



MEMORANDUM

To: Chief Officer – Ministry PLAHI

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From: Director – Department of Environment
Director – National Roads Authority
Director – Water Authority Cayman

Date: 30 January 2015

Subject: South Sound Drainage Basin Stormwater Management

Summary and Recommendation

A meeting took place on 10 December 2014 between the Department of Environment, the National Roads Authority and the Water Authority (the Planning Department did not respond to the invitation to attend). The purpose of the meeting was to discuss the impact that planned developments within the South Sound drainage basin, including a four-lane highway, will have on stormwater management in this area.

There was a consensus amongst those in attendance that construction of the proposed road and a number of proposed major developments within the basin will have serious implications for flooding of properties within the basin and South Sound environs if not planned in the context of a regional strategy for stormwater management.

As the agencies do not have a specific mandate, power or resources to effectively resolve this issue, it was agreed to bring this matter to the attention of the ministries of PLAHI and FSCE for consideration. **Our recommendation is to issue an RFP to select a suitably qualified consultant to undertake a hydrological assessment of the South Sound drainage basin and devise a regional stormwater management plan, which will include drainage engineering specifications for the proposed road and future development and Best Management Practices to minimise the impacts of stormwater flooding.**

The Request for Proposals (RFP) for the consultancy can be jointly developed by the NRA, Water Authority, DoE and Planning, to select a consultant to work with our agencies to prepare a regional stormwater management plan. We estimate that the cost of the plan would be in the order of \$200,000 and these funds will have to be requested in the 2015/16 budget currently being prepared.

Background

Proposed and existing developments including new roads in the South Sound drainage basin are shown in Figure 1 and Figure 2.

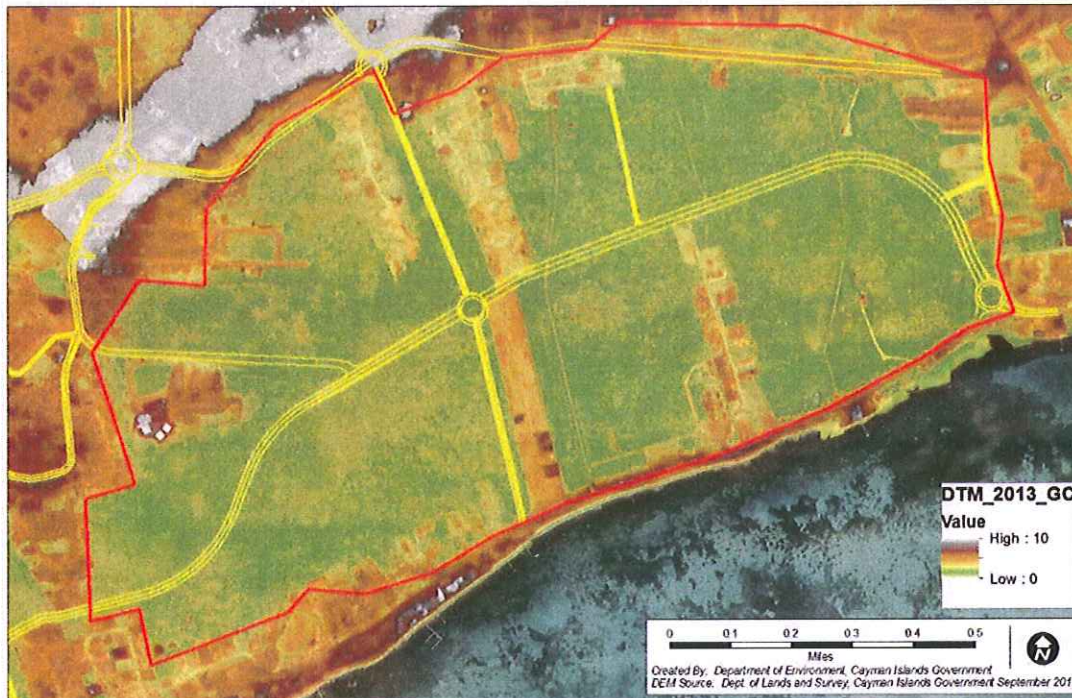


Figure 1: Topography of South Sound drainage basin (outlined in red) and location of proposed road (outlined in yellow)

A number of existing developments in the basin become inundated with rainwater during the wet season; most notably Randyke Gardens. Several new residential subdivisions have been granted CPA approval in the past 3 years and, most recently, the agencies have been contacted by Cayman Enterprise City regarding a 50 acre development in the basin and an application has been received from Exeter Development Ltd for a 30-35 acre general commercial development to the south of Linford Pearson highway (comprising a large anchor grocery/retail outlet, with supporting ancillary retail and commercial development); see Figure 2.

Unless the drainage and flooding issues in the area are addressed in a comprehensive manner, prior to these developments and the road coming forward, the agencies have grave concerns regarding the impacts of seasonal flooding on existing developments and on the quality of the receiving waters; i.e., the South Sound lagoon.

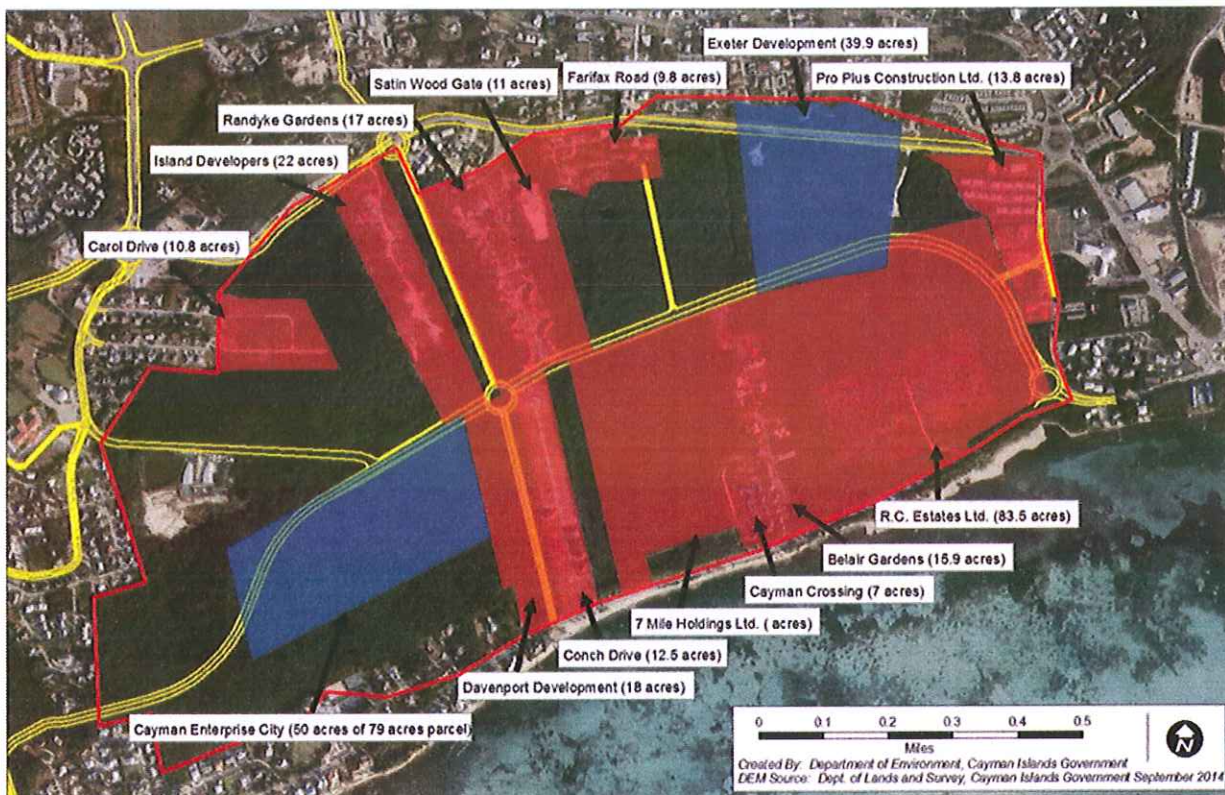


Figure 2: Aerial image showing permitted developments (highlighted in red) and proposed developments (highlighted in blue) within the South Sound drainage basin.

The South Sound mangrove basin is a blocked non-tidal mangrove wetland which is impounded by the beach ridge and South Sound road to the south, and higher elevation, drier land as well as the Linford Pearson highway to the north. The beach ridge and roads are relatively impermeable to sea water and the mangrove swamp is flooded principally by rainwater. Historically, excess rainwater not retained by the extensive mangrove wetland basin gradually percolated through the beach ridge and mangrove coastlines along the length of South Sound lagoon. Following the construction of South Sound Road and the beginning of developments which reclaimed portions of the mangrove wetland, a series of MRCU physical control canals installed in the 1970's helped to alleviate storm waters and, more recently, a series of culverts were installed by PWD/NRA under South Sound road to drain the mangrove basin to the South Sound lagoon. However, the recent filling along the eastern end of the shoreline in South Sound has resulted in many of these culverts being blocked. The one remaining culvert, in close proximity to the Red Bay dock, is normally blocked by the NRA with a sheet of metal placed in front of the culvert; this culvert is made operational when required (see figures 3 & 4). Seasonal flooding of Randyke Gardens and other low-lying developments in the basin has become a normal occurrence and without a regional stormwater management plan, this flooding will get worse.



Fig 3: Closed Culvert in South Sound



Fig 4: Landward End of South Sound Culvert

Detailed water level measurements in South Sound have shown that the mean surface water level within the swamp is higher than the mean sea level in South Sound (Davies, J.E. and Giglioli, M.E.C, 1977). Accordingly, during the wet season, impounded rain water remains within the basin and has limited means of escape. As more and more development is brought forward, the implications of removing the stormwater retention capacity of the basin becomes increasingly significant and problematic, not only from the perspective of flood risk for properties within the basin but also for the health of the South Sound lagoon which forms part of the Cayman Islands Marine Park system and is therefore considered a protected area under the National Conservation Law. The previous system of culverts draining waters into the South



Fig 5: Red tannin stained water flowing into South Sound at the present culvert (2008).

Sound was problematic in that it created concentrated discharge points for fresh and tannin rich waters to enter the Replenishment Zone; this solution did not mimic the natural drainage patterns of the mangrove basin as previously described.

The rapid and concentrated discharge of stagnant storm water presents a number of environmental and aesthetic issues. Most marine communities, including the seagrass flats, patch reefs and fringing reefs of South Sound, are not tolerant to the large shifts in salinity brought on by the introduction of large pulses of freshwater. Additionally mangrove basin storm water contains large amounts of nutrients and is typically low in oxygen due to high biological oxygen demand of mangrove peats which adds to its detrimental impacts to marine communities.

Aesthetically, concentrated mangrove storm water impacts the ordinarily clear waters of South Sound and can result in strong odours due to the presence of hydrogen sulphide.



Fig 6: Red tannin stained water near shore South Sound – note the striking transition between the clear water and the stained near shore water.

Rather than continuing with the current practice of requiring each development to deal with storm water management in isolation, we believe a basin-wide approach to managing storm water in this location is urgently required. In fact this area was prioritised by the former Roads Division of PWD for the development of a storm water management plan about 10 years ago. As new developments are constructed on sites filled to higher elevations than existing properties in the South Sound drainage basin, the older existing properties are going to suffer from increased intensity and duration of flooding, as the retention capacity of storm water will be reduced as the basin is developed. We believe that a more appropriate mechanism in addition to the traditional means of storm water drainage (disposal wells) may be to have a series of retention basins for storm water to drain to for holding and filtration, before being dispersed into the South Sound lagoon in a controlled way. However, in order to engineer a regional solution, a detailed understanding of the hydrology of the basin and the implications of various developments is required.


The NRA, the Water Authority and the Department of Environment are therefore bringing this matter to your attention as we believe that the correct approach to tackling this issue is to instruct a suitably qualified consultant to undertake a hydrological assessment of the South Sound drainage basin and devise a regional stormwater management plan, which will include drainage engineering specifications for the proposed road and future development, and Best Management Practices to minimise the impacts of storm water flooding.

If the approach outlined in this Memorandum is agreeable to your Ministry, the next step would be to formulate a Request for Proposals (RFP) in order to seek consultants who would work with our agencies to prepare a storm water management plan. This RFP can be prepared jointly by the NRA, Water Authority, DoE and Planning. We estimate that the cost of the plan would be in the order of \$200,000 and these funds will have to be requested in the 2015/16 budget currently being prepared.

We look forward to your feedback on this matter at your earliest convenience. Please do not hesitate to contact us should you wish to discuss this further.



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