

# Coastal Environment of Otago

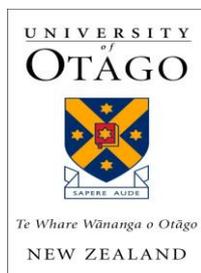
## Natural Character and Outstanding Natural Features and Landscapes Assessment

### Dunedin City Section Report

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Prepared by



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LANDSCAPE ARCHITECT





**Figure 1 : Dunedin City Coastal Environment**

## Introduction

This report has been commissioned by the Otago Regional Council, and Dunedin City Council to inform the reviews of the Otago Regional Policy Statement and Dunedin City District Plan. It is required to assist the Councils to fulfil their obligations under Section 6 of the Resource Management Act 1991 (RMA) and the New Zealand Coastal Policy Statement 2010 (NZCPS).

Section 6 of the RMA deals with 'matters of national importance' and requires councils to 'recognise and provide for':

- (a) 'The preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use and development.*
- (b) The protection of outstanding natural features and landscapes from inappropriate subdivision, use and development.'*

Regional policy statements, regional plans and district plans must all give effect to the NZCPS. Of particular relevance to this report is Policy 13 which requires:

- (1) To preserve the natural character of the coastal environment and to protect it from inappropriate subdivision, use and development:*
- (2) Recognise that natural character is not the same as natural features and landscapes or amenity values...*

and Policy 15 which is:

*To protect the natural features and natural landscapes (including seascapes) of the coastal environment from inappropriate subdivision, use and development:*

This report presents the results of the assessment of the coastline of Dunedin City and explains the background to the assessment and the methods utilised.

The report and assessment work have been undertaken by a team put together for the project. The team members are:

- Mike Hilton and Teresa Konlechner, University of Otago (Coastal geomorphology)

- Brian Stewart, Ryder Consulting Ltd (Marine ecology)
- Mark Sanders, Ryder Consulting Ltd (Terrestrial ecology)
- Marion Read, Read Landscapes Ltd (Landscape assessment)
- Mike Moore, Mike Moore Landscape Architect (Landscape Assessment)

GIS mapping was provided by Ryder Consulting Ltd.

## **The Coastal Environment – Dunedin City**

The Dunedin City coastal environment includes the coastal marine area and extends from near Taieri Mouth in the south, to the Pleasant River estuary in the north (Figure 1). The coastal environment spans Mean High Water Springs (MHWS), with Dunedin City Council holding jurisdiction above this, and Otago Regional Council below. Except for where information on the character of the marine environment is available, this project has necessarily focused on the terrestrial and nearshore environments. This is reflected in the mapping.

The character of the Dunedin City coast varies considerably along this length. In very broad terms, it can be described as follows:



*Figure 2: View over Warrington Spit and the northern coastline*

The north coast, from Pleasant River mouth to Blueskin Bay is a landscape of cliffs and hillslopes interspersed with sweeping sandy beaches backed by estuaries (see Figure 2). The geology of this section is mainly sedimentary.

The central section from Blueskin Bay to St Clair is an eroded volcanic landscape with a number of drowned valleys forming inlets and the Otago Harbour as illustrated in Figure 3.



*Figure 3: View northward along the eastern coast of Otago Peninsula*

Between St Clair and Brighton the geology is again predominantly sedimentary, the key landscape features being the sandstone cliffs, south of St Clair and the Kaikorai Stream Estuary as shown in Figure 4.

The southern section from Brighton to Taieri Mouth is a landscape of sandy pocket beaches interspersed with low rocky headlands and reefs with gently sloping coastal terraces behind as illustrated in Figure 5. The geology in this area is schist, part of a limited area where the Otago schist is exposed on the coast. Although the Taieri River mouth is entirely within Clutha District, part of the tidal section of the lower river gorge forms a section of the City boundary and is part of the Dunedin City coastal environment.



*Figure 4: View of the coastline south of urban Dunedin including Blackhead and the Tunnel Beach sandstone cliffs*



*Figure 5: View northward of the coastline between Taieri Mouth and Brighton.*

There are a few small islands, including Goat and Quarantine Islands in Otago Harbour, and Wharekakahu, White and Green Islands off the ocean coast.

Most of the Dunedin City coastline is modified, at the very least by the clearance of the indigenous vegetation cover. Agriculture either is or has been undertaken to the cliff tops or the inland extent of the dune systems resulting in modifications to the ecology and morphology of the landscape. Sand dune morphology and ecology has been extensively modified, primarily by non-native dune plants. Settlements are a feature of the coast, the largest being the urban area of Dunedin itself, which has resulted in a significant modification to the coast around Ocean Beach and the head of the Otago Harbour. Other areas urbanised to varying extents include the margins of Waikouaiti Estuary, Blueskin Bay, Purakaunui Inlet, Otago Harbour, and Kaikorai Estuary as well as Brighton / Ocean Grove.

Parts of the Dunedin Coast are well known for their natural character, scenic, ecological and wildlife values. Obvious examples are Taiaroa head, Sandfly Bay and Tunnel Beach but there are many others. These valued landscapes underpin increasingly important tourism activities.

## **Definition of the Coastal Environment**

Policy 1 of the New Zealand Coastal Policy Statement 2010 provides guidance on the extent of the coastal environment, and states that it includes:

- a) the coastal marine area;
- b) islands within the coastal marine area;
- c) areas where coastal processes, influences or qualities are significant, including coastal lakes, lagoons, tidal estuaries, saltmarshes, coastal wetlands, and the margins of these;
- d) areas at risk from coastal hazards;
- e) coastal vegetation and the habitat of indigenous coastal species including migratory birds;
- f) elements and features that contribute to the natural character, landscape, visual qualities or amenity values;
- g) items of cultural and historic heritage in the coastal marine area or on the coast;
- h) inter-related coastal marine and terrestrial systems, including the intertidal zone; and
- i) physical resources and built facilities, including infrastructure, that have modified the coastal environment.

The key parameters that have been used in defining the inland extent of the coastal environment are as follows:

In the case of estuaries, rivers and low lying areas the coastal environment has been defined with regard to:

- The extent of areas previously mapped as being subject to coastal hazards and / or;
- The extent of tidal reach (where salinity affects the ecology rather than simply water movement) and / or;
- The top of the coastal escarpment where this exists and / or;
- The extent of landforms which are primarily a product of coastal processes.

In the case of cliffed or hilly areas the coastal environment has been defined with regard to:

- Significant changes of slope defining land adjacent to the coast with coastal aspect and / or;
- The extent of landforms which are primarily a product of coastal processes and / or;
- Areas that are visually prominent in wider coastal views (e.g. headlands).

## **Assessment method**

### **General comments**

It is fairly standard, for a project like this, to present the research method as a linear process.

This would normally follow the following structure:

- Desk top analysis
- Preliminary mapping
- Field work
- Natural character assessment
- Landscape assessment
- Report preparation.

While this format provides the basic structure of the investigation, the actual process was iterative, particularly with regard to the identification of natural character areas which were modified following the field survey.

Field work was undertaken by helicopter, the entire length of the Otago coastline being flown at low altitude over two days. A photographic record of the entire coastline was created during this time, save for the seaward sides of Taiaroa Head and Moeraki Peninsula, both of which have no-fly zones around them (Taiaroa Head was subsequently photographed from the sea). Rivers were surveyed as far as the tidal reach and / or saline influence extended, and the edges of estuaries were followed.

Where required, the boundaries of the coastal environment and natural character units were modified as a consequence of the observations made during the field work. This was particularly the case for the Tumai section of coastline (from Matanaka to Pleasant River), where observation of the landform enabled a more sensitive identification of a change in slope, and the Heywood Point to Potato Point coastline, where the more-or-less steady slope from the coastal cliffs to the hill tops made it difficult to distinguish an unambiguous boundary.

### **Natural character assessments**

The assessment of the natural character of each unit was undertaken using the criteria provided by the Otago Regional Council. These were:

- Geomorphological and hydrological naturalness, broken into the following aspects:
  - The degree to which the landforms / seabed are the product of natural processes
  - The degree to which natural geomorphological and hydrological processes are operating unconstrained
  - The degree to which water quality and quantity are unaffected by land use activities
  
- Ecological naturalness, broken into the following aspects:
  - The degree to which the vegetation patterns are a product of natural processes
  - The degree to which the vegetation cover is indigenous to the area
  - The (apparent) health and level of modification of intertidal and aquatic habitats
  - The degree to which wildlife is present and sustained;

- Experiential naturalness, broken into the following aspects:
  - The degree to which buildings, structures and earthworks (including dredging) influence the character of the landscape or seascape.
  - The degree to which there are wild and scenic qualities.

A scale of five possible ratings (high, medium - high, medium, medium – low, low) was used for the assessment of each of these aspects.

### Geomorphological and hydrological naturalness

The assessments of the geomorphological and hydrological naturalness were made with regard to the photographic record, the background knowledge of the areas involved by the team members and published data from a variety of sources including investigations commissioned by local authorities (ORC and DCC) and local commercial enterprises, research projects undertaken by staff and students at the University of Otago, and books detailing the natural history of the Otago coastline.

To assess the degree to which landforms are the result of natural processes and the degree to which these processes are operating unconstrained, the effect of structures, non-native species and landuse, both past and present, were considered. Important processes in the terrestrial coastal environment for this assessment included aeolian sand transport from the beach inland on sandy coasts and wave erosion on rocky coasts. Important processes in the marine coastal environment were alongshore and onshore/offshore movements of sediment, and tidal water circulation and freshwater inflows in estuarine environments. Consideration was given to whether modification of these processes has altered both landforms/seabed and the overall geomorphic or hydrologic ‘function’ of the unit.

Assessments of water quality and quantity were based on published data where available. Where no data was available assessments were based on the geomorphology and geology of the unit in question, the regional marine process and the history of land management.

### Ecological naturalness

Ecological assessments are based largely on Abby Smith’s (Smith 1994) “Eastward to the Sea”, prepared as a background report for the preparation of the current Regional Plan: Coast. This current assessment updates Smith’s work by including data that has come to

hand since. These data are derived from a variety of sources, including investigations commissioned by local authorities (ORC and DCC) and local commercial enterprises, research projects undertaken by staff and students at the University of Otago, publications from the Department of Conservation (DoC) and Ministry of Fisheries (now MPI), and books detailing the natural history of the Otago coastline.

For example, investigations of estuaries were undertaken as part of the ORC's state of the environment (SOE) monitoring and were carried out in accordance with the New Zealand Estuary Monitoring Protocol (Robertson *et al.* 2002). Likewise, investigations of many of the local inlets have been undertaken at the behest of local aquaculture concerns (e.g. Southern Clams Ltd). These conform to standard ecological methods investigating shellfish resources and associated community structure. Investigations within the harbour comprise assessments of the shoreline, carried out as ecological assessments of likely effects of road improvement and road maintenance work, and assessments of the wider harbour to gauge the effects of dredging operations and clam harvesting. Other investigations include assessments of the effects of sewage disposal, both offshore and coastal, stormwater discharges to the harbour and local coastline and effects of other human activities on the CMA. A list of investigations, reports and accounts used in making ecological assessments is contained in the references section.

First-hand accounts have also been obtained from DoC staff, representatives from local iwi, representatives of the fishing and aquaculture industries, and through personal field experience gathered over the past twenty five years.

#### Experiential naturalness

The assessments of the influence of buildings, structures and earthworks, and of experiential naturalness were made with regard to the photographic record and the background knowledge of the team members.

#### Overall natural character rating

Once each specialised aspect of the natural character assessment was concluded a composite assessment was undertaken to identify the overall natural character rating, again using the five point scale. Areas assessed as having high natural character required high or predominantly high scores in all disciplinary areas. The areas assessed as having high

natural character ratings were then reviewed and a judgement made as to which could be considered 'outstanding'. Reasons were recorded.

### **Natural features, landscapes and seascapes assessments**

Landscape character units and natural features within the coastal environment were identified in parallel with the natural character assessments. The landscape units, defined as areas of generally similar character, were sometimes similar in extent to the natural character units, but were generally a composite of several. For example, the Hawkesbury Lagoon, Waikouaiti Estuary, Waikouaiti Beach and Karitane Beach units were considered to be one landscape area. In most cases the landscape units extend beyond the coastal environment, but this assessment focusses only on that part within the coastal environment.

'Natural features' are distinct elements or groupings of elements forming subsets within a landscape. Natural features considered to be potential candidates for 'outstanding' status were identified through field observation, desktop research and the natural character assessments. An important source in identifying potentially outstanding natural features was the Inventory and Maps of Important Geological Sites and Landforms in the Otago Region (Hayward and Kenny, 1998).

Both the landscape units and natural features identified were described and assessed in accordance with the amended Pigeon Bay factors as follows:

- Natural science factors / legibility / expressiveness
- Aesthetic values (naturalness / memorability) wild and scenic
- Transient values
- Shared and recognized values
- Tangata whenua values
- Historic heritage values

Comments were recorded for each assessment factor and a rating applied using a five point scale. It is important to note that these are not criteria, *per se*, but rather, comprise important aspects of landscape appreciation and significance, and are not of equal value. Consequently there are no benchmarks for attainment; rather an overall judgement of pre-eminence is made on the basis of the defined qualities. Those that were rated as high were

reassessed with regard to whether 'outstanding natural landscape' or 'outstanding natural feature' status in terms of S6b of the RMA was warranted (i.e. were they 'notable due to the expression of natural elements, patterns and processes' (NZILA 2010)). Those which were considered outstanding natural landscapes in the terms of S6b of the RMA were identified and the reasons recorded. A level of exceptionality within the Otago context is required for a landscape or feature to be assessed as outstanding.

The natural feature and landscape assessments have been informed by the natural character assessments and by desktop research, field observation and a high level of familiarity (amongst the assessors), with the coastal areas involved. Important information sources on landscape values include the following:

- Otago Regional Plan Coast, Otago Regional Council 2001.
- Otago Regional Plan Water, Otago Regional Council 2004
- Dunedin City District Plan, Dunedin City Council 1999.
- Otago Conservation Management Strategy, Department of Conservation, 2013
- Otago Conservation Management Strategy, Department of Conservation, 1998
- Kai Tahu ki Otago Natural Resource Management Plan, Kai Tahu ki Otago Ltd, 2005
- Coastal Dune Reserves Management Plan, Dunedin City Council, 2010
- Cultural Evaluation of the Rural and Landscape Sections of the Dunedin City Council District Plan, Kai Tahu ki Otago Ltd, 2006.
- Dunedin LMA Review, Boffa Miskell, 2007.

The assessments are based on the input of two landscape architects, and have been peer reviewed by the other team members.

## Results - Natural Character

### Overview

A total of 59 natural character areas were defined. These, along with the natural character ratings assigned are shown in Figures 6(a) – 6(d) and summarised in Table 1.

Table 1 : Natural character unit ratings – Summary table

| Unit Number | Unit Name                                    | Natural character rating | Outstanding? |
|-------------|--|--------------------------|--------------|
| D1          | Pleasant River Estuary                       | Medium - High            |              |
| D2          | Tumai  | Medium - High            |              |
| D3          | Hawksbury Lagoon                             | Low                      |              |
| D4          | Waikouaiti Beach                             | Medium - Low             |              |
| D5          | Waikouaiti Estuary                           | Medium                   |              |
| D6          | Kaitane Headland                             | Medium - High            |              |
| D7          | Karitane Beach                               | Medium                   |              |
| D8          | Seacliff                                     | Medium - High            |              |
| D9          | Warrington and Doctors Point Sandspits       | Medium                   |              |
| D10         | Blueskin Bay                                 | Medium                   |              |
| D11         | Mapoutahi Cliffs                             | Medium - High            |              |
| D12         | Purakaunui Beach                             | Medium                   |              |
| D13         | Purakaunui Inlet                             | Medium                   |              |
| D14         | Potato Point                                 | Medium - High            |              |
| D15         | Long Beach – Heyward Point                   | Medium - High            |              |
| D16         | Aramoana Beach and Barrier north of the mole | Medium                   |              |
| D17         | Aramoana Spit                                | Medium                   |              |
| D18         | Aramoana Salt Marsh                          | High                     |              |
| D19         | Otafelo Point to Port Chalmers               | Medium - Low             |              |
| D20         | Port Chalmers                                | Low                      |              |
| D21         | Upper Otago Harbour                          | Medium - Low             |              |
| D22         | Harbour Head / Dunedin                       | Low                      |              |
| D23         | Harbour Islands / Portobello Peninsula       | Medium - High            |              |
| D24         | Portobello Bay / Harwood Flats               | Medium - Low             |              |
| D25         | Otakou / Te Rauone                           | Medium - Low             |              |
| D26         | Taiaroa Head                                 | Medium - High            |              |
| D27         | Harington Point                              | Medium - High            |              |
| D28         | Pipikaretu                                   | Medium - High            |              |
| D29         | Okia / Vistory Beach                         | Medium - High            |              |
| D30         | Papanui Inlet                                | Medium - High            |              |

|     |                            |               |     |
|-----|----------------------------|---------------|-----|
| D31 | Cape Saunders              | High          |     |
| D32 | Allans Beach               | Medium - High |     |
| D33 | Hoopers Inlet              | Medium        |     |
| D34 | Sandfly Bay                | High          |     |
| D35 | Sandymount                 | High          | Yes |
| D36 | Seal Point                 | Medium - High |     |
| D37 | Boulder Beach              | Medium - High |     |
| D38 | Highcliff / Pudneys Cliff  | High          | Yes |
| D39 | Smaills Beach / Tomahawk   | Medium        |     |
| D40 | Tomahawk Lagoon            | Medium        |     |
| D41 | Lawyers Head               | Medium        |     |
| D42 | Ocean Beach Domain         | Low           |     |
| D43 | St Clair                   | Low           |     |
| D44 | White Island               | High          | Yes |
| D45 | St Clair cliffs            | Medium - High |     |
| D46 | Tunnel Beach               | High          |     |
| D47 | Blackhead                  | Medium - Low  |     |
| D48 | Island Park                | Medium        |     |
| D49 | Kaikorai Estuary           | Medium - Low  |     |
| D50 | Green Island               | High          | Yes |
| D51 | Ocean View / Westwood      | Medium        |     |
| D52 | Brighton                   | Medium        |     |
| D53 | Otokia Creek               | Medium - Low  |     |
| D54 | Brighton Road Beach South  | Medium        |     |
| D55 | Kuri Bush                  | Medium - High |     |
| D56 | Taieri Mouth North         | Medium        |     |
| D57 | Taieri River Gorge (lower) | High          |     |
| D58 | Taieri River Gorge (upper) | Medium - Low  |     |
| D59 | Henley                     | Medium - Low  |     |

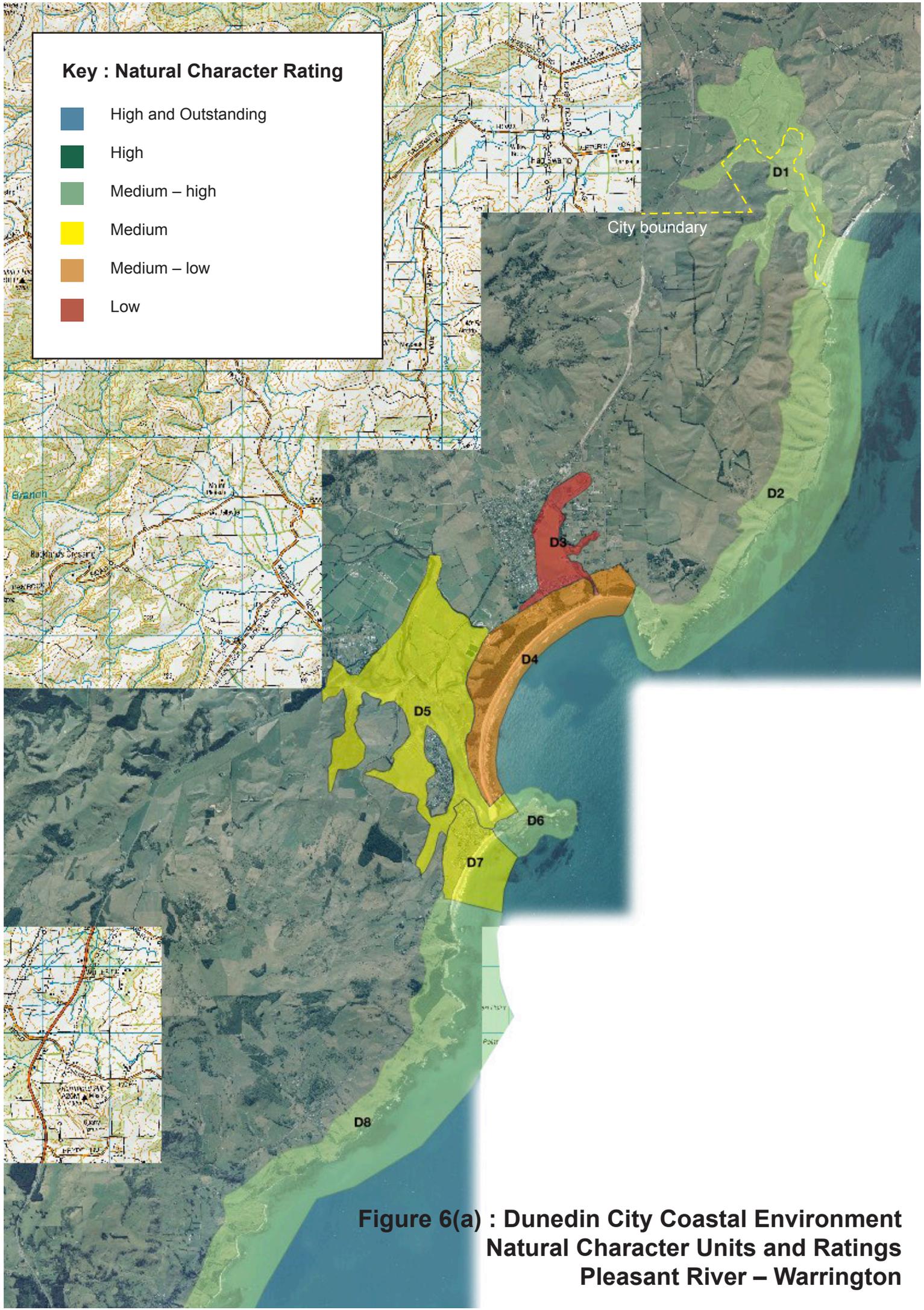
Only 5 areas rated low for overall natural character. All these were urbanised locations where urban development has obliterated the natural landforms and altered the ecology resulting in highly modified landscapes with little natural character. The majority of natural character units were rated medium – low, medium, or medium – high. These were typically areas where rural land use predominates and impacts the landscape to various degrees, and / or where non-native plants have substantially altered the morphology and ecology of the unit. Nine units rated ‘high’ for natural character and four of these were also assessed as outstanding.

## **Areas of high and outstanding natural character**

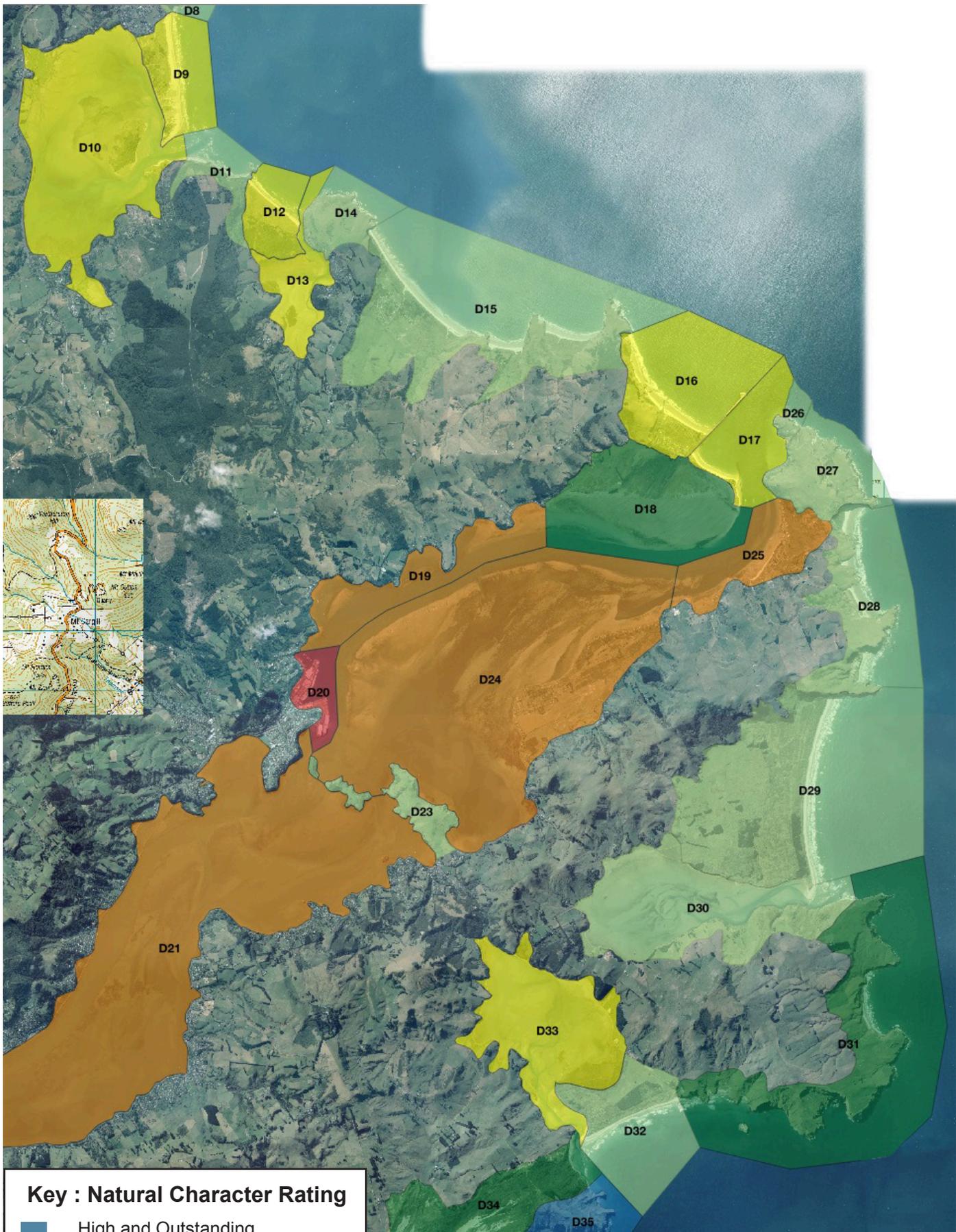
Nine units rated high for natural character as follows. Those that were also considered to be outstanding are highlighted in bold.

- Aramoana Salt Marsh (D18)
- Cape Saunders (D31)
- Sandfly Bay (D34)
- **Sandymount (D35)**
- **Highcliff / Pudneys Cliff (D38)**
- **White Island (D44)**
- Tunnel Beach (D46)
- **Green Island (D50)**
- Taieri River Gorge (lower) (D57)

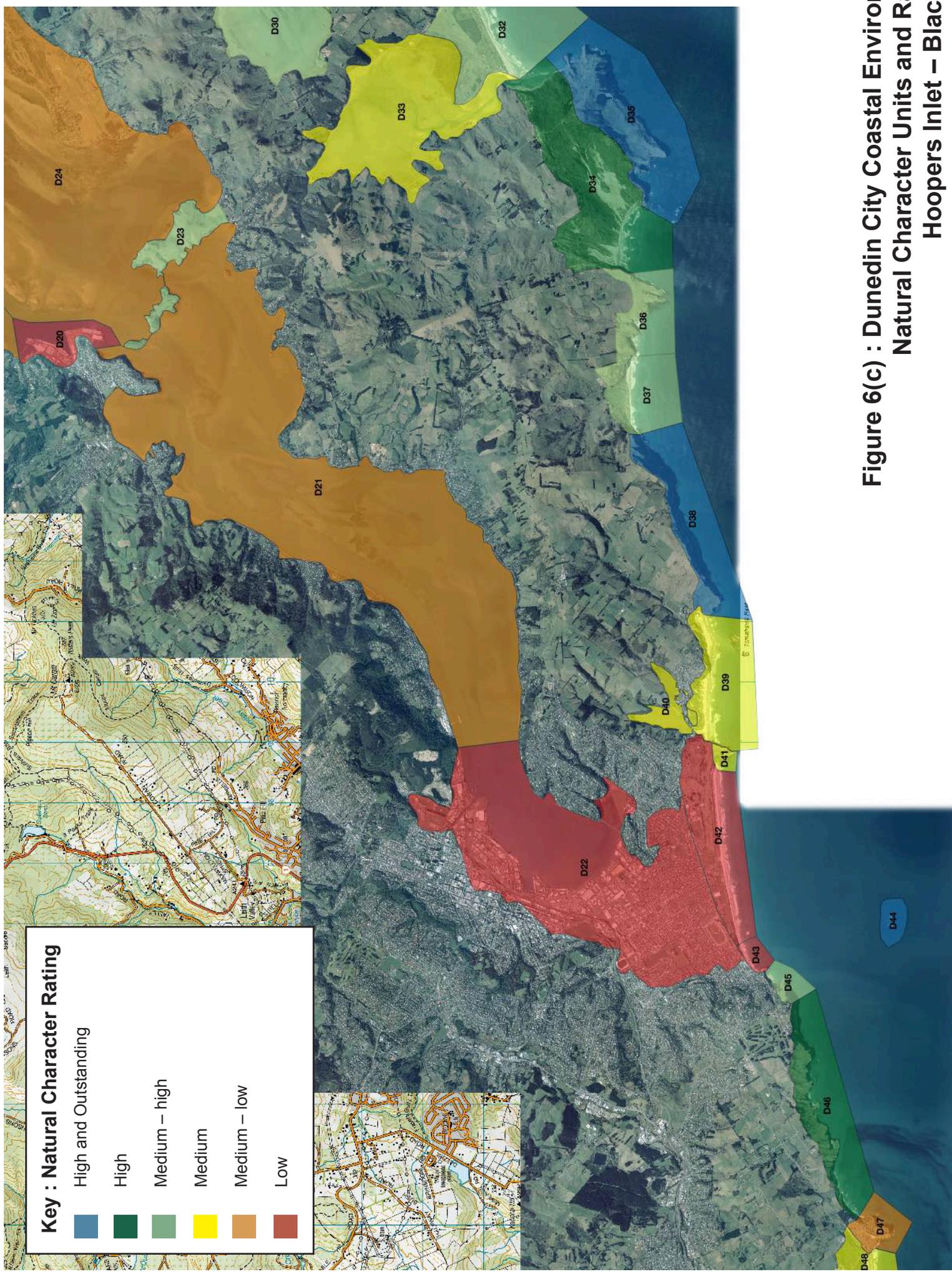
These are briefly discussed below.



**Figure 6(a) : Dunedin City Coastal Environment Natural Character Units and Ratings Pleasant River – Warrington**



**Figure 6(b) : Dunedin City Coastal Environment  
Natural Character Units and Ratings  
Warrington – Hoopers Inlet**



**Key : Natural Character Rating**

- High and Outstanding
- High
- Medium – high
- Medium
- Medium – low
- Low

**Figure 6(c) : Dunedin City Coastal Environment  
Natural Character Units and Ratings  
Hoopers Inlet – Blackhead**

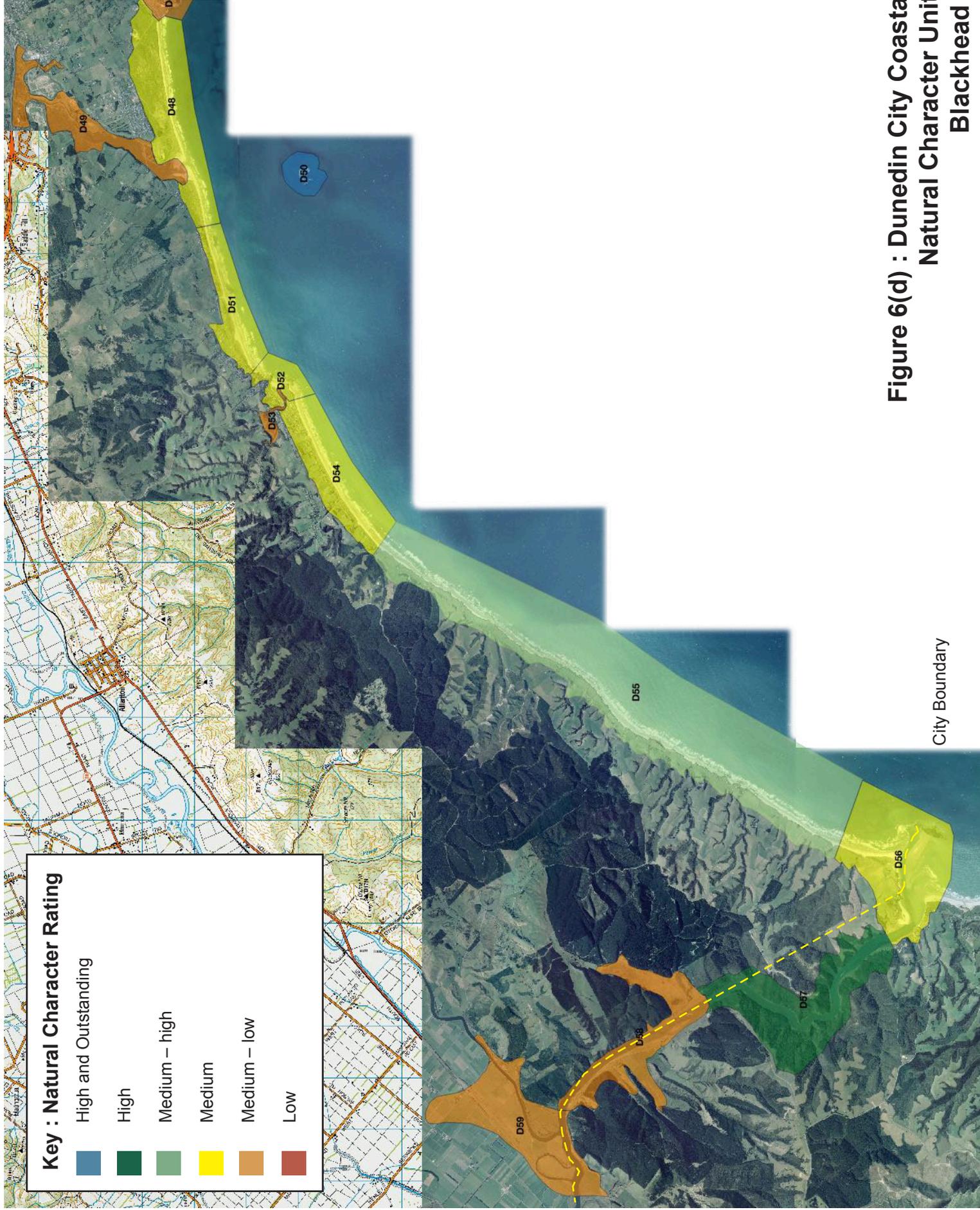


Figure 6(d) : Dunedin City Coastal Environment Natural Character Units and Ratings  
Blackhead – Taieri Mouth

## Unit D18. Aramoana Salt Marsh



The Aramoana Salt Marsh unit encompasses tidal flats, saltmarsh and relict transgressive dunes near the north-western head of the Otago Harbour and adjacent to the settlement of Aramoana. Whilst its natural character is modified to some extent on its landward edge by agricultural land use and Aramoana Road, its eastern portion is essentially unmodified.

Geomorphological naturalness in this unit was assessed as medium – high only, given the influence of land use practices on its inland edges discussed above and also reflecting the influence of Port Otago channel works and ship wakes on the supply and distribution of sediments. Water quality was also scored down, reflecting the overall quality of Otago Harbour waters. In terms of ecological naturalness however, this unit scored highly across all assessment criteria and is described as an extensive, largely intact saltmarsh. There is minimal influence of buildings, structures and earthworks and the area is wild and scenic in terms of being undomesticated with a high degree of perceptual naturalness. Overall, this unit was assessed as having high natural character largely on the basis of its significant ecological values. It has a degree of modification however, that precludes ‘outstanding’ status.

## Unit D31. Cape Saunders



The Cape Saunders unit encompasses the coast at the south-east extremity of the Otago Peninsula extending from the mouth of Papanui Inlet to Allans Beach. It includes Wharekakahu Island and Papanui Beach. It is described as a predominantly basalt headland with landforms comprising sea cliffs, intertidal reefs, sea stacks and sandy coves, some with small dune systems.

The landforms were assessed as being highly expressive of natural processes and the geomorphological and hydrological processes are operating largely unconstrained with the exception that *Ammophila arenaria* (marram grass, marram) has modified dune morphology to an extent. Ecologically, the terrestrial vegetation patterns are modified by farming practices and exotic grasses, but the naturalness and health of the intertidal and aquatic habitats is high. The unit scored highly in terms of the degree to which wildlife is present and sustained, particularly with regard to sub tidal reefs, rocky intertidal areas and headlands. Buildings, structures and earthworks have a very small influence on the natural character of the landscape and the cliffs and reefs score highly in terms of wild and scenic qualities. Overall, this unit is assessed as having high natural character. It is not assessed as 'outstanding' however, due to the degree of modification to terrestrial ecological values.

## Unit D34. Sandfly Bay



This unit comprises a headland by-passing transgressive dune system with multiple phases that extend over the ridge to Hoopers Inlet. The youngest phase remains largely mobile with low vegetation cover, aeolian sand transport and active transverse dunes. Older phases are stable, some with indigenous hardwood / broadleaf forest.

Geomorphological naturalness is assessed as high or medium high with modification by marram being the major reason for not rating it more highly. Medium – high ratings were given for the degree to which the vegetation patterns are a product of natural processes, the degree to which the vegetation cover is indigenous, and the apparent health and level of modification of intertidal and aquatic habitats. The unit scored highly for the degree to which wildlife is present and sustained. There are no discernible structures within this unit and a track down to the beach, the only evidence of any earthworks. Wild and scenic qualities are assessed as high. Overall, this unit has been rated as having high natural character. Outstanding status was not considered warranted, however, due to the degree of modification of the vegetation cover on the mobile dunes.

## Unit D35. Sandymount



The Sandymount unit encompasses the summit of Sandymount along with the slopes and cliffs on its southern side. It is differentiated from the adjacent Sandfly Bay unit because it is much less impacted by wind-blown sand and is described as a basalt headland with high, steep coastal cliffs, subtidal reefs, caves and stacks, minor headlands and coves. The dramatic landform features of the Chasm and Lovers Leap are within this unit.

Natural geomorphological and hydrological processes are operating relatively unconstrained and the unit rates 'high' for the degree to which the landforms reflect natural processes. 'Medium – high' ratings were given for the degree to which vegetation patterns are the product of natural processes and the degree to which the vegetation cover is indigenous to the area, whilst 'high' ratings were given for the apparent health and level of modification of intertidal and aquatic habitats, and the degree to which wildlife is present and sustained. There are no structures or earthworks to detract from its natural character and the unit is assessed as highly scenic . This area is assessed as having high and outstanding natural character.

Unit D38. Highcliff / Pudneys Cliff



The Highcliff / Pudneys Cliff unit extends from Boulder Beach to Smalls Beach and is described as basalt headland with coastal cliffs, offshore reefs, minor headlands and coves.

This unit scores 'high' or 'medium – high' across all the criteria. Water quality is occasionally impacted by contamination from the Tahuna Waste Water Treatment Plant outfall which affects the intertidal and aquatic habitats to some extent. Otherwise, natural values are high. There are no buildings, structures or earthworks to detract from the drama of the cliffs which provide high wild and scenic qualities. This unit is assessed as having both high and outstanding natural character.

## Unit D44. White Island



White Island is a small basalt island with subtidal reefs off the St Clair coast. There is no vegetation and therefore no ratings given for terrestrial vegetation values but its scores 'high' for geomorphological, hydrological and ecological naturalness otherwise. There are no structures present and the island has been given a 'medium – high' rating for wild and scenic qualities. Overall it is considered to have high and outstanding natural character.

## Unit D46. Tunnel Beach



The Tunnel Beach unit encompasses the section of sandstone cliffs between the basalt cliffs and headlands of Blackhead and St Clair. Its inland extent is a relatively distinct change in slope back from the clifftops. It is described as sandstone cliffs with sea stacks, an arch and coves with narrow sandy beaches.

Geomorphological naturalness is rated as 'high', with hydrological naturalness impacted to a small degree by sediment and nutrient runoff and conservatively rated as 'medium – high'. Ecological naturalness is impacted by the almost complete replacement of indigenous vegetation with pasture. The unit is given 'high' to 'medium – high' ratings for the apparent health and level of modification of intertidal and aquatic habitats and for the degree to which wildlife is present and sustained. It also scores 'high' for minimal influence of buildings, structures and earthworks and for its wild and scenic qualities. The overall natural character assessment is high but not outstanding.

## Unit D50. Green Island



Green Island is a small basalt island off the coast near the Kaikorai Stream mouth, with intertidal reefs. It rates 'high' across all assessment criteria with the exception of water quality (due to the possible effect of outflow from Kaikorai Estuary) and wild and scenic qualities, where it has been assessed as 'medium – high'. It has particular significance as habitat for wildlife and is assessed overall as having high and outstanding natural character.

## Unit D57. Taieri River Gorge (lower)



The Taieri River Gorge (lower) unit is largely within Clutha District but does extend into Dunedin City at its northern end. For the purposes of this study it is included in both areas as a landscape feature of significance and one which, as such, raises potential cross boundary issues. This unit encompasses the seaward end of the Taieri River Gorge where the geology is schist. The coastal environment boundaries are defined by the extent of the gorge landform.

This is a highly scenic gorge with regenerating indigenous vegetation along both sides and scores 'high' or 'medium – high' for geomorphological naturalness, the degree to which buildings, structures and earthworks influence the character of the landscape, and for wild and scenic qualities. Whilst there are significant ecological values, water quality (and possibly quantity) in the river is significantly modified, with flow-on effects on the apparent health and level of modification of intertidal and aquatic habitats and the degree to which wildlife is present and sustained. Overall the unit has been assessed as having high, but not outstanding natural character.

## Results – Natural landscapes and seascapes

### Overview

A total of 22 landscape character units were identified, some being composites of the natural character units. Natural character units were combined when it was clear that they formed a single landscape. For example, the Hawksbury Lagoon, Waikouaiti Beach, Waikouaiti River Estuary and Karitane Beach and Karitane Headland were considered to form one landscape, that of a shallow coastal basin containing two estuaries enclosed at either end by rocky headlands.

The landscape character units, along with the landscape value ratings assigned are shown in Figures 7(a) – 7(d) and summarised in Table 2.

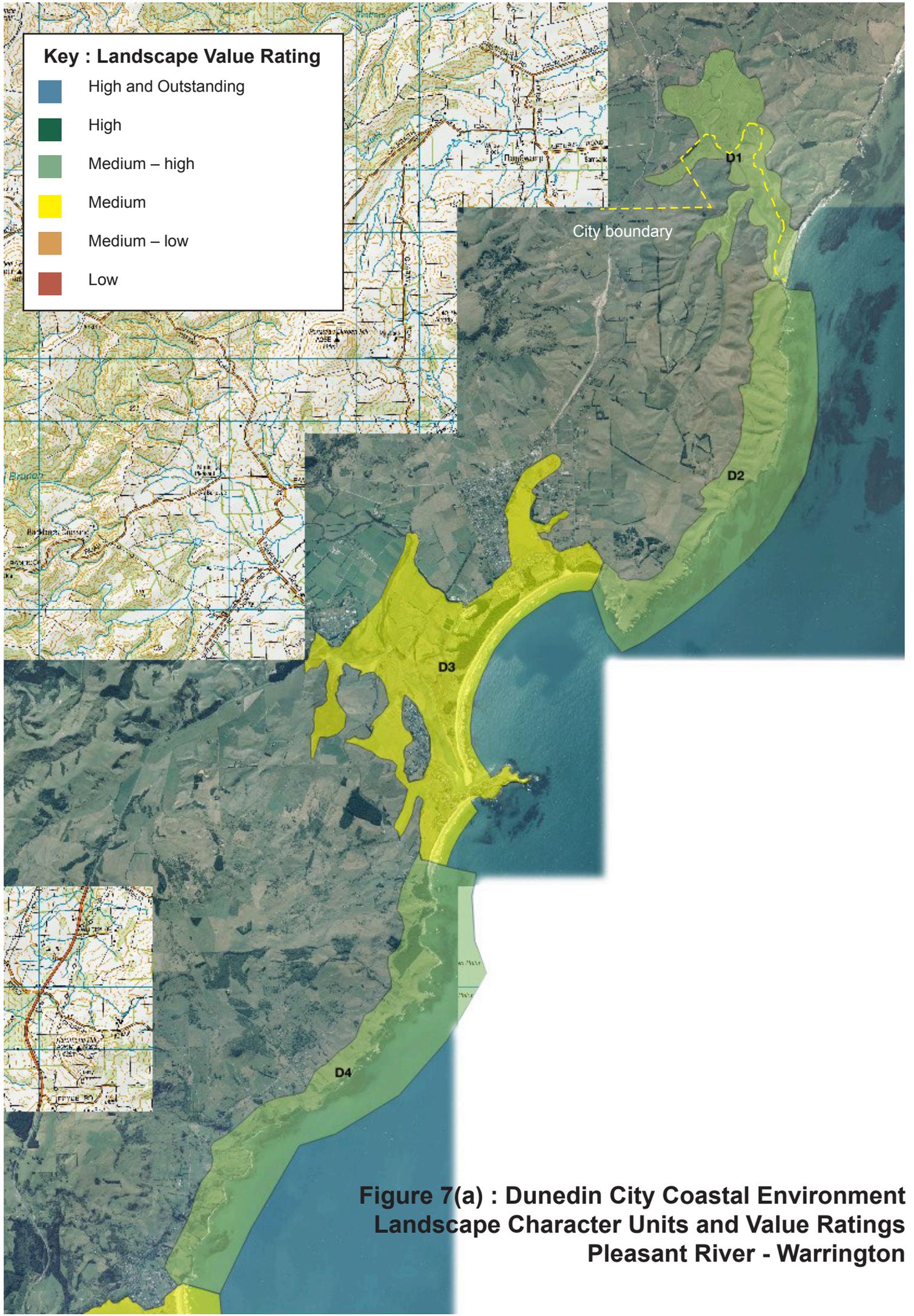
Table 2 : Landscape character unit value ratings – Summary table

| Unit Number | Unit Name                    | Overall landscape values rating | Outstanding? |
|-------------|------------------------------|---------------------------------|--------------|
| D1          | Pleasant River Estuary       | Medium - High                   |              |
| D2          | Tumai                        | Medium - High                   |              |
| D3          | Waikouaiti / Karitane        | Medium                          |              |
| D4          | Seacliff                     | Medium - High                   |              |
| D5          | Blueskin Bay                 | Medium                          |              |
| D6          | Purakaunui                   | Medium - High                   |              |
| D7          | Heyward Coast                | High                            | Yes          |
| D8          | Lower Otago Harbour          | Medium - High                   |              |
| D9          | Upper Otago Harbour          | Medium                          |              |
| D10         | Outer Otago Peninsula        | High                            | Yes          |
| D11         | Papanui Inlet / Okia         | High                            | Yes          |
| D12         | Cape Saunders Coast          | High                            | Yes          |
| D13         | Allans Beach / Hoopers Inlet | High                            | Yes          |
| D14         | Southern Otago Peninsula     | High                            | Yes          |
| D15         | Smaills / Tomahawk           | Medium - High                   |              |
| D16         | Ocean Beach                  | Medium - Low                    |              |
| D17         | Tunnel Beach Coast           | High                            |              |
| D18         | Kaikorai / Green Island      | Medium                          |              |
| D19         | Brighton                     | Medium - High                   |              |
| D20         | Brighton – Taieri Mouth      | Medium                          |              |
| D21         | Taieri River Gorge           | Medium - High                   |              |
| D22         | Henley                       | Medium - Low                    |              |

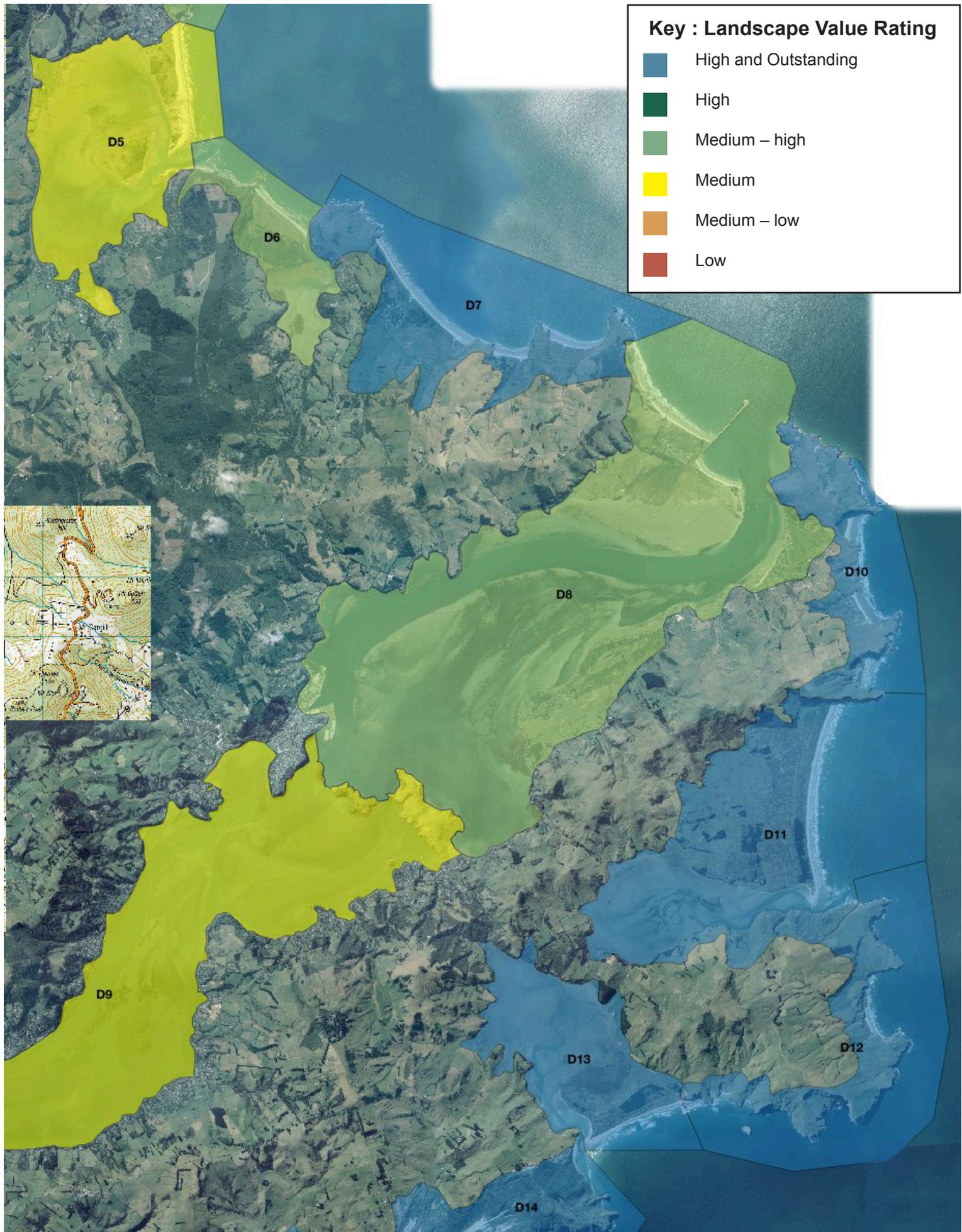
Two units rated medium – low, five rated medium and eight were assessed as medium – high. Seven units rated high for landscape values and six of these were also considered to be outstanding as follows:

- Heyward Coast (D7)
- Outer Otago Peninsula (D10)
- Papanui Inlet / Okia (D11)
- Cape Saunders Coast (D12)
- Allans Beach / Hoopers Inlet (D13)
- Southern Otago Peninsula (D14)

The Tunnel Beach Coast unit (D17) was rated high but was not assessed as outstanding largely due to the degree of modification of Blackhead. The Tunnel Beach sandstone features however have been identified as an outstanding natural feature (discussed under ‘natural features’).



**Figure 7(a) : Dunedin City Coastal Environment Landscape Character Units and Value Ratings Pleasant River - Warrington**



**Figure 7(b) : Dunedin City Coastal Environment Landscape Character Units and Value Ratings Warrington – Hoopers Inlet**

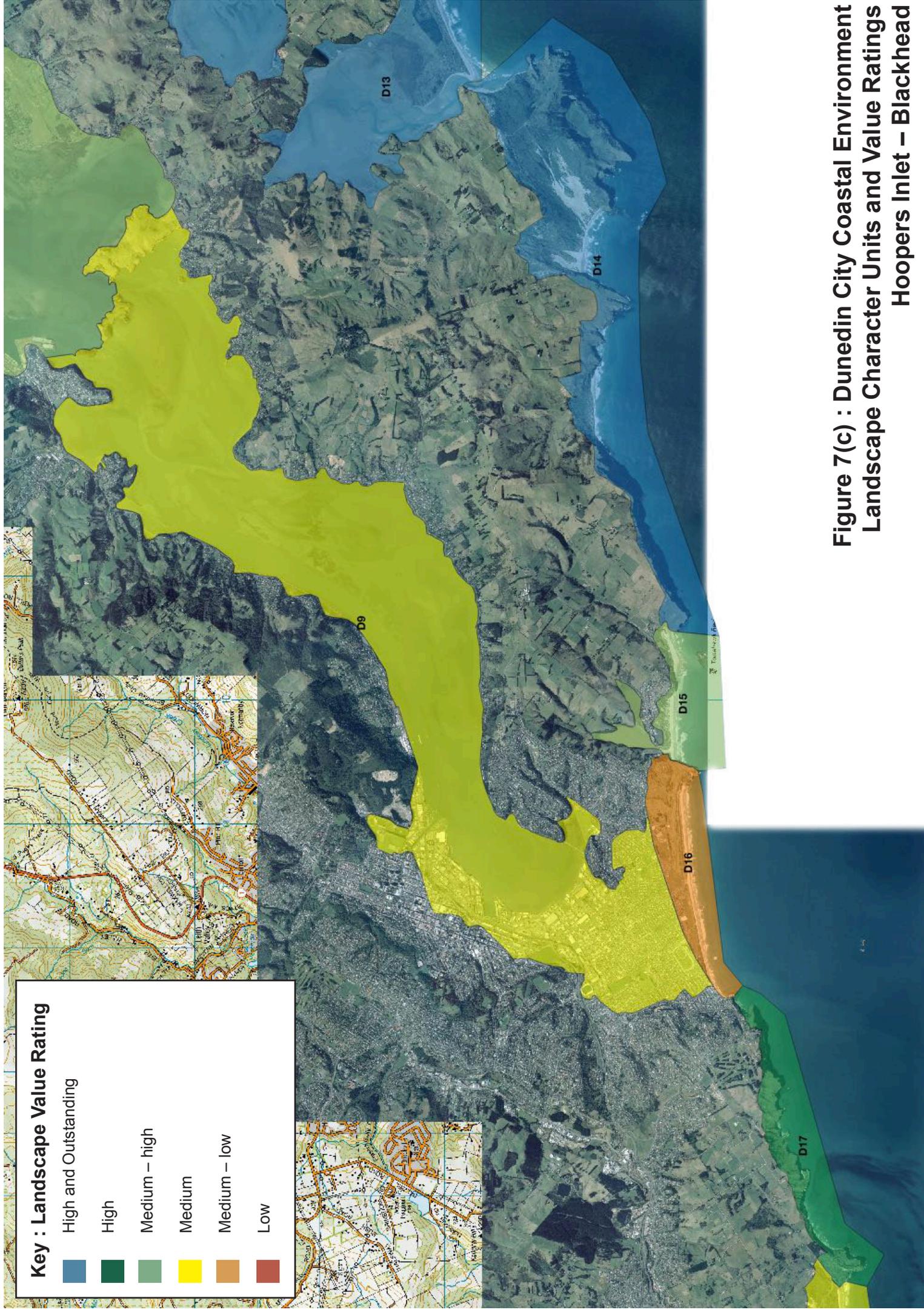
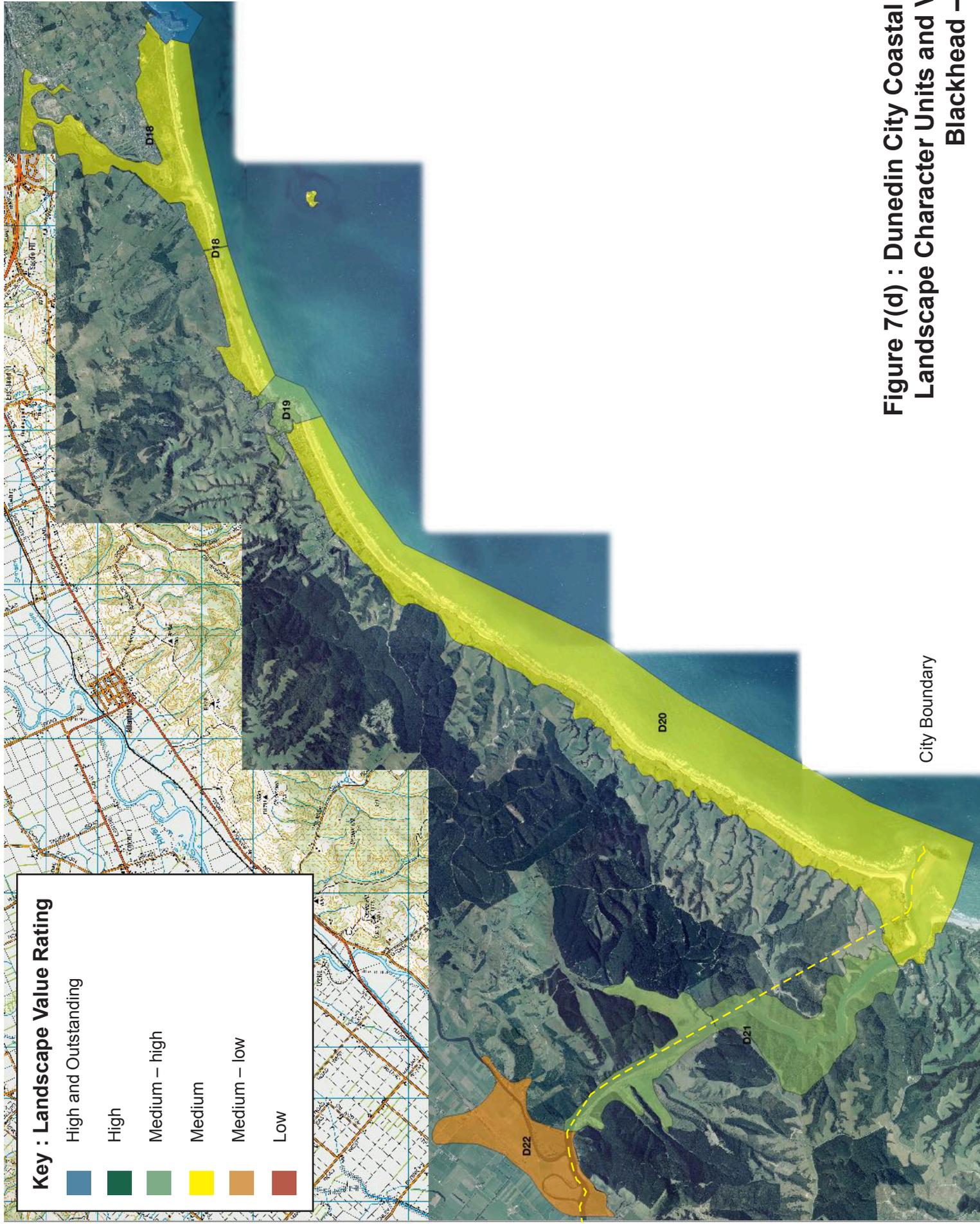


Figure 7(c) : Dunedin City Coastal Environment  
Landscape Character Units and Value Ratings  
Hoopers Inlet – Blackhead



**Figure 7(d) : Dunedin City Coastal Environment  
Landscape Character Units and Value Ratings  
Blackhead – Taieri Mouth**

City Boundary

## Outstanding natural landscapes and seascapes

### Unit D7. Heyward Coast



The Heyward Coast unit extends from Potato Point in the west to Heyward Point and the Aramoana cliffs in the east. It encompasses a sequence of volcanic rock headlands separated by the beaches, dunes and flats of Long Beach, Whareakeake Beach and Kaikai Beach. There is a distinctive pattern to this landscape with headlands being characterised by cliffs, stacks and reefs, and the beaches being backed by dunes and wetlands. A distinctive component of this unit are relict sea cliffs, now disconnected from coastal processes by the progradation of sandy barriers during the Late-Holocene. Terrestrial vegetation is predominantly pastoral with some patches of native forest and scrub, most notably within the Heyward Point Scenic Reserve. There is a settlement at Long Beach, a few cribs at Whareakeake and a house and farm shed on Potato Point but otherwise (apart from the lighthouse on Heyward Point), the landscape is devoid of significant structures.

This unit has been assessed as outstanding based largely on the following factors:

- It includes a number of areas of significant natural value
- It is a highly coherent landscape, expressive of its eroded volcanic origins

- It has high aesthetic value based on naturalness, and its dramatic cliffs and headlands and coherent pattern, make it highly memorable.
- Transient values associated with the presence of wildlife
- It rates highly in terms of shared and recognized values
- It has significant cultural value to both tangata whenua and pakeha.

## Unit D10. Outer Otago Peninsula



The Outer Otago Peninsula unit extends from Harington Point, around the tip of Otago Peninsula to Te Whakarewaiki Point, north of Victory Beach. It encompasses Pilots Beach and Taiaroa Head, and a number of small sandy beaches on the ocean side of the peninsula including Penguin Beach, Pipikaretu Beach and Ryans Beach. The geology of the area is volcanic with cliffed headlands and reefs along with more recent marine deposits in the form of beaches and dunes in the bays. In the main, the land is pasture covered, but there are also areas of indigenous bush as well as marram dominated dune areas. There is a cluster of structures and associated development at Taiaroa Head but otherwise structures are mainly insignificant.

This unit has been assessed as outstanding based largely on the following factors:

- It includes a number of areas of significant natural value
- It is a highly coherent landscape, expressive of its eroded volcanic origins
- It has high aesthetic values based on naturalness, and its dramatic cliffs and headlands and coherent pattern, make it highly memorable.
- It has very significant transient values associated with the presence of wildlife
- It rates highly in terms of shared and recognized values
- It has significant cultural value to both tangata whenua and pakeha.
- It includes areas of historic heritage significance

## Unit D11. Papanui Inlet / Okia



The Papanui Inlet / Okia unit comprises Papanui Inlet and Okia Flat along with the immediate cliff and hill margins that are within the coastal environment. Okia Flat comprises a Late-Holocene barrier notable for its extensive progradational sequence of beach and dune ridges. Relict sea cliffs and stacks are conspicuous landforms, the Pyramids being the most notable example. Papanui Inlet is a shallow estuary characterised by extensive intertidal sand flats and multiple channels. There are two small islands near its western end. In general, the vegetation character of Okia flat changes from more to less modified, with increasing proximity to Victory Beach. At its western end the land is predominantly under improved pasture whilst the areas nearer the beach are now protected as a reserve and are being allowed to naturally regenerate, albeit the dune vegetation is dominated by non-natives. There are exotic woodlots of varying scale scattered around on the flats. There are no buildings within the coastal environment with the exception of a few farm sheds and inlet edge cribs on the northern side, and a small crib settlement (including boat sheds) on the steep southern shores of the inlet. Narrow metalled roads run around the western shores of the inlet, in places cutting off areas of salt marsh which have typically been drained.

Landscape values are highly significant on the ocean side / eastern end of this unit but less impressive around the more modified inlet edge. Overall, the unit has been assessed as

outstanding, and falls within a wider context (beyond the extent of the identified coastal environment) that also has high landscape values. Its key values are:

- It includes a number of areas of significant natural value
- It is a generally coherent landscape, expressive of its eroded volcanic origins
- It has high aesthetic values, particularly in the eastern / ocean side of the unit, based on naturalness, and its coastal landforms and coherent pattern, make it highly memorable.
- Transient values associated with the presence of wildlife
- It rates highly in terms of shared and recognized values
- It has significant cultural value to tangata whenua
- It includes features of historic heritage significance

## Unit D12. Cape Saunders Coast



The Cape Saunders Coast unit covers the remote south-eastern corner of the Otago Peninsula between Papanui Inlet and Allans Beach. It includes Papanui Beach and Wharekakahu Island. The landform is characterised by basalt or breccia cliffs, some very high, with reefs, stacks and sea caves. Behind these, the land is generally a gently sloping, dissected plateau, eventually rising more steeply toward Mt Charles. Back from the coastal edge the land is mainly pasture with native bush and scrub patches. There are no significant structures present apart from the lighthouse structure at Matakītaki Point. The coastal environment has been identified to encompass the visually significant headlands.

This unit has been assessed as outstanding based largely on the following factors:

- It includes a number of areas of significant natural value
- It is a highly coherent landscape, expressive of its eroded volcanic origins
- It has high aesthetic values based on naturalness, and its dramatic cliffs and headlands and coherent pattern, make it highly memorable.
- Transient values associated with the presence of wildlife
- It rates highly in terms of shared and recognized values

## Unit D13. Allans Beach / Hoopers Inlet



This unit encompasses the drowned valley of Hoopers Inlet and the sand barrier at its entrance edged by Allans Beach. The inlet itself is a shallow estuary with intertidal sand flats and channels, and with salt marsh areas around its edges. A low scarp defines the extent of the coastal environment. The sand barrier grades from the sweep of Allans Beach, through marram and scrub covered dunes to an area of pasture or exotic woodlot to a large saltmarsh wetland. The land back from the inlet edge is generally under pasture cover but there are areas of native scrub or bush as well as exotic trees, typically macrocarpa. The estuary-head areas are modified by roads running around the inlet edge and in places these cut off embayments via causeways. There are a number of boat sheds dotted along the shoreline and some on-going reclamation adjacent to the inlet's south-eastern shore.

Landscape values are highly significant on the ocean side / southern end of this unit but less impressive around the more modified inlet edge. Overall, the unit has been assessed as outstanding, and falls within a wider context (beyond the extent of the identified coastal environment) that also has high landscape values. Its key values are:

- It includes a number of areas of significant natural value
- It is a generally coherent landscape, expressive of its eroded volcanic origins

- It has high aesthetic values, particularly in the southern / ocean side of the unit, based on naturalness, and its coastal landforms and coherent pattern, make it highly memorable.
- Transient values associated with the presence of wildlife
- It rates highly in terms of shared and recognized values
- It has cultural value to tangata whenua

## Unit D14. Southern Otago Peninsula



The Southern Otago Peninsula unit stretches from Maori Head in the west, to the mouth of Hoopers Inlet in the east. This south-facing coastal section encompasses high, cliffed coastlines at both ends, as well as a lower, less rugged section between Boulder Beach and Sandfly Bay. The coastal environment includes the sand dunes extending over the hilltop at Sandymount. The geology is volcanic with basalt cliffs, shore platforms, and sea stacks (including Gull and Tow Rocks). There is a considerable amount of native scrub on the steep coastal faces and in older transgressive dune phases at Sandfly Bay. Areas at Boulder Beach and Sandfly Bay are largely under marram grass cover, albeit large areas of the Sandfly dunes are sparsely vegetated. Apart from penguin hides at Sandfly Bay, and a farm shed and viewing platforms at Sandymount, there are no structures of significance present.

This unit has been assessed as outstanding based largely on the following factors:

- It includes a number of areas of significant natural value
- It is a highly coherent landscape, expressive of its eroded volcanic origins
- It has high aesthetic values based on naturalness, and its dramatic cliffs and headlands and coherent pattern, make it highly memorable.
- It has transient values associated with the presence of wildlife
- It rates highly in terms of shared and recognized values

- It has cultural values of significance to tangata whenua

## Results - Natural Features

### Overview

A total of 21 potentially outstanding natural features were identified and these, along with the landscape value ratings assigned are shown in Figures 8(a) – 8(d) and summarised in Table 3.

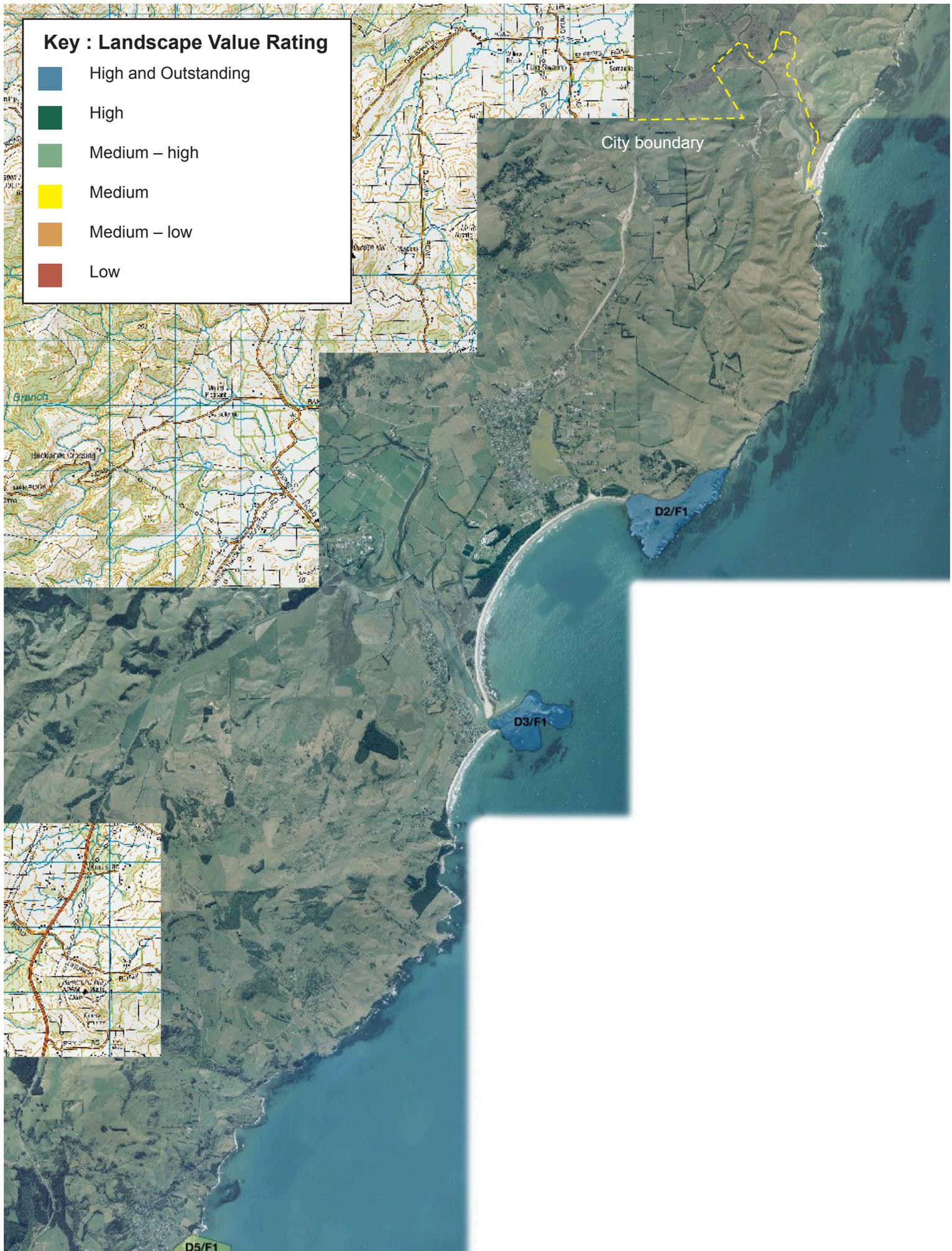
Table 3 : Natural Feature value ratings – Summary table

| Unit Number | Feature Name                     | Overall landscape values rating | Outstanding? |
|-------------|----------------------------------|---------------------------------|--------------|
| D2/F1       | Matanaka                         | High                            | Yes          |
| D3/F1       | Karitane Peninsula               | High                            | Yes          |
| D5/F1       | Warrington Spit / Rabbit Island  | Medium - High                   |              |
| D6/F1       | Mapoutahi                        | High                            | Yes          |
| D7/F1       | Potato Point                     | Medium - High                   |              |
| D7/F2       | Heyward Point / Aramoana Cliffs  | High                            | Yes          |
| D8/F1       | Aramoana Salt Marsh              | High                            | Yes          |
| D8/F2       | Harwood stranded sea cliffs      | Medium - Low                    |              |
| D9/F1       | Goat Island - Rakirir            | High                            | Yes          |
| D9/F2       | Quarantine Island                | High                            | Yes          |
| D10/F1      | Taiaroa Head                     | High                            | Yes          |
| D11/F1      | Pyramids                         | High                            | Yes          |
| D12/F1      | Wharekakau Island                | High                            | Yes          |
| D14/F1      | Lovers Leap and the Chasm        | High                            | Yes          |
| D14/F2      | Sandfly Bay dunes                | High                            | Yes          |
| D16/F1      | White Island                     | Medium - High                   |              |
| D17/F1      | Tunnel Beach sandstone features  | High                            | Yes          |
| D17/F2      | Blackhead organ pipes            | High                            | Yes          |
| D18/F1      | Green Island                     | High                            | Yes          |
| D19/F1      | Brighton uplifted marine terrace | Medium                          |              |
| D21/F1      | Lower Taieri River Gorge         | High                            | Yes          |

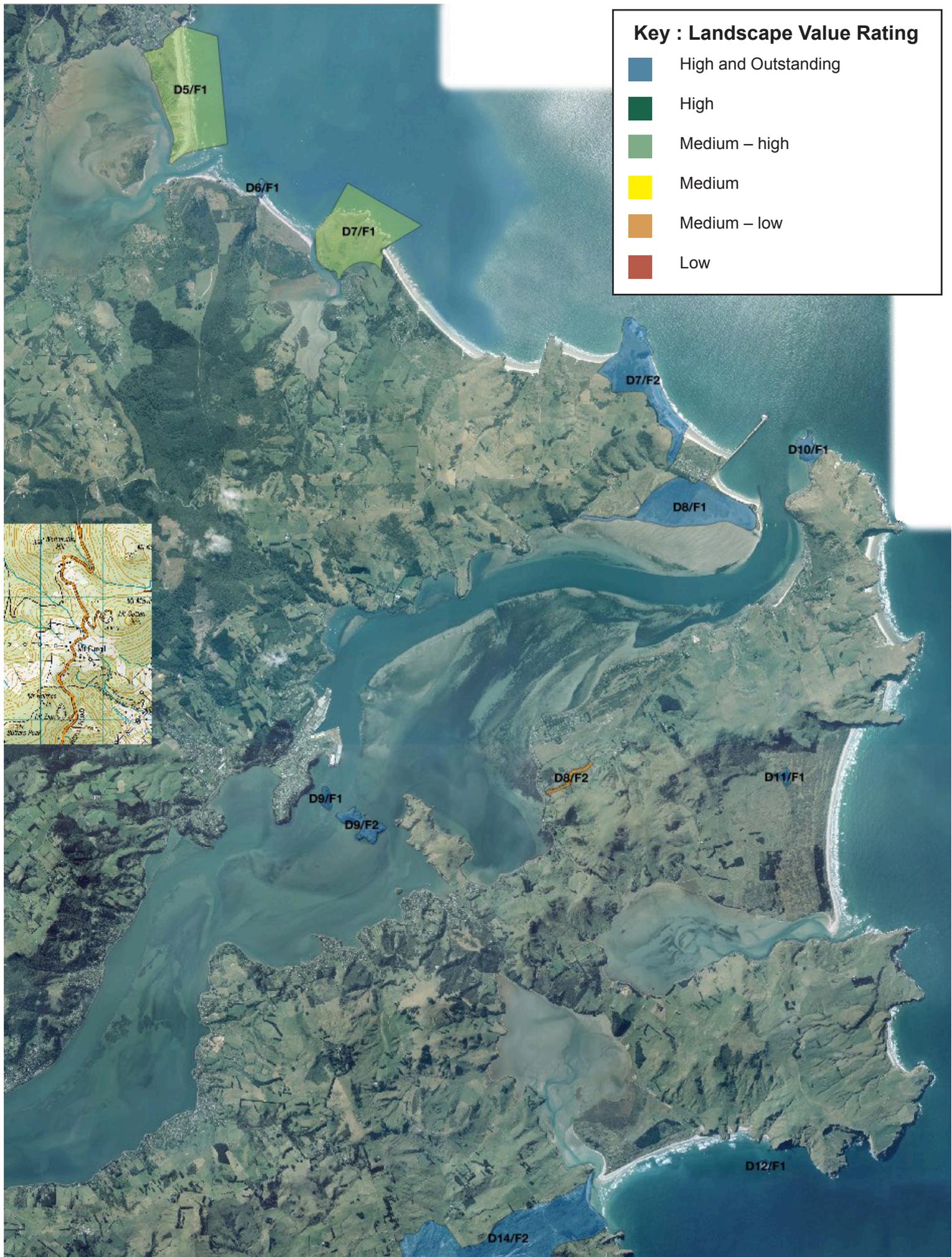
Of the 21 features considered, 16 were assessed as outstanding as follows:

- Matanaka (D2/F1)
- Karitane Peninsula (D3/F1)
- Mapoutahi (D6/F1)

- Heyward Point / Aramoana Cliffs (D7/F1)
- Aramoana Salt Marsh (D8/F1)
- Goat Island – Rakiriri (D9/F1)
- Quarantine Island (D9/F2)
- Taiaroa Head (D10/F1)
- Pyramids (D11/F1)
- Wharekakahu Island (D12/F1)
- Lovers leap and the Chasm (D14/F1)
- Sandfly Bay dunes (D14/F2)
- Tunnel Beach sandstone features (D17/F1)
- Blackhead organ pipes (D17/F2)
- Green Island (D18/F1)
- Lower Taieri River Gorge (D21/F1)



**Figure 8(a) : Dunedin City Coastal Environment  
Natural Features and Value Ratings  
Pleasant River - Warrington**



**Figure 8(b) : Dunedin City Coastal Environment  
Natural Features and Value Ratings  
Warrington – Hoopers Inlet**





**Figure 8(d) : Dunedin City Coastal Environment  
Natural Features and Value Ratings  
Blackhead – Taieri Mouth**

## Outstanding natural features

### Feature D2/F1. Matanaka



This landscape feature is the Cornish Head headland including the rock slump on the southern face and the sea cave complex. The extent of the caves has determined the northward boundary. The Matanaka Historic Reserve, containing the earliest farm buildings in New Zealand is adjacent to this area (outside the coastal environment). This headland is comprised of sedimentary rock with volcanic material coinciding with the summit of the hill. The rock slump is a large scale and distinctive landform feature on the south side and the sea caves are located over a 2km stretch on the eastern side. Some of these caves extend hundreds of meters inland and some are linked via intersecting passages. A reef protects the cave entrances at low tide. The headland is under pasture cover and there are no buildings located within the coastal environment.

The headland, with its rock slump landform and impressive complex of sea caves has highly significant geomorphological and aesthetic values. These are its core values, however, its proximity to the Matanaka Historic Reserve also gives it heritage significance. Overall, landscape values are assessed as high and outstanding

## Feature D3/F1. Karitane Peninsula



Karitane Peninsula is an eroded headland of sedimentary rock connected to the mainland by beach deposits. It is the site of various pa and a whaling station, and is largely grass covered, although residential development has encroached onto its landward end and there is an active revegetation project.

The peninsula has high geological, geomorphological and habitat values, and high tangata whenua and historic heritage values. It also scores highly in terms of aesthetic memorability and shared and recognised values. Despite encroachment by housing at its western end, it has been assessed as a natural feature with high and outstanding landscape values.

Feature D6/F1. Mapoutahi



Mapoutahi is a rugged promontory of volcanic origin defining the western end of Purakaunui Beach. There are no structures other than some wooden steps and the vegetation cover is rough grassland, regenerating native scrub and some scattered pine and macrocarpa trees. Mapoutahi is a distinctive coastal feature with moderately high natural character values. It is highly significant culturally and historically, and is assessed as outstanding primarily on this basis.

Feature D7/F1. Heyward Point / Aramoana Cliffs



This feature is a headland of volcanic geology at the termination of the major ridgeline on the northern side of Otago Harbour. The headland is characterised by impressive cliffs up to 180m in height. At the Aramoana end the cliffs are bordered by a sandy beach and there are stacks and reefs off Heyward Point itself. Behind the cliffs the land is mainly under pasture cover but there is a significant area of indigenous forest within the Heyward Point Scenic Reserve. There is a small lighthouse on Heyward Point but otherwise, no structures of significant scale.

The Heyward Point / Aramoana Cliffs feature is significant primarily for its geological, ecological and aesthetic values. Overall, landscape values are assessed as high and outstanding.

Feature D8/F1. Aramoana Salt Marsh



This feature incorporates the salt marsh and adjacent harbour sand flats, and a dune system on the south-western side of the Aramoana township. The area corresponds with the area under natural vegetative cover. The Aramoana saltmarsh is a coastal wetland of international / national significance which also has high aesthetic and cultural values. Overall, the landscape values are assessed as high and outstanding.

Feature D9/F1. Goat Island - Rakiriri



Goat Island – Rakiriri is the smaller of the two mid Otago Harbour islands and along with Quarantine Island and Portobello Peninsula, part of a ridge running across the centre of the harbour. The Island is covered in indigenous bush. Two flattened areas retained by rock walling date from its use for quarantine purposes. A pylon is located on its summit. Goat Island – Rakiriri has highly significant cultural and historic values and high natural and aesthetic values. Overall, landscape values are assessed as high and outstanding.

Feature D9/F2. Quarantine Island – Kamau Taurua



Quarantine Island is the larger of the two mid Otago Harbour Islands. It is comprised of volcanic rock from earlier eruptive phases of the Dunedin volcano and its elongated shape reflects its origins as part of a ridge running through the middle of what is now the harbour. The island is predominantly under pasture cover although there are significant areas of regenerating native bush present. There are a few buildings, including a restored barracks building dating from its use as a quarantine station, along with other relics dating from this period of its history. The island has significant historic and cultural values and high or high - moderate natural and aesthetic values. It has a strong sense of place and overall landscape values are assessed as high and outstanding, largely on account of its cultural / and historic significance.

## Feature D10/F1. Taiaroa Head



Taiaroa Head, the outermost point of the Otago Peninsula, is a rounded basalt headland with steep cliffs on its ocean facing side. The feature includes Pilots Beach (because of its high natural values and historic linkages with Taiaroa Head) and all the area included within the nature and local purpose reserves. Taiaroa Head has been the focus of human activity both before and after European settlement and structures that exist today include the lighthouse, the Armstrong Disappearing Gun, Observation Post, Signal Station, Observatory and the Royal Albatross Visitor Centre. As well, there are tracks, roads, parking areas and historic structure remnants. The vegetation cover is mainly grassland. Taiaroa Head (Pukekura) has widely recognised natural habitat and wild and scenic aesthetic values. It is also of great cultural and historic significance. Overall, landscape values are assessed as high and outstanding.

Feature D11/F1. Pyramids



The Pyramids are outcrops of columnar basalt that have been eroded by the sea but which are now stranded far inland by coastal progradation. They are covered by indigenous scrub and bush. The Pyramids have significant natural science, aesthetic, shared and recognised and cultural values. Overall, their landscape values are assessed as high and outstanding.

Feature D12/F1. Wharekakahu Island



Wharekakahu lies some 250m from the shore off Alfred and Cicily Beaches. It is a sparsely vegetated rock stack with steep cliffed sides. Wharekakahu has very high natural character and aesthetic values. Overall, its landscape values are assessed as high and outstanding.

Feature D14/F1. Lovers Leap and the Chasm



This feature encompasses a section of the cliffs south of Sandymount with highly dramatic erosional features in columnar jointed basalt. Lovers Leap and the Chasm have very high natural science, aesthetic, and shared and recognised values. Overall, landscape values are assessed as high and outstanding.

Feature D14/F2. Sandfly Bay dunes



The feature assessed is the transgressive dune system extending from Sandfly Bay beach over the ridge to Hoopers Inlet. The dunes are vegetated to varying extents from none to indigenous forest cover on the Hoopers Inlet side. The Sandfly Bay dunes have very high natural science, aesthetic, transient and shared and recognised values. Overall, landscape values are assessed as high and outstanding.

Feature D17/F1. Tunnel Beach sandstone features



The feature assessed is the sandstone cliff section of the coast excluding the basaltic cliffs at either end. This coastline is characterised by spectacular caves, arches, stacks, and a few pocket beaches. The Tunnel Beach Sandstone features have very high memorability and wild and scenic qualities and significant natural science, transient, shared and recognised and historic heritage values. Overall, landscape values are assessed as high and outstanding.

Feature D17/F2. Blackhead organ pipes



The feature assessed is the end of the Blackhead headland that remains largely in its natural state and which includes columnar basalt (organ pipe) formations including formations known as the 'Roman baths' and the 'Dock'. This area is protected from quarrying by a covenant. It should be noted however, that the identified natural feature does not include those parts of the covenanted area where substantial modification to the landform has occurred. The Blackhead Organ Pipes are dramatic and memorable formations with high geological and aesthetic values. There are also significant cultural values relating to this headland. Overall, landscape values are assessed as high and outstanding.

Feature D18/F1. Green Island



Green Island is a small basalt island approximately 2km off the coast. It has reefs surrounding it and vegetation dominated by *Coprosma repens* (taupata). Green Island has very high values generally, and particularly as a wildlife haven. Overall, landscape values are assessed as high and outstanding.

## Feature D21/F1. Lower Taieri River Gorge



This feature encompasses the lower section of the Taieri River gorge from the Taieri Mouth bridge to the end of the schist section and includes the gorge defining slopes either side of the river as well as significant tidal side streams and wetlands. Whilst most of this area is within Clutha District, a small part extends into Dunedin City. The Taieri River is tidal with significant marine influence right through this gorge. The lower gorge is protected to a large degree by the Taieri River Scenic Reserve and has high natural values including areas of significant podocarp forest, impressive rock bluffs and saltmarsh wetland margins. The Lower Taieri River Gorge has high values across all the assessment factors. Overall, landscape values are assessed as high and outstanding.

## **Conclusion**

The coastal environment within Dunedin City exhibits a wide variation in character including the degree of natural character. Of fifty-nine natural character units identified, nine were assessed as having high natural character. Four of these were identified as outstanding. The outstanding areas were either steep, cliffed areas or offshore islands.

Twenty-two landscape character units were identified and six were assessed as outstanding in terms of section 6(b) of the RMA, using the Amended Pigeon Bay assessment factors. The areas considered outstanding are similar in character, being eroded volcanic coastal landscapes of headlands and sandy beaches.

Desktop research and field observation suggested twenty-one potential candidates for outstanding natural feature status. Assessment using the Amended Pigeon Bay factors has confirmed sixteen of these. These include headlands, cliffed sections with caves and arches, areas of saltmarsh, islands, active dune systems, relict stacks and a tidal river gorge.

## References

- Benn, J. and Shingle, M. (2007). Annotated Bibliography: Coastal and Continental Shelf Processes of Otago Harbour and Blueskin Bay. Report prepared for Port Otago Ltd by Shore Processes and Management Ltd.
- Bishop D and Turnbull I (1996). Geology of the Dunedin Area. Institute of Geological and Nuclear Sciences Ltd, Lower Hutt.
- Boffa Miskell Ltd (2007). Dunedin LMA Review. Dunedin City Council
- Darby, J., Fordyce, E., Mark, A., Probert, K. and Townsend, C. (2003). The Natural History of Southern New Zealand. University of Otago Press, Dunedin.
- Department of Conservation (2013). Conservation Management Strategy Otago 2014 – 2024. Department of Conservation.
- Department of Conservation (1998). Otago Conservancy Management Strategy. Department of Conservation.
- DoC (2011). Coastal marine habitats and marine protected areas in the New Zealand Territorial Sea: a broad scale gap analysis. Department of Conservation and Ministry of Fisheries. Wellington, New Zealand.
- Dunedin City Council (2010). Coastal Dune Reserves Management Plan. Dunedin City Council.
- Dunedin City Council (1999). Dunedin City District Plan. Dunedin City Council.
- Forsyth P (2001). Geology of the Waitaki Area. Institute of Geological and Nuclear Sciences Ltd, Lower Hutt.
- Grove, S.L. (1995). Subtidal soft-bottom macrofauna of the upper Otago Harbour. Unpublished MSc thesis, University of Otago.

- Grove S.L. and Probert P.K. (1997). Report to the Otago Regional Council on macrobenthic samples from stations 970040-970059 (Upper Otago Harbour Basin and Andersons Bay Inlet). Dept of Marine Science, University of Otago.
- Hand, K. (2013). Seabird Colonies of Otago: A review of current status, survey effort and implications for establishment of Important Bird Areas. Report submitted for Post-graduate Diploma in Wildlife Management. WLM No. 271, University of Otago.
- Hayward B and Kenny J (1998). Inventory and maps of important geological sites and landforms in the Otago region. Geological Society of New Zealand Miscellaneous Publication 99.
- James, M., Probert, K., Boyd, R., and John, A. (2007). Summary of existing ecological information and scoping of further assessments for Port Otago dredging project. Report HAM2007-156 to Port Otago Limited, National Institute of Water & Atmospheric Research Ltd., Project number POL08201. 65 pages.
- Kai Tahu Ki Otago Ltd (2006). Cultural evaluation of the rural and landscape sections of the Dunedin City Council District Plan. Dunedin City Council.
- Kai Tahu Ki Otago (2005). Natural Resource Management Plan 2005. Kai Tahu Ki Otago.
- MBEG (2004). Marine Biodiversity Expert Group Report. Prepared as part of the Marine Protection Process for Ngai Tahu Whanui Takiwa.
- Morton, J. and Miller M. (1973). The New Zealand Sea Shore. Collins, Auckland. 653 pp.
- NZILA (2010). Best Practice Note, Landscape assessment and sustainable management 10.1. New Zealand Institute of Landscape Architects.
- Otago Regional Council (2005). Environmental Status of The Near Shore Coastal Environment. Otago Regional Council.
- Otago Regional Council (2004). Otago Estuaries State of Environment Report 2010. Otago Regional Council.
- Otago Regional Council (2001). Regional Plan: Coast for Otago. Otago Regional Council.

- Otago Regional Council (2004). Regional Plan: Water for Otago. Otago Regional Council.
- Otago Regional Council (2004). Report on the Surface Water Quality of the Lower Taieri River Catchment. Otago Regional Council.
- Otago Regional Council (2008). Water quality of coastal Otago catchments five-year monitoring summary 2003 to 2008. Otago Regional Council.
- Ozanne, R. (2012). State of the environment: Surface water quality in Otago. Otago Regional Council.
- Paavo, B.L. and Probert, P.K. (2005). Infaunal assemblages in coastal sediments at dredge disposal sites of Otago, New Zealand. Report prepared for Port Otago Ltd. by the Department of Marine Science, University of Otago, Dunedin, New Zealand.
- Rainer S.F. (1981). Soft-bottom benthic communities in Otago harbour and Blueskin Bay, New Zealand. N.Z. Oceanographic Inst. Memoir 80: 38pp.
- Ralph, P.M. and Yaldwyn, J.C. (1956). Seafloor animals from the region of Portobello Marine Biological Station, Otago Harbour. *Tuatara* 6(2): 57-85.
- Robertson, B.M.; Gillespie, P.A.; Asher, R.A.; Frisk, S.; Keeley, N.B.; Hopkins, G.A.; Thompson, S.J.; Tuckey, B.J. (2002). Estuarine Environmental Assessment and Monitoring: A National Protocol. Part A. Development, Part B. Appendices, and Part C. Application. Prepared for supporting Councils and the Ministry for the Environment, Sustainable Management Fund Contract No. 5096. Part A. 93p. Part B. 159p. Part C. 40p plus field sheets.
- Single, M. (2014). Long Mac groyne and Shelly Beach geomorphological processes. Report prepared for Port Otago Ltd by Shore Processes and Management Ltd.
- Smith, A.M. (1994). Eastward to the Seas: a Scientific Review of Otago's Coastal Marine Area. Background Report 4, Regional Coastal Plan for Otago. Prepared for the Otago Regional Council.

- Stewart, B.G (2005a). Dunedin's urban stormwater discharges: Port Chalmers. Report prepared for the DCC by Ryder Consulting Ltd.
- Stewart, B.G (2005b). Dunedin's urban stormwater discharges: Effects on Second Beach and St Clair Beach. Report prepared for the DCC by Ryder Consulting Ltd.
- Stewart B.G. (2005c). Peninsula Road Improvements Projects: Ecological Impact Assessment. Report prepared for OPUS International Consultants Ltd by Ryder Consulting Ltd.
- Stewart, B.G. (2006a). Seacliff treated wastewater discharge to land: Assessment of environmental effects to accompany resource consent renewal. Prepared for the DCC by Ryder Consulting Ltd.
- Stewart, B. (2006b). Stock assessment of cockles (*Austrovenus stutchburyi*) in Papanui and Waitati Inlets, Otago 2004. Final report for the Ministry of Fisheries Research Project COC2004/02. 54p.
- Stewart B. (2007). Mapping of the Waikouaiti and Shag River Estuaries: Otago Regional Council State of the Environment Report. Prepared for the ORC by Ryder Consulting Ltd. pp. 55.
- Stewart B. (2008a). Habitat Mapping of the Taieri River Estuary; Otago Regional Council State of the Environment Report. Prepared for the ORC by Ryder Consulting Ltd. pp. 34.
- Stewart B. (2008b). Habitat Mapping of the Kaikorai Estuary; Otago Regional Council State of the Environment Report. Prepared for the ORC by Ryder Consulting Ltd. pp. 34.
- Stewart B.G. (2008c). Stock Assessment of Clams (*Austrovenus stutchburyi*) in Waitati Inlet, Otago 2007. Report prepared for the Ministry of Fisheries by Ryder consulting Ltd.
- Stewart B.G. (2008d). Clam (*Austrovenus stutchburyi*) resource and habitat survey in Otago Harbour (COC3), Otago, 2008. Report prepared for Southern Clams Ltd by Ryder Consulting.

- Stewart, B.G. (2012). *Waikouaiti Land Treatment System: Waikouaiti Beach Ecological Survey*. Report prepared for Dunedin City Council by Ryder Consulting Ltd.
- Stewart B.G. (2013a). Peninsula Road improvements project – Stage II: Initial Ecological and habitat assessment. Report prepared for DCC by Ryder Consulting Ltd.
- Stewart, B.G. (2013b). *Warrington Treated Sewage Discharge: Waitati Inlet ecological survey, 2013*. Report prepared for the Dunedin City Council by Ryder Consulting Ltd.
- Stewart, B.G. (2013c). Baseline Environmental Monitoring for Project Next Generation: In-Harbour assessment. Report prepared for Port Otago Ltd by Ryder Consulting Ltd.
- Stewart B.G. (2013d). Repeat Monitoring of Seagrass Beds for Project Next Generation: Spring 2013. Report Prepared for Port Otago Ltd. by Ryder Consulting. 27pp.
- Stewart, B. (2013e). Green Island Wastewater and Tahuna Wastewater Treatment Plants (ORC Consent 97530, Condition 8 and ORC Consent 2006.553, Condition 7a): Rocky Shore Ecological Monitoring 2013. Report to the Dunedin City Council prepared by Ryder Consulting Limited.
- Stewart, B. G. (2014a). Tahuna wastewater treatment plant outfall – discharge consent 2002.623: Offshore sediment survey: March 2014. Prepared by Ryder Consulting Ltd for Dunedin City Council.
- Stewart, B. (2014b). Waikouaiti Landfill - Receiving Water Monitoring for September 2014. Report prepared for Delta by Ryder Consulting Ltd.
- Stewart, B.G. (2014c). Possible ecological issues for proposed road maintenance: Papanui Inlet, Hoopers Inlet, Purakaunui Inlet, Karitane. Report prepared for DCC by Ryder Consulting Ltd.
- Stewart, B. (2015). Tahuna Wastewater Treatment Plant (ORC Consent 2006.553, Condition 6c): Rocky Shore Ecological Monitoring 2015. Report to the Dunedin City Council prepared by Ryder Consulting Limited.
- Stewart, B., Keogh, J., Fletcher, D. and Mladenov, P. (1992). Biomass survey of the New Zealand littleneck clam (*Chione stutchburyi*) in Papanui and Waitati Inlets, Otago during

1991/1992. Marine Science and Aquaculture research Centre, University of Otago, Dunedin, New Zealand. 37p.

Stewart B.G. and Ryder G.I. (2004). Characterisation Of Dunedin's Urban Stormwater Discharges And Their Effect On The Upper Harbour Basin. Report to the DCC prepared by Ryder Consulting Ltd.

## **Appendix 1 : Natural Character Assessment Sheets**

## **Appendix 2 : Natural Features and Natural Landscapes Assessment Sheets**