



Department of
Primary Industries and
Regional Development

Digital Library

Land resources series

Natural resources research

1992

Land resources map in the southern section of the Peel-Harvey catchment, swan coastal plain, Western Australia

Dennis van Gool

Bev Kipling

Follow this and additional works at: https://library.dpird.wa.gov.au/land_res

 Part of the [Agriculture Commons](#), [Natural Resources Management and Policy Commons](#), and the [Soil Science Commons](#)

Recommended Citation

van Gool, D, and Kipling, B. (1992), *Land resources map in the southern section of the Peel-Harvey catchment, swan coastal plain, Western Australia*. Department of Primary Industries and Regional Development, Western Australia, Perth. Map.

This map is brought to you for free and open access by the Natural resources research at Digital Library. It has been accepted for inclusion in Land resources series by an authorized administrator of Digital Library. For more information, please contact library@dpird.wa.gov.au.

LAND RESOURCES IN THE SOUTHERN SECTION OF THE PEEL-HARVEY CATCHMENT, SWAN COASTAL PLAIN, WESTERN AUSTRALIA

Dennis van Gool and Bev Kipling
Division of Resource Management
Department of Agriculture, Western Australia
March 1992

Legend of soil-landscape mapping units arranged in physiographic order

The mapping units are grouped according to the geomorphic elements described by McArthur and Batters (1960) in order of decreasing age. The distinguishing features of the mapping units are shown below. Wherever possible the terminology of the Australian Soil and Land Survey Field Handbook (McDonald et al., 1984) has been used. Some of the terms are qualified at the bottom of the legend.

Darling Scarp: Moderately inclined to steep, incised, high relief slopes forming the western ridge of the Darling Ranges. Underlain by the Darling granite and the remainder have variable soils formed from weathering of Archean granitic and gneissic rocks. Soils are generally well drained and rock outcrops commonly occur.

D1 Steeper slopes (20-30%) of steep face with gradational red and yellow earths and duplex soils with variable depth and common rock outcrop.

D2 Moderately inclined slopes (10-20%) with similar soils and rock outcrop to D1.

D3 Deeply incised tributary valleys with steep sideslopes; soils and rock outcrop similar to D1.

D4 Gently inclined crests and upper slopes with shallow uniform brownish sands with ironstone gravel and very common duricrust outcrop (black laterite).

D5 Deeply incised river valleys with moderately inclined slopes with deep sandy duplex soils and minor rock outcrop; although swampy depressions or seepage areas do occur, this unit is generally moderately well to well drained.

Ridge Hill Shelf (foothills): - Laterized, low relief, foothills of the Darling Scarp, comprising fossil shoreline bench sediments, Holocene colluvium and narrow bands of alluvium.

F1 Gently inclined slopes (5-10%), with moderately well to well drained:

a. shallow to moderately deep, very gravelly acidic yellow duplex soils and common laterite.

b. moderately deep to deep, gravelly acidic yellow duplex soils and rare laterite.

c. deep uniform yellowish brown sand, generally laterite and gravel free.

F2 As for F1 (a,b,c), but with very gently to gently inclined lower slopes (1-5%).

F3 Very gently inclined lower slopes (1-3%) with deep, imperfectly drained yellow and reddish brown duplex soils.

F4 Incised stream channels with poorly drained acidic yellow duplex soils and gradational sandy brown earths.

F5 Poorly defined stream channels on lowest slopes with soils similar to F4.

Pinjara Plain: - Broad low relief plain west of the foothills, comprising predominantly Pleistocene fluvial sediments and some Holocene alluvium associated with major current drainage systems. Major soils are relatively poorly drained and moderately susceptible to salinity in limited areas.

P1 Flat to very gently undulating plain with alkaline mottled yellow duplex (or "effective duplex") soils comprising:

a. shallow pale sand to sandy loam over clay; imperfect to poorly drained and generally not susceptible to salinity.

b. moderately deep pale sand to sandy loam over clay; imperfectly drained and moderately susceptible to salinity in limited areas.

c. as for P1a, but moderately susceptible to salinity.

d. shallow pale sand to sandy loam over very gravelly clay; moderately well drained.

P2 Flat to very gently undulating plain with alkaline mottled yellow duplex soils which generally consist of shallow pale sand to sandy loam over clay.

P2a As for P2, but there is a moderately deep silcrete or calcareous horizon generally on top of an (olive-grey) clay.

P3 Flat to very gently undulating plain with deep, imperfect to poorly drained acidic yellow, grey or brown gradational earths and mottled yellow duplex soils, with loam to clay loam surface horizons.

P4 Poorly drained flats, sometimes with glisti microrelief and with moderately deep to deep black, olive and some yellow and brown cracking clays and less commonly non-cracking friable clays with generally acidic subsoils.

P5 Poorly drained flats, commonly with glisti microrelief and with deep black, grey to olive brown cracking clays with alkaline subsoils.

P5a P5 clay with a veneer of grey sand.

P5a Very gently undulating alluvial terraces contiguous with the plain with moderately well to well drained soils. These are associated with major current river systems, and have acidic red and yellow duplex soils, less commonly gradational red and yellow earths.

P6b Very gently undulating alluvial terraces and low rises contiguous with the plain, with moderately well to well drained soils. These are associated with prior stream deposits upon the plain, and have uniform brownish sands or well structured gradational brown earths; soils are moderate to moderately well drained.

P6c Very gently undulating alluvial terraces and flats with uniform friable brown loams, or well structured gradational brown earths; soils are moderate to moderately well drained.

P7 Seasonally inundated depressions and depressions with very poorly drained variable acidic mottled yellow and grey duplex soils.

P7a As for P7 but alkaline.

P7b Seasonally inundated depressions or seepage areas near the base of the foothills with very poorly drained deep bleached siliceous sands.

P8 Broad poorly drained flats and poorly defined stream channels with moderately deep to deep sands over generally rock-silt, acidic or less commonly silty and yellow duplex soils to uniform bleached or pale brown sands over clay.

P9 Shallowly incised stream channels or minor creeks and rivers with deep acidic mottled yellow duplex soils.

P10 Gently undulating to flat terraces adjacent to major rivers, but below the general level of the plain, with deep well drained uniform brownish sands or loams subject to periodic flooding.

P10a Flat terraces adjacent to major rivers with deep black cracking clays with alkaline subsoils; soils similar to P5.

* effective duplex - soils with similar land qualities that have a deep soil over a better bed.

Available refers to the soil reaction trends described by Northcote, (1979).

This mapping incorporates unclassified coastal mapping (Oma 1981). To the north a detailed mapping of the Peel-Harvey Estuary and Murray (Oma 1980). The map units employed here are largely derived from the Peel-Harvey study, with some minor editorial changes.

The boundaries of the adjoining maps have been modified slightly using the 1991 aerial photography to ensure continuity.

Note: The map has a cadastral base which is not necessarily a functional road directory.

Qualification of descriptive terms

Slope	Relief	Soil depth	Abundance classes
Level	Extremely low	< 50 cm	Very low
Very gently inclined	Very low	50-100 cm	Low
Gently inclined	Low	100-200 cm	Many
Moderately inclined	High	> 200 cm	Abundant
Moderately steep	Very high	> 300 cm	Very abundant

Key

- Peel Harvey legal catchment boundary
- Shire boundary
- Miscellaneous swamps
- Clay pan
- Property lot numbers (land reserve numbers)
- State Forest boundary
- CALM pine plantation boundary
- National Park boundary

Source: CALM office February, 1992

Note: The map has a cadastral base which is not necessarily a functional road directory.

Qualification of descriptive terms

Slope	Relief	Soil depth	Abundance classes
Level	Extremely low	< 50 cm	Very low
Very gently inclined	Very low	50-100 cm	Low
Gently inclined	Low	100-200 cm	Many
Moderately inclined	High	> 200 cm	Abundant
Moderately steep	Very high	> 300 cm	Very abundant

Key

- Peel Harvey legal catchment boundary
- Shire boundary
- Miscellaneous swamps
- Clay pan
- Property lot numbers (land reserve numbers)
- State Forest boundary
- CALM pine plantation boundary
- National Park boundary

Source: CALM office February, 1992

Note: The map has a cadastral base which is not necessarily a functional road directory.

Qualification of descriptive terms

Slope	Relief	Soil depth	Abundance classes
Level	Extremely low	< 50 cm	Very low
Very gently inclined	Very low	50-100 cm	Low
Gently inclined	Low	100-200 cm	Many
Moderately inclined	High	> 200 cm	Abundant
Moderately steep	Very high	> 300 cm	Very abundant

Key

- Peel Harvey legal catchment boundary
- Shire boundary
- Miscellaneous swamps
- Clay pan
- Property lot numbers (land reserve numbers)
- State Forest boundary
- CALM pine plantation boundary
- National Park boundary

Source: CALM office February, 1992

Note: The map has a cadastral base which is not necessarily a functional road directory.

Qualification of descriptive terms

Slope	Relief	Soil depth	Abundance classes
Level	Extremely low	< 50 cm	Very low
Very gently inclined	Very low	50-100 cm	Low
Gently inclined	Low	100-200 cm	Many
Moderately inclined	High	> 200 cm	Abundant
Moderately steep	Very high	> 300 cm	Very abundant

Key

- Peel Harvey legal catchment boundary
- Shire boundary
- Miscellaneous swamps
- Clay pan
- Property lot numbers (land reserve numbers)
- State Forest boundary
- CALM pine plantation boundary
- National Park boundary

Source: CALM office February, 1992

Note: The map has a cadastral base which is not necessarily a functional road directory.

Qualification of descriptive terms

Slope	Relief	Soil depth	Abundance classes
Level	Extremely low	< 50 cm	Very low
Very gently inclined	Very low	50-100 cm	Low
Gently inclined	Low	100-200 cm	Many
Moderately inclined	High	> 200 cm	Abundant
Moderately steep	Very high	> 300 cm	Very abundant

Key

- Peel Harvey legal catchment boundary
- Shire boundary
- Miscellaneous swamps
- Clay pan
- Property lot numbers (land reserve numbers)
- State Forest boundary
- CALM pine plantation boundary
- National Park boundary

Source: CALM office February, 1992

Note: The map has a cadastral base which is not necessarily a functional road directory.

Qualification of descriptive terms

Slope	Relief	Soil depth	Abundance classes
Level	Extremely low	< 50 cm	Very low
Very gently inclined	Very low	50-100 cm	Low
Gently inclined	Low	100-200 cm	Many
Moderately inclined	High	> 200 cm	Abundant
Moderately steep	Very high	> 300 cm	Very abundant

Key

- Peel Harvey legal catchment boundary
- Shire boundary
- Miscellaneous swamps
- Clay pan
- Property lot numbers (land reserve numbers)
- State Forest boundary
- CALM pine plantation boundary
- National Park boundary

Source: CALM office February, 1992

Note: The map has a cadastral base which is not necessarily a functional road directory.

Qualification of descriptive terms

Slope	Relief	Soil depth	Abundance classes
Level	Extremely low	< 50 cm	Very low
Very gently inclined	Very low	50-100 cm	Low
Gently inclined	Low	100-200 cm	Many
Moderately inclined	High	> 200 cm	Abundant
Moderately steep	Very high	> 300 cm	Very abundant

Key

- Peel Harvey legal catchment boundary
- Shire boundary
- Miscellaneous swamps
- Clay pan
- Property lot numbers (land reserve numbers)
- State Forest boundary
- CALM pine plantation boundary
- National Park boundary

Source: CALM office February, 1992

Note: The map has a cadastral base which is not necessarily a functional road directory.

Qualification of descriptive terms

Slope	Relief	Soil depth	Abundance classes
Level	Extremely low	< 50 cm	Very low
Very gently inclined	Very low	50-100 cm	Low
Gently inclined	Low	100-200 cm	Many
Moderately inclined	High	> 200 cm	Abundant
Moderately steep	Very high	> 300 cm	Very abundant

Basement dune and sandplain system: - Pleistocene sand dunes with very low relief, leached grey siliceous sand intergrading sandy and dry swamps and gently undulating sand. These occur immediately west of the Pinjara Plain. Topography becomes more subdued from west to east.

B1 Extremely low to very low relief dunes, undulating sandplain and discrete sand rises with deep bleached grey sands sometimes with a pale yellow B horizon or a weak iron-organic horizon at depths generally greater than 2 metres; barkasia dominant.

B1a As for B1, but with a more intensely coloured yellow B horizon occurring within 1 metre of the surface; iron and barkasia dominant (red gum rise).

B2 Flat to very gently undulating sandplain and broad very low rises with moderately well to well drained deep bleached grey sands with a pale yellow B horizon or a weak iron-organic horizon at depths generally greater than 2 metres; barkasia dominant.

B3 Closed depressions and poorly defined stream channels with moderately deep, poorly to very poorly drained bleached sands with an iron-organic horizon; clay at generally less than 1 metre depth; surface horizons are dark grey sand or sandy loam.

B4 Broad poorly drained sandplain with deep grey siliceous sands or deep well drained siliceous yellow-brown sands.

B5 Shallowly incised stream channels of minor creeks and rivers with soils similar to B4 (and B6).

B6 Sandplain (and broad extremely low rises) similar to B4 with imperfectly drained soils.

Stenswood dune and sandplain system: - Gently to moderately inclined low hills and gently undulating plain located west of the Baseline dune system, associated with Pleistocene, Tertiary Limestone. Hills consist of a core of friable calcarenite, capped by secondary calcite and overlain by variable depths of well to rapidly drained siliceous yellow-brown sands. The gently undulating sandplain is underlain by calcareous Pleistocene marine limestone component of the Tarnalia Limestone.

S1 Dune ridges with well to rapidly drained:

a. shallow to moderately deep yellow-brown sands, very common limestone outcrop and slopes 5 to 15%.

b. deep yellow brown sands or pale sands with yellow-brown subsoil, and slopes 5 to 15%.

c. deep bleached grey sands with yellow-brown subsoils, and slopes 5 to 15%.

d. moderately deep to deep yellow-brown sands, rare limestone outcrop and slopes 15 to 25% on the eastern slope.

S2 Lower slopes (1-5%) of dune ridge with well drained:

a. shallow to moderately deep yellow-brown sands and common limestone outcrop.

b. deep bleached grey sands with yellow-brown subsoils usually occurring on the eastern slope of the Stenswood dune ridge.

S3 Inter dunal swales and depressions with gently inclined sideslopes and deep well drained siliceous yellow-brown sands.

S4 Flat to gently undulating sandplain (including minor depressions) with:

a. deep, pale and sometimes bleached, sands with yellow-brown subsoils.

b. shallow to moderately deep yellow-brown and grey-brown sands with minor limestone outcrop.

c. deep, yellow-brown or dark brown sands that are seasonally inundated.

S5 Stony plain with extremely low ridges (rare beach ridges and shallow to moderately deep siliceous yellow-brown sands).

Quindrup Dune System (coastal dunes): - Unconsolidated Holocene sand west of the Stenswood dunes. The ridge formations are low relief complex, generally well to rapidly drained, uniform pale calcareous sands. The soils are well to rapidly drained, uniform pale calcareous sands.

Q1 Foredune/low dune complex (semi erosional) with very low relief ridge and swale topography and deep calcareous sands.

Q2 Relict foredunes and gently undulating beach ridge plain with deep calcareous sands.

Q2a More prominent relict foredune ridges which occur within unit Q2.

Q3 Flat to very gently undulating plain with variably leached calcareous sand generally overlying a calcareous horizon at 60-80cm depth.

Q4 Complex of nested low relief parabolic dunes with moderate to steep slopes and deep calcareous sands with variable depth of darkening at the surface horizon.

Q5 Long walled discrete parabolic dunes with similar slopes and soils to Q3.

Q6 Subdued parabolic dunes on the eastern margins of the dune system.

Q7 Small gently undulating dune (deflation basin) enclosed by parabolic dunes with moderately deep to deep calcareous sands over limestone.

Q8 Flat to very gently undulating erosional floor of blowout or sandsheet with medium to coarse sand or calcareous pavement, seasonally waterlogged.

Q9 Actively eroding, poorly vegetated, blowout with rim and bowl (parabolic) morphology with deep calcareous sands.

Q10 Very broad shallow depression with deep, poorly drained, fine textured alkaline calcareous alluvium.

V1 Saline tidal flats with grey, black and brown fossil muds and humic sandy clays with locally common shell and limestone fragments.

V2 Sand dunes similar to V1, but marginally higher and commonly supporting stands of Melaleuca spp.

V3 Sand flats similar to V2, but marginally higher and commonly supporting stands of Melaleuca spp.

V4 Low level storm beach ridges and terraces with minor limestone outcrops. Soils are generally well to rapidly drained, uniform pale calcareous sands.

V5 High level sandy terrace and gently undulating beach ridges with moderately deep to deep grey siliceous sandy overlying soft shelly limestone or shell beds.

V6 High level sandy terrace and gently undulating beach ridges with deep grey or bleached pale brown siliceous sands overlying soft shelly limestone.

V7 Very broad shallow depression with deep, poorly drained, fine textured alkaline calcareous alluvium.

V10 Highest level terrace associated with the western margins of Lake Clifton and Lake Preston with shallow calcareous black sandy loam overlying limestone.

Quindrup Dune System (coastal dunes): - Unconsolidated Holocene sand west of the Stenswood dunes. The ridge formations are low relief complex, generally well to rapidly drained, uniform pale calcareous sands. The soils are well to rapidly drained, uniform pale calcareous sands.

Q1 Foredune/low dune complex (semi erosional) with very low relief ridge and swale topography and deep calcareous sands.

Q2 Relict foredunes and gently undulating beach ridge plain with deep calcareous sands.

Q2a More prominent relict foredune ridges which occur within unit Q2.

Q3 Flat to very gently undulating plain with variably leached calcareous sand generally overlying a calcareous horizon at 60-80cm depth.

Q4 Complex of nested low relief parabolic dunes with moderate to steep slopes and deep calcareous sands with variable depth of darkening at the surface horizon.

Q5 Long walled discrete parabolic dunes with similar slopes and soils to Q3.

Q6 Subdued parabolic dunes on the eastern margins of the dune system.

Q7 Small gently undulating dune (deflation basin) enclosed by parabolic dunes with moderately deep to deep calcareous sands over limestone.

Q8 Flat to very gently undulating erosional floor of blowout or sandsheet with medium to coarse sand or calcareous pavement, seasonally waterlogged.

Q9 Actively eroding, poorly vegetated, blowout with rim and bowl (parabolic) morphology with deep calcareous sands.

Q10 Very broad shallow depression with deep, poorly drained, fine textured alkaline calcareous alluvium.

V1 Saline tidal flats with grey, black and brown fossil muds and humic sandy clays with locally common shell and limestone fragments.

V2 Sand dunes similar to V1, but marginally higher and commonly supporting stands of Melaleuca spp.

V3 Sand flats similar to V2, but marginally higher and commonly supporting stands of Melaleuca spp.

V4 Low level storm beach ridges and terraces with minor limestone outcrops. Soils are generally well to rapidly drained, uniform pale calcareous sands.

V5 High level sandy terrace and gently undulating beach ridges with moderately deep to deep grey siliceous sandy overlying soft shelly limestone or shell beds.

V6 High level sandy terrace and gently undulating beach ridges with deep grey or bleached pale brown siliceous sands overlying soft shelly limestone.

V7 Very broad shallow depression with deep, poorly drained, fine textured alkaline calcareous alluvium.

V10 Highest level terrace associated with the western margins of Lake Clifton and Lake Preston with shallow calcareous black sandy loam overlying limestone.

Quindrup Dune System (coastal dunes): - Unconsolidated Holocene sand west of the Stenswood dunes. The ridge formations are low relief complex, generally well to rapidly drained, uniform pale calcareous sands. The soils are well to rapidly drained, uniform pale calcareous sands.

Q1 Foredune/low dune complex (semi erosional) with very low relief ridge and swale topography and deep calcareous sands.

Q2 Relict foredunes and gently undulating beach ridge plain with deep calcareous sands.

Q2a More prominent relict foredune ridges which occur within unit Q2.

Q3 Flat to very gently undulating plain with variably leached calcareous sand generally overlying a calcareous horizon at 60-80cm depth.

Q4 Complex of nested low relief parabolic dunes with moderate to steep slopes and deep calcareous sands with variable depth of darkening at the surface horizon.

Q5 Long walled discrete parabolic dunes with similar slopes and soils to Q3.

Q6 Subdued parabolic dunes on the eastern margins of the dune system.

Q7 Small gently undulating dune (deflation basin) enclosed by parabolic dunes with moderately deep to deep calcareous sands over limestone.

Q8 Flat to very gently undulating erosional floor of blowout or sandsheet with medium to coarse sand or calcareous pavement, seasonally waterlogged.

Q9 Actively eroding, poorly vegetated, blowout with rim and bowl (parabolic) morphology with deep calcareous sands.

Q10 Very broad shallow depression with deep, poorly drained, fine textured alkaline calcareous alluvium.

V1 Saline tidal flats with grey, black and brown fossil muds and humic sandy clays with locally common shell and limestone fragments.

V2 Sand dunes similar to V1, but marginally higher and commonly supporting stands of Melaleuca spp.

V3 Sand flats similar to V2, but marginally higher and commonly supporting stands of Melaleuca spp.

V4 Low level storm beach ridges and terraces with minor limestone outcrops. Soils are generally well to rapidly drained, uniform pale calcareous sands.

V5 High level sandy terrace and gently undulating beach ridges with moderately deep to deep grey siliceous sandy overlying soft shelly limestone or shell beds.

V6 High level sandy terrace and gently undulating beach ridges with deep grey or bleached pale brown siliceous sands overlying soft shelly limestone.

V7 Very broad shallow depression with deep, poorly drained, fine textured alkaline calcareous alluvium.

V10 Highest level terrace associated with the western margins of Lake Clifton and Lake Preston with shallow calcareous black sandy loam overlying limestone.

Quindrup Dune System (coastal dunes): - Unconsolidated Holocene sand west of the Stenswood dunes. The ridge formations are low relief complex, generally well to rapidly drained, uniform pale calcareous sands. The soils are well to rapidly drained, uniform pale calcareous sands.

Q1 Foredune/low dune complex (semi erosional) with very low relief ridge and swale topography and deep calcareous sands.

Q2 Relict foredunes and gently undulating beach ridge plain with deep calcareous sands.

Q2a More prominent relict foredune ridges which occur within unit Q2.

Q3 Flat to very gently undulating plain with variably leached calcareous sand generally overlying a calcareous horizon at 60-80cm depth.

Q4 Complex of nested low relief parabolic dunes with moderate to steep slopes and deep calcareous sands with variable depth of darkening at the surface horizon.

Q5 Long walled discrete parabolic dunes with similar slopes and soils to Q3.

Q6 Subdued parabolic dunes on the eastern margins of the dune system.

Q7 Small gently undulating dune (deflation basin) enclosed by parabolic dunes with moderately deep to deep calcareous sands over limestone.

Q8 Flat to very gently undulating erosional floor of blowout or sandsheet with medium to coarse sand or calcareous pavement, seasonally waterlogged.

Q9 Actively eroding, poorly vegetated, blowout with rim and bowl (parabolic) morphology with deep calcareous sands.

Q10 Very broad shallow depression with deep, poorly drained, fine textured alkaline calcareous alluvium.

V1 Saline tidal flats with grey, black and brown fossil muds and humic sandy clays with locally common shell and limestone fragments.

V2 Sand dunes similar to V1, but marginally higher and commonly supporting stands of Melaleuca spp.

V3 Sand flats similar to V2, but marginally higher and commonly supporting stands of Melaleuca spp.

V4 Low level storm beach ridges and terraces with minor limestone outcrops. Soils are generally well to rapidly drained, uniform pale calcareous sands.

V5 High level sandy terrace and gently undulating beach ridges with moderately deep to deep grey siliceous sandy overlying soft shelly limestone or shell beds.

V6 High level sandy terrace and gently undulating beach ridges with deep grey or bleached pale brown siliceous sands overlying soft shelly limestone.

V7 Very broad shallow depression with deep, poorly drained, fine textured alkaline calcareous alluvium.

V10 Highest level terrace associated with the western margins of Lake Clifton and Lake Preston with shallow calcareous black sandy loam overlying limestone.

Quindrup Dune System (coastal dunes): - Unconsolidated Holocene sand west of the Stenswood dunes. The ridge formations are low relief complex, generally well to rapidly drained, uniform pale calcareous sands. The soils are well to rapidly drained, uniform pale calcareous sands.

Q1 Foredune/low dune complex (semi erosional) with very low relief ridge and swale topography and deep calcareous sands.

Q2 Relict foredunes and gently undulating beach ridge plain with deep calcareous sands.

Q2a More prominent relict foredune ridges which occur within unit Q2.

Q3 Flat to very gently undulating plain with variably leached calcareous sand generally overlying a calcareous horizon at 60-80cm depth.

Q4 Complex of nested low relief parabolic dunes with moderate to steep slopes and deep calcareous sands with variable depth of darkening at the surface horizon.

Q5 Long walled discrete parabolic dunes with similar slopes and soils to Q3.

Q6 Subdued parabolic dunes on the eastern margins of the dune system.

Q7 Small gently undulating dune (deflation basin) enclosed by parabolic dunes with moderately deep to deep calcareous sands over limestone.

Q8 Flat to very gently undulating erosional floor of blowout or sandsheet with medium to coarse sand or calcareous pavement, seasonally waterlogged.

Q9 Actively eroding, poorly vegetated, blowout with rim and bowl (parabolic) morphology with deep calcareous sands.

Q10 Very broad shallow depression with deep, poorly drained, fine textured alkaline calcareous alluvium.

V1 Saline tidal flats with grey, black and brown fossil muds and humic sandy clays with locally common shell and limestone fragments.

V2 Sand dunes similar to V1, but marginally higher and commonly supporting stands of Melaleuca spp.

V3 Sand flats similar to V2, but marginally higher and commonly supporting stands of Melaleuca spp.

V4 Low level storm beach ridges and terraces with minor limestone outcrops. Soils are generally well to rapidly drained, uniform pale calcareous sands.

V5 High level sandy terrace and gently undulating beach ridges with moderately deep to deep grey siliceous sandy overlying soft shelly limestone or shell beds.

V6 High level sandy terrace and gently undulating beach ridges with deep grey or bleached pale brown siliceous sands overlying soft shelly limestone.

V7 Very broad shallow depression with deep, poorly drained, fine textured alkaline calcareous alluvium.

V10 Highest level terrace associated with the western margins of Lake Clifton and Lake Preston with shallow calcareous black sandy loam overlying limestone.

Quindrup Dune System (coastal dunes): - Unconsolidated Holocene sand west of the Stenswood dunes. The ridge formations are low relief complex, generally well to rapidly drained, uniform pale calcareous sands. The soils are well to rapidly drained, uniform pale calcareous sands.

Q1 Foredune/low dune complex (semi erosional) with very low relief ridge and swale topography and deep calcareous sands.

Q2 Relict foredunes and gently undulating beach ridge plain with deep calcareous sands.

Q2a More prominent relict foredune ridges which occur within unit Q2.

Q3 Flat to very gently undulating plain with variably leached calcareous sand generally overlying a calcareous horizon at 60-80cm depth.

Q4 Complex of nested low relief parabolic dunes with moderate to steep slopes and deep calcareous sands with variable depth of darkening at the surface horizon.

Q5 Long walled discrete parabolic dunes with similar slopes and soils to Q3.

Q6 Subdued parabolic dunes on the eastern margins of the dune system.

Q7 Small gently undulating dune (deflation basin) enclosed by parabolic dunes with moderately deep to deep calcareous sands over limestone.

Q8 Flat to very gently undulating erosional floor of blowout or sandsheet with medium to coarse sand or calcareous pavement, seasonally waterlogged.

Q9 Actively eroding, poorly vegetated, blowout with rim and bowl (parabolic) morphology with deep calcareous sands.

Q10 Very broad shallow depression with deep, poorly drained, fine textured alkaline calcareous alluvium.

V1 Saline tidal flats with grey, black and brown fossil muds and humic sandy clays with locally common shell and limestone fragments.

V2 Sand dunes similar to V1, but marginally higher and commonly supporting stands of Melaleuca spp.

V3 Sand flats similar to V2, but marginally higher and commonly supporting stands of Melaleuca spp.

V4 Low level storm beach ridges and terraces with minor limestone outcrops. Soils are generally well to rapidly drained, uniform pale calcareous sands.

V5 High level sandy terrace and gently undulating beach ridges with moderately deep to deep grey siliceous sandy overlying soft shelly limestone or shell beds.

V6 High level sandy terrace and gently undulating beach ridges with deep grey or bleached pale brown siliceous sands overlying soft shelly limestone.

V7 Very broad shallow depression with deep, poorly drained, fine textured alkaline calcareous alluvium.

V10 Highest level terrace associated with the western margins of Lake Clifton and Lake Preston with shallow calcareous black sandy loam overlying limestone.

Quindrup Dune System (coastal dunes): - Unconsolidated Holocene sand west of the Stenswood dunes. The ridge formations are low relief complex, generally well to rapidly drained, uniform pale calcareous sands. The soils are well to rapidly drained, uniform pale calcareous sands.

Q1 Foredune/low dune complex (semi erosional) with very low relief ridge and swale topography and deep calcareous sands.

Q2 Relict foredunes and gently undulating beach ridge plain with deep calcareous sands.

Q2a More prominent relict foredune ridges which occur within unit Q2.

Q3 Flat to very gently undulating plain with variably leached calcareous sand generally overlying a calcareous horizon at 60-80cm depth.

Q4 Complex of nested low relief parabolic dunes with moderate to steep slopes and deep calcareous sands with variable depth of darkening at the surface horizon.

Q5 Long walled discrete parabolic dunes with similar slopes and soils to Q3.

Q6 Subdued parabolic dunes on the eastern margins of the dune system.

Q7 Small gently undulating dune (deflation basin) enclosed by parabolic dunes with moderately deep to deep calcareous sands over limestone.

Q8 Flat to very gently undulating erosional floor of blowout or sandsheet with medium to coarse sand or calcareous pavement, seasonally waterlogged.

Q9 Actively eroding, poorly vegetated, blowout with rim and bowl (parabolic) morphology with deep calcareous sands.

Q10 Very broad shallow depression with deep, poorly drained, fine textured alkaline calcareous alluvium.

V1 Saline tidal flats with grey, black and brown fossil muds and humic sandy clays with locally common shell and limestone fragments.

V2 Sand dunes similar to V1, but marginally higher and commonly supporting stands of Melaleuca spp.

V3 Sand flats similar to V2, but marginally higher and commonly supporting stands of Melaleuca spp.

V4 Low level storm beach ridges and terraces with minor limestone outcrops. Soils are generally well to rapidly drained, uniform pale calcareous sands.

V5 High level sandy terrace and gently undulating beach ridges with moderately deep to deep grey siliceous sandy overlying soft shelly limestone or shell beds.

V6 High level sandy terrace and gently undulating beach ridges with deep grey or bleached pale brown siliceous sands overlying soft shelly limestone.

V7 Very broad shallow depression with deep, poorly drained, fine textured alkaline calcareous alluvium.

V10 Highest level terrace associated with the western margins of Lake Clifton and Lake Preston with shallow calcareous black sandy loam overlying limestone.

Quindrup Dune System (coastal dunes): - Unconsolidated Holocene sand west of the Stenswood dunes. The ridge formations are low relief complex, generally well to rapidly drained, uniform pale calcareous sands. The soils are well to rapidly drained, uniform pale calcareous sands.

Q1 Foredune/low dune complex (semi erosional) with very low relief ridge and swale topography and deep calcareous sands.

Q2 Relict foredunes and gently undulating beach ridge plain with deep calcareous sands.

Q2a More prominent relict foredune ridges which occur within unit Q2.

Q3 Flat to very gently undulating plain with variably leached calcareous sand generally overlying a calcareous horizon at 60-80cm depth.

Q4 Complex of nested low relief parabolic dunes with moderate to steep slopes and deep calcareous sands with variable depth of darkening at the surface horizon.

Q5 Long walled discrete parabolic dunes with similar slopes and soils to Q3.

Q6 Subdued parabolic dunes on the eastern margins of the dune system.

Q7 Small gently undulating dune (deflation basin) enclosed by parabolic dunes with moderately deep to deep calcareous sands over limestone.

Q8 Flat to very gently undulating erosional floor of blowout or sandsheet with medium to coarse sand or calcareous pavement, seasonally waterlogged.

Q9 Actively eroding, poorly vegetated, blowout with rim and bowl (parabolic) morphology with deep calcareous sands.

Q10 Very broad shallow depression with deep, poorly drained, fine textured alkaline calcareous alluvium.

V1 Saline tidal flats with grey, black and brown fossil muds and humic sandy clays with locally common shell and limestone fragments.

V2 Sand dunes similar to V1, but marginally higher and commonly supporting stands of Melaleuca spp.

V3 Sand flats similar to V2, but marginally higher and commonly supporting stands of Melaleuca spp.

V4 Low level storm beach ridges and terraces with minor limestone outcrops. Soils are generally well to rapidly drained, uniform pale calcareous sands.

V5 High level sandy terrace and gently undulating beach ridges with moderately deep to deep grey siliceous sandy overlying soft shelly limestone or shell beds.

V6 High level sandy terrace and gently undulating beach ridges with deep grey or bleached pale brown siliceous sands overlying soft shelly limestone.

V7 Very broad shallow depression with deep, poorly drained, fine textured alkaline calcareous alluvium.

V10 Highest level terrace associated with the western margins of Lake Clifton and Lake Preston with shallow calcareous black sandy loam overlying limestone.

Quindrup Dune System (coastal dunes): - Unconsolidated Holocene sand west of the Stenswood dunes. The ridge formations are low relief complex, generally well to rapidly drained, uniform pale calcareous sands. The soils are well to rapidly drained, uniform pale calcareous sands.

Q1 Foredune/low dune complex (semi erosional) with very low relief ridge and swale topography and deep calcareous sands.

Q2 Relict foredunes and gently undulating beach ridge plain with deep calcareous sands.

Q2a More prominent relict foredune ridges which occur within unit Q2.

Q3 Flat to very gently undulating plain with variably leached calcareous sand generally overlying a calcareous horizon at 60-80cm depth.

Q4 Complex of nested low relief parabolic dunes with moderate to steep slopes and deep calcareous sands with variable depth of darkening at the surface horizon.

Q5 Long walled discrete parabolic dunes with similar slopes and soils to Q3.

Q6 Subdued parabolic dunes on the eastern margins of the dune system.

Q7 Small gently undulating dune (deflation basin) enclosed by parabolic dunes with moderately deep to deep calcareous sands over limestone.

Q8 Flat to very gently undulating erosional floor of blowout or sandsheet with medium to coarse sand or calcareous pavement, seasonally waterlogged.

Q9 Actively eroding, poorly vegetated, blowout with rim and bowl (parabolic) morphology with deep calcareous sands.

Q10 Very broad shallow depression with deep, poorly drained, fine textured alkaline calcareous alluvium.

V1 Saline tidal flats with grey, black and brown fossil muds and humic sandy clays with locally common shell and limestone fragments.

V2 Sand dunes similar to V1, but marginally higher and commonly supporting stands of Melaleuca spp.

V3 Sand flats similar to V2, but marginally higher and commonly supporting stands of Melaleuca spp.

V4 Low level storm beach ridges and terraces with minor limestone outcrops. Soils are generally well to rapidly drained, uniform pale calcareous sands.

V5 High level sandy terrace and gently undulating beach ridges with moderately deep to deep grey siliceous sandy overlying soft shelly limestone or shell beds.

V