PATRICK PARSONS

50th Est. 1964

Our ref: AJFC/hm/N10127

Mr R Radmall
Pagham Parish Council
The Village Hall
Pagham Road
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Bognor Regis
PO21 4NJ

6 November 2014

Dear Ray

COASTAL DEFENCES AND FLOODING, PAGHAM

Patrick Parsons Limited was originally engaged in 2010 by Pagham Parish Council to study the geomorphological development of its frontage with particular reference to the growth of the Church Norton (Southern) Shingle Spit which has, since 2003, extended across the harbour mouth.

Since producing the original report dated November 2010, I have maintained contact with the Parish Council and continued my appraisal of the processes associated with the serious erosion problems which threaten that community. On several occasions I have reiterated the advice set out in the original November 2010 report that there is an urgent need for "System Scale Intervention". The recommended solution is to reinstate the harbour mouth management procedure carried out prior to 2003. In the first instance there is the essential priority to deal with the environmental constraints which have impacted so unnecessarily upon the obvious and easily implemented remedy.

Whilst I was working on the original report, I had the benefit of the cooperation of the Arun District Council Coastal Engineers, who provided background historical data and details of the technical assessments they had undertaken over the years. Of most significance was their 2007 plan for the Pagham frontage, produced and signed off by the Chief Engineer. This proposed the "preferred option" to reinstate the harbour mouth to its pre-2003 location by excavation, using land-based plant, to open the ends of the new channel during a single tide and use the retrieved material to block the existing channel. There will be a need to stabilise and control the new channel by extension of the existing steel sheet piled training wall.

Although we understand that work is in progress to upgrade the inner harbour defences, a wise precaution would be to re direct the orientation of the proposed new channel toward the east to avoid the prevailing south westerly driven waves. The training wall extension should secure the entrance and thus assist the control of wave propagation within the harbour. There is now a greater quantity of shingle to be excavated during this channel re construction than was present in the 2010 assessment. My revised estimate is for these works is £1.75 million which includes the additional length of steel sheet piled wall associated with the training wall.

The optimum width of channel is advised as being between 60 and 80 metres in order to achieve a concentrated current which should provide a strong element of self-flushing of the new entrance. This will need to be monitored as there remains a significant likelihood that the prevailing west to east longshore drift will gradually occlude the new entrance and it is likely that a return to the previous (pre-2004) periodic maintenance will prove necessary. If the extended training wall can be incrementally extended to maintain the channel and continue to promote the self-flushing and scour of the entrance, it is quite conceivable that such maintenance can be minimalized and any future disturbance reasonably avoided and mitigated against. In that connection, we believe there is a strong likelihood that the "Barcock Cycle" as monitored and promulgated by former Arun District Council consultants will re-establish, whereby formative extensions of the Church Norton Spit across the tidal delta will fail due to storm/wave action and provide an element of natural self-regulation of the harbour entrance.

The engineering detail of the training wall extension will need to be discussed and agreed with the regulatory authorities in respect of how it be incorporated within the existing landscape. It is clear, however, that the existing steel sheet piled training wall is an accepted feature within the Nature Reserve. Its easterly aspect is almost entirely hidden by the shingle embankment by which it is reinforced against lateral tidal pressure. There is concretion and natural mollusc colonisation along its inner face, and, because the footprint of the structure occupies minimal linear space, it is our view that this technique of controlling the new extended channel would be the preferred option. Such a technique has significant benefits including cost, transport speed and carbon footprint and is simpler, less disruptive and more effective than the placing of rock armour, which would occupy a very broad footprint with shallow angles of repose, present possible permeability problems, as well as settlement and safety issues.

The Church Norton Spit has continued to grow across the former harbour mouth since I first visited the site in 2010. It is now in excess of 1 kilometre in length. There are also significant nearshore and offshore shoals along its seaward margins. It is also clear that the natural trend, if no intervention takes place, is that the developing shoals at its distal end will link with the Spit and extend farther to the east. The ebb tide can be seen to be particularly destructive as it impacts the existing remnant groynes which have been badly damaged and poorly maintained. The cycle of erosion due to the shore-parallel proximity of this current which is estimated as being 3.3 million cubic metres of water per tide is already plain to see. The landward extent of those groynes has been outflanked. The scour is impacting upon the remnant of the seaward rock toes and the associated eddy currents are progressing inexorably eastward. The 2011 Arun District Council Strategic Flood Risk Assessment predicts a breach of the backshore raised shingle bank and a serious tidal incursion into the major built-up area in the central part of the beach frontage flanking the Yacht Club. The extended linear erosion along almost 800 metres of that frontage is already serious. The Arun District Council "rainbow spraying" of 22 barge loads (20,000 m3) in 2010 at a cost in excess of £650k had been washed away by Spring 2013. There is no natural longshore drift replenishment due to the current disposition of the harbour mouth by the extended Church Norton Spit.

I was distressed to learn of the most recent incident whereby the failure to implement the 'intervention' we had recommended as long ago as 2010 has resulted in deterioration of the beach frontage beyond the adopted emergency trigger levels, causing a real threat of loss of seafront homes and potential severe threat during any ongoing storm situation that the 2008 Coastal Strategy Environment Agency report

assessed would affect 330 inland homes. We are aware of the evacuation of 86 families last winter from the Haven Holiday site due to flooding.

We would contend that the blocking off the harbour channel is the most sustainable engineering solution and subsequently to repair and upgrade the existing timber beach groynes. This will reinstate the previous shore-perpendicular tidal entrance, eliminate the shore-parallel scour and, equally important, release the huge amount of shingle currently trapped by the exit current to naturally feed and replenish the Pagham frontage. Even as long ago as 2010 the former Arun District Council Chief Engineer estimated a minimum 20 year supply of shingle was trapped within, and seaward of, the Church Norton Spit.

There is clearly now a far greater resource of natural beach replenishment which must be made available to the Erosion Management Authority at Arun District Council in order that it is no longer denied the means to carry out the essential works to stabilise the existing beach frontage and mitigate against the potential of widespread damage caused by further coastal erosion and flooding.

I was pleased to be informed that Pagham Parish Council has now been accorded the title of "Promoting Authority" in its endeavour to secure partnership agreement for a sustainable long-term solution to the on going coastal erosion and flooding issues that are threatening this community.

Yours sincerely

Anthony Cowey
Infrastructure Director
BSc CEng MICE

ROSEBAY SERVICES

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PAGHAM HARBOUR, SPIT AND OPEN COAST 4th November 2014

Dear Mr Radmall

I refer to our discussions following my site inspection carried out over the weekend of 1st and 2nd November 2014. As you are aware, I am the engineer that deals with coastal matters on behalf of Bourne Leisure. The Church Farm Holiday Park which fronts Pagham Harbour is one of the 35 caravan parks owned by Bourne Leisure.

I have been dealing with coastal issues at Church Farm since 2008, with particular reference to the embankment that surrounds the holiday village. At present the Environment Agency and Bourne Leisure are partnering in a scheme to reduce the risk of flooding over the embankment. This is being achieved by the building of a new clay bund around the harbour, reducing the flood risk as the crest height of the defences is being increased.

I have observed the changes to the open coast at Pagham over this time and have witnessed the growth of the shingle spit. I have also seen the problems this has caused and observed the threat to the properties overlooking the beach. I understand that an adaptive management policy has been adopted for the open coast frontage. At present limited rock resources are being managed to protect the scour from the current that fills and empties Pagham Harbour every 12 hours on the tide. It is clear that more rock is required to protect the frontage and the effect of the scour current running past the existing groynes.

Please note that I am not party to any recent surveys, aerial, bathymetric or topographic which would help explain any trends for the spit and the frontage. I have been asked however if the cutting through of the spit would be of benefit to the houses on the frontage. The cutting through of the spit would take all the pressure away from the frontage. It would not be a simple operation however as it will be necessary to determine the best orientation for the new channel. It also will be necessary to close off the existing channel at the same time involving a lot of plant and machinery. It is important that the existing channel is throttled back and closed and the hydraulic power from the harbour is utilised through the new opening.

Although it is not impossible under a severe storm condition, it is considered unlikely that the existing channel will close under natural conditions.It must also be noted that once the new channel has become established through the spit then regular maintenance work will be required to maintain it.

The volume of shingle currently contained within the accreting Church Norton Spit and its nearshore shoals is massive. If that could be released from the constraint of the current disposition of the exit channel, the prevailing west/east longshore drift would begin the process of moving significant quantities onto the Pagham frontage. It is a huge resource which should be made available to the District Council engineers to speed up that process of beach replenishment by using diggers and trucks to transport that material to the seriously eroded beach which forms the protection for the Pagham community.

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The relocation of the harbour mouth to its previous position approximately 1 kilometre to the west would remove the shore parallel scour current which is the cause of the now dangerous situation facing homeowners.

If the 'intervention' is refused or not implemented for other reasons, my observations arising from recent visits and detailed photographic appraisal, are that the erosion will continue to migrate eastwards along the Pagham frontage, putting at risk even more sea front homes.

It will be a difficult task for the District Council to successfully manage the situation in the face of current winter storms if homes are not to be lost. With limited resources and ongoing emergency conditions, it is my sincere hope that they will be able to succeed in their endeavours until the proposed sustainable long term solution can be implemented.

Yours Sincerely

Proprietor: A Tindle, BSc, CEng, MICE
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