourism developments in rural areas should ensure that agricultural activities are maintained as the predominant land use in the region, and are situated on land with lower agricultural potential.

46 Staging of tourism developments should be achieved in a co-ordinated manner ensuring consistency in appearance, building themes, materials, and links between buildings, vehicle parking and ancillary uses on the site.

47 Tourism developments in rural areas should provide visitor experiences and be developed in association with (a) or (b):

(a) linear parks

(b) recreation and sporting venues.

48 Tourism developments should satisfy all of the following:

(a) use external materials of construction that are in keeping with traditional building styles, (i.e.stone, masonry or weatherboard walls, timber framed windows, pitched corrugated steel roofs in either naturally weathered galvanised iron or similar, verandas where appropriate and outbuildings, fences and other structures) to complement the major buildings

(b) provide vehicle parking and access ways which are surfaced with materials appropriate to maintaining the character of the locality

(c) be designed and sited to prevent overshadowing and overlooking

(d) provide safe and convenient vehicle access that is compatible with the surrounding uses.

49 Tourism developments in rural areas should satisfy all of the following:

(a) ensure the retention of native vegetation is maximised by only locating in areas which consist of a modified landscape

(b) not require changes to natural features

(c) be designed and sited to ensure the bed and banks of watercourses are protected from inappropriate development and management practices.

50 Tourism developments should protect the water resources of the region by satisfying all of the following:

(a) being located away from water sensitive areas

(b) having safe and efficient effluent disposal systems

(c) incorporating an adequate area for waste disposal on the allotment of the proposed development

(d) disposing of waste water and effluent onto land and at a rate within the capacity of the allotment to retain and treat effluent

(e) not disposing of waste water and effluent into watercourses

(f) avoiding the use of holding tanks for waste water and effluent.

51 Tourism developments should only occur if a water source of acceptable quality, quantity and reliability is secured.

52 Tourist accommodation should not be converted to dwellings and should be designed to preclude the conversion of buildings into dwellings such as through shared facilities, common utility services, grouped accommodation and/or shared parking.

53 Tourist accommodation, when proposed to be located in an existing building should ensure that development is in keeping with the existing form and scale of the building.

54 Tourist accommodation ancillary uses such as recreation, leisure, conference/meeting rooms and dining facilities should be limited to the requirements of guests being catered for.

55 Interpretive signs should be constructed, designed and located so as to complement the features of the surrounding area, enhance visitor's understanding of the region and facilitate access to sites in a manner that minimises impacts on the environment.

Animal Keeping and Aquaculture

56 Intensive animal keeping should not be located within 2000 metres of a proclaimed township boundary or within 400 metres of a dwelling not on the same property as the intensive animal keeping.

57 All buildings, pens, runs, holding yards and other ancillary structures should be sited as unobtrusively as possible, particularly when viewed from primary or secondary arterial roads and preferably be screened by other buildings or vegetation on the site.

58 Development for aquaculture should satisfy all of the following:

(a) where water storage dams are required, be located unobtrusively and established to minimise disturbance to the natural land form

(b) provide a safe efficient effluent disposal system so as not to pollute any land, watercourse or water resource or be a risk to public health

(c) be set well back from public roads

(d) incorporate extensive landscaping.

Buffers

59 Residential development should be located or incorporate measures such that the effects of chemical spray drift and dust are minimised.

60 Development should reduce conflict between residential zones, townships and rural uses by complying with (a) and (c) or (b) and (c):

(a) where aerial spraying is required, providing a separation distance of 300 metres to a residential or urban zone

(b) the provision of a vegetated buffer of a minimum width of 40 metres which satisfies all of the following:

(i) which contains random plantings of fast growing and hardy native or indigenous varieties of tree and shrub species of differing growth habits, at spacings of 4 to 5 metres

(ii) with species selected with foliage from the base to the crown with long, thin and rough foliage to facilitate the more efficient capture of spray droplets

(iii) which provides a semi-permeable barrier with a porosity of 0.5, to allow air to pass through the buffer

(iv) which attains a mature height of 1.5 times the spray height

(v) which is provided with a suitable watering system and access tracks either side for fire protection and access

(c) not storing refuse or organic waste within 150 metres of residential or urban zones.

61 Landscaped buffers located adjacent a residential or urban zone should be designed taking into account the nature, source and frequency of potential adverse impacts; prevailing winds in the locality; topography of the area; existing vegetation and the presence of potentially sensitive adjacent uses.

62 No development (including land division) should occur within 500 metres of the landfill waste depot at Pedlar Creek prior to a site audit report undertaken by a site contamination auditor accredited by the Environment Protection Authority.

Small Scale Agricultural Industries (not including wineries)

63 Industry and warehousing should only be developed if it supports primary production, processing, storage and distribution of local primary produce or products produced on the same site, and should be developed where:

(a) it has a direct relationship with primary production

(b) it is unlikely to limit or inhibit the use of adjoining land for primary production

(c) the particular use requires a site in proximity to a particular natural resource or other product or materials sourced from the locality

(d) it will not result in the alienation of land or water resources identified as significant for primary production or ecological reasons

(e) the use would be inappropriate within a township

(f) the capacity of the infrastructure, including roads, is capable of supporting the use without detriment to existing users.

64 Agricultural industries (small-scale) should:

(a) include at least one of the following activities normally associated with the processing of primary produce:

(i) washing

(ii) grading

(iii) processing (including bottling)

(iv) packing or storage; and may include an ancillary area for sale and/or promotion of produce (including display areas)

(b) have a total combined area for any one or any combination of these activities (including ancillary sales area) not exceeding 250 square metres per allotment with a maximum building area of 150 square metres, including a maximum area of 50 square metres for ancillary sale and display of goods manufactured in the industry

(c) process primary produce from within the Mount Lofty Ranges Region

(d) only occur on an allotment where a habitable dwelling exists.

Small scale light industry

65 Small scale light industries should be home based and should:

(a) include at least one of the following activities:

(i) arts

(ii) crafts

(iii) tourist

(iv) heritage related activities, and

may include an ancillary area for sale or promotion of goods manufactured in the industry (including display areas)

(b) have a total combined area for any one or any combination of these activities (including ancillary sales/promotion area) not exceeding 80 square metres per allotment with a maximum building area of 80 square metres, including a maximum area of 30 square metres for sale of goods made on the allotment by the industry

(c) not be located further than 50 metres from a habitable dwelling occupied by the proprietor of the industry on the allotment.

Mineral Water Extraction and Processing Plants

66 Mineral water extraction and processing plants should:

(a) include at least one of the following activities normally associated with the extraction and processing of mineral water:

(i) extraction

(ii) bottling

(iii) packaging

(iv) storage

(v) distribution; and

may include ancillary activities of administration and sale and/or promotion of mineral water product

(b) have a total combined area for any one or any combination of these activities (including ancillary sale and/or promotion areas) not exceeding 350 square metres per allotment with a maximum building area of 250 square metres, including a maximum area of 50 square metres for ancillary sale and/or promotion of mineral water product

Wineries and Ancillary Activities

67 Wineries should:

(a) include at least one of the following activities normally associated with the making of wine:

(i) crushing

(ii) fermenting

(iii) bottling

(iv) maturation/cellaring of wine; and may include ancillary activities of administration, sale and/or promotion of wine product and dining

(b) be located within the boundary of a single allotment which adjoins or is on the same allotment as a vineyard

(c) process primary produce primarily sourced from within the Mount Lofty Ranges Region

(d) only include dining facilities as an ancillary use to the winery

(e) where of 500 tonnes or greater crush capacity per annum, be located not closer than 300 metres to a dwelling or tourist accommodation that is not in the ownership of the winery applicant.

Agricultural Industries (small-scale), Wineries, Mineral Water Extraction and Processing Plants and Home Based Industries

68 Agricultural industries, home based industries, mineral water extraction and processing plants, and wineries should:

(a) incorporate all-weather on-site parking (including for commercial vehicles) with safe and convenient access for staff and visitors

(b) locate any effluent system or effluent drainage field within the allotment of the development;

(c) incorporate effluent management systems which ensure protection of surface and ground water and reduce the need for on-site storage systems and should accord with the following:

(i) the disposal area consists of soil and vegetation that has the capacity to store and use the effluent without polluting surface or ground water resources

(ii) effluent is irrigated using low trajectory low pressure sprinklers, drip irrigators or agricultural pipe

(iii) on-site storage and disposal of effluent and any malodours not impacting on the local environment, surface or ground water, and nearby soil and crop conditions

(iv) storm water run-off from areas at wineries which are contaminated with grape or grape products be drained to winery effluent management systems during vintage periods

(v) storm water from roofs and clean hard paved surfaces at a winery diverted away from winery effluent management systems and disposed of in an environmentally sound manner or used for productive purposes

(vi) storm water management incorporate techniques which avoid erosion and maintain water quality, through development of on-site detention, retention basins or other appropriate means

(d) process primary produce that is grown within the Mount Lofty Ranges Region and sell goods manufactured and produced by the industry

(e) enhance the rural/agricultural character and/or heritage features and tourist activities of the Mount Lofty Ranges Region

69 Agricultural industries, wineries and mineral water extraction and processing plants should not be located:

(a) on land that is classified as being poorly drained or very poorly drained

(b) within 800 metres of a high water level of a public water supply reservoir

(c) closer than 300 metres (other than a home based industry) to a dwelling or tourist accommodation that is not in the ownership of the applicant.

Land Division

70 For land not within a policy area, land division, including boundary realignments, should only occur where it will promote economically productive, efficient and sustainable primary production and not create any allotment less than 16 hectares in area; unless it is located in Hackham and those parts of Old Noarlunga north if the Onkaparinga River, where land division, including boundary realignments should not create allotments less than 4 hectares in area.

PROCEDURAL MATTERS

Complying Development

Complying developments are prescribed in Schedule 4 of the *Development Regulations 2008*.

In addition, the following forms of development are designated as complying subject to the conditions contained in *Table Onka/1 - Conditions for Complying Development*:

Form of Development	Exceptions
Farming	Except where located within one of the following policy areas: (a) **Environment Protection Policy Area 30** (b) **Landscape Protection Policy Area 31** (c) **Mount Lofty Ranges Policy Area 32** (d) **Open Space Policy Area 33**.
Horticulture	Except where located within one of the following policy areas: (a) **Environment Protection Policy Area 30** (b) **Landscape Protection Policy Area 31** (c) **Mount Lofty Ranges Policy Area 32** (d) **Open Space Policy Area 33**.

Non-complying Development

Development (including building work, a change in the use of land, or division of an allotment) for the following is non-complying:

Form of Development	Exceptions
Advertisement and/or advertising hoarding	Advertisement and/or advertising hoarding where the development achieves at least one of (a) or (b): (a) is adjacent to a road with a speed limit of less than 80 km/h (b) has an advertisement area of 2 square metres or less and achieves all of the following: (i) the message contained thereon relates entirely to a lawful use of land (ii) the advertisement is erected on the same allotment as the use it seeks to advertise (iii) the advertisement will not result in more than two advertisements on the allotment.
Amusement machine centre	
Auction room	
Bulky goods outlet	
Bus depot where located within the **Open Space Policy Area 33**	
Bus station where located within the **Open Space Policy Area 33**	
Caravan park	
Community centre	Except where it is located within the **Mount Lofty Ranges Policy Area 32**
Consulting room	

Form of Development	Exceptions
Crematorium where located within one of the following policy areas: (a) **Mount Lofty Ranges Policy Area 32** (b) **Open Space Policy Area 33**	
Dwelling	Except for a detached dwelling that achieves all of the following: (a) it is to be erected on an existing allotment and where a habitable dwelling does not already exist on the allotment (b) no valid planning authorisation to erect a dwelling on that allotment exists (c) no other application for planning authorisation is being made or has been made and is not yet determined for a dwelling on that allotment (d) it complies with all of the following (A) to (F): (A) it is not located in areas subject to inundation by a 1-in-100 year average return interval flood event or sited on land fill which would interfere with the flow of such flood waters (B) it is to be connected to an approved waste treatment system which may include sewerage, Community Wastewater Management System, or on-site wastewater treatment and disposal methods (C) it does not have any part of a septic tank effluent drainage field or any other waste water disposal area (eg irrigation area) located within 50 metres of a watercourse (D) it does not have a waste water disposal area located on any land with a slope greater than 20 per cent (1-in-5), or depth to bedrock or seasonal or permanent watertable less than 1.2 metres (E) it does not have a septic tank or any other waste water treatment facility located on land likely to be inundated by a 1-in-10 year average return interval flood event (F) it is sited at least 25 metres from any watercourse.
Educational establishment	
Entertainment venue	
Fuel depot	
General industry	
Hall	
Hospital	
Horse keeping	Except where it achieves either of the following: (a) it is located outside the **Environment Protection Policy Area 30** (b) it is located within the **Mount Lofty Ranges Policy Area 32** and achieves all of the following: (i) associated buildings and structures, including stables, shelters and exercise yards are not located in areas subject to inundation by a 1-in-100 average return interval flood event (ii) located on land with a slope not exceeding 12 degrees

Form of Development	Exceptions
	(iii) located on land where the average annual rainfall does not exceed 1000 millimetres (iv) associated buildings, structures and intensive exercise areas are located a minimum of 25 metres from any watercourse.
Hotel	
Indoor recreation centre	
Industry	Except where it is located outside of both the **Environment Protection Policy Area 30** and the **Open Space Policy Area 33,** and it includes one of the following: (a) it is located outside the **Mount Lofty Ranges Policy Area 32** and it achieves one of the following: (i) it is directly associated with the processing of primary production or natural resource extraction, and it includes at least one of the following activities: (A) washing (B) grading (C) processing (including bottling) (D) packing (E) storage (ii) it is not directly associated with the processing of primary production or natural resource extraction and it achieves both (A) and (B): (A) it is not located in a building that existed before 1 January 2001 (B) it does not occupy a floor area greater than 150 square metres (b) it is located within the **Mount Lofty Ranges Policy Area 32** and it includes all of the following: (i) it is directly associated with the processing of primary production or natural resource extraction, and it includes at least one of the following activities takes place: (A) washing (B) grading (C) processing (including bottling) (D) packing (E) storage (ii) the total combined area for any one or any combination of these activities (including ancillary activities) does not exceed 250 square metres with a maximum building area of no greater than 150 square metres, and a maximum area of no greater than 50 square metres for the sale and display of goods manufactured in the industry (iii) the industry, including ancillary uses, is located within the boundary of a single allotment (iv) it is not located within any of the following: (A) a 900 millimetres or greater rainfall/year area (B) 200 metres of a major stream (third order or higher) (C) 800 metres of the high water level of a public water supply reservoir (v) it complies with all of the following (A) to (G):

Form of Development	Exceptions

(A) it is not located in areas subject to inundation by a 1-in-100 year average return interval flood event or sited on land fill which would interfere with the flow of such flood waters
(B) it is connected to an approved sewage effluent disposal scheme or has an on site waste water treatment and disposal method which complies with the requirement of the Environment Protection Authority
(C) the effluent system and any effluent drainage field are located within the allotment of the development
(D) it is not located on land with a slope greater than 20 per cent (1-in-5)
(E) it is not located on land that is classified as being poorly drained or very poorly drained
(F) it is located at least 50 metres from a bore, well or watercourse
(G) the development does not have septic tank and sub surface soakage field or disposal area or any other waste water treatment facility located on land subject to inundation by a 1-in-10 year average return interval flood event

(c) it is located within the **Mount Lofty Ranges Policy Area 32** and it includes all of the following:
(i) it is a mineral water extraction and processing plant, and where at least one of the following activities takes place:
(A) extraction
(B) bottling
(C) packaging
(D) storage
(E) distribution
(ii) the total combined area for any one or any combination of these activities (including ancillary activities) does not exceed 350 square metres with a maximum building area of no greater than 250 square metres, and a maximum area of no greater than 50 square metres for the sale and display of goods manufactured in the industry
(iii) the industry, including ancillary uses, is located within the boundary of a single allotment
(iv) it is located at least 200 metres from a major stream (third order or higher)
(v) it complies with all of the following (A) to (G):
(A) it is not located in areas subject to inundation by a 1-in-100 year average return interval flood event or sited on land fill which would interfere with the flow of such flood waters
(B) it is connected to an approved sewage effluent disposal scheme or has an on site waste water treatment and disposal method which complies with the requirement of the Environment Protection Authority.
(C) the effluent system and any effluent drainage field are located within the allotment of the development

Form of Development	Exceptions
	(D) it is not located on land with a slope greater than 20 per cent (1-in-5) (E) it is not located on land that is classified as being poorly drained or very poorly drained (F) it is located at least 50 metres from a bore, well or watercourse (G) the development does not have septic tank and sub surface soakage field or disposal area or any other waste water treatment facility located on land subject to inundation by a 1-in-10 year average return interval flood event (d) it is located within the **Mount Lofty Ranges Policy Area 32** and involves a home based industry that achieves all of the following: (i) it involves one of the following activities: (A) arts (B) crafts (C) tourism (D) heritage related activities, and may include an ancillary area for sale and/or promotion of goods manufactured in the industry (including display areas) (ii) the total combined area for any one or any combination of these activities does not exceed 80 square metres and no more than 30 square metres for sale and display of goods manufactured in the industry (iii) the industry is not located further than 50 metres from a habitable dwelling on the allotment (iv) the industry, including any ancillary uses is located within the boundary of a single allotment (v) there is no more than one industry located on an allotment (vi) the industry is located at least 200 metres from a major stream (3rd order or higher) (vii) it complies with all of the following (A) to (G): (A) it is not located in areas subject to inundation by a 1-in-100 year average return interval flood event or sited on land fill which would interfere with the flow of such flood waters (B) it is connected to an approved sewage effluent disposal scheme or has an on site waste water treatment and disposal method which complies with the requirement of the Environment Protection Authority. (C) the effluent system and any effluent drainage field are located within the allotment of the development (D) it is not located on land with a slope greater than 20 per cent (1-in-5) (E) it is not located on land that is classified as being poorly drained or very poorly drained (F) it is located at least 50 metres from a bore, well or watercourse (G) the development does not have a septic tank and sub surface soakage field or disposal area or any other waste water treatment facility located on land subject to inundation by a 1-in-10 year average return interval flood event.

Form of Development	Exceptions
Intensive animal keeping where located within one of the following policy areas: (a) **Environment Protection Policy Area 30** (b) **Landscape Protection Policy Area 31** (c) **Mount Lofty Ranges Policy Area 32** (d) **Open Space Policy Area 33**.	
Land division	Except where it achieves all of the following: (a) it is not located in a policy area and it achieves one of the following: (i) all allotments resulting from the division are at least 16 hectares (ii) no additional allotments are created and the number of resulting allotments of less than 16 hectares is not more than the number that existed prior to rationalisation (iii) it is located within the suburb of Hackham, and that portion of Old Noarlunga north of the Onkaparinga River (iv) it is located at Seaview Road McLaren Vale and the purpose of the land division is for: (A) tourist accommodation for more than 55 guests (B) a community division within the meaning of the *Community Titles Act 1996*, and is accompanied by a scheme description that commits the development to ongoing tourist accommodation use to the exclusion of all other types of residential use other than a manager's residence. (b) it is located in the **Mount Lofty Ranges Policy Area 32** and it achieves all of the following: (i) no additional allotments are created, either partly or wholly within the policy area (ii) the development of the proposed allotments does not result in a greater risk to pollution of surface or underground waters than would the development of existing allotments (iii) each resulting allotment provides a suitable site for a detached dwelling which complies with all of the following: (A) it is not located in areas subject to inundation by a 1-in-100 year average return interval flood event or sited on land fill which would interfere with the flow of such flood waters (B) it is connected to an approved waste treatment system which may include sewage, Community Wastewater Management System, or on-site wastewater treatment and disposal methods (C) it does not have any part of a septic tank effluent drainage field or any other wastewater disposal area (eg irrigation area) located within 50 metres of a watercourse (D) it does not have a wastewater disposal area located on any land with a slope greater than 20 per cent (1-in-5), or depth to bedrock or

Form of Development	Exceptions
	seasonal or permanent watertable less than 1.2 metres (E) it does not have a septic tank or any other wastewater treatment facility located on land likely to be inundated by a 1-in-10 year average return interval flood event (F) it is sited at least 25 metres from any watercourse (c) it is located within **Open Space Policy Area 33** and achieves one of the following: (i) all allotments resulting from the division are at least 4 hectares with a minimum frontage of 100 metres to a public road (ii) no additional allotments are created partly or wholly in the policy area and the purpose of the land division is to: (A) provide for a minor readjustment of allotment boundaries to correct an anomaly in the placement of those boundaries with respect to the location of those existing structures; or (B) provide for a minor readjustment of allotment boundaries in order to improve the management of the land for the purpose of servicing, access and/or the conservation of its natural features, or (C) the provision of open space (to be vested as Reserve) or service easements (d) it is located within the **Environment Protection Policy Area 30** and achieves one of the following: (i) no additional allotments are created partly or wholly within the policy area (ii) the leasing of land is for a term not exceeding five years.
Land-fill that constitutes solid waste disposal required to be licensed as a waste depot under the *Environment Protection Act 1993*.	
Motel where located within one of the following policy areas: (a) **Environment Protection Policy Area 30** (b) **Mount Lofty Ranges Policy Area 32**.	
Motor racing or testing venue	
Motor repair station	
Nursing home	
Office	Except where it is ancillary to and in association with one of the following land uses: (a) primary production (b) tourism development.
Office and dwelling	
Petrol filling station	

Form of Development	Exceptions
Place of worship	
Pre-school	
Prescribed mining operations where located within one of the following policy areas: (a) **Environment Protection Policy Area 30** (b) **Mount Lofty Ranges Policy Area 32**.	
Primary school	
Private hotel where located within one of the following policy areas: (a) **Mount Lofty Ranges Policy Area 32** (b) **Open Space Policy Area 33**.	
Radio or TV studio	
Racecourse where located within the **Open Space Policy Area 33**.	
Residential flat building	
Road transport terminal where located within one of the following policy areas: (a) **Open Space Policy Area 33** (b) **Mount Lofty Ranges Policy Area 32** (c) **Environment Protection Policy Area 30**.	
Service industry where located within the **Open Space Policy Area 33**.	
Service trade premises	
Shop and dwelling	
Shop or group of shops	Except where it achieves (a), (b) and (c): (a) it is located outside of the following policy areas: (i) **Environment Protection Policy Area 30** (ii) **Mount Lofty Ranges Policy Area 32** (iii) **Open Space Policy Area 33** (b) it is ancillary to and in association with primary production or tourism development (c) the gross leasable area is 200 square metres or less.
Showground where located within the **Open Space Policy Area 33**.	
Stadium	
Stock saleyard where located within one of the following policy areas: (a) **Mount Lofty Ranges Policy Area 32** (b) **Open Space Policy Area 33.**	

Form of Development	Exceptions
Stock slaughter works where located within one of the following policy areas: (a) **Mount Lofty Ranges Policy Area 32** (b) **Open Space Policy Area 33**.	
Store where located within one of the following policy areas: (a) **Mount Lofty Ranges Policy Area 32** (b) **Open Space Policy Area 33**.	
Telecommunications facility where it is located within the **Mount Lofty Ranges Policy Area 32**	
Tourist accommodation and ancillary uses	Except where it achieves one of the criteria (a) to (e), and all of the criteria (f) to (i), although excludes caravan or camping grounds: (a) within part of or is an extension to a dwelling or lawful tourist accommodation existing as at 14 September 1990, and where up to eight guests are accommodated in hosted accommodation; or (b) wholly within a dwelling or lawful tourist accommodation existing as at 21 September 2000, and where up to ten guests are accommodated in non-hosted accommodation; or (c) wholly within or within part of or is an extension to a State or local heritage place (which may be in association with a new or existing dwelling) and where no more than thirty guests are accommodated on a single allotment; or (d) in any combination of State or local heritage places or other existing buildings or new buildings, and where from 31 to 55 guests are accommodated (e) tourist accommodation complex and associated development including a hotel, conference centre, restaurant and recreation areas at Allotment 14 Seaview Road, McLaren Vale in Deposited Plan 15740 in Certificate of Title 5442/793, or otherwise associated with allotments adjacent Seaview Road approved under the *Community Titles Act 1996* for a tourism developments of more than 55 guests (f) when accommodating eleven guests or more any effluent generated is not disposed onto land: (i) in a high rainfall zone (>900 mm/year) (ii) within 200 metres of a major watercourse (3rd or higher order) (g) not have a waste water disposal area located on any land with a slope greater than 20 per cent (1-in-5), or depth to bedrock or seasonal or permanent watertable less than 1.2 metres (h) has an approved secure, potable water supply that can provide at least 125 litres per person per day (including staff) (i) complies with all of the following (A) to (F): (A) it is not located in areas subject to inundation by a 1-in-100 year average return interval flood event or sited on land fill which would interfere with the flow of such flood waters

Form of Development	Exceptions
	(B) it is to be connected to an approved waste treatment system which may include sewerage, Community Wastewater Management System, or on-site wastewater treatment and disposal methods (C) i does not have any part of a septic tank effluent drainage field or any other waste water disposal area (eg irrigation area) located within 50 metres of a watercourse (D) it does not have a waste water disposal area located on any land with a slope greater than 20 per cent (1-in-5), or depth to bedrock or seasonal or permanent watertable less than 1.2 metres (E) it does not have a septic tank or any other waste water treatment facility located on land likely to be inundated by a 1-in-10 year average return interval flood event (F) it is sited at least 25 metres from any watercourse.
Warehouse where located within one of the following policy areas: (a) **Mount Lofty Ranges Policy Area 32** (b) **Open Space Policy Area 33**.	
Waste reception, storage, treatment or disposal where it is located within the **Mount Lofty Ranges Policy Area 32**	
Wind farm	Except where the turbine generates power to be used wholly for activities on the property upon which the turbine is situated and the turbine does not exceed 10 metres in height.
Wind monitoring mast	
Winery where located within the **Mount Lofty Region Policy Area 32**	Winery (including ancillary activities of administration, sale or promotion of wine product and dining) where: (a) at least one of the following activities associated with the making of wine takes place: (i) crushing (ii) fermenting (iii) bottling (iv) maturation/cellaring of wine (b) buildings and infrastructure for the winery and associated activities are located within the boundary of a single allotment which adjoins, or is on the same allotment as a vineyard (c) there is no more than one winery located on an allotment (d) the winery and ancillary activities are not located within 200 metres of a major stream (3rd order or higher) (e) complies with all of the following (A) to (G): (A) it is not located in areas subject to inundation by a 1-in-100 year average return interval flood event or sited on land fill which would interfere with the flow of such flood waters (B) it is connected to an approved sewage effluent disposal scheme or has an on site waste water treatment and disposal method which complies with the requirement of the Environment Protection Authority.

Form of Development	Exceptions
	(C) the effluent system and any effluent drainage field are located within the allotment of the development (D) it is not located on land with a slope greater than 20 per cent (1-in-5) (E) it is not located on land that is classified as being poorly drained or very poorly drained (F) it is not located within 50 metres of any bore, well or watercourse (G) the development does not have septic tank and sub surface soakage field or disposal area or any other waste water treatment facility located on land subject to inundation by a 1-in-10 year average return interval flood event.
Wrecking yard	

Public Notification

Categories of public notification are prescribed in Schedule 9 of the *Development Regulations 2008*.

Further, the following forms of development (except where the development is non-complying) are designated:

Category 1	Category 2
	Industry in association with farming where it is located in the **Mount Lofty Ranges Policy Area 32** Light industry where it is located within the **Mount Lofty Ranges Policy Area 32** Mineral water extraction and/or processing plant where located within the **Mount Lofty Ranges Policy Area 32** Winery where it is located within the **Mount Lofty Ranges Policy Area 32** where either (a) or (b) apply**:** (a) processes 500 tonnes of grapes or less per year (b) processes 500 tonnes of grapes or more per year and is located further than 300 metres of the following zones or policy areas: (i) residential (ii) tourism development (iii) township (iv) rural living (v) mixed use.

Residential Zone

Refer to the *Map Reference Tables* for a list of the maps that relate to this zone.

OBJECTIVES

1 A residential zone comprising a range of dwelling types, including a minimum of 15 per cent affordable housing.

2 Increased dwelling densities in close proximity to centres, public transport routes and public open spaces.

3 Development that contributes to the desired character of the zone.

DESIRED CHARACTER

The zone covers large areas of the City of Onkaparinga and contains a diverse range of residential environments, topographic characteristics, housing types and locations. This variation ranges from low to very low density, leafy green, steeply undulating hills environment to be found in places including Aberfoyle Park, Chandlers Hill, Coromandel Valley, Flagstaff Hill, O'Halloran Hill and parts of Woodcroft, to less steeply undulating areas that are less heavily vegetated in Happy Valley, and the central areas of Christie Downs, Morphett Vale, Hackham, Huntfield Heights Seaford, Moana and Seaford Rise. South of Christies Beach the coastal and near coastal strip contains gently undulating areas and plains reaching to Maslins Beach. The zone also includes coastal flats and sensitive dune areas at Port Noarlunga and between Aldinga Beach and Sellicks Beach, and areas that possess their own distinct character, such as the coastal township character of Port Noarlunga and the country township character of McLaren Vale and Willunga.

The zone will accommodate an ever more diverse range of housing to meet the needs of the community and will be adaptable to change over time in response to cyclical changes in demographics and household as well as the condition of the housing stock. Older neighbourhoods will undergo progressive change through turnover in population and ageing of existing residents which will generate a need for more housing diversity and adaptability as well as changes in density and in addition to the provision of different services and facilities to complement these changes. Residential development will incorporate affordable housing to serve the wide range of housing needs within the community.

It is envisaged that the character, density and pattern of development across the zone will vary according to local conditions with lower densities and dwelling design that responds to the terrain, eco systems, vegetation and topography. There will be an emphasis on higher residential densities in locations in close proximity to shopping centres, public transport and public open space on land with moderate gradients and where impacts on native vegetation and the natural environment will be minimised.

Development will create attractive public streetscapes and open space with clear definition between public and private spaces and incorporate design features such as public lighting, passive surveillance opportunities and visually permeable public areas that create and maintain high levels of personal and community safety.

It is envisaged that further greenfields development will be undertaken in a manner which will provide for communities with walkable neighbourhoods that maximise land efficiency and provide a range of dwelling types and densities, creating attractive, liveable, versatile and interesting residential areas where the private and public realms interact positively from both social and urban design perspectives. These areas will be characterised by the need for greater housing affordability, a need for social, economic and environmental sustainability, and the ability to provide public transport as efficiently as possible.

Overall, individual dwellings in the zone will contribute to the desired character by incorporating elements of good design which include the establishment of visual and physical connections between the public realm of the streets, and private homes, with windows and entrances orientated to provide opportunities for eyes on the street and enhancing the perception of public safety felt throughout the zone. Individual building design will be expected to respond to the natural qualities of sites and take advantage of orientation opportunities to maximise privacy and internal/external relationships for the benefit of occupants. On steeper sites it is envisaged that dwelling designs will respond to topographic conditions by incorporating split-levels and be designed to minimise alteration of the prevailing landform and vegetation whilst managing the potential impact of visual bulk to public streets and to neighbouring properties.

It is envisaged that medium density forms of residential development will be undertaken within designated policy areas and precincts to take advantage of established infrastructure and community facilities. Redevelopment of large sites or sites created through aggregation of small allotments for medium density development will be done in a manner that reduces the impacts of increased densities on adjoining development by the retention of unbuilt space around the edges of the development and the scaling down of building height and bulk around those edges. Factors such as terrain, existing vegetation, accessibility to services, infrastructure, public transport, proximity to centres and enhancement of the positive elements of existing character will be taken into account when determining the suitability of urban infill proposals.

Development in the Aldinga Dunes area and around the dunes at Port Noarlunga will conserve and protect the particular low density, coastal dunes and highly vegetated scrubland character of these unique parts of the zone.

It is essential that all development within the zone establishes and maintains it as an attractive place in which to live and where the residential use of land is the primary function. Non-residential uses will be minor in scale and nature to serve the needs of the local community, or ancillary or incidental to the residential use of the land. Such non-residential uses will only be undertaken in a manner which does not adversely impact upon the amenity of the locality in which it is situated or on residential lifestyle enjoyed by the occupiers of other land within the zone.

Development undertaken at the interface of the zone and rural areas should be laid out and established in a manner which clearly limits the potential for conflict between urban and rural activities.

Development in the country townships of McLaren Vale and Willunga will be undertaken in a form and pattern of land division that is consistent with the early character established in those areas. Development of a kind, density and character that is typical of suburban areas within the metropolitan area will be avoided.

PRINCIPLES OF DEVELOPMENT CONTROL

Land Use

1 The following forms of development are envisaged in the zone:

- affordable housing
- domestic outbuilding in association with a dwelling
- domestic structure
- dwelling
- dwelling addition
- small scale non-residential use that serves the local community, for example:
  - child care facility
  - health and welfare service
  - open space
  - primary and secondary school
  - recreation area
  - shop, office or consulting room
- supported accommodation.

2 Development listed as non-complying is generally inappropriate.

3 Vacant or underutilised land should be developed in an efficient and co-ordinated manner to increase housing choice by providing dwellings at densities higher than, but compatible with adjoining residential development.

4 Non-residential development such as shops, schools and consulting rooms should be of a nature and scale that:

(a) serves the local community

(b) is consistent with the character of the locality

(c) does not detrimentally impact on the amenity of nearby residents.

5 The use and placement of outbuildings should be ancillary to and in association with a dwelling or dwellings.

Form and Character

6 Development should not be undertaken unless it is consistent with the desired character for the zone.

7 Dwellings should be designed within the following parameters unless otherwise stated in a policy area:

Parameter	Value
Minimum setback from primary road frontage for local roads and streets	3 metres where located within one of the following precinct or policy areas: (a) **Precinct 36 Targeted Infill** of the **Medium Density Policy Area 40** (b) **Seaford Heights Policy Area 43** (c) **Seaford Meadows Policy Area 44**. 5 metres in **all other circumstances**
Minimum setback from secondary road frontage for local roads and streets	0.6 metres where located within one of the following precinct or policy areas: (a) **Precinct 36 Targeted Infill** of the **Medium Density Policy Area 40** (b) **Seaford Heights Policy Area 43** (c) **Seaford Meadows Policy Area 44.** 1.5 metres in **all other circumstances**
Minimum setback from rear boundary (ground floor)	0 metres where located within one of the following precinct or policy areas: (a) **Precinct 36 Targeted Infill** of the **Medium Density Policy Area 40** (b) **Seaford Heights Policy Area 43** (c) **Seaford Meadows Policy Area 44** providing that both of the following are satisfied, the wall will not: (i) exceed 8 metres in length (ii) result in attributable walls or structures exceeding 50 per cent of the length of the boundary. 3 metres in **all other circumstances**.

Parameter	Value
Minimum setback from rear boundary including balconies (second storey)	7.5 metres where located within **Noarlunga Downs Policy Area 41** unless the rear boundary abuts an access laneway where the set back is 5 metres. 3 metres where located within one of the following precinct or policy areas: (a) **Precinct 36 Targeted Infill** of the **Medium Density Policy Area 40** (b) **Seaford Heights Policy Area 43** (c) **Seaford Meadows Policy Area 44.** 0 metres if the rear boundary abuts a rear access laneway where located within **Seaford Heights Policy Area 43.** 5 metres in **all other circumstances**.
Minimum setback from rear boundary including balconies (third storey)	**5 metres** plus an additional setback equal to the increase in wall and/ or screen height above 6 metres.
Minimum setback from side boundary where wall height less than 3 metres above natural ground level	(a) 0 metres providing that both of the following apply, the wall will not: (i) exceed 8 metres in length (ii) result in attributable walls or structures exceeding 50 per cent of the length of the boundary (b) 0.9 metre in all other circumstances.
Minimum setback from side boundary where wall height (including balconies/ screens) is between 3 and 6 metres above natural ground level	(a) 2.9 metres if adjacent southern boundary (b) 1.9 metres in all other circumstances.
Minimum setback from side boundary where wall height (including balconies/ screens) is greater than 6 metres above natural ground level	(a) if adjacent the southern boundary, 2.9 metres plus an additional setback equal to the increase in height above 6 metres (b) if not adjacent the southern boundary, 1.9 metres plus an additional setback equal to the increase in height above 6 metres.
Maximum site coverage	70 per cent where located within **Medium Density Policy Area 40**. No maximum parameter in all other circumstances.
Maximum wall and building height above natural ground level	3 storeys or 10.5 metre maximum building height within: (a) **Precinct 36 Targeted Infill** of the **Medium Density Policy Area 40** (b) on land adjoining The Esplanade within **Medium Density Policy Area 40** (c) on land that abuts the rear boundary of land adjoining The Esplanade and has direct frontage to a street parallel to The Esplanade within **Medium Density Policy Area 40** (d) on land abutting public open space within **Medium Density Policy Area 40** (e) on master planned sites envisaged within **Medium Density Policy Area 40** 2 storeys or 6 metre wall height (whichever is lesser) in **all other circumstances.**

8 The side set back parameters may be reduced to 0 metres (excluding any external boundaries adjacent existing development) where a comprehensive development scheme is proposed over a master planned development area and building envelopes, indicate that the requirements for private open space, access to sunlight and other requirements associated with residential amenity can be achieved for new dwellings within the site.

9 Garages and carports facing the street (other than an access lane way) should be designed with a maximum width of 6 metres or 50 per cent of the allotment or building site frontage width, whichever is the lesser distance.

10 Driveways should provide access to single or double garages or carports via a driveway crossover (the area between the property boundary and the kerb) not exceeding 4 metres in width.

11 Vehicle access to residential flat buildings and group dwellings from roads should be in accordance with either (a) or (b):

(a) from a rear access lane

(b) via a minimum number of common driveways.

12 Common driveways and driveways in a battle-axe configuration (or similar) where access is onto a local road should achieve both (a) and (b):

(a) a minimum width of 3 metres and a maximum width of 4 metres plus:

(i) a minimum 1 metre landscaping strip along the entire length of the driveway to the street boundary and fencing to soften the appearance of the driveway and allow for mature vegetation

(ii) passing bays to allow for simultaneous two way vehicle movements on sites with three or more dwellings, with the bay located away from the front property boundary to maximise landscaping and minimise the extent of hard surfacing visible from the street

(b) be positioned to maximise on street parking opportunities between driveways.

13 Common driveways and driveways in a battle-axe configuration (or similar) servicing more than three dwellings on allotments should be 6 metres or greater in width for the first 6 metres of the allotment where fronting arterial, distributor and collector roads.

14 Adequate access should be provided to the rear of any site for servicing purposes.

15 Domestic outbuildings, including garages and carports, should avoid the use of bright and highly reflective external materials and finishes.

16 A dwelling should have a minimum site area (and in the case of residential flat buildings and group dwellings, an average site area per dwelling) and a frontage to a public road not less than that shown in the following table unless otherwise stated in the policy area:

Dwelling type	Site area (excluding a battleaxe configuration) (square metres)	Minimum frontage (metres)
Detached	325 minimum	9
Semi-detached	325 minimum	9
Group dwelling	270 average	18
Residential flat building	270 average	18
Row dwelling	230 minimum	7

17 On steeper land an increased site area and frontage should be provided to:

(a) minimise the extent of cut and fill

(b) allow for the provision of accessible and useable private open space

(c) allow for safe and convenient site access

(d) enable the retention of existing vegetation

(e) reduce the apparent bulk and scale of buildings

(f) provide an attractive outlook from living or habitable rooms (i.e. avoiding views of extensive retaining walling).

18 Dwellings should not be developed on sites with a battleaxe configuration unless served by a driveway with a minimum width of 3 metres and a maximum width of 4 metres onto a local road plus a 1 metre landscaping strip along the entire length of the driveway to the street boundary and satisfying (a) or (b):

(a) the site fronts an area of public open space or a road not used for vehicle access (with access provided to the rear)

(b) the site provides a minimum of 400 square metres (excluding the driveway handle).

19 Where allotments are adjacent to public open space all of the following apply:

(a) dwellings should be designed and oriented to ensure placement of doors, windows and balconies face onto public open space in order to create visual interest and maximise opportunity for passive surveillance

(b) landscaping, fences and walls should be visually permeable to the public area

(c) carports and garages should be located to avoid obscuring views to the public area

(d) direct pedestrian connections onto public open space should be provided.

20 Residential buildings on corner allotments or with dual frontages to roads or reserve areas should be designed to address all street frontages through the use of wrap around verandas and balconies, windows, materials and detailing that complement the front elevation.

21 Development should provide for conveniently located pedestrian/cycle creek crossings to connect residential areas south and north of Hackham Creek and designed to connect into a broader pedestrian/cycle network.

22 Development within Aldinga, Aldinga Beach and Port Willunga should be undertaken in accordance with *Concept Plan Map Onka/8 - Aldinga*.

23 Buffers located adjacent to the Aldinga Scrub Conservation Park as shown on *Concept Plan Map Onka/8 - Aldinga* should be designed to achieve the following:

(a) the convenient movement of vehicles, cyclists and pedestrians around the outer edge of the buffer

(b) clear paths of access to the Aldinga Scrub Conservation Park, but only in a manner which best attracts low-impact bushwalking

(c) the re-establishment or preservation of a solid belt of vegetation that consists of the same native vegetation communities found in the Aldinga Scrub

(d) groundwater recharge that best suits the ecology of the Aldinga Scrub.

24 Small-scale consulting rooms and child care centres should be developed along collector roads to minimise the impact of associated traffic upon surrounding residential development.

Affordable Housing

25 Development should include a minimum 15 per cent of residential dwellings for affordable housing.

26 Affordable housing should be distributed throughout the zone to avoid over-concentration of similar types of housing in a particular area.

Land Division

27 Land division should create allotments with an area of 325 square metres or greater and a frontage of 9 metres or greater unless otherwise stated in a policy area.

28 Site areas should be increased:

(a) by a minimum of the following to respond to site topography:

(i) 10 per cent where the site gradient (at any point) is greater than 1-in-10 but less than 1-in-5

(ii) 20 per cent where the site gradient (at any point) is greater than 1-in-5.

(b) where vegetation or heritage preservation is envisaged.

29 The land division of broad acre sites should be designed to achieve a minimum net density of 22 dwellings per hectare (density calculations will not consider the potential for mews dwellings above garages).

30 Land division should not result in the creation of sites with a battleaxe configuration unless served by a driveway with a minimum width of 3 metres and a maximum width of 4 metres plus a 1 metre landscaping strip along the entire length of the driveway to the street boundary and satisfying (a) or (b):

(a) the site fronts an area of public open space or a road not used for vehicle access (with access provided to the rear)

(b) the site provides a minimum of 400 square metres (excluding the driveway handle).

31 Slow points, traffic calming devices and warning signs should be constructed on roads where pedestrian and cycle paths cross roadways, including where roads intersect with the Coast to Vines Rail Trail.

32 Land division east of the Southern Expressway should include a connector road between Yeltana and Brodie Roads of sufficient width and alignment to accommodate bus movements.

Seaford Heights Policy Area 43

Refer to the *Map Reference Tables* for a list of the maps that relate to this policy area.

OBJECTIVES

1 A residential policy area comprising a range of dwelling types including a minimum of 15 per cent affordable housing.

2 Increased dwelling densities in locations close to retail centres, public transport and public open spaces.

3 Development that contributes to the desired character of the policy area.

DESIRED CHARACTER

The policy area will be characterised by the need to accommodate a diverse range of housing to meet the needs of the community. It is envisaged that this greenfield land will be developed to provide its future community with walkable neighbourhoods that maximise land efficiency. T his area will be characterised by greater housing diversity, a safer public environment, greater social, economic and environmental sustainability, and the ability to provide public transport more efficiently.

Individual dwellings in the policy area will contribute to the desired character by incorporating design elements that establish connections between the public realm of the streets, and private homes, with windows and entrances orientated to provide opportunities for 'eyes on the street' and enhancing the perception of public safety throughout the policy area. Individual building design will be expected to exploit the natural qualities of sites and to use orientation opportunities to maximise privacy and internal/external relationships for the benefit of occupants. Cut and fill should be minimised to reduce the potential impact of visual bulk to public streets and to neighbouring properties.

Medium density residential development will occur in the policy area and predominantly within 400 metres of the **Neighbourhood Centre Zone** or adjoining public open space. This will allow for increased numbers of residents to benefit from public infrastructure investment and to take advantage of good access to retail facilities and other community services. In turn this higher density form of development will provide a diverse, desired, feasible and sustainable form of housing that secures social and economic benefits.

A noticeable difference between the medium density residential area and other residential areas will be the character established by the application of urban design principles that support a pedestrian scale rather than an automobile scale. Design features that contribute to a pedestrian-oriented character for the policy area will allow for strong connections between the main entrances of dwellings and pubic footpaths.

People will be attracted to walk along local streets where the fronting development provides visual interest and includes design elements that relate to a human scale. The success of a building's design will be determined by the ability to make a positive contribution to the public realm and its ability to provide visual interest for passing pedestrians.

Development within the policy area will promote and facilitate the safe and convenient use of bicycles and walking as a legitimate and sustainable manner in which to make the trip to the shops or the daily journey to and from work. Access networks within the policy area will integrate in an efficient manner with existing and proposed cycle networks and walking trails provided or proposed within adjoining areas.

Street trees and planting strips will help buffer pedestrians from vehicle traffic and create a unifying theme that binds more diverse dwelling styles. Driveways crossing council landscaping strips will not compromise council's capacity to enhance streetscapes, and will be arranged to minimise the potential for vehicle-pedestrian conflicts.

Dwelling designs will respond to context and will balance the desire for the more efficient use of land with the attainment of a reasonable level of privacy and amenity for occupants and nearby residents.

Standards of privacy appropriate for medium density development areas will place some onus on adjacent residential development to take supplementary action to secure their required level of privacy rather than requiring new development to provide total protection of a neighbour's privacy. A greater emphasis will be placed on maintaining privacy between and in living areas and private open space compared with other rooms and areas of dwellings.

Development will provide for walkable neighbourhoods that will reduce car dependence for access to employment, retail and community facilities and assist in establishing a sense of community, a strong local identity and sense of place. Development will integrate design of open space and urban water management.

An interconnected network of streets will be developed to facilitate safe, efficient and pleasant walking, cycling and driving that will promote active street-land use interfaces, with building frontages to streets to improve personal safety through increased surveillance and activity and other Crime Prevention Through Environmental Design (CPTED) principles. Development will also be designed to support public transport systems (available or proposed), and provide safe, direct access to these systems.

The policy area will be developed in a manner that will result in a cost-effective and resource-efficient development that promotes affordable housing and optimum land efficiency wherever possible. A variety of lot sizes and housing types will cater for the diverse housing needs of the community at a density that will support the provision of local and neighbourhood services.

PRINCIPLES OF DEVELOPMENT CONTROL

Land Use

1 The following forms of development are envisaged in the policy area:

- affordable housing
- detached dwelling
- domestic outbuilding in association with a dwelling
- dwelling addition
- group dwelling
- multiple dwelling
- residential flat building (buildings between one and three storeys)
- row dwelling
- semi-detached dwelling
- small scale non-residential uses that serve the community, for example:
  - child care facilities
  - health and welfare services
  - open space
  - primary and secondary schools
  - recreation areas
  - shops, offices or consulting rooms
- supported accommodation.

2 The development of a school should adjoin district open space to facilitate the sharing of large areas of open space.

Form and Character

3 Development should not be undertaken unless it is consistent with the desired character for the policy area.

4 Development within Seaford Heights should be undertaken in accordance with *Concept Plan Map Onka/19 – Seaford Heights*.

5 A vegetated area consistent with GRO Plan LX1114 (Lot A) should be provided to screen urban development and interrupt site lines from Victor Harbor Road.

6 A dwelling located 400 metres or more from the **Neighbourhood Centre Zone** should have a minimum site area per dwelling and a frontage to a public road not less than that shown in the following table:

Dwelling type	Site area - excluding a battleaxe allotment (square metres)	Minimum frontage (metres)
Detached	240 minimum	9
Semi-detached	200 minimum	7.5
Group dwelling	175 average (not including the driveway)	16
Residential flat building	175 average (not including the driveway)	16
Row dwelling	150 minimum	5

7 A dwelling located less than 400 metres or more from the **Neighbourhood Centre Zone** should have a minimum site area per dwelling and a frontage to a public road not less than that shown in the following table:

Dwelling type	Site area - excluding a battleaxe allotment (square metres)	Minimum frontage (metres)
Detached	150 minimum	6
Semi-detached	140 minimum	6 5 where vehicle access is from a rear laneway
Group dwelling	No minimum	No minimum
Residential flat building	No minimum	No minimum
Row dwelling	No minimum	No minimum

8 Residential flat buildings, row dwellings and group dwellings located within 400 metres of the **Neighbourhood Centre Zone** should have a minimum site area that is capable of achieving the required levels of private open space, service areas, car parking and any applicable setback parameters.

9 To avoid creating an overbearing scale, residential buildings exceeding two storeys in height should be located on sites adjoining either:

(a) an area of public open space (other than adjoining the Victor Harbor Road buffer area identified in *Concept Plan Map Onka/19 - Seaford Heights*

(b) fronting road reserves which are greater than 10 metres wide.

10 Dwellings should only be developed on sites with a battleaxe configuration where the dwelling is provided with alternate frontage to an area of public open space or a road from which vehicle access is not provided.

11 Open upper level balconies of medium density residential development should extend no more than 1 metre closer to the primary road boundary.

12 Open verandas of medium density residential development should extend no more than 2 metres closer to the primary road boundary than the associated dwelling.

13 Front verandas of medium density residential development may be included in private open space calculations where both of following apply:

(a) the floor level of the veranda is a minimum of 0.5 metres above the footpath grade level;

(b) the veranda is at least two metres deep and four metres across.

14 Medium density residential development should maximise convenient access to areas of useable outdoor space by incorporating design elements such as:

(a) shared courtyards for group dwellings and residential flat buildings

(b) driveways and other vehicle areas that can accommodate other uses

(c) designing unbuilt areas to serve interchangeably as private courtyards or parking space

(d) rooftop gardens and terraces.

15 Group dwellings should incorporate a shared community space in the form of a courtyard that is designed and sited to achieve all of the following:

(a) ensure all of the dwellings are sited and arranged around the courtyard or a public road

(b) ensure the shared space is distinct from the public space of the street and footpath

(c) include private outdoor space (typically in the form of a small garden, patio or veranda) at the interface between individual dwelling units and the shared courtyard

(d) avoid having garaging terminate the view of the shared courtyard

(e) include façade elements fronting the shared courtyard as appropriate for street frontages i.e. prominent entries, windows and architectural detail

(f) ensure end units fronting the street are designed to provide a strong street orientation

(g) contribute towards greater connectivity in an area by providing a pedestrian connection to the next street where possible

16 Ground floor dwellings of residential flat buildings should be designed and sited to provide a safe and active streetscape and enhance the visual attractiveness of the locality, and should include one or more of the following:

(a) front landscaping or terraces that contribute to the spatial and visual structure of the street

(b) individual entries for ground floor accommodation.

17 Common driveways from roads up to and including distributor level classification should be 3.5 metres wide and positioned to allow for on street parking opportunities between driveways.

18 Medium density dwelling walls should be setback from common driveways in accordance with one of the following minimum distances:

(a) 1.5 metres where the wall contains a habitable room window

(b) 1 metre where the wall contains a habitable room window with a sill height of at least 1.5 metres above the driveway

(c) 0 metres where there are no windows in the wall.

Affordable Housing

19 Development should include a minimum 15 per cent of residential dwellings for affordable housing.

20 Affordable housing should be distributed throughout the policy area to avoid over-concentration of similar types of housing in a particular area.

Land Division

21 Land division achieving a net density of 40 dwellings per hectare is considered appropriate where the land satisfies (a) or (b) and (c):

(a) it is adjacent public open space

(b) it is within 400 metres of the **Neighbourhood Centre Zone**

(c) has a slope less than 1-in-15.

22 Land division should be designed to achieve all of the following:

(a) create a combination of low and medium density dwelling sites, and avoiding the creation of very low density sites that achieves less than 11 dwellings per hectare gross

(b) avoid the creation of lots backing onto arterial roads

(c) accommodate street tree planting and landscaping on both sides of the street

(d) provide pedestrian paths on both sides of roads

(e) include lot layout techniques that enable development (rather than back fencing) to face Robinson Road

(f) incorporate a landscaped buffer along Main South Road

(g) provide a north/south collector road that is appropriately positioned to allow for reasonable access to bus services from all areas of the policy area

(h) provide the potential for passive surveillance of rear laneways

23 Land division should create allotments which have sufficient width to accommodate an individual single width driveway that is less than 50 per cent of the total frontage (excluding battleaxe allotments).

24 Land division should result in a street network that is highly interconnected through the use of one or more of the following measures:

(a) using street block lengths of not more than 220 metres and predominantly 150 to 180 metres

(b) designing to maximise the choice of movement directions and possible routes

(c) providing relatively direct local vehicle trips in and between neighbourhoods, local activity centres and other destination places such as schools and recreation places

(d) maximising street connections to existing areas

(e) ensuring junctions are spaced to reduce overloading on single intersections and to contribute to shorter vehicle trip lengths.

PROCEDURAL MATTERS

Complying Development

Complying developments are prescribed in Schedule 4 of the *Development Regulations 2008*.

Non-complying Development

Development (including building work, a change in the use of land, or division of an allotment) for the following is non-complying:

Form of Development	Exceptions
Amusement machine centre	
Consulting room	Except where it achieves both (a) and (b): (a) the total floor area is less than 100 square metres (b) the site does not front an arterial road.
Crematorium	
Dairy	
Dwelling which: (a) is in **Coordinated Development Policy Area 67**; and (b) would result in more than one dwelling on an allotment	Except where either (a) or (b) are satisfied: (a) all owners of the allotment upon which the dwelling(s) is to be developed have entered into a legally binding infrastructure contribution agreement with the council for the **Coordinated Development Policy Area 67** and: (i) the agreement(s) are operative; and (ii) no owner is in breach of the agreement(s) (b) the land upon which the dwelling(s) is to be developed was previously the subject of one or more legally binding infrastructure contribution agreement(s) executed in 2014 or later between the council for the **Coordinated Development Policy Area 67** and all owners of that land and such agreement(s) have been terminated because: (i) all contributions payable under the agreement have been paid; or (ii) the sunset date of the agreement has been reached.
Farming	
Fuel depot	
Horse keeping	
Horticulture	
Hospital	
Hotel	
Industry	
Intensive animal keeping	

Form of Development	Exceptions
Land division which results in one or more allotments wholly or partly in **Coordinated Development Policy Area 67**	Except where either (a) or (b) are satisfied: (a) all owners of the land proposed to be divided have entered into a legally binding infrastructure contribution agreement with the council for the **Coordinated Development Policy Area 67** and: (i) the agreement(s) are operative; and (ii) no owner is in breach of the agreement(s) (b) all land proposed to be divided was previously the subject of one or more legally binding infrastructure contribution agreement(s) executed in 2014 or later between the council for the **Coordinated Development Policy Area 67** and all owners of that land and such agreement(s) have been terminated because: (i) all contributions payable under the agreement have been paid; or (ii) the sunset date of the agreement has been reached.
Motor repair station	
Office	Except where it achieves both (a) and (b): (a) the total floor area is less than 100 square metres (b) the site does not front an arterial road.
Petrol filling station	
Public service depot	
Restaurant	
Road transport terminal	
Service trade premises	
Shop or group of shops	Except where it achieves both (a) and (b): (a) the gross leasable area is less than 80 square metres (b) the site does not front an arterial road.
Stock sales yard	
Stock slaughter works	
Store	
Warehouse	
Waste reception, storage, treatment or disposal	
Wrecking yard	

Public Notification

Categories of public notification are prescribed in Schedule 9 of the *Development Regulations 2008.*

Further, the following forms of development (except where the development is non-complying) are designated:

Category 1	Category 2
Where located within the **Medium Density Policy Area 40**: (a) detached dwelling(s) (b) row dwelling(s) of two storeys or less (c) semi-detached dwelling(s) of two-storeys or less (d) single storey building(s) comprising dwelling(s) Within the **Precinct 36 Targeted Infill**: (e) two-storey building(s) comprising dwelling(s) or a combination of (a), (b), (c), (d), (e).	Where located within the **Medium Density Policy Area 40:** (a) three-storey row dwelling(s) (b) three-storey semi-detached dwelling(s) (c) two-storey building(s) comprising dwelling(s) except where identified as a Category 1 form of development Within the **Precinct 36 Targeted Infill**: (d) three-storey building(s) comprising dwelling(s) except where identified as a Category 1 form of development or a combination of (a), (b), (c) or (d).
Where located within the **Seaford Heights Policy Area 43**: (a) a building of two storeys comprising dwellings located within 400 metres of the **Seaford Heights Policy Area 24** (of the **Neighbourhood Centre Zone**) (b) land division including earthworks (c) retaining walls less than 2 metres in height.	Land division where located within the **Co-ordinated Development Policy Area 67**. Where located within the **Seaford Heights Policy Area 43**, a three storey dwelling located within 400 metres of the **Seaford Heights Policy Area 24** (of the **Neighbourhood Centre Zone**) that is adjoining either (a) or (b): (a) an area of public open space (b) a road reserve which is greater than 10 metres wide.

Table Section

Table Onka/2 - Building Setbacks from Road Boundaries

Part A Standard Minimum Distances for Building Setback
(in addition to any road widening requirements where applicable)

Road boundary	Setback distance from road boundary (metres)
Primary Arterial Road	10
Secondary Arterial Road	8
Distributor Road	8
Collector Road (except in the **Hills Face Zone**)	6
Local Roads and Streets (except in the **Hills Face Zone**)	5
Collector Road or Local Roads and Streets in the **Hills Face Zone**	8
Secondary road boundary	**Setback distance from secondary road boundary (metres)**
Primary or Secondary Arterial Road	4 metres
Other Road Types	1.5 metres (single storey) 2 metres (two storey)

Note: The distances specified in Part A apply to roads or sections of road not listed in Part B

Part B Non-standard Minimum Distances for Building Setback
(in addition to any road widening requirements where applicable)

Road boundary	Setback distance from road boundary (metres)
Ackland Hill Road From Adelaide to Goolwa Road, MR 11, to Cherry Gardens Road	20
Boko Road From Adelaide to Goolwa Road, MR 11, to Cherry Gardens Road	30
Cherry Gardens Road From Adelaide to Goolwa Road, MR 11, to the Council boundary, both sides	25
Cut Hill Road From the southern corner of Section 797, Hundred of Kuitpo, to the eastern boundary of Section 309, Hundred of Kuitpo, both sides	20
Oakridge Road Full length of Oakridge Road within the Hills Face Zone - both sides	20
Piggott Range Road Full length - both sides	20

Part C Road Widening Requirements

Commissioner of Highways Controlled Roads

Road name	Portion of road	Distance required (metres)
Beach Road	Northern side, Main South Road to a point 500m west	20.12
	Northern side, Majorca Road to a point 150m west	20.12
Biscay/ Aldinga Road	Northern side, Plains Road to a point 150m east of Delabole Road	7.9
Chandlers Hill Road	Northern side, a point 150m West of Glenloth Drive to a point 75m east of Glenloth Drive	4.5
Commercial Road	Eastern side, Dalkeith Road to a point 325m North	35
	Eastern side, Dalkeith Road to a point 150m South of Lennard Drive	37.3
	Eastern side, a point 150m South of Lennard Drive to a Point 550m South	23.5 12
	Eastern side, Maslin Beach Road to a point 550m North	131
	Western side, Gulf Parade to a point 100m North	12.4
	Eastern side, Penzance Street to Fremantle Road	14
	Eastern side, Fremantle Road to Jared Road	12.4
	Eastern side, Jared Road to a point 100m South of Aldam Road	33
	Eastern side, a point 100m South of Aldam Road to Seaford Road	31.5
	Eastern side, Seaford Road to a point 50m South of Tiller Drive	14.5
	Eastern side, a point 50m South of Tiller Drive to a point150m south	37.2
	Eastern side, Robinson Road to Griffiths Drive	35.6
	Eastern side, Griffith Drive to a point 50m south of Bruce Place	
Doctors Road	Southern side, Main South Road to a point 100m east	6.1
Dyson Road	Eastern side, a point opposite Murray Road to a point 225m north	126
	From the point 225m north to a point 75m north	19
Kenihans Road	Northern side, Robbie Drive to a point 50m east of Tennessee Drive	27.5
	Northern side, a point 50m East of Tennessee Drive to a point 100m west of Weatherly Road	6.1
Main Road	Eastern side, Black Road intersection to a point 400m North (point A)	12
	Western side, Point A to a point 350m south	12
	Western side, Weymouth Recreation Ground to a point 250m north (Point B)	18 110
	Western side, Point B heading north until council boundary	
Main South Road	Eastern side, Button Road to Sellicks Beach Road	30
	Western side, Hart Road to a point 600m south	30
	Eastern side, Colville Road to a point 50m north of Button Road	30
	Eastern side, Patapinda Road to a point 1.4km northeast	15
	Western side, area bounded by River Road	15
	Western side, River Road to a point 350m northeast	85
	A further 200m North East on the western side	100
	A further 250m North East on the western side	200
	Western side, Southern Expressway to Melsetter Road	15

Part C Road Widening Requirements

Commissioner of Highways Controlled Roads

	Western side, Dalkeith Road to Maslin Beach Road	45
	Eastern side, Wheaton Road to Tatachilla Road (not including area bounded by Pedler Road)	45
	Eastern side, Tatachilla Road to Plains Road intersection	30
	Western side, Maslin Beach Road to a point 375m northeast of How Road	17
	North-western side, River Road to Onkaparinga River	15
	North-western side, Onkaparinga River to a point 50m south of Railway Road	15
	North-western side, Seaford Road to a point 350m South (Point C)	15
	North-western side, Point C to Dungeys Road	26
	Western side, Dungeys Road intersection to a point 125m south	21
	Western side, Robinson Road intersection to a point 150m north	8.5
	South-eastern side, Patapinda Road to Onkaparinga River	15
	Western side, Robinson Road to Dalkeith Road	15
	Eastern side, Robinson Road to Wheaton Road	30
	Western side, Cox Road to a point 125m North of Perth Street	30
Maslin Beach Road	Northern side, Commercial Road to Main South Road	7.9
Old Coach/ Eastview Road	Eastern side, Maslin Beach Road to a point 225m south	8
Panalatinga Road	Eastern side, Kellys Road to a point 75m north	30
	Eastern side, Kellys Road to point 350m south	50
Robinson Road	Southern side, Main South Road to a point opposite Dungeys Road	35
	A point opposite Dungeys Road to a point 350m South East	65
Tatachilla Road	Southern side, Victor Harbour Road to California Road	7.9
	Northern side, Main South Road to Victor Harbor Road	7.9
Victor Harbor Road	Eastern side, a point 50m South of Allen Street to Quarry Road	35
	Eastern side, Quarry Road to a point 250m South (point D)	35
	Point D to Church Road, Willunga	35
	Western side, Ostrich Farm Road to a point 150m South of Quarry Road	35

Intersections affected by road widening

Beach Road and Dyson Road
Chandlers Hill Road and Kenihans Road
Main Road and Black Road
Main South Road and Black Road
Main South Road and Doctors Road
Main South Road and Majors Road
Main South Road and Seaford Road
Main South Road and Sherriffs Road

Part D Road Widening Requirements
Council Controlled Roads

Road type	Distance required (metres)
Secondary Arterial	32
Distributor	26
Collector Major	18.5
Collector Minor	14.7

Notes:
1 Allotments which are potentially affected by road widening are illustrated in the development constraints maps.
2 The distances specified Part D indicate the amount of widening to the road reserve that is required. Building setback distances should take into account Part A and Part B (Minimum Distances for Building Setback) in addition to the road reserve widths specified in Part D.
3 Part D is provided as an indication of potential road widening requirements. In all cases, confirmation should be made by referring directly to the network asset planner road networks within council.
4 Part D indicates council-controlled roads that have previously been identified for road widening but do not necessarily represent all roads that may currently be identified for road widening or may be identified in the future for road widening.

Table Onka/3 - Off Street Vehicle Parking Requirements

The following off street vehicle parking requirements apply except where otherwise stated in *Table Onka/3A - Off Street Vehicle Parking Requirements for Designated Areas*.

Form of Development	Number of Required Car Parking Spaces (unless otherwise stated in a zone, policy area or precinct)
Aged persons accommodation	1 per unit
Amusement machine centre	7 per 100 square metres
Auction room	1 per 100 square metres plus 2 additional spaces
Bulky goods outlet	2 per 100 square metres (minimum) 4 per 100 square metres (maximum)
Community centre	4 per 100 square metres (minimum) 10 per 100 square metres (maximum)
Consulting room	10 per 100 square metres
Dwelling (other than a group dwelling or residential flat building)	1 covered space for a dwelling with 1 or 2 bedrooms (or room(s) capable of being used as a bedroom) 2 for a dwelling with 3 or more bedrooms (or room(s) capable of being used as a bedroom), one of which should be covered
Educational establishment (school)	1 per full-time employee plus 1 space for wheelchair users plus an additional 10 per cent of this total for visitors
Educational establishment (tertiary)	0.6 per full-time student plus 0.2 per part-time student
Entertainment venue	1 per 4 seats or 8 per 100 square metres whichever is the greater
Funeral parlour	4 per 100 square metres plus 1 per 4 seats (chapel)
Hall	1 per 5 seats
Hospital	2.5 per bed
Hotel and licensed premises	1 per 2 square metres (public bar) 1 per 6 square metres (lounge or beer garden) 1 per 3 seats (dining room) 1 per 2 machines (gaming room)

Form of Development	Number of Required Car Parking Spaces (unless otherwise stated in a zone, policy area or precinct)
Group dwelling and residential flat building	1 covered space for a dwelling with 1 or 2 bedrooms (or room(s) capable of being used as a bedroom) 2 for a dwelling with 3 or more bedrooms (or room(s) capable of being used as a bedroom), one of which should be covered plus dedicated visitor parking should be provided for dwellings sharing a common driveway in accordance with the following: (a) 1 space per 3 to 5 dwellings (b) 2 spaces per 6 to 8 dwellings (c) 0.25 spaces per dwelling for 8 or more dwellings (rounded to the nearest whole number).
Indoor recreation centre	4 per court
Library	4 per 100 square metres
Motel	1 per room plus 1 per employee
Motor repair station	2 per 100 square metres or 4 per service bay, whichever is the greater.
Multiple dwelling	1 per 2 occupants
Non-residential development (other than listed in this table)	4 per 100 square metres (minimum) 6 per 100 square metres (maximum)
Petrol filling station	6 per service bay plus 5 per 100 square metres of retail floor space
Place of worship	1 per 4 seats
Pre-school	1 per 4 children
Radio studio or Television studio	5 per 100 square metres
Restaurant (fast food/family)	
Without dine-in or drive through facilities	12 per 100 square metres
With dine-in and without drive through facilities	1 per 5 square metres (internal and external seating) or 1 per 2 seats (internal seating), whichever is the greater
With dine-in and drive through facilities	1 per 3 square metres (internal and external seating) or 1 per 2 seats (internal seating), whichever is the greater
Restaurant (traditional)	1 per 3 seats or 1 per 15 square metres, whichever is the greater (indoor areas) 1 per 6 seats (outdoor eating areas)
Service trade premises	2 per 100 square metres (minimum) 4 per 100 square metres (maximum)
Supported accommodation	1 per 4 beds
Tourist accommodation	1 per 3 beds or 1 per room plus 1 per employee whichever is greater

Form of Development	Number of Required Car Parking Spaces (unless otherwise stated in a zone, policy area or precinct)
Industry and/or Warehouse	Office component 3.3 per 100 square metres plus Non-office component
200 square metres or less	2 per 100 square metres
Greater than 200 square metres and less than 2000 square metres	1.33 per 100 square metres
Greater than 2000 square metres	0.67 per 100 square metres

Notes:

1 The number of employees shall be determined making a reasonable estimate of the number of workers attending on the site of the development during periods of full production or output.

2 A discount factor of up to 20 per cent will be considered where any land use is proposed within a designated activity centre and the majority of existing and proposed off-street car parking supply is shared between different premises within a centre.

3 Where larger multiplex complexes are proposed, car parking may need to be calculated on the individual components.

4 The floor areas relevant to this table will generally be the development's gross leasable floor area but may be reviewed to better determine the area of use or activity likely to generate car parking demand.

5 'Seats' as relevant to this table shall generally relate to normal seating arrangements for patrons, taking into account any other statutory requirements regulating seating capacity.

6 A proponent may take an empirical assessment of car parking demand to determine a reduced provision of on-site car parking by considering the following factors:
   (a) proximity to a Regional Centre and/or a train station or other forms of high frequency public transport
   (b) on-street car parking capacity
   (c) the variation of car parking demand generated by different facilities at different times
   (d) any other factors that may influence a reduced demand for car parking

7 For Affordable Housing (as classified by the relevant authority) the minimum number of on-site car parking spaces can be reduced to 1 less car parking space per dwelling than would otherwise be required, providing each dwelling has at least 1 dedicated car parking space and 50 per cent of the shortfall is provided within a shared on-site car park conveniently located to the dwellings.

8 Car parking rates in this table are subordinate to more specific policy direction where applicable.

Table Onka/8 - Contributory Items

Property Address	Description of Contributory item	Certificate of Title	DPLG ID
15 Appletree Lane CLARENDON	Dwelling	CT 6101/988	5192
15 Appletree Lane CLARENDON	Dwelling	CT 6101/988	5182
24 Chalk Hill Road CLARENDON	Dwelling	CT 5443/660	24476
282 Grants Gully Road CLARENDON	Dwelling	CT 5380/428	5163
Alt 51 Grants Gully Road CLARENDON	War Memorial	CT 6164/623	5172
15 Grants Gully Road CLARENDON	Dwelling	CT 5323/498	5164
23 Grants Gully Road CLARENDON	Dwelling	CT 5692/902	5165
24 Grants Gully Road CLARENDON	Dwelling	CT 5302/408	5166
38 Grants Gully Road CLARENDON	Outbuilding (former Barn / Stables)	CT 5421/917	24477
41 Grants Gully Road CLARENDON	Dwelling - 'Blackwood Lodge'	CT 5873/655	24478
45 Grants Gully Road CLARENDON	Former dwelling/shop	CT 5497/957 CT 5498/302	5167
55 Grants Gully Road CLARENDON	Former stables, Fire shed	CT 5778/984	5171
56 Grants Gully Road CLARENDON	Dwelling - former shop	CT 5160/232	5170
73 Grants Gully Road CLARENDON	Restaurant - former dwelling	CT 5426/746	5175
77 Grants Gully Road CLARENDON	Former dwelling	CT 5367/641	5177
79 Grants Gully Road CLARENDON	Dwelling	CT 5412/661	5178
80 Grants Gully Road CLARENDON	Hall	CT 6066/679	5179
81 Grants Gully Road CLARENDON	Bakery	CT 6099/597	5180
84 Grants Gully Road CLARENDON	Restaurant former Dwelling	CT 5201/712	24479
10 Harper Road CLARENDON	Dwelling	CT 5189/296	5186
37 Hollitt Road CLARENDON	Dwelling	CT 6133/274	5184
Pt Alt 27 Hollitt Road CLARENDON	Dwelling	CT 5480/830	24480
1608 Kangarilla Road CLARENDON	Dwelling 'Rockbeare'	CT 5304/246	24481
Alt 5 Luke Road CLARENDON	Planting - olive grove	CT 5145/110	5183
41 Nicolle Road CLARENDON	Dwelling	CT 5942/381	5185
35 Nicolle Road CLARENDON	Pavilion	CT 5433/675	24482
244 Potter Road CLARENDON	Dwelling	CT 5852/473	5189
Alt 102 Potter Road CLARENDON	Dwelling	CT 5444/318	24483
13 Saint Ninians Road CLARENDON	Dwelling	CT 5482/826	5190
125 Turners Gully Road CLARENDON	Dwelling	CT 5845/411	5181

Table Onka/10 - State Heritage Places

Property Address	Description and/or Extent of Listed Place	Lot No. or Part Sec	Plan No.	Certificate of Title	Section 16 Criteria	SA Heritage Register ID
2 Old Coach Road ALDINGA	Memorial to the Wreck of the 'Star of Greece'	A203	F164026	CT 5956/622		14071
206-208 Port Road ALDINGA	Hart's Cafe & Real Estate Office (former Temperance Hotel)	A16	F101638	CT 5867/801		12796
Lewis Street CHERRY GARDENS	Farm Outbuilding	A7	F152383	CT 5799/152		12712
55 Grants Gully Road CLARENDON	Hall (former Clarendon Bible Christian Church)	A622	F5463	CT 5778/983		12716
59 Grants Gully Road CLARENDON	Former Clarendon Police Station & Courthouse	A623	F5463	CT 5611/409		10451
74 Grants Gully Road CLARENDON	Former Oddfellows Hall	A604	F5463	CT 5490/585		10473
Grants Gully Road CLARENDON	Clarendon Winery Complex	A1	D14878	CT 5145/166		11193
Grants Gully Road CLARENDON	Clarendon Weir, Onkaparinga River	Q99	F218799	CT 5885/765		12711
2 Luke Road CLARENDON	Dwelling (former Clarendon Wesleyan Methodist Church)	A101 A102	D48136 D48136	CT 5554/102 CT 5554/103		14256
Potter Road CLARENDON	Clarendon Primary School (Original 1885 Building)	A29	F5967	CT 5798/104		14255
Scenic Road CLARENDON	Former Dwelling & Slab Barn	Q7	F153533	CT 5279/766		12714
Turners Gully Road CLARENDON	Thrush Grove Cottage	A102	D25667	CT 5431/793		10452
404B Main Road COROMANDEL VALLEY	Coromandel Valley Institute	A44	F149129	CT 5831/522		12410
406 Main Road COROMANDEL VALLEY	Former Murray & Sons Biscuit & Jam Factory Foreman's Residence	A51	D51639	CT 5667/111		14257

Property Address	Description and/or Extent of Listed Place	Lot No. or Part Sec	Plan No.	Certificate of Title	Section 16 Criteria	SA Heritage Register ID
Murrays Hill Road COROMANDEL VALLEY	Horner's Bridge [Stone Arch]	S596 ROAD RESERVE S1653 ROAD RESERVE	H105100 H105500	N/A N/A		10468
Matthews Road DORSET VALE VIA BLACKWOOD	Dwelling ('Mackereth Cottage')	S1427	H105500	CT 5806/966		10470
2 Gates Road HACKHAM	Dwelling ('Holly's House')	A1	F153542	CT 5279/800		14507
Main South Road HACKHAM	Office (former Four Winds Dwelling)	A17	D7907	CT 5264/327		10954
424 Beach Road HACKHAM WEST	Simplicity Funeral Parlour (former Morphett Vale Primary School)	A11	D12422	CT 5111/8		14430
Chandlers Hill Road HAPPY VALLEY	Happy Valley Reservoir (Dam Wall & Towers)	S516 CAB A100 A98 A95 S466 S466, 475	H105500 R394 F216252 F216147 F216330 H105500 H105500	GM 229/415 N/A CT 5837/72 CT 5831/856 CT 5830/157 CT 6089/961 CT 6089/962		12710
Essington Street HAPPY VALLEY	Sturt Gorge Glaciation Geological Site, Sturt Gorge Recreation Park	S625, 674 S1556,1561 S1648 1649 & 1665 A3 A4 A1 A2 A2233 A611 A610 A608	H105100 H105500 H105500 D61457 D35889 D56671 D33672 D9612 D77028 D77028 D77028	CR 5758/608 CR 5906/446 CR 5906/446 CR 5906/446 CR 5750/580 CR 5849/542 CT 5164/868 CT 5390/621 CT 6063/573 CT 6063/572 CT 6063/570		14109
47A Fraser Avenue HAPPY VALLEY	Horndale Winery & Distillery Complex - Residence	A500	D70991	CT 5975/298		25052
Lot 105 Fraser Avenue HAPPY VALLEY	Horndale Winery & Distillery Complex - Winery	A105	D29829	CT 5246/128		10573
Lot 102 Jordan Avenue HAPPY VALLEY	Horndale Winery & Distillery Complex - Liquor Store and Still House	A102	D29829	CT 5246/125		25053
1 Olive Farm Place HUNTFIELD HEIGHTS	Olive Farm (Dwelling and Outbuildings)	A2	F5509	CT 5504/886		14508

Property Address	Description and/or Extent of Listed Place	Lot No. or Part Sec	Plan No.	Certificate of Title	Section 16 Criteria	SA Heritage Register ID
Dashwood Gully Road KANGARILLA	Dwelling (former Kangarilla Hotel, later a Temperance Hotel and then a guest house)	A806	F6192	CT 5510/980		14258
Old Coach Road KUITPO	Silvicultural Reserves (E. sideroxylon 1898 & 1900), Kuitpo Forest	S120 & 126	H105300	CR 5774/376	a	25921
Wickham Hill Road KUITPO	Dwelling ('Clear Hills')	S3510	H105300	CT 5841/28	b	14772
15 Liston Road LONSDALE	Underground Tank & Barn, Glenheath Homestead	A1	F17428	CT 5476/715		12581
MASLIN BEACH	Maslin Bay to Aldinga Bay Coastal Cliff Section Geological Site	S799, 801, 802 A2 A1 A2 A1	H106000 D40554 D40554 D56399 D56399	CR 5752/694 CR 5291/866 CR 5291/865 CR 5869/782 CT 5875/933		14040
Chaffeys Road MCLAREN VALE	Seaview Winery (former Hope Farm, later Benelan) Dwelling, Sheds & Cellar	S519	H106000	CT 5410/316		14502
Chaffeys Road MCLAREN VALE	Coriole Winery (Winery, Dwelling & Outbuilding)	A99	F153385	CT 5547/408		14503
Chaffeys Road MCLAREN VALE	Samuel's Gorge Winery (former Seaview Farm) including two dwellings, two underground tanks, a cellar and a building housing two olive presses	A10	F15883	CT 5093/773	a b e g	14505
Chapel Hill Road MCLAREN VALE	Chapel Hill Winery (former McLaren Vale Bible Christian Church)	A100	D46664	CT 5976/160		14504
Kays Road MCLAREN VALE	Kay Brothers Amery Winery	A82	F153368	CT 5869/326		14506
133 Main Road MCLAREN VALE	Part of the Former Congregational Church Complex - 1862 Church - now the Singing Gallery	A100	D70585	CT 6005/932		26273
6 Tatachilla Road MCLAREN VALE	Part of the Former Congregational Church Complex - 1844 Church and Graveyard	A102	D70785	CT 6005/934		14069

Property Address	Description and/or Extent of Listed Place	Lot No. or Part Sec	Plan No.	Certificate of Title	Section 16 Criteria	SA Heritage Register ID
1 Church Street MORPHETT VALE	Dwelling	A150	D6364	CT 5462/329		12556
40 Flaxmill Road MORPHETT VALE	Dwelling ('Mossgiel')	A3	F152789	CT 5356/615		14498
214-216 Main South Road MORPHETT VALE	Shop (former Morphett Vale Baptist Church)	A18	F152094	CT 5985/864		12560
250-262 Main South Road MORPHETT VALE	Mary Help of Christians (St Mary's) Catholic Church	A28	F152004	CT 5358/388		10596
243 O'Sullivan Beach Road MORPHETT VALE	Wakefield's Homestead	A5	D25969	CT 5431/202		12575
142 Wheatsheaf Road MORPHETT VALE	Thrush Grove (Dwelling & Dairy)	A500	D46727	CT 5399/158	a b	11039
14 William Street MORPHETT VALE	Morphett Vale Institute	A10	F218261	CT 5846/707		12535
William Street MORPHETT VALE	Former John Knox Free Presbyterian Church	A500	F42504	CT 5882/951		10597
William Street MORPHETT VALE	Former John Knox School	A500	F42504	CT 5882/951		12534
148 Beach Road NOARLUNGA CENTRE	Consulting Rooms (former Dwelling)	A37	F12360	CT 5807/2		14499
Church Hill Road OLD NOARLUNGA	St Philip & St James Anglican Church & Graveyard	A2	D40739	CT 5263/595		12820
165-181 Old South Road OLD REYNELLA REYNELLA	Shop (former Reynella Primary School combined Schoolroom and Dwelling)	A8	F158899	CT 5289/61		14497
204-212 Old South Road OLD REYNELLA REYNELLA	Crown Inn	A47	F104036	CT 5140/517		12585
211-221 Old South Road OLD REYNELLA REYNELLA	Former Reynella Changing Station Dwelling & Stables	Q13	D54064	CT 5809/428		12579
6 Peach Street OLD REYNELLA REYNELLA	Dwelling (former Reynella School comprising 'cottage' and 'hall')	A91	F203817	CT 5368/65		12587

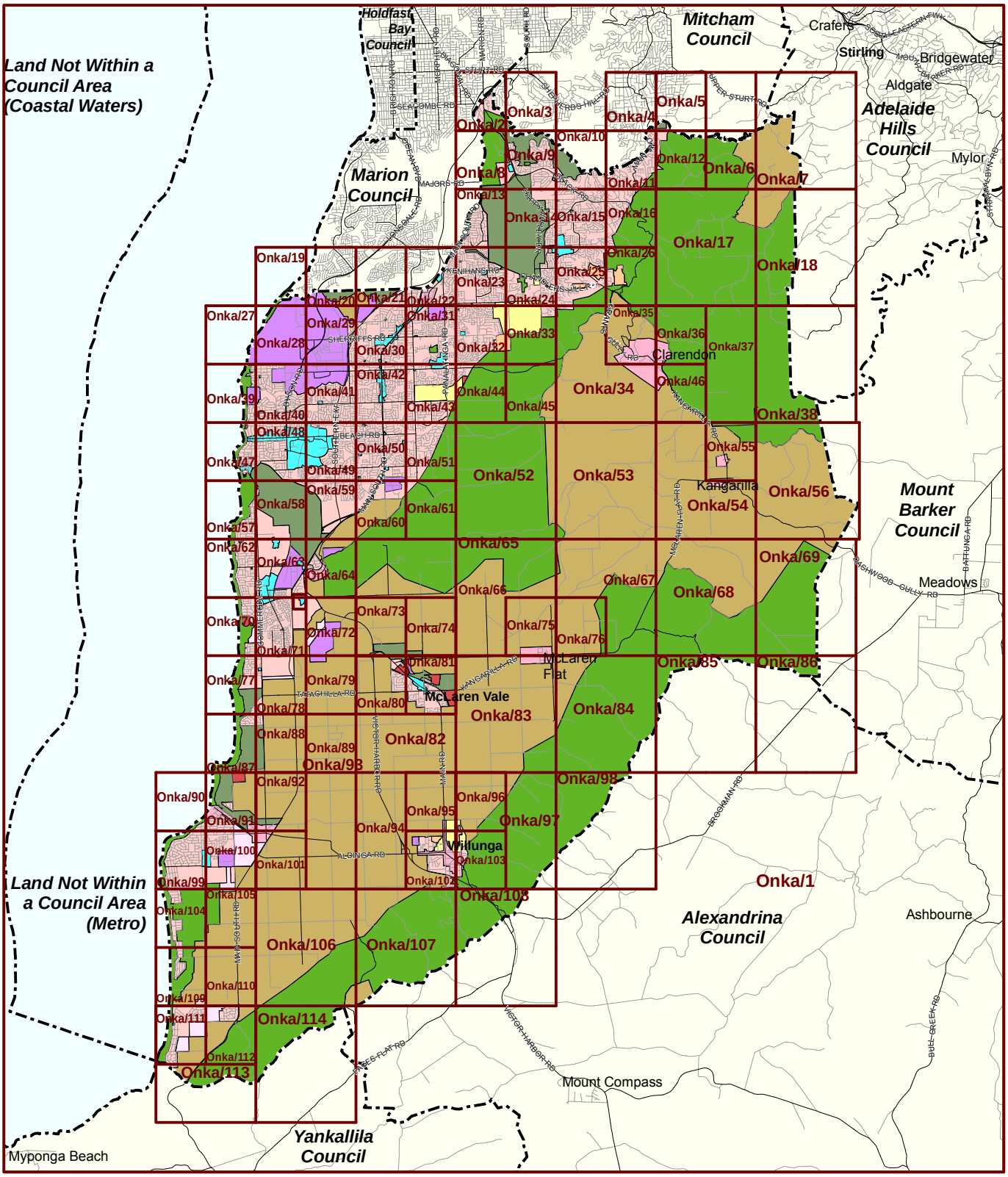
Property Address	Description and/or Extent of Listed Place	Lot No. or Part Sec	Plan No.	Certificate of Title	Section 16 Criteria	SA Heritage Register ID
20-36 Reynell Road OLD REYNELLA REYNELLA	Hardy's (former Reynell's) Reynella Winery, including Pigeon Loft, Cave Cellar No.1, Reynell's House (now offices), the Dairy, the Shell of the Chateau and the Boiler Stack	A501	D77674	CT 6071/788		12720
80 Murray Road PORT NOARLUNGA	Perry Homestead	A201	D48945	CT 5532/170		12582
53 Old Honeypot Road PORT NOARLUNGA	Dwelling & Outbuildings	A11	D38972	CT 5175/883		14500
29 Saltfleet Street PORT NOARLUNGA	Port Noarlunga Hotel (former Milliari Guest House only - incorporated in hotel in 1933)	A5	D43	CT 5117/876		14496
41 Wearing Street PORT NOARLUNGA	Dwelling ("Sauerbier's House") and Storage Shed/Privy	A10	T105501	CT 5321/746		11770
Sauerbiers Road PORT NOARLUNGA SOUTH	Pingle Farm (Dwelling, Barn and Underground Tank), Onkaparinga River National Park	A104	D62452	CR 6066/181	a b	14766
13 Port Road PORT WILLUNGA	Dwelling (former Seaview Hotel)	A17	D24345	CT 5409/437		14286
Braes Close REYNELLA EAST	Dwelling ('The Braes')	A101	D30415	CT 5223/887		12607
71 Griffiths Drive SEAFORD	Dwelling (former Farm House)	A92	D91150	CT 6108/822	a	14494
Wheaton Road SEAFORD HEIGHTS	Former Noarlunga Ostrich Farm, including former Prior's Court Homestead (1850s section only) and Barn	A10	F15505	CT 5057/849		14427
Sauerbiers Road SEAFORD MEADOWS	Prospect Farm, including homestead, cottage, well, barn, two sheds and implement shed and stone walling	A23	D69693	CT 5961/260		11828
Bayliss Road WHITES VALLEY	Dwelling ('former Hawthorn Farm')	A248	F164071	CT 5801/572		14066

Property Address	Description and/or Extent of Listed Place	Lot No. or Part Sec	Plan No.	Certificate of Title	Section 16 Criteria	SA Heritage Register ID
3-5 High Street WILLUNGA	Willunga Hotel, comprising original hotel, cottage & two storey shop	A10 A7 A9	F159034 F159031 F159033	CT 5289/914 CT 5289/915 CT 5289/918		10343
38 High Street WILLUNGA	Masonic Hall (former Willunga Church of Christ) & Outside Toilet	A464	F164287	CT 5706/863		14073
44 High Street WILLUNGA	Former Bakery & Residence	A505	F164328	CT 5380/702		14074
51 High Street WILLUNGA	Bush Inn (sometime Canberra Hotel)	A4	D60856	CT 5887/568		14075
61 High Street WILLUNGA	National Trust Museum (former Willunga Police Station and Residence, Cell Block and Courtyard, Stables & Courthouse)	A5	D87298	CT 6086/563		10342
62 High Street WILLUNGA	Dwelling (former Willunga Post Office & Telegraph Station)	A91	F163617	CT 5302/794		10626
17 St Andrews Terrace WILLUNGA	Dwelling	A469	F164292	CT 5461/981		10344
20 St Andrews Terrace WILLUNGA	Dwelling (former 'Glantawe House')	A521	F164344	CT 5702/272		14078
16 St Georges Street WILLUNGA	Dwelling	A340	F211126	CT 5593/55		14038
19 St James Street WILLUNGA	Dwelling ('Upalong')	A293	F211079	CT 5746/764		14077
St James Street WILLUNGA	Morton's Bridge [Stone Culvert]	ROAD RESERVE	H106000	N/A		14076
17 St Lukes Street WILLUNGA	Former Bassett's Boys School (later Willunga Council Chambers)	A497	F164320	CT 5816/928		10345
21 St Lukes Street WILLUNGA	Dwelling ('Buckland House') (sometime school)	A536	F164359	CT 5687/925		14165
13-15 St Mary's Street WILLUNGA	Dwelling ('St Mary's Lodge')	A100	D83817	CT 6058/449		14079
1 St Peters Terrace WILLUNGA	Dwelling & Shop (Willunga House)	A559	F164382	CT 5815/551		14072

Property Address	Description and/or Extent of Listed Place	Lot No. or Part Sec	Plan No.	Certificate of Title	Section 16 Criteria	SA Heritage Register ID
7 St Peters Terrace WILLUNGA	Dwelling ('St Anne's Lodge')	A4	F139592	CT 5257/10		10625
Delabole Road WILLUNGA SOUTH	Delabole Slate Quarry & Settlement (ruin)	A102 A353	F11130 F164176	CT 5489/834 CT 5751/324		10965
Dunstan Road WILLUNGA SOUTH	Bangor Slate Quarry (later Australian Slate Quarry) Complex	A51	D55796	CT 5839/98		12301
Dunstan Road WILLUNGA SOUTH	Bangor Slate Quarry Powder Magazine	A51	D55796	CT 5839/98		14067
Range Road WILLUNGA SOUTH	Former Loud's Quarry	A101	D57665	CT 5860/931		14080
Pimpala Road WOODCROFT	Mount Hurtle Winery	A31	D21214	CT 5966/164		11045

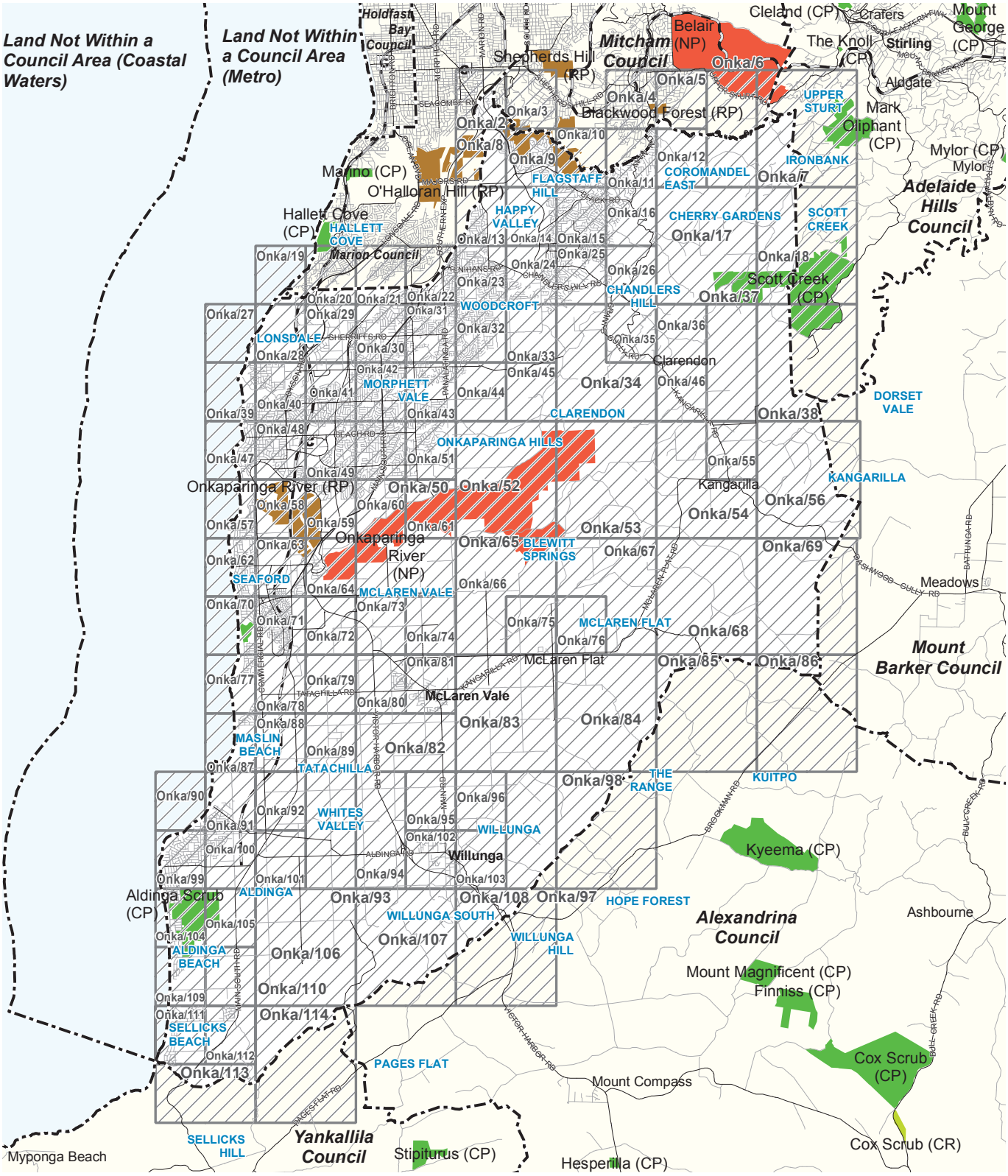
Note: This table is an extract from the South Australian Heritage Register established under Section 13 (1) of the *Heritage Places Act 1993*. In the event of a discrepancy between this extract and the South Australian Heritage Register, the South Australian Heritage Register shall prevail.

Spatial Extent Maps



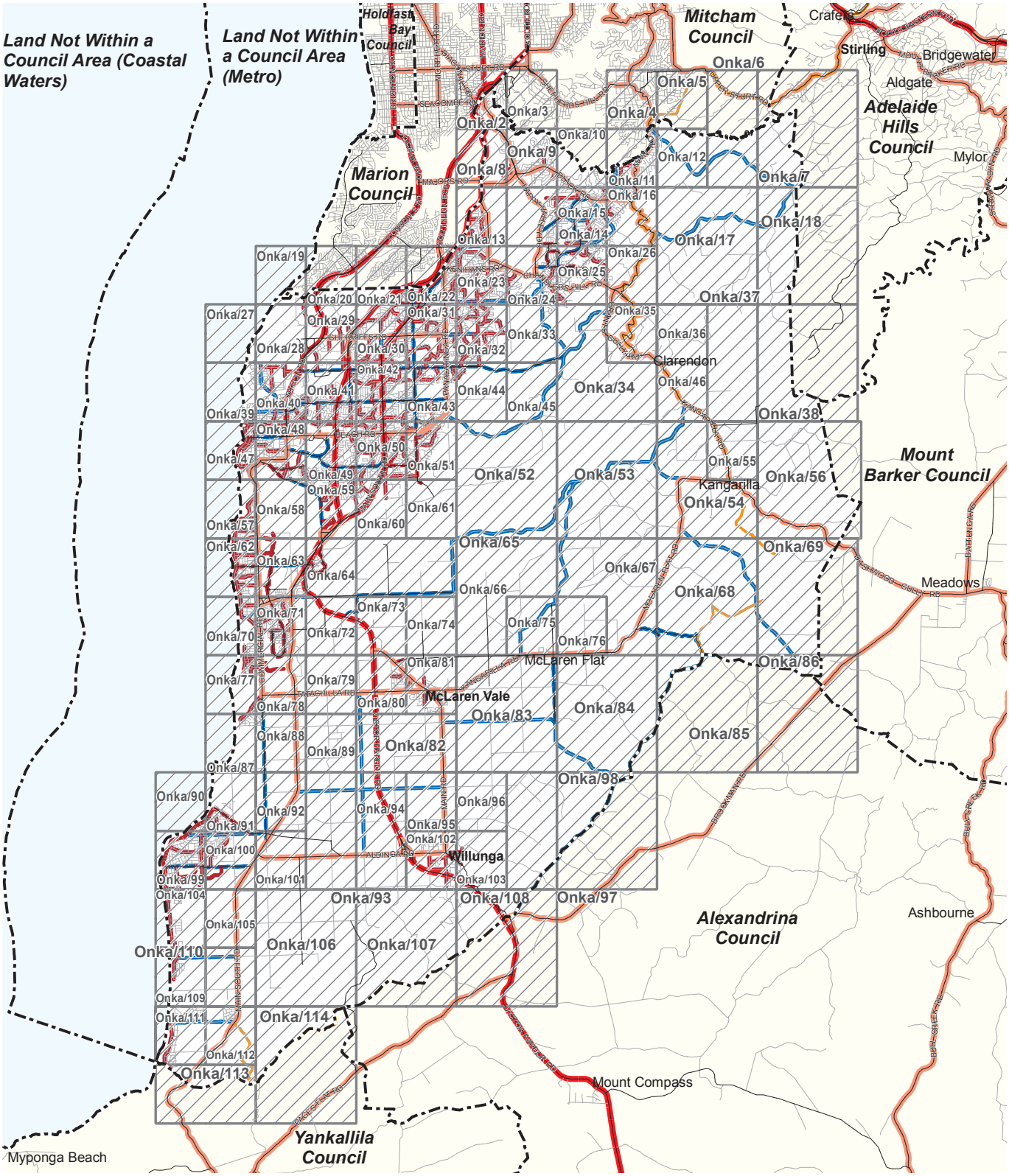
For the purposes of the Development Plan unless otherwise clearly indicated, the zone/policy area/precinct boundaries depicted on or intended to be fixed by Maps Onka/1 to Map Onka/117 inclusive shall be read as conforming in all respects (as the case may require) to the land division boundaries, to the centre line of roads or drain reserves or to the title boundaries, or to imaginary straight lines joining the positions defined by survey or by the measurements shown on the said maps against which the said zone/policy area/precinct boundaries are shown or otherwise indicated.

Council Index Map



- Council Office
- Railways
- Local Reserves
- National Park
- Conservation Park
- Recreation Park
- Conservation Reserve
- Waterbodies
- Development Plan Boundary

Location Map Onka/1



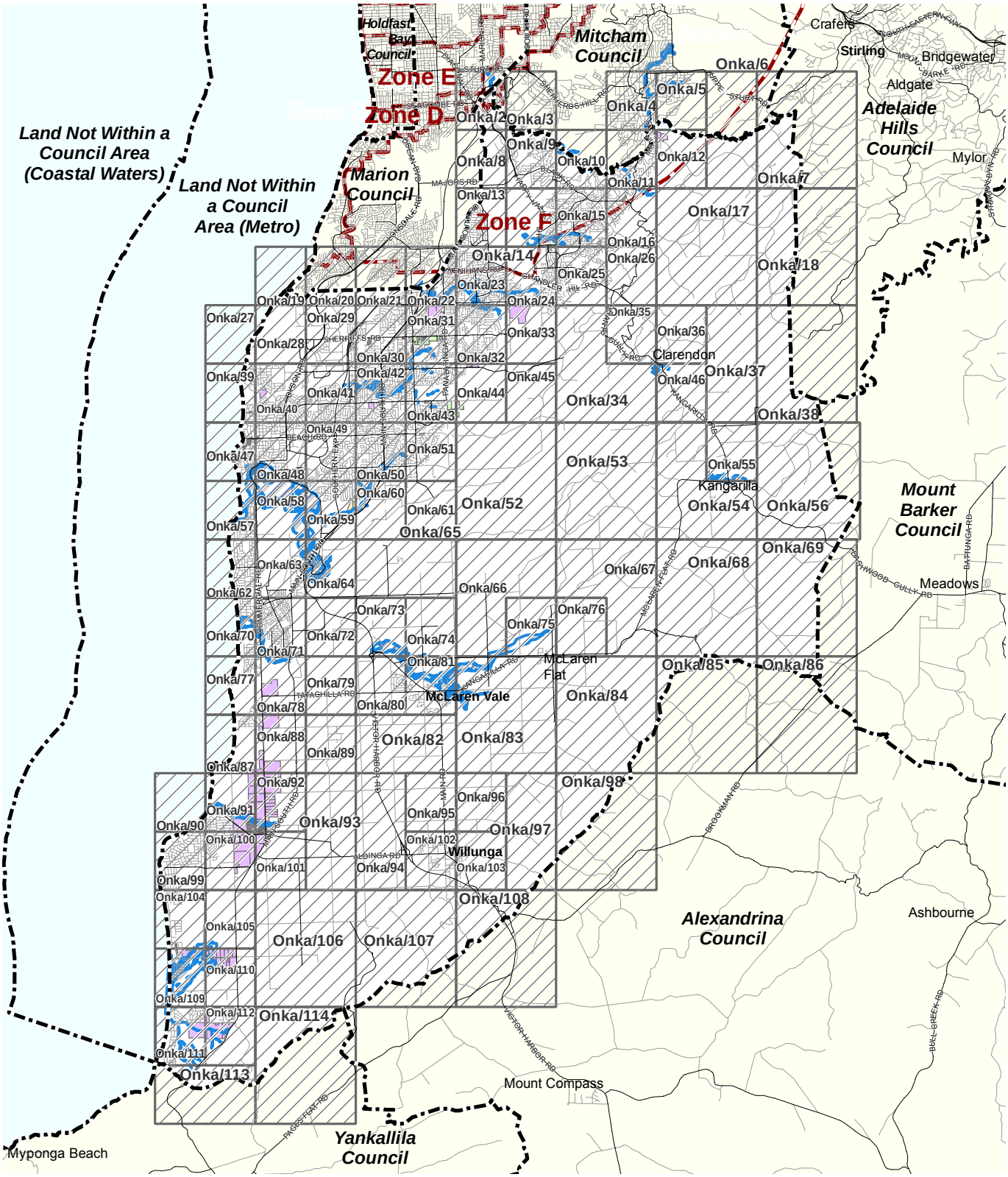
- Mount Lofty Scenic Roads
- Primary Arterial Roads
- Secondary Arterial Roads
- Collector Roads
- Distributor Roads
- Development Plan Boundary

Overlay Map Onka/1

TRANSPORT

ONKAPARINGA COUNCIL

Consolidated - 20 December 2018



Airport Building Heights

Zone D	All Structures Exceeding 45 metres above existing ground level
Zone E	All Structures Exceeding 100 metres above existing ground level
Zone F	APPROVAL REQUIRED FOR ALL STRUCTURES OVER 30m

The road reserve distance required for future road widening for the identified allotments is detailed in Table Onka/2 – Building Set Backs from Road Boundaries and Road Widening

N

0 15 km

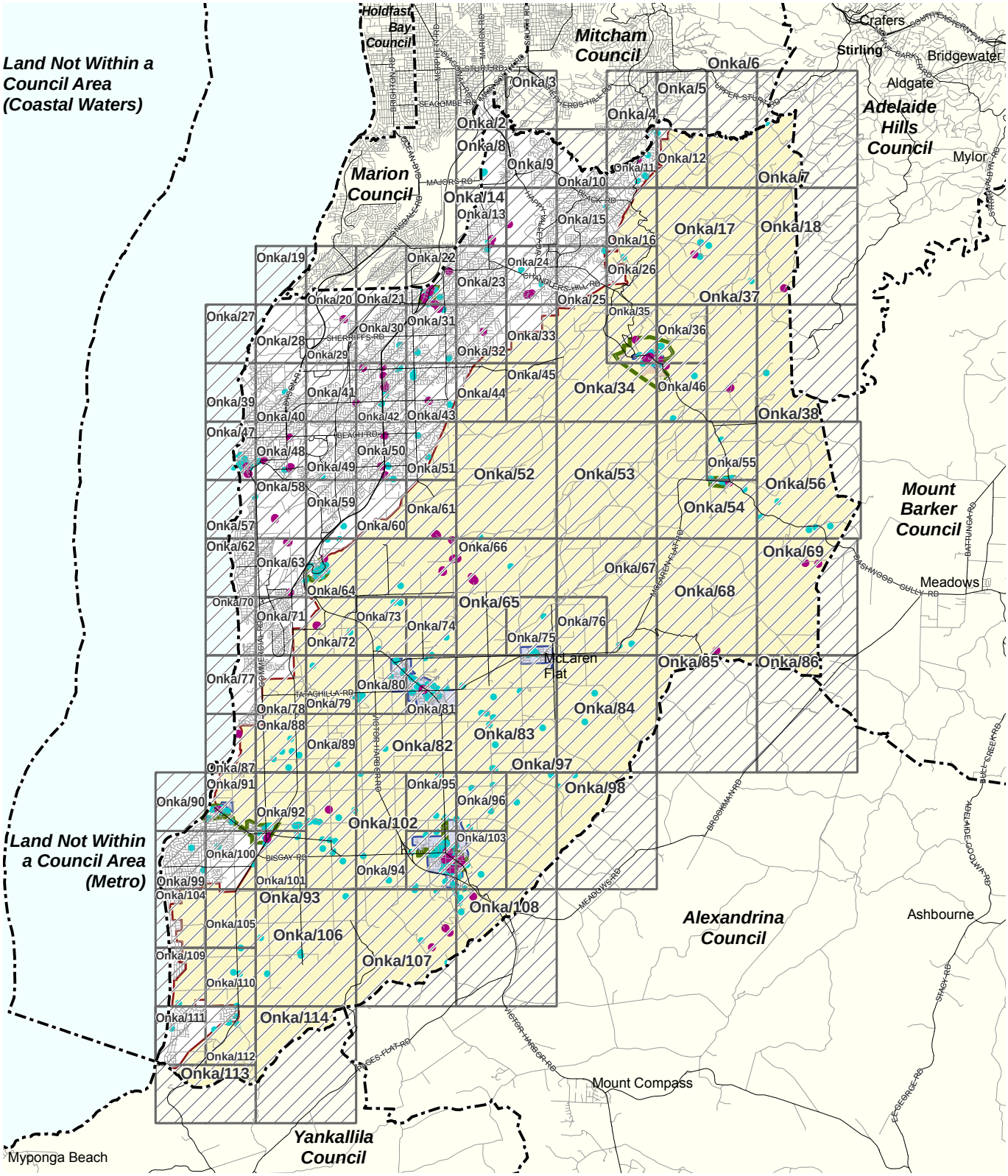
- Flood 100 A.R.I.
- Airport Building Heights
- Collector Major (parcel identified for future road widening)
- Collector Minor (parcel identified for future road widening)
- Distributor (parcel identified for future road widening)
- Secondary Arterial (parcel identified for future road widening)
- Development Plan Boundary

Overlay Map Onka/1

DEVELOPMENT CONSTRAINTS

ONKAPARINGA COUNCIL

Consolidated - 20 December 2018



Overlay Map Onka/1

HERITAGE AND CHARACTER PRESERVATION DISTRICT

ONKAPARINGA COUNCIL

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Location Map Onka/72



Overlay Map Onka/72

TRANSPORT

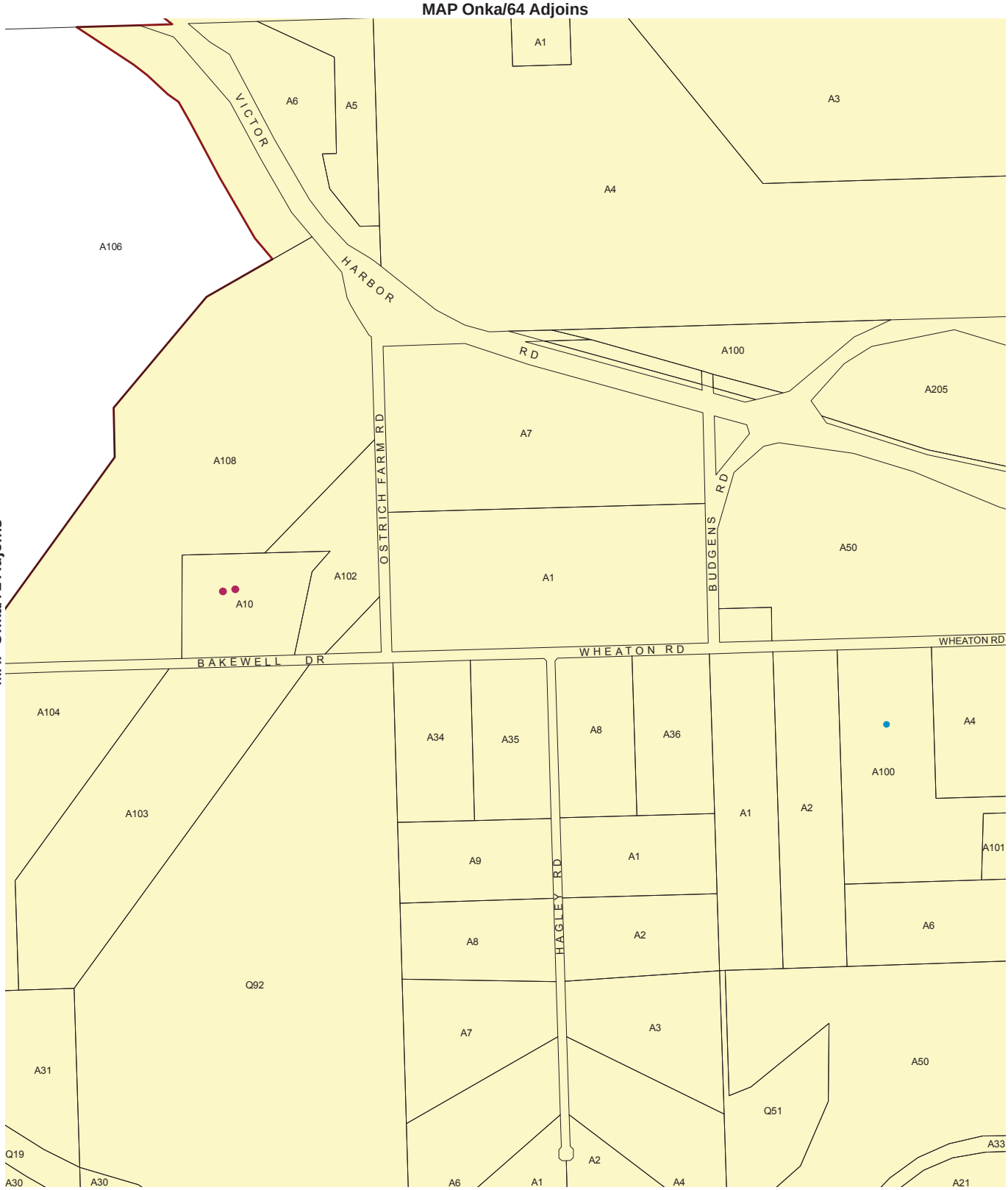
Primary Arterial Roads

Distributor Roads

ONKAPARINGA COUNCIL

Consolidated - 20 December 2018

MAP Onka/64 Adjoins



MAP Onka/71 Adjoins

MAP Onka/73 Adjoins

MAP Onka/79 Adjoins

Heritage points are indicative only.
For further information on State and Local Heritage Places and Contributory Items please refer to the relevant tables within this document.

N

0 500 m

Overlay Map Onka/72

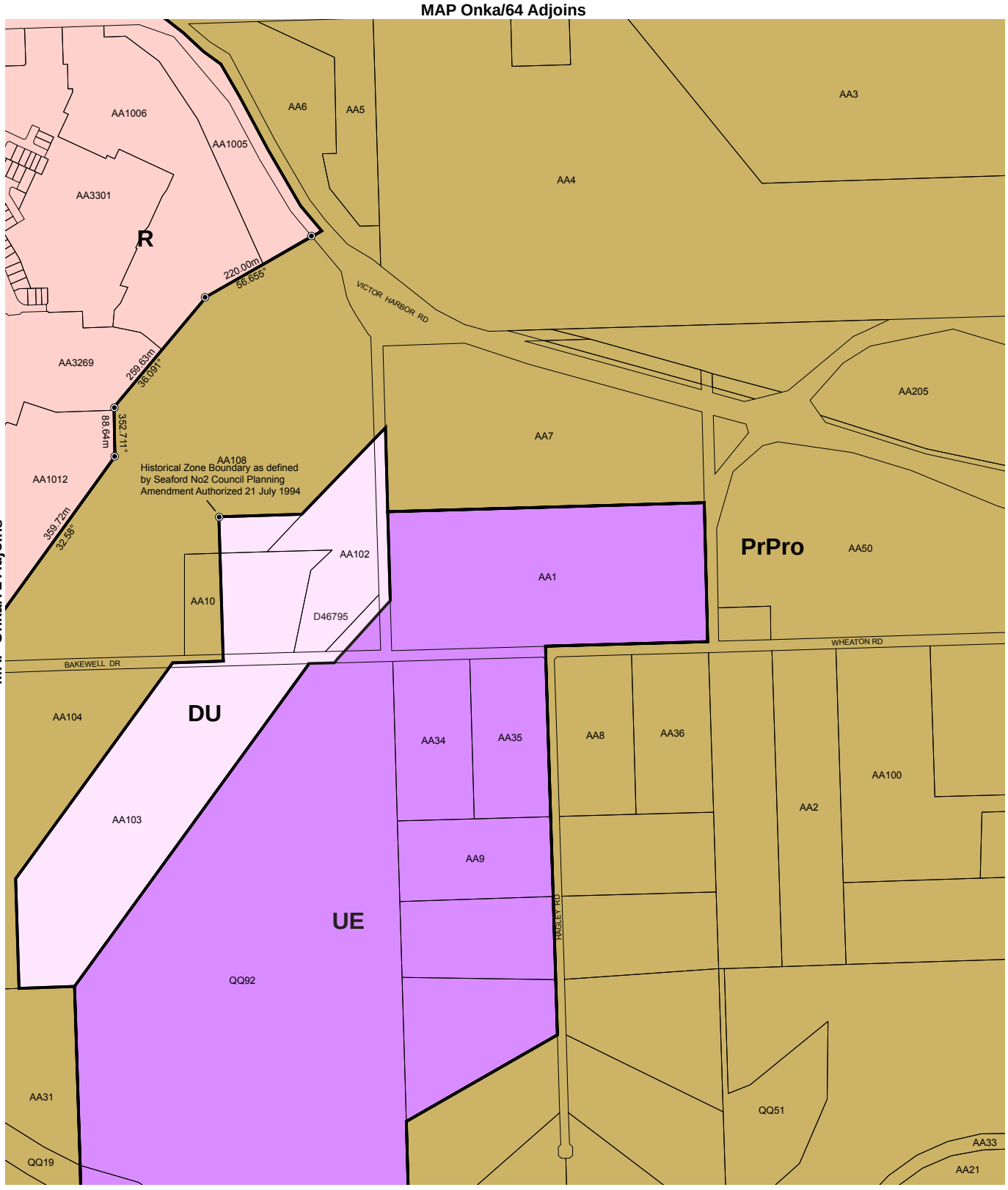
HERITAGE AND CHARACTER PRESERVATION DISTRICT

State heritage place

Local heritage place

Character Preservation District

ONKAPARINGA COUNCIL
Consolidated - 20 December 2018



Lamberts Conformal Conic Projection, GDA94

N

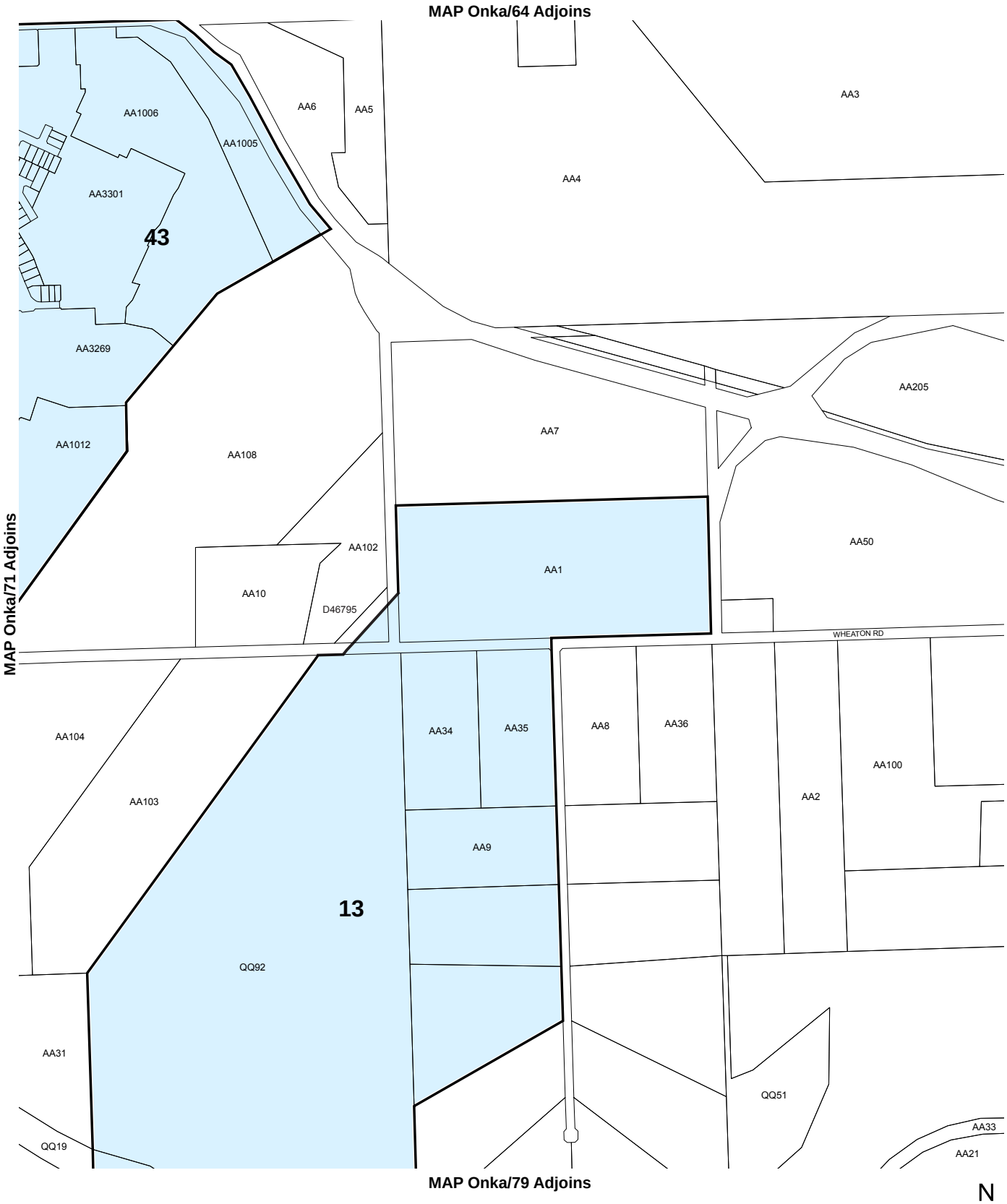
0 500 m

Zones

DU	Deferred Urban
PrPro	Primary Production
R	Residential
UE	Urban Employment
	Zone Boundary

Zone Map Onka/72

ONKAPARINGA COUNCIL
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Lamberts Conformal Conic Projection, GDA94

Policy Area

13 Infrastructure Policy Area

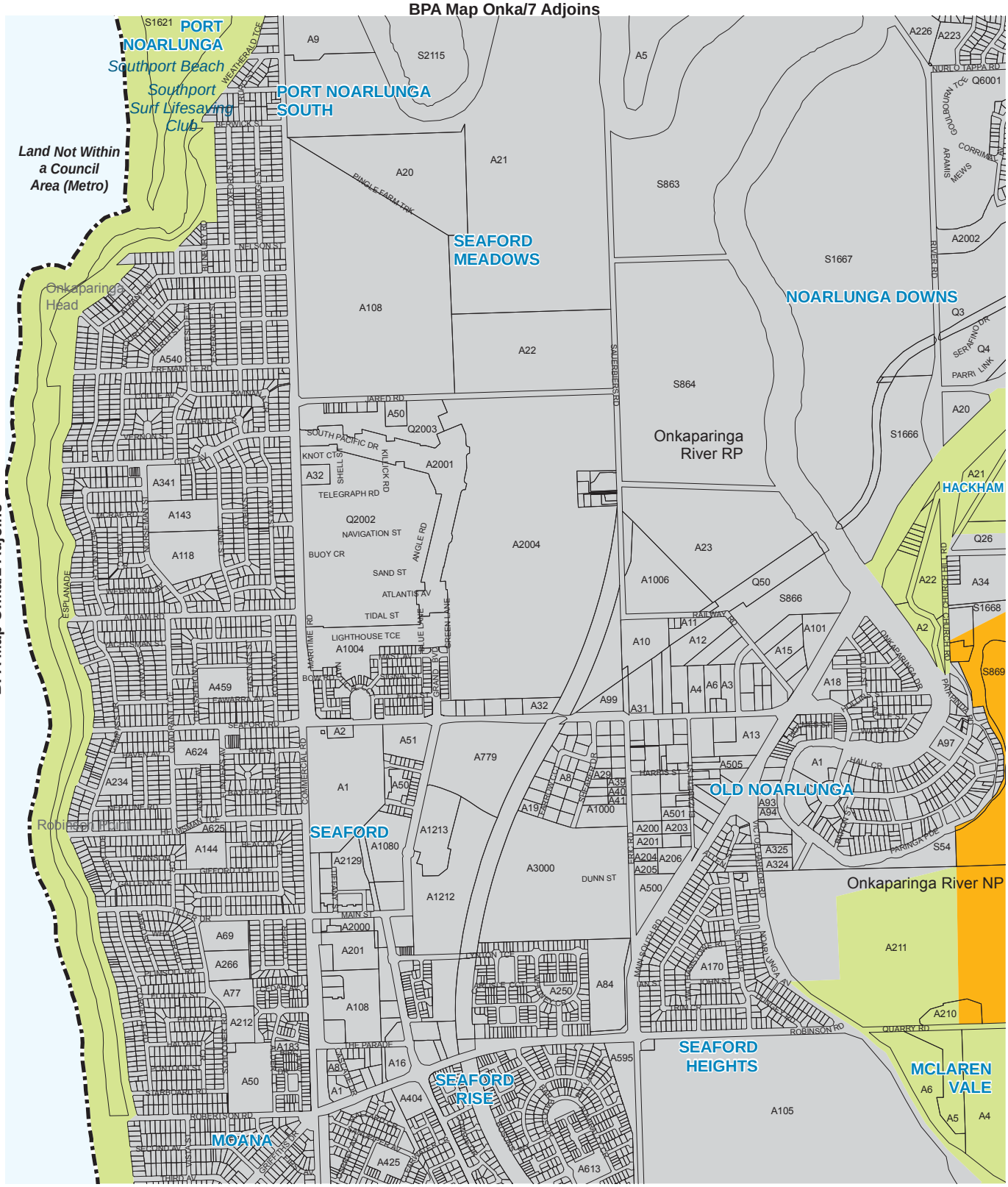
43 Seaford Heights Policy Area

Policy Area Map Onka/72

Policy Area Boundary

Bushfire Risk BPA Maps

BPA Map Onka/7 Adjoins



BPA Map Onka/11 Adjoins

N

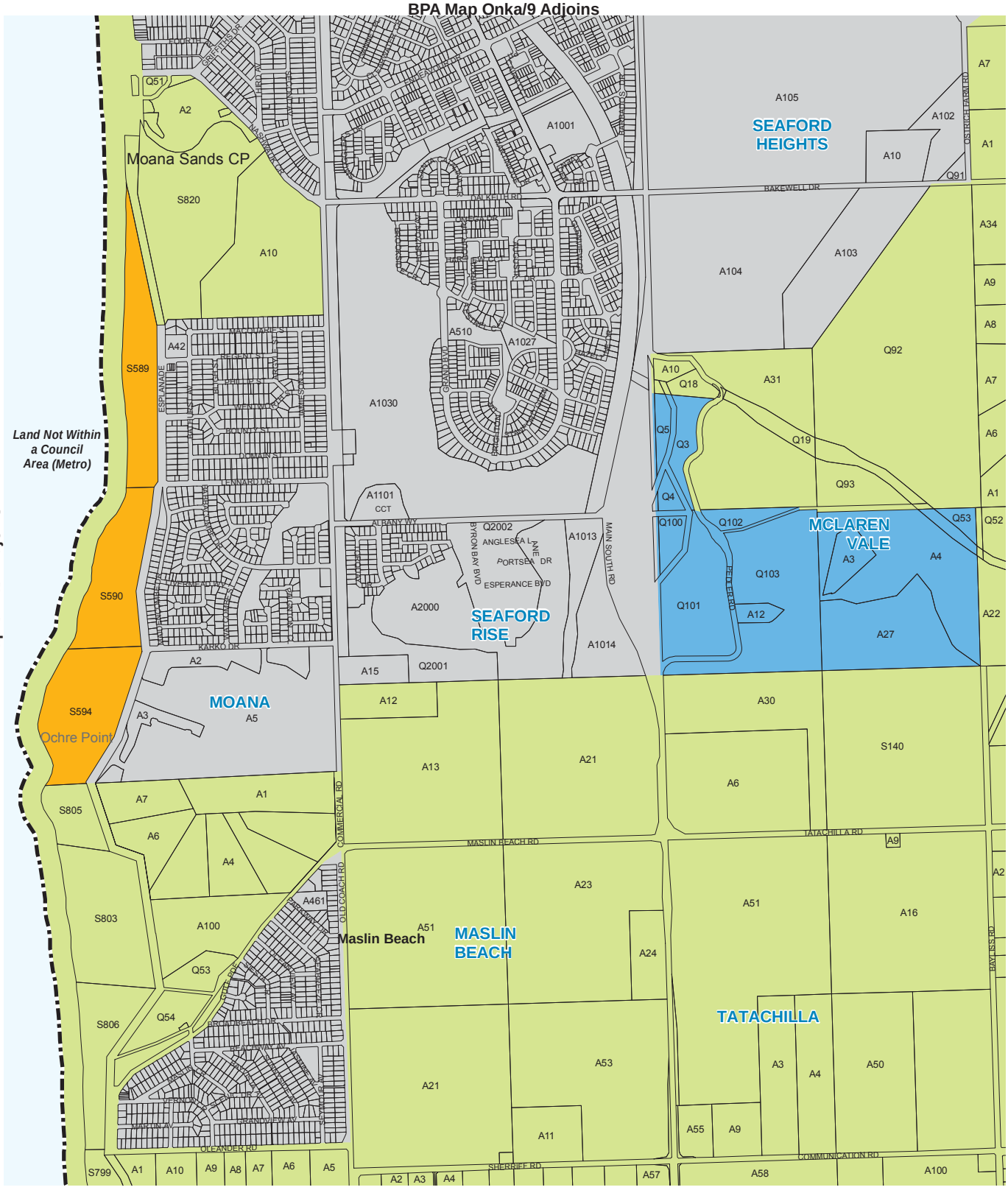
0 1,000 m

Bushfire Protection Area
BPA Map Onka/9
BUSHFIRE RISK

High Bushfire Risk
General Bushfire Risk
Excluded area from bushfire protection planning provisions
Development Plan Boundary

ONKAPARINGA COUNCIL
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BPA Map Onka/9 Adjoins



BPA Map Onka/1 Adjoins

BPA Map Onka/1 Adjoins

BPA Map Onka/1 Adjoins

N

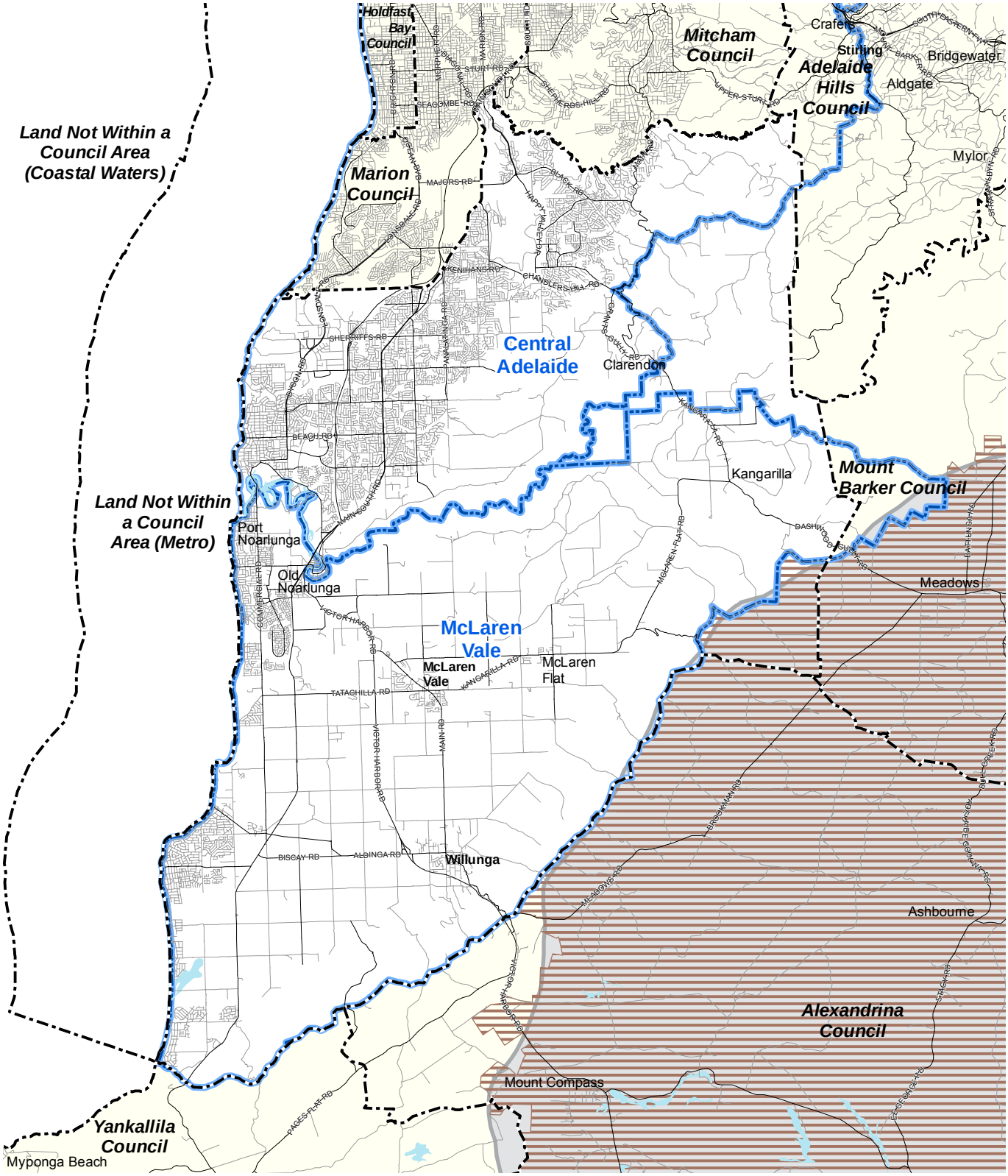
0 1,000 m

Bushfire Protection Area
BPA Map Onka/11
BUSHFIRE RISK

ONKAPARINGA COUNCIL
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- High Bushfire Risk
- Medium Bushfire Risk
- General Bushfire Risk
- Excluded area from bushfire protection planning provisions
- Development Plan Boundary

Concept Plan Maps



Note: Development in the identified areas may require referral in accordance with Schedule 8 of the Development Regulations 2008.

N

0 15 km

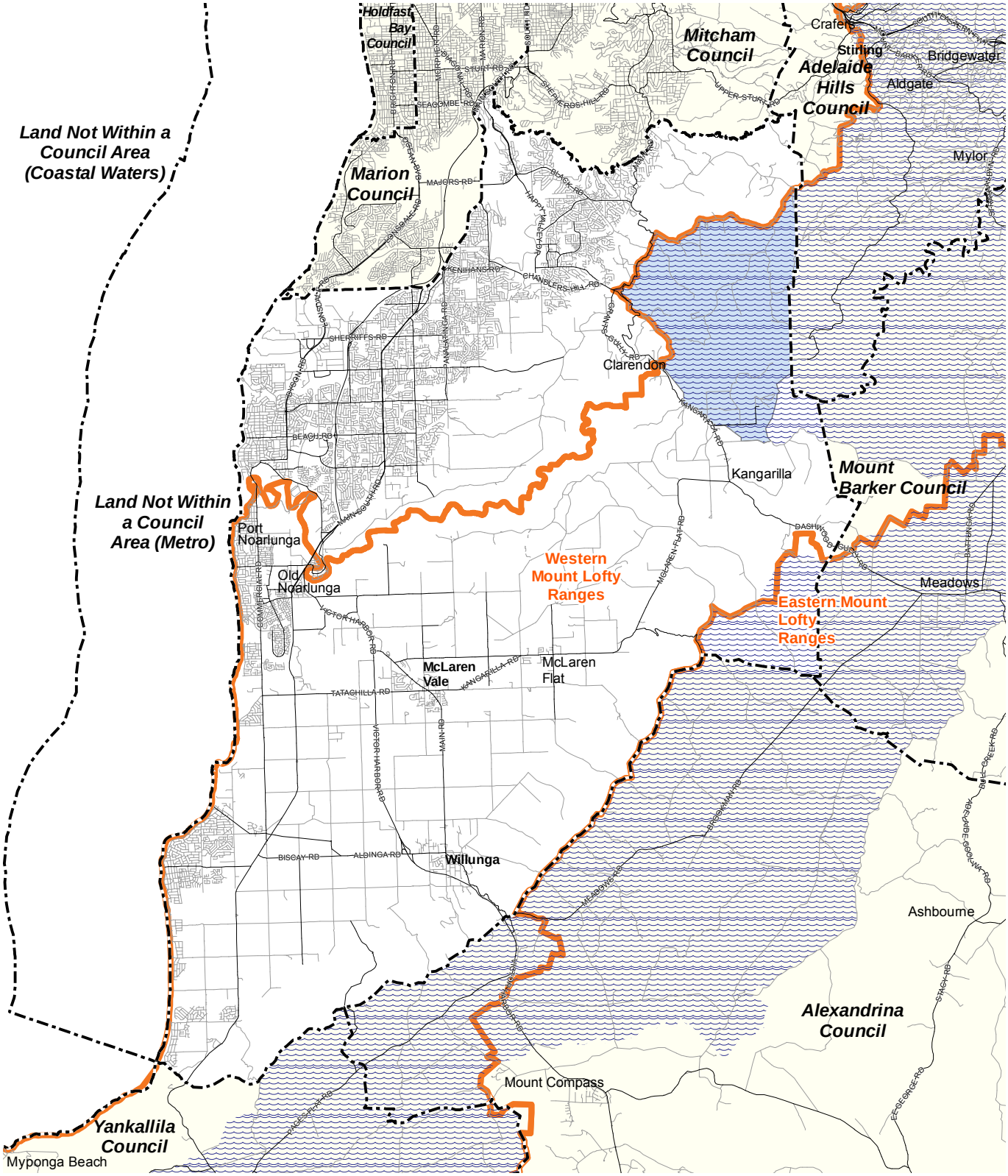
Concept Plan Map Onka/1

DEVELOPMENT CONSTRAINTS WATER MANAGEMENT AREAS

ONKAPARINGA COUNCIL

Consolidated - 20 December 2018

- Wetlands of National Importance
- Prescribed Wells Areas
- River Murray Protection Area - Tributaries Area
- Murray Darling Basin
- Development Plan Boundary



Note: Development in the identified areas may require referral in accordance with Schedule 8 of the Development Regulations 2008.

Watershed Area 1

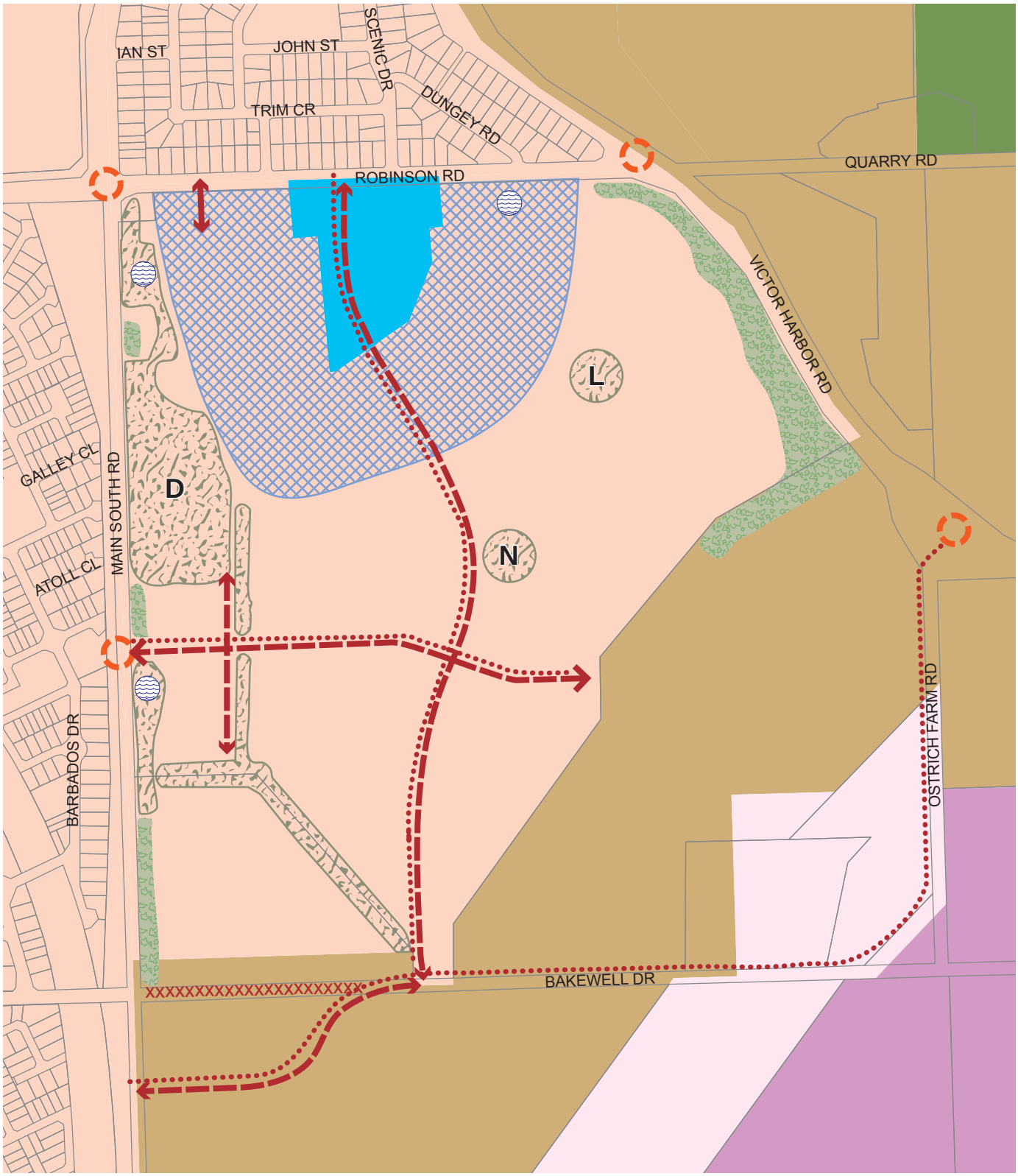
Mt Lofty Watershed Boundary

Prescribed Water Resource Areas

Development Plan Boundary

Concept Plan Map Onka/2

DEVELOPMENT CONSTRAINTS
MOUNT LOFTY RANGES
WATER MANAGEMENT AREAS



- Neighbourhood Centre
- Residential
- Medium Density Housing
- Hills Face
- Urban Employment
- Primary Production
- Deferred Urban
- Public Open Space
- Local Open Space
- Neighbourhood Open Space
- District Open Space
- Buffer To Main South Road and Victor Harbor Road
- Wetland/Detention Basin
- XXXXX Future Road Closer
- Upgrade Intersection
- Bicycle Routes
- Proposed Road
- Access

N

1:8,000

0 100 200 300 400 500 metres

Concept Plan Map Onka/19

SEAFORD HEIGHTS

Consolidated - 20 December 2018

ONKAPARINGA COUNCIL