Coastal Works Review

Crymble Landholdings Ltd - Seven Mile Beach – Proposed Excavation of Seabed – Block: 11B Parcel: 17

DEPARTMENT OF ENVIRONMENT

HE HATH FOUNDED IT UPON THE SEAS

CAYMAN ISLANDS GOVERNMENT

PREPARED FOR: MINISTRY OF FINANCIAL SERVICES, COMMERCE AND ENVIRONMENT

March 24, 2016

Authored by: Technical Review Committee - Department of Environment

Coastal Works Review

Crymble Landholdings Ltd - Seven Mile Beach – Proposed Excavation of Seabed – Block: 11B Parcel: 17

1. Project Proposal

The applicant – Crymble Landholdings Ltd. – is seeking permission for the excavation of 1,669 sq ft of beachrock-dominated seabed offshore from Block 11B Parcel 17, as shown in Figure 1.

The applicant has indicated that this is a 'trial' excavation with the objectives being as follows:

1. To determine if a tracked excavator can lift and transport ashore the slabs of beachrock and establish the beachrock thickness.
2. To determine if the beachrock is underlain by sand or layers of beachrock.
3. To determine how much sand will be required to cover newly exposed beachrock.
4. To determine if the removed beachrock can be mechanically broken up to gain useful replacement sand.
5. To collect samples for a geological review and analysis.

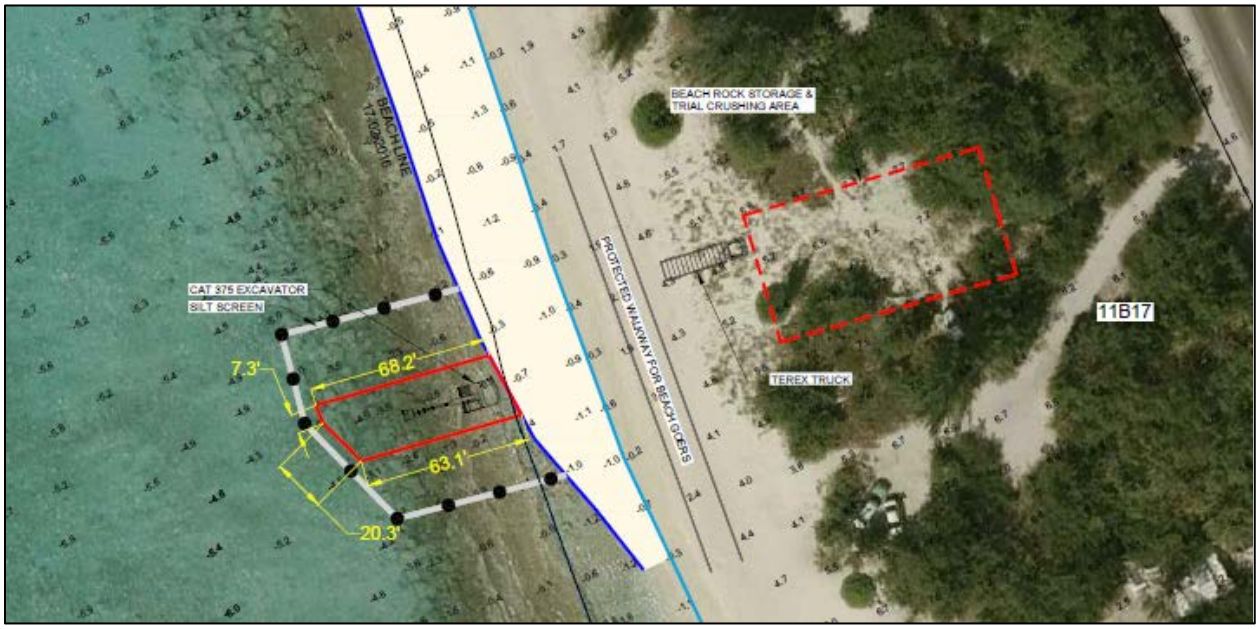

FIGURE 1: PROPOSED TRIAL EXCAVATION FOOTPRINT (SOURCE: APEC – DWG NO CWL-10, 2016)

The application forms indicate that the works will result in the removal of approximately 186 cubic yards of beachrock (based on the assumption that the beachrock is approximately 3ft thick). Based on the land-based investigations there is a likelihood that the beachrock may be sitting on a layer of peat, albeit the quantity of peat is unknown at this stage.

The application also indicates that material will be used to infill the excavated seabed (approximately 125 cubic yards), which will either be comprised of "compatible beach sand from site or crushed and screened beachrock".

The works will take in the order of 2-3 weeks to complete and will be enclosed using silt screens.

2. Environmental Assessment

The application site is located within the **Seven Mile Beach Marine Park** and is within **an active turtle nesting area**. A commentary on the environmental impacts and implications of this project are detailed below:

The applicant provides a number of supporting studies to demonstrate that the proposed 'trial' excavation will not have any adverse environmental impacts (this will be explored further in this section). It is understood that the results of the trial will be used to inform a further application for the removal of beachrock along an approximately 1,700 ft (0.5KM) long stretch of coastline to provide "a safe water access for visitors" to a proposed hotel development, to the north of the Kimpton resort. Therefore, whilst the proposed trial which is the subject of the current application will only directly impact an area of approximately 27ft by 65ft, the full extent of the proposed project which will be forthcoming in a further application later this year is significantly larger (see Figure 2).

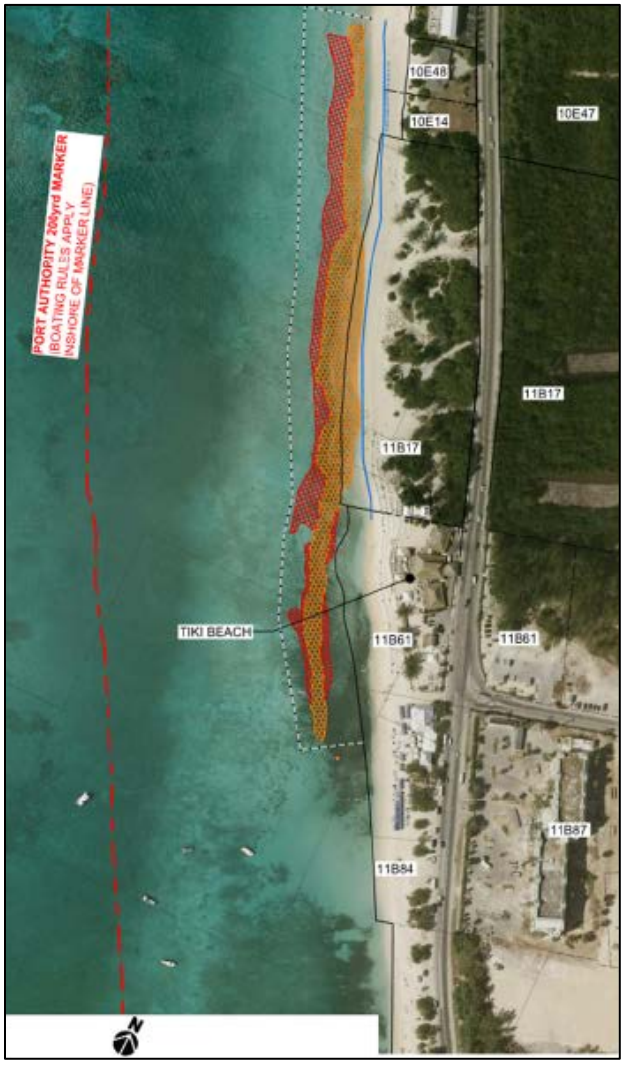

FIGURE 2: PROPOSED EXTENT OF BEACHROCK REMOVAL (SOURCE: APEC, 2016)

The environmental effects of removing the beachrock in this location have been reviewed previously by the DoE. In 1979 a Feasibility Study into the modification of the coast was undertaken by Dr. Harry Roberts and subsequently in 1996 an application was made to remove the rock; the application was not approved. Roberts, a marine geologist, advised against the complete removal of beach rock in front of Block 11B Parcel 17 for the following reasons:

a) "*The coast will readjust to the new condition and coastal retreat will inevitably occur. The shoreline will probably retreat until it is consistent with the general equilibrium arc of Seven Mile Beach. Rough calculations of the magnitude of this retreat show that the coast could recede 300 ft (100m) or more.*
b) *Without a doubt this solution would affect the configuration of neighbouring property coastlines. Adjacent properties are going to experience coastal retreat also".*

He also assessed the possibility of partial removal of small sections of beachrock, which results in the creation of arc-shaped beaches behind the excavated areas. However, Roberts advised that there are also problems with this approach, including local coastal retreat depending on the extent of beach rock removed (the smaller the quantity the better).

a. Seven Mile Beach Coastal System

In assessing the potential impacts of the beachrock removal, it is important to understand the role that it plays within the Seven Mile Beach coastal system. The evolution of Seven Mile Beach and its characteristics have been documented in a number of studies and reports (Clark, 1988; Seymour, 2000 and the Beach Review & Assessment Committee 'BRAC' report, 2003), all of which are available on the DoE website. These three studies reference the presence of beachrock along Seven Mile Beach and explain the way in which it functions within the coastal system.

Within the coastal works application submission, the applicant refers to the work of Clark and his findings that the beachrock in this location is impeding the north to south transport of sediment, with sediment accumulating to the north of the beachrock and erosion being seen to the south of the beachrock (closer to Public beach). However, Clark and Seymour make further observations and recommendations regarding the presence of this beachrock, as outlined below.

Sections of Clark's work deal specifically with the submerged beachrock which is proposed to be removed as part of this application and the proposed subsequent application. Clark writes that:

"To the north of public beach is a major obstruction to longshore sediment transport. This obstruction, a low emerged rock structure, is a cemented former beach ridge which is aligned generally shore-parallel but with an angle slightly offshore to the south. The beach to the immediate north of this structure is wide in comparison to the remainder of Seven Mile Beach and is probably stable during northwest storm activity. Northwest wave activity undoubtedly transports sand alongshore and to the south beyond the seaward limits of this rock structure. Because of the southward angle offshore of the structure, longshore sediment is diverted offshore instead of along the beach. The net loss of beach sediment to the south of this structure is quite apparent as is evidenced by a narrow beach width of only about ten feet and a steep erosion escarpment in to the upland."

However, Clark advises against removing or lowering the beackrock and states that:

"***Although the rock structure undoubtedly affects the shoreline dynamics significantly, its removal or lowering is not recommended. The structure also acts like a reef or detached breakwater providing coastal protection to the narrower dune ridge it fronts...Additionally, removal of the rock would upset the stability of the beach to the north.*** *It would be more advisable to periodically nourish the beach with sand immediately to the south of and shoreward of the rock structure*."

Clark concludes that:

"*This beach is a valuable nonrenewable resource with finite limits, and natural erosion or artificial losses caused by imprudent development may serve to accelerate its depletion.*"

Seymour, 2000 confirms that:

"*Throughout the central section [of Seven Mile Beach],* ***a series of beach rock outcroppings act as minor headlands, anchoring the shoreline at their locations and dividing it into a series of pocket beaches that enhance the stability of the shoreline locally.***"

He also notes that beachrock functions as a barrier to the offshore movement of beach sands during severe storms.

It is therefore of great concern to the DoE when a applicant seeks to modify or remove naturally occurring coastal geomorphological features, such as beachrock, which are performing a function within a dynamic beach environment. Removal of such features can have significant consequences within the overall coastal system, particularly in this instance for the beach to the north of the beachrock outcrop. The sensitivity of this issue is elevated given the importance of Seven Mile Beach to tourism, with the highest density of tourism accommodation being situated on, or in the vicinity of, Seven Mile Beach. It may be that the proposed trial removal of 1,669 sq ft of beachrock does not have medium or long term significant impacts on the overall coastal system; however, it is essential to view this trial within the overall context of the intended large-scale beach rock removal along a significantly larger portion of Seven Mile Beach.

The applicant's submission includes a statement from Dr. Seymour which advises that the removal of "a minor rock feature" should be permitted, however "*removing a major rock feature which was capable of seriously influencing alongshore transport would require careful consideration. But that is not the case here.*" The DoE is of the firm view that the second phase of works will undoubtedly involve the removal of a "major rock feature" (1,700 linear feet of beachrock, spanning both marine submerged rock and rock beneath the sand dune), which "seriously influences alongshore transport of sediment". The DoE's view is supported by previous advice from Seymour (2000) and that of Dr Roberts (1979) and Clark (1998).

Having carefully reviewed the scope of works provided by the applicant to Dr. Seymour, the DoE is concerned that there is sufficient ambiguity in the project description provided to result in a legitimate misunderstanding of the proposed extent of beachrock removal. The submission to Dr Seymour refers to "the removal of **some** beachrock fronting two adjacent sites" and "**partial removal** of the beachrock". Nowhere in the document are any linear dimensions provided and the graphics in the report (e.g. Figure 7) have no units of measurement in order to contextualise the extent of the works. If Cabinet is minded to grant approval, the DoE strongly recommends that prior to issuing a decision the views of an independent coastal engineer (commissioned by the Government) should be solicited in order to assess and advise on the proposed works (both for the trial and full extent of works). If the works are undertaken and they result in significant shoreline retreat and exacerbate coastal erosion there are few engineering options available to remedy the situation without significant economic and environmental costs.

b. Precedent of Beachrock Removal

Furthermore, if approved, the principle of removing a naturally forming coastal geomorphological feature for aesthetic purposes sets a dangerous precedent for Seven Mile Beach and the Islands as a whole. There are other properties on Seven Mile Beach and other coastlines with beachrock outcrops that would prefer to have a sandy unimpeded access into the water. However, the removal of such features can have a very de-stabilising effect on a

coastline with potentially short-term benefits being overshadowed by medium to longer term negative impacts such as shoreline retreat, sand loss and general issues of coastal erosion. Permitting the applicant to modify this area would set a precedent in which it would be difficult to refuse any further applications to modify beachfront properties for private gain. This precedent would be extremely unfortunate especially for Seven Mile Beach which has been long recognized internationally for its natural beauty, recently receiving the award for the Caribbean's best beach from Caribbean Travel and Life magazine.

c. Marine Park Zone

The proposed works are located in the Seven Mile Beach Marine Park Zone, which was established to provide a higher level of protection to the coral reefs and other marine resources present in the area as they represent environmentally valuable resources which are susceptible to human impacts. The proposed works involving beachrock removal and filling of the seabed, both at the trial pit stage (the current application) and the subsequent proposal to remove a greater extent of beachrock, are contradictory to the long-established management policies for the Seven Mile Beach Marine Park Zone. They will also place additional stress on the nearshore marine resources and reflect badly on the Islands' commitment to conservation of marine resources. Since the establishment of the Seven Mile Beach Marine Park, the DoE has consistently recommended against the approval of any docks, jetties, groynes, excavation or other forms of coastal modification in order to preserve this natural asset to the greatest extent possible.

d. Benthic Habitat

Beachrock represents a unique habitat with environmental and cultural attributes. The hard semi-permanent assemblages created by exposed beach rock add 3 dimensional structure which greatly increases biodiversity in the area through the creation of habitat and shelter. Hard and soft corals, sponges and other encrusting organisms are able to attach to the surface and fish and other invertebrates are able to utilise the habitat and food resources created. Culturally these nearshore biologically productive resources attract fishermen, snorkelers and beach goers for various reasons. The sheltered waters behind the beachrock ridge provide calmer conditions for smaller children and less confident swimmers. Large Parrotfish and other herbivorous fish feed on the algal mats growing on the shallow rock ridges and baitfish (e.g. fries) typically congregate in these beachrock associated areas. Snorkelers benefit from easy access to a diverse array of fish and coral not typically present in the purely sandy areas of Seven Mile Beach.

e. Turtle Nesting

The DoE turtle nesting beach monitoring programme has monitored this area since 1999 and has recorded nesting by both Green and Loggerhead turtles on the application site and adjacent lots. This is an active nesting area, particularly for Green turtles, with nest numbers increasing in recent years. In 2012, 16 nests were recorded in this location and there has been an average of 7 nests per year recorded over the past five years.

Along this stretch of the coastline nesting has historically commenced from June through to September, with hatchlings emerging until November. Excavation works in the location are likely to result in shoreline retreat, which will result in a reduction in beach habitat for turtles to nest on. Furthermore, Green turtles demonstrate a high degree of nesting site fidelity (i.e. they return to the same place to nest year on year) and if the site is disturbed or obstructed the turtle may abandon its nesting attempts rather than seek an alternative location.

If Cabinet is minded to grant approval for this application, the DoE requests that appropriate conditions are included on any grant of consent to ensure that works are carried out outside of the nesting and hatching season and that any construction lighting is modified to not have an adverse impact on turtles.

f. Rationale for Application

In considering the application for the trial pit, the DoE offers the following comments on each of the objectives of the trial provided in the application submission:

1. "*To determine if a tracked excavator can lift and transport ashore the slabs of beachrock and establish the beachrock thickness*". Beachrock is a soft substrate in geological terms. The DoE has witnessed numerous excavation projects involving harder substrate that an excavator has managed to remove with ease.
2. "*To determine if the beachrock is underlain by sand or layers of beachrock*". The trial pit is intended to inform a significantly larger excavation project; the proposed trial will confirm the characteristics of the seabed and beachrock in this specific location but is unlikely to be representative of the 1,700 ft length of beach rock that will be the subject of a further application. Beachrock does not form in a uniform fashion and the characteristics of the trial pit will differ from the beachrock further along the coastline. The applicant could take cored samples which would be significantly less intrusive.
3. "*To determine how much sand will be required to cover newly exposed beachrock*". As with the comment above, the characteristics of the seabed in this location may not be representative of the full extent of beachrock removal area.
4. "*To determine if the removed beachrock can be mechanically broken up to gain useful replacement sand*". Again, it is unclear why such a substantial area of excavation is required in order to undertake this analysis. The applicant's submission refers to the advice of Dr Seymour in respect of this proposal. In terms of crushing the rock, he advises that this should be done well away from the beach as it is unlikely to produce well grounded grains of the proper grain size.
5. "*To collect samples for a geological review and analysis*". From correspondence with Dr Brian Jones, it is understood that 5 hand sized samples collected from the surface of the beachrock are required for the geological review and analysis.

On the basis of the above, the DoE does not believe that the rationale for the 'trial' excavation is adequately justified.

3. Comments & Recommendations

Having considered and reviewed this proposal, the Department does not support the proposed trial excavation as outlined in this review and summarised below:

- The rationale and justification for the proposed 'trial' excavation is not supported by the DoE. We are of the view that the trial investigations can be undertaken in a significantly less environmentally damaging manner, additionally the 'trial' will not provide the information required to evaluate how this section of Seven Mile Beach will respond to the removal of the wider extent of beachrock, which is the ultimate goal of the applicant.

- Previous studies undertaken have consistently advised against lowering or removing the beackrock in this location due to the de-stabilisng effect on the beach to the north which is being 'anchored' by the rock and the beach running parallel to the beachrock. The DoE is therefore very concerned about the impacts of conducting a 'trial' for a wider project involving removal of beachrock along an approximately 1,700 ft (0.5km) stretch of coastline which, in principle, is not supported by the DoE.

- The works are proposed within the Seven Mile Beach Marine Park and are contradictory to the long-established management policies for the Marine Park Zone, they will place additional stress on the nearshore

marine resources and reflect badly on the Islands' commitment to conservation of marine resources. Furthermore, this is an active turtle nesting location.

- The principle of removing a naturally forming coastal geomorphological feature for aesthetic purposes sets a dangerous precedent for Seven Mile Beach and the Islands as a whole. This precedent would be extremely unfortunate especially for Seven Mile Beach which has been long recognized internationally for its natural beauty, recently receiving the award for the Caribbean's best beach from Caribbean Travel and Life magazine.

- The beachrock represents a unique attribute to Seven Mile Beach providing diversity to the attraction that appeals to numerous beach goers for whom easy access to the sea is not a priority or an obstacle.

If Cabinet is minded to grant approval, the DoE strongly recommends that prior to issuing a decision the views of an independent coastal engineer (commissioned by the Government) should be solicited in order to assess and advise on the proposed works (both for the trial and full extent of works).

Should Cabinet be minded to approve these particular aspects of the application the Department can provide recommended licence fees (Royalty, Environmental Mitigation and Administration & Monitoring) and conditions.

Please do not hesitate to contact the Department should you have any questions.

Technical Review Committee
For Director of Environment