

MOUNT LOFTY RANGES LANDSCAPE QUALITY ASSESSMENT PROJECT

EXECUTIVE SUMMARY

Introduction

The Mount Lofty Ranges Landscape Quality Assessment project was carried out during 2015 to measure and map the scenic quality of the region in South Australia. The study area stretched from Cape Jervis in the south to Truro in the north, east to the Palmer escarpment and west to include the Hills Face Zone near Adelaide as well as the McLaren Vale area to the sea. The area is around 4,700 sq km.

Nature of landscape quality

Landscape quality is an aesthetic quality which is assessed via our affective capacity, our likes and dislikes, our aesthetic preferences, not via our cognitive abilities which analyse and logically comprehend the environment. Early attempts often measured every aspect of the landscape – height, aspect, geology, vegetation, land use, in the hope that its scenic quality would emerge but it never did as it can only be assessed aesthetically. The scientific basis is psychophysics, the measurement of the effect on the brain of stimuli from the senses – sight, sound, taste, touch and smell. Research has established the use of photographs as a vehicle for measuring preferences. Strict criteria apply to the photography of the landscape so that the rating is of the quality of the scene, not the quality of the photograph.

History of the Mt Lofty Ranges

The Aboriginal habitation of the area extends back millennia and involved three tribes, the Peramangk in the central Ranges, the Kurna on the western plains to Cape Jervis, and the Ngarrindjeri along the Fleurieu Peninsula and east to the Lakes and River Murray. Many traces through rock art exist throughout the Ranges.

European exploration of the region commenced with Matthew Flinders and Nicholas Baudin in 1802 as they passed

the coast in their ships. With colonisation in 1836, exploration of the interior commenced and explorers waxed lyrical about the beauty of the Ranges. Wakefield's systematic colonisation of the area began in 1836 and towns sprung up over the following decades throughout the Ranges. Farming required the clearance of the tall native trees, a process that took years. Transforming the land to resemble England was the aim of many settlers. Some areas such as the southern plateau remained uncleared and undeveloped until after WW2 when trace element deficiencies were rectified and the area cleared for agriculture. Post war development also saw the construction of reservoirs, electricity infrastructure and major roads including the South Eastern Freeway through the Ranges and the establishment of parks and reserves. The recent proposal to seek listing of the Ranges under the World Heritage Convention is the latest of many measures to recognise the attractiveness of the Ranges.

In the 1970s, earnest proposals to declare an English-style National Park over the entire Mt Lofty Ranges to protect its beauty eventually petered out, although they did stimulate several studies of its landscape quality to be undertaken.

Physically the Ranges comprise north-south trending uplands, the highest being 727 m at Mt Lofty overlooking Adelaide. The vegetation comprises dry sclerophyll forests in the higher wetter areas, and the savannah woodland formation in the drier eastern area. The region's landscape character comprises the high ranges, the lower ranges and escarpments, and the undulating country and wide flat valleys.

Acquiring the data

Six previous studies by the consultant which included parts of the Ranges are described. Twenty-one landscape units were defined across the Ranges of areas

having similar features and characteristics.

The research method involves respondents rating photographs of the landscape and also scoring the visual significance of certain components in the landscape (e.g. land forms, water, colour), analysing the ratings and component scores and from this gaining a thorough understanding of the landscape quality and the components that contribute to it. This knowledge is then applied in mapping the landscape quality.

The project commenced with three months of photography throughout the region in which 7,000 photos were taken. These supplemented 6,000 photos previously taken of the region. For the first time, this survey used spliced photos, two images spliced together to provide a wider angle of view which aids immersion of the viewer in the landscape. A total of 150 images were selected to cover land forms, land cover, land uses, presence of water, seasonal colour, fire damaged landscapes and landscape units, and included images used in the author's PhD Thesis (*Landscape Quality Assessment of South Australia*, Uni. Adelaide, 2000) and in the previous Barossa study plus benchmark scenes of South Australia which enable the ratings to be related to studies from elsewhere in the State. Of the 150 images, 119 were spliced and the remaining 31 were single photos. A statistical principle is that each type of scene should have three examples and this was followed throughout, e.g. three scenes of McLaren Vale vineyards.

In addition to the main survey instrument, six surveys covered the components: land form, land cover, naturalness, visual diversity, colour and water. These were scored on the basis of their visual significance in the scenes. The consultant also scored a further eight attributes. The surveys used the Survey Monkey® on-line survey facility which has proved excellent.

To gain participation in the landscape survey, invitations were emailed to

approximately 1700 addresses, located from Internet searches of outdoor, sports, social and interest clubs, councils, service and environmental groups, and newspapers throughout Adelaide and the Ranges. Mailing invitations commenced on 7 July and the survey terminated on 22 July after 16 days with 560 responses. Meanwhile invitations to score the six component surveys were forwarded and the required 30 responses obtained for most surveys by 27 July. The responses indicate the effectiveness and efficiency of using the Internet for such surveys.

Data Analysis

Analysis of the results was postponed for two months by trips overseas and was completed in early November. Mapping was then undertaken in November.

Of the 560 responses, two-thirds (379) completed all 150 scenes. Following removal of 38 who rated no scenes, and two more who showed strategic bias by rating all scenes '10', the data set was 519 responses. This has a confidence interval of 0.043, better than the 0.05 confidence interval at the 95% confidence level which is the benchmark for the social sciences.

Of the 519 respondents, slightly more females than males participated, 82% of participants were in the 45+ age groups, 77% were born in Australia, and 63% had either a degree or higher degree. Compared with the South Australian community, respondents' age, birthplace and education were statistically significantly different but gender was not statistically different to the general population. Overall the survey participants were better educated, with more middle aged and more females and more Australian-born than the South Australian community.

If these differences affected results it would be expected that the means would differ markedly across the range of respondent characteristics but in fact they are very similar, a difference of less than 2%.

Over half (52%) of respondents either lived in or commuted through the Ranges so it is not surprising that 66% indicated that they were either very familiar or extremely familiar with the region. The mean rating of those who live in the Ranges was 6.00 compared with 5.88 for those who live outside the area.

Over 50 respondents commented on their familiarity with the Ranges, and a further 55 comments from those who live in or commute through them. There were 100 comments about the survey itself, many expressing negative views about the photo quality and that being taken largely through summer did not capture the winter green.

Ratings of South Australian scenes used in previous surveys were slightly higher, about 0.33 or 5%, compared with the previous ratings. Ratings of Barossa scenes also used previously were however only 0.03 (0.64%) different.

The ratings for the Mt Lofty Ranges range from 4 to 7, apart from an 8 for the Morialta waterfalls. The majority of ratings are 5 and 6 with 5 applying to the flatter land and 6 to the undulating and steeper land, particularly with tree cover. Flat barren land rates 4. Rugged land such as Morialta achieves a rating of 7.

In scenes with open grazing or cropping land, the ratings between winter and summer vary by around 0.8. The winter green pastures and crops are 0.8 higher than the summer brown. This particularly affects those parts of the Ranges with scattered trees over pastures and the eastern cropping areas. In many areas this is the difference between a 5 and a 6 rating. Interestingly however, vines and orchards which also change colour with the seasons retain the same rating throughout the year.

In mapping the winter ratings were adopted, e.g. 6 instead of 5 for much of the scattered trees area. The following table displays the average ratings obtained from the survey.

Area or feature	Rating
Land forms	
Land form score 1	4
Land form score 2	5
Land form score 3	5
Land form score 5	6
Land form score 5	7
Rugged terrain and rock faces	7
Substantial waterfalls	8
Flat & undulating land without trees	5
Flat & undulating land, scattered trees	6
Steep land with scattered trees	7
Land cover	
Land cover score 1	3
Land cover score 2	4
Land cover score 3	5
Land cover score 4	6
Land cover score 5	8
Stands of dense trees (low, medium & tall height)	6
Roadside trees (dense with undergrowth)	6
Exotic vegetation (excl. pines)	6
Pines and tree plantations	4
Land barren of tree cover	5
Land use	
Flat cropping land	5
Market gardens	5
McLaren Vale vines	5
Vines in Ranges – undulating land	5
Vines in Ranges – steep land	6
Orchards – undulating land	5
Orchards – steep land	6
Water	
Farm dams & reservoirs	6
Naturalness	
Naturalness score 1	4
Naturalness score 2	5
Naturalness score 3	5
Naturalness score 4	6
Naturalness score 5	7
Diversity	
Diversity score 1	4
Diversity score 2	5
Diversity score 3	6
Diversity score 4	6
Diversity score 5	7

The study analysed each of these features and components in detail. Using multiple regression, models were derived for the landscape quality. The best model was that which used all six components and achieved a correlation coefficient (r^2) of 0.90:

$$Y = -0.63 + 0.55 \text{ naturalness} + 0.54 \text{ diversity} + 0.37 \text{ land cover} + 0.28 \text{ land form} + 0.28 \text{ colour} + 0.14 \text{ water}$$

(F = 18.3, df 6,12, p < 0.000; R² = 0.90)

However a model with only two components achieved a respectable R² of 0.81:

$$Y = 1.075 + 0.66 \text{ naturalness} + 1.03 \text{ diversity}$$

(F = 299, df 2, 139, p < 0.000)

In mapping the landscape quality, certain principles were followed:

- Parts of the scene elicit different ratings but are averaged by the respondent in rating the scene;
- Ratings grade like contours around the landscape and progressively rise and fall as ratings;
- The rating reflects what is viewed from a location, it does not provide the rating of that viewing location but rather what is seen from it;
- In mapping, the rating applies to the landscape beneath, not what may be seen over it in the distance.

The resources available for mapping the landscape quality included the rating of the 142 scenes (i.e. excluding the South Australian scenes), analysis of scenes by landscape types (e.g. land forms, water), scoring of the landscape components, ratings of comparison scenes of seasonal colour, comparison of the ratings with the component scores. In addition there were 13,000 other photos of the region plus maps and Google Earth®.

Mapping proceeded through each of the 21 landscape units and based on the detailed results, the entire Mt Lofty Ranges was mapped. The following table displays a typical result for a landscape unit, showing the ratings for each type of landscape characteristic.

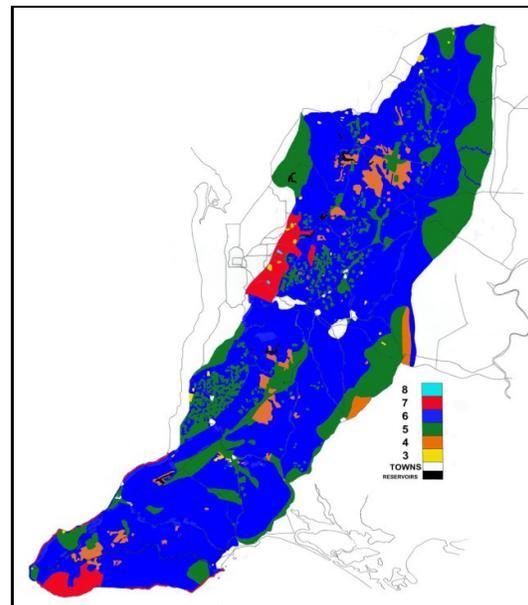
Piccadilly- Lenswood – Lobethal unit	
Rugged terrain	7
Flat and undulating grazing land with scattered trees	6
Dense stands of trees	6
Roadside trees	6

Exotic trees	6
Pine plantations	4
Market gardens	5
Vines & orchards on undulating land	5
Vines & orchards on steep land	6
Quarry	3

The resultant summary and map of landscape quality for the Mt Lofty Ranges are shown below.

Summary of landscape quality ratings

Rating	Sq km	%
3	14	0.30
4	181	3.82
5	1070	22.60
6	3315	70.03
7	152	3.21
8	2	0.04
Total	4734	100.00



Landscape quality map of the Mt Lofty Ranges

The highest rating of 8 is for two waterfalls in the Adelaide Hills Face, the Morialta and Waterfall Gully falls.

The next highest rating, 7, applied to the Hills Face Zone overlooking Adelaide, the steep land to the north and south of the Kangaroo Creek Reservoir, the Deep

Creek – Blowhole Creek – Talisker area near the tip of Fleurieu Peninsula, and sections of the Fleurieu coast.

The dominant rating throughout the Ranges is 6, reflecting the prevalence of undulating land with either scattered trees or tracts of trees. The 6 rating also applied to roadside trees, exotic trees, hills faces including the Barossa Ranges and the Willunga Scarp, the Inman and Hindmarsh Valleys, areas of dense vegetation, and to the seven reservoirs in the Ranges. Tree-lined creeks in the eastern ranges rate 6.

The 5 rating applied to the many vineyards including the McLaren Vale and those scattered throughout the Ranges. It also applied to flat land with trees and to undulating but barren land. The undulating but bare cropping land south of Truro rated 5. Market gardens and orchards rated 5. The eastern ranges are rated 5. The Hills Faces south of Gawler and also overlooking Morphett Vale both rate 5.

Pine forests rate 4 throughout the Ranges and are a significant land use in the Mt Crawford, Kuitpo and Inman Valley areas. The flat bare areas used for cropping in the Bremer Valley and between Strathalbyn and Woodchester rate 4.

The 3 rating applied to quarries, including those in the Hills Face Zone, sand workings at Mt Compass, Maslins and Sandy Creek, and to mines such as Kanmantoo and Brukunga. The Penrice quarry near Angaston rates 3.

Detailed analysis of the map by councils was undertaken. The Adelaide Hills Council has the most extensive areas of high quality landscapes (6 – 8), followed by Yankalilla and Mitcham Councils.

Overall the map brings out some important points:

- The rating 6 dominates the Ranges and is bound in the east by the bare hills and escarpment of rating 5 and in the west by the hills face at Gawler,

Adelaide, Morphett Vale and Willunga, rating 5 – 7.

- The rating 6 reflects the winter rating, the summer rating would be mostly 5 so the landscape quality varies with the seasons.
- Landscape quality also varies over time with changes in land use. The establishment of pine forests at Mt Crawford, Kuitpo and Second Valley decades ago transformed 5 and 6 rating landscapes to 4 rating. The current spread of tree plantations, though using native trees, will have a similar effect as they also rate 4.
- Vines are becoming the new land use across the Ranges. Pockets of vines exist from south of Yankalilla north through to the Eden Valley and across much of the central Ranges. In many areas they are transforming the landscapes of scattered trees on grazing land to monocultures of vines stretching across the undulating hills but with all remnant trees removed. Thus more vines means less trees. Vineyards do not generally tolerate trees in their midst. And it is the trees that enhance landscape quality, not vines.
- While the seasonal colour of vines in autumn might be thought to enhance the landscape, this study showed that the ratings of autumnal colour were lower than their summer green. Also, the ratings of vines in green leaf were lower than that of green pastures. Thus the argument that the spread of vines across the Ranges will enhance landscape quality is not supported by this survey.

In the final chapter, the factors which generate landscape appeal are examined, ranging from individual factors through familiarity with the landscape and cultural factors to innate factors common to all people.

Recent research into the restorative benefits of viewing nature are examined

including people being happier, less aggressive, less fatigued and with longer attention spans. These aesthetic services have immense social and economic spinoffs.

The current program to nominate the Mt Lofty Ranges under Criteria 4, 5 and 6 of the World Heritage Convention are examined, and it is proposed that an additional criterion, 7b, be added: that it contains *areas of exceptional natural beauty and aesthetic importance*. This would omit part A of Criterion 7, *superlative natural phenomena*.

The current study meets the requirement that natural beauty be assessed using a method that is systematic, rigorous and transparent.

Current provisions of Development Plans of Councils to protect and manage landscape quality are examined in detail and while there are many excellent Objectives and Principles of Development Control across the councils, there is considerable variation among them. However the recognition of landscape by all councils is heartening. All consider also the visual impact of developments.

In order to position the Ranges better in terms of World Heritage nomination, a Ranges-wide Landscape Protection Zone is proposed that would be adopted by all Councils and included in their Development Plans. This would include strengthened Objectives and Principles of Development Control as well as provisions relating to their application by Councils. Townships would be excluded from the Zone.

Lessons from the study include the recognition that landscape quality can be measured and it can be mapped but that it requires an immense amount of effort, 1500 hours for the current study, and considerable attention to detail. Although it is commonly held that “beauty is in the eyes of the beholder”, the similarity of preferences for landscape quality – the bell-shaped curve of preference with most around the average - has been found in all the author’s landscape studies and gives a lie to this adage.

Improvements to the survey include a greater mix of summer and winter photos, more scenes with farmhouses, improvements to the survey instrument, and, possibly, a lesser length of the survey.

Proposals to improve the landscape management of the Ranges are presented in 13 recommendations covering: nomination under Criterion 7 of World Heritage Convention, Ranges-wide Landscape Protection Zone, protection of hills faces in the Inman and Hindmarsh Valleys and other localities, regeneration of scattered trees and protection of trees in vineyard development, use of mixed species in tree plantations, protection of roadside trees, encouragement to land holders to beautify their dams, provision of viewing areas along roads, designation of Scenic Routes along major roads, removal of eyesores, provision of lookouts over reservoirs which have significant landscape value, and cessation of softwood plantations in the Ranges.

CONTENTS

	Executive Summary	i
	Contents	vii
	Tables	ix
	Figures	xi
1.	INTRODUCTION	1
2.	HISTORY OF THE MOUNT LOFTY RANGES	
	2.1 Aboriginal habitation	2
	2.2 European exploration	4
	2.3 Early European settlement	7
	2.4 Post WW2 development	11
	2.5 World Heritage nomination of the Mt Lofty Ranges	14
3.	MEASUREMENT OF LANDSCAPE QUALITY	
	3.1 Cognitive and affective paradigms	17
	3.2 Psychophysics	17
	3.3 Use of Photographs	17
	3.4 Community Preferences Method	18
4.	LANDSCAPES OF THE MOUNT LOFTY RANGES	
	4.1 Physical character	22
	4.2 Landscape character	22
	4.3 Findings of previous studies	23
	4.4 Detailed landscape units	25
	4.5 Changes in the visual appearance of the Ranges	58
5.	ACQUIRING THE DATA	
	5.1 Study area	59
	5.2 Photographing the Mt Lofty Ranges	59
	5.3 Spliced scenes	60
	5.4 Selection of survey photographs	63
	5.5 Preparation of the Internet survey	65
	5.6 Landscape components	66
	5.7 Invitations to participate	68
	5.8 Monitoring the surveys	68
	5.9 Timeline of the project	69
	5.10 Mt Lofty Ranges Internet Survey	70
6.	ANALYSIS OF RESULTS	
	6.1 Introduction	75
	6.2 Data management	75
	6.3 Respondent characteristics	78
	6.4 Familiarity & residence	81
	6.5 Internet access	83
	6.6 Comments by participants	83
	6.7 Comparisons with previous studies	85
	6.8 Scene analysis	86
	6.9 Land form	86
	6.10 Land cover	97

6.11	Land use	106
6.12	Arid - lush	119
6.13	Presence of water	120
6.14	Naturalness	123
6.15	Visual diversity	125
6.16	Buildings and sheds	128
6.17	Landscape component scores	128
6.18	Model development	134
6.19	Summary of landscape quality	136
7.	MAPPING LANDSCAPE QUALITY	
7.1	Principles for mapping landscape quality	137
7.2	Rating scale	138
7.3	Resources	139
7.4	Generic ratings	139
7.5	Landscape unit ratings	140
7.6	Summary of landscape unit ratings	165
7.7	Map of landscape quality	166
7.8	Landscape quality by council	170
8.	RETROSPECT AND PROSPECT	
8.1	The unique qualities of the Mt Lofty Ranges	177
8.2	What generates the appeal of the Mt Lofty Ranges landscape?	178
8.3	World Heritage proposal	180
8.4	Landscape protection in Mount Lofty Ranges	182
8.5	Landscape management	187
8.6	Survey lessons and improvements	189
8.7	Recommendations	191
9.	REFERENCES	192
	APPENDIXES	
1	Generic invitation letter	195
2	Survey scene ratings & component scores	196
3	Survey scene locations, ratings and ratings histograms	200
4	Comments from participants	227

TABLES

Section	Contents	Page
5.1	Relationship between pixel width compression and file size	60
5.2	Use of Photoshop® to reduce file size	60
5.3	Selection of survey scenes	64
5.4	Scenes by landscape unit	65
5.5	Average dimensions of 150 images	66
5.6	Responses from surveys	69
6.1	Rating of scenes by participants	75
6.2	Data set	75
6.3	Cases of possible strategic bias	77
6.4	Demographic characteristics of participants	78
6.5	Age vs gender	79
6.6	Age vs education	79
6.7	Age vs birthplace	79
6.8	Gender vs education	79
6.9	Age distribution of participants	79
6.10	Gender of participants	79
6.11	Birthplace of participants	79
6.12	Educational attainment of participants	80
6.13	Mean ratings by respondent characteristics	81
6.14	Familiarity with the Mt Lofty Ranges	81
6.15	Live in or commute through the Mt Lofty Ranges	81
6.16	Familiarity vs live in or commute through the Mt Lofty Ranges	81
6.17	Influence of familiarity on rating	82
6.18	Influence of residence on ratings	83
6.19	Survey ratings compared with previous surveys of SA scenes	85
6.20	Survey ratings compared with Barossa survey	86
6.21	Predictive ratings based on land form scores	87
6.22	Influence of land form on ratings	87
6.23	Ratings of rugged terrain and rock face scenes	87
6.24	Adelaide Hills Face Zone ratings	91
6.25	Predicted ratings based on land form scores	94
6.26	Other hills face ratings	94
6.27	Predictive ratings based on land cover scores	97
6.28	Frequency of scenes of scattered and dense trees	97
6.29	Ratings of land cover combinations	98
6.30	Extent of dense tracts of trees vs ratings	99
6.31	Ratings vs density of scattered trees	102
6.32	Rating of indigenous, exotic and mixed vegetation	103
6.33	Ratings of roadside tree scenes	104
6.34	Grazing land: Predictive ratings of the influence of land cover	106
6.35	Ratings of cropping land	107
6.36	Ratings of market gardens	108
6.37	Ratings of pines and tree plantations	109
6.38	Ratings of McLaren Vale	111
6.39	Ratings of vines	113
6.40	Ratings of all scenes with vines	113
6.41	Ratings of orchards	115
6.42	Pasture & vines scenes with summer & autumn colour	117
6.43	Comparison of summer and autumn ratings	117
6.44	Comparison of brown and green pasture ratings	119
6.45	Influence of water colour in rating of water	120
6.46	Size of reservoirs in the Mt Lofty Ranges	122
6.47	Ratings of reservoirs	122
6.48	Application of naturalness algorithm	124
6.49	Component means and standard deviations	129
6.50	Correlations between landscape components	132

6.51	Correlations of ratings with landscape components	133
6.52	Algorithms for relationships between ratings and components	133
6.53	Multiple regression model, all components – Enter method	135
6.54	Multiple regression models, one to five components – Stepwise method	135
6.55	Average ratings for Mt Lofty Ranges	136
<hr/>		
7.1	Average ratings for Mt Lofty Ranges	139
7.2	List of landscape units	140
7.3	Rating of Central Adelaide HFZ	164
7.4	Summary of landscape quality ratings	168
7.5	Ratings by council (sq km)	169
<hr/>		
8.1	Summary of provisions of Council Development Plans relating to landscape amenity	182
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FIGURES

Section	Contents	Page
1.1	Mount Lofty Ranges Study Area	1
2.1	Aboriginal tribes of the Mt Lofty Ranges	2
2.2	Peramangk cave painting	3
2.3	S.T. Gill Aboriginal returning from the hunt	3
2.4	Rock at Penneshaw carved by Baudin's expedition: "Expedition of discovery by Captain Baudin in the <i>Géographe</i> , 1803"	4
2.5	G.F. Angas Evening at Angaston, 1846-7	5
2.6	G.F. Angas, Encounter Bay, 1844	5
2.7	S.T. Gill View of Adelaide, 1840s	7
2.8	G.F. Angas View from Mount Lofty, 1846	7
2.9	S.T. Gill Surveyors	8
2.10	Spread of settlement 1839 – 1868	9
2.11	Preliminary districts, counties and special surveys	9
2.12	National Parks and Reserves, Mt Lofty Ranges	11
2.13	Comparison of the extent of natural vegetation in 1945 and 1968	12
3.1	Framework of landscape quality assessment	19
3.2	The Community Preferences Landscape Assessment Method	21
4.1	Areas of scattered trees	22
4.2	Landscape quality rating, Mt Lofty Ranges	23
4.3	Landscape rating, Fleurieu Peninsula	24
4.4	Barossa and Eden Valley ratings	24
4.5	Landscape rating, Lower River Murray Lakes	24
4.6	Landscape units in the Mount Lofty Ranges	25
5.1	Photography routes, Mt Lofty Ranges	59
5.2	Comparison of one photo with spliced photos	62
5.3	Comparison of scenes taken with different focal lengths	62
5.4	Location of 142 images	65
5.5	Responses to landscape survey	68
5.6	Responses to component surveys	69
5.7	Project timeline	69
6.1	Rating of scenes by respondents	75
6.2	Histogram of respondent ratings	75
6.3	QQ plot of respondent means	76
6.4	Histogram of scene ratings	76
6.5	QQ plot of scene ratings	76
6.6	Distribution of respondent means and standard deviations	76
6.7	Mean average ratings by respondent characteristics	80
6.8	Mean average ratings by respondent characteristics—exaggerated scale	81
6.9	Familiarity with the Mt Lofty Ranges	81
6.10	Familiarity vs residence	82
6.11	Influence of familiarity on rating	82
6.12	Influence of residence on ratings	82
6.13	Influence of land form on ratings of all scenes	86
6.14	Influence of land form on ratings	87
6.15	Relationship between ratings and visual significance of rock faces	88
6.16	Rugged terrain and land form scores	88
6.17	HFZ scenes: ratings vs land form scores	94
6.18	Other hills face scenes: ratings vs land form scores	94
6.19	All 142 scenes: ratings vs land cover score	97
6.20	Ratings of land cover combinations	98
6.21	Ratings of dense tree close up views	98
6.22	Ratings of dense tree panoramic views	98

6.23	Scattered & dense trees: ratings vs land cover score	98
6.24	Extent of dense tracts of trees vs ratings	99
6.25	Ratings vs density of scattered trees	102
6.26	Scattered trees: Relationship of water area and ratings	103
6.27	Scattered trees: Relationship of visual significance of water & ratings	103
6.28	Rating of indigenous, exotic and mixed vegetation	103
6.29	Ratings of grazing land	106
6.30	Grazing land: influence of land form on ratings	106
6.31	Grazing land: Influence of land cover on ratings	106
6.32	Influence of visual diversity on vines rating	114
6.33	Influence of colour on vines rating	114
6.34	Influence of visual diversity on orchards rating	115
6.35	Influence of colour on orchards rating	115
6.36	Comparison of summer and autumn ratings	118
6.37	Ratings of brown and green pasture	119
6.38	Influence of arid-lushness on ratings	120
6.39	Influence of arid-lushness on land cover score	120
6.40	Water scenes in descending ratings order	120
6.41	Visual diversity scores in scenes with water	121
6.42	Colour scores in scenes with water	121
6.43	Naturalness scores - all scenes	123
6.44	Naturalness vs Land form scores – all scenes	124
6.45	Naturalness vs Land cover scores – all scenes	124
6.46	Naturalness vs Land form scores – indigenous vegetation	125
6.47	Visual diversity scores vs ratings	125
6.48	Visual diversity scores vs naturalness scores	127
6.49	Visual diversity scores vs colour scores	127
6.50	Buildings and sheds scores compared with ratings	128
6.51	Histograms of component scores	129-30
6.52	Component scores vs standard deviations	130-1
6.53	Correlations between component scores	132
6.54	Ratings and the landscape component scores	133-4
<hr/>		
7.1	Rating of scene #18, Marble Hill valley	137
7.2	Components of rating scene #18	137
7.3	Scene #19 Rating of dam and valley	137
7.4	Scene #19 Rating of valley 5's	138
7.5	Scene #28 Rating 6.69	138
7.6	Scene #28 rating 5 – 6.59	138
7.7	Landscape units in the Mount Lofty Ranges	140
7.8	Landscape quality map of the Mt Lofty Ranges	167
7.9	Proportions of landscape quality ratings for Mt Lofty Ranges	168
7.10	Council boundaries	168
7.11	Ratings by council	169
7.12	Yankalilla Council	170
7.13	Victor Harbor Council	170
7.14	Alexandrina Council	171
7.15	Murray Bridge Council	171
7.16	Onkaparinga Council	172
7.17	Mt Barker Council	172
7.18	Adelaide Hills Council	173
7.19	Mitcham Council	174
7.20	Burnside Council	174
7.21	Tea Tree Gully Council	175
7.22	Playford Council	175
7.23	Barossa Council	176
7.24	Mid Murray Council	176
<hr/>		
8.1	Hierarchy of Societal Landscape Preferences	178
8.2	Barossa Ranges Hills Face	183

8.3	Mid Murray Council's Hills Face	184
8.4	Adelaide Hills Council Scenic Routes	188
8.5	Proposed scenic roads	188
8.6	Scene and histogram to illustrate commonality of most ratings	190
