

Chapter 7

Superficial Sediments

Classification and Distribution

The sediment classification scheme used on the 1:5 000 map series is primarily facies- and material-related. The symbols on the maps comprise a prefix to indicate the age of the sediments, followed by superscripted lower-case letters to indicate environment of deposition and upper-case letters to indicate material. Ages of the sediments are Pleistocene (Qp), Holocene (Qh) and Quaternary undivided (Q). The environments of deposition seen in the district (Figure 11) are slope (s), alluvial (a), beach (b), intertidal (i) and marine (m). The materials are fill (F), debris (D), sand (S) and mud (M).

The lithostratigraphic units used in the 1:20 000 map series are not used in the 1:5 000 series. The correlation between these units and the facies mapped here is shown in Table 2. Essentially, the Chek Lap Kok Formation in the district is represented by Pleistocene alluvial sand and mud, while the Hang Hau Formation is represented by mud and sand of marine origin. The precise relationship between these formations and slope debris, onshore alluvium, and beach and intertidal deposits is not currently established.

Superficial sediments occur mostly in the low-lying ground and offshore areas, although slope debris generally occurs on the higher ground, filling small valleys. Downslope, these deposits may have been reworked by fluvial processes, and the distinction between slope debris and alluvium is difficult to define. In the northeast, much of Tsing Yi New Town is underlain by shallow marine, intertidal and alluvial sediments, representing deposits of Tsing Yi Bay and the inlet between Tsing Yi and the island of Nga Ying Chau, mostly reclaimed during the 1980s (Figure 12).

Offshore, the seabed comprises predominantly marine mud and sand of the Hang Hau Formation. Thin alluvial sediments of the Chek Lap Kok Formation occur beneath these marine sediments over much of the district and occur at seabed in areas of strong currents. In some parts of the Rambler Channel and in the Ma Wan Channel, to the west of Tsing Yi, currents have scoured all sediments down to bedrock.

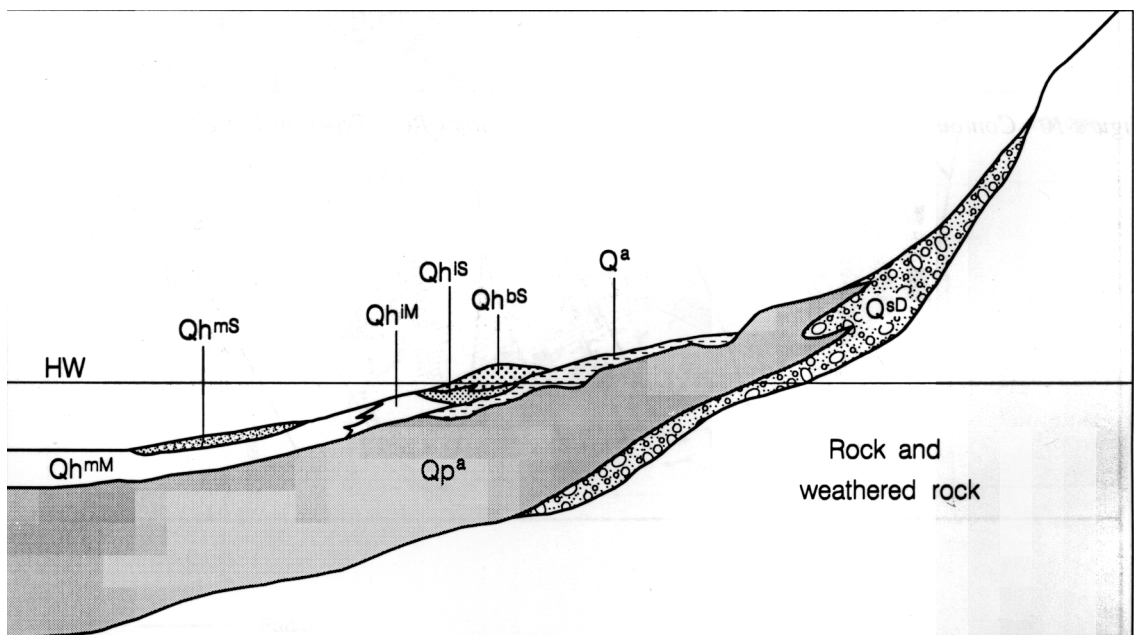


Figure 11 - Schematic Section Showing the Relationship between Superficial Deposits and the Different Environments of Deposition

Qp = Pleistocene; Qh = Holocene; Q = Quaternary (undivided);
s = slope; a = alluvial; b = beach; i = intertidal; m = marine;
F = fill; D = debris; S = sand; M = mud; HW = high-water level

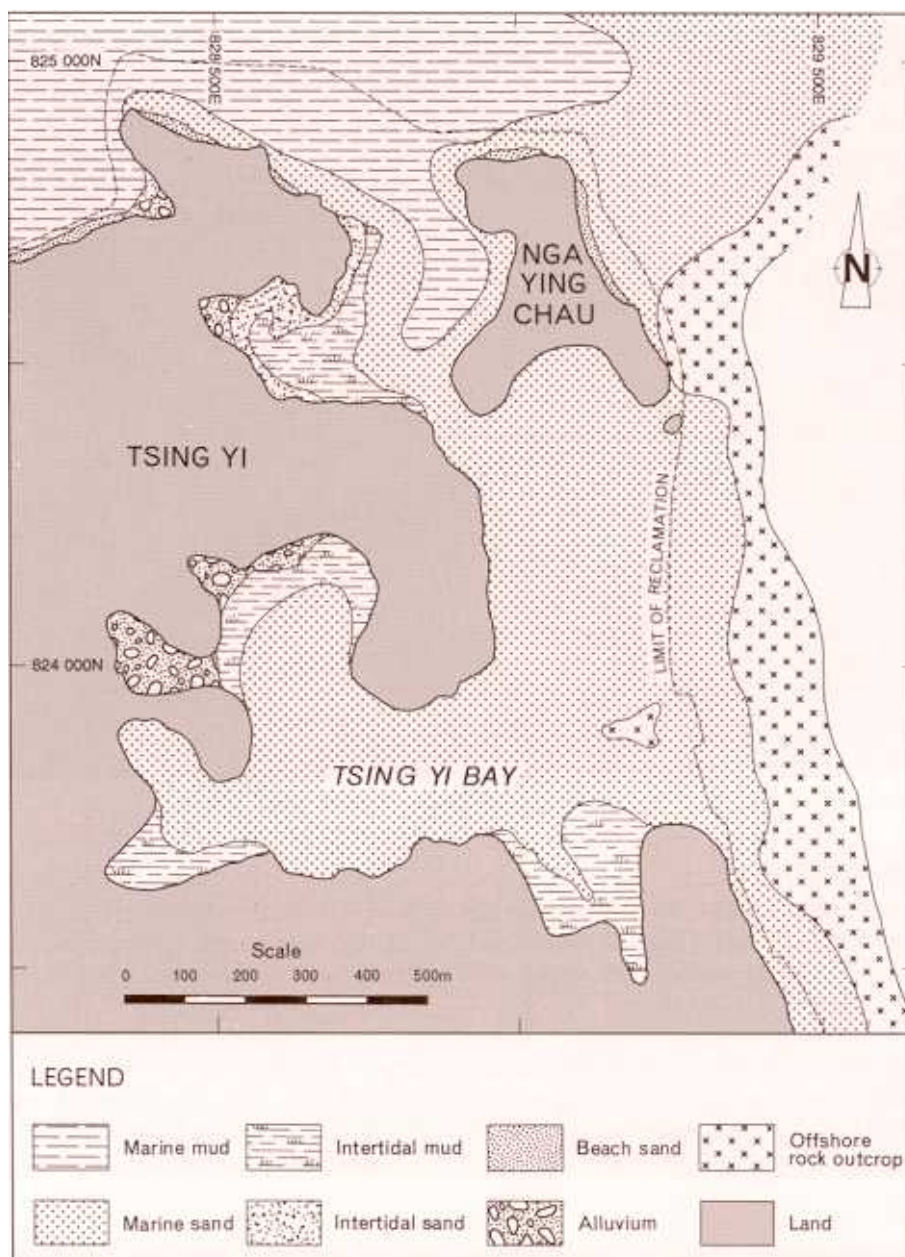


Figure 12 - Pre-reclamation Geography of Tsing Yi Bay and Nga Ying Chau Inlet Showing Superficial Sediments

Slope Debris

Deposits belonging to this classification, which in Hong Kong are generally referred to as colluvium, are accumulations of locally-derived material. In most cases, these are debris flows which have moved down-slope during periods of high rainfall. In many cases on Tsing Yi, the debris comprises a predominance of boulders, particularly in steep shallow valleys along the southern and eastern slopes of the central range of hills (Plate 14).

Slope debris commonly occurs on hillslopes and in shallow valleys, where alluvial processes can sometimes be seen to have reworked the debris. The debris flow frequently grades into alluvium at the foot of such valleys, and the boundary between the two facies is difficult to determine. This is especially the case on the northwestern shore, where, in many cases, the inter-relationship is masked by coastal development.

The matrix of the slope debris is generally a dense fine to coarse sandy silt. Sediment colour ranges from greyish brown through yellowish brown to reddish brown. Boulders comprise slightly- to completely-decomposed granite and volcanic rocks, which reflects the local bedrock geology.

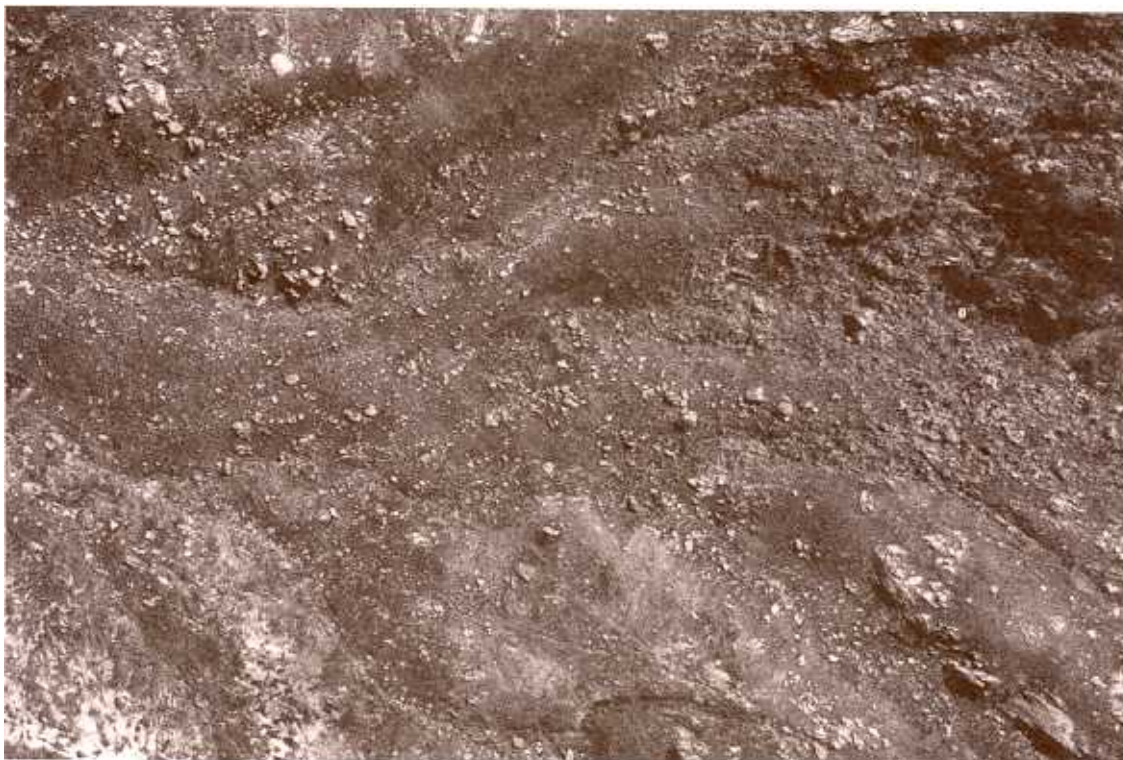


Plate 14 - Aerial Photograph of Eastern Tsing Yi Showing Typical Boulder Fields, 1963

Alluvial Sediments

Alluvial deposits may be identified both onshore and offshore. The onshore alluvium typically infills low-lying valleys, much now buried beneath disused paddy fields and later coastal development. The offshore alluvium usually underlies marine muds and sands of the Hang Hau Formation and is designated the Chek Lap Kok Formation.

Onshore, the alluvium generally comprises medium dense yellowish brown silty sand with gravel, soft to firm yellowish brown clayey silt, and soft pale greyish yellow clay with fine sand and fine to coarse gravel. As much of this alluvium occurs in low-lying land near the coast, most has now been covered with reclamation fill. Some of this alluvium may be late Pleistocene in age but most is considered to be Holocene.

Offshore, the alluvium is entirely of late Pleistocene age and belongs to the Chek Lap Kok Formation (Strange & Shaw, 1986). Throughout the district, the formation is thin (up to 5 m) and appears to fill hollows in the bedrock (Figure 13). It is poorly sorted, firm to stiff, yellow to reddish brown sandy silty clay with gravel. Recognition of this formation on seismic profiles is very difficult in the district because of its thinness and impersistence.

The Chek Lap Kok Formation is much thinner than in many other parts of the Territory. This suggests that pre-Holocene erosion cut deeply into rockhead and alluvial sediments here before deposition of the comparatively thick sequence of marine sediments of the Hang Hau Formation.

Beach Sand

Over 80% of the coast of Tsing Yi has been developed and consists of reclaimed land. Of the remaining natural coastline, all in the northwestern part of the island, much of the shore is rocky with occasional beaches. This shore is now being rapidly reclaimed, and it is anticipated that by late 1995, the entire Tsing Yi coastline will be man-made. Beach sand also exists beneath the extensive reclamation in the northeast and in the south of the island.

The sand is dominantly loose yellowish brown fine- to medium-grained with shell fragments and gravel. In some boreholes on the east coast, it is described as grey to black silty clayey medium sand. The colour change may relate to chemical reduction of the organic debris in the sand.

Intertidal Sediments

Intertidal mud and sand are present beneath the reclamation in the northeast of the island (Figure 12). The extent of these sediments has been interpreted from pre-reclamation (1963) aerial photographs. The sediments have been divided into intertidal mud (Qh^m), intertidal sand (Qh^s) and undifferentiated sediments (Qh^i) and have been sampled in a number of boreholes.

The intertidal mud is generally a soft dark grey to yellowish brown sandy clay with shell and coral fragments and lithic gravel. The muds are usually confined to the inner parts of the estuary where current energy is low. Intertidal sand tends to be argillaceous and is interbedded with soft greyish brown clayey silt and sand with some gravel.

Sands occur in more open parts of this area and interdigitate with the marine sands. The boundary between these two facies is difficult to define. Intertidal sand is also identified near to the coast, where it occurs alongside beach sand and alluvium. In some instances, areas may be identified from aerial photographs as intertidal, but lack of borehole data prevents differentiation into sand or mud.

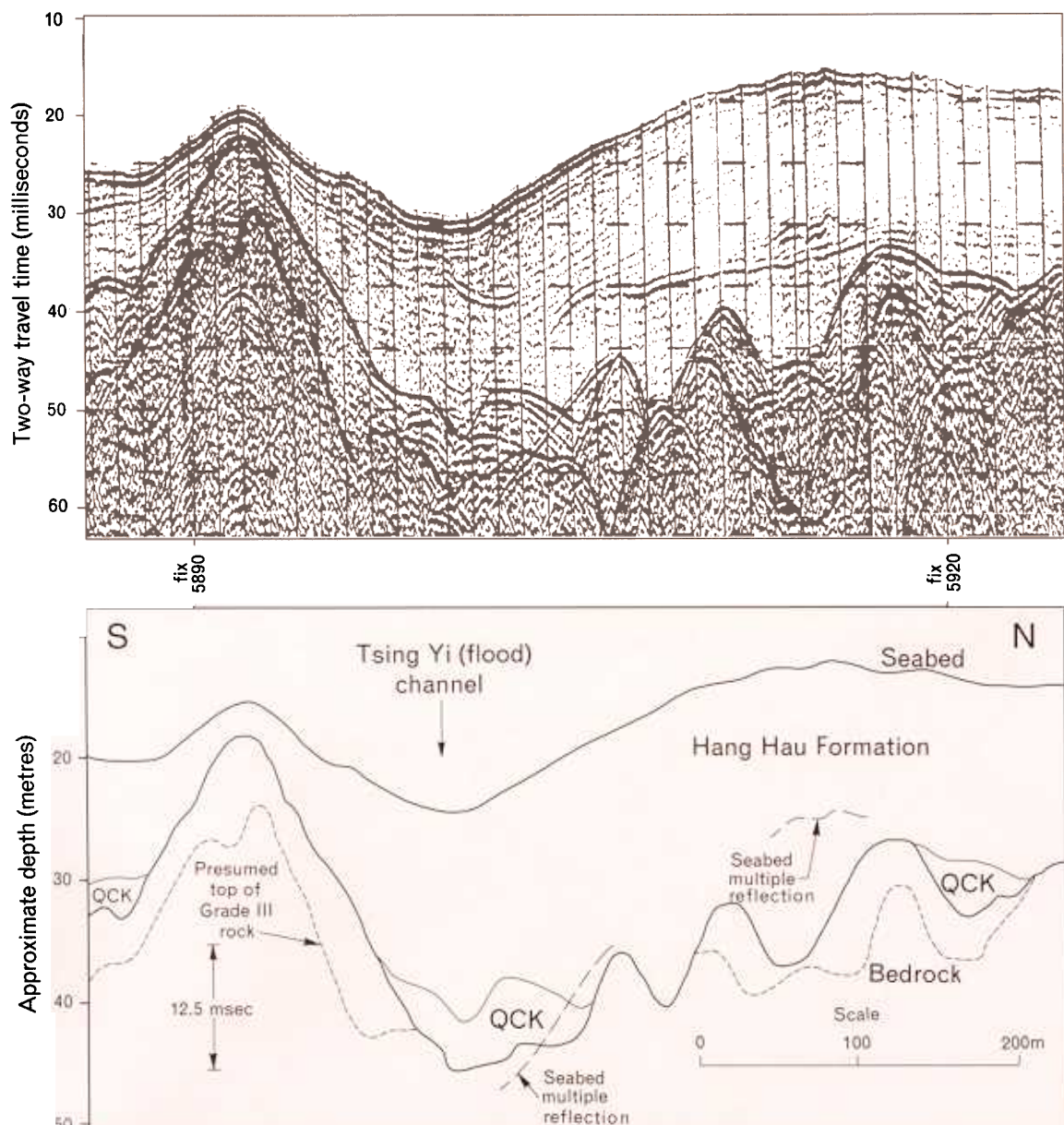


Figure 13 - Seismic Profile Showing the Character of the Chek Lap Kok (QCK) and Hang Hau Formations in the Tsing Yi Channel (for location, see Figure 4)

Marine Sediments

Sediments belonging to this classification have been laid down in a sub-littoral shallow marine environment. They comprise muds and sands of the Hang Hau Formation (Strange & Shaw, 1986) and are entirely of Holocene age. They occur in the offshore areas and beneath coastal reclamation fill. Marine sand also occurs beneath fill in the inlet between Nga Ying Chau and Tsing Yi in the northeastern part of the island (Figure 12).

Interpretation of seismic records demonstrates a large variation in thickness of the Hang Hau Formation around the district. In the Rambler and Ma Wan channels, currents have scoured sediments down to bedrock, and in these parts the formation is absent. It thickens markedly on channel margins (Figure 13), in small bays near the coast and in hollows in the irregularly-eroded bedrock north of the island, where it reaches a thickness of over 25 m. To the south of the island, the formation generally thickens away from the coastline but, as in the north, local thickening in rockhead hollows is seen near the shore.

Marine mud is present at seabed in the southern part of the Rambler Channel and the western part of the Tsing Yi Channel. It also occurs in small bays on the western coast of Tsing Yi and at Tsuen Wan. It comprises very soft to soft, very dark grey clayey silt with shell fragments. Off the southwesterly tip of the island, marine mud is overlain by marine sand. In the western part of the Tsing Yi Channel, marine mud overlies thin marine sand.

The marine sand is dominantly soft grey clayey medium-grained and contains shell fragments. These shell fragments, sometimes with lithic gravel, are often concentrated in bands, which may be indicative of storm events. The sand usually overlies stiff clay and dense sand of the Chek Lap Kok Formation, but to the southwest of Tsing Yi, overlies marine mud. In the eastern part of the Tsing Yi Channel and the north Rambler Channel, the marine sand is very thin.

Modification of the Sea Bed

The seabed in the district has been considerably modified by man. Southwest of Tsing Yi, sand has been dredged as fill for reclamation; the dredged area is shown on the map sheet. The sand, which is alluvial and part of the Chek Lap Kok Formation, occurs in a positive bathymetric feature lateral to the channel running down the west coast of Tsing Yi. This channel forms part of the submarine channel system linking Urmston Road, Brothers and Ma Wan channels to the north with the East and West Lamma channels to the south. The sediment is described as a poorly sorted fine to coarse quartzo-feldspathic sand.

In the southern part of the Rambler Channel, the natural seabed is covered with anthropogenic mud comprising an admixture of natural silt and effluent. The high organic content of the mud causes acoustic blanking of a spectacular nature. Other debris has been dumped in the channel, especially in the southern part. Boreholes have penetrated building rubble and rubber tyres. The largest single item is the remnants of the liner the Queen Elizabeth (Seawise University), which sank to the southeast of Tsing Yi in January 1972. The top portion was cut away but much of the hull remains buried in the mud.