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APPENDIX A: SITE DESCRIPTIONS

Site number: **1**

Location: 1.5 km south of Yanchep Lagoon

GPS: 0370544 / 6506865

Geological unit: Safety Bay Sand, S1 backed by S2

Description: Narrow (<10m) sandy beach backed by large extensive dunes characterises this area. Foredunes are well-vegetated approx 5-8 m tall. Scattered along the waters edge are limestone outcrops ~ 50cm high and of varying diameter.

Site number: **2**

Location: Two Rocks

GPS: 0365481 / 6514219

Geological unit: Safety Bay Sand (S2), Tamala Limestone (LS1)

Description: Two Rocks beach is a narrow (10-15 m) sandy beach, backed by low (3-5 m) hummocky dunes. A large limestone island sits just off the beach in the water. There are several blocks (1-2 m^3) as well as evidence of undercutting, including an archway that has been eroded by wave action.

Site number: **3**

Location: Mindarie Beach

GPS: 0377069 / 6492532

Geological unit: Safety Bay Sand, S1 backed by S2

Description: Mindarie is a long, wide sweeping beach backed by large (6-10 m) vegetated dunes. There are no limestone cliffs developed on this beach, but there are however, numerous limestone sections protruding from within the sand dunes and some cliffed headlands to the north. One particular outcrop protruding from within the dunes is about 5-6m wide and approx 4m tall. There are some large ($1m^3$) blocks of limestone that have broken off from the main body and toppled to the ground. A sign has been erected at the top of the staircase in the car park, warning people that there is a risk of rockfall and that paths should be used at all times.

Site number: **4**

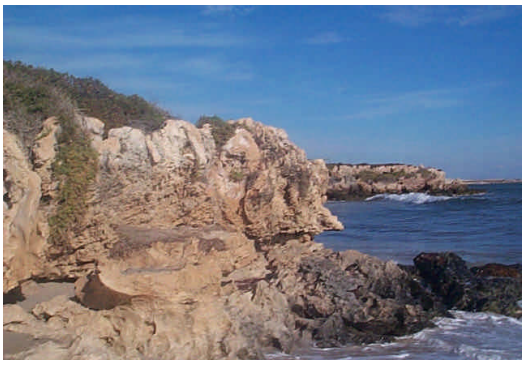
Location: Quinns Rock Beach

GPS: 0376504 / 6494237

Geological unit: Tamala Limestone (LS1)

Description: There is a very narrow (<10m wide) sandy beach, backed by low (~5 m) dunes. At the southern end of the beach, vertical limestone cliffs approx. 3-4 m tall

form a series of headlands along coast. Access to the cliff areas is limited as they front straight on to the water. There is evidence of wave undercutting and the development of small overhangs. There are several large (>1m^3) blocks of limestone scattered around the base of the limestone which provide evidence for collapse. There is a large sign at the top of the car park warning visitors that this is a rock fall risk area.



Site number: **5**

Location: Immediately south of Ocean Reef Boat Harbour

GPS: 0379629 / 6485055

Geological unit: Tamala Limestone (LS1)

Description: This site is characterised by a small sandy beach backed by highly weathered limestone cliffs (~5 m tall). The beach is littered with very large (1-2 m^3) blocks of limestone derived from collapse. The cliff face appears to be quite fresh in a number of places which is evidence for recent topples. The limestone is extremely porous exhibiting large solution tubes <60 cm in diameter. A fence has been erected part way around this area, but does not surround it, making the beach easily accessible. There are no warning signs in the immediate vicinity identifying the cliff as a hazard.

Site number: **6**

Location: North Beach between Castle St. and Malcom St.

GPS: 0381914 / 6474767

Geological unit: Tamala Limestone (LS1)

Description: Some of the limestone cliffs within this area appear to have crumbling rock faces. Pitting caused by dissolution is evident in some outcrops, along with overhang development and loosened blocks of limestone. Calcified root structures can be seen quite clearly in one outcrop, and is an excellent example of the Zone of Roots. Fences have been erected around dangerous areas and warning signs are displayed.

Site number: **7**

Location: Floreat Beach

GPS: 0382316 / 6466206

Geological unit: Safety Bay Sand, S1 backed by S2

Description: This site is characterised by a long narrow (~10-15m wide) beach backed by low (< 5m tall) vegetated dunes with a slope of approximately 30^{o}.

Site number: **8**

Location: City Beach

GPS: 0382341 / 6466087

Geological unit: Safety Bay Sand (S1)

Description: This site consists of a wide flat sandy beach. The area has been artificially developed with a stone wall and grassed BBQ/play area backing the beach. There are no natural hazards from limestone cliffs or sand dunes at this site.

Photo of site 7

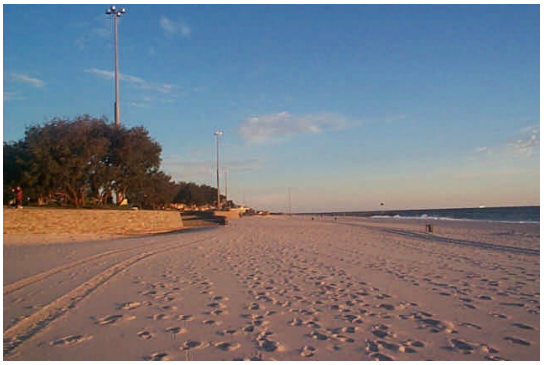


Photo of site 8

Site number: **9**

Location: Meelup Beach

GPS: 0322449 / 6283597

Geological unit: Safety Bay Sand (S1) and Granite Gniess (GN)

Description: Meelup Beach is a small sandy cove in between two rocky headlands. The headlands are composed of large rounded granite gneiss boulders. The narrow beach has a very gentle slope and is backed by a grassed reserve with many trees and a car park. There are no cliff lines or sand dunes at this site.

Site number: **10**

Location: Broadwater

GPS: 0335537 / 6274775

Geological unit: Safety Bay Sand, S1 backed by S13

Description: The beach at this site is quite narrow (10–15 m) and very flat. Backing the sandy beach are some well vegetated low dunes, no more than 2 m high. The dunes are well stabilised by trees and grasses and do not present a threat to the community.

Site number: **11**

Location: Peppermint Grove Beach

GPS: 0361080 / 6289159

Geological unit: Safety Bay Sand, S1 backed by S2

Description: Peppermint Grove is a sandy beach, 10-20 m wide backed by small <1m foredunes with moderate vegetation cover. The foredunes grade into larger (>6m) dunes backing the beach that are densely vegetated and appear to be well stabilised.

Photo of site 10

Photo of site 11

Site number: **12**

Location: Binningup Road

GPS: 0377460 / 6331445

Geological unit: Safety Bay Sand, S1 backed by S2

Description: Long, narrow sandy beach with shore parallel foredunes 3-5 m in height. Dunes are moderately vegetated and are quite steep with an angle of repose around 45^{o}.

Site number: **13**

Location: Preston Beach

GPS: 0373603 / 6360932

Geological unit: Safety Bay Sand, S1 backed by S2

Description: Preston is a narrow sandy beach, < 10 m wide backed by small < 4-5m foredunes with moderate vegetation cover. The foredunes have a gentle slope of 10-20^{o} and grade into larger (>10m) dunes backing the beach that are densely vegetated.

Photo of site 12

Photo of site 13

Site number: **14**

Location: Tims Thickett Road

GPS: 0370112 / 6386302

Geological unit: Safety Bay Sand, S1 backed by S2

Description: The foredunes along this narrow beach are 4-5 m high and front on to the waters edge. Their angle of repose is around 70-80^{o}, giving them a cliff like appearance, which is most likely caused by wave erosion. The dune systems backing the beach are extremely large reaching heights well over 20 m. There is evidence of de-vegetation and blowout formation, however these are being remedied through the use of brushing.

Site number: **15**

Location: Gretel Drive, 2km North of Falcon Bay

GPS: 0374892 / 6395996

Geological unit: Tamala Limestone (LS1)

Description: The limestone outcrop in this location is part of a natural headland (< 3-4m high). The limestone fronts directly onto the water with some narrow areas of beach at the base of the cliffs. Weathering features are highly developed at this site, with rock surfaces being extremely jagged and porous. There is clear evidence of undercutting and the development of overhangs, as well as fractures and piping in the rock. Large sections of rock have separated from the parent rock and lay scattered around the base of the cliffs. There are also large separated rocks (> $1m^3$) encroaching on to the staircase that provides access to the beach. There are no signs erected at this site warning the public about the condition of the limestone or the risk of rockfall.

Site number: **16**

Location: Mersey Point Reserve

GPS: 0377965 / 6425528

Geological unit: Safety Bay Sand, S2 backed by S13

Description: Small narrow beach with gently sloping 2-3 m dunes. The area backing the beach has been levelled to form a picnic reserve.

No Photo

Site number: **17**
Location: Challenger Beach
GPS: 0384527 / 6438843
Geological unit: Tamala Limestone (LS1)

Description: Challenger beach is a flat and narrow sandy beach backed by < 4 m high limestone cliffs. At the base of the cliff there are numerous blocks of limestone ranging in size up to 2 m^3. There does not appear to be any major overhang development or cave formation. A 'rockfall risk' sign has been erected at the top of the beach.

Site number: **18**
Location: South Cottesloe Beach
GPS: 0382113 / 6458087
Geological unit: Tamala Limestone (LS1)

Description: This large area of limestone outcrop is extremely weathered showing many dissolution features such as pitting and piping. Three small interlinked-caves have formed along a bedding plane within the limestone. The individual caves are about 1 ½ metres deep, 1-2 m wide with a height of roughly 1/2 metre. Two residual columns support the front section of the cave formation. Variations in the colour of the exposed rock formation indicate recent fracture. This is supported by several large blocks (<1m^3) of separated rock. A general council sign has been erected at the

entrance to the beach outlining prohibited activities and general warnings. The risk of rock fall is one of these warnings.