Scenic Amenity of Glen Rock

A case study in measuring community appreciation of landscape aesthetics

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EXECUTIVE SUMMARY

People from all walks of life are bound by common instinctive responses to the appearance of the landscape. For example, most people prefer the appearance of landscapes with trees and green grass rather than industrial buildings. The exact nature of peoples responses though, are often colored by their experience of the landscapes around them.

This study was initiated to develop a better understanding of people's appreciation of the scenery at Glen Rock, a property of about 6,400 ha located about 100km west of Brisbane. This information will be in the development of a management plan for the property. A suite of other values (eg. nature conservation, water protection) will be taken into account in the development of recreation and grazing strategies for the property. By recognition of the scenic amenity of the property, it will be possible to provide a more enjoyable experience for visitors to the property.

Inception. The Regional Landscape Strategy and Brisbane City Council have recently completed a study, based at Moggill on the outskirts of Brisbane, which has defined a new approach for the assessment of Scenic Amenity. The final report of study has been used as the basis of method to assess scenic amenity at Glen Rock. This Glen Rock study is the first application of the methodology developed at Moggill. This Glen Rock study has refined some components of the method, particularly relating to the technique used to survey community preferences for landscapes.

The Glen Rock property, about 6,300 ha in size is about 130 km south west of Brisbane. It consists of a series steep valley adjoining the World Heritage Listed Main Range National Park. Whilst much of the property is covered in natural vegetation, it has been used for extensive cattle grazing for the best part of a century.

The Glen Rock property is now owned by the Queensland Government, and represents an area of importance for multiple use and outdoor recreation by the people of South East Queensland. Information collected by this study is used for the development of a management plan for the property.

Structure of method. The assessment of scenic amenity has been implemented in five stages.

- A *perception study* is used to develop a statistical model that expresses community preferences for different types of landscapes.
- These models are applied during *scenic preference mapping,* which relates peoples preferences to maps of land cover and topography.
- *A viewer appreciation assessment* identifies all important public viewing locations and allocates a weighting to each location based on assumed duration, appreciation level, and estimated number of viewers per day. This provides information in the importance of view points, used as an input to visual exposure mapping.
- *Visual exposure mapping* relies on the use of a digital terrain model to assess how often a place in the landscape can be seen from view points. This assessment is weighted by the distance between a location in the landscape

and the view point. It also takes into account the visibility from the view point and the orientation of the landscape to the viewer.

– The final stage to *map scenic amenity* requires integration of the visual exposure map and the scenic preference map, to identify the relative contribution made by different places in the landscape to the collective community appreciation of open space scenery. The final scenic amenity map is based on a 1-10 rating system, where 10 represents the most highly valued scenery in south east Queensland, and 1 represents the least valued scenery in the region.

Perception Study. A total of 21 photos were used to represent all land types and land features from different viewing positions. These photos were show to 60 people including members of outdoor recreation groups, local residents, international backpackers, and government natural resource professionals. People were asked to sort the photos in decreasing order of preference, and to then allocate a score from 10-1 indicating how much they liked the scenery. In a slight departure from the 'Moggill' methodology, respondents were asked to score photos according to three emotional response ratings – interesting, calming, and beautiful. People were also invited to record their response to the scenery, and what they noticed about the scenery.

The study found some important differences in responses from different sample groups. Notably, government professionals expressed a stronger preference for natural appearing scenery than other sample groups.

A total of 78 basic attributes were recorded to describe photo content, such as percent trees in the foreground. An additional 32 combined attributes were also calculated, to give a total of 110 photograph attributes.

The most attractive scenery in Glen Rock is described as 'peaceful running water'. The least attractive scenery was described as a 'dry rocky creek bed'. This emphasises the importance of running water to people's appreciation of scenery. Other preferred scenery as described as a 'beautiful view of escarpment through trees' and an 'expansive view down to mountain valley'. Other scenery with a low preference was described as an 'uninviting weed infested hillside' and 'barren cleared flats'. These responses indicate the importance of intact vegetation and views down from mountain tops.

A simple robust model was developed to predict scenic preference from photo content. The model uses the presence of running river in the foreground, the presence of green grass or shady trees in the foreground, and the steepness of the topography in the foreground. This function provides a consensus model for predicting scenic preference from landscape attributes.

Scenic preference mapping. Scenic preference maps were developed by integrating vegetation maps, topographic maps, and maps showing the location of running streams. This map illustrates that areas with highest scenic preference are around running creeks in the upper part of Black Fellow Creek, and at tops of the mountains where there are dense and shady trees. The area of lowest scenic preference is the flat and undulating areas of open forest along the edges of the valley.

Viewer appreciation assessment. An expert assessment was conducted of the locations, number of users, and type of recreation users across the property, based

around the use of current access tracks. This assessment indicates the importance of the current 'Casuarina' picnic and camping area. The relative importance of different viewing locations was used as input to the visual exposure mapping process. It is recognised that the assessment of visitor numbers was speculative and would need to be re-assessed at the conclusion of the management planning process.

Visual exposure mapping. View point location data was combined with a digital elevation model of the study area to model how often parts of the landscape can be seen. The final visual exposure map shows areas of highest visual exposure as the sides of mountains in the northern half of the property. Areas of lowest visual exposure are the valleys in the far south of the study area.

Scenic Amenity. A scenic amenity map was produced by combining Scenic Preference and Visual Exposure. Four importance categories of scenic amenity have been developed (high, medium, low, very low) to synthesise information to a level which can be used in planning.

The areas of highest scenic amenity occur on both sides of the main Black Duck Creek valley in the northern half of the property, above the intersection of Flaggy and Blackfellow Creeks. Scenic Amenity is strongly affected by the base visitation pattern, which is focussed along the valley floor in the northern half of the property.

Maps of scenic amenity at a finer resolution clearly show the strong effect of relief on scenic amenity. For example, the southern side of Glen Rock peak has a scenic amenity score of about 5.2. Other areas of relatively high scenic amenity occur immediately above the Casuarina Camping area, on the slopes of Glen Rock mountain, above Glen Rock homestead, and on the slopes of Mt Machar on the southern side of the valley. Other isolated sites of relatively high scenic amenity also occur next to moderately exposed semi-permanent flowing creeks in the upper part of the valley.

Whilst the highest score scenic amenity score at Glen Rock of 5.5 (out of 10) indicates only moderate regional significance, this is due to relatively low visitation numbers. Some scenery, from tops of mountains and around the semi-permanent creeks, are among the best in south east Queensland, with scenic preference ratings of 8-9 on a ten point scale.

Management and development of recreation facilities at Glen Rock must be sensitive to peoples strong preference to maintain highly natural landscapes. Assessment of visual impact should take into account the effect on ground views, but also the effect on views from walking trails and lookout points from hillsides and mountain tops.

The greatest appeal of Glen Rock, to the potential visitors who were surveyed, is the undeveloped nature of the property. Whilst increasing visitor numbers to Glen Rock will also increase scenic amenity values, this will need to be achieved with sensitive planning of facilities.

1 INTRODUCTION

We all draw pleasure from looking at beautiful landscapes. Beautiful natural areas are often protected from development because of their appearance, and a desire to exclude or restrict development from such areas. At the same time, some buildings have little effect on our responses to the landscape.

At a broad level, it is easy to reach agreement about what we like to look at, or what we dislike. For example, the appearance of rolling green hills and shady trees is relaxing. These images can also make us think what it would be like to picnic there, what it would be like to walk through that space, or what happened last time we were in a similar place. On the other hand, industrial buildings can make us feel stressed or annoyed. When we see houses built on a beautiful area that was once farm land or bushland, we can also feel a sense of loss.

The exact nature of peoples responses though, are often colored by their experience of the landscapes around them, and the expectations generated by their cultural environment. A person who lives and works on a farm has a different set of expectations of the landcsapec than a person who has always lived in the inner city.

People with responsibility for planning and management of areas used for public recreation are faced with the dilemma of providing facilities for people, such as roads, picnic areas, and accommodation (ie. to meet a purpose) and ensuring that these facilities do not detract from the appearance of environment people come to experience.

South East Queensland is currently experiencing a rapid growth in population because of our favorable climate and environment. Twenty nine percent (29%) of Australia's population growth between 1991 and 2011 will occur in South East Queensland, equivalent to all of NSW's share of growth over the same period. This growth of population is paralleled by a loss of open space, especially in coastal areas, due to increased urbanisation of farm land and bushland. At the same time, there is an increasing demand for natural and near-natural areas for people to undertake outdoor recreation.

Whilst all people appreciate the aesthetics of landscapes, the complex interaction our psyche and the environment has contributed to a lower understanding of scenic amenity compared to some other values. Because of the diversity of opinion about scenery, there has been a tendency to assume that it is subservient to other practical needs of our community.

A recently completed project, the Moggill Scenic Amenity Pilot Study, provides a useful methodology to objectively survey community preferences for different types of scenery. The assessment of Scenic Amenity for Glen Rock is the first application of this method outside of the Moggill project.

The methodology provides an important vehicle for gathering information about how people value the scenery at Glen Rock, compared to other places of South East Queensland. By assessing and recognising the scenic amenity of different parts of Glen Rock and including this information to a plan of management, we can ensure that peoples recreation experience is maintained and enhanced.

Consideration of scenic amenity at Glen Rock, and in similar planning projects in SEQ will improve the lifestyle of people who live, work, and travel throughout our region.

2 BACKGROUND

Glen Rock is a regional park of about 6,300 ha, about 130 km south west of Brisbane, which was purchased by the state government in about 1996 to provide for a range of community uses. Opportunities for outdoor recreation and education, were seen as priority uses of the park, as well as continued rural land use and protection of nature conservation values. Three sites have been developed for picnickers and campers.

Major development of the park however, has awaited the development of a plan of management, which would develop an overall vision for the property, and identify specific locations where particular uses should be given priority, and where some uses should be restricted or excluded.

Glen Rock is but one of a series of properties which have been purchased by the Regional Landscape Strategy to achieve its goals of protection regionally significant open space in South East Queensland. The Regional Landscape Strategy is a government program under the South East Queensland Regional Framework for Growth Management.

A Glen Rock Community Advisory Committee, established by the Regional Landscape Strategy endorsed the development if a multiple use management plan for the park in 2000. Development of the management plan has been contracted to the Forest Management and Sustainable Use group within the Department of Natural Resources. The planning process to be applied at Glen Rock is a participatory and multiple use planning process (MUMPS). The MUMPS process seeks to optimise community benefit from the park in a sustainable manner. Values and uses which are taken into account in this planning process include Ecotourism, Nature Conservation Values, Cultural Heritage (non-indigenous), Cultural heritage (Indigenous), Military Training Values, Forest Products, Scenic Amenity, Outdoor recreation, Outdoor education, and Water Quality and Quantity.

The procedures used for assessment of scenic amenity in for the Glen Rock management plan have been drawn from a new study recently commissioned by the Regional Landscape Strategy and the Brisbane City Council. This study, called the Moggill Scenic Amenity Pilot Study has developed a Geographic Modelling and objective Community Participation approach for mapping scenic amenity. The method has community confidence, is able to withstand the rigors of current government planning processes, and which is capable of being readily applied to other areas in South East Queensland.

Assessment of Scenic Amenity at Glen Rock, using the Geographic Modelling and Objective Community Participation approach, is the first application of this technique outside the Moggill study.

Assessment of Scenic Amenity therefore provides an important opportunity to validate and refine the Moggill method, as well as provide an important input to the Glen Rock Management Plan.

3 REVIEW OF OTHER STUDIES

The Moggill Scenic Amenity Study (Preston, 2001) provides a thorough overview of previous studies and methodologies. A summary of this review is contained here, within the context of the Glen Rock Project.

3.1   PREVIOUS STUDIES IN SEQ

Three contemporary studies provide examples of recent contemporary approaches to the assessment of scenic amenity. The Visual Assessment of South-East Queensland (Loder and Bayly, 1993) was initiated by SEQ2001, the precursor RFGM. The project worked from classical theory that visual quality increases with increasing relief and topographic ruggedness, vegetation (and land cover) pattern, presence of natural landscapes, absence of unnatural landscapes, and water forms, water edges, and water area. The Landscape Assessment of Tambourine Mountain (Loder and Bayly, 1994) was more detailed than the 1993 Visual Assessment of SEQ study. Tambourine Mountain was identified in 1993 as a landscape of high regional significance. Visual aspects of the landscape were a primary consideration. Other values included in the analysis were historical significance, natural environmental significance, and social significance. Coastal Landscapes of Queensland (Brannock Humphreys, 1997) is the most contemporary and widely accepted study of its type. The project has produced maps for use by state and local government showing the location of highly valued coastal landscapes. The method has been expert based and used stakeholder workshops in support of the mapping work, which included discussion of photographs. These workshops highlighted the range of views within the community about how people value landscapes.

3.2   DEFINITION USED IN OTHER STUDIES

The term Scenic Amenity has not been widely used in Australian or overseas studies to define the scenic value of open space. Some other common definitions include:

- *Scenic beauty* is widely used in United States studies of visual preference of forest scenes (Rosenberger and Smith, 1998). Scenic Beauty was first described by Daniel and Boster (1976) as "a relative measure of public visual preference for a landscape". Scenic beauty strictly excludes other cultural or ecological values. It is also driven by community preferences, rather than expert opinion or landscape theory, and is measured on a 10 point scale.

- *Visual quality* and *scenic quality* are widely used terms that are generally synonymous with scenic beauty, except that there is no explicit effort to assess the beauty of a landscape, compared to other values. In some cases, assessment is based on expert theory (Bergen, 1993), and in other cases, it relies on public surveys (eg. Prineas and Allen, 1992). \

- *Landscape value* or *landscape quality* is used to describe a composite of the scenic value, and other cultural and environmental values. The UK Countryside Commission (1993) suggests that the landscape value includes the scenic or visual dimensions of the landscape, plus other dimensions including geology, topography, soils, ecology, anthropology, landscape history, architecture, and cultural associations

- *Aesthetic significance* is commonly used in Australia as one of the components of cultural heritage value (Australian Heritage Commission, 1998). Aesthetic significance is also used as one of the criteria to assess the heritage significance of a site under the Queensland Heritage Act (1992). A major study to identify areas of high aesthetic value was completed for the Queensland Comprehensive Regional Assessment (CRA) / Regional Forest Agreement (RFA) Steering Committee (Lennon and Tinsley, 1998).

- *Landscape class*, indicating the level of naturalness of a landscape, has recently been applied by the joint project in South East Queensland to assess Outdoor Recreation Opportunities (Department of Natural Resources, Department of Sport Tourism and Racing, 1999). This system is an adaptation of the Clark and Stankey (1979) Recreation Opportunity Spectrum, which is has also been used as the foundation for other landscape mapping studies in Queensland (eg. Loder and Bayly, 1993; Brannock and Humphreys, 1997).

- *Landscape character* is a term with growing interest and acceptance (for example Countryside Commission, 1993; Brabyn, 1996) that gives recognition to the local context or setting, and to the landscape characteristics distinctive to a particular area. Landscape character is also more widely applied to modified landscapes containing a range of natural, rural, and built landscape elements.

- *Scenic character* has been used in recent assessment of Airlie Beach (Green, 2000). Scenic character is very similar to the notion of scenic preference adopted in this study, because it is based on a qualitative survey of people in the community using photographs to evoke people's responses.   However, scenic character was not scored using a 1-10 rating.

- *Visual amenity* has been used by the Maroochy Shire Council (1992) in its plan for the Blackall Ranges, as an all-embracing term, which includes scenic quality, character and community value.

- In conclusion, the terms *scenic beauty, visual quality,* and *scenic character* are highly synonymous when assessed using community surveys. It is suggested that the term *scenic preference* be adopted in this study, because it implicitly defines that it is a statement of the relative liking of scenery as measured by community assessment.

Scenic preference is only one part of the equation. It does not recognize that higher community value is placed on parts of the landscape which have more impact and can be seen more often than other parts of the landscape. The term *visual amenity* encapsulates the notion that some areas can be seen more often by the community than others. Also, most applications of *visual quality* assessment require an assessment of visual sensitivity, or the degree of exposure. The term *vista scenic beauty* recognizes that some parts of the landscape are seen more often than others. It is appropriate however to introduce another term. *Visual exposure* is an appropriate term to describe the relative impact of a place in the landscape by taking into account the number of viewers, their appreciation of scenery, and the distance between a viewer and a place in the landscape.

3.3   DEFINITION OF SCENIC AMENITY

As explained by Preston (2001), assessing scenic amenity is not just about defining and locating areas of 'beautiful' scenery. It involves assessing the extent that the community values the appearance of the landscape. It also involves assessing which parts of the landscape are valued because they can be seen from various vantage points.

This study has adopted the same definitions of the report by Preston (2001), which defines *Scenic Amenity* as a measure of the relative contribution made by different places in the landscape to the collective community appreciation of open space as viewed from places which are important to the public.   Scenic Amenity involves the integration of two factors,

Scenic Preference and *Visual Exposure*. A schematic representation of the derivation of Scenic Amenity is given in Figure 1.

Scenic preference is defined as a rating of peoples liking for different types of scenery of open space compared to areas occupied by built structures, measured using photographic stimuli. It includes peoples visual responses and non-visual responses, to the extent that these responses are evoked by photographs of scenery. A complete assessment of community appreciation of aesthetics would require an on-site assessment by a comprehensive sample of people. Since this is impractical in most studies, scenic preference provides a feasible method of measuring communities aesthetic appreciation of the landscape.

Visual exposure is a measure of the extent to which a place in the landscape is seen from important public viewing locations such as roads, recreation areas, schools, or golf courses.
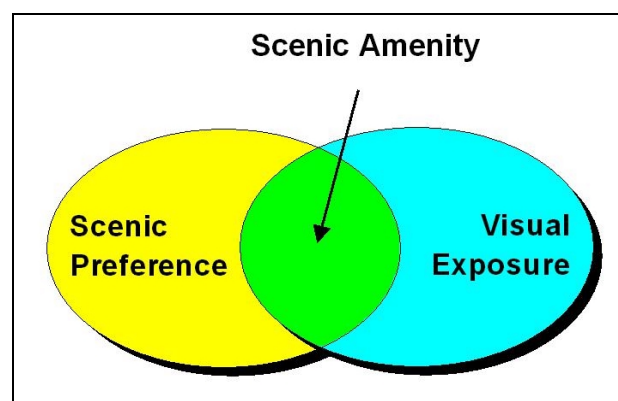
Figure 1. Components of Scenic Amenity

Scenic Amenity is principally a measure of the communities benefit from viewing open space. However, the visual image of open space evokes responses about other open space values. For example, a person's response to an image of eucalypt forest may be partly influenced by the conservation values of that person toward eucalypt forests and conservation. Similarly, a person may respond positively to a view of a fresh running creek because it evokes memories and thoughts about the sound of the running water, and the bird life that may be present. Even thought Scenic Amenity is separate to other open space values, it is linked to them because of memories, knowledge, values and emotions evoked by the visual image of open space.

3.4   EVALUATING PEOPLES RESPONSES

In broad terms, four different methods that can be used to assess how people respond to the landscape (adopted from Zube et.al. 1982).

- *Expert techniques.* These methods are often applied by experienced landscape architects based on previous experience and formal landscape theory, taking into account features such as line, form, colour, and texture. Expert techniques have the advantage that they do not require assessment of community preferences. This avoids the complex tasks of assessing what the community prefers, and associating community preferences with areas on maps. Whilst cost effective, it

is difficult to know if maps produced by this technique concur with the full spectrum of community values.

- *Quantitative surveys.* These methods seek to use quantitative social research techniques to measure the relationship between human responses to the environment and physical features of the landscape through testing of observers' preferences. Assessment of people's visual preferences for different types of scenery is used widely in United States based research of Scenic Beauty Estimation procedures, initially promoted by Daniel and Boster (1976). Another example of the use of quantitative surveys is the work by Prineas and Allen (1992) and the recent study by Green (2000).

- *Focus groups.* These methods use social research techniques (usually focus groups led by a person trained in psychology) to understand and describe the feelings and perceptions of groups of people who interact with the landscape. It is usual to seek to describe the meaning that landscapes can hold for people.

- *Individual experiential approaches.* These methods are based on understanding the individual experience in the human-landscape interaction, a person's subjective feelings, expectations, and their interpretations of an encounter with the landscape.

In conclusion, the *quantitative survey* technique was considered most appropriate by Preston (2001) because it provides a scientific basis for assessing community preferences. It is important however, to also compliment quantitative surveys with qualitative focus group discussions or individual interviews, to ensure that the language being used to evaluate preferences is appropriate to the community and landscape being assessed.

3.5   SOURCES OF VARIATION IN COMMUNITY PREFERENCES

Prior studies have shown that while there is general agreement between different groups of people about which types of scenery are preferred, there are also major and important differences between different groups of people. Factors that have been demonstrated in overseas studies (eg. Dearden, 1981) to affect people's responses to landscapes include:

- Familiarity with the landscape. For example, farmers and long term residents appreciate farms, whereas non-farmers and recent residents prefer natural landscapes.

- Education level. People with a higher education level tend to place higher value on natural landscapes.

- Professionals compared to residents. The scenic preferences of people employed as landscape architects, planners and practitioners differ significantly from the preferences of the general public

- Ethnicity, age, distance from the landscape, and income have also been found to important factors in describing people's responses to the landscape.

It is therefore important to involve a range of people with different backgrounds, age groups, and education levels in assessing scenic amenity, in order to avoid any potential bias in measuring community preferences for scenery.

3.6 MEASURING PEOPLES RESPONSE TO SCENERY

Zube (2000) and Russell et. al. (1981) presents a model which explains the variety of peoples emotional (or affective) responses the environment. People can express a degree of liking or dislike for a landscape, but in order to understand what has evoked a response, it is helpful to be able to track the type of response. The failure to address these dimensions of response has been one of the criticisms made of quantitative survey techniques (such as scenic beauty estimation) that require people to record only one score of 10-1 for photographs.

A universal model has been suggested to describe people's responses to environment that can allow us to track those features that evoke the strongest responses from people. This model (see Figure 2) indicates that pleasure and arousal can be genuinely independent of one another. This is a circular model, where it is suggested that any response to the environment can be plotted according to the strength of association with these four main axes.
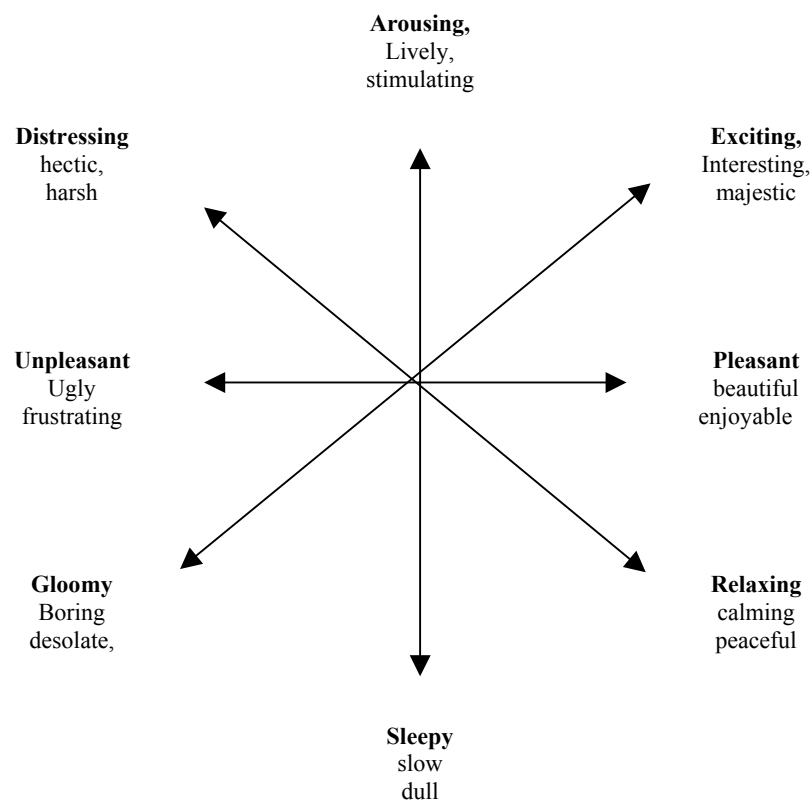
Figure 2. Dimensions of emotional responses (after Russell et. al., 1981)

In the Moggill study reported by Preston (2001), people were asked to respond to a series of 17 different adjectives, based on the Russell model and open ended responses from survey participants. Peoples responses to these adjectives were grouped into 3 independent factors, being Factor 1 (pleasing), made up of adjectives - attractive, inspiring, inviting, beautiful, harmonious, interesting, lush, calm, safe; Factor 2 (displeasing) - threatening, depressing, confining, ruined, monotonous, busy, and Factor 3 (isolation) - isolated, solitary, (not) busy. The study found that there was no clear association with the general model proposed by Russell et. al (1981).

It is therefore appropriate to improve the survey response method to seek peoples explicit response to the major factors of the Russell model which are relevant to response to open space landscapes. These are:

1. Relaxing, calming, peaceful – Distressing, hectic, harsh

2. Exciting, interesting, majestic – Gloomy, boring, desolate,

3. Pleasant, beautiful, enjoyable – Unpleasant, ugly, frustrating

In addition, people should be asked open ended questions about their response to the scenery, and what they noticed about the scenery.

3.7   MAPPING SCENIC PREFERENCE

The most common method used to allocate community preferences for different types of scenery to location son a map is for a professional to directly allocate the value to the map unit based on the observed features, such as was used by Loder and Bayly (1993).

A second approach is to use a statistical model of scenic preferences to allocate preferences to maps, based on aerial estimates of land cover for particular land units (eg. Prineas and Allen, 1992; Bishop and Hulse, 1994; Bishop, 1996). Within this second approach, there are a variety of possible mechanisms able to be used to implement models. A major consideration in this second approach is whether to use a polygon approach, which involves delineation of boundaries between different landscape units (eg. Pineas and Allen, 1992), or to use a continuous mapping approach, which uses a 3D GIS approach to draw all possible viewsheds from all possible view points (eg. Bishop and Hulse, 1996).

Preston (2001) suggests that the most practical and robust approach is to estimate land cover percentages for all types of land units, using photographs obtained for the perception study, and to apply the scenic preference model to these estimates. Whilst this is not as sophisticated as other GIS methods, it is readily implemented and does not require massive GIS processing. This approach is also appropriate because of the strong effect of land cover in the foreground and mid-ground on prediction of scenic preference.

3.8   MAPPING VISUAL EXPOSURE

Mapping of Visual Exposure mapping can be manually produced from topographic maps, or, in more recent times, by analysis of a Digital Elevation Model in a Geographic Information System. Maps of the 'seen area' require identification of particular vantage points (eg. lookouts, picnic spots, roads) so that a map can be produced which takes account of the number of viewers from multiple locations and their duration of viewing (eg. Bergen, 1993).

A number of procedures have been developed to automate the process of seen area analysis, by taking into account the distance between observation points and places in the landscape, as well as the orientation of the landscape to the view point (eg. Bisshop, 1993, Wang et.al 2000).

An automated approach taking into account vantage points, the level of appreciation of viewers, as well as well as topographic considerations, was implemented by Preston (2001). The Glen Rock project uses the same models built to map visual exposure at Moggill.

3.9   SCALE

Maps at a coarse scale (eg. 1:100,000 scale) can be used to provide a strategic overview of a region. Mapping for local government planning is usually conducted at a more detailed scale of 1:25,000 to 1:5,000 scale. More detailed maps have a greater correspondence with what people can see whilst standing on the ground. The main issue however is that the cost of mapping escalates as you increase the detail of the map. For example it takes sixteen maps of 1:25,000 scale to cover the same area as a 1:100,000-scale map. In general it is usual to use source material (eg. aerial photographs) from the same scale or at a greater scale than the final maps produced by the study.

Whereas mapping for the Moggill Study was conducted at 1:15,000. it is considered appropriate for this Glen Rock project to map Scenic Amenity at a scale of 1:25,000 in view. This scale has been used for other assessments conducted for this project (eg. Nature conservation).

4 METHOD OVERVIEW

The same structured approach used by Preston (2001) was used in this study. Assessment of scenic amenity is divided the study into five stages as depicted in Figure 3.

- A *perception study* (1) is used to develop a statistical model that expresses community preferences for different types of landscapes.

- These models are applied during *scenic preference mapping* (2), which relates peoples preferences to maps of land cover and topography.
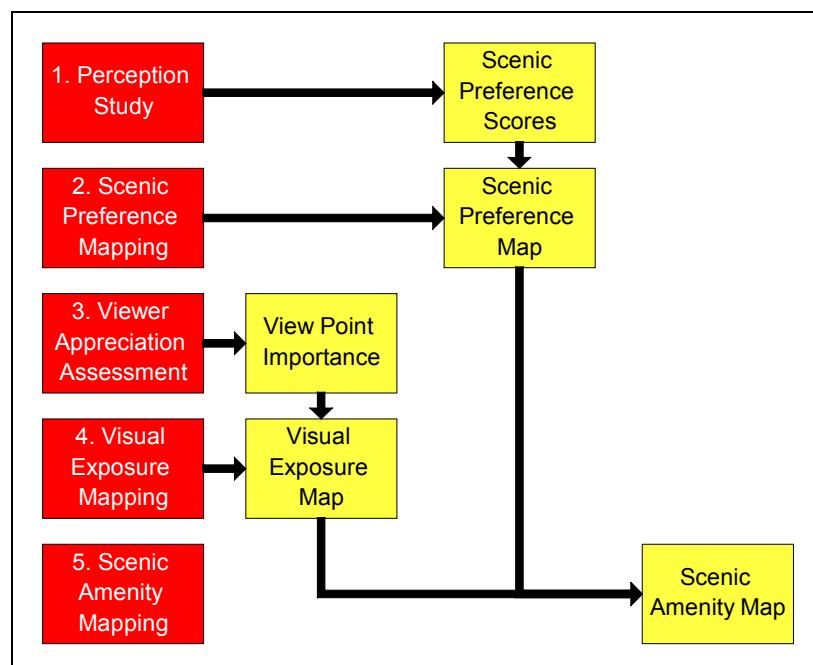
Figure 3. Stages involved in assessing scenic amenity

- A *viewer appreciation assessment* (3) identifies all important viewing locations and allocates a weighting to each location based on an assumed viewing duration, appreciation levels, and an estimated number of viewers per day. This provides an importance value for view points as an input to visual exposure mapping.

- *Visual exposure mapping* (4) relies on the use of a digital terrain model to assess how often a place in the landscape can be seen from view points. This assessment is weighted by the distance between a point in the landscape and the view point. It also takes into account the visibility from the view point and the orientation of the landscape to the viewer.

- The final stage of *mapping scenic amenity* (5) requires integration of the visual exposure map and the scenic preference map, to identify the relative contribution made by different places in the landscape to the collective community appreciation of viewing scenery of open space.

5 DESCRIPTION OF THE STUDY AREA

The study is located about 130 km south west of Brisbane and 42km south of Gatton as depicted in Figure 4. To travel to the property, from Gatton, visitors need to drive along the Mt Sylvia Road, turn left into East Haldon Road, until you see the entrance to the Glen Rock Property.

Figure 4. Location of the Glen Rock property

The Glen Rock property was bought five years ago by DNR as part of the Department's South East Queensland Regional Landscape Strategy to provide more open space and recreation opportunities for the growing community of South East Queensland.

Glen Rock protects a diverse range of landforms, vegetation and wildlife. It stretches from the fertile flats of the Blackfellow Creek, Shady, Flaggy and Black Duck Creeks to the rugged gorges and ridges and high plateau country of the upper reaches of the Tenthill Valley. The vegetation communities range from open woodlands and rocky escarpments to dry and wet rainforest. Wildlife such as the vulnerable brush-tailed rock wallaby, powerful owl and glossy black cockatoo inhabit the area.

Figure 5 shows the location of major recreation facilities, the Angophora Day Use Area, the Casuarina Camping Area, and the Casuarina Day Use Area (next to the camping area). Major peaks in the study area are Mount Philp, Glen Rock, Mount Machar, Mount Hennessy (just outside the property) and Point Pure.

Figure 5. Location of existing recreation facilities and major peaks

6 PERCEPTION STUDY

6.1 OVERVIEW

There are eight stages to the perception study. These are:

- divide the area into different land cover and topographic types by mapping land units
- acquire a set of photos which represent different types of land
- identify a cross-section of people who represent the community of interest
- design the survey technique to suit the community and geographical area
- collect information on peoples responses to scenery in photos
- assess the content of each photograph
- identify important landscape components associated with emotional responses
- produce a model that predicts scenic preference from photo content
- analyse the diversity of community responses to photos and identify any trends.

6.2 BASE LAND TYPE MAPPING

Of the five factors which can be mapped and which may influence people's response to photos (Preston 2001), two were taken into account in the initial land type mapping study. These were:

- Density of tree cover
- Steepness of the land and its elevation above the surrounding area

The two of the other three factors (density of buildings, presence of transmission lines) are not major elements in the landscape at Glen Rock. The third factor, presence of distinctive land cover types (esp. water, crops, grass) was assumed in the initial mapping to be adequately represented by the information on changed tree density.

Two sets of information were used to produce initial land types for the study. Existing 1:25,000 vegetation mapping (Grimshaw, 2000) was used to identify different vegetation and land cover characteristics. Digital terrain information was used to map slope classes.

Vegetation maps were compressed into a seven class map according to tree density and the presence of distinctive land types, as indicated in Table 1. These were further compressed according to tree density as summarised in Table 3.

Table 1. List of land types based on vegetation maps

Land type			Mapped vegetation type and major species			
Group	Tree density	Description	Type	Species	Type	Species
1	5	Improved pasture	A	Agriculture		
2	5	Native pasture	C	Cleared		

Land type			Mapped vegetation type and major species				
Group	Tree density	Description	Type	Species		Type	Species
3	10	Thinned trees / lantana	R	Regrowth			
4	40	Creek vegetation	3a	Eucalyptus tereticornis, Casuarina cunninghamiana		3c	Eucalyptus tereticornis
5	80	Tall shady open forest	8a	Eucalyptus biturbinata, Eucalyptus eugenioides		8b	Eucalyptus tereticornis, Eucalyptus melliodora
			8e	Lophostemon confertus, Eucalyptus tereticornis		8h	Eucalyptus saligna
6	90	Tall shady closed forest	8n	Argyrodendron actinophyllum			
7	40	Tall sunny open forest	8d	Eucalyptus crebra, Eucalyptus melanophloia		8j	Eucalyptus moluccana
			8k	Eucalyptus albens		9h	Eucalyptus crebra

A digital elevation model of Glen Rock was used to produce a map of elevation range within an area of 200m. This data was then simplified using criteria in Table 2 to produce a four class elevation range map as shown in Figure 7.

Table 2. Criteria to produce land types based on elevation range

Elevation range class	Description	Lower limit	Upper limit
1	Flat	0m	40m
2	Low range	40m	80m
3	Moderate range	80m	120m
4	High range	120m	600m

Vegetation density and elevation range maps were combined to produce 20 possible initial land types as described in Table 3.

Table 3. Criteria used to define initial land types

	Tree density				
Elevation Range	Very dense (90%)	Dense (80%)	Moderate density (40%)	Low density (10%	Very low density (5%)
Flat	1. Flat very dense trees	2. Flat dense trees	3. Flat moderate tree density	4. Flat low tree density	5. Flat very low tree density
Low elevation range	6. Low range very dense trees	7. Low range dense trees	8. Low range moderate tree density	8. Low range low tree density	10. Low range very low tree density
Moderate elevation range	11. Mod range very dense trees	12. Mod range dense trees	13. Mod range moderate tree density	14. Mod range low tree density	15. Mod range very low tree density
High elevation range	16. High range very dense trees	17. High range dense trees	18. High range mod tree density	19. High range low tree density	20. High range very low tree density

These land types were used to assist with stratification of the study area to ensure that photographs represented all major land types in the area.
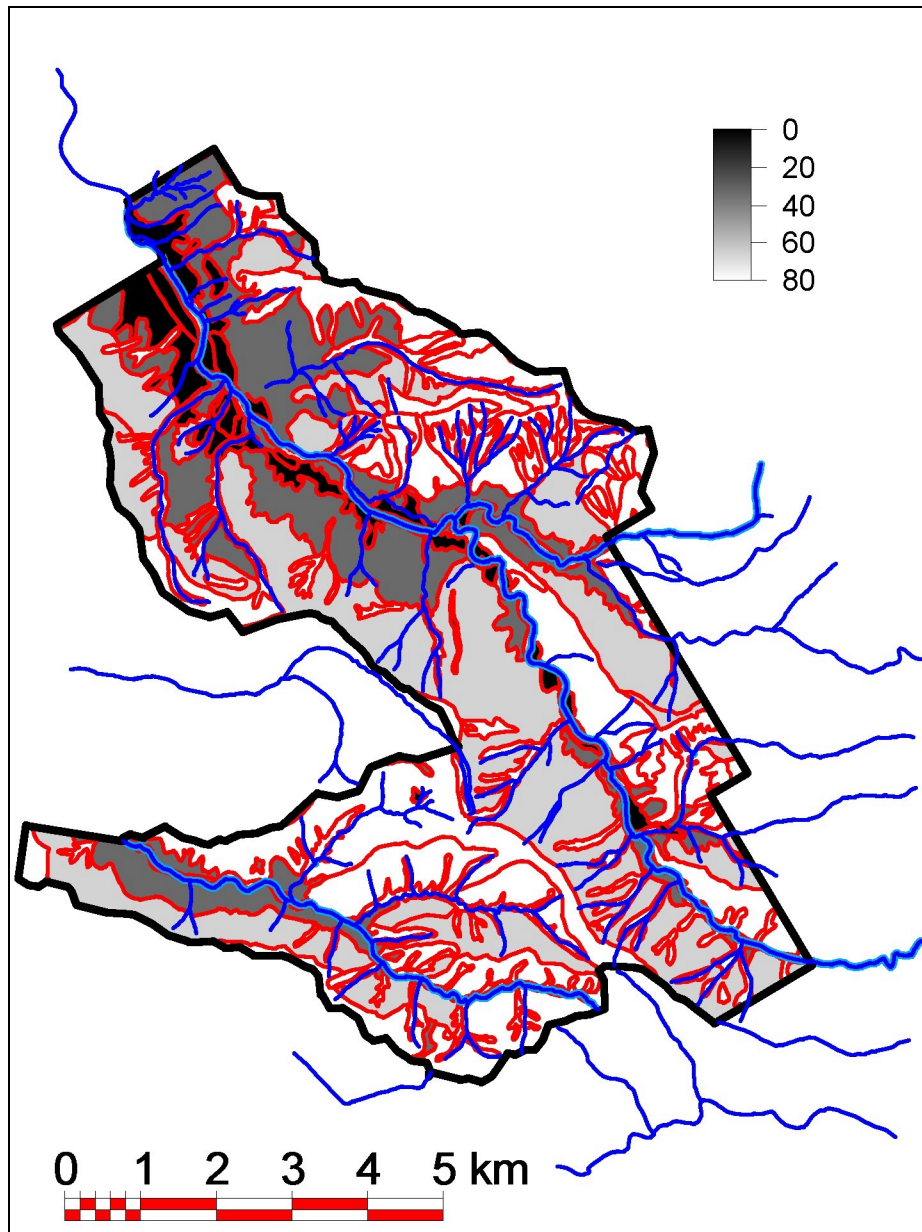
Figure 6. Tree density
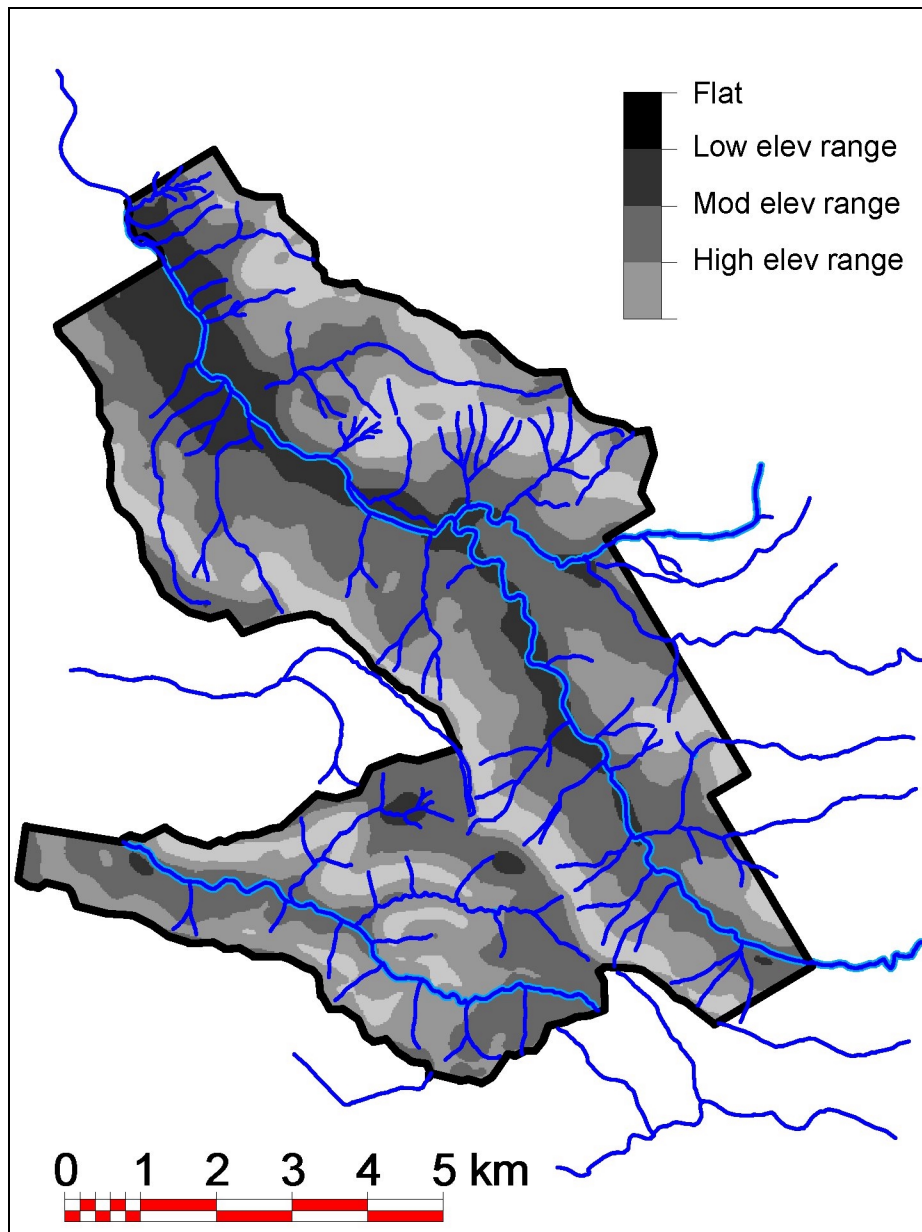
Figure 7. Elevation Range

6.3 ACQUISITION OF PHOTOS

About 120 photos were taken of Glen rock to represent all land types and various land features in range of different viewing positions. Photos was chosen to represent the variability of the land cover types, and the possible combinations of objects in foreground, mid-ground, and background positions. A set of 21 different photos was selected from the pool to provide the best representation of different land types.

6.4 SELECTION OF PEOPLE

Based on a review of factors that may influence people's response, it was decided to select people from different groups as follows:

- Outdoor recreation users from Toowoomba and Brisbane
- Residents of Gatton Shire (Glen Rock is part of Gatton Shire)
- Government natural resource professionals
- International visitors to South East Queensland

A total of 60 people were therefore interviewed. Some of the demographic characteristics of these people are sumamrised in Table 4. As can be seen from this table, a reasonable balance was achieved in terms of gender, recreation groups, and location. Whilst this range is inadequate compared to the same size required to survey a full community, it provides a structured representation of potential and existing recreation users of the property.

Table 4. Characteristics of people interviewed

Sample group description	Gender		Rec group		Based in				
	Female	Male	Rec group	Not rec	Gatton	Toowoomba	Brisbane	Other	No. people
Govt. Nat Res. Planners	4	2		6			6		6
Brisbane Bushwalkers	4	1	5				5		5
Brisbane Horse Riders	2	3	5				5		5
Brisbane Ornithologists	2	2	5				4		4
Gatton Rural Residents	7	5		12	12				12
Gatton Town Residents	3	3		6	6				6
Others	2			3				3	3
Toowoomba Horse Riders	2	3	5			5			5
Toowoomba 4wd	1	3	4			4			4
International Backpackers	6	4		10				10	10
TOTAL	33	26	24	37	18	9	23	10	60

Figure 8 shows the number of people interviewed by age group. An even distribution of people across all adult age groups were surveyed.
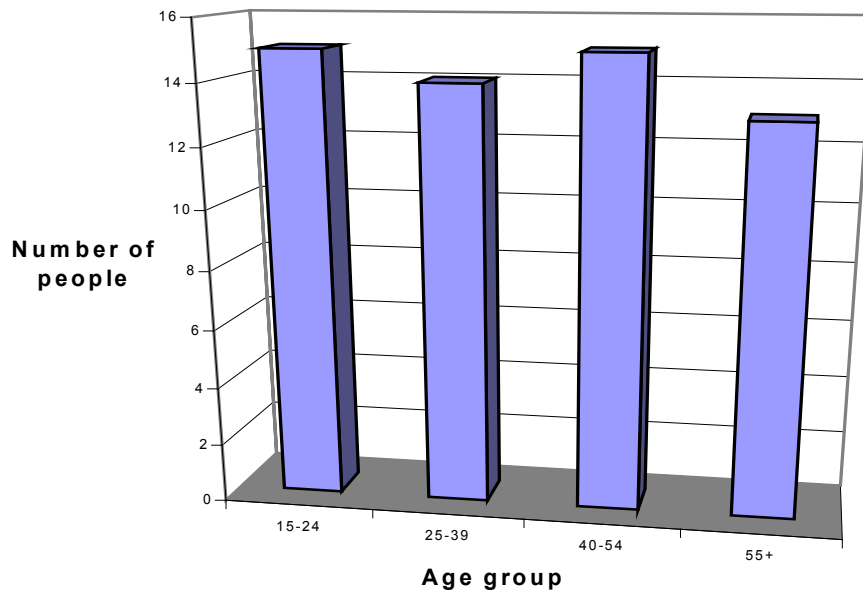
Figure 8. Number of people interviewed by age group

6.5   DESIGN OF THE SURVEY TECHNIQUE

A major literature review was conducted before commencement of surveys to determine the suite of questions needed to evoke a response from community members that would be adequate to closely examine differences between various community groups. Background research indicated that by asking people about there emotional response to photos, in addition to a basic preference rating, it was more likely that we could track particular landscape elements which contribute to a persons liking or dislike of scenery.

A series of pilot tests were conducted to develop the most appropriate language to be used and the structure of questions to be used in the survey. These tests indicated that the preferred structuring of the survey was as follows:

- Rank the photos in order on a table from the scene which is most preferred, to the scenery which is least preferred

- Record your rating from 10 (the most preferred) to the least preferred (1) scenery

- Record your score from 5 (inaccurately) to 1 (inaccurate) about whether each of the following (18) adjectives describes your response to the photo.

- Other information was also recorded about

  - Familiarity with natural landscapes (bushlands) (7-1)
  - Familiarity with rural landscapes (7-1)
  - Familiarity with river landscapes (7-1)
  - Familiarity with landscapes around Glen Rock (7-1)
  - Age
  - Gender
  - Occupation

- Country of birth
- Suburb
- Block type (Suburb, rural-res, agricultural)

A summary of response data is given in Table 5. Full results from this tabulation are given in Appendix 3.

Table 5. Summary of response data

PhotoID	Rating	Emotional	Beautiful	Calming	Interesting
1	9.5	*6.1*	6.1	*6.5*	5.8
14	8.3	*5.6*	*5.6*	5.6	5.6
2	8.3	*5.6*	5.6	5.3	*5.8*
4	7.5	*5.3*	5.3	5.2	*5.5*
3	7.4	*5.2*	5.1	*5.4*	5.2
5	7.2	*4.9*	4.9	*5.1*	4.8
6	7.0	*4.8*	4.7	*4.8*	4.7
8	6.7	*4.7*	4.6	4.6	*4.9*
7	6.3	*4.5*	*4.6*	4.5	*4.6*
16	5.9	*4.3*	4.3	4.2	*4.5*
11	5.7	*4.0*	4.1	*4.2*	3.8
19	5.5	*4.1*	4.0	4.0	*4.3*
18	5.5	*3.8*	3.5	3.8	*4.2*
10	5.3	*3.6*	3.4	3.4	*4.1*
15	5.3	*4.2*	4.2	*4.5*	3.9
17	5.3	*4.2*	4.1	4.2	*4.4*
21	5.0	*3.9*	*4.0*	3.9	3.7
12	4.6	*3.5*	3.5	*3.6*	3.3
20	4.6	*3.6*	3.5	*3.6*	3.7
13	4.4	*3.3*	3.2	*3.4*	3.3
9	4.0	*3.2*	3.2	3.2	*3.4*

6.6 INTERPRETATION OF EMOTIONAL RESPONSE DATA

Because of the small sample size for this project (21 photos and 60 people) it is not possible to develop statistical relationships between landscape elements and emotional response data. Qualitative examination of the survey data indicates however, that this information will assist with identification of particular landscape elements which can improve the nature quality of future perception models.

Some examples of qualitative observations of the data include:

- The two photos of highest relative interest (ie. Have a high interest score compared to other emotional response scores) are for photo 10 and photo 18. Both photos have a high diversity compared scenery in other photos.

Photo 18   *Photo 10*

- The same two photos (10 and 18) are also have the lowest relative beauty.
- The two photos of highest relative calming effect (photos 15 and 1) have an absence of built structures and, in the case of photo 1, it is the only image with water.
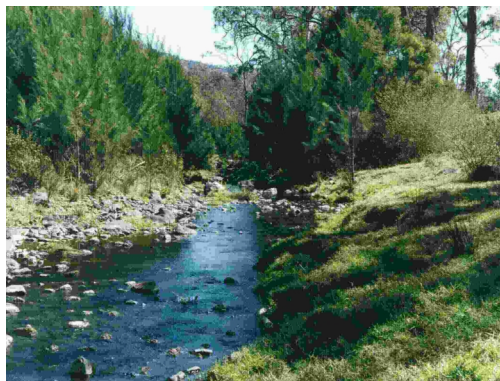
Photo 1   *Photo 15*

- There is a tendency for people to find scenery to be more interesting and more calming, than it is beautiful.

Whilst there is significant opportunity for further exploration and interpretation of data collected by this study, it demonstrates the potential value in collecting emotional response data to provide more complete understanding of peoples rating of scenery.

Interpretation

Preston (2001) found that one of the most important values of emotional response data was the ability to investigate the relationship between selected emotional response adjectives, and scenic preference rating. Using response data from 54 photos and 210 people, a relationship was identified which indicates that people have a positive response to photos with a scenic preference rating of greater than about 5.0. Similar analysis in the current study indicates that on average, people begin to have a positive emotional response for photos which have a rating of about 5.4.
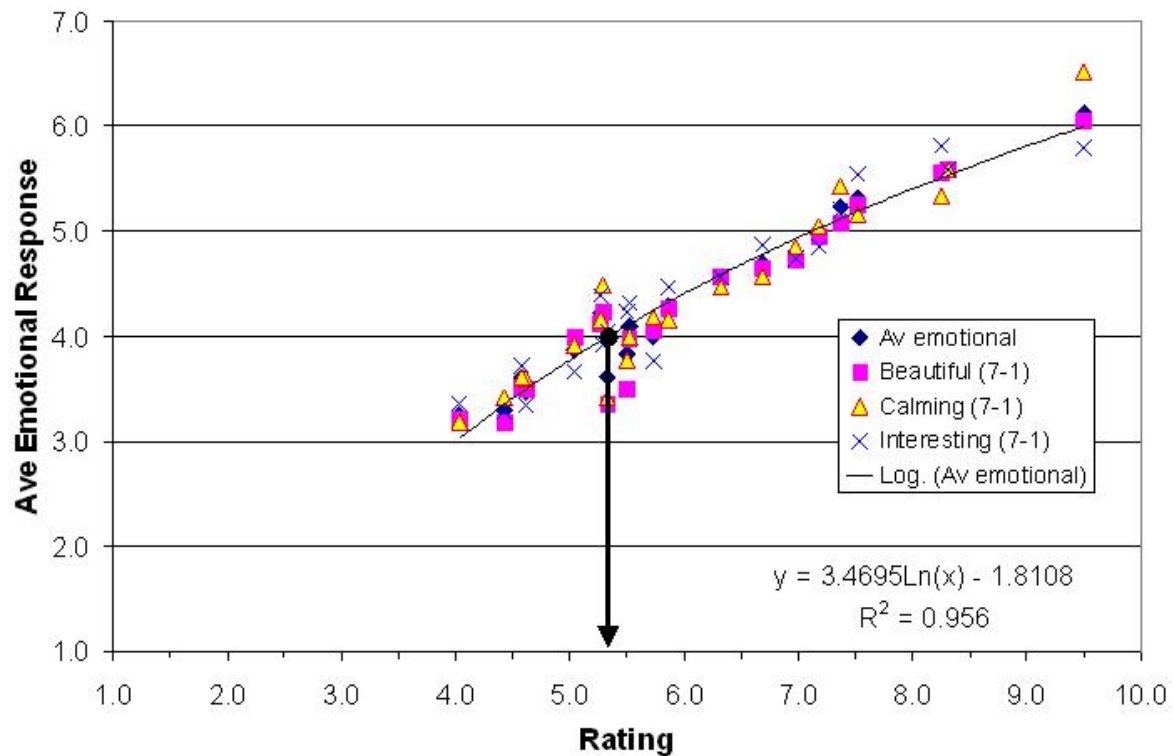
Figure 9 . Response V's Rating for the three emotional response adjectives
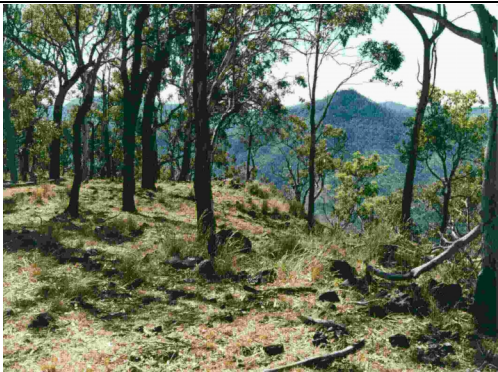
6.7 INTERPRETATION OF OPEN RESPONSE DATA

Most of the 30 people who were given the opportunity to record open responses against the questions 'what was your response' and 'what did you notice'. Some important observations are:

– The five words most often to describe what was noticed in the scenery were: trees (15 times), fence (12 times), cattle (10 times), fences (10 times), house (10 times).

– The five words most often to describe peoples response to the scenery were: dry (22 times), nice (17 times), peaceful (16 times), cool (12 times), boring (9 times).

The number of times each 'noticed' and 'response' word were counted for each photo. This process was useful to identify those components of the landscape which most affected peoples ratings of scenery. For example, the most commonly used words for the photos with highest and lowest rating are listed in Table 6

Table 6. Examples of most commonly used words for each photo

	Photo	Ave. Rating	Most commonly noticed	Most common response
	1	9.5	Water	Peaceful
	14	8.4	View	Beautiful
	13	4.5	Dead tree	Dry
	9	3.9	Rocks	Dry

Observations of these open responses emphasises the importance of running water, shady cool trees, and downward looking views to people's appreciation of scenery. This information was used to guide the selection of attributes recorded from photographs.

6.8   MEASURING CONTENT OF EACH PHOTOGRAPH

The method used to assess photo attributes was adopted from Preston (2001). The content of each photograph was estimated by overlaying a 100 cell grid on the photo. The dominant land cover in each cell was recorded. A second character was also recorded to indicate its distance from the viewer. A dual alpha code was recorded for each cell (see example in Figure 10).

Figure 10. Example of land cover coding

A total of 20 codes were used to describe land cover types (Table 7). Four additional codes were added because of response information recorded during interviews. These additional attributes are

- – Dense (shady) trees
- – Sparse (sunny) trees
- – Dead trees
- – Green grass
- – Brown grass

Table 7. List of land cover codes used to record land cover

Code	Description
X	Sky
T	Dense trees and natural shrubs (shady)
U	Sparse trees (sunny)
Z	Dead trees
R	River / streams
G	Green grass
O	Brown Grass
I	Industrial style (metal) buildings or signs
M	Modern houses
H	Traditional houses

Code	Description
P	Power poles
L	Transmission lines
W	Wooden or other fence in character
F	Brick or Other fences out of character
S	Soil
K	Rocks
A	Farm animals
B	Bitumen road
D	Track
C	Crops
E	Weeds

Three distance zones were recorded (Table 8).

Table 8. List of codes used to record estimated distance from view point

Code	Description
F	Foreground < 100m
M	Mid ground 100m-1km
B	Background 1km +

The first character of the dual code is the land cover type. The second character is the distance from viewer. For example "TF" means trees in the foreground, whereas "RM" means river in the mid-ground.

In addition to recording land cover and distance from viewer, an additional eight attributes were recorded to describe the topography and general character of the photograph. These additional attributes were:

- Fore-ground elevation range (<100m)
- Mid-ground elevation range (100m-1km)
- Back-ground elevation range (1km +)
- Total elevation range
- DNR Landscape class
- Scenic Amenity Setting
- Distinct land cover types
- Most distant object

A total of 78 base attributes were calculated for each photo, plus an additional 32 combined attributes, to give a total of 110 attributes for analysis. A complete list of all attributes is given in Appendix 2.

6.9   SCENIC PREFERENCE MODEL

Preliminary analysis was conducted to identify possible photo attributes to be included in the scenic preference model. Seven variables were found to be useful in this model as listed below:

- Percent trees, grass or water in the foreground (increasing percent positive)
- Percent dead trees (increasing percent negative)

- Elevation range in the foreground (increasing percent positive)
- Water in the foreground (increasing percent positive)
- Wooden fences in the foreground (increasing percent positive)
- Dense trees in the foreground (increasing percent positive)
- Sparse plus dense trees (increasing percent negative).

A simple robust model was also developed by regression analysis to predict scenic preference from photo content. This model uses three of the above photo attributes to predict scenic preference. Whilst the resulting equation explains only 52.2% of the variation of peoples responses (see Equation 1), it is considered stable and has a maximum variation of 1.5 between the observed and a predicted score.

Scenic preference rating (10-1) =   *4.497 (base score)*

*+ 0.1454 * Water in foreground*

*+ 0.0228 * Dense trees or green grass in foreground*

*+ 0.711 * Elevation range in foreground (1-4)*

Equation 1. Scenic Preference Model

This model indicates the strong positive effect water, dense trees, and steep terrain on scenic preference.

Figure 11 provides some examples of application of the model adapted from data on the composition of land types in the study area. This diagram illustrates how the increasing percentage of dense trees, green grass and water increases scenic preference. Note that the model tends to over-estimate scenic preference of photos taken from the flat valley floor with dry grass. All such areas receive an allocation of a score of about 5.2 from the model, whereas individual photos scored between about 4.0 and 5.3.
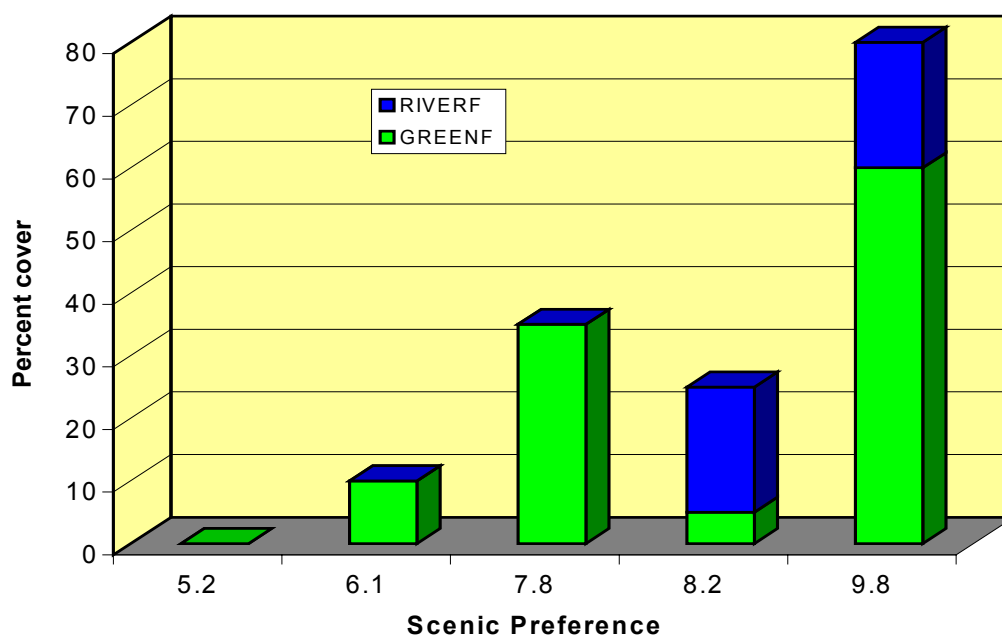
Figure 11. Examples of scenic preference predicted using equation 1

6.10 DIVERSITY OF COMMUNITY RESPONSES

Whilst the sample size is too small to identify any major conclusions about preferences between sample groups, some trends are apparent. The average response for each sample group were summarised for groupings of photos using the 'setting' attribute. Settings were – forest, agricultural, or water. Some observations from Figure 12 are:

– Brisbane Government Natural Resources officers have the highest preference for forest settings. Their preference for agricultural settings is lower than four groups.

– International backpackers have the lowest preference for forest settings, and for the river setting.

– Brisbane ornithologists have the lowest preference for agricultural settings of all groups. Gatton town residents have the highest preference for agricultural settings.

– All groups prefer forest and water settings over agricultural settings.

– Gatton town residents have the highest preference for the river setting.

The study found that there were substantial differences between responses from different sample groups for several important photos, the sample size is inadequate to include demographic attributes into the scenic preference model.
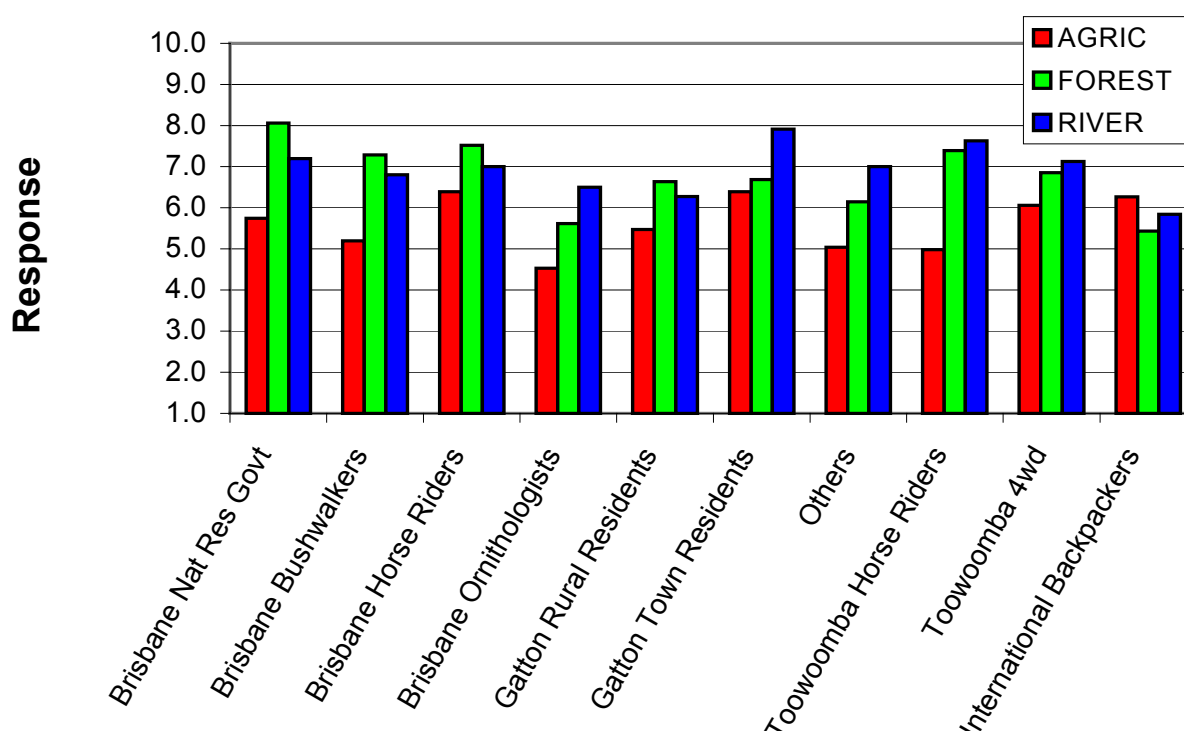
Figure 12. Average responses for sample group by setting

The observation that Government Professionals are outstanding, is consistent with results reported by Preston (2001). This group was found to express a stronger preference for scenery that appeared very natural than other sample groups. On the other hand, rural

residential residents were found to respond favourably to rural and slightly modified landscapes.

These conclusions reinforce the importance of sampling a wide range of community groups when developing scenic preference models, and highlight the difference between agricultural producers and government professionals in particular.

The models that have been developed could be said therefore to be widely representative of a spectrum of city and rural residents, recreation groups and other residents of the region.

6.11 REGIONAL SIGNIFICANCE

To assess the regional significance of scenery at Glen Rock, a second set of photos was created from around South East Queensland which also contained some of the photos from the main Glen Rock set. These 21 photos were shown to people in the main interview after they scored the Glen Rock set. Only about 40 people provided theses responses since examination of the second set was optional.

The selection of photos for this second set was qualitative, but effort was taken to ensure that a full range of natural to urban shots were used. To assist with cross comparison with work by Preston (2001), several photos from the Moggill study were also included.

The same interview technique was used for this second set, except that photos were only ranked then rated. A copy of photos and their ratings is given in Appendix 4. A summary of response ratings and their comparison with the Glen Rock set is given in Table 9.

Table 9. Response ratings for the SEQ photo set

SEQ set Photo no	SEQ set Ave rank	Variation in SEQ rank	Glen Rock set Photo no	Glen Rock set Ave Rank	Difference (%)
18	9.3	1.8	1	9.5	2%
3	8.2	2.0			
16	8.1	1.7			
10	8.0	1.9			
17	8.0	1.6	2	8.2	2%
8	7.7	1.7			
12	7.3	1.6			
6	7.2	2.2			
1	7.1	1.8			
23	6.7	2.0			
4	6.5	1.9			
21	6.4	1.8	16	5.9	8%
22	6.4	2.0			
19	5.6	2.3	18	5.5	2%
11	5.3	2.2			
13	5.1	2.2			
5	4.6	1.9			
14	4.2	2.3			
15	3.2	1.7			
7	1.4	0.7			
2	1.3	0.7			

This shows that there is only a minor variation between average scores for photos in the SEQ set, compared to the Glen Rock set. It has therefore been assumed that scenic preference ratings derived from the Glen Rock set can be used for assessing regional significance, without re-scaling.

7 SCENIC PREFERENCE MAPPING

7.1   OVERVIEW

Based on Preston (2001), the stages involved in scenic preference mapping are as follows

- Revision of base mapping of land units to reflect important land types identified in the scenic preference model
- Estimation of land cover proportions from photos obtained for the perception study and allocation to land units
- Application of the scenic preference model to estimate average scenic preference for land units
- Interpretation to ensure that the output maps are logical

7.2   REVISION OF BASE LAND UNIT MAPS

The perception study indicated that initial criteria for delineation of land types were adequate with the exception of the presence of running water and the presence of green grass. The location of semi-permanent streams were mapped by the Property Manager and entered into the project GIS. Streams were buffered by 50m to include stream-side vegetation as shown in Figure 13. Green grass was assumed to coincide with the location of improved pastures derived from the vegetation map.

A final land type map was constructed by intersecting the map of running streams with maps of elevation range and tree density. To reduce the complexity of this map, a simple classification was conducted based on elevation range, the proportion of shady trees or green grass, and the area of running streams in each polygon. This classification produced a map of 12 land types described in Table 11 and shown in **Error! Reference source not found.**.

Table 10. Final land types

Land type	Description
1	mod elev range low green
2	mod elev range mod green
3	hi elev range mod green
4	hi elev range low green
5	low elev range mod green
6	low elev range vlow green
7	vlow elev range vlow green
8	low elev range running stream low green
9	vlow elev range running stream low green
10	vlow elev range running stream high green

Land type	Description
11	vlow elev range green
12	mod elev range running stream high green

The content of photographs 21 photographs used in the perception study were tabulated against the mapped land types from which they were taken. These estimates provide an indication of the proportion of land cover types within each land type. These figures were used as the basis for estimating the proportion of land cover types present in each land unit type. Estimated proportions of each land cover type are shown in **Error! Reference source not found.**.

Scenic preference ratings were also predicted for each land type using Equation 1 from the perception study. As seen in Table 11 the highest scenic preference of 9.8 is for land type 12, which has a high percent of shady trees or green grass, running streams, and a moderate elevation range. The lowest scenic preference of 5.2 is for land type 7, which has a very low elevation range, very low amount of green grass or shady trees, and no running streams.

Table 11. Final land types and composition

Land type	Description	Percent shady trees or green grass	Percent running stream	Average elevation range	Predicted scenic preference
1	mod elev range low green	10.0	0.0	2.0	6.1
2	mod elev range mod green	35.0	0.0	2.0	6.7
3	hi elev range mod green	35.0	0.0	3.5	7.8
4	hi elev range low green	10.0	0.0	3.5	7.2
5	low elev range mod green	35.0	0.0	1.5	6.4
6	low elev range vlow green	0.0	0.0	1.5	5.6
7	vlow elev range vlow green	0.0	0.0	1.0	5.2
8	low elev range running stream low green	5.0	20.0	1.0	8.2
9	vlow elev range running stream low green	5.0	20.0	1.0	8.2
10	vlow elev range running stream high green	60.0	20.0	1.0	9.5
11	vlow elev range green	35.0	0.0	1.0	6.0
12	mod elev range running stream high green	60.0	20.0	1.5	9.8
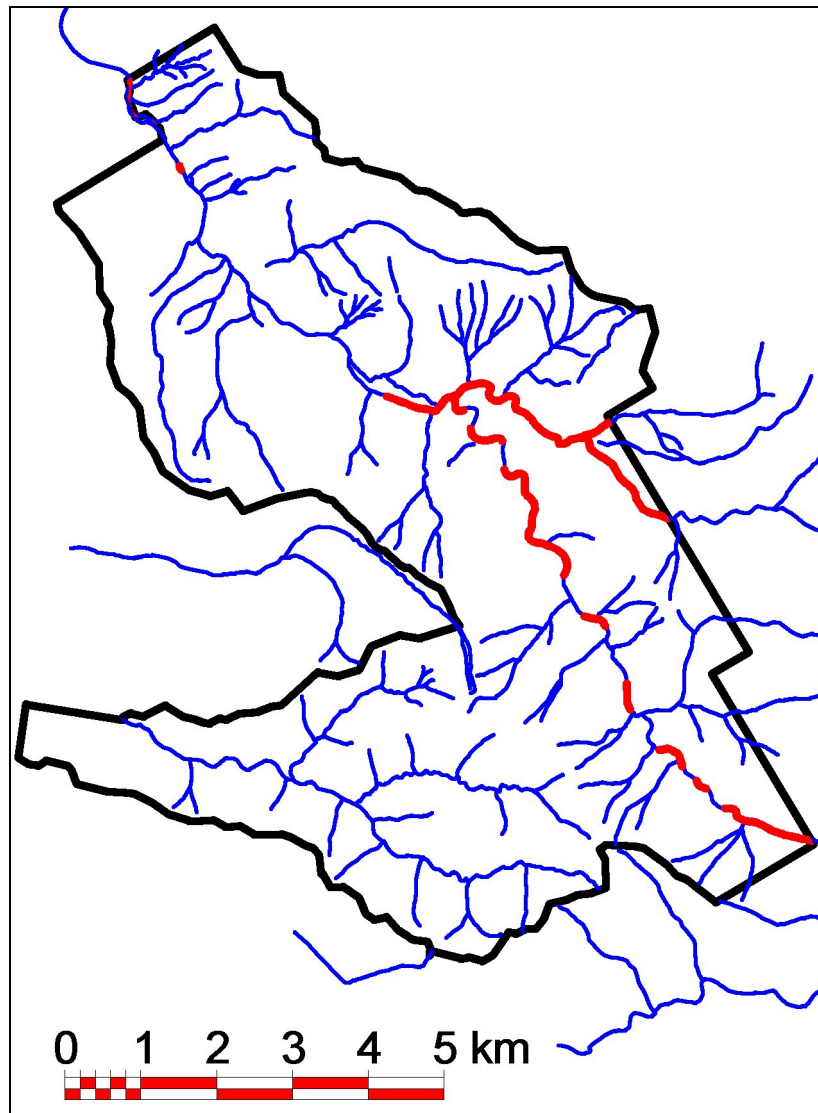
Figure 13. Location of running streams
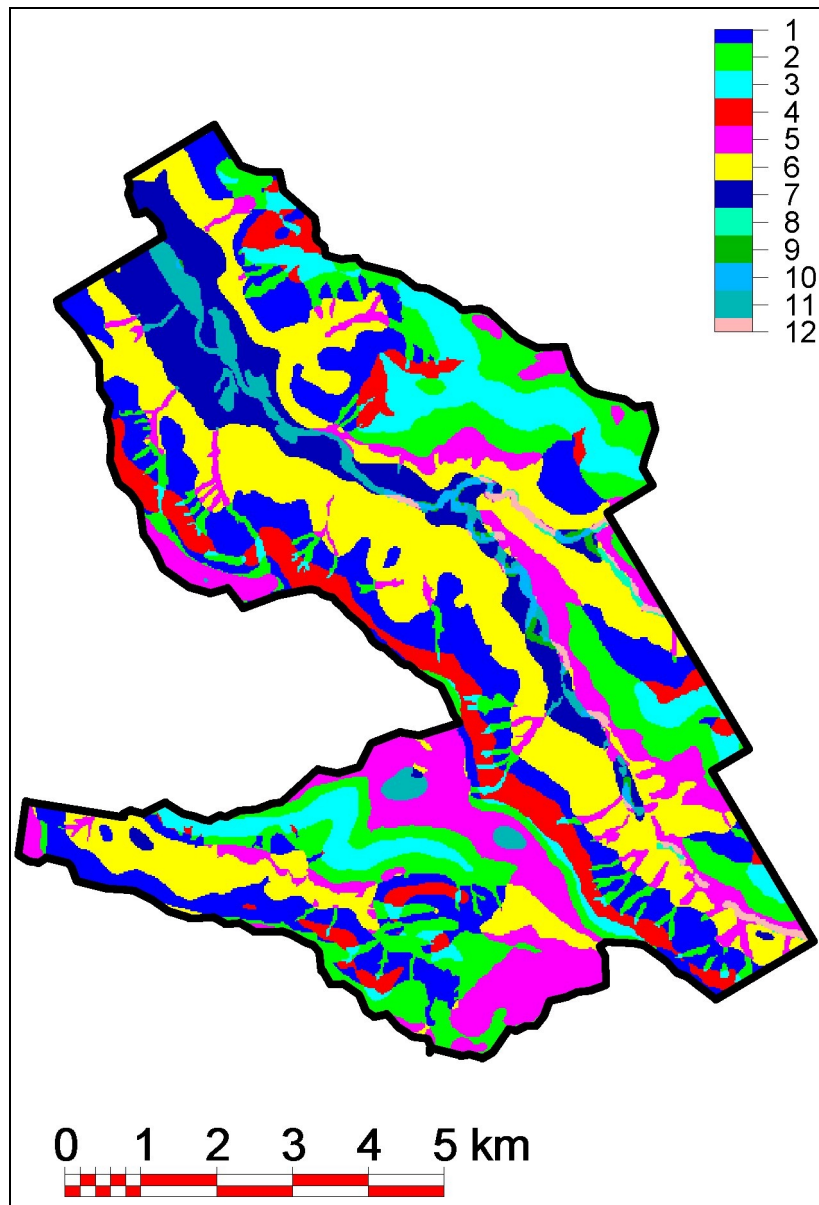
Figure 14. Final land units and types

7.4 INTERPRETATION

These scenic preference ratings were applied to the Land Units to produce Map A. Scenic Preference (see section 20.1). This map illustrates that areas with highest scenic preference are around running creeks in the upper part of Black Fellow Creek, and at tops of the mountains where there are dense and shady trees. The area of lowest scenic preference is the flat and undulating areas of open forest along the edges of the valley.

8 VIEWER APPRECIATION ASSESSMENT

8.1   OVERVIEW

The stages involved in viewer appreciation assessment are:

− Conduct an inventory the location of public places which are used for viewing of open space, and estimate the number and type of viewer groups who use that location

− Develop a viewer weighting system to take into account the effect of number of viewers, their appreciation level, and duration of viewing on overall view point importance

− Apply viewer weights to the view point inventory data to derive view point importance

− Allocation of an estimate of visibility from viewpoints, based on estimates from land cover mapping

8.2   INVENTORY OF VIEWING LOCATIONS

Of the eight types of public places recognised as important by Preston (2001), the only two types present in the Glen Rock study area are recreation trails and recreation areas.

The number of visitors to each public place was estimated by interviewing the manager of the Resource Assessment Team *(D. Batts, pers comm.).* Existing roads, trails and recreation areas were classified into seven groups as summarised in Table 12.

Table 12. Classification of tracks and recreation areas

View Point Group	Type	Description
1	Road	2wd hi volume
2	Multi-use track	4wd hi volume
3	Multi-use track	track mid vol
4	Multi-use track	track low vol
5	Multi-use track	track vlow vol
6	Recreation area	camper / picnicer
7	Waling track	walker hi vol

8.3   VIEWER WEIGHTING SYSTEM

Three major factors are considered to affecting the importance of view points, being:

• duration spent at this location
• number of viewers per day
• appreciation level of the main viewer type for scenery.

The generalized formula for calculation of view point importance is calculated using Equation 2. This formula allows flexibility to modify the weighting given to each of the

three components. The formula is modified using the functions shown in following discussion.

View Point Importance = *Duration Score X Duration Weighting*

+ Number of viewers per day X Viewer Number Weighting

+ Appreciation level X Appreciation level weighting

Equation 2. Calculation of View Point Importance

A full discussion of the relative weightings for appreciation, viewer numbers, and duration is given by Preston (2001).

8.4   APPLICATION OF WEIGHTS TO VIEW POINTS

These three functions were applied in a simple spreadsheet to produce an overall View Point Importance, ranging from 4.3 for the camping and picnic areas, and 0.6 for very low use multi-purpose tracks as seen in Table 13.

Table 13. View Point Importance

View Point Group	View Point Description	Number of viewers / day	Appreciation	Duration	View Point Importance
1	2wd hi volume	20	50%	0:00:45	1.4
2	4wd hi volume	2	90%	0:01:00	1.7
3	track mid vol	2	90%	0:01:00	1.7
4	track low vol	1	90%	0:01:00	1.5
5	track v low vol	0.1	90%	0:01:00	0.6
6	camper / picnicker	20	90%	0:05:00	4.3
7	walker hi vol	10	90%	0:02:00	2.9

These View Point Weightings were allocated to all view points to produce a map as illustrated in Figure 15. This map illustrates that most of the important view points are around the Casuarina Day Use and Camping areas just under Glen Rock, and at the Angophora Day Use area. Other important roads and tracks are the entry road from the northern end of the study area, and some of major tracks at the bottom of the valley and across to Mt Machar, Mt Hennessy, and down Black Duck Creek.
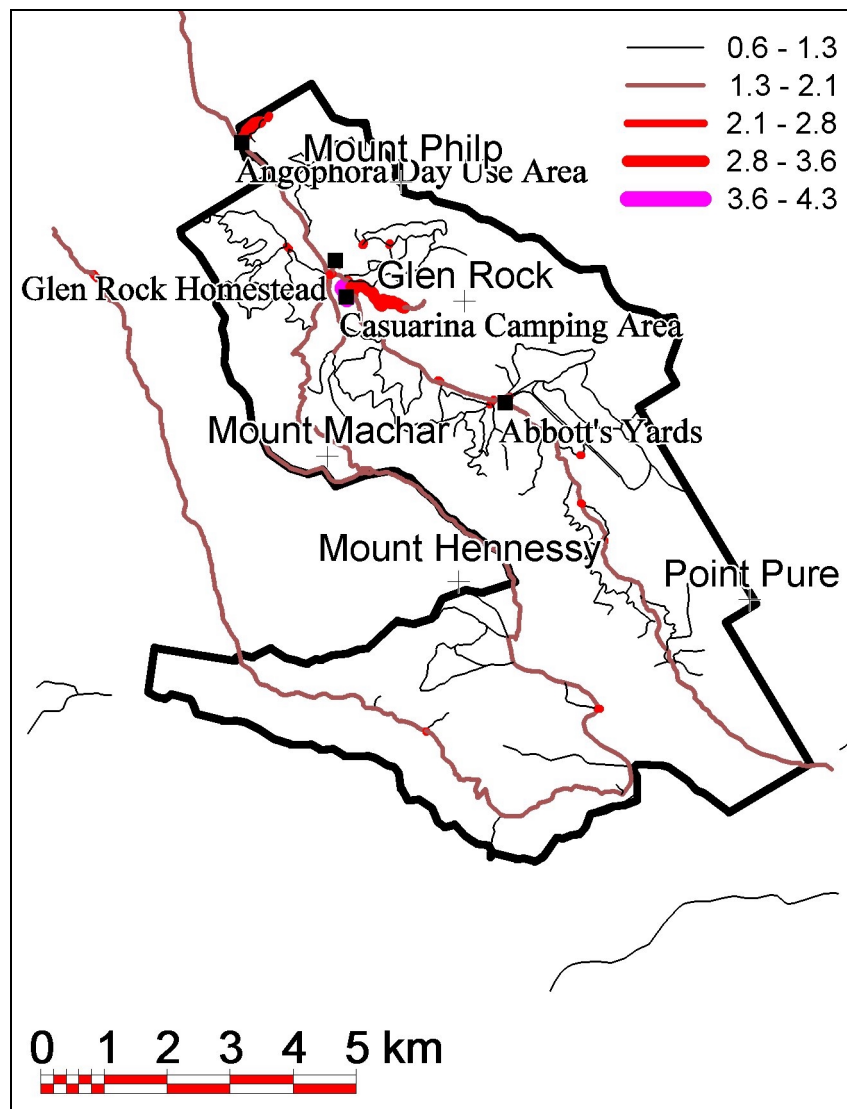
Figure 15. View Point importance

8.5   ESTIMATION OF VISIBILITY FROM VIEW POINTS

In addition to view point importance, the approximate visibility from each view point is evaluated, based on an estimate of visibility from land type maps. As indicated in Table 14, the highest visibility of 100% is from view points from improved pasture and native pasture (Vegetation types 1 and 2), and the lowest visibility is from the tall shady closed forest (Type 6).

Table 14. Estimated visibility from view points based on estimates from vegetation maps

Vegetation Group	Visibility	Tree density	Description
1	100	5	Improved pasture
2	100	5	Native pasture
3	95	10	Thinned trees / lantana
4	60	40	Creek vegetation

Vegetation Group	Visibility	Tree density	Description
5	20	80	Tall shady open forest
6	10	90	Tall shady closed forest
7	60	40	Tall sunny open forest

9 VISUAL EXPOSURE MAPPING

9.1 OVERVIEW

As discussed by Preston (2001), visual exposure maps represent how often parts of the landscape can be seen from major public places which are currently used by the community.

Major factors that affect the visual significance importance of an object in the landscape have been incorporated into a visual exposure model. This model accepts View points as input (and an estimate of visibility) and a digital elevation model. The output is a visual exposure map.

Production of a Visual Exposure Map involves the following steps

- Base mapping involving production of a Digital Elevation Model (DEM) from contour information
- Development of an efficient visual exposure model, integrates the DEM and View Point data to produce the Visual Exposure Map
- Sensitivity analysis of the visual exposure model to changes in input data
- Application of the model to produce the final visual exposure map
- Interpretation of the output to ensure results are logical

9.2 BASE MAPPING

Digital contours of the study area were converted to a 20m interval digital elevation model (DEM) shown in Figure 16. This diagram shows the high range of elevation in the study area ranging from over 900m ASL in the peaks in the central west of the study area, through to about 250 m ASL along the valley in the north of the study area.
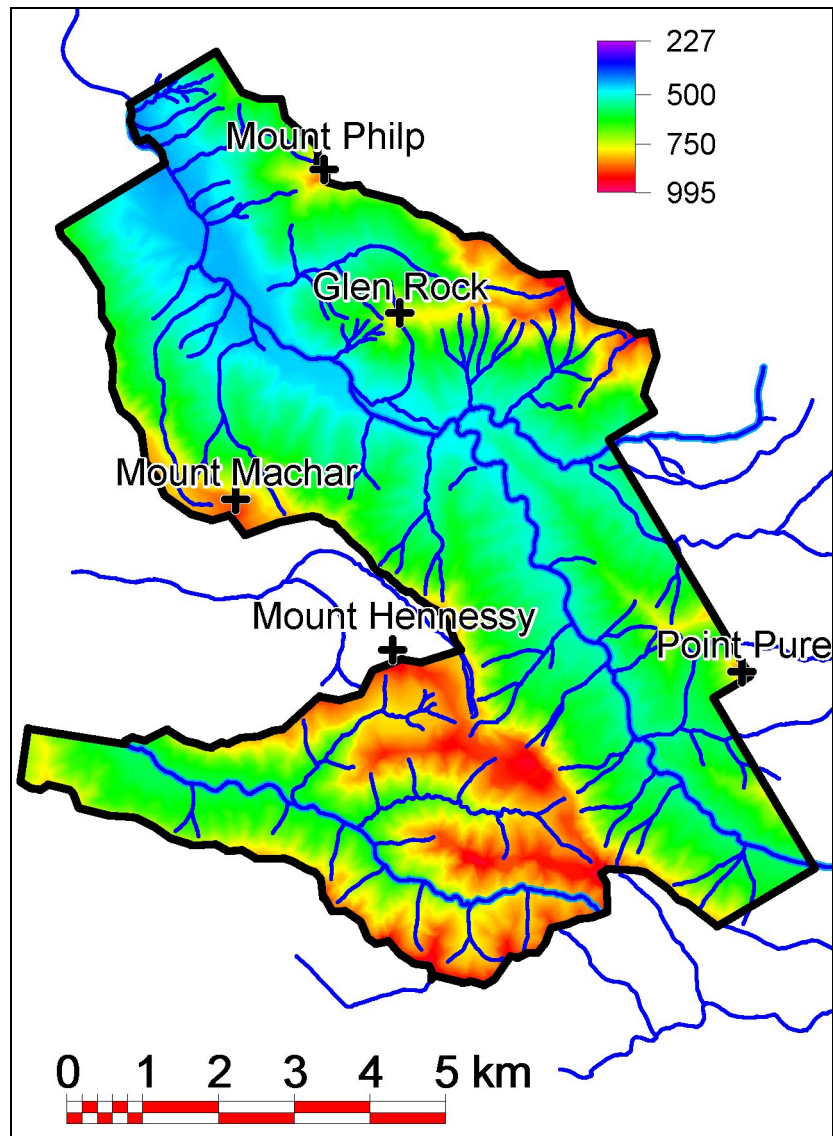
Figure 16. Elevation map

9.3   MODEL DEVELOPMENT

As discussed by Preston (29001), major factors that are taken into account by the visual exposure model are:

- The number of view points which can see a place in the landscape (places seen more often are rated higher)

- the distance from view point to a point in the landscape (places closer to a view point are rated higher).

- the orientation of the land to the view point (points which are more perpendicular – such as steep hillsides - are rated more highly than flat areas)

- the importance of the view point (from the view appreciation assessment), and

- the visibility from a view point.

An efficient computer algorithm was written in the TNT Mips Spatial Manipulation Language (MicroImages, 2000) to produce automated 'seen area' maps. The visual exposure model is based on a mathematical representation of a 360 degree (horizontal) by 360 degree (vertical) view-space. The theoretical maximum view space is 360 x 360 (129,600 degrees). On a perfectly flat surface, the maximum view-space is 360 degrees. View points which are closer to a location in the landscape occupy a larger proportion of view-space than distant objects. This means that there is an exponential decay with increasing distance between a location in the landscape and a view point. This function is expected to be similar to the log decay function used by Bishop and Hulse (1994).

This model also takes into account the orientation of the land surface to view points. Land surfaces facing perpendicular to the viewer are weighted more highly than objects with a narrow view angle. Thus, faces of steep hillsides facing toward the viewer are weighted more highly than a flat area of grassland the same distance away.

The model accumulates the total view-space (in degrees) occupied by view points, modified by the view point importance scores and visibility from each view point.

The final model (in degrees) is rescaled to a maximum score of 10 using the formula

Visual Exposure Rating (10-1) = 5.1074 x VE score (degrees)$^{0.25}$ - 13.7805

This function converts the Cumulative Visual Exposure Score to a rating from 10-1. It is would be possible to calibrate this model against an area of higher visitation to standardise this formula for application to other areas.

9.4 APPLICATION AND INTERPRETATION

The visual exposure model was applied to the study area using the view point weightings shown in Table 13.

A series of functions were applied to the study area to produce Map B. Visual Exposure (see section 20.2). The final visual exposure map shows areas of highest visual exposure as the sides of mountains in the northern half of the property. Areas of lowest visual exposure are the valleys in the far south of the study area.

10 SCENIC AMENITY MAPPING

10.1 CALCULATING SCENIC AMENITY

As explained by Preston (2001), Scenic Preference Maps are combined with Visual Exposure Maps by a multiplication of the two ratings using the matrix in Table 15. A series of mathematical functions were developed from this matrix for application in the Scenic Amenity GIS. This matrix is based on the assumption that the full scenic preference rating will only be realised with a maximum visual exposure of 10. Decreasing visual exposure decreases the scenic preference score. For example, a land unit with a scenic preference of 6.0 will only have a scenic amenity score of 6.0 if the visual exposure is 10.0. If the visual exposure decreases to 6, then the scenic amenity decreases to 5.3. As visual exposure declines further to a value of 1, the scenic amenity decreases to 1.1.

Table 15. Matrix used to calculate Scenic Amenity from Visual Exposure and Scenic Preference

					Scenic Preference					
		1	2	3	4	5	6	7	8	9	10
Visual Exposure	1	0.2	0.4	0.5	0.7	0.9	1.1	1.3	1.5	1.6	1.8
	2	0.5	0.9	1.4	1.8	2.3	2.8	3.2	3.7	4.1	4.6
	3	0.6	1.3	1.9	2.5	3.2	3.8	4.4	5.1	5.7	6.3
	4	0.7	1.5	2.2	3.0	3.7	4.5	5.2	6.0	6.7	7.4
	5	0.8	1.6	2.5	3.3	4.1	4.9	5.7	6.6	7.4	8.2
	6	0.9	1.8	2.6	3.5	4.4	5.3	6.1	7.0	7.9	8.8
	7	0.9	1.8	2.8	3.7	4.6	5.5	6.4	7.4	8.3	9.2
	8	1.0	1.9	2.9	3.8	4.8	5.7	6.7	7.6	8.6	9.5
	9	1.0	2.0	2.9	3.9	4.9	5.9	6.8	7.8	8.8	9.8
	10	1.0	2.0	3.0	4.0	5.0	6.0	7.0	8.0	9.0	10.0

Scale				Scenic Amenity
7.0	to	10.0	=	High
5.0	to	6.9	=	Moderate
3.0	to	4.9	=	Low
0.0	to	2.9	=	Very low

The general criteria for high, medium, low, and very low scenic amenity are outlined in Table 16. These criteria can be used in interpreting the final scenic amenity map.

Table 16. General criteria for high, medium, low, and very low scenic amenity

Scenic Amenity Value	Group	Description
0.0 – 2.9	Very low scenic amenity	Land whose appearance has very low preference, or which has a very low level of visual exposure.
		In general, this land has a Scenic Preference of lower than 2.9, or has a scenic preference of 3.0 to 10 with a low visual exposure of less than 3.0.
3.0 – 4.9	Low scenic amenity	An area whose appearance is not preferred by the community or which has a low level of visual exposure compared to other parts of an assessment area.
		In general, this land has a Scenic Preference of between 3.0 and 4.9 and a high visual exposure of 4.0 to 10.0, or has a scenic preference of 5.0 to 10 with a low visual exposure of less than 3.0.
5.0 – 6.9	Medium scenic amenity	An area whose appearance is moderately preferred by the community that has a moderate level of visual exposure compared to other parts of an assessment area.
		In general, this land has a Scenic Preference of between 5.0 and 6.9 and a high visual exposure of 4.0 to 10.0, or has a scenic preference of 7.0 to 10 with a low visual exposure of less than 4.0.
7.0 – 10.0	High scenic amenity	An area whose appearance is highly preferred by the community that has a high level of visual exposure compared to other parts of an assessment area.
		In general, this land has a Scenic Preference of between 7.0 and 10.0 and a high visual exposure of 4.0 to 10.0.

10.2 INTERPRETATION

A scenic amenity map for the study area is shown in Map C. Scenic Amenity (see section 20.3). The areas of highest scenic amenity occur on both sides of the main Black Duck Creek

valley in the northern half of the property, above the intersection of Flaggy and Blackfellow Creeks. Scenic Amenity is strongly affected by the base visitation pattern, which is focussed along the valley floor in the northern half of the property.

Maps of scenic amenity at a finer resolution clearly show the strong effect of relief on scenic amenity. For example, the southern side of Glen Rock peak has a scenic amenity score of about 5.2. Other areas of relatively high scenic amenity occur immediately above the Casuarina Camping area, on the slopes of Glen Rock mountain, above Glen Rock homestead, and on the slopes of Mt Machar on the southern side of the valley. Other isolated sites of relatively high scenic amenity also occur next to moderately exposed semi-permanent flowing creeks in the upper part of the valley.

Whilst the highest score scenic amenity score at Glen Rock of 5.5 indicates only moderate regional significance, this is due to relatively low visitation numbers. Some scenery, from tops of mountains and around the semi-permanent creeks, are among the best in south east Queensland, with ratings of 8-9 on a ten point scale.

11 GENERALISATION OF RESULTS TO PLANNING UNITS

A series of 77 planning units were developed by the Department of Natural Resources for the study area. These planning units were drawn to follow topographic or vegetation boundaries, to produce sensible land units which could be used to synthesise resources and planning information across a full suite of land values.

The three main maps produced by this study (scenic preference, visual exposure, scenic amenity) were generalised to this coarser resolution to allow comparison and integration with other values. These maps are shown in Appendix 6. maps by planning unit (see section 21).

Planning units of highest scenic amenity are nos 18, 25, 31, and 32 on the western side of the valley, and units 11, 13, 14 on the north=eastern side of the valley. Other units of relatively high scenic amenity value are 21, 22 and 38 on the eastern side of the valley, near the Casuarina picnic and camping area, and units 5, 26, and 33 on the western side of the valley.

12 IMPLICATIONS FOR LAND MANAGEMENT AND PLANNING

Management and development of recreation facilities at Glen Rock must be sensitive to peoples strong preference to maintain highly natural landscapes. Drawing from peoples clear preference for landscapes without buildings, as demonstrated in this study, care should be taken to ensure that built structures, including sheds, toilet blocks, or houses, great care should be taken with site location and design. Before the location of any building is finalised, it is appropriate to assess the visual impact of several alternative locations. Fences also reduce the appeal of scenery, but to a lesser extent than buildings. Assessment of visual impact should take into account the effect on ground views, but also the effect on views from walking trails and lookout points from hillsides and mountain tops.

Maintenance of Scenic Amenity at Glen Rock has parallels with the principles used in recreation planning, which limit recreation development to maintain Landscape Class. Whilst it may be argued that the principles used to protect and maintain Landscape Class

obviate the need for protection of scenic amenity, it should be remembered that this is an Landscape Class appraisal is an expert based assessment, and does not take into account multiple view points to the extent of scenic amenity.

It would be appropriate to conduct further studies of the relationship between Landscape Class and Scenic Amenity, as an adjunct to the design of any new recreation facilities at Glen Rock.

13 CONCLUSIONS

The scenery of the Glen Rock property is one of its greatest assets. Views down the rugged mountain valleys, and intimate creek and bushland scenery is inspiring and relaxing to a full range of visitors. The agricultural facilities along the valley floor provide increased diversity and interest to visitors. The greatest appeal of Glen Rock, to the potential visitors, is the undeveloped nature of the property.

Whilst none of the property is presently of high scenic amenity, due to low visitor numbers, increased recreation use at Glen Rock will also increase scenic amenity values. In the next few years, it will be important to ensure that sensitivity is given to the planning and design of all recreation facilities, particular in the siting and design of buildings or tracks which can be seen from high vantage points.

The scenic amenity assessment method, based on objective community participation and geographic modelling, is the first project after the first Moggill Scenic Amenity Study where these techniques have been applied. The whole project was undertaken with few hold-ups and technical challenges, has taken less than 4 person months to implement.

The study has resulted in improvements to the interview method used in Perception Studies. The Scenic Amenity methodology has been proven to be robust, adaptable, and transferable. It has also yielded results which are useful for management planning at Glen Rock, and which provide guidance for ongoing management and planning.

14 DEFINITIONS

High scenic amenity
An area whose appearance is highly preferred by the community which also has a high level of visual exposure compared to other parts of an assessment area.

Landscape aesthetics
Peoples response to a landscapes evoked by looking at an image of a landscape. This includes peoples visual appreciation, as well as other sensory and emotional responses which are triggered by photographs.

Open space
Any area of land or water that has no or few built structures. Open space includes wetlands, bushland, beaches, lakes, dams, agricultural land, culturally significant places, and outdoor recreation areas.

Public places	Places of importance to the public such as government owned land used for recreation or travel (such as roads, recreation areas), private property used for community recreation and out-door enjoyment (such as golf courses, horse riding areas or areas of other cultural significance (such as local shops, schools, churches).
Scenic amenity	A measure of the relative contribution of different places in the landscape to the collective community appreciation of open space as viewed from places of importance to the public.
Scenic preference	A rating of peoples preference for scenery of different types of open space compared to areas occupied by built structures, measured using photographic stimuli.
View point	A location selected to sample public places from which people view open space.
Visual exposure	A measure of the extent to which a place in the landscape can be seen from a range of important public viewing locations such as roads, recreation areas, schools, or golf courses.

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16 APPENDIX 1. INTERVIEW QUESTIONS

16.1 INTERCEPT INTERVIEW INSTRUCTIONS

Introduction

Good morning / afternoon.

My name is _____ <name> _____ from _____ <organization> _____.

We are conducting market research about what people like or dislike about natural and rural scenery of places around south east queensland. We are particularly interested in a property about 2 hours drive west of Brisbane called Glen Rock.

I am wondering of you have time to participate in an interview, where I will ask you to pick out some photographs of scenery which you particularly like.

The interview will take about 20 minutes. If you have time, there is an optional second half to the interview which will take the total time of the interview to one hour.

If you are interested in participating, I am happy to buy you a cup of coffee at the cafeteria downstairs.

WHEN SEATED

I will be asking you to sort the photographs in order of your preference for the scenery, that it, how much you like the look of the scenery. I am aware that the photos may encourage you to think of other things about the photos, such as "I would like to go camping there" or "that looks like good soil for crops", but to the extent it is possible, we are interested in your first impressions about what you like about the appearance of the scenery only.

Also, it is important that you respond to the types of scenery <u>in</u> the photographs, not to the development quality of the photography or the lighting at the time of day it was taken.

EXERCISE ONE

Before we start looking at the photos, it is useful if you can fill out some forms about yourself and how familiar you are with different types of landscapes. We also want to know about how familiar you are with the Glen Rock Property.

Work sheet E, which is on the top of the pile, can be used to record information about yourself and how familiar you are with Glen Rock. I will read the form to you so as you can fill it out before we start looking at the photos.

EXERCISE TWO

The first thing I would like you to do is to rank the 21 photos (Set G) from left to right and down the table starting with the scene you PREFER most and finishing with the scene you PREFER least.

(Once the person has commenced exercise 2, proceed to buy coffee and donut)

> When you are done, I would like you to record on Worksheet 'A' the numbers on the back of the photographs in the order that you have placed them.

> Place the photos back into the same position ready for the next exercise.

EXERCISE THREE

We are going to record some additional information about each photo in set G. There are four different things I would like you to record about each photo. It is easiest to explain this by describing what is on work sheet B. I have also handed you an example sheet.

- Write a number from 10 to 1 indicating how much you like the scenery.
- Write a number from 5 to 1 indicating how accurately you think the word 'calming' describes the scenery.
- Write a number from 5 to 1 indicating how accurately you think the word 'interesting' describes the scenery.
- Write a number from 5 to 1 indicating how accurately you think the word 'beautiful' describes the scenery.

You will notice on the example sheet that the 'liking' score for the first photo must be 10, and the last photo must have a score of `1'. You may however want to give more than one photo the same score, and you may also skip a number if you think there is a gap in how much you like the photos.

Record your scores on **Worksheet C** in the order you used to for the first exercise.

At the end of this exercise you can pick up the photo set and place them back in a pile.

This is the end of the main interview. If you have time and are interested, we have a second set of photographs from other places in SEQ, which we would like to show you.

If person is interested, proceed to next exercise.

If person is finished, thank them for their input, and ask them if they would like a copy of the report about the study. If so fill out the appropriate form.

EXERCISE FOUR

We are now going to repeat the first exercise for photo set D. As with the first exercise, the first thing I would like you to do is to rank the 21 photos from left to right and down the table starting with the scene you PREFER most and finishing with the scene you PREFER least.

(When most finished)

> When you are done, I would like you to record on Worksheet 'C' the numbers on the back of the photographs in the order that you have placed them.

> Place the photos back into the same position ready for the next exercise.

EXERCISE FIVE

The final exercise is to record your liking score, again from 10 to 1, for photo set D. This time, you do not need to record additional information on words to describe your response. We only need to know your liking score for each photo.

Record your scores on Worksheet D in the order you used to for the third exercise.

At the end of this exercise you can pick up the photo set and place them back in a pile.

CLOSING

Thank you for participating in this survey. To show us our appreciation for your input, we would like to be able to send you a copy of the final report of this study. If you fill out the form on your address, we will mail a copy to you.

END

Your initials: _____   Photo Set (circle)   A B C D E F G   Todays Date: ____ / ____ / _____

Write photo number in each box.

Prefer most

(1)	(2)	(3)	(4)	(5)	(6)	(7)
(8)	(9)	(10)	(11)	(12)	(13)	(14)
(15)	(16)	(17)	(18)	(19)	(20)	(21)

Prefer least

16.3   WORK SHEET B

Your initials: _____   **Photo Set (circle)**   A B C D E F G   **Todays Date:** ____ / ____ / _____

QUESTIONS FOR EACH PHOTO

How would **rate** your **liking** of the scenery	10	9	8	7	6	5	4	3	2	1
How **beautiful** is the scenery	Stunning 7		Beautiful 6	Nice 5	4		Slightly unattractive 3		Unattractive 2	Ugly 1
How **calming** is the scenery	Very peaceful 7		Calming 6	Slightly calming 5	4		Slightly unsettling 3		Agitating 2	Stressful 1
How **interesting** is the scenery	Very engaging 7		Interesting 6	Slightly interesting 5	4		Slightly uninteresting 3		Uninspiring 2	Boring 1
What was your main **response** to the scenery					What is the main thing you **noticed** about the scenery					

WORKSHEET

	1	2	3	4	5	6	7
Liking	10 9 8 7 6 5 4 3 2 1	10 9 8 7 6 5 4 3 2 1	10 9 8 7 6 5 4 3 2 1	10 9 8 7 6 5 4 3 2 1	10 9 8 7 6 5 4 3 2 1	10 9 8 7 6 5 4 3 2 1	10 9 8 7 6 5 4 3 2 1
Beautiful	7 6 5 4 3 2 1	7 6 5 4 3 2 1	7 6 5 4 3 2 1	7 6 5 4 3 2 1	7 6 5 4 3 2 1	7 6 5 4 3 2 1	7 6 5 4 3 2 1
Calming	7 6 5 4 3 2 1	7 6 5 4 3 2 1	7 6 5 4 3 2 1	7 6 5 4 3 2 1	7 6 5 4 3 2 1	7 6 5 4 3 2 1	7 6 5 4 3 2 1
Interesting	7 6 5 4 3 2 1	7 6 5 4 3 2 1	7 6 5 4 3 2 1	7 6 5 4 3 2 1	7 6 5 4 3 2 1	7 6 5 4 3 2 1	7 6 5 4 3 2 1
Response ?							
Noticed ?							

	8	9	10	11	12	13	14
Liking	10 9 8 7 6 5 4 3 2 1	10 9 8 7 6 5 4 3 2 1	10 9 8 7 6 5 4 3 2 1	10 9 8 7 6 5 4 3 2 1	10 9 8 7 6 5 4 3 2 1	10 9 8 7 6 5 4 3 2 1	10 9 8 7 6 5 4 3 2 1
Beautiful	7 6 5 4 3 2 1	7 6 5 4 3 2 1	7 6 5 4 3 2 1	7 6 5 4 3 2 1	7 6 5 4 3 2 1	7 6 5 4 3 2 1	7 6 5 4 3 2 1
Calming	7 6 5 4 3 2 1	7 6 5 4 3 2 1	7 6 5 4 3 2 1	7 6 5 4 3 2 1	7 6 5 4 3 2 1	7 6 5 4 3 2 1	7 6 5 4 3 2 1
Interesting	7 6 5 4 3 2 1	7 6 5 4 3 2 1	7 6 5 4 3 2 1	7 6 5 4 3 2 1	7 6 5 4 3 2 1	7 6 5 4 3 2 1	7 6 5 4 3 2 1
Response?							
Noticed ?							

	15	16	17	18	19	20	21
Liking	10 9 8 7 6 5 4 3 2 1	10 9 8 7 6 5 4 3 2 1	10 9 8 7 6 5 4 3 2 1	10 9 8 7 6 5 4 3 2 1	10 9 8 7 6 5 4 3 2 1	10 9 8 7 6 5 4 3 2 1	10 9 8 7 6 5 4 3 2 1
Beautiful	7 6 5 4 3 2 1	7 6 5 4 3 2 1	7 6 5 4 3 2 1	7 6 5 4 3 2 1	7 6 5 4 3 2 1	7 6 5 4 3 2 1	7 6 5 4 3 2 1
Calming	7 6 5 4 3 2 1	7 6 5 4 3 2 1	7 6 5 4 3 2 1	7 6 5 4 3 2 1	7 6 5 4 3 2 1	7 6 5 4 3 2 1	7 6 5 4 3 2 1
Interesting	7 6 5 4 3 2 1	7 6 5 4 3 2 1	7 6 5 4 3 2 1	7 6 5 4 3 2 1	7 6 5 4 3 2 1	7 6 5 4 3 2 1	7 6 5 4 3 2 1
Response ?							
Noticed ?							

16.4   WORK SHEET C

Your initials: _____   Photo Set (circle)   A B C D E F G   Todays Date: ____ / ____ / _____

Write photo number in each box.

Most Preferred

(1)	(2)	(3)	(4)	(5)	(6)	(7)
(8)	(9)	(10)	(11)	(12)	(13)	(14)
(15)	(16)	(17)	(18)	(19)	(20)	(21)

Least Preferred

16.5   WORK SHEET D

Your initials: _____   Photo Set (circle)   A B C D E F G   Todays Date: ____ / ____ / _____

QUESTION FOR EACH PHOTO

How would rate your liking of the scenery	Like most	9 8 7 6 5 4 3 2 1	Like least

WORKSHEET

	position *1*	*2*	*3*	*4*	*5*	*6*	*7*
Like	10 9 8 7 6 5 4 3 2 1	10 9 8 7 6 5 4 3 2 1	10 9 8 7 6 5 4 3 2 1	10 9 8 7 6 5 4 3 2 1	10 9 8 7 6 5 4 3 2 1	10 9 8 7 6 5 4 3 2 1	10 9 8 7 6 5 4 3 2 1
	8	*9*	*10*	*11*	*12*	*13*	*14*
Like	10 9 8 7 6 5 4 3 2 1	10 9 8 7 6 5 4 3 2 1	10 9 8 7 6 5 4 3 2 1	10 9 8 7 6 5 4 3 2 1	10 9 8 7 6 5 4 3 2 1	10 9 8 7 6 5 4 3 2 1	10 9 8 7 6 5 4 3 2 1
	15	*16*	*17*	*18*	*19*	*20*	*position* *21*
Like	10 9 8 7 6 5 4 3 2 1	10 9 8 7 6 5 4 3 2 1	10 9 8 7 6 5 4 3 2 1	10 9 8 7 6 5 4 3 2 1	10 9 8 7 6 5 4 3 2 1	10 9 8 7 6 5 4 3 2 1	10 9 8 7 6 5 4 3 2 1

Your initials: _____   Todays Date: ____ / ____ / _____

1. How would you rate your *familiarity* with some types of landscapes on a scale of 1 to 7, where 7 is "very familiar with this landscape and 1 is "have little or no familiarity with this landscape"? You may build up familiarity by studying, working in, or visiting this type of landscape.

Bushlands - areas of natural vegetation
        7   6   5   4   2   2   1

Rural landscapes - farms
        7   6   5   4   2   2   1

The landscape around Glen Rock itself
        7   6   5   4   2   2   1

2. What is your Gender
        1   Male
        2   Female

3. What is your Age
        1   18-24 years
        2   25-39 years
        3   40-54 years
        4   55+ years

4. What is your occupation?   ....

5. In which country were you born?

        ....

6. What suburb do you live in and what is the postcode ?

        .... Post code ....

7. What type of block do you live on?

        1   Suburban block
        2   Rural-residential/acreage
        3   Agricultural/farm

If we have any difficulty reading your responses to these questions, may we contact you. If this is OK, please write your name and number in the space provided. Your name will not be entered into any computer or used in this analysis.

NAME:..

PHONE: (.....) ....

17 APPENDIX 2. PHOTO ATTRIBUTES

A total of 17 codes were used to describe land cover types (Table 7), and three distance zones were recorded (Table 8).

Table 17. List of land cover codes used to record land cover

Code	Description
X	Sky
T	Trees and natural shrubs
R	River
G	Grass
I	Industrial style buildings or signs
M	Modern houses
H	Traditional houses
P	Power poles
L	Transmission lines
W	Wooden or fence in character
F	Other fences out of character
S	Soil
A	Farm animals
B	Bitumen road
D	Dirt track
C	Crops and planted vegetation
E	Weeds

Table 18. List of codes used to record distance from observer

Code	Description
F	Foreground < 100m
M	Mid ground 100m-1km
B	Background 1km +

The first character of the dual code is the land cover type. The second character is the distance from viewer. For example "TF" means trees in the foreground, whereas "RM" means river in the mid-ground.

In addition to recording land cover and distance from viewer, an additional eight attributes were recorded to describe the topography and general character of the photograph. These additional attributes were:

- Fore-ground elevation range (<100m)
- Mid-ground elevation range (100m-1km)
- Back-ground elevation range (1km +)
- Total elevation range
- DNR Landscape class
- Scenic Amenity Setting
- Distinct land cover types
- Most distant object

Short descriptions of codes used for each of these attributes are given in Table 19 to Table 22.

Table 19. Codes for Elevation Range

Code	Description
1	< 50m
2	50-100m
3	100-300m
4	300 +

Table 20. Codes for DNR Landscape Class

Code	Description
1	100% natural
2	97-100% natural
3	90-97% natural
4	85-90% natural
5	70-85% natural
6	50-70% natural
7	25-50% natural
8	10-50% natural
9	< 10% natural

Table 21. Codes for Scenic Amenity Setting

Code	Description
RIVER	River
AGRIC	Agricultural
URBAN	Urban
FOREST	Bushland
RR	Rural residential

Table 22. Codes for most distant object

Code	Description
1	< 100m
2	100m - 1km
3	1km - 10km
4	10km +

An example of the application of these codes is given in Table 23.

Table 23. Example of additional scenic attributes recorded for photo A21

Attribute	Code
Foreground elev range	1
Midground elev range	1
Background elev range	1
Total elev range	1
DNR Landscape class	1
SA Setting	RIVER
Distinct LC types	2
Most distant object	2

Land cover proportion

Land cover and distance zone data were analysed to determine the proportion of the land area (i.e. Excluding sky – 'X') occupied by each land cover type in each distance zone.

For example, Table 24 shows the analysis of photo content by distance zones for photo A21.

Table 24. Example of base land cover proportions for Photo A21

Land cover proportion by distance zone	Percent
SKY	25%
LAND	75%
TREEF	60%
TREEM	19%
TREEB	1%
RIVERF	0%
RIVERM	19%
RIVERB	1%
TREE	80%
RIVER	20%

This example illustrates that only 75% of the total photo area is assessed for land cover. The total photo is covered by six different land cover / distance zone combinations, being trees and river in each of the three distance zones. Most of the photo (60%) is covered by trees in the foreground, and equal amounts are covered by trees and river in the mid-ground (19%). Only a small proportion is in the background (1% tree and 1% river). A total of 80% of the photo is covered in trees and 20% is covered in river. All other land cover proportions (eg. urban foreground) were zero.

A series of an additional 8 combinations of the basic land cover combinations were also calculated in recognition that people may be responding to general groups of land cover elements. Table 25 lists the primary combined types calculated. Each of these primary combined types was also calculated for each distance zone.

Table 25. Combined land cover types

Attribute	Description
GREEN	Dense trees + green grass percent land
NATURAL	Dense trees + green grass + river percent land
ELECTRIC	Power poles + transmission percent land
ALLFEN	All fences (W+F) percent land
BUILDINGS	All buildings (I + M + H) percent land
ROAD	All roads and tracks (B+D) percent land
BUILT	All built structures (I+M+H+P+M+W+F+B+D)
BNR	Built to natural ratio (BUILD/NATURAL)

Summary

A total of 130 different attributes were estimated for each photo. These attributes provide a set of scenic characteristics to use in exploratory analysis of peoples response to the photographs. A complete list of all attributes is given in Table 26.

Table 26. Complete listing of all photo attributes

Att no.	Attribute code	Attribute description	Data type
	Photo no	As used in interviews (eg. A3)	text
Basic land cover attributes			
1	SKY	Sky percent of photo	continuous percent
2	LAND	Land percent of photo (includes water)	continuous percent
3	DENSEF	Dense trees percent of land in fg	continuous percent
4	DENSEM	Dense trees percent of land in mg	continuous percent
5	DENSEB	Dense trees percent of land in bg	continuous percent
6	DENSE	Dense trees percent of land	continuous percent
7	SPARSEF	Sparse trees percent of land in fg	continuous percent
8	SPARSEM	Sparse trees percent of land in mg	continuous percent
9	SPARSEB	Sparse trees percent of land in bg	continuous percent
10	SPARSE	Sparse trees percent of land	continuous percent
11	DEADF	Dead trees percent of land in fg	continuous percent
12	DEADM	Dead trees percent of land in mg	continuous percent
13	DEADM	Dead trees percent of land in bg	continuous percent
14	DEAD	Dead trees percent of land	continuous percent
15	RIVERF	River percent of land in fg	continuous percent
16	RIVERM	River percent of land in mg	continuous percent
17	RIVERB	River percent of land in bg	continuous percent
18	RIVER	River percent of land	continuous percent
19	GRASSF	Green Grass percent of land in fg	continuous percent
20	GRASSM	Green Grass percent of land in mg	continuous percent
21	GRASSB	Green Grass percent of land in bg	continuous percent
22	GRASS	Green Grass percent of land	continuous percent
23	BROWNF	Brown grass percent of land in fg	continuous percent
24	BROWNM	Brown grass percent of land in mg	continuous percent
25	BROWNB	Brown grass percent of land in bg	continuous percent
26	BROWN	Brown grass percent of land	continuous percent
27	INDUSTF	Industrial bulidings percent of land in fg	continuous percent
28	INDUSTM	Industrial bulidings percent of land in mg	continuous percent
29	INDUSTB	Industrial bulidings percent of land in bg	continuous percent
30	INDUST	Industrial bulidings percent of land	continuous percent
31	MODERNF	Modern houses percent of land in fg	continuous percent
32	MODERNM	Modern houses percent of land in mg	continuous percent
33	MODERNB	Modern houses percent of land in bg	continuous percent
34	MODERN	Modern houses percent of land	continuous percent
35	TRADF	Traditional qld houses percent of land in fg	continuous percent
36	TRADM	Traditional qld houses percent of land in mg	continuous percent
37	TRADB	Traditional qld houses percent of land in bg	continuous percent
38	TRAD	Traditional qld houses percent of land	continuous percent
39	POWERF	Power poles percent of land in fg	continuous percent
40	POWERM	Power poles percent of land in mg	continuous percent
41	POWERB	Power poles percent of land in bg	continuous percent
42	POWER	Power poles percent of land	continuous percent
43	TRANSF	Transmission lines percent of land in fg	continuous percent

44	TRANSM	Transmission lines percent of land in mg	continuous percent
45	TRANSB	Transmission lines percent of land in bg	continuous percent
46	TRANS	Transmission lines percent of land	continuous percent
47	WOODF	Wooden fence percent of land in fg	continuous percent
48	WOODM	Wooden fence percent of land in mg	continuous percent
49	WOODB	Wooden fence percent of land in bg	continuous percent
50	WOOD	Wooden fence percent of land	continuous percent
51	FENCEF	Other fence percent of land in fg	continuous percent
52	FENCEM	Other fence percent of land in mg	continuous percent
53	FENCEB	Other fence percent of land in bg	continuous percent
54	FENCE	Other fence percent of land	continuous percent
55	DIRTF	Exposed soil percent of land in fg	continuous percent
56	DIRTM	Exposed soil percent of land in mg	continuous percent
57	DIRTB	Exposed soil percent of land in bg	continuous percent
58	DIRT	Exposed soil percent of land	continuous percent
59	ROCKF	Exposed rock percent of land in fg	continuous percent
60	ROCKM	Exposed rock percent of land in mg	continuous percent
61	ROCKB	Exposed rock percent of land in bg	continuous percent
62	ROCK	Exposed rock percent of land	continuous percent
63	ANIMALF	Farm animals percent of land in fg	continuous percent
64	ANIMALM	Farm animals percent of land in mg	continuous percent
65	ANIMALB	Farm animals percent of land in bg	continuous percent
66	ANIMAL	Farm animals percent of land	continuous percent
67	BITUMENF	Bitumen road percent of land fg	continuous percent
68	BITUMENM	Bitumen road percent of land mg	continuous percent
69	BITUMENB	Bitumen road percent of land bg	continuous percent
70	BITUMEN	Bitumen road percent of land	continuous percent
71	TRACKF	Dirt track percent land fg	continuous percent
72	TRACKM	Dirt track percent land mg	continuous percent
73	TRACKB	Dirt track percent land bg	continuous percent
74	TRACK	Dirt track percent land	continuous percent
75	CROPF	Crop percent land fg	continuous percent
76	CROPM	Crop percent land mg	continuous percent
77	CROPB	Crop percent land bg	continuous percent
78	CROP	Crop percent land	continuous percent
79	WEEDF	Weed percent land fg	continuous percent
80	WEEDM	Weed percent land mg	continuous percent
81	WEEDB	Weed percent land bg	continuous percent
82	WEED	Weed percent land	continuous percent
Other basic attributes			continuous percent
83	FOREG	Percent of land in foreground	continuous percent
84	MIDG	Percent of land in mid ground	continuous percent
85	BACKG	Percent of land in background	continuous percent
86	MGBG	Percent of land in mid and back ground	continuous percent
87	ELEVRF	Elevation range foreground	ordinal
88	ELEVRM	Elevation range midground	ordinal
89	ELEVRB	Elevation range background	ordinal
90	ELEVR	Elevation range total photo area	ordinal
91	LANDSCAPE	DNR Landscape class	ordinal
92	SA SETTING	Scenic Amenity Setting	category

93	LCTYPES	Number of distinct land cover types	integer
94	MAXDIST	Distance to most distant object	ordinal

Land cover combined attributes

95	TREEF	Dense trees percent of land in fg	continuous percent
96	TREEM	Dense trees percent of land in mg	continuous percent
97	TREEB	Dense trees percent of land in bg	continuous percent
98	TREE	Dense trees percent of land	continuous percent
99	GREENF	Dense trees + green grass percent land fg	continuous percent
100	GREENM	Dense trees + green grass percent land midground	continuous percent
101	GREENB	Dense trees + green grass percent land background	continuous percent
102	GREEN	Dense trees + green grass percent land	continuous percent
103	NATURALF	Green + river percent land fg	continuous percent
104	NATURALM	Green + river percent land midground	continuous percent
105	NATURALB	Green + river percent land background	continuous percent
106	NATURAL	Green + river percent land	continuous percent
107	ELECTRICF	Power poles + transmisison percent land fg	continuous percent
108	ELECTRICM	Power poles + transmisison percent land mg	continuous percent
109	ELECTRICB	Power poles + transmisison percent land bg	continuous percent
110	ELECTRIC	Power poles + transmisison percent land	continuous percent
111	ALLFENF	All fences (W+F) percent land fg	continuous percent
112	ALLFENM	All fences (W+F) percent land mg	continuous percent
113	ALLFENB	All fences (W+F) percent land bg	continuous percent
114	ALLFEN	All fences (W+F) percent land	continuous percent
115	BUILDINGSF	All buildings (I + M + H) percent land fg	continuous percent
116	BUILDINGSM	All buildings (I + M + H) percent land mg	continuous percent
117	BUILDINGSB	All buildings (I + M + H) percent land bg	continuous percent
118	BUILDINGS	All buildings (I + M + H) percent land	continuous percent
119	ROADF	All roads and tracks (B+D) percent land fg	continuous percent
120	ROADM	All roads and tracks (B+D) percent land mg	continuous percent
121	ROADB	All roads and tracks (B+D) percent land bg	continuous percent
122	ROAD	All roads and tracks (B+D) percent land	continuous percent
123	BUILTF	All built structures (I+M+H+P+M+W+F+B+D) fg	continuous percent
124	BUILTM	All built structures (I+M+H+P+M+W+F+B+D) mg	continuous percent
125	BUILTB	All built structures (I+M+H+P+M+W+F+B+D) bg	continuous percent
126	BUILT	All built structures (I+M+H+P+M+W+F+B+D)	continuous percent
127	BNRF	Built to natural ratio fg (BUILD/NATURAL)	continuous percent
128	BNRM	Built to natural ratio mg (BUILD/NATURAL)	continuous percent
129	BNRB	Built to natural ratio bg (BUILD/NATURAL)	continuous percent
130	BNR	Built to natural ratio (BUILD/NATURAL)	continuous percent

18 APPENDIX 3. GLEN ROCK PHOTOGRAPHS

Photo 1: Peaceful running water

Ave rating (10-1) (unscaled)	**9.5**		
Variation of rating (3-1):	1.1		
Ave beautiful score (7-1):	6.1		
Ave calming score (7-1):	6.5		
Ave interesting score (7-1):	5.8		
Overall emotional response:	Very positive		

Main response:		*Noticed:*	
peaceful	5	water	10
cool	4	river	3
inviting	3	green	2
pretty	2	running water	2
relaxed	2	beautiful Casuarina grove	1
relaxing	2	cattle access	1
beautiful	2	clean water	1
beautiful landscape	1	clear river	1
beautiful place to relax	1	creek	1
fresh	1	difference in fauna	1
green grass and water	1	lush green	1
like Bavaria	1	mountains in background	1
like Devon UK	1	natural (not many weeds)	1
like NZ	1	riverbed	1
lovely relaxing	1	shade	1
pretty water	1	she oaks	1
quiet / cool	1	stream	1
refresh	1	textural changes / water rocks vegetation	1
refreshing	1	textures	1
relaxed / fresh	1	water / shade	1
restful	1	water flowing	1
serene	1	water / shade	1
serene / lush	1	weeds	1
swimming	1		
too much clearing	1		
top spot	1		
tranquility	1		
worth looking further	1		

Photo 14: Beautiful view of escarpment through trees
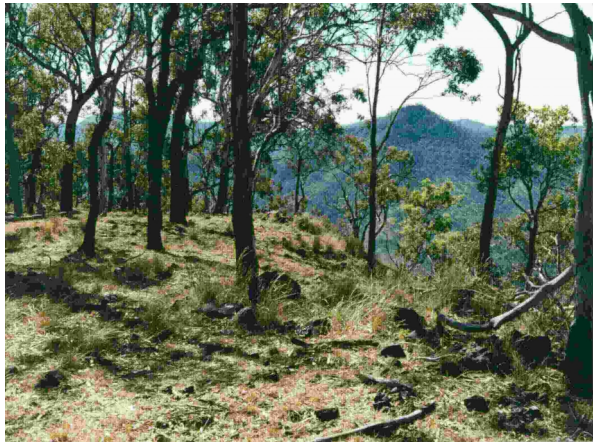
Ave rating (10-1) (unscaled)	**8.4**
Variation of rating (3-1):	1.4
Ave beautiful score (7-1):	5.6
Ave calming score (7-1):	5.6
Ave interesting score (7-1):	5.6
Overall emotional response:	Positive

Main response:	*No.*	*Noticed:*	*No.*
beautiful	2	view/s	5
cool	2	trees	3
access	1	backdrop	1
aspect, achievement	1	cool / shady	1
change	1	crest hill	1
contrasts	1	drop off	1
dappled shade	1	escarpment	1
echo	1	foreground/background changes	1
exciting	1	free	1
exhilarating	1	harsh beauty	1
good	1	height	1
good view	1	height / roads	1
good walking	1	height / mountain	1
great view	1	high up	1
inspiring	1	on top of the world	1
inviting	1	openness	1
lovely view	1	overbearing	1
mountains forever	1	previous tree clearing	1
natural	1	rugged	1
peaceful	1	shade	1
picturesque	1	tantalising views	1
relaxing	1	texture	1
remote	1	timber	1
secluded	1	tree	1
slightly rough edge	1	tree trunks	1
smoko	1	trees / mountains	1
warmth	1	trees/ stones	1
what a view	1	view through trees	1
worth investigating	1	view / trees	1

Photo 2: Expansive view down to mountain valley

Ave rating (10-1) (unscaled)	**8.2**
Variation of rating (3-1):	*1.6*
Ave beautiful score (7-1):	*5.6*
Ave calming score (7-1):	*5.6*
Ave interesting score (7-1):	*5.6*
Overall emotional response:	*Positive*

Main response:		*Noticed:*	
awe inspiring	1	mountains	3
bare patches	1	valley	3
beautiful landscape	1	cleared land	2
contrasts	1	scenery	2
cool	1	view	2
dry	1	distant ridge	1
expanse	1	geomorphology	1
fantastic	1	great view	1
good	1	green hills	1
good view	1	high place	1
good view	1	high ridges	1
grandeur	1	land formation	1
grandeur / freedom	1	landscape	1
great mountains	1	mountains / valley	1
impressed	1	open	1
lovely view	1	scale	1
majestic	1	scope	1
nice view	1	scope / size	1
on top	1	topography	1
picturesque	1	valley meets mountains	1
sense of space	1	valleys	1
stunning view	1	varied terrain	1
superior	1	vast view	1
unrest	1	vastness	1
vast	1	views	1
what a view	1	well maintained	1
wide land	1		
wild mountains	1		
wonderful	1		
working	1		
wow	1		

Photo 4: Grand view of contoured mountain valley

Ave rating (10-1) (unscaled)	**7.5**	
Variation of rating (3-1):	1.8	
Ave beautiful score (7-1):	5.3	
Ave calming score (7-1):	5.2	
Ave interesting score (7-1):	5.5	
Overall emotional response:	Positive	

Main response:		*Noticed:*	
interesting	2	valley	3
awe-inspiring	1	mountains	2
awesome	1	view	2
Big	1	space	2
Cause	1	great view	1
closed in	1	landscape	1
contained	1	scale	1
depressing	1	topography	1
dwarfed	1	vast view	1
grand	1	big trees	1
grandeur / freedom	1	contours	1
great	1	contours of the land	1
green hills	1	end of road	1
inspiring	1	folds of mountains/ like a whirlpool	1
intrigue	1	hot/ barren	1
inviting	1	huge	1
nice	1	land features	1
nice forest	1	majestic mountains	1
nice view	1	ridge lines / less cleared land	1
sense of space	1	size	1
wow	1	spurs / ridgeline	1
		water?	1
		wide mountain	1

Photo 3: Natural shady trees with interesting bark

Ave rating (10-1) (unscaled)	**7.4**
Variation of rating (3-1):	2.0
Ave beautiful score (7-1):	5.1
Ave calming score (7-1):	5.4
Ave interesting score (7-1):	5.2
Overall emotional response:	Positive

Main response:		*Noticed:*	
natural	3	trees	4
trees	2	eucalypts	2
adventurous	1	bark colours	1
beautiful	1	bark of tree	1
beauty	1	bush	1
colours	1	clearing	1
comfortable	1	colours / patterns trees	1
cool	1	dappled shade	1
cool/ shady	1	depth of field / trees draw one forward	1
green	1	different trees	1
hot	1	grasses	1
I like being in the trees	1	grove of trees	1
I like the rainforest	1	gum trees	1
lacking interest	1	gums	1
lovely	1	heavily timbered	1
lovely trees	1	horrible grass	1
nature	1	interesting trees	1
nice shady	1	light patterns bark	1
open forest	1	little understorey	1
peaceful	1	open forest/ stunning grey gums	1
pretty	1	regrowth	1
relaxing	1	rhythm of trunks/ bark textures	1
restful	1	shady trees	1
sense of space	1	stands of trees/ bark	1
simplicity	1	sunshine	1
so what	1	tree	1
typical bush	1	trunks	1
unspoiled	1		
wild	1		

Photo 5: Nice treed view of distant valley

Ave rating (10-1) (unscaled)	**7.2**
Variation of rating (3-1):	1.7
Ave beautiful score (7-1):	4.9
Ave calming score (7-1):	5.1
Ave interesting score (7-1):	4.8
Overall emotional response:	Slightly positive

Main response:		*Noticed:*	
nice view	3	view/s	4
nice	2	trees	3
expansive	1	valley	2
explore	1	open space	2
good climbing	1	contrast	1
good view	1	distance/ views	1
good/bad	1	distant clearing	1
green	1	distant view/ close view	1
greenery	1	forest	1
interfered with	1	hills	1
mountains to eternity	1	hills in horizon	1
natural	1	lack of charm	1
no boundaries	1	sloping terrain / views	1
ok view	1	valley/ trees	1
peaceful	1	vast area	1
prospect / space	1	view/ trees	1
relaxed	1	vista	1
relaxing	1		
scenic	1		
sense of space	1		
you can see for miles	1		

Photo 6: Nice shady view of fence and cliff

Ave rating (10-1) (unscaled)	**7.0**	
Variation of rating (3-1):	2.0	
Ave beautiful score (7-1):	4.7	
Ave calming score (7-1):	4.8	
Ave interesting score (7-1):	4.7	
Overall emotional response:	Slightly positive	

Main response:		*Noticed:*	
nice	3	fence/s	8
cool	2	shade	2
contrast	1	trees	1
deep shade	1	fantastic destination	1
drawn in	1	barbed wire/ majestic outcrop	1
good for walking	1	cliff barriers	1
good mix of things	1	cool / shady	1
good spot for cattle	1	corner	1
interested	1	fence alignment	1
interesting secluded	1	fence disturbs me	1
inviting	1	fences / dead trees/ cliff line	1
journey / destination	1	inviting gully	1
man meets cliff	1	mountain	1
mixed feelings	1	mountain in background	1
peaceful	1	perspective	1
picturesque	1	rocks in background	1
pretty walking	1	rocky bluff	1
quiet	1	shadows	1
scenic	1	shadows fence	1
serene	1	small yard	1
spoilt	1	stewarded	1
very Aussie outback	1	weeds	1
view of rock	1		
working property	1		
worth exploring	1		

Photo 8: Contoured ridge covered in trees

Ave rating (10-1) (unscaled)	**6.7**	
Variation of rating (3-1):	2.1	
Ave beautiful score (7-1):	4.6	
Ave calming score (7-1):	4.6	
Ave interesting score (7-1):	4.9	
Overall emotional response:	Slightly positive	

Response words:		*Noticed words:*	
natural	2	mountain	3
alright view not spectacular	1	Ridge/s	2
beautiful	1	hill	1
bush	1	view	1
colours	1	big trees	1
dry	1	colour	1
eager to explore	1	contours land	1
inspiring	1	degradation	1
interesting	1	erosion	1
intrigue	1	flowering gums	1
looks dry	1	forested landscape	1
lovely rhythm	1	geology	1
mountains like fingers or hand into valley	1	gullies	1
nice forest	1	height / shade	1
nice view	1	hills / tree tops	1
real Australian	1	many trees	1
relaxed	1	mountain patterns	1
rugged	1	mountains skyline	1
striking	1	ridges / valleys	1
too steep	1	rugged hills	1
working place	1	terrain features	1
nice forest	1	texture gully/ trees	1
		undulation	1
		valley/ mountains	1

Photo 7: Farm house in nice setting

Ave rating (10-1) (unscaled)	**6.6**		
Variation of rating (3-1):	1.7		
Ave beautiful score (7-1):	4.6		
Ave calming score (7-1):	4.5		
Ave interesting score (7-1):	4.6		
Overall emotional response:	Slightly positive		

Main response:		*Noticed:*	
alive	1	house	9
can tell a story	1	Farm-house	2
change in scenery	1	contrast	1
contrast hill	1	appropriate	1
damaged / degraded	1	bush fire	1
dry	1	country feel	1
good place to live	1	don't like the house	1
historic / stewarded	1	farm	1
homely	1	flat area	1
hot	1	hill	1
layered mountains	1	house tucked into hill	1
love to live here	1	man made interference	1
nice place	1	mountain/ old homestead	1
nice place to live	1	rustic house	1
nice setting for homestead	1	setting	1
not alone	1	setting of house	1
not private	1	untouched mountain	1
ok	1	who lives here?	1
peaceful	1		
picturesque	1		
quiet	1		
slightly unattractive	1		
warm	1		

Photo 16: Nice view of pines and hillside

Ave rating (10-1) (unscaled)	**5.9**
Variation of rating (3-1):	1.7
Ave beautiful score (7-1):	4.3
Ave calming score (7-1):	4.2
Ave interesting score (7-1):	4.5
Overall emotional response:	Slightly positive

Response words:		Noticed words:	
dry	3	green tree/s	4
bare	2	tree/s	5
comforted	1	barren hillside	1
curiosity	1	Callitris	1
diverse	1	camping area	1
ever-changing	1	clash of pines to dry open gums	1
harsh	1	cypress	1
high	1	dark green tree	1
interest	1	different types of land/ terrain/vegetation	1
like	1	few trees	1
looks like home	1	green pine trees	1
natural	1	green / shade	1
nice	1	height / shadows	1
nice background	1	invasive green tree	1
nice hills	1	rocks in background	1
nice landscape	1	softwood	1
nice view	1	the big tree	1
scenic	1	unspoilt	1
sparse	1	variety trees	1
thirst	1	view of property	1
too hot	1	weeds	1
worth climbing	1		

Photo 11: Peaceful view of fence around paddock

Ave rating (10-1) (unscaled)	**5.8**
Variation of rating (3-1):	2.1
Ave beautiful score (7-1):	4.1
Ave calming score (7-1):	4.2
Ave interesting score (7-1):	3.8
Overall emotional response:	Varied / neutral

Main response words:		*Noticed:*	
peaceful	3	fence/s	8
boring	2	fences	3
hot	2	a lot of yards	1
quiet	2	baldness	1
awesome	1	brown grass	1
barren	1	cattle	1
bland	1	country	1
civilized	1	farm	1
desolate	1	fenced	1
great view	1	fence posts	1
interesting	1	fencing	1
lost	1	green grass	1
nice	1	green tinges	1
nice fence	1	neatness	1
not exciting	1	no shade	1
not interesting	1	no trees	1
ok	1	open space	1
open	1	over clearing	1
ordered	1	paddock	1
pretty	1	post rail fence	1
purposeful	1	rails	1
quaint	1	sky	1
road not up valley?	1	trees mountains look good	1
spoilt by roads	1	wide space	1
uninterested	1	yards	1

Photo 18: Cattle in front of rocky mountain
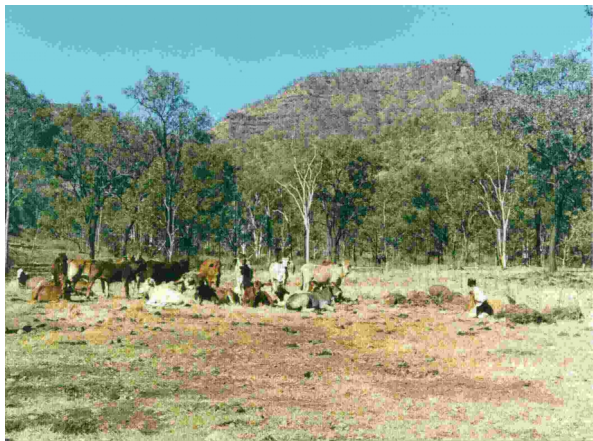
Ave rating (10-1) (unscaled)	**5.5**	
Variation of rating (3-1):	2.7	
Ave beautiful score (7-1):	3.5	
Ave calming score (7-1):	3.8	
Ave interesting score (7-1):	4.2	
Overall emotional response:	Varied / neutral	

Response words:		*Noticed words:*	
hot	2	cattle	10
dry	1	cow/s	5
peaceful	1	animals	1
quiet	1	cattle / rock	1
alive	1	cattle / trees	1
annoyed	1	cattle at peace with surroundings	1
cattle	1	cattle damage	1
cattle intrude/ annoy	1	cattle, shade trees	1
contented	1	cattle/ rock	1
different	1	dirt	1
disturbed ground	1	dry dusty	1
dry / shitty	1	erosion / land degraded by cattle	1
harshness of country	1	farm scene	1
I hate cows	1	great to see working landscapes	1
love cattle	1	productive	1
moo!	1	rock form	1
nice	1	rocks	1
rural	1	shape mountain	1
smelly cows	1	sparseness	1
ugg!	1	white trees/ cows	1
unattractive	1		
very dry	1		
well cattle	1		
yaks	1		

Photo 15: Lots of trees on hillside

Ave rating (10-1) (unscaled)	**5.4**	
Variation of rating (3-1):	2.4	
Ave beautiful score (7-1):	4.2	
Ave calming score (7-1):	4.5	
Ave interesting score (7-1):	3.9	
Overall emotional response:	Varied / neutral	

Response words:		*Noticed words:*	
boring	3	bush	3
cool	2	many trees	2
Australian	1	tree tops	2
average	1	trees	2
could be anywhere	1	all trees	1
curiosity	1	colour range	1
great	1	density vegetation	1
great trees	1	different shades of trees	1
interesting	1	foliage	1
interested to explore	1	lots of trees/ vegetation	1
lost in the bush	1	lots trees	1
lots of trees	1	many treetops	1
mountains	1	shade	1
natural	1	terrain	1
nice place	1	too many trees	1
not exciting	1	tree tree tree	1
over timbered	1	treetops	1
rough	1	two hillsides	1
silence	1	unattractive place to live	1
singing birds	1	unproductive	1
so what?	1	unspoilt	1
trees - hmm!	1	weeds	1
treetops	1	where's the compass	1
view	1		

Photo 19: Dry pasture in front of hill

Ave rating (10-1) (unscaled)	**5.4**
Variation of rating (3-1):	2.0
Ave beautiful score (7-1):	4.0
Ave calming score (7-1):	4.0
Ave interesting score (7-1):	4.3
Overall emotional response:	Varied / neutral

Response words:		*Noticed words:*	
dry	2	bareness	1
hot	2	barren	1
awe inspiring	1	cleared foreground	1
barren	1	cleared land	1
bleached	1	cows	1
bored	1	creek flat	1
deserted	1	exposed ground	1
harshness of country	1	fence posts / pasture	1
hot	1	geology	1
hot / dry	1	geology/ layers	1
interest	1	green trees	1
interesting	1	green trees to creek	1
looking up	1	height rugged	1
majestic	1	lack of visual interest	1
peaceful	1	less trees	1
scenic	1	materials	1
thirsty	1	not enough trees	1
too cleared	1	nothing	1
too dry	1	possibility for revegetation	1
too hot	1	range of forms	1
unattractive	1	road	1
very dry	1	skyline	1
wide brown land	1	the triangular mountain	1
		too cleared	1
		view	1
		view/ hill	1

Photo 10: Interesting cattle yards in farm scene

Ave rating (10-1) (unscaled)	**5.4**
Variation of rating (3-1):	2.5
Ave beautiful score (7-1):	3.4
Ave calming score (7-1):	3.4
Ave interesting score (7-1):	4.1
Overall emotional response:	Varied / neutral

Main response:		*Noticed:*	
interested	2	yards	5
activity	1	fences	2
busy	1	fence	2
calming	1	background	1
cool	1	background hills	1
distracted	1	barren landscape	1
dry	1	built environment	1
farming	1	busy	1
functional	1	cattle yard	1
good farm	1	composition yards	1
great colour	1	cow sheds	1
green / brown	1	farm scene	1
historic	1	heavy rainfall	1
intrigued about farming activities	1	like the trees	1
man's needs to mountains	1	materials	1
mix man/nature	1	paddock	1
nice	1	progressive	1
no animals?	1	rural	1
not enough trees	1	shade trees, yards	1
past age	1	tells a story	1
practical use	1	the tree	1
quaint	1	things go on here	1
smelly cows	1	tidy	1
structured	1	too much man made junk	1
tell me more who/ what?	1	twisted trees	1
too hot	1	ugly shed	1
tried to ignore yards	1	wooden fence	1
unattractive	1	yards too low	1
undulating	1		

Photo 17: Toilets blocking nice mountain view

Ave rating (10-1) (unscaled)	**5.3**
Variation of rating (3-1):	2.3
Ave beautiful score (7-1):	4.1
Ave calming score (7-1):	4.2
Ave interesting score (7-1):	4.4
Overall emotional response:	Varied / neutral

Response words:		Noticed words:	
bored	1	toilet/s	4
contrasts	1	toilet block	3
good toilet block	1	building	2
good/bad	1	amenities	1
Grand canyon?	1	aspect	1
great campsite	1	BBQ seats/ house	1
hot/ bright	1	building / hills behind	1
hut in way	1	clean facilities	1
interesting	1	destination	1
intriguing	1	hills trees	1
inviting	1	house	1
lack shade	1	materials	1
man to mountain	1	mountains / outhouse	1
nice	1	necessary need?	1
nice background	1	park	1
nice camp ground	1	patterns / contrast	1
not very interesting	1	progress	1
practical	1	ridgeline	1
prepared	1	solar panel / shed	1
recreational	1	solar panels	1
rural haven	1	terrible	1
sad	1	toilet/ shower	1
toilet block	1	tree stumps / no shade	1
toilets!*?	1	unattractive	1
too hot	1		
ugly building	1		
ugly shed	1		
view blocked by toilet	1		

Photo 21: Road through dry grassy flat

Ave rating (10-1) (unscaled)	**5.1**	
Variation of rating (3-1):	2.2	
Ave beautiful score (7-1):	4.0	
Ave calming score (7-1):	3.9	
Ave interesting score (7-1):	3.7	
Overall emotional response:	Varied / neutral	

Response words:		Noticed words:	
dry	2	grass	2
nice	2	road	2
boring	1	bit of road	1
alone	1	cleared land	1
beautiful	1	contrast	1
bland ?	1	dirt road	1
creek / trees	1	dry grass / road	1
dead	1	flat valley	1
everything	1	foreground	1
flat	1	foreground too cleared	1
inquisitive	1	grass flats, creek	1
inviting	1	long distance	1
nice view	1	many trees	1
ok	1	mountain	1
putting green	1	nice background	1
too hot	1	parched	1
typical country	1	road to where	1
uninviting	1	road usage	1
where are we going?	1	rural	1
		rutted road	1
		space	1
		track	1

Photo 20: Barren campsite in front of mountain

Ave rating (10-1) (unscaled)	**4.7**	
Variation of rating (3-1):	2.5	
Ave beautiful score (7-1):	3.5	
Ave calming score (7-1):	3.6	
Ave interesting score (7-1):	3.7	
Overall emotional response:	Varied / Slightly negative	

Main response:		*Noticed:*	
nice	2	road	2
action	1	attractive place to live	1
bare	1	backdrop	1
barren	1	barren	1
barren, boring	1	camp facilities	1
bored	1	country farm	1
boring	1	dry flats	1
disappointing	1	green trees, ridges	1
disrupting	1	hills	1
dry	1	ideal for camp	1
exposed	1	lack of tents	1
facilities spoil the view	1	layout	1
good camp base	1	messy	1
great campsite	1	mountain	1
green	1	neat tidy foreground	1
green hills	1	no shade over camp	1
hot / dry	1	ok for picnic /shelter sheds	1
hot / bland	1	parking	1
just ugly	1	parking area	1
lack trees	1	picnic area	1
man not blending with nature	1	picnics	1
nice	1	post around road/ skyline	1
not enough trees	1	recreation	1
obstacles	1	resting place	1
ok	1	roof	1
over done	1	the trees	1
place to relax	1	too cleared	1
too hot	1	track	1
touristy	1	traditional	1
ugly	1		
unattractive	1		
very dry	1		
welcoming	1		
what's that?			

Photo 12: Barren cleared flats

Ave rating (10-1) (unscaled)	**4.7**	
Variation of rating (3-1):	2.0	
Ave beautiful score (7-1):	3.5	
Ave calming score (7-1):	3.6	
Ave interesting score (7-1):	3.3	
Overall emotional response:	Varied / Slightly negative	

Main response:		*Noticed:*	
barren	2	cleared land	2
dry	2	dryness	2
hot	2	fence	2
accessible nature	1	cleared / dieback	1
awful	1	dead flats	1
boring	1	dead grass	1
dead	1	dead trees	1
dry	1	flat	1
dry grass	1	hill line	1
dry infertile	1	hills	1
flat	1	mountain	1
good grazing	1	nice background	1
inviting	1	open space	1
nice	1	openness	1
nondescript	1	over cleared	1
ok	1	scraggly bush	1
open/cleared	1	skyline	1
sadness	1	some good trees	1
slightly unattractive	1	too cleared	1
typical mountain	1	valleys	1
uninspired	1		

Photo 13: Uninviting weed infested hillside
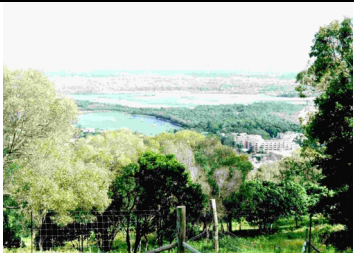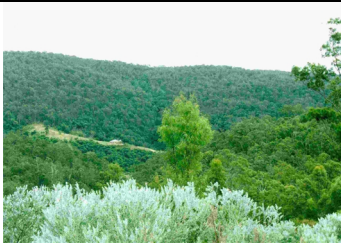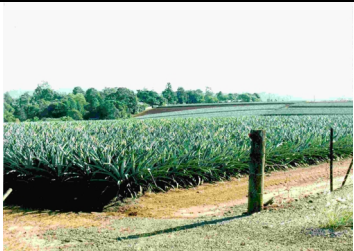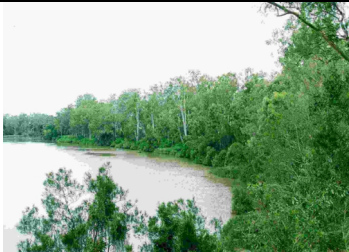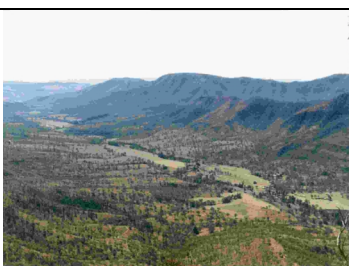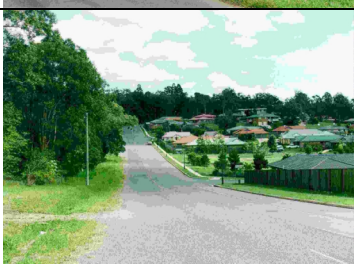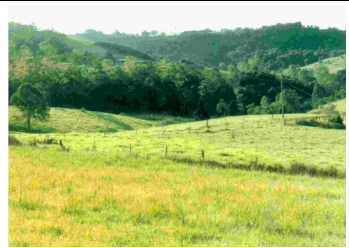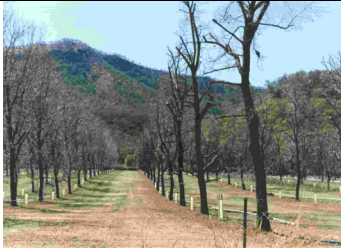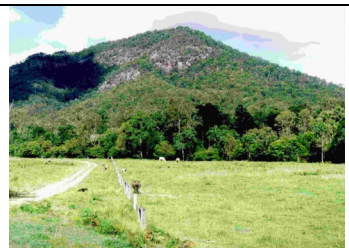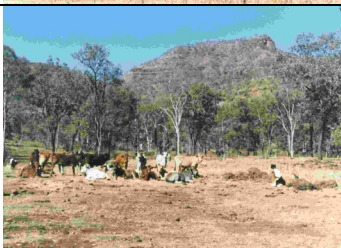
Ave rating (10-1) (unscaled)	**4.5**
Variation of rating (3-1):	2.6
Ave beautiful score (7-1):	3.2
Ave calming score (7-1):	3.4
Ave interesting score (7-1):	3.3
Overall emotional response:	Varied / Slightly negative

Response words:		Noticed words:	
nice	2	dead tree	2
Dry	2	weeds	2
annoyance	1	bare trees	1
boring unattractive	1	bushes	1
bush	1	dead timber	1
bush fire	1	dead trees	1
degraded	1	dieback / ringbark	1
desert	1	dieback / weeds	1
disappointed	1	grass	1
disappointing	1	hill	1
heavily cleared	1	lantana	1
Hot / dry	1	long grass bare trees	1
insect sounds	1	more scraggly bush	1
interesting	1	natural Australia	1
interesting vegetation	1	prickly grass	1
lantana	1	ridge	1
needs work	1	rise	1
not exciting	1	scruffy paddock	1
scratchy	1	subtle colours	1
starkness	1	tall grass	1
too hot	1	the white bark	1
uninviting	1	tree clearing	1
why walk the hillside	1	vegetation	1
wouldn't go there	1	weed	1
		weed infestation	1
		weeds	1
		weeds in foreground	1

Photo 9: Dry rocky creek bed

Ave rating (10-1) (unscaled)	**3.9**
Variation of rating (3-1):	2.2
Ave beautiful score (7-1):	3.2
Ave calming score (7-1):	3.2
Ave interesting score (7-1):	3.4
Overall emotional response:	Negative

Response words:		Noticed words:	
dry	4	rocks	3
hot dry	3	creek bed	2
harsh	2	dry creek bed	3
barren landscape	1	stones	2
could get hot	1	degradation	1
curious	1	creek	1
depressing	1	riverbed	1
desolate	1	barren	1
dryness	1	diversity	1
harsh drought	1	dry creek	1
heat	1	dry riverbed	1
hot parched	1	dryness	1
interested to explore	1	harshness	1
nature	1	no water	1
nice	1	nothing	1
no water	1	pebbles	1
no water	1	rocks / dry	1
possible flooding	1	rocky creek	1
rough	1	stone	1
unattractive	1	the rocks	1
uncomfortable	1	weeds / no water	1
yuk	1		

19   APPENDIX 4. SEQ PHOTOGRAPHS

D18 **9.3**	**D06** **7.2**	**D11** **5.3**
D03 8.2	D01 7.1	D13 5.1
D16 8.1	D23 6.7	D05 4.6
D10 8.0	D04 6.5	D14 4.2
D17 8.0	D21 6.4	D15 3.2
D08 7.7	D22 6.4	D07 1.4
D12 7.3	D19 5.6	D02 1.3

20 APPENDIX 5. DETAILED MAPS

20.1 MAP A. SCENIC PREFERENCE

21 APPENDIX 6. MAPS BY PLANNING UNIT