CHAPTER 3  MEASUREMENT OF LANDSCAPE QUALITY

3.1 COGNITIVE AND AFFECTIVE PARADIGMS

The challenge in measuring landscape quality is to appreciate its subjective nature and to ensure that this is what is measured. Many early attempts measured everything in the landscape that was measurable – the height and steepness of landforms, the extent and nature of vegetative cover, water bodies, the land uses, colours and a host of other attributes anticipating that through doing so, a measure of landscape quality would emerge. It never did.

The reason is that as a subjective quality, landscape quality can only be assessed via our affective capacity, our likes and dislikes, our aesthetic preferences, not via our cognitive abilities which analyse and logically comprehend the environment. The error was in confusing paradigms, using the cognitive analytical approach to measure a subjective quality. The paranoia of analysts not to be subjective missed the point, it is possible to objectively measure subjective qualities.

Dictionaries reinforce the distinction between the cognitive and the affective in their definition of aesthetics as "things perceptible by the senses (i.e. affective) as opposed to things thinkable or immaterial (i.e. cognitive) (Shorter Oxford, 1973).

Using an analogy from music, an individual’s liking for music does not derive from an analysis of the use of instruments, the number and range of notes, the scoring for the orchestra, or a detailed analysis of the score. Rather it is immediate and without analysis. The same can be said of our preferences for coffee, chocolate, holiday destinations, even love…

3.2 PSYCHOPHYSICS

The basis of measuring landscape quality lies in the science of psychophysics which was developed by Gustav Fechner (1801 – 1887), an early German psychologist. Psychophysics measures the effect on the brain of stimuli from the senses – sight, sound, taste, touch and smell. A vast literature has developed in psychophysics.

In the 1980s and 1990s, psychologists mainly in the US, turned their attention to applying its methods to understanding how humans comprehend landscape quality. Researchers including Terry Daniel, Stephen and Rachel Kaplan, T.R. Herzog, Bruce Hull, Herbert Schroeder, Greg Buhyoff, Paul Gobster, Philip Dearden, Roger Urlich, and, in Australia, Allan Purcell, Richard Lamb and Ian Bishop carried out numerous studies which established a methodological framework and greatly enhanced understanding of human-landscape interaction.

3.3 USE OF PHOTOGRAPHS

An issue which was investigated by many researchers was whether photographs could serve as an adequate surrogate for in-field assessments of landscape quality. Research by Daniel and Boster, 1976; Dunn, 1976; Shuttleworth, 1980; Trent, Neumann & Kvashny, 1987 and Stamps, 1990 established that the results of photographs could be comparable with field assessments. Applying meta-analysis to existing studies, Stamps (1990) found a high correlation of 0.86 in the ratings of photographs and on-site assessments.

Photographs provide significant advantage in not having to transport large groups of participants through the countryside. They also enabled areas remote from each other to be assessed on a comparative basis which would not be possible through field assessment, and for the effects of temporal landscape changes such as seasonal colour to be assessed. Finally, photographs enable the visual effects of
changes in the landscape such as new developments or changes in land use to be assessed using scenes with and without the change.

The researchers identified a range of criteria that photographs should meet, and I have extended these in my studies. The aim is that the photographs be standardised as far as possible so that the differences are in the landscape quality, not the quality of the photograph.

The photographs should meet the following criteria:

- Use 50 mm focal length (equivalent to 35 mm in digital camera) in horizontal (landscape) format; use colour photographs - black & white may be more dramatic but loses the dimension of colour;

- Not include people or animals as their inclusion enhances ratings;

- Avoid photographic composition of a scene to frame a view or to lead the viewer into a scene; such composition enhances its appearance;

- Aim for good lateral and foreground context to scenes and of typical representative scenes, not unusual (i.e. rare) scenes. However significant features such as cliffs, waterfalls and water bodies may be included;

- Avoid transitory effects of special atmospheric lighting such as sunsets or particularly vivid side lighting. Aim for sunny cloud-free conditions to standardise scenes against a blue sky. However this ideal may be sometimes difficult to achieve in some localities;

- Extend scene to horizon and provide lateral and foreground context of single landscape unit, avoid close-up confined views;

- Scenes from mountain tops of valleys and vistas below should include some foreground to provide context as the scene can otherwise appear as though it was taken from an aircraft;

### 3.4 COMMUNITY PREFERENCES

**METHOD**

The method that the researchers established has the following components:

- **Rating scale** Use of a rating scale such as 1 (low) – 10 (high) by which the landscape quality can be judged. The scale is a surrogate for landscape quality and forces the participant to condense their assessment of the scene into a number. Experience of thousands of participants in surveys indicates that this is not difficult and the results reflect closely their perception of landscape quality. Ratings on a 1 – 10 scale provide an absolute measure of landscape quality at the interval scale which can be analysed statistically. Rankings (i.e. scene 1 is better than scene 2) only compare one scene with another and are an ordinal measure which cannot be analysed statistically.

- **Survey instrument** Use of a survey instrument – a form provided to participants, or an on-line survey that they are invited to enter.

- **Participants** Access to a large number of participants in the survey to achieve statistical validity. Based on a 5% (0.05) margin of error and a confidence interval of 95%, a sample of around 380 is required.

The technology that is now available facilitates landscape surveys and was not available to the early researchers:

- Digital cameras that allow large numbers of photographs to be taken of the study area; typically 2 – 3,000 in a survey, thus providing a large data base from which a sample may be drawn for the survey;
• Digital manipulation of photographs through use of Photoshop® and similar programs which enable features to be removed from scenes, or proposed developments inserted for assessment;

• Placement of the survey on a website such as Survey Monkey® either on a restricted or open basis; invitations to participate are sent by email with the link to the survey included, thus making it very convenient. The surveys can be entered at the participant’s own work place or home and at their timing, thus not requiring attendance at say a university or community centre to be shown the scenes. The on-line survey enables the participant to complete it at their own pace. The survey instrument automatically re-randomises the scenes for each survey respondent.

• Statistical packages including Excel® and SPSS® readily enable analysis of the results.

Figure 3.1 illustrates the framework for measuring landscape quality through the survey instrument, the dependent variable (i.e. the rating of landscape quality) and the independent variables (significance of land forms, land cover, water etc.), and analysing and applying the results. The method is called the Community Preferences Method as it relies on members of the community expressing their landscape preferences rather than having these determined by some ‘expert’.

The Community Preferences Method involves the following steps (Figure 3.2):

1. Photograph the region. This may include seasonal change in the landscape to quantify how much landscape quality changes across the seasons.

2. Classify the region’s landscape into landscape units of similar character.

3. Select a set of 100 – 150 photographs to sample the landscape units. A survey of 150 scenes can be processed by most participants very quickly, say 15 - 20 minutes. The brain is able to rapidly discriminate the appropriate rating for a scene (Herzog, 1984, 1985) and rapid evaluation minimizes the likelihood of analysis and revision. The aim is to draw on the person’s affective judgement, not on their cognitive processes which involve analysing each scene. Around 20% of the survey comprises benchmark scenes from outside the study area to provide a wider range of likely ratings; the range within the study area may extend only over 2 – 3 units of the 1 – 10 scale.

4. Prepare an Internet survey containing the scenes and instructions. The survey includes randomisation of the scenes and automatically entering the ratings into the data base. The survey includes basic demographic data (age, gender, education, birthplace) and also gauges their familiarity with the region and whether they reside in it. The survey commences with an explanation of the survey, provides instructions, urges participants to use the entire rating scale and to judge each scene on its merits – to trust their initial instinct and not analyse their response. The survey also provides a contact point for questions, and an opportunity to provide
comments. Finally it offers the respondent the opportunity to comment on the survey and to register to receive a summary of the results. Four sample scenes are shown at the beginning of the survey to cover the range of landscape quality and to cue participants to the highs and lows they will encounter in the survey.

In Australia in 2012-13, 83% of households had Internet access with 77% via broadband\(^1\). Access among high income households was up to 98%. Lack of Internet access will therefore not significantly affect the viability of the survey.

5. Send invitations by email to potential participants to log into the Internet survey and rate the scenes on a 1 (low) to 10 (high) scale; the survey may be visited by several thousand over one month.

6. Invite up to 30 participants\(^2\) score the scenes for the significance of various characteristics (e.g. trees, landforms, water, diversity, naturalness); this scoring is carried out via additional Internet surveys. The landscape scores when combined with the scene ratings enable their contribution to landscape quality to be quantified.

7. Prepare the data set comprising the survey ratings and the landscape component scores. Conduct various statistical tests on the data to ensure their quality and check for strategic bias (e.g. entire ratings of 1 or 10 where the participant uses the survey for their own objectives such as diminishing or enhancing the rating of the area).

8. Analyse the influence of participant characteristics (e.g. age, gender, education) on ratings, compare the characteristics of the participants with those of the wider Australian community, and assess the influence of the participant’s familiarity of the region and residence on their ratings. Inevitably the participants in these surveys tend to be far better educated than the wider community, however most surveys find it very difficult to gain the participation of members of the community who lack interest.

9. Analysis of the ratings commences with the general and moves progressively to the specific. Mean ratings are derived for the landscape units and the range of landscape characteristics, and ratings are analysed against the landscape scores (e.g. ratings vs scores for land form).

10. Derive predictive models using multiple linear regression to combine the ratings (dependent variable) with the scores of landscape characteristics (independent variables) thereby identifying the contribution of the landscape factors to landscape quality. The models may be tested against the ratings of each scene.

11. Examine comments of the participants on the survey or its subject, classify the comments, and provide examples where relevant.

12. Use the detailed knowledge gained from the analysis and the models to map landscape quality for the region.

The steps of the method are outlined in Figure 3.2.

---

2. The Manchester Study (1976) stated that 30 respondents is the minimum number to prove normality.
Figure 3.2  The Community Preferences Landscape Assessment Method
CHAPTER 4  LANDSCAPES OF THE MOUNT LOFTY RANGES

4.1 PHYSICAL CHARACTER

South Australia is predominantly a flat state with arid ranges in the Far North – the Flinders Ranges and the Musgrave Ranges. In the southern agricultural region, the Mount Lofty Ranges are the main topographic feature rising to 727 metres.

Geologically the Mount Lofty Ranges exhibit the graben-horst structure of block faulting on the western side with the ranges rising in a series of steps, while on the eastern side are thick metamorphosed sedimentary rocks with granitic intrusions such as at Victor Harbor. Glaciation occurred in the southern Ranges which carved out the U-shaped glacial Inman Valley.

The topography ranges from the deep narrow gorges cut through the steep western escarpment, low ranges of hills separated by wide valleys such as the Onkaparinga in the central Ranges, and undulating land to the north and east. The wide Inman Valley extends most of the way between the east to west coast and to the south is a low plateau extending to the coast and dissected by short streams. The Barossa Ranges comprises a striking escarpment overlooking the Barossa Valley while to the east, the low Palmer escarpment extends northward into the Mid North.

The vegetation of the Mount Lofty Ranges reflects its isolation from similar vegetation in the eastern States and reflects island ecology, an area widely separated from similar areas interstate. Two broad vegetation associations are present, the dry sclerophyll forests and the savannah woodland formation. The sclerophyll forests, comprising various Eucalyptus species (E. obliqua, E. baxteri, E. fasciculosa, E. goniocalyx and E. cosmophylla) occur in the wetter parts of the Ranges and southern areas. The savannah woodland, comprising widely spaced tall Eucalypts (E. leucoxylon, E. viminalis, E. camaldulensis and E. odorata) occurs in the somewhat drier eastern areas.

Note: Tracts of native vegetation occur within the areas of scattered trees along with dense vegetation along creeklines, shelterbelts and roadsides. Mapped from Google Earth®.

Figure 4.1 Areas of scattered trees

Figure 4.1 shows the approximate area of scattered trees in the study area. This includes areas of dense native vegetation as well as areas of pine plantations. The map was initially prepared to define the eastern extent of the scattered trees, east of which is essentially barren land.

4.2 LANDSCAPE CHARACTER

Although small in area compared with the rest of South Australia, the landscape of this area is highly regarded by the community. The region’s landscape character comprises the high ranges, the lower ranges and escarpments, and the undulating country and wide flat valleys.

The main range comprises the high core from Mt Bold through Mt Lofty north to the
Torrens Gorge. The lower ranges and escarpments include the Barossa Ranges, the Willunga escarpment, the southern tip of Fleurieu Peninsula, and the eastern Palmer escarpment. The Inman, Onkaparinga and Torrens Valleys together with the Willunga plain occupy the third landscape unit.

4.3 FINDINGS OF PREVIOUS STUDIES

The author has conducted six studies which included part or all of the Mount Lofty Ranges. These were:

- Tree Amenity Study, 2004. Developed a model for the assessment of the amenity value of isolated and scattered trees including trees from the central and northern Ranges.
- Coastal Viewscapes Project, 2005. The project assessed and mapped the landscape quality of the entire South Australian coast including Fleurieu Peninsula and the Metropolitan coast.
- Generic Landscapes Study, 2013. Study derived generic ratings for a range of land forms, land cover, land use and water.

The South Australian landscape study was at a broad scale and rated much of the Mount Lofty Ranges as 5, with the horticultural area of Lenswood – Piccadilly rated 6 together with the hills faces of Gawler, Morphett Vale, Willunga, Barossa Ranges and the Palmer scarp (Figure 4.2). The hills face overlooking central Adelaide was rated 7. Extensive pine plantations were rated 4.

The Tree Amenity Study classified trees by nine characteristics (e.g. height, canopy form, species) and two context factors (terrain, land use) which were used to quantify the contribution of each to the ratings of scenes. It found that preferences increased markedly with the greater number and density of trees, healthier trees, and the height of trees. This has particular application to the areas of scattered trees in the eastern half of the Ranges.

The Coastal Viewscapes Project rated the cliff and headland sections of the Fleurieu Peninsula as 7 and the remaining sections including the Metropolitan coast as 6 (Figure 4.3).
The Barossa Study found that much of the Barossa Ranges rated 6 while the Eden Valley rated 5 (Figure 4.4).

The River Murray study rated the lakes and their shores as five but the areas of saltmarsh rated, lower, 4 or even 3 (Figure 4.5).

The Generic Landscapes Study found the following:

- Scattered trees 5.71, dense trees 6.86;
- Straw coloured crops and pastures 3.05, green coloured rated 3.70.
- Scenes with scattered trees, straw coloured ground rated 5.80 while green coloured rated 5.36.
- Dense trees rated 6.86 overall, comprising mallee 6.28, sclerophyll woodland 6.67, and sclerophyll forest 7.51.
- Where the forest or woodland had open ground it rated 6.54 while closed ground rated 7.51.
- Vines with backing ranges rated 4.37 and without the ranges 3.36.
- Hills rated a mean of 5.15; low 4.44, medium 4.54, and high 6.07.
- Scattered or dense trees on the hills increased these ratings.
• Low and medium hills, scattered trees increased ratings by 47% while dense trees in high hills increased ratings by 18%.

• Presence of backing hills raised ratings by 0.95 or 28.5%. Distance, elevation, and angle of view to the backing hills had negligible effect on the ratings.

• Water bodies increased ratings by 0.44 or 8.4%, slightly more on plains than in hills. Little water was needed to increase ratings; for every 1% increase in the water area, ratings increased by 0.13, so a 10% water area increases ratings by 1.3.

4.4 DETAILED LANDSCAPE UNITS

In order to describe the landscapes of the Mount Lofty Ranges in more detail, twenty-one landscape units were defined of areas having similar features and characteristics. The coast which was covered in the Coastal Viewscapes study was omitted as a distinct unit.

The units are described by reference to the land forms, land cover, land use, presence of water and any other distinctive features which characterise the unit. The names given to the units are purely arbitrary. Figure 4.6 shows the distribution of the units through the Ranges.

<table>
<thead>
<tr>
<th>No.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Southern plateau</td>
</tr>
<tr>
<td>2</td>
<td>Inman and Hindmarsh Valleys</td>
</tr>
<tr>
<td>3</td>
<td>Mount Compass</td>
</tr>
<tr>
<td>4</td>
<td>Willunga scarp</td>
</tr>
<tr>
<td>5</td>
<td>Echunga-Myponga valley</td>
</tr>
<tr>
<td>6</td>
<td>McLaren Vale – Willunga Plains</td>
</tr>
<tr>
<td>7</td>
<td>Onkaparinga Gorge–Mount Bold Resvr</td>
</tr>
<tr>
<td>8</td>
<td>Macclesfield – Ashbourne</td>
</tr>
<tr>
<td>9</td>
<td>Eastern slopes</td>
</tr>
<tr>
<td>10</td>
<td>Bremer Valley</td>
</tr>
<tr>
<td>11</td>
<td>Mt Barker – Hahndorf</td>
</tr>
<tr>
<td>12</td>
<td>Longwood – Scott Creek</td>
</tr>
<tr>
<td>13</td>
<td>Onkaparinga Valley</td>
</tr>
<tr>
<td>14</td>
<td>Piccadilly – Lenswood – Lobethal</td>
</tr>
<tr>
<td>15</td>
<td>Gawler – Little Para</td>
</tr>
<tr>
<td>16</td>
<td>One Tree Hill - Sandy Creek</td>
</tr>
<tr>
<td>17</td>
<td>Kersbrook – Mt Crawford – Williamstown</td>
</tr>
<tr>
<td>18</td>
<td>Barossa Ranges</td>
</tr>
<tr>
<td>19</td>
<td>Eden Valley</td>
</tr>
<tr>
<td>20</td>
<td>Palmer Scarp – eastern ranges</td>
</tr>
<tr>
<td>21</td>
<td>Adelaide Hills Face Zone</td>
</tr>
</tbody>
</table>

Note: Boundaries are approximate

Figure 4.6 Landscape units in the Mount Lofty Ranges

1. Southern plateau unit

The Southern Plateau unit lies south of the main Range Road between Victor Harbor and Cape Jervis and comprises land which was cleared and developed following WW2 after the rectification of trace element deficiencies in the soil. Although the large tracts of native vegetation were cleared, a distinctive feature is that streamside vegetation was retained to protect the creeklines. Another distinctive feature is the presence of tall dense windbreaks of cypress trees.

The area is flat along the Range Road which is the highest level but it drops into a series of valleys and spurs to the south.

The unit is largely used for cattle and sheep raising. There are several significant conservation parks including Deep Creek and Newland Head and stands of pine in forest reserves. The land
slopes gently toward the southern coast with numerous streams, the area being among the wettest in the Ranges. The native vegetation is generally low and dense, but stands of taller trees also occur, particularly on river flats. Being exposed to the Southern Ocean, the area is often windswept and many trees display flagging, bent over by the constant wind. Large cypress windbreaks are a feature of the landscape. There are no significant settlements within the area apart from farmhouses. Apart from the conservation parks where there is abundant native vegetation, the general appearance is of a modified, non-natural landscape with moderate diversity.
2. **Inman and Hindmarsh Valleys unit**

The Inman and Hindmarsh Valleys were formed by Permian glaciation moving over the land from the south-east about 270 million years ago. The valleys extend almost from Victor Harbor through to Yankalilla and Normanville. Evidence of glaciation occurs at Glacier Rock in the midst of the Inman Valley, scratches on the bedrock caused by rock-strewn glacier passing over it. Crozier Hill appears to have the shape of a *roche moutonnée* (an elongated mound of bedrock worn smooth and rounded by glacial abrasion), a unique round shape like a cockle shell formed by the action of glaciation.²

A distinctive feature of the unit which defines its extent, are the densely vegetated hills faces along parts of the southern side of the Inman valley and the northern side of the Hindmarsh Valley. Within the valleys the land is flat to undulating. Apart from the dense tracts of native vegetation on the hills faces, scattered trees are found across some of the unit, enhancing the appearance of the farms. The farms are mainly used for stock raising. The Starfish Hill wind farm, the only one in the Ranges, is located east of Delamere near the coast.

² Professor Bob Bourman, Professor of Geomorphology at the University of South Australia, informed me that “there is no definitive evidence that Crozier Hill is a roche moutonnée, but quite a lot of inferential material suggests that it was formerly one but subsequently modified when direct lines of evidence, e.g. striated surfaces, were destroyed.”
Crozier Hill near Victor Harbor – possibly a *roche moutonnée* formed by a glacier

Inman valley – part of the southern hills face

View across Inman Valley towards hills face on northern side of Hindmarsh Valley

Hindmarsh Valley hills faces

Northern slopes of Hindmarsh Valley viewed from Crows Nest Road
Part of the Second Valley Forest viewed from Hay Flat Road

Hindmarsh Valley northern slopes from Mount Alma Road

Inman Valley from Mount Alma Road

3. Mount Compass unit

Nangkita Road

Mt Moon from Mt Compass
The Mount Compass unit covers the sandy flat land and low rounded hill of Mt Moon (786 m) and the hills between Nangkita and Tooperang. The unit is like a bowl with higher land to the south, north and east. The land around the town of Mount Compass is flat to undulating and used for stock raising and occasional cropping. Extensive sand mines are on the western outskirts of Mount Compass which is the only settlement in the unit. Large vineyards have been established in recent years in the southern area east of the Victor Harbor road. There are several small pine plantations in the west. The Scott and Stipitus Conservation Parks are in this unit. The unit is low to moderate naturalness and diversity.
4. Willunga Scarp unit

The Willunga Scarp, officially the Sellicks Hill Range, is the southern continuation of the Adelaide Hills Face Zone, protected from subdivision since the mid-1970s. The scarp is a distinctive physical feature, providing the southern boundary to the McLaren Vale vineyards and the Willunga plains. The Range is around 400 m high and is slightly lower towards the sea in the west.

Until the last decade or so, the scarp was distinctly barren of trees but the Greening the Willunga Scarp movement has seen extensive plantings across much of it. The trees have changed the stark but colourful ridges and valleys that comprise the scarp to a more uniform vegetated appearance. Early slate mines were established near the town of Willunga and a quarry operates near Sellicks Hill. Other areas are grazed. The re-vegetation of the scarp is enhancing its naturalness but it remains low to moderate as does its diversity.

High hills extend south from the scarp around the coast to Carrickalinga and within these hills is located the Myponga Reservoir which is surrounded by extensive pine plantations. There are also vineyards in this area.
Willunga Scarp south of Willunga from Colville Road

Willunga Scarp from Hahns Road

Willunga Scarp from Hahns Road

Willunga Scarp from South Road

Myponga Reservoir
5. Echunga-Myponga valley unit

#367-9  Hahndorf to Echunga Road

#396-7  Echunga to Meadows Road

#425-7  Meadows to Willunga Road

#412-4  Kuitpo Forest, Brookman Road

#457-460  Willunga Hill to Myponga Road – Myponga River
This unit comprises a long shallow series of valleys which stretch from near Hahndorf and Echunga in the north to Myponga in the south. These are the valleys of tributaries to the Onkaparinga River, Meadows Creek and the Myponga River. The hills which line the valley are relatively low, particularly in the north and the valley almost appears as a plain as the hills are partially hidden behind the large scattered trees along the valley. Most of the valley is used for grazing and cropping with some market gardens of strawberries. Some tree plantations have also been planted. The dense Kuitpo pine forests are located in the central part. The small towns of Echunga, Meadows and Myponga are situated in the valley. The Myponga, Yulte and Kyeema Conservation Parks are within the unit. The unit is of low naturalness and low to moderate diversity.


This unit comprises a plain that extends from south of the Onkaparinga Gorge to the Willunga Scarp and west to the coast. After the Barossa Valley, it is the most well-known large vine-growing area in South Australia. Recycled water from the Christies Beach Sewage Treatment Works is piped across the unit, enabling the substantial expansion of the vines over the past decade.
The Willunga area was formerly a premier almond growing area but the industry has re-located to the Riverland and the almonds replaced with vines. The vineyards are generally barren of trees with most trees confined to roadsides and creeklines. There are a few tracts of native vegetation, e.g. Douglas Scrub. South and...
east the area is framed by the Willunga escarpment. Sand mines exist near McLaren Vale and in the west near Maslins Beach.

The built-up area of Adelaide extends south from Noarlunga in the western part to Sellicks Hill, broken only by the Aldinga Scrub Conservation Park. McLaren Vale and Willunga are the other main settlements in the unit.

Monocultures of vines are not particularly diverse but the vines setting with large red gums and glimpses of sea heighten diversity. Views to the sea in the western area and from higher localities, together with patches of native vegetation and tree-lined roads enhance the naturalness of the unit. The unit has low naturalness but moderate diversity.

7. Onkaparinga Gorge – Mount Bold Reservoir unit

The Onkaparinga Gorge is a little-visited wilderness area comprising a deep steep gorge alongside the lower Onkaparinga River. It is a National Park. The Mount Bold Reservoir, originally constructed in the 1930s and raised in the 1960s, is surrounded by extensive native vegetation and pine forests in a deep valley and is a restricted access area. Clarendon lies between the two and is one of the oldest settlements in the Ranges. The unit has moderate to high naturalness and low to moderate diversity.
8. Macclesfield – Ashbourne unit

Bull Creek valley and the ranges to the west
This central Ranges area comprises a north-south range paralleling Bull Creek. It is used for grazing and cropping with some vineyards recently established. There are several pine plantations. Tracts of native vegetation are present, mainly along the ridges, and scattered trees, particularly in the eastern part. The small settlements of Macclesfield and Ashbourne are found in this unit. The Cox’s Scrub, Mt Magnificent and Finniss Conservation Parks are located in this unit. Despite its impressive name, Mt Magnificent is a diminutive hill. The unit has low to moderate naturalness and diversity.

9. **Eastern slopes unit**

This unit extends from east of Mount Barker, south to near Port Elliot and comprises the slopes of the Ranges that extend down to the eastern plains in a series of spurs and valleys. There are no settlements of any consequence. Being lower rainfall, it mainly supports scattered trees although clumps of trees are found along the upper parts. The ridges are largely barren lower down although the creeks are often lined with large trees. The area is used for grazing. It has low naturalness and diversity.
The Bremer Valley is a distinct north-south valley in the east of the Ranges, extending along the Bremer River north from Callington. Its eastern face rises to the Monarto area, originally scheduled for a new town in the 1970s but subsequently abandoned and part of it assigned to the popular Monarto open plains zoo. Kanmantoo, Callington and Harrogate are the settlements in this unit. The lower rainfall supports mainly scattered trees but there are some small tracts of native vegetation. Recent decades has also seen extensive regeneration occurring in the unit, particular south of Harrowgate.

The valley is used for cropping and grazing. The large Kanmantoo copper mine in its midst has created large stockpiles of overburden. The unit is low in naturalness and diversity.

#1079-82  Lower eastern slopes, lower Old Bull Creek Road

#1119-21  Eastern slopes, upper Old Bull Creek Road

#1757-9  Cropping on eastern plains (Woodchester – Strathalbyn Road)

With few exceptions, cropping does not occur in the Mt Lofty Ranges

10. Bremer Valley unit

#3665-9  Bremer Valley, Harrogate Road – the most extensive cropping area in the Ranges
Bremer River valley between Harrogate and Callington

Kanmantoo copper mine

Bremer Valley from Whalley Hill. Mt Barker on RHS

Kanmantoo

Harrogate Road
11. Mt Barker – Hahndorf unit

This unit contains the significant double peak of Mount Barker, mistaken by early explorers on the River Murray for Mount Lofty. Wide productive valleys, used for cropping, grazing, and increasingly for vines fill the area. Extensive vineyards have been established in the hills east of Hahndorf in recent years.

Hahndorf, the original town of the Lutherans, contains buildings of traditional German half-timbered architecture, enhancing its attractiveness as South Australia’s premier tourist town. Hans Heysen, South Australia’s most famous painter, lived at his property, The Cedars near Hahndorf, and his iconic paintings of the massive red gums of the area captured their beauty and did much to change Australian’s view of their native flora.

This central Ranges unit contains the largest settlement, Mount Barker, which is planned to expand substantially southward over attractive good quality agricultural land. It would make better sense to locate additional urban development further out in areas of lower agricultural and scenic value such as around the existing settlements of Kanmantoo, Callington, Woodchester and Strathalbyn. The unit is low to moderate in diversity and low in naturalness.

In addition to Mt Barker and Hahndorf, the unit contains the settlements of Littlehampton and Nairne, both of which have expanded in recent years due to the greater accessibility to Adelaide provided by the South Eastern Freeway.
12. Longwood – Scott Creek unit

This compact area situated west of Mylor comprises dense hills and valleys with tracts of native vegetation and scattered trees. It is a popular hobby farming area with small holdings used for grazing and small orchards. Mylor is the significant settlement in the unit. The Scott Creek, Mark Oliphant and Mylor Conservation Parks are located in this unit. Being well vegetated makes it a bushfire risk area.
and parts of the unit were burnt in the 1980 and 1983 Ash Wednesday fires. The unit has moderate naturalness and diversity.
13. **Onkaparinga Valley unit**

This unit extends along the valley of the Onkaparinga River from Verdun to near Birdwood. It is a rich agricultural area used for grazing and cropping with extensive vineyards. The Woodside Army Camp at Inverbrackie is located east of Woodside. The Oakbank racecourse is the centre of the popular Easter races. In addition to these towns there are Balhannah, Charleston and Mount Torrens. They are popular tourist destinations with various attractions in the area.

Large scattered trees are found throughout the valley, apart from where they have been cleared for vineyards and other intensive uses. The unit is low in naturalness but of moderate diversity.

![Onkaparinga Valley](image1)

14. **Piccadilly - Lenswood - Lobethal unit**

This unit extends from the main ridgeline of the Ranges east to include the Piccadilly market gardens and vines, the apple orchards of Ashton and Basket Range, and the vines and orchards of Lenswood and Lobethal. The unit has high topographical variety with deep densely vegetated valleys and valleys intensively used for horticulture together with flat and undulating areas.

There are extensive tracts of dense tall native vegetation plus exotic vegetation and scattered large trees.

The unit contains the most visually diverse landscapes in the Mount Lofty Ranges with extensive market gardens, orchards and vineyards, often mixed together in the scene, grown on diverse topography. Their infinite variety of combinations of shapes, slopes, hues and textures amidst the hills and trees creates vistas of very pleasing diversity. There are many farm dams in this high rainfall area. There is often a juxtaposition of tall native trees with vines and farmland on sloping valleys and views to distant ranges and ridges. In some areas, the tall dense trees prevent extensive views of the landscape.

Some vines and orchards are covered with white or dark grey shadecloth. While this is visually intrusive, it also restricts view of the attractive vines and orchards. Autumn leaf colouring is obscured by the

![Onkaparinga Valley](image2)
shadecloth which could reduce the attractiveness of these areas for tourism.

To the north are extensive pine plantations which are part of the Mt Crawford forests.

Settlements include Uraidla and Summer-town, Carey Gully, Ashton, Lenswood and Lobethal. The popular Mount Lofty Botanic Garden is located on the high ranges east of Piccadilly Valley and there are the Kenneth Stirling and Montacute Conservation Parks. The Mt Crawford Forest extends south of the Torrens River.

The unit is of moderate naturalness and moderate to high diversity.
Horticultural area north of Lenswood
15. **Gawler – Little Para unit**

This unit comprises the Hills Face Zone south of Gawler and west of Elizabeth and Salisbury. The hills are low with some scattered trees and are used for grazing. It is of low naturalness and diversity. The relative insignificance of the range makes it curious that it was even designated as Hill Face Zone which was probably to provide the northern expression of the hills face near Adelaide.
16. **One Tree Hill - Sandy Creek unit**

This unit extends south from Sandy Creek to Inglewood and comprises fairly wide shallow valleys, ridgelines and hills used mainly for grazing with some vineyards and orchards, particularly in the Paracombe area. There are tracts of native vegetation and also scattered large trees. As in the south, large cypress wind breaks are used in this unit.

The Paracombe area is characterised with small farmlets, open grazing, some rock quarries, many farm dams, extensive orchards, some covered orchards, some vines, golf course, horse agistment, cattle and sheep grazing.

The Little Para Reservoir is located in the unit and is surrounded by formerly barren hills which are being revegetated. The 2015 Sampson Flat bushfires razed the southern part of this unit. One Tree Hill, Inglewood and Houghton are the main settlements. The Mannum-Adelaide pipeline traverses this area. The area is low in naturalness and diversity.
Sandy Creek - One Tree Hill – Inglewood area

Sampson Flat fire – Hannaford Hump Road

Towards River Torrens Gorge from Churchett Road, Houghton
17. Kersbrook – Mt Crawford – Williamstown unit

This extensive unit comprises some distinct hills such as Mount Crawford and Mount Gawler with wide valleys used for grazing and cropping. There are some extensive vineyards in this unit. Its main use is for pine forests, the Mt Crawford Forest, stands of which are located on Mt Gawler, south of the South Para Reservoir and in the Mount Crawford area. The Warren Reservoir is also located in this unit. The Warren and Hale Conservation Parks, comprising extensive native vegetation are located near the Warren Reservoir. Kersbrook and Williamstown are the main settlements. Parts of the unit were burnt in the 2015 Sampson Flat fire. The area is low in naturalness and diversity.
18. **Barossa Ranges unit**

The Barossa Ranges overlook the Barossa Valley on the east and are a distinctive escarpment with some tracts of native vegetation. Its rugged terrain and native vegetation combine to result in a rating of 6 in the Barossa landscape study. The Ranges are of moderate naturalness and diversity.
19. **Eden Valley unit**

Keyneton. It is a wide valley, extensively planted with vineyards and has many scattered trees giving a pleasing appearance. The famous Lindsay Park...
A horse stud is located near Angaston. The Barossa study rated this area as 5. The area is low in naturalness and of low to moderate diversity.
20. Palmer Scarp – eastern ranges unit

The low escarpment and spurs of the eastern ranges comprises this unit which extends from Palmer north to Eudunda. The hills are generally barren apart from trees along the creeks. The area is used for grazing. Large granitic boulders occur near the ridge of the ranges above Palmer. The unit is low in naturalness and diversity.
21. **Adelaide Hills Face Zone unit**

The Adelaide Hills Face Zone extends from Gawler to Sellicks Hill, but this unit covers the central part of the zone overlooking Adelaide and that adjacent to Morphett Vale. The steep high ranges adjacent to Adelaide provide an impressive backdrop to the city and far-sighted planning in the 1970s ensured their protection from subdivision and development through regulation.

The unit contains many significant parks: Anstey Hill and Shepherds Hill Recreation Parks and the Black Hill, Morialta, Horsnell Gully and Cleland Conservation Parks. Extensive dense tracts of native vegetation are located in this unit, mainly within these parks. The remainder is used for grazing and quarrying, the visual impact of which has been greatly moderated over recent decades. Some orchards on steep slopes occur in the Montacute area.

Without the Hills Face overlooking Adelaide, the city would be very much the poorer aesthetically and also physically – e.g. its rainfall would be much lower without the blocking to the westerly systems provided by the high ranges. The Ranges have also dictated the orientation of Adelaide in a north-south direction although with the access provided by the South East Freeway, many people are now commuting from the Ranges or beyond such as Victor Harbor and Murray Bridge.
Adelaide Hills Face Zone – Anstey Hill to Black Hill

Adelaide Hills Face Zone from North Adelaide

Adelaide Hills Face Zone from Unley Oval

Adelaide Hills Face Zone – above Happy Valley & Morphett Vale, from Majors Road
4.5 CHANGES IN THE VISUAL APPEARANCE OF THE RANGES

The hues of the agricultural sections of the Mount Lofty Ranges changes from the green of winter and spring to the straw hue of summer and autumn. The extensive pastures used for grazing change from their summer straw hue to green during autumn through to spring. The extensive areas of vines and orchards similarly change from the green during their growing season to bright yellows and browns of autumn. Within the towns of Stirling and Aldgate, together with Hahndorf and other hills towns, the trees in the streets and gardens change colour through the year, their autumn colours attracting many visitors.

Areas in which the hues change little throughout the year are the pine plantations of Mount Crawford in the north and Second Valley in the south. Their uniform green hue markedly reduces the visual diversity of these areas.

At a longer timescale, the clearance of native vegetation throughout much of the Ranges also changed the landscape character and quality. Generally the loss of naturalness decreases landscape quality.

The establishment of large pine plantations in some areas of the Ranges in past decades and the revegetation of the Willunga scarp are examples of physical change in the landscape. Similarly the marked expansion of vines across the Willunga Plains, and the loss of the former almond groves, has changed the landscape character of this area.

A potential change in the future is through the gradual loss of the remnant red gums scattered across the eastern part of the Ranges. Although regeneration is occurring in some areas, their loss will render the areas barren of trees and scenic quality will suffer accordingly.