Chapter 5  Physical environment

This chapter deals with the existing physical environment including:

- Topography, geology and soils.
- Hydrology and drainage.
- Groundwater.
- Coastal and marine ecology.
- Air quality and noise.
- Terrestrial flora and fauna.
- General climate.
- Winds.
- Visual environment.

5.1  Topography, geology and soils

5.1.1  Topography

The site’s topography is characterised as low lying and low relief coastal plain.

The site’s highest point is in its north-east portion, at approximately 10–12 m AHD.

The site falls away from the Gawler River towards the Thompson Outfall Channel, at approximately 2–3 m AHD.

The Gawler River is a perched river system. It is higher than its adjoining flood plain.

The site has no hills or distinguishing topographical features.

5.1.2  Geology and soils

Golder and Associates reference the Geologic Survey of South Australia—Adelaide 1:250,000 map sheet, which indicates the majority of the near-surface stratigraphy of the site comprises the Quaternary sediments of the Pooraka Formation, and the St Kilda and Glanville Formations towards the coast. The Pooraka Formation is described as mottled clay and silt inter-bedded with sand, gravel and thin sandstone layers. The St Kilda formation is characterised by estuarine muds, sands, peats and shelly beds and often contains lenses of highly permeable sand layers (Appendix 7).

The Late Quaternary sediments on the Northern Adelaide Plains overlie the older sediments of the Hindmarsh Clay, which is described as a layered sequence of mottled red-brown sandy clay and sand and gravel lenses. In a hydrogeological context together these units can be collectively described as clays containing lenses and discontinuous layers of silts, sands and gravels.

Interpretation of available lithological logs and drillers logs from the state Drillhole Enquiry System (DES) indicates the near surface sediments comprise discontinuous beds and lenses of clay, silt and sand. In a similar fashion to the site-specific data there is a high degree of variability in the logged sediments both laterally across the area, and vertically through the profile.

However, it was evident interpretation of the data is confounded by a lack of detail in the near surface interval in many of the logs. A geological cross-section, based on the logs from DES was prepared by Golder and Associates.
It illustrates the variability from west to east across the site, but also seems to indicate a relatively consistent clay layer sitting at a depth of around 20 m across the site.

Northcote in ‘Natural History of the Adelaide Region’ describes the dominant soils of site and its environs as permeable, alkaline, red brown soils/calcareous red pedal clays with a moderate to high bearing capacity and deficiencies in nitrogen, phosphorous and zinc.

Golder and Associates undertook a preliminary geotechnical investigation of the site, comprising the excavation of fourteen test pits and drilling of sixty-one bores. Test samples were taken from depths of 0.2 m and 2.8 m, and the soil types were recorded to a depth of up to 6 m below the surface. Soil chemical testing was undertaken of forty-five samples for sodic and saline characteristics.

Generally, the topsoil was clayey sand or sandy clay, with the plasticity of the fine fraction of the soil varying from low to high. Beneath the topsoil, the investigation encountered sand, clay, clayey sand or sandy clay.

Across the site there was variation in the composition, thickness of material layers, plasticity, depth, colour and proportion of calcareous materials disseminated in the soil, as calcrete gravels or both. Inferred calcrete was observed, but did not cause refusal.

No other rock-strength material was encountered; however, dense, possibly cemented, sand was found at 3.7 m at some test sites. Some boreholes were predominately sand, but these were scattered across the site and did not provide a geological pattern.

As the site drops below 10 m AHD towards the site’s south-west portion, saline groundwater tables begin to influence soil profiles and productivity potential. As the land further drops away to the low lying coastal flats and associated with saline water courses the soils become poorly drained and the watertable is shallow and saline. In these areas the presence of land salinisation is recognisable either as saline subsoils or as surface seepage and the presence of salt tolerant vegetation.

5.1.3 Acid sulphate soils

Golder Associates investigated the presence of acid sulphate soils (ASS) on the site (Appendix 8).

Acid Sulphate Soils (ASS) are generally located at or below 5 m AHD, within the St Kilda soil formation. Golder and Associates identified where these conditions occurred on the site and rated locations as high, medium or low risk.

In addition to the test pits and bores installed as part of the geotechnical investigation, Golder and Associates also drilled an additional twelve boreholes as part of a targeted ASS investigation.

No Actual ASS, or Actual ASS indicators were found on the site.

Potential ASS (PASS) material was found in three boreholes in the southern portion of the site, and in a channel, located off the site.

PASS was not encountered within other parts of the site identified as high risk.

5.2 Hydrology and drainage

The Gawler River and Thompson Creek provide the majority of the site’s natural drainage.

The site’s surface water hydrology is largely controlled by the Gawler River. During the winter wet season the Gawler River can have large flows and flooding, but is largely dry during the drier summer months with only stagnant pools.

The Gawler River is a perched river system. It is higher than its adjoining flood plain, therefore, stormwater runoff from the site does not drain into the River, or the Buckland Park Lake system, as they are effectively located upstream.
The site is within the Gawler River flood plain.

The site drains away from the Gawler River in a south westerly direction, to the Thompson Outfall Channel at its south-west corner, carried by a system of natural creek lines, culverts and open drains along road sides.

The Gawler River’s channel is 3 to 4 m below ground level, and flood flows can overflow the channel, spilling away from the channel towards lower lying areas in its floodplain. These flows generally do not re-enter the Gawler River channel.

Extending through north–south through the centre of the site, Thompson Creek is a shallow, intermittent watercourse that channels surface flows during the wet season and periods of flooding when the Gawler River overflows. It is likely this watercourse also acts as a shallow groundwater drain when the shallow watertable is elevated above the creek bed as a result of direct recharge during the wet season.

5.3 Groundwater and the aquifer

SKM investigated groundwater conditions under the site (Appendix 9). They found the site is underlain by a series of shallow aquifers that are hydraulically connected. These are composed of intercalated sands, silts and clays. Groundwater levels are typically shallow particularly where clay layers cause local perching. Salinity levels vary widely across the site but increase dramatically to hypersaline levels in the vicinity of the salt pans, in the site’s south-west corner.

SKM drilled a series of eleven new monitoring wells to obtain site specific information within the site. All wells were sampled for groundwater levels, salinity, hydraulic conductivity and hydro-geochemistry. Results from these surveys were used to improve the conceptualisation of groundwater processes within and around the site which was used in the establishment of a numerical model.

Clays under site act as an impediment to downward movement of water and may result in the development of perched watertables. Depth to groundwater is generally shallow and varies from around 8 m in the north-east of the site to less than 2 m in the south-west. Problems associated with waterlogging and salinity are most likely to occur in areas where the depth to groundwater is less than 2 m below ground level. Groundwater flow is predominantly from the north-east to the south-west.

SKM investigated the aquifer beneath site (Appendix 10). They concluded the T2 aquifer has the potential to accept up to 50 ML/a without pressurising the aquifer, which would potentially result it impacts on all existing bores connected to the T2 aquifer.

5.4 Coastal and marine ecology

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

The site does not directly form part of the coastal plain’s ecological systems.

The Cheetham salt pans and farming land separate the site from the natural coastal ecosystems. Buckland Park Lake and the Port Gawler Conservation Park are to the north and east of the site and are separated by the Gawler River.

Cooe surveyed the coastal plain (Appendix 11). They found the coastal and marine ecosystems support abundant flora and fauna. In general, the mangrove forest and samphire habitats found there are in good health, although there was signs of anthropogenic impact and signs of gradual loss. The Cheetham salt pans have impacted on the coastal plain’s land form and natural hydrology. They are blocking the retreat of mangrove forest and samphire habitats as sediment and detritus builds up.

All locations surveyed showed some degradation from feral animal grazing, weeds and general rubbish, however, much of the Conservation Park land appears to be in good condition.
Offshore, west of the site, are the Adelaide Dolphin Sanctuary, St Kilda-Chapman Creek Aquatic Reserve and the Barker Inlet-St Kilda Aquatic Reserve. These coastal habitats provide for many animals from nurseries to commercially significant fish and crustaceans, to shelters for migratory bird species.

Marine species of conservation significance or vulnerable identified include the Syngnathidae Family (Pipefish), the Clinidae Family (Weedfish and Snakebleeny) and the Apogonidae Family (Cardinal fishes) the Congolli, Common Galaxias or Jollytail, Mountain Galaxias, Flathead Gudgeon, Magpie Fiddler Ray and invertebrate species including the brown or black striated sea anemone and barnacles.

5.5 Air quality and noise

Air quality and noise assessments were undertaken by Connell Wagner (Appendices 12 and 13).

5.5.1 Air quality

Connell Wagner identified pesticide spraying of crops in the locality by aerial spraying or boom spraying from a tractor as existing sources of potential pollution. Aerial spraying is probably used infrequently in the area, given the small scale of horticultural activities and the use of glasshouses.

Jeffries demonstration farm and composting facility

Air quality investigations also considered the Jeffries composting facility, located 1.1 km from the site’s southern boundary, including odour, bio-aerosols and dust factors.

Analysis of odour from the Jeffries facility found that under worst-case conditions, the minimum average 99.9th percentile odour concentration complied with the EPA’s 2 Odour Unit Limit at locations 1.7 km from the facility.

The impact of dust generating activities and wind erosion from stockpiles at the Jeffries composting facility was assessed as part of the facility’s 2003 Public Environmental Report. The analysis of the daily averaged PM10 contours showed that the 50 µg/m³ NEPM guideline is complied within the facility’s boundary.

5.5.2 Noise

Connor Wagner undertook noise surveys at and around the site to determine the existing ambient background noise levels.

Summarised results from the noise monitoring are illustrated in Table 5.1. A more detailed account of the findings is provided in the report (Appendix 13).

Table 5.1 Summary of background noise survey results (in dB/A)

<table>
<thead>
<tr>
<th>Site</th>
<th>Monitoring period</th>
<th>Day (7 am–10 pm)</th>
<th>Night (10 pm–7 am)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Leq</td>
<td>Lmax</td>
</tr>
<tr>
<td>1</td>
<td>11–16 Dec. 2007</td>
<td>48</td>
<td>65</td>
</tr>
<tr>
<td>2</td>
<td>11–19 Dec. 2007</td>
<td>64</td>
<td>79</td>
</tr>
<tr>
<td>3</td>
<td>18–22 Jan. 2008</td>
<td>56</td>
<td>79</td>
</tr>
</tbody>
</table>

From the table it can be seen that ambient noise level at site 1 (at the corner of Legoe and Tippets Bridge Roads within the site) is low, and generally caused by sources such as wind (rustling of leaves), insects, birds chirping, distant traffic, surrounding agricultural and horticulture activities and, occasionally, light aircraft flying over the area.
Noise levels at site 2 (at the corner of Port Wakefield Road and Park Road) are mainly attributable to traffic along Port Wakefield Road. Noise levels at site 3 (at the Park Road boundary of the State Shooting Park) primarily result from traffic along Park Road, State Shooting Park activities and surrounding agricultural and horticulture activities.

In addition to monitoring at these three sites, attended noise monitoring was undertaken during outdoor clay target shooting activities at the SA Shooting Park (Saturday, 19 January 2008). The results of the attended noise measurements are summarised in Table 5.2.

Table 5.2  Results of gun firing noise survey at Shooting Park

<table>
<thead>
<tr>
<th>Location</th>
<th>Description</th>
<th>Lpeak (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Gun-firing noise from outdoor clay target shooting area</td>
<td>108–120</td>
</tr>
<tr>
<td>2</td>
<td>Intermittent local traffic (heavy vehicle) along Park Road</td>
<td>106–111</td>
</tr>
<tr>
<td></td>
<td>Gun-firing noise emitted from outdoor clay target shooting area with no adjacent vehicle movement</td>
<td>101–106</td>
</tr>
</tbody>
</table>

Table 5.2 shows that gun-firing noise emitted from State Shooting Park at the boundary of the site next to Park Road was around 101–106 dB (Lpeak), and is less than noise resulting from heavy vehicle travelling along Park Road.

5.6 Terrestrial flora and fauna

5.6.1 Flora

Most of the native vegetation in the region and much of the site has been cleared.

Dr Bob Anderson undertook a field survey of the flora on the site, its environs and the region (Appendix 14). There are areas of remnant native vegetation on the site, primarily in the northern and southern areas. Elsewhere, there are small to tiny remnant areas of the vegetation communities considered to have been present prior to European settlement, especially along sections of Thompson Creek. A few of the better quality locations are on public roadsides and are listed as RMS.

There are remnant, mature river red gum areas and individual trees along the Gawler River floodplain. These areas also contain some species with a listed conservation rating for the Southern Lofty botanical region.

There are scattered river red gums and a small area of black box woodland elsewhere in the northern portion of the site.

Two other areas of native vegetation are located in the south and centre of the site, namely:

- Chenopod low shrubland areas.
- Leafless cottonbush low shrubland and smaller areas of remnant native vegetation along parts of Thompson Creek.

Over 220 species of introduced plants have been recorded in the region. On the site, Proclaimed and environmental weed species such as bridal creeper, St John’s wort, silverleaf nightshade, African boxthorn, Bathurst burr, Noogoora burr, three-cornered jack and caltrop are present. Species such as Coolatai grass (one roadside infestation) and Calomba daisy (isolated infestations throughout much of the site) are present.

No areas of *Phytophthora cinnamomi* (die-back fungus, cinnamon fungus) or Mundulla Yellows were recorded. However, some trees appear to have aberrant growths and canopy die-back, possibly as a result of drought or agricultural impacts, including exposure to agricultural chemicals or salinity.
5.6.2 Fauna

Dr Bob Anderson undertook a field survey of the fauna on the site, its environs and the region (Appendix 15). Fauna is mostly restricted to areas of remnant vegetation. Roadsides, revegetation sites and constructed wetlands have fewer habitats and lower species numbers.

Remnant habitat is variable in extent and quality. Much of it is associated with the woodlands, chenopod shrublands and aquatic areas, especially along the Gawler River and Thompson Creek.

The river red gum remnants along the Gawler River and its floodplain provide an important local and regional habitat for birds, bats and reptiles, with hollows in mature species critical for breeding of many species.

The Cheetham salt pans and Thompson Creek provide habitat for common aquatic birds as well as significant species such as the buff-banded rail and crakes. Small terrestrial bird species, such as fairy-wrens, scrub-wrens and small parrots also make extensive use of this habitat.

Cleared areas used for agricultural production are generally of poor quality as habitat with nil or a weed-dominated understorey providing limited resources to a number of common local fauna, mostly bird species.
Apart from two mammal species, both of which will be confined to the woodland areas, all of the species of national and state conservation significance known to occur within the region and site are birds.

There are:

- One species listed as nationally threatened under the EPBC Act, the orange-bellied parrot, which has been recently recorded as occurring in the region 4 km north-west of the site.

- 25 species listed under the EPBC Act under the National Wildlife Conservation Plan for Migratory Shorebirds occur within the region and parts of the site. These bird species are also listed under various international treaties or conventions to which Australia is a co-signatory. This represents 70% of all of the species listed in the Plan.

- Some 10 to 15 other species listed under international conventions or treaties to which Australia is a co-signatory and which are listed as being migratory, have habitat within the region and/or site or are conservation-dependent species.

- 31 species are also listed under SA legislation. Many of these species are also listed under the EPBC Act.

- 15 bird species which occur in the site are listed as part of a draft Regional Recovery Plan. These include buff-banded rail, crested shrike-tit, pallid cuckoo, peregrine falcon, red-capped robin, red-rumped parrot, sacred kingfisher, slender-billed (sapphire) thornbill, tawny frogmouth, tree martin, whistling kite, white-browed babbler, white-fronted chat, yellow-rumped thornbill and yellow-tailed black cockatoo. Eleven of these species are breeding residents or breeding visitors in the site or the adjacent section of the Gawler River corridor. 

![Figure 5.2 Fauna survey](image-url)
Buckland Park Lake, 2 km to the site’s north-west, is a particularly well established and important regional freshwater wetland. Bird life is prolific and the habitat is known to be a breeding area for many species. Birds such as Australasian bittern that are rare in south-eastern Australia have found refuge at this wetland during the current drought and may breed in this area. Other wetland sites, such as the Barker Inlet and Greenfields wetlands, 20 km south of the site, and the Cheetham salt pans have salt or brackish water and attract and maintain populations of migratory waders and other shorebird species. There is little doubt that the wider region has a wetland community of State and national importance.

However, these habitats are on the site only as small, ephemeral wetlands associated with Thompson Creek and are not significant as habitat. Migratory birds covered by international treaties (JAMBA and CAMBA) and birds of national significance do not appear to use these areas either at all or are occasional visitors in small numbers.

Along the Gawler River riparian corridor, white-bellied sea-eagle, a number other raptors, duck species and nankeen night-heron were recorded. These species and groups are classified as nationally threatened. A range of common aquatic species were also observed at this location, such as heron species.

5.7 General climate

The Adelaide coastal plain is characterised by a mediterranean climate, with hot, dry summers and relatively cool, wet winters.

As part of the air quality assessment, Connell Wagner selected 2001 as the most appropriate reference year for climate simulation purposes. This was based on comparison of 2001 conditions with long-term average conditions using publicly available data from the closest Bureau of Meteorology automatic weather station, located at RAAF Edinburgh. The long-term average meteorological data from this site is presented in Table 5.3 as representative of climatic conditions at the site (Appendix 12).

Rainfall

Local climate data provided by Golder and Associates give an average annual rainfall of 442 mm. This occurs mostly in the winter months, with average monthly rainfall between June and August of around 53 mm. The summer period (December to February) has a mean monthly rainfall of around 22 mm (Appendix 7).

There have been a number of wetter and drier cycles over the last 100 years, with the most recent wet periods occurring in 2000, the mid-1970s and the mid-1950s. These wet periods correspond to years of above average rainfall.

Table 5.3 Long-term meteorological data for RAAF Edinburgh

<table>
<thead>
<tr>
<th>Data</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean daily max temp (°C)</td>
<td>29.8</td>
<td>29.9</td>
<td>26.9</td>
<td>22.9</td>
<td>19.2</td>
<td>15.8</td>
<td>15.3</td>
<td>16.5</td>
<td>18.8</td>
<td>21.9</td>
<td>25.5</td>
<td>27.8</td>
</tr>
<tr>
<td>Mean daily min temp (°C)</td>
<td>16.4</td>
<td>16.5</td>
<td>14.4</td>
<td>11.6</td>
<td>9.1</td>
<td>6.8</td>
<td>6.0</td>
<td>6.5</td>
<td>8.1</td>
<td>10.0</td>
<td>12.7</td>
<td>14.8</td>
</tr>
<tr>
<td>Mean 9 am wind speed (km/h)</td>
<td>14.2</td>
<td>11.7</td>
<td>11.9</td>
<td>12.8</td>
<td>12.1</td>
<td>11.9</td>
<td>13.1</td>
<td>15.5</td>
<td>17.7</td>
<td>18.5</td>
<td>16.3</td>
<td>16.0</td>
</tr>
<tr>
<td>Mean 3 pm wind speed (km/h)</td>
<td>23.1</td>
<td>21.0</td>
<td>20.6</td>
<td>19.1</td>
<td>17.6</td>
<td>17.7</td>
<td>18.9</td>
<td>21.3</td>
<td>22.5</td>
<td>22.6</td>
<td>22.6</td>
<td>24.0</td>
</tr>
<tr>
<td>Mean monthly rainfall (mm)</td>
<td>21.3</td>
<td>16.1</td>
<td>23.9</td>
<td>30.8</td>
<td>43.3</td>
<td>53.6</td>
<td>52.6</td>
<td>49.7</td>
<td>48.1</td>
<td>41.5</td>
<td>25.4</td>
<td>21.8</td>
</tr>
</tbody>
</table>
5.8 Winds

As the terrain is fairly simple and flat the meteorological conditions were not seen to vary significantly through the area used for modelling. The annual wind rose generated by Connell Wagner shows that the region is dominated by winds blowing from the north-east and the south-west quadrants (Appendix 12). Winds from the other cardinal directions are fairly negligible, with the exception of westerlies.

Analysis shows that more than 80% of winds occurring in the region have magnitudes less than 5 m/s.

5.9 Climate change

Parsons Brinkerhoff considered a report by the Commonwealth Scientific and Industrial Research Organisation, which looked at climate change projections throughout Australia, based on the latest (fourth) assessment report by the Intergovernmental Panel on Climate Change in 2007 (Appendix 16).

Climate change is expected to affect Adelaide’s average annual temperatures, the frequency of hot days, over 35°, annual average rainfall, the intensity of rainfall events, the number of dry days, wind speed, and weather conditions conducive to fire.

Climate changes over the next decade or two will largely be determined by past greenhouse gas emissions. Accordingly, projections out to around 2030 are little affected by the emission scenario that eventuates. However, beyond 2030 the degree of climate change will increasingly be determined by the emission scenario.

It is important to note the difference between climate change and climatic variability. The climate in most of Australia has always been highly variable. The weather in any day, month or year will continue to be mainly determined by natural climatic variability, which cannot be easily predicted.

The Playford (City) Development Plan considers the impacts of climate change on sea levels. It is anticipated sea levels will rise by 0.3 m by 2050, and a further 0.7 m by 2100.

5.10 Visual amenity and landscape character

Swanbury Penglase have prepared a visual assessment (Appendix 17).

The character of the Horticulture (West) zone is distinguished by open rural areas, market gardens, vineyards, orchards and structured, open paddocks. These areas are supported by greenhouses, packaging sheds and residential rural living.

The site, and the area around it, is relatively flat with limited topographic features. The uniformity of the landscape diminishes the scenic amenity of the landscape.

Due to the low lying and flat landscape character, expansive views are experienced to the south of the site towards Port Adelaide and Outer Harbour. The scale of the shipping cranes provides a backdrop to a distant industrial character.

To the south, Cheetham salt pans and Buckland Park Lake form an associated visual element to the salt pans.

The coastal plain’s visual character is defined by the low lying saltbush and samphire and dense mangroves closer to the coastal edge.

To the site’s south, the State Shooting Park has periphery fencing and a vegetation buffer limiting views into the site.

A disused silo located on the Jeffries demonstration farm is a dominant visual element. The silo is elevated above what is a denuded flat landscape with limited topographic or vegetative features. The silo is located approximately 350 m to the south of the site boundary.
Virginia is characterised by a mixture of rural residential living, greenhouses and horticultural practices to the periphery and a small commercial, retail precinct along Old Port Wakefield Road. There is no visual connection between Virginia and the site.

Port Wakefield Road's infrastructural form delineates the rural living context of Virginia to the east and more intensive horticultural practices.

Port Gawler, approximately 2 km to the site’s north is characterised by a small array of rural dwellings and associated farming equipment.

Infrastructural forms are scattered throughout the landscape, with major vertical and horizontal scaled elements such as transmission lines being collocated to road corridors, specifically Port Wakefield Road. The various scales of transmission lines (66 kV and 11 kV lines) aligned to various orientations, provides complexity to the skyline whilst traversing along road corridors.

Some isolated visual elements are present in the form of a telecommunication tower and the disused silo located within Jeffries demonstration farm.

The Port Wakefield Road provides fragmented views with existing verge plantings filtering the depth of visual field. Located along Port Wakefield Road are numerous tertiary roads which typically have greenhouses or isolated rural dwellings at the intersections.

The most dominant visual element within this landscape region is the Gawler River open space. The vertical scale of the remnant Eucalypts which align the riverbed provide a backdrop for views from the south and north. The meandering form of this vegetation corridor dissects the landscape providing a natural gateway to those travelling through the landscape and across the river on Port Wakefield Road. The river is ephemeral with limited flow in the summer months.

The Gawler River corridor is designated as Metropolitan Open Space (MOSS) recreation, providing a buffer of vegetation and open space, creating a defined character zone.

To the west of the site, there are some glimpsed views of the coast in and around Windamere Estate. The man-made levy banks to the salt pans limit the views across the horizontal landscape.

The site’s dominant landscape character is defined by horticulture. Its visual character is bounded by the Gawler River corridor to the north. The river corridor provides a dense vegetation buffer, preventing more expansive views to the north or from the north of the site.

The site is denude of visually significant vegetation and has been intensively eroded by horticultural and grazing practices. The landform is flat with the exception of Thompson Creek which represents a dryland swale showing signs of erosion and infill from neighbouring farming practices.

Windamere has a rural residential dwelling and olive grove. Similarly a property on Buckland Road which bounds the south-eastern side of the side has associated olive groves.

The uniformity and intensity of the horticulture degrades the visual landscape. Expansive views to the south limit a sense of scale and visual interest. The lack of topographic variance also attributes to the lack of visual attraction.

Existing road corridors, particularly Port Wakefield Road, and the NEXY, introduce infrastructural elements and visual corridors which are transient by nature. As a result the landscape is predominantly viewed through the eyes of a moving occupant.
5.11 Hazards and risks

The following hazards and risks have been identified:

- Flooding from the Gawler River will impact on the proposal, or the proposal will impact on flooding.
- Climate change induced sea level rise will exacerbate flooding.
- Acid Sulphate Soils will be uncovered during construction, releasing acid leachate into the marine environment.
- Groundwater conditions will be altered, or salinity in the groundwater will impact on the proposal.
- Stormwater discharged from the site via the Thompson Outfall Channel will impact on the marine environment.
- Significant flora and fauna on the site or the coastal plain will be impacted.

These potential hazards and risks are discussed in more detail elsewhere within the EIS.