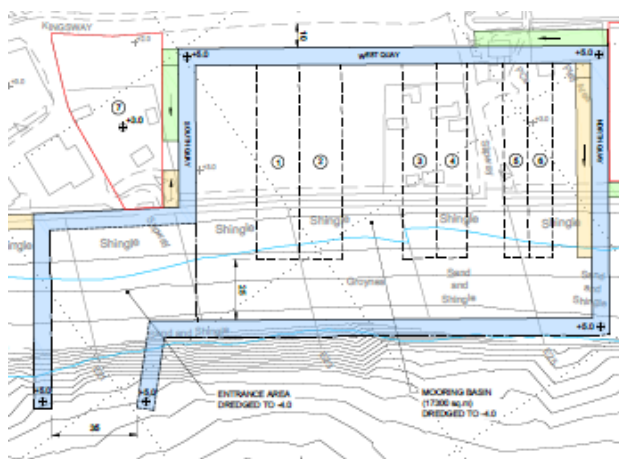


Selsey East Beach Harbour – Selsey Haven

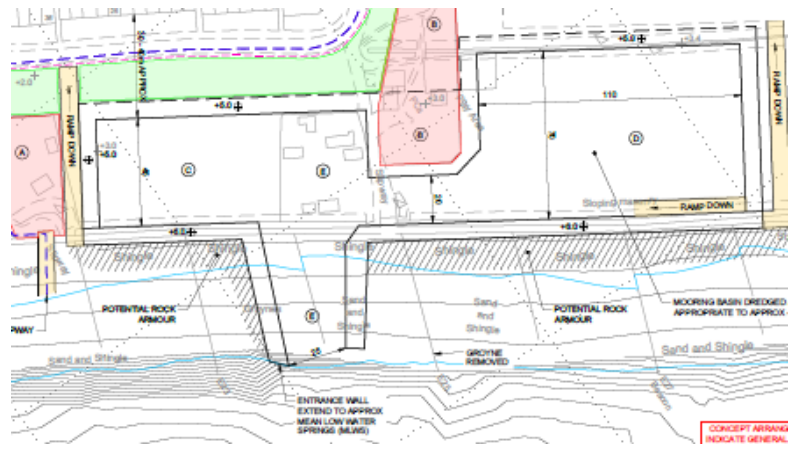
Nick Williams | Senior Specialist | Coastal Geomorphology

Updated advice following ‘Alternative Layout’ from Royal Haskoning DHV.

1. All points on coastal processes and geomorphology in our original letter (25 May 2017), including the coastal processes and geomorphology annex still stand.
2. It is appreciated that measures have been taken to reduce the potential impact on the system, by moving the whole structure landwards thus reducing the amount of protrusion onto the beach (inter-tidal areas) see images below. It is clear the reflective properties of the overall structure have been reduced however unlikely to be fully diminished.
3. The harbour arms (across shore break waters) extend from the landward margin down to mean low water, having an impact on the longshore movement of coarse sediment, shingle (gravel) which is the material that constitutes Pagham spit and delta.



Original (May 2017)



Alternative Layout (Aug 2017)

4. It is appreciated that the aim is for the harbour arms *‘to act just like the current groyne system does, therefore minimising the impact on sediment transport.’* However the current groyne field is wooden groynes with relatively uniform spacing. This scheme would effectively place two larger (height and width(?)) solid rock(?) groynes. This would have a greater effect on the system than the wooden groynes currently have, thus reducing the potential for longshore sediment transport.
5. Compounding the effect of disturbing longshore sediment movement is the inlet itself, previously mentioned in point 21 of the geomorphology comments (25 May 2017). Whilst the impact with inlets causing a change and or break in the sediment transport system could be subject to additional studies and numerical modelling. Anecdotal evidence from other harbours on this stretch of coastline would indicate (for example) tidal flushing to be a likely effect, causing complexities when considering the bypassing of sediment.

6. Whilst it is appreciated that further comments have been supplied (below) point 19 of the geomorphology comments (25 May 2017) still stands.

'Sediment will be bypassed and dredged from the harbour entrance as required, in order to maintain the 'natural' sediment transport, therefore the sediment transport process will be managed to mimic as far as possible the variability in the transport rates through a process of monitoring and adaptive bypassing.' & *'Beach bypassing would still form an integral part of the design which will accommodate works to facilitate the by-passing operation.'*

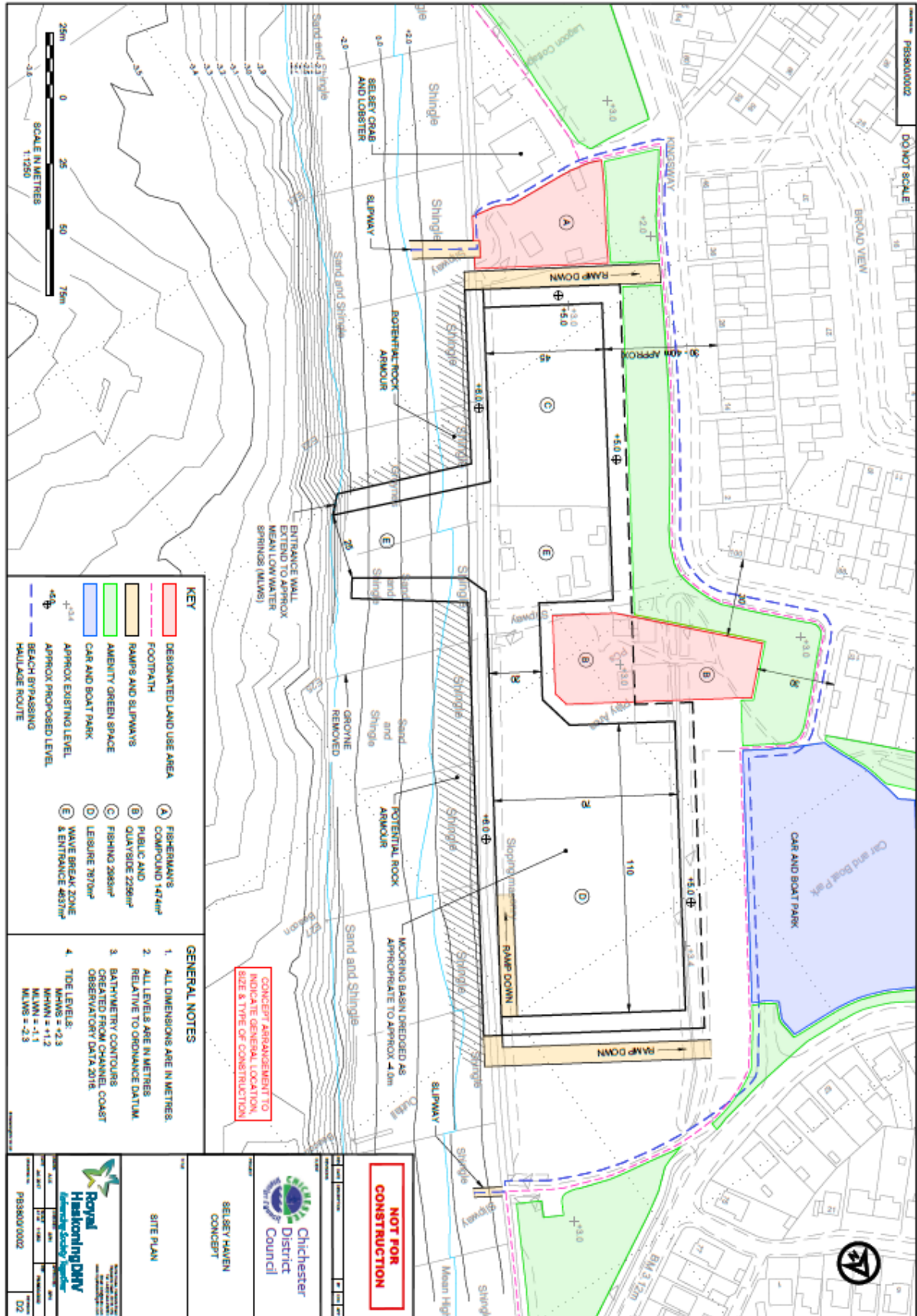
(Point 19) Periodic by-passing would not facilitate a natural functioning of the system and would be unlikely to have the flexibility in approach to act as the natural system does.

This being said we welcome additional studies and or numerical modelling to support an evidence base which shows that the 'natural' sediment transport regime can be feasible and sustainable.

Annex A - Further information provided by RHDHV

Please note:

- that for this option, the concept is for the harbour arms to act just like the current groyne system does, therefore minimising the impact on sediment transport.
- Sediment will be bypassed and dredged from the harbour entrance as required, in order to maintain the 'natural' sediment transport, therefore the sediment transport process will be managed to mimic as far as possible the variability in the transport rates through a process of monitoring and adaptive bypassing.
- Beach bypassing would still form an integral part of the design which will accommodate works to facilitate the by-passing operation.
- Additional studies, numerical modelling etc. will follow this process.



Hi Tom,
Many thanks for the revised plan.
I copy in the other regulators as this might make things easier for them to comment.

I have pasted below my original comments with your answers in red.
I have added new comments in green and crossed out those that no longer apply. Comments that are neither crossed out or have no additional green comment still apply.

I hope this helps – generally quite an improvement, Uwe

2. Our understanding on coastal processes in the area of interest and the potential impacts of the harbour on sediment transport.

a. ~~It is disappointing that previous comments about the ‘too seaward’ position of option 1 in the preliminary consultation voiced by EA have not been considered and found their way into the Key Technical Issues Study. There is almost no difference between option 1 and this proposal (certainly not in the seaward position) and hence all the concerns raised in relation to option 1 remain valid.~~

~~This option was chosen following the overall comments received during the previous workshop. Also as previously discussed originally we were aiming for an all-land option but there was insufficient room, and even with the now permissible encroachment into the East Beach green area we need to be careful not to end up with an over-elongated mooring basin. The option is still concept at this stage and we are open to changes and suggestions from yourself with regards to a more landward layout option. We could then discuss this with the various consultees to identify an acceptable balance.~~

Generally, this is more in line with what I had in mind. With the outer face of the harbour wall coinciding with the seaward face of the present seawall, the beach can continue to occupy the same space as at present and thus does significantly reduce the impact on the present beach.

b. ~~In the discussion about longshore transport rates a reference to more recent rates calculated on survey data is missing (see http://www.se-coastalgroup.org.uk/wpcontent/uploads/2013/10/Regional_sediment_budget_report%20-%20Selsey%20Bill%20to%20Brighton.pdf, and updated version should become available in the next few weeks). Thank you for the recent study. We will incorporate this into our report.~~

~~Unfortunately, information on the seaward face of the harbour wall is vague. Page 3 has “Where intermittent piles occur, armourstone fill will be used”. From the description I would imagine a harbour facing sheet pile wall fronted by rock armour. From this inner wall a deck would extend for a width of ~8 m to seaward where it would be supported by piles. So in the simplest case the rock would start just seaward of the inner sheet pile line and given a height of at least 8 m (from 5 mOD to 3 mOD) and a slope of 1 in 2 this would extend another ~8 m seaward of the position of the vertical outer wall shown in the cross section. This simple triangular shape would risk lifting the deck so that the rock slope should probably start more seaward. In the extreme, the rock toe would extend some 20 m seaward of the outer vertical wall as illustrated in the cross section (including a berm). Fundamentally, this would increase the negative impact on coastal processes and visual appeal.~~

~~What is described above is not in line with our thinking. Our thinking was to have a structure more in line with example below although different materials. The below example is Cardiff Bay Barrier which is constructed as precast concrete box units sunk to the bed, with an impermeable sheltered face and a louvered front face.~~

A vertical concrete wall is a simple replacement and thus the comments above are no longer applicable. However, the ‘potential rock armour’ notes obviously open up the option for something quite different and the question would be ‘how high’ and ‘why is this required for the Haven but not for the present seawall’. I appreciate that this might provide a factor of safety, however, as The Haven duplicates the seawall with the seaward and landward harbour wall, failure of the outer harbour wall (previously the seawall) has negligible consequence in terms of flood risk to people and properties and would be ‘limited’ to the boats in the harbour.

d. ~~Page 3 has “For the seaward face the intention is to encourage the build-up of beach material in front of the harbour in order to promote natural by-passing.” This sentence does not make much sense.~~

i. ~~Advancing the line seaward will on its own reduce the potential of beach build-up. Agreed, by advancing the line, the coastline will be placed in deeper water, where a beach is less likely to form. We will take this into consideration.~~

ii. ~~Assuming the rock is also used to reduce overtopping into The Haven, then filling the interstices with beach sediment is counterproductive as it reduces the permeability of the rock structure. We will take this into consideration.~~

iii. ~~Natural sediment transport is from south to north so once sediment is north of the harbour mouth, ie in front of the harbour wall, it is already bypassed~~

so how this would 'promote natural by-passing' is not clear. ~~By by-passing we mean sediment reaching the beaches to the north of the harbour.~~

e. Together with comments under point 4 there is a real danger that in further design refinements the proposed sketched structure will be even more disruptive to coastal processes and will require additional / larger structures including further up- and/or downdrift to manage the sediment accumulation and scour. Alternatively / additionally, requirements for additional structures may only become apparent after construction and operation due to changes in sea level and/or sediment dynamics. ~~This is something that would be looked at in detail in subsequent studies, such as detailed design.~~

I think these no longer apply

3. Comment on the acceptability of beach by-passing as an ongoing means of compensating for any interruption in the natural longshore sediment transport to the north of the harbour.

a. The cover email makes a comparison with the by-passing at Shoreham "In essence, the process will copy that currently undertaken at Shoreham Port which we understand is acceptable to all parties involved.", however, there are some fundamental differences

i. The longshore transport boundary is natural and has 'always' existed owing to the Adur river.

ii. There is 'near unlimited' accommodation space on the western side of Shoreham Port which allows for substantial volumes to accumulate before they have to be moved. This space is not available south of the Haven unless the southern Harbour is extended. In that case, the beach sediment will accumulate subtidally from which it will be more difficult to recover.

iii. At the eastern side of Shoreham there is equally near unlimited accommodation space to deposit the annual by-passing volume. North of the Haven there is less space unless one spreads out the bypassing volume which would have a higher impact on a larger part of the beach; or unless one introduces new / larger structures as anticipated in 2e.

iv. Acceptability is probably the wrong word as Shoreham Port operates the bypassing under the Harbour Act on its own land.

v. Infilling of the harbour mouth with sediment from updrift would eventually increase fluvial flood risk inland, which is not the case at The Haven.

vi. There are significant additional structures behind the beach on the downdrift side.

vii. Overall Shoreham Port sits more toward the end of sediment cell while Selsey sits at the start.

viii. Bypassing increases burial pressures on the Southern Water outfall west of Brighton Marian

ix. The actual recycling activities with lorries doing the trip around the harbour is not much appreciated by the Shoreham residents due to traffic and associated noise, congestion and air pollution.

b. Longshore transport is a near continuous process driven by moderate waves under oblique incidence. As such (together with the previous points) the frequency and magnitude of bypassing will be important to mitigate as much as possible against this new artificial transport boundary. Given that LST rates updrift can be different from those downdrift (e.g. through the hydrodynamic impact of the harbour wall generating reflection, edge waves or other scour enhancing mechanisms) there will be occasions when the downdrift beach requires sediment but the updrift beach does not provide it. ~~This is possible, however we think these phenomena may only occur local to the northern side of the harbour, immediately adjacent to the northern harbour wall. The 'natural' rate of transport will resume quickly once out of the shadow / shelter of the harbour.~~

Taking the above comments ii to b. and the fact that the harbour entrance is essentially just a concrete groyne (albeit probably with a different profile), accommodation space for shingle up and downdrift is minimal. It seems thus essential to come up with a near-continuous bypassing option as moving by lorry does not seem feasible. Assuming for simplicity 7,000m³ per year and 700 tides a year, that is about 10m³ per tide (e.g. something that scrapes say a 1m wide stretch next to the groyne 0.5m deep every low tide (assuming 20m of beach) at low tide and transports this across [slingshot?? or little shuttle boat] at high tide; or something similar, ie some custom build vehicle with front loading shovel and 10m³ capacity).

This assumes that there is material arriving at the same rate as it is taken, however, if there is more going on the eastern side then refilling is tricky and if there is more coming on the western side this might fall into the entrance. Tricky, but with natural sediment transport being the main issue, a near continuous system (with fall-back and redundancy build in) would possibly leave little room for objection on sediment transport grounds.

c. Inevitably, some shingle will enter the harbour mouth. There it will be mixed with finer sediments, making it much less useful as a source of material to be placed on the down drift beach. ~~If the material from dredging is not appropriate for being placed on the down drift beach then we will not use it.~~

This comment still applies.

d. Given points b and c the question has to be asked whether the assumption of simply bypassing without the need of e.g. a stockpile or occasional small scale recharge is valid; together with the associated cost implications. **This will be considered however we do not think stockpiling will be necessary. If rates of transport on the south side are equivalent to rates on the north side then it should be a simple transfer from one side to the other. However, I agree that the transport rates require closer scrutiny as the process moves forward.**

This comment still applies.

e. Recovery of material on the updrift end is best carried out during spring low tides which at Selsey – like most of the rest of the Southcoast – occur over weekends either early morning or late afternoon with the former having a particular impact on residents behind the beach. Assuming the specialised vehicle, say 10m or scraping, 5 min to go round, 2 min to empty and 5 min to go back every low tide might be acceptable to residence given the general noise increase from The Haven.

4. What would be required by the Environment Agency in subsequent studies to gain full acceptance of this concept?

a. As a regulator, the EA comments on Water Framework Directive and Flood risk. As the Haven is well within the frontage managed by Chichester DC they would bear most of any negative consequences arising from the Haven. However, flood risk to downdrift frontages managed by the EA may increase. If The Haven were found to be causing issues for FdGiA funded defences either side, contributions would have to be sought from the operator.

b. From a WFD perspective, East Selsey has a more or less natural appearance with a continuous beach and exposed seawall restricted to the southern end. Rock and continuous structures protruding seawards beyond the beach are absent and as such the proposal would introduce new materials (and replace beach with these) into what is already a Heavily Modified coastal waterbody. A WFD compliance assessment screening exercise using the process outlined in the new Clearing the Waters For All guidance available on GOV.UK (<https://www.gov.uk/guidance/water-framework-directive-assessment-estuarine-and-coastalwaters>) should be carried out in particular in relation to hydromorphology and potentially also for biology – habitats impacts. As the site falls within 2km of a WFD protected site (the Pagham Harbour SPA), any potential impacts to the SPA will also need to be considered in the impact assessment. This may require detailed studies and data collection on nearshore sediment transport processes.

In relation to WFD replacing a concrete seawall with a concrete harbour wall and introducing 2 concrete groynes seems less impact than the previous version. Not sure what the WFD impact of the Haven as such would be in relation to water quality.

5. Impacts on wider coastal management.

a. Much will depend on the specifics of the harbour entrance (e.g. seaward extent and impact on tidal currents and subtidal sediment transport) and the details of the outer seawall (e.g. in relation to shape [sharp northern corner] and wave reflection). Groynes up- or downdrift may need to be modified to increase storage capacity for bypassing or to increase volume updrift to allow for larger losses (granted, raising of the land behind this frontage will reduce flood risk and may lower the FCERM requirements of the beach, but as this beach also has a high amenity value, narrowing of the beach may be undesirable). **We believe that shingle transport is driven mainly by waves not currents. We believe that if sediment bypassed equals sediment required to continue the pathway north, then groynes will not need modifying. Modifying groynes may aggravate the problem by introducing further cross-shore structures, something we would ideally like to avoid.**

I think the new layout will generally have less to much less impact on wider coastal management.

b. In the long term (e.g. sea level rise, changes in sediment dynamics), the Haven is unlikely to provide a sustainable flood defence solution as is, but also prevents future adaptation that could include a more landward alignment of the coast for the location of the Haven as well as over a considerable distance up- and downdrift.

This comment still applies.

c. In the medium to long term, boat sizes will increase which may reduce the Haven's viability due to lack of expansion space

This comment still applies.

d. There is so far no 'decommissioning' plan which ties into point b about long term sustainability of a hard structure so close to the present coast line.

In summary, the proposal presented for The Haven

This comment still applies.

- introduces a significant disturbance to sediment transport processes along the eastern side of Selsey Peninsula and into the downdrift frontages including Pagham Harbour with the effectiveness of bypassing as a mitigation measure being uncertain. **We agree that there are disturbances to sediment transport processes along the eastern side of Selsey and that the impacts downdrift will require further scrutiny to reduce uncertainty at later stages of the project.**

As with previous comments, I think the present option will have less/much less of an impact depending on the bypassing methodology.

- closes down a range of options for future FCERM management of much of the eastern side of the Selsey Peninsula and is thus not a sustainable option **We believe the effects would be local if managed correctly.** **This comment still applies.**
- contains a large number of uncertainties in relation to future changes in e.g. sea level, sediment dynamics, additional / enlarged structures, decommissioning. **This would be considered during a more detailed study.** **Indeed.**

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