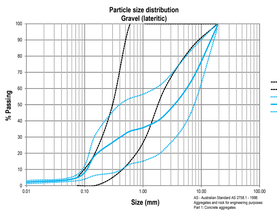
Surficial materials

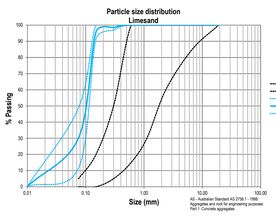
Gravel (lateritic)

Lateritic gravel is known to be ubiquitous beneath the pindan sandplain. However, outcrops are restricted. The gravel is red or purple sandy gravel comprising nodular and pisolitic gravel and boulders of lateritized sandstone in a matrix of fine- to medium-grained, angular quartz sand. In the north of the region, gravel overlying sandstone is exposed in the headwaters of some of the creeks reaching the coast between *Coulomb Point* and *Carnot Bay*. In the vicinity of *Broome* outcrops are generally confined to coastal sections and the area around *Twelve Mile*. There are four active gravel pits within 15 km of *Broome*. Around *Collins Lagoon*, 70 km east-northeast of *Broome*, there are a number of inactive and active pits. Except near the coast and along the *Great Northern Highway*, the groundwater table is generally greater than 20 m below the ground surface. In the south, a 4–15 km wide arcuate band running from *Parda Hill* in the south, through *Dondis Dam* to the *Edgar Range* in the east defines an area of outcropping and buried lateritic gravels. The gravel surface outcrops locally but is more commonly covered with dark, reddish brown sand. Three gravel pits near *Dampier Downs Outcamp* have worked this material in the past. Limited borehole evidence suggests the groundwater table is about 25 m below the ground surface in this region. East and northeast of *Port Smith*, between *Cape Villaret* and *Cape Du Boulay*, lateritic gravels with a patchy, thin sand veneer are commonly found on interfluves and rises and have been worked 6.5 km east of *Yardoogarra* and along the *Great Northern Highway*. Similar material is found at *Bidyadanga* where several gravel pits are being worked. In these two areas, the groundwater level is expected to be less than 20 m below the ground surface.
Everywhere, gravel thicknesses generally average 3 m or less. The mean grading for this material is 5% fines (<0.075 mm), 37% sand, and 58% gravel (>2.0 mm).



Limesand

Limesand occurs as narrow, discontinuous strips of closely spaced, low-relief, coastal dunes. These are rarely more than 600 m wide, composed of pale pinkish grey quartz sand and shell debris, and occur between *Broome* and *Cape Baskerville* in the north, and between *Yardoogarra* and *Bidyadanga* in the south. In the past, they have only been worked close to *Broome*. These longitudinal and parabolic dunes are generally unstable with foredunes and frontal dunes susceptible to wave and wind erosion and large areas of blowouts along much of the coast. The mean grading for this material is 30% fines (<0.075 mm) and 70% sand (0.075 – 2.0 mm). Known $CaCO_3$ values range between 14% and 49%. Chenier ridges and spits between *Dampier Creek* and *Crab Creek* on the northern shore of *Roebuck Bay* are minor sources of limesand and shell grit. These deposits have been worked near *Crab Creek*. For all deposits, the groundwater table is generally less than 10 m below the ground surface.



Limestone

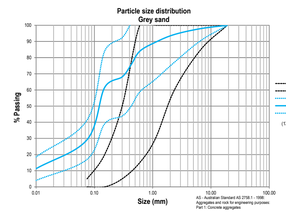
Shore-parallel, rounded limestone ridges between *Broome* and *Cape Boileau* are the major limestone resource of the region. The limestone is pale yellowish brown, contains quartz and shell debris, and is variably lithified. Known $CaCO_3$ values range between 51% and 72%. There are no active workings but this limestone has been worked in the past between *Coconut Well* and *Willies Creek*. Discrete, low-relief, attenuated linear and en-echelon chenier ridges of calcareous sandstone are found between *Thangoo* and *Yardoogarra*. These have limited potential as a source of lime and are, in part, overlain by unconsolidated pink or pale-brown, loose calcareous sands. These deposits have been worked near *Thangoo*.

Sand and gravel

Four main categories of sand are defined: grey sand, red sand, reddish brown sand, and yellow sand. A separate category of sand and gravel is described.

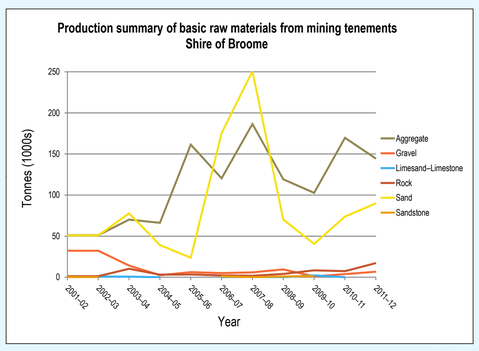
Grey sand

The landward margins of the supratidal flats of *Willies Creek*, *Cable Beach*, *Dampier Creek*, and *Roebuck Plains* include a narrow band of pale-grey to grey, silty fine-grained sand composed of subrounded to well-rounded quartz with fine-grained shell debris and occasional whole shells. Lateritic gravel is a significant component in some deposits. Pits have not been developed in this material. The groundwater table in these areas is very shallow and saline. The mean grading for this material is 27% fines (<0.075 mm), 67% sand, and 6% gravel (>2.0 mm).



Red sand

South of the arcuate lateritic gravel band are extensive dunefields of parallel longitudinal or seif dunes aligned east–west and up to 0.5 km to 1 km apart. These dunefields comprise deep, red, loose, siliceous sands, although red silty sands and sandy silts are found. Thicknesses up to 7.5 m have been proved in boreholes. The area is remote and difficult to access. East–west aligned dunes also occur in the northeastern part of the map.

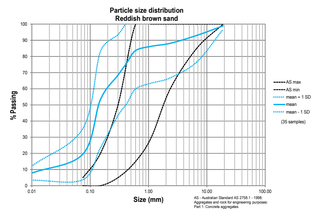


Surficial materials (continued)

Sand and gravel

Reddish brown sand

The greater part of the region consists of extensive, gently undulating, low-relief sandplains with areas of through-going drainage. The material is reddish brown, homogeneous, fine-grained, and silty, and comprises subrounded quartz grains in a variably silty matrix. It is known locally as pindan. Many now inactive and several active pits have been developed in this sand, especially within a 20 km radius of *Broome*. Numerous borrow pits are seen along the *Great Northern Highway*, both south and east of *Broome*, and along the *Broome – Cape Leveque Road*. Borehole evidence shows that thicknesses vary markedly, even on the local scale, but are generally in the order of 5–10 m, although material up to 20 m in thickness has been proved. The groundwater table is generally greater than 20 m below the ground surface except closer to the coast and between *Roebuck Bay* and *Nillibubacca*, where it is generally less than 10 m below the ground surface, but is often much shallower. The mean grading for this material is 19% fines (<0.075 mm), 68% sand, and 13% gravel (>2.0 mm).

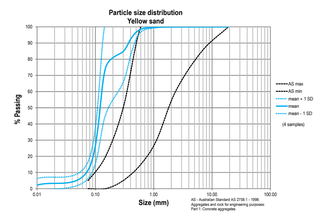


Sand and gravel

Stream channels with bedloads of sand and some gravel are found in two general areas. Valley flats that reach the coast between *Coulomb Point* and *Carnot Bay* are generally less than 400 m wide and contain grey and brown sands and silty sands. Drainage floors that enter *Roebuck Plains* contain brown silty sands resting on lateritic gravels and scattered areas of groundwater calcrete. Thicknesses of material are generally less than 1 m. All streams are prone to flash flooding.

Yellow sand

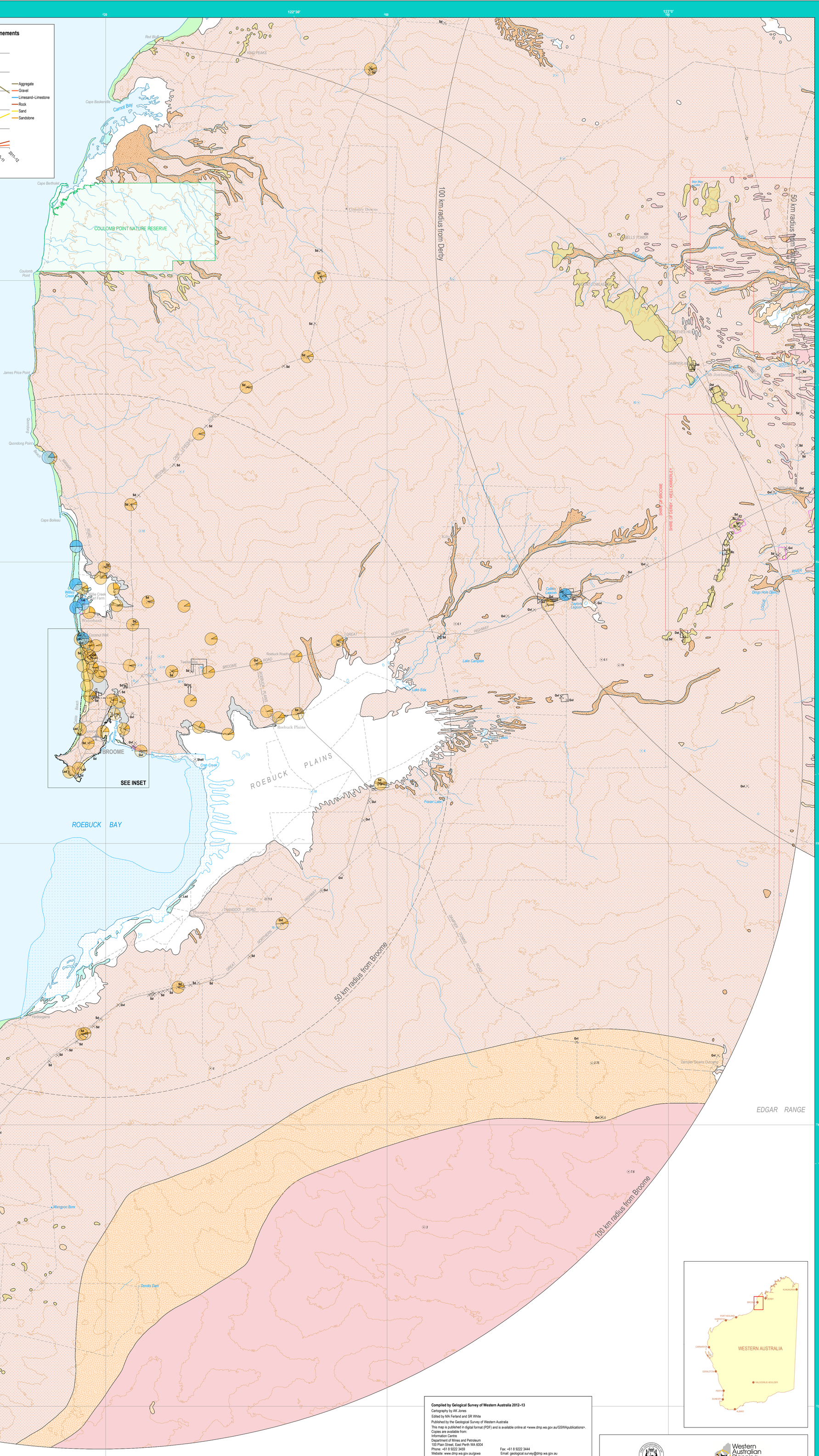
Residual sand derived from the weathering of the coastal limestone is found as a cover to the limestone between *Broome* and *Coconut Well*. The material is pale yellowish brown, occasionally pink because of included ferruginous dust, fine- to medium-grained, moderately sorted quartz sand. Pits have not been developed in this material. The groundwater table is generally less than 10 m below the ground surface. The mean grading for this material is 11% fines (<0.075 mm) and 89% sand (0.075 – 2.0 mm).



Hard rock

Sandstone

Sandstone is the bedrock to the region. The dominant rock types are subhorizontal or gently dipping fine- to coarse-grained, locally thinly bedded to laminated sandstone, silty sandstone, and silicified quartz sandstone. These are the only sources of high-strength hard rock for crushed-rock aggregates and dimension stone in the region. Outcrops are found in three general areas. A few small, isolated outcrops occur within and surrounding the *Point Coulomb Nature Reserve* where the sandstone is only exposed in river channels eroded through the low-lying pindan sandplain. In the northeast, prominent ranges of hills are found between *Mt Jowlaenge* and *Nillibubacca*, and southwest of *Nillibubacca*. Several quarries have periodically been worked in these sandstone hills for dimension stone. A single operating quarry 13 km southwest of *Nillibubacca* supplies concrete and road aggregate. In the southwest, widely scattered and isolated small outcrops are found in coastal cliffs south of *Yardoogarra*, and inland between *Parda Hill* and *Wangpoo Bore*.


INDIAN OCEAN
ROEBUCK BAY
ROEBUCK PLAINS
COULOMB POINT NATURE RESERVE
100 km radius from Derby
50 km radius from Broome
100 km radius from Broome
EDGAR RANGE
GOURDAN BAY
LA GRANGE BAY
BROOME
SEE INSET
Cape Bertholet
Carnot Bay
Cape Baskerville
Coulomb Point
James Price Point
Quondong Point
Cape Boileau
Willies Creek
Cape Villaret
Cape Du Boulay
Port Smith
Port Hedland 430 km
Dondis Dam
Wangpoo Bore
Lake Eda
Lake Campion
Fraser Lake
Dampier Downs Outcamp
Frazier Downs
Coconut Well
Roebuck Plains
Crab Creek
Yardoogarra
Thangoo
Bidyadanga
Broome Bird Observatory
Cable Beach
Gantheaume Bay
Gantheaume Point
Entrance Point
Inner Anchorage
Cape Latreille
Red Bluff
KING PEAKS
Mt Jowlaenge
Mt Anderson
Mt Hann
Mt Pierre
Mt Ford
Mt Wells
Mt Dockrell
Mt Pierre
Mt Ford
Mt Wells
Mt Dockrell
Mt Anderson
Mt Hann
Mt Jowlaenge