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CITY OF AUCKLAND DISTRICT PLAN

HAURAKI GULF ISLANDS SECTION REVIEW

COLOUR FOR BUILDINGS

September 2006

Prepared by

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for

Auckland City Council

as part of the

Hauraki Gulf Islands District Plan Review

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PURPOSE OF REPORT

This report is prepared as part of the review of the Hauraki Gulf Islands District Plan and assesses the effect of colour on buildings in the Hauraki Gulf Islands. The aim of the report is to identify colours that will assist the integration of buildings into the landscape

Past studies carried out in the Gulf Island's, such as Essentially Waiheke, have identified the character as being "low key". The colour of buildings is one factor that affects this low key character, along with other factors including small scale buildings, expansive rather than intensive development, openness, unkerbed roads, informality and individuality. Colour can affect how recessive or dominant buildings are in the landscape, and thus impacts on these "low key" qualities. *Figures 1, 2 and 3* illustrate the difference colour can make to a building's integration with the landscape.

Colour can also be a factor in the expression of individuality, which is a contributor to the unique character of Waiheke and other parts of the Hauraki Gulf Islands. However this needs to be tempered with the aim of limiting the dominance of buildings in particular locations so landscape character remains readily perceived.

Threats to the existing qualities include features such as substantial new homes that are of a scale that is contrary to the existing character of the built surroundings, or with colours that emphasise the buildings prominence. Such emphasis is seen as contrary to the preferred "low key" local character, and contrary to the aim of integrating buildings with their environment rather than contrasting with and dominating it. Mitigation of the visual impact of built structures in these landscapes is an important aspect of ensuring the natural values are maintained.

Figure 1: Recessive colours compatible with those found in the surrounding landscape

Figure 2: Colours that illustrate dominant and recessive qualities.

Figure 3: Dominant qualities of light colours

This review includes developing an understanding of colour theory and what colour characteristics have the most visual impact on buildings in the landscape. The BS 5252 Colour Framework was referenced, along with the colour charts of a range of paint companies and their supporting colour theory information. A preliminary judgment was made as to which colour groups would be appropriate in this landscape as well as the impact of light reflectance. This judgment was tested on site and refined to form the basis of the recommendations.

The information was analysed and a system developed so colour recommendations could be applied as a permitted activity standard, or for guidance in assessing discretionary activities.

COLOUR FRAMEWORK

A recognised colour system was needed from which to develop a colour selection appropriate to the landscape context of the Hauraki Gulf Islands. Information supplied by the major paint companies demonstrated a range of options to use as a colour system, but a British Standard (BS) provided an independent standard which is recognised by the industry and is accessible to both the paint companies and the public.

Of the British Standards available, BS 5252 (Standard Specification Colour Range) was chosen. It is presented as a colour framework which relates colours in terms of selected steps, based on the visual attributes of hue, greyness and weight.

- Hue is the attribute of redness, yellowness, blueness etc of a colour;
- Greyness is the estimated grey content of colours and is divided into five groups, A to E, from grey to clear;
- Weight is a subjective term for lightness modified as necessary to produce colours of the same character in different hues.

(BS No 5252 Colour Range, is reproduced in a colour chart published by Resene. See *Figure 7* below. This colour chart is referred to throughout this report).

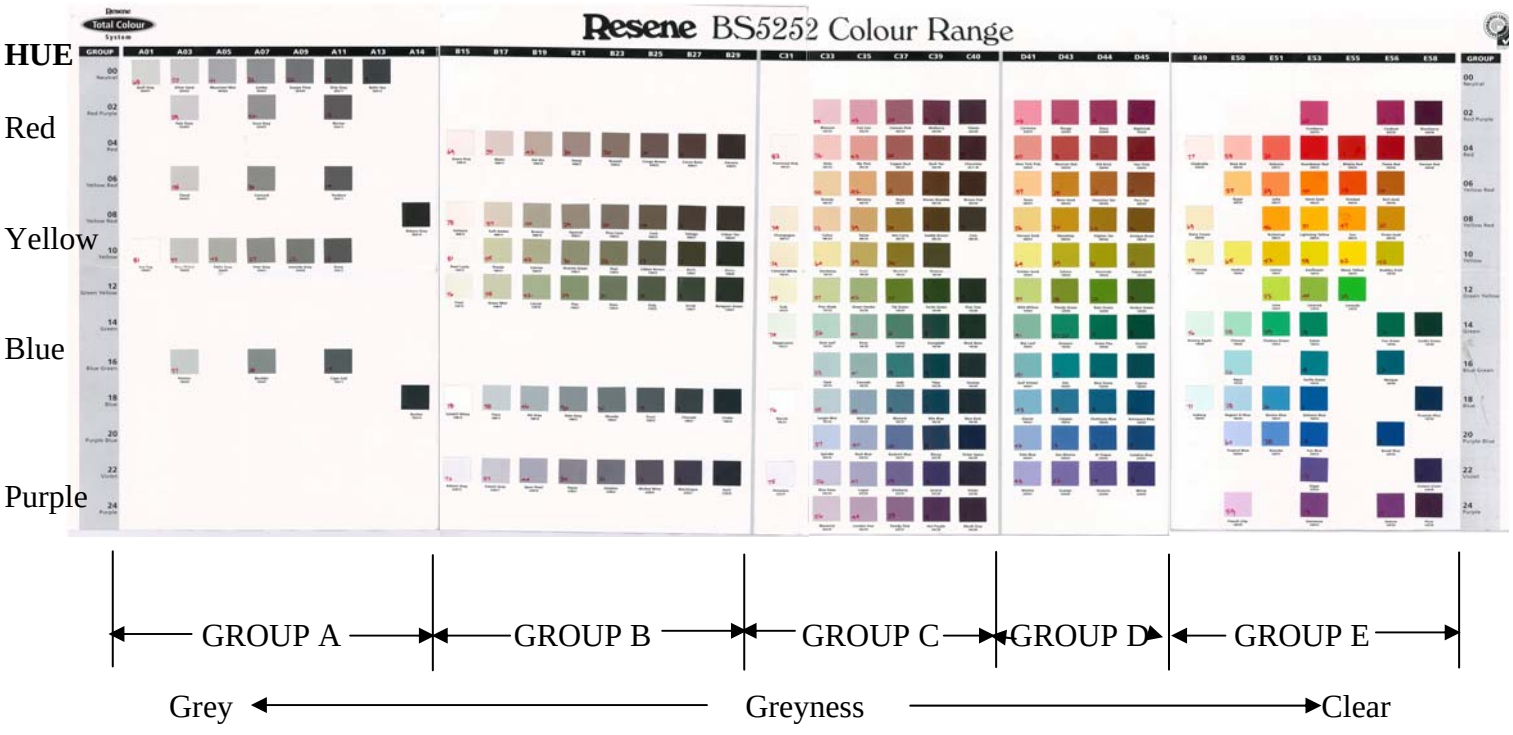
Figure 4: Example of colour grouping

The blue house in the centre of the photo is recorded on the 5252 standard as Bluestone 16D44

***Hue**: from the blue-green row 16.*
***Greyness**: from the D group i.e nearly clear*
***Weight**: from column 44*

(Bluestone also has a low Reflectance Values (RV) of 13%. RV is discussed under the section 'Critical Colour Attributes' of this report)

Figure5 BS5252 presented on Resene Colour Chart



Hue

Hue is what is normally referred to as colour, such as red, yellow, blue etc. Colour is often arranged in a circle to understand how the colours relate to each other and this is called the colour wheel. There are usually three main colours (primary colours) placed around the circle and in between are the colour mixes. The Primary Colours are red, blue and yellow. Between red and blue are the violets; between blue and yellow are the greens; between yellow and red are the oranges. The simple colour wheel is shown in *Figure 6*.

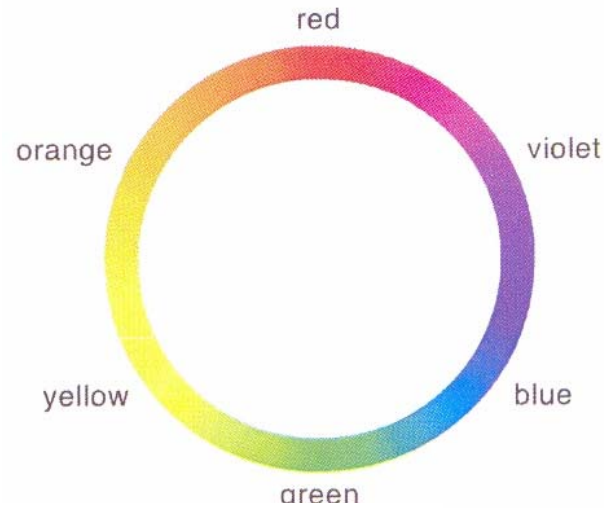


Figure 6. Colour Wheel

On the chart representing the BS 5252, the colours or hues are arranged in a vertical fashion and are numbered from red/purple through yellow to blue. If they were shown on a colour wheel, purple (24) would be alongside red/purple (02).

Greyness

On BS5252, the colours are also grouped from A to E, according to their greyness. Those colours in the A group are mostly grey with a hint of colour such as slightly purple, green etc.

In the B group the colour is more obvious but the colours are muted due to the grey influence. They are soft and visually recessive and undemanding. The colours from the B range are generally appropriate colours for the landscape because of these recessive qualities.

The colour is clearer in the C group where the grey is even more reduced. There is more contrast between the colours and less ambiguity. It is easier to identify between purples and blues for example even though the general effect of the colour is muted by the influence of grey.

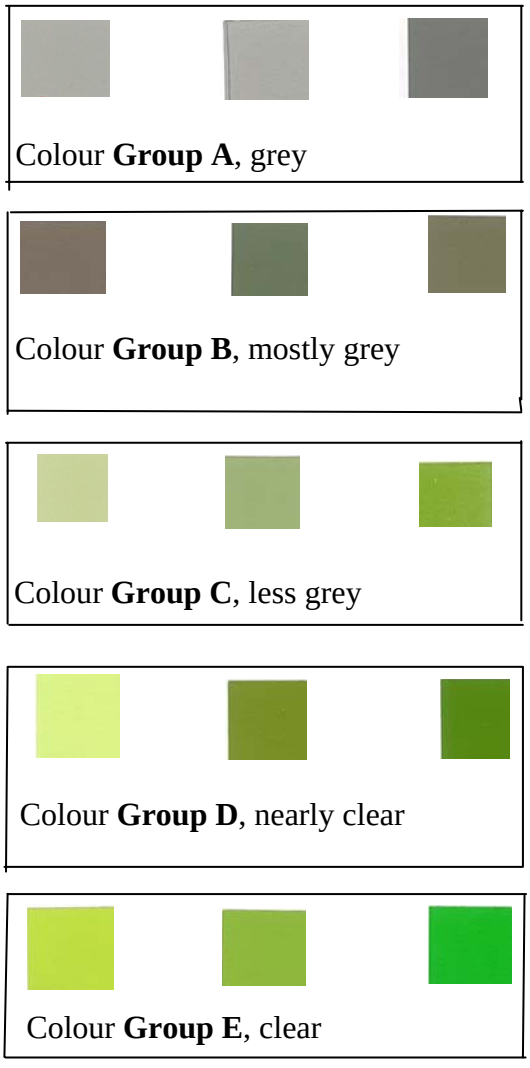


Figure 7. Colour Groups A to E

Colour clarity is more pronounced in the D and E groups where the grey content is minimal. The effect is more intense, particularly in the E group and the colours stand out for their clarity. They are prominent in any context, but particularly in a landscape setting. There is contrast between colours found in group D and marked contrast between the colours within Group E, with no ambiguity at all. These attributes are illustrated in the examples shown in *Figure 7*

Analysis of the greyness groups indicates that the more grey content there is in a colour, the more recessive that colour will be in a landscape setting. Conversely, the clearer colours with less grey are more dominant and are not so appropriate in a natural environment where integration is the aim.

Glacier 18D41

Astronaut Blue 18D45

Figure 8. Colours with different weight in the same hue

Weight

This attribute describes the lightness or darkness of a colour, like the difference between the lighter Glacier 18D41 and the darker Astronaut Blue.18D45. These are colours in the same hue or colour range (Blue) and the same grey content group (D), but have a different weight as illustrated in *Figure 8*

Also, different colours can have the same weight and therefore be compatible as shown in *Figure 9*.

Copper Rust 04 C37

Hot Curry 08 C37

Fiji Green 12 C37

Figure 9. Colours of the same weight

Although this is an interesting aspect of colour, weight is not particularly relevant or a critical factor in assessing building colour in a landscape context. For this reason weight has not been included for further consideration in this assessment.

Reflectivity

A further visual effect of surfaces is their reflectivity. The approximate reflectance value (RV) of a colour indicates the amount of light that a colour will reflect. Flat black has a reflectance value of 0% and absorbs most light. In contrast white has a reflectance value of 100%. Colours with a low RV also absorb more heat than those with a high RV. All colours fit between these two extremes. Colours have measured RV's and this information is available from most paint companies. Some examples are shown in *Figure 10*.

Reflectivity can be gauged in a general sense, by looking at a surface or a cluster of surfaces such as a group of buildings or objects through half closed eyes. The reflectivity will become a dominant feature as the shape and form is muted by blurred vision. Usually it is the colours with the highest reflectivity which stand out the most. These colours generally are the whites and near whites and the bright, clearer colours. Because of this visual dominance, the attribute of reflectivity required assessment to determine what levels would be appropriate in a landscape situation.

Figure 10. Showing the effect of different reflective values

To further illustrate reflectivity, BS 5252 has been rearranged, with the colours organised according to their reflectivity, as shown in *Figure 11*. The higher reflectivity values (79-60) are on the left, and the lower reflectivity values are on the right (10-0).

As can be seen, colours with a high RV on the left are generally lighter, whilst colours with a low RV are generally darker. Reflectance values alone, therefore, do not lead to recessive colours. The combination of RV AND greyness leads to colours that are more recessive.

The type of material that a colour is being applied to is also relevant, as darker colours absorb more heat A coating with a RV of greater than 40% is often required by manufacturers to help ensure the longevity of the structure and coating.

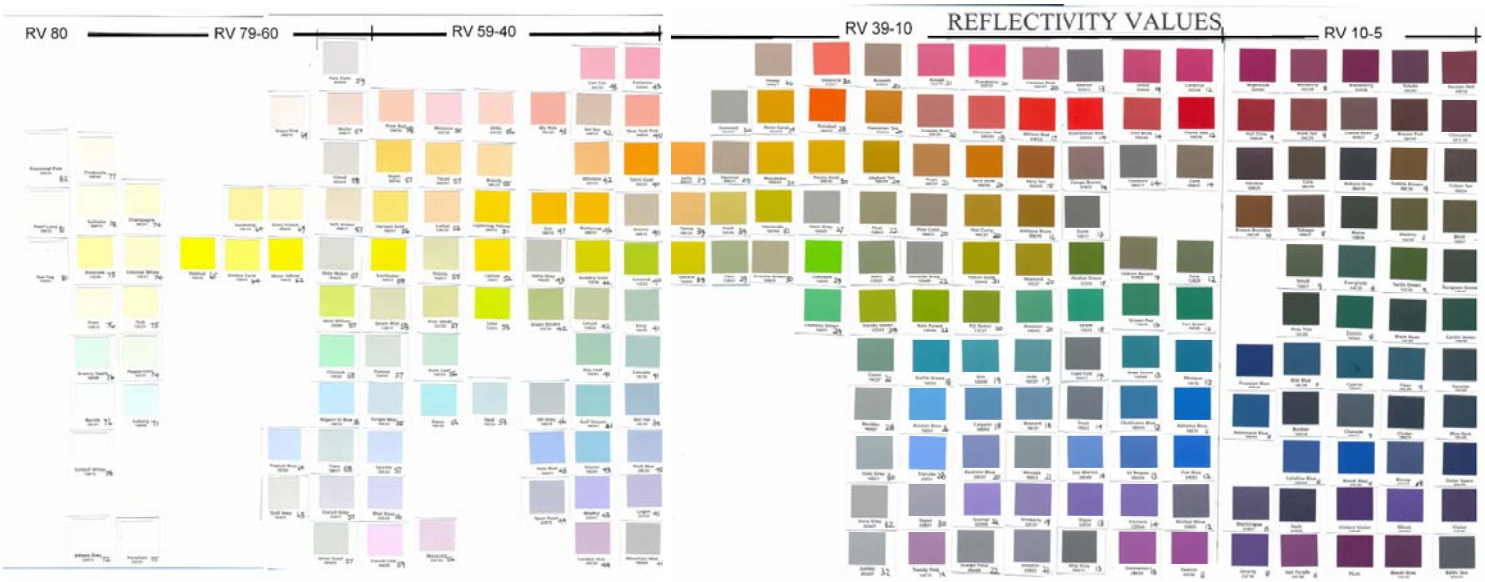


Figure 11. Resene BS5252 Colour Chart ordered by Reflectivity Value

HGI OBSERVATIONS

When gathering information for the preparation of this report, site work was undertaken on a number of the Hauraki Gulf Islands between mid 2005 to mid 2006. The first day was in sunshine and the second day was overcast. The observations were taken in both sunny and overcast conditions, morning and afternoon light, with some critical buildings being re-checked at different times and lights to confirm or reject the original conclusions. Generally the distance from the observer to the buildings would be described as middle to far distance in the context of each island. Colour matching was done against the surface on both sunny and shaded building faces

A range of building and roof colours was observed and their recessive or dominating qualities noted. The colour and reflective value was assessed along with their estimated position on the Resene BS5252 colour chart.

The colour of buildings affects their visibility. This study has identified the qualities and characteristics of colour that create a visual impact and cause buildings to be visually dominant and therefore not integrated into the landscape.

In many areas on Waiheke and Great Barrier Islands, significant areas of the land unit are covered in regenerating native bush at varying stages of maturity. Although there are some evergreen and deciduous exotic plants, the predominant vegetation is native.

In the other parts of these Islands, there is a range of smaller vegetation and pastoral settings including grapes, olives, shelter trees and mixed exotics. Some examples of the range of landscapes are illustrated in *Figure 12*.

Figure 12. Typical Hauraki Gulf Islands landscapes

The colour of the vegetation is variable and ranges from yellow greens and blue greens with browns and greys. The effect of the colour in the vegetation is influenced by light, texture, proximity and contrast. Manuka has blue/grey tones, whilst regenerating whitey wood and ponga has bright yellow/green tones.

Other influences are the size and shape of the leaves plus their surface texture and density, as illustrated in the contrast between, kanuka and puriri, for example.

The colours of the vegetation and buildings are also influenced by the time of day and atmospheric conditions. As illustrated in *Figures 13 and 14*, the colours are bright in the morning sunshine and subdued in the evening light.

Variation would also occur according to the weather such as in overcast or rainy conditions. These factors affect the appearance of both the buildings and the surroundings. The brighter the light the easier it is to pick out detail and the visual impact is increased.

The buildings which were the least visible and the most integrated into their surroundings, were either in natural timber or were darkly coloured with paint or timber stain. The most visible structures were walls in the near white range and light coloured roofs angled to the sky. The contrasts are shown in *Figure 15*.

In assessing the visual effects of the vast colour range in between the light and dark colours, the colour attributes of reflectivity and greyness were critical and required further investigation. Although there were some bright colours which stood out, they did not necessarily have a high reflective value so their particular colour qualities had to be identified.

Figure 13: Morning light giving highly reflective effects on the varying colours of the vegetation and buildings

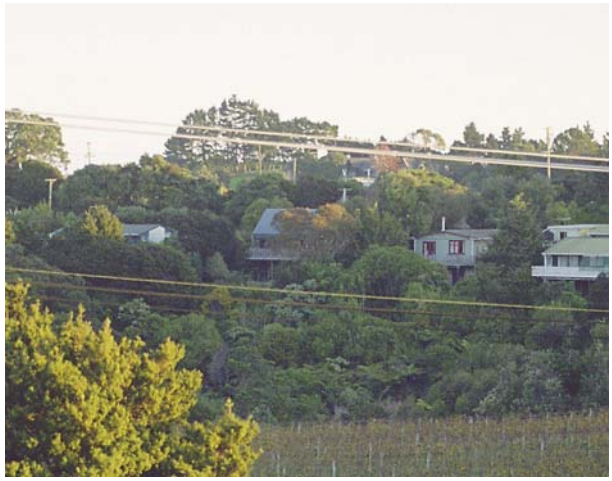


Figure 14: The same view in the evening light showing the subdued effect on colour

Figure 15. Recessive and dominant colours. The darker colours with a lower RV are more recessive, whilst the lighter colours (especially white) are more dominant.

CRITICAL COLOUR ATTRIBUTES

1 Reflectivity

It was apparent that any wall colour with a reflectivity value greater than around 60% and roof colour of around 40%, regardless of the hue, was intrusive and created an unacceptable contrast with the setting. Typical examples of these wall colours are indicated in *Figure 16* and show reflective values of 75 and 78

In all the examples noted on site and photographed, the critical visual factor was the dominance of the highly reflective white or nearly white in the landscape. Although the form and scale of a building might also make a contribution to the visual impact, by using the technique of half closing the eyes, these qualities were reduced while the impact of the light colour remained.

Specific buildings which were considered to be appropriate as far as their recessive qualities were concerned, but which were still relatively light in colour, were noted. The RV values of these buildings was around 57% to 58%, which was considered an acceptable level in those landscape settings. These colours, however, were from the greyer end of the colour range (Group B). These examples are illustrated in *Figure 17* and form a bench mark of acceptability for reflectivity

Although higher reflectance values generally cause colours to be more obvious, their dominance is influenced by the amount of greyness they contain. Where colours are muted by having more greyness, they can be less dominant. Where they are clear and bright and have less greyness, they can also be visually dominant. This aspect of colour is discussed in more detail in the next section under greyness.

Solitaire
08B15
RV 78

Primrose
10E49
RV 75

Figure16: showing examples of a high RV

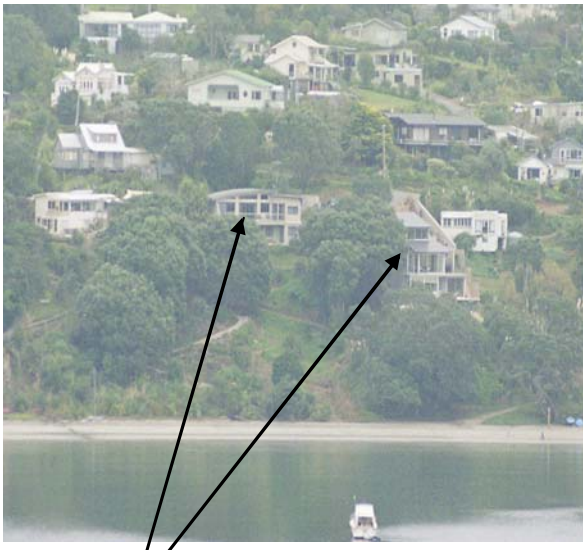


Figure 17: illustrating acceptable RV's The two houses in the centre of the photo, near the water, are at the limit of the acceptable RV at around 57 – 58. They are in the A and B greyness groups, which are appropriate

2 Greyness

Although the RV is an important criterion, some colours with a low reflectivity were also visually dominant. These colours are what would be referred to in everyday language as bright or intense and are described as clear or nearly clear in BS 5252. This quality is due to their diminished greyness and two typical examples are shown in *Figure 18*.

Boston Blue
18E51
RV 26

Limerick
12E53
RV 40

Figure 18: examples of bright colours with a low RV

The greyness attribute of colour has been previously described in this report under the section called Colour Framework. In Groups A and B, which are predominantly greys in BS 5252, the colours are generally recessive, particularly if they have a low reflectivity. This applies to the A and B groups in particular and to a lesser extent the C group. This range of colours is appropriate in a landscape setting where it is preferable that built structures do not dominate.

By contrast, those colours with less grey in the D and E groups are clear and consequently are more distinguishable. These qualities of clarity and distinctiveness, mean that the colours stand out.

In BS5252, the colours are grouped from A which are the greys, to E which are clear and examples are illustrated in *Figure 19*. The colours which were dominant were in the D and E groups. These colours have the least grey and were in marked contrast with the natural environment so they are less suitable as recessive colours in a landscape setting.

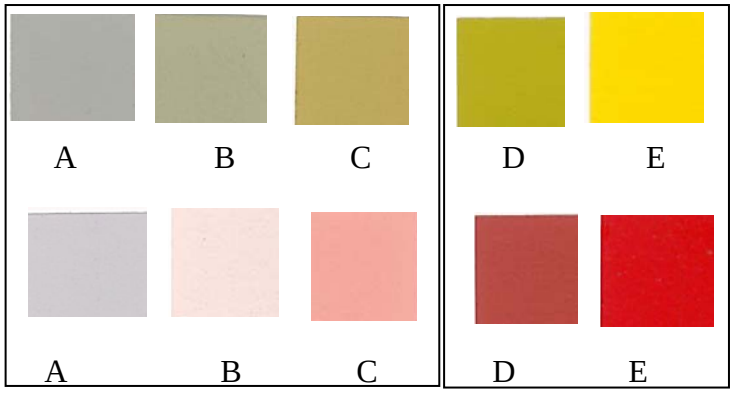


Figure 19: Colour groupings from A, (grey), to E, (clear)
The D and E groups are dominant and inappropriate, while the A, B and C groups with more grey are acceptable

As has been identified, reflectivity and greyness are the attributes of colour which have the greatest impact on the visibility of buildings in a landscape setting.

However a low reflectivity alone cannot be relied on to mean a colour will be muted and therefore appropriate in the landscape. For example, the colours on BS5252 chart in the D and E groups which are clear and often bright, do not always have a high RV. It is their characteristics of brightness or clearness which cause them to be outstanding, rather than the reflectivity rating.

Examples of this situation can be found in the colour Guardsman Red 04E53. This has a RV of only 14 even though it is a bright red. Also, Limeade 12E55, is bright green but has a RV of 29, as shown in the example in *Figure 20*. Both of these examples show that colours which are prominent and visually demanding due to their brightness and clarity do not necessarily have high reflectivity values

Colours with these qualities of brightness and clarity are visually demanding and in certain situations are appropriate, such as in urban and commercial settings, but not necessarily in landscape settings unless a building is purposefully being highlighted. Where the intention is to integrate the buildings into the landscape surroundings, these colours are inappropriate

Reflectance value and colour clarity are therefore both important contributors to the impact of colour. Both influence the recessive or advancing effect that a colour can have and therefore the potential visual impact of buildings in the landscape.

Limeade
12E55
RV 29

Guardsman Red
04E53
RV 14

Figure 20. Clear colours with a low RV These colours are bright and clear and visually dominating even though they have a low reflectivity value

The conclusion reached is that those colours which are too light or too bright are inappropriate. Examples are shown in *Figure 21*. These colours and their reflectance values were matched and identified on BS5252 colour chart and an acceptable range was defined

On BS5252, the brighter less acceptable colours are concentrated in the D and E groups, with some debatable colours in the C group. The colours with higher reflectance values are aligned in columns on the left in each greyness group, and lower reflectance values are on the right of each greyness (A,B,C,D,E) group. This pattern formed the basis of the recommendations.

The visual impact of reflectivity and greyness are less easily defined in the C greyness group on BS5252. For the reasons outlined in this report, it was decided that a maximum RV of 40% for the C group would be an acceptable limit.

By keeping the roof colour in the darker colour range from greyness groups A, B and C and with a maximum RV of 40%, the impact of reflectivity will be reduced.

The colour or hue attribute has proved to have less influence on the visibility of buildings than reflectivity and greyness. For this reason it is possible to use any colour without impacting on dominance as long as the reflectance value and greyness is within acceptable limits. By keeping the restrictions on colour to a minimum, the community will be able to have more choice and room for self expression.

Figure 21: Light coloured buildings The gold coloured building on the left had an RV of 56 and was in Group D. This was considered too bright, along with the lighter buildings

RECOMMENDATIONS

Assessment Criteria for selecting surface colour should refer to BS5252 as the base information. The colour selection is made from the following indicators and applies to the predominant colours of a structure such as the walls and roof. Architectural details such as fascias, door and window frames are excluded.

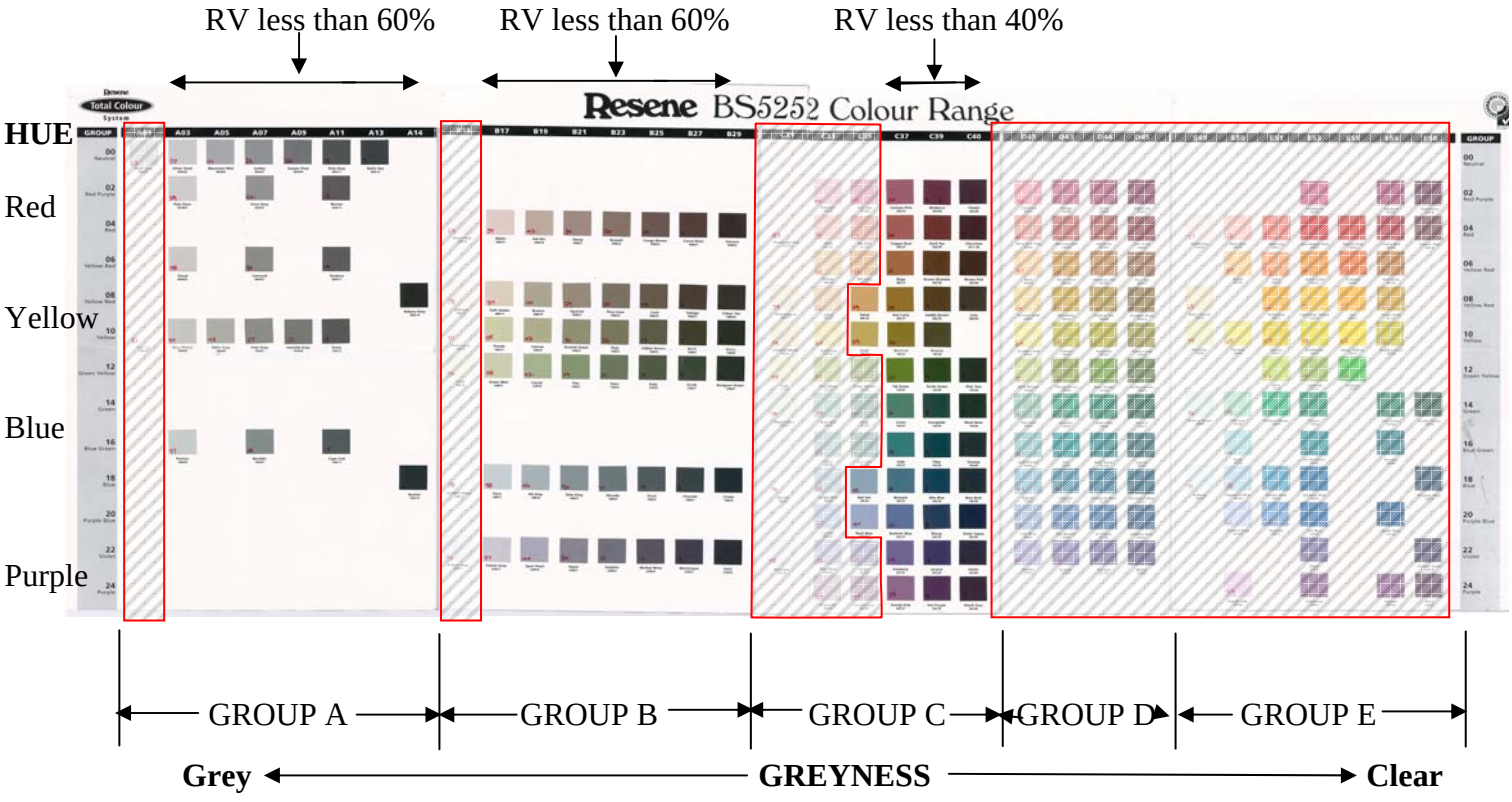
- Hue (Colour)
  All the colours from
  00 – 24 are acceptable

- Reflectance Value (RV) and Greyness Groups
  The predominant wall colours, have a RV rating of no more than 60% for greyness groups A and B and no more than 40% for greyness group C.

  Roofs: A RV rating of no more than 40% within greyness groups A, B and C.

These colour qualities are outlined below on BS5252 in *Figure 22*.

Figure 22: Resene BS 5252 Colour Chart
Colours which are unacceptable are cross hatched



HAURAKI COLOUR CHARTS

The major paint companies assisted during the preparation of this report by providing information about the systems they use to categorise colour. All the companies approached, including Benjamin Moore Paints, Dulux, Resene and Wattyl Taubmans, expressed a willingness to provide colour charts using their own colours which are comparable with the guidelines and the information in this report. Some companies have had more experience in this area of work, having done area specific charts before, but they all agreed that it is possible and appropriate.

While any company charts would not necessarily be BS colour, the chart information from each company would include hue, reflective values, and greyness (brightness) and would be collated by the colour experts of the various paint companies. The colour range would be comparable with the recommended reflectivity of less than 60% for greyness groups of A, and B, and less than 40% for group C of the BS5252 standard.

The paint companies all understand BS 5252 and are familiar with the technical background. Even though the colour range has become dated, the standard could be used as a common base around which more contemporary colours could be built.

This approach would allow the paint companies to include their particular colours within the latest colour trends and it would also allow the opportunity to update the colour range in future to keep abreast of current colours.

Another advantage of this approach would be that the public would be given a wider choice of colours within the recommended limits of the BS 5252 range, and the colour choice could be updated and remain relevant to the fashion of the times.

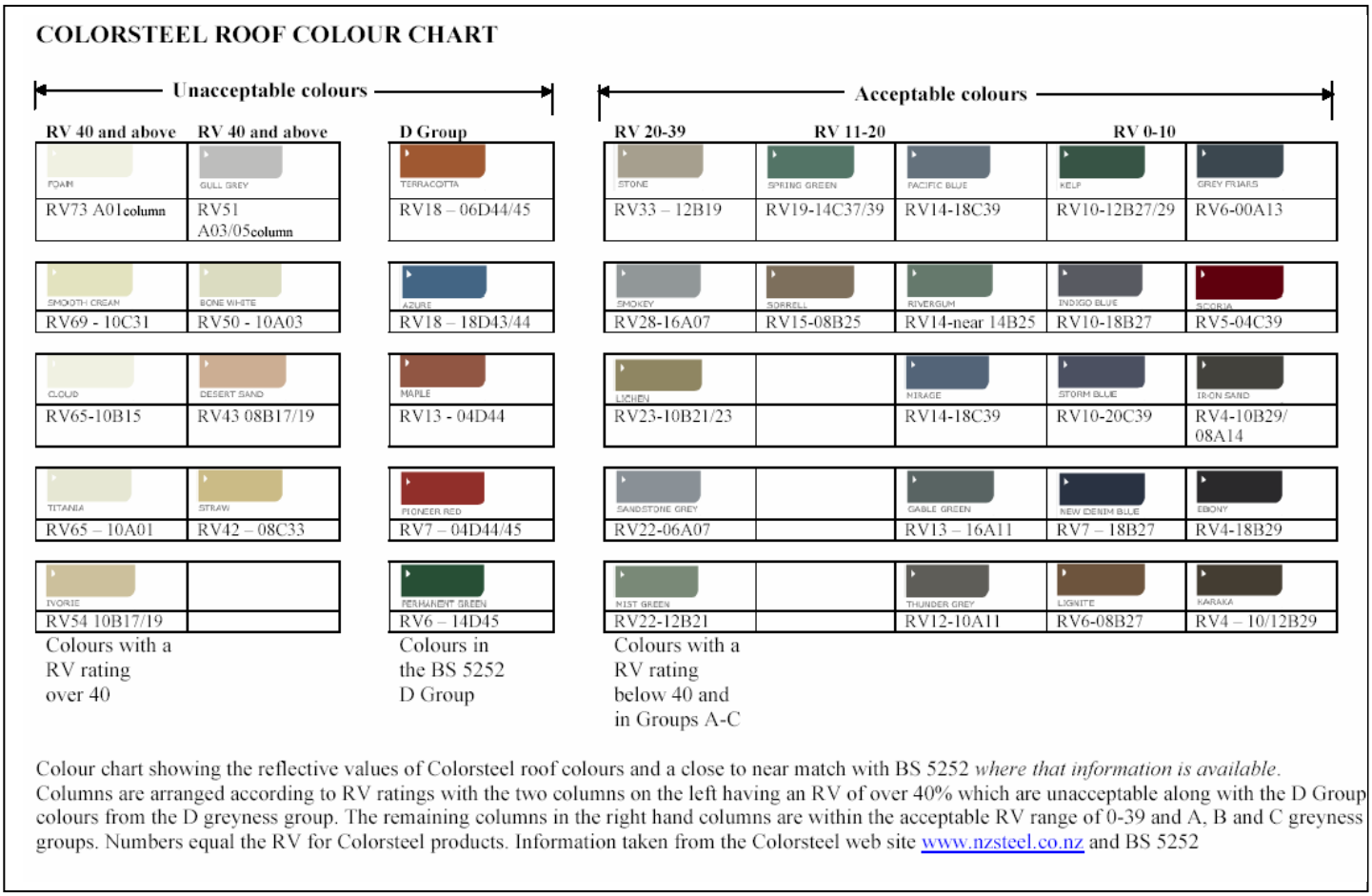
The various colour charts could be held in the council offices on the islands and other public places such as the libraries, so they are readily accessible to the public. Some companies are also willing to put the colour charts on their websites.

ROOF COLOUR

The Colorsteel range of colours has been aligned close or near to BS 5252 with reflective values included. These attributes are shown in the Roof Colour Chart *(Figure 23)*. The lighter colours with a RV of more than 40% which are unacceptable, are on the left hand side of the chart alongside the colours from the D greyness group. The darker colours with an acceptable RV of less than 40% and from greyness groups A, B and C, are in columns on the right.

If roofs are to be painted, the colour should be within the recommended range but with a RV of no greater than 40%

Figure 23. Coloursteel roof colour chart ordered by Reflectivity Value and greyness, showing recommended colours



Colour chart showing the reflective values of Colorsteel roof colours and a close to near match with BS 5252 *where that information is available*. Columns are arranged according to RV ratings with the two columns on the left having an RV of over 40% which are unacceptable along with the D Group colours from the D greyness group. The remaining columns in the right hand columns are within the acceptable RV range of 0-39 and A, B and C greyness groups. Numbers equal the RV for Colorsteel products. Information taken from the Colorsteel web site www.nzsteel.co.nz and BS 5252

CONCLUSION

In identified parts of the Hauraki Gulf Islands the aim is to maintain the dominance of natural elements over the built environment.

To achieve this aim, there is a need to ensure the visual integration of buildings into the landscape, and the colour of buildings can assist in this. This study has highlighted the impact of buildings with a high reflective value and with clear bright colours, and made recommendations accordingly

The brighter or lighter the colour of buildings, the greater the contrast and the less they are integrated. To achieve visual integration, colours that are less bright and less contrasting have been selected.

The recommendations have provided for as much choice as possible while ensuring the range is appropriate in the landscape. The Gulf Islands are about diversity so it is appropriate that there should be minimum restrictions on hue choice and this has been provided for. Also the lighter colours within the selected range provide options for situations where the buildings are shaded and dark.

Figure 24. Buildings in landscapes dominated by natural features

Figure 25: Lighter coloured roofs against the sky

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Resene BS5252 Colour range

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Queenstown Lakes District Council and Civic Corp. A Guide to reducing glare and reflection in the Queenstown Lakes District.

NZ Dulux Colour Map

British Standard 5252