Pagham Beach and Harbour Entrance
Potential Intervention Measures

Report on Workshop Meeting held on 7 May 2014

Pagham Parish Council

July 2014 – Final

PB1354

Royal HaskoningDHV
Enhancing Society Together

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1 INTRODUCTION

1.1 Introduction

A meeting was held on the 7th May 2014 at the Haywards Heath offices of Royal HaskoningDHV. In attendance were Pagham Parish Council (PPC), Arun District Council (ADC), the Environment Agency (EA), Natural England (NE), the Royal Society for the Protection of Birds (RSPB), and Royal HaskoningDHV (RHDHV). The meeting was also attended by Nick Gibb, MP for Bognor Regis and Littlehampton.

This 'final' report is an update of the first and second drafts, incorporating comments received from the attendees. This version has been ratified by the attendees so that the statements can be taken to be accurate to the best of their knowledge regardless of their original source (as a general principle the statements are not attributed to any particular attendee).

The note has been structured under various questions which were asked (or implied) and addressed during the meeting. Some of the questions have been re-ordered so as to present a more logical account.

The meeting was based on the premise that PPC are promoting a scheme to manage risk to people and properties on Pagham Beach from coastal erosion and excessive wave overtopping.

For the purposes of the meeting it was assumed that intervention measures would involve coastal works somewhere along the frontage between the original harbour entrance at the steel sheet piled wall training arm and the east end of East Front Road (See Appendix A). The attendees believed this was the most favourable location for promoting a scheme and that there was no other more 'obvious' location in the vicinity.

Potential intervention measures could include coastal structures, beach management, and built environment resilience measures or a combination of these.

It was understood that the development of any intervention measures would be subject to due process, carried out with due care and attention, and subject to post monitoring. Any formal application of the details, assumptions and conclusions recorded in this report will be followed by necessary legislative requirement processes and appropriate monitoring which may lead to changes in earlier assumptions and conclusions.

1.2 Attendees

Table 1 below shows the list of attendees and their contact details.

Attendee Name	Organisation	Contact Details
Ray Radmall	Pagham Parish Council (PPC)	paghampc@gmail.com
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Jennifer Goodwin	Royal HaskoningDHV (RHDHV)	jennifer.godwin@rhdhv.com

Table 1: List of attendees

1.3 Purpose of the Meeting

The purpose of the meeting was to open discussions between NE and the EA (both statutory consultees of the regulators), Arun District Council as Coastal Protection Authority, key stakeholders and the project team, in order to identify issues and criteria to use when assessing potential intervention measures, whilst ensuring that decisions are robust, evidence based and do not create problems for future management within the vicinity of Pagham Beach.

There was an expectation that everything would be said in good faith, that pertinent information would not be withheld, and that PPC would be helped in identifying the best way to meet their objective.

Apart from a few incidental comments there was no discussion on economic or 'political' matters as these were outside the planned scope of the meeting. In addition, attention to the range of technical, socio-economic, uncertainty and risk related issues will be addressed in subsequent phases of this project.

1.4 Purpose of this Report

PPC have commissioned this report in order to identify and promote a scheme to manage the risk to people and properties on Pagham Beach by seeking input from key regulatory authorities in order to define the best way to proceed. Outcomes from this report will be used to inform the development of options.

2 QUESTIONS RAISED DURING THE MEETING

2.1 What is the main objective of Pagham Parish Council with regard to this scheme?

The main objective of PPC is to manage the risk to people and properties on Pagham Beach against coastal erosion and excessive wave overtopping primarily by means of a sustainable beach. The use of a hard linear defence (such as a rock revetment) instead of a beach would not meet this objective, however the use of groynes may.

2.2 What is the general location under consideration for potential intervention measures?

The potential location of intervention measures extends from the steel sheet piled wall training arm at the original harbour entrance to the eastern end of East Front Road (see Appendix A).

2.3 What are the nature conservation designations in this general location?

The potential area of intervention lies within or adjacent to a number of international and national nature conservation designations (see Appendix B for plans and Appendix C for citations). Designations of most significant are;

Internationally Protected Sites:

- Pagham Harbour Ramsar; and
- Pagham Harbour Special Protection Area (SPA).
- Pagham Harbour Geological Conservation Review (GCR); and

NOTE: There are no designated Special Areas of Conservation (SACs) within the Pagham Harbour area.

International Bird Areas:

- Pagham Harbour Important Bird Area (IBA).

NOTE: Pagham Harbour IBA is a site identified by Birdlife International as supporting bird populations of international importance. Within the European Union this generally means that such sites fulfil the requirements for designation as SPAs.

Nationally Protected Sites:

- Pagham Harbour Site of Special Scientific Interest (SSSI);
- Bognor Reef SSSI; and
- Pagham Harbour Marine Conservation Zone (MCZ).
- Pagham Harbour National Conservation Review (NCR).

Locally Protected Sites

- Pagham Harbour Local Nature Reserve (LNR);
- Pagham Harbour RSPB Reserve;

2.4 What are the physical boundaries of the nature conservation areas?

The seaward boundary of the designated areas at Pagham is the Mean Low Water Mark (MLWM). Due to the dynamic nature of the coast, seaward boundaries are not fixed in one position but naturally move with MLWM. The seabed below MLWM is outside the designated conservation areas at Pagham.

It is important to note that the functional linkages between areas either side of a conservation boundary are important (for example coastal processes) as these linkages might affect a site's interest, therefore these linkages must be taken into consideration for all intervention measures and management issues. In highly dynamic coastal environments such as Pagham Harbour mouth and Church Norton Spit, hydrodynamic and coastal processes are particularly important and are critical to the designation and such processes are not confined to site boundaries.

It was noted that OS maps and GIS shape files available from Natural England's interactive mapping website 'Magic' (www.magic.gov.uk) do not represent the current location of the MLWM at Pagham. This is due to recent rapid geomorphological changes within the study area. The boundaries as they currently appear on Magic are shown in Appendix B. For all other landward boundaries for conservation designations, the boundaries remain fixed.

2.5 Are different weightings given to the importance of different conservation categories?

No weightings are given to the conservation designations and the features which they support. Each designated site and feature has its own unique merits and sensitivities and each intervention measure needs to be addressed against each individual site's own merits and sensitivities with the aim to maintain the site features and its interests. Consideration must be given to the fact that some designated sites, if not all, are ecologically linked. However, the SPA is representative of the most critical sensitivities that are likely to be encountered.

2.6 Does the sensitivity to intervention measures change within conservation boundaries?

The change in sensitivity within the conservation areas was discussed in depth with considerations primarily focused upon the SPA. However it was noted that the general principles on sensitivity are similar for all conservation designations.

Issues and impacts within conservation boundaries depend upon location, type of intervention (i.e. impacts are case specific) and on the issues being assessed. However, the general consensus was that although sensitivities vary with features and in some cases location, Pagham Beach is less sensitive to disturbance than Church Norton spit and that sensitivities are greater overall the further west.

This was evidenced by the recent consents for, and subsequent construction of, the rock revetment and training arm towards the west end of Harbour Road. However it should

be noted that the consents were based on a specific proposal which did not necessarily indicate that other works in the vicinity would be approved.

It was highlighted that along Church Norton Spit itself there are a range of features of interest with varying sensitivity levels.

In terms of impacts to vegetation, the eastern end is considered to be less sensitive to disturbance than the western extent, as it has more recently formed shingle with less, if any, established vegetation. Interests strengthen towards the western end due to the increase in surface area and the increase in well-established colonised shingle vegetation which is much more sensitive to disturbance. As well as the change in interests along the spit towards established vegetation, the transition and range of stability is part of a unique interest of the spit as it shows different stages of development.

The spit itself is also geomorphologically important for its unique character, including the presence of natural ridge formations and recurves, as captured by the SSSI and GCR designation. In addition, the recently formed shingle along the eastern end is important as it is one particular location where the Little Terns nest.

Whilst there is a general increase in sensitivities from east to west it should be noted that there are local variations to this trend, and that the biodiversity interests may be said to increase from east to west as more species are involved in the western, more established end.

2.7 Are there any foreseeable changes or additions to the conservation categories?

It is understood that a new Marine SPA is proposed in the Solent, in the coastal waters between Chichester and Langstone Harbours and around Selsey Bill. The proposed Solent Marine SPA would offer protection across the Solent to tern foraging areas. Consultation on the proposed Solent Marine SPA is due to take place this year (2014), with implementation proposed by 2015.

However, it was noted by NE that it is not anticipated that there would be any direct impacts or implications for the Marine SPA, as a result of the proposed intervention measures within the study area, as the Marine SPA would focus on marine ecosystems and the proposed works would most likely be undertaken in the intertidal area at a distance from the proposed Marine SPA, in an area in which the existing SPA applies.

2.8 Would a natural closure of the harbour entrance be acceptable?

It was noted that both the EA and NE would not do anything to prevent a natural closure of the harbour nor seek to re-open the harbour provided it was the result of natural processes. The conservation objectives for the site allow for natural change, including natural closing the harbour and therefore, where possible, they would like to see natural processes at work.

However, if issues such as water quality within the harbour become a conservation issue then these would need to be addressed and a range of options may be available to do this. Such options would have to be tested against the environmental legislation processes. See Question 2.13 for further comments.

2.9 Would measures that indirectly cause a closure of the harbour entrance be acceptable?

This would not be seen as an entirely natural occurrence and therefore any option would need to be subject to due process. The outcome of the assessment process could then inform decision makers, and the regulators would provide advice on the potential conservation issues should the details of any proposed intervention be developed.

2.10 Would measures that directly close the harbour entrance be acceptable?

This would not be a natural occurrence and therefore the intervention measure would have little likelihood of being acceptable. If it was pursued further it is likely that any offsetting or mitigating measures would be challenging at least. It is not clear at this stage what the impacts would be and their extent, so it is difficult to say whether those effects could be offset at all.

2.11 Would measures that maintain a natural closure of the harbour entrance be acceptable?

Should the harbour naturally close, it would still be appropriate to allow natural processes to continue to operate which may eventually lead to the re-opening of the harbour entrance. Therefore any proposal to maintain the natural closure of the harbour entrance would be subject to due process.

2.12 What are the potential issues and impacts of a closure of the harbour?

Management
It was noted that if the harbour was closed (naturally, indirectly or directly), this would cause various management issues:

- Wildlife (such as the Little Tern) favours the presence of a spit as it provides some isolation from the mainland, from humans, from pets and natural predators, by which they are easily disturbed. If closure of the harbour were to occur, protective measures such as fencing would need to be considered to protect wildlife. However, as noted by NE, fencing is only one of the suite of management measures that may be necessary, and these cannot guarantee that wildlife such as Little Terns will use the area for nesting. Also, if the level of disturbance increased from humans, pets and natural predators, then it is unlikely that the Little Terns would nest or be successful, despite any management measures in place.

- In addition NE noted that fencing is currently in place but only to indicate where the Terns nest and is not the type of fencing to exclude pets and natural predators. The Little Terns protection is currently achieved due to the distance that they nest from the source of these impacts.

- For breeding and nesting certain bird species (such as Little Tern, Ringed Plover and Oystercatcher) prefer the presence of fresh bare shingle, such as that which is freshly accreted. A change in the shingle formations may lead to an increase in vegetation, including non-native species, from the mainland increasing along the spit. This could result in the need for vegetation cleaning to maintain shingle exposure. However, as noted by NE, where vegetation has been cleared before for Little Terns, this has had limited success.

- Potential impacts on the experience of visitors and an increase in the number of visitors. Visitor numbers could increase from the Pagham Beach side as a closure would allow people to walk from Pagham to Church Norton. This could increase footfall in the area and potentially damage vegetated coastal shingle and increase disturbance to bird species in the area.

Recreation and Other Uses
Pagham Harbour and beach has a range of recreational activities so any closure could have an impact, positive or negative, on these activities.

Conservation Designations
The closure of the harbour is likely to cause major changes to the intertidal habitats supported within the SPA, Ramsar, SSSI and associated features. As a result of the conservation status of the designated sites at Pagham Harbour, it is likely that any forced closure of the harbour would involve a lengthy process of mitigation and compensation, with the need to quantify and qualify the extent of the impacts. It is also likely that there will be a need to demonstrate that there are no other alternative options and to illustrate that the proposed scheme is of national interest. This may prove difficult to achieve and would require an assessment to quantify and qualify the extent of the impacts.

Flood Risk
Tidal levels in Pagham Harbour are controlled by the elevation of tidal levels outside the harbour and how they are modified as they enter and leave through the channel entrance. It was understood that an earlier study undertaken by the EA had determined that a closure of the harbour entrance would result in a reduction in the high water levels thereby reducing the flood risk to the areas surrounding Pagham Harbour. The closure would also result in a maximum 11 cm rise in water levels under an extreme rainfall event. However, it was very unlikely that this increase would result in a water level in excess of the existing extreme high tide level.

Water Quality
For potential impacts and considerations on water quality, see Question 2.13.

2.13 Would measures that reduce tidal flows through the harbour entrance be acceptable?

Water Quality
Pagham Harbour is tidal and therefore naturally flushes daily which contributes to maintaining its water quality. If the harbour closed, the intertidal area would become a large estuarine lagoon. Water quality conditions would be difficult to predict and would be dependent upon how much saline water entered the lagoon via percolation through the spit or wave overtopping of the spit. In addition, tidal effects based on percolation, how long the lagoon would remain isolated and the effect of nutrients entering the lagoon in runoff and outputs from sewage works, amongst others, would need considering.

It was noted that fresh water input into the harbour is very low. Also Pagham sewage treatment works and Siddlesham sewage treatment works both discharge into Pagham Harbour via Pagham Rife and Broad Rife respectively. It was discussed that sewage discharge into the harbour is already a problem and any intervention measures must comply with the Water Framework Directive (2009) which aims to achieve good ecological potential by 2015 and good water quality by 2027. The current status of the water body within Pagham Harbour and Lagoon is 'moderate'.

The current sewage problem and consequent 'moderate' water quality is an on-going issue with the sewage treatment works believed to be currently working at their peak capacity. The problem is further exacerbated during high rainfall events which can cause contaminated surface water run-off into the harbour. Therefore closure might require increased treatment and modification of effluent outfalls within the harbour which would require discussions and agreements with the utility companies.

Overall, measures that would prevent or significantly reduce tidal flows are seen to be unfavourable and potentially unacceptable if water quality becomes degraded.

2.14 What are the present shortcomings of the existing rock revetment and training arm?

The main shortcomings of the existing structure are as follows:

- The toe level of the revetment is too high allowing undermining.

- The length of the rock training arm is too short allowing the channel to the east to remain close to the shoreline and severe eddy currents to develop on the eastern side of the structure.

- The rock revetment and training arm are too permeable allowing ebb flows from the harbour to wash out fine material from behind the structures.

As a consequence there is some instability in the structure and beach erosion is occurring in the lee of the structure. This has resulted in the 15 properties to the west being better protected but the properties to the east being at risk from flooding, overtopping and erosion.

It was noted that when the revetment was constructed the design was sufficient to deal with the conditions at the time. However, the present shortcomings have occurred due to the unexpected exceptional growth of the shingle spit.

2.15 With remedial measures what is the likely effectiveness and lifespan of the existing rock revetment and training arm?

It was agreed that the immediate problems with the existing structure were mainly of an engineering nature and could be resolved by an upgrading of the structure. This could include a lengthening of the training arm to match the original length of the now partly failed rock groyne. Provided the design met the new operating conditions there was no reason why the structure itself could not have a lifespan in excess of 50 years.

However, the lifespan of the structure in terms of its sustainability and effectiveness were less certain and would require further study. Given the dynamic and unpredictable nature of the harbour entrance there was a risk of the structure, even in its upgraded condition, being overwhelmed by natural processes. Also there would most probably be on-going issues with a reduced size of beach to the east of the structure. However, subject to sustainability, this could be resolved by regular beach renourishment (whether recycling or recharge) in order to provide the required standard of protection and provide the beach amenity that PPC wish to see.

2.16 Would extensions to the existing rock revetment and training arm be more acceptable than new structures constructed elsewhere?

Rock Revetment
It was noted that an extension to the existing rock revetment would be more acceptable by the regulators than the construction of a new structure elsewhere as the existing structure is already in place. Consents could therefore be 'streamlined' as this process has already been carried out in principle. However, new structures would need to be tested under the various planning and environmental legislation to ensure it is compatible. Work undertaken for the existing structure could help inform this and provide some of the evidence base.

Rock Training Arm
It was agreed that working alongside natural processes or 'Steering Natural Functions' would be favoured above measures that would interrupt natural processes and potentially provides a solution that is more sustainable, effective and cost effective. Therefore the continued or extended use of the rock training arm to provide a level of control would be considered less of an issue as it gives a 'degree of control' without preventing processes altogether and does not involve the construction of additional structures elsewhere.

2.17 Would a natural breach of the shingle spit be acceptable?

It was noted that both the EA and NE would not do anything to prevent a natural breach of the shingle spit nor seek to re-close the spit provided it was the result of natural processes.

2.18 What are the key issues when considering an artificial breach of the shingle spit?

Church Norton Spit is one of only a few shingle spits in the UK that has been able to naturally evolve. The spit is a key geomorphological and geological feature of international and national interest being a classic shingle spit landform comprises a series of sub-parallel ridges and recurves, marking different phases of extension and frontal accretion and therefore it is important to maintain its natural behaviour and features.

It is difficult to accurately predict the implications of breaching the spit due to many uncertainties, including but not limited to; the natural development of the breach in terms of the behaviour of the disconnected spit (flying bar) and the behaviour of Church Norton spit and the possibility of a natural re-closure, along with the general impacts on coastal processes along the frontage and technical feasibility in terms of breaching and maintaining the breach.

The location of a potential breach point along Church Norton Spit was discussed. Three potential locations were acknowledged, being three erosion pockets along the eastern section of the shingle spit (see Appendix A). Although these did not rule out other possible locations for further investigation, they were seen as a reasonable way forward.

If the spit was artificially breached then there could be a need for a commitment to maintain the breach for the long term. This would probably require a fairly long and substantial training arm. The outcome of this discussion is summarised below:

- A breach in the spit is more favourable the further east it occurs, being the weakest point and generally (subject to local variations) the least sensitive. Refer to Questions 2.5 and 2.6 for details on sensitivities.

- A breach would have ongoing issues concerning the uncertainty of future behaviour and these risks would need to be understood for any consent. In addition, consultation would be required with NE regarding who is responsible for managing the risks and the ongoing management and mitigation, and who would address unforeseen impacts or monitoring. Also the EA would need to be assured of WFD funding commitments.

- Various scenarios of a breach would need to be appraised.

- Church Norton Spit would remain but the breach would result in the spit becoming shorter, with a disconnected second spit (‘flying bar’) to the east. The behaviour of the disconnected spit would be difficult to predict.

- Natural processes and sediment transport would still occur (including littoral beach drift west to east) and this could block the harbour resulting in the potential need for continued maintenance to ensure the harbour remains open.

- The new channel could act as a barrier to sediment movement along the frontage resulting in potential shingle accreting on Pagham Beach.

- Any form of breach to the Church Norton Spit would probably require significant works within the SPA, Ramsar and SSSI in order to maintain their integrity.

- It has been noted by NE that any hard engineering on the spit would not be a favoured approach due to the sensitivities involved and as with other intervention measures, would need to be assessed and tested.

An extension of the existing steel sheet piled wall training arm along the original harbour entrance was also discussed which, together with excavation of the spit, could re-direct the channel along its former path (prior to the accelerated growth from 2001). It was noted that if a coastal defence structure or any other permanent structure was in place before the study area was designated, then this is included and part of the designated site. It was therefore arguable whether an extension to the existing structure would be considered less critical than introducing a new separate structure further along the spit. However, due to the width and stability of the spit at this point it was considered that this was not the case and would still require full assessment.

2.19 Would adaptable measures have the potential to be more acceptable than fixed measures?

Adaptive measures were favoured compared to more permanent measures due to the uncertain behaviour and processes in the area. Adaptive short term measures allow for the phasing of works and, if required, their subsequent removal.

Dealing with issues in the short term with adaptable measures together with continued monitoring of the spit would deal with the on-going uncertainty over the spit's behaviour. This would then enable intervention measures to be phased with natural processes to tackle the situation both proactively and reactively. This approach was favoured as it makes use of the existing works in providing evidence of the performance of intervention measures with the option of further modifications or removal if necessary.

It was agreed that adaptive management is a favourable approach, however adaptive measures would be less favoured by the local residents as they are looking for greater long term certainty.

It is critical here to acknowledge whether cutting through the channel provides this long term certainty or whether it introduces other unknowns and risks (including consequent additional management requirements which cannot be budgeted for), all of which may be difficult to predict. In addition, potentially managing scour at its local point and replenishing the shingle holds more certainty as it is a tried and tested method along many other beaches to provide both a defence and amenity value.

2.20 Would short term / temporary measures have the potential to be more acceptable than long term / permanent measures?

Beach Management
It was noted that beach management is a well-established approach in coastal engineering. The concept of beach renourishment via recycling (i.e. obtaining shingle from one area of the frontage and moving it to a more needy area) or recharge (i.e. importing new shingle and depositing it where required) was well understood and generally acceptable where it could provide the necessary protection. Also beaches provide an amenity.

However, due to the dynamic nature and uncertain behaviour of the spit and coastal processes, beach management is not without its risks. Some risks will be specific to Pagham and therefore approaches and cost will vary compared to other coastal areas.

Beach management would not be ruled out whether as a short term or full solution, or in combination with for example more permanent coastal structures. The particular circumstances would dictate whether or not such measures would be more or less favourable than permanent measures.

Recycling:

- From an environmental perspective, the area proposed for shingle removal (the distal end of Church Norton Spit) within the ebb delta requires careful consideration so that the impacts on natural geomorphological features are minimised. The area of current accretion is formed of new fresh shingle deposits and is therefore of lower environmental value, and potentially less sensitive, as discussed in Question 6. However, this option still has the potential to disrupt natural processes and potentially disrupt the designated SPA and SSSI interest features in the area.

- As noted by NE recycling using shingle from the spit and delta should be assessed on a case by case basis.

- ADC noted that following an event where high levels of shingle were lost in a short time period, recycling shingle from an area of gain to an area of loss would still be favourable. The latest freshly deposited shingle at the eastern tip of the spit is estimated to have at least 50,000 tonnes of new shingle. It was agreed that the logistical issues of collecting this material and recycling it could be difficult from both an environmental and technical perspective but nonetheless could be achieved.

Recharge:

- Recharge of material was discussed to have fewer impacts and complications environmentally, however logistical issues could remain.

- This option still has the potential to disrupt natural processes and potentially disrupt the geomorphological features of the SSSI along with other interest features of the SPA and SSSI. Source of the shingle is an important factor here when assessing the impacts to the designated sites.

2.21 Are there any intervention measures that would be seen to actively support the conservation objectives?

In principle the removal of existing structures and any return towards the natural geomorphological processes operating within the area, would be seen as an intervention that supports the conservation objectives.

2.22 Are there any obvious and reasonably achievable (compensation) measures that could be used to offset the impacts of any new works?

It was agreed that it would be best to avoid the need for compensation measures if at all possible as the legislation requires that impacts should be avoided or mitigated where possible and due to the lengthy and complex legislative process involved.

Compensation in regards to Natura 2000 (N2K) sites has a specific meaning in the process of assessment and would be a complex issue.

It was discussed that habitat compensation is the final step, in a lengthy Environmental Impact Assessment (EIA) and Habitat Regulations Assessment (HRA) process. Which, put simply, begins by identifying what interests are present at the site and how these interests will be impacted upon by the proposed development. It is first established if these impacts can be avoided, if avoidance is unachievable, then impacts must be mitigated either by design alteration or construction methodology. If sufficient mitigation is unachievable then the project must be taken to a higher level of examination, where the case for the proposed works must be presented, determining that there is no alternative option and that the proposed works are of national importance. If an adverse effect is concluded but a project is still to be assented, where there is an overriding public interest and not alternatives, then habitat compensation measures are necessary and will be discussed. However, preparation for this stage is advisable, i.e if the scheme is likely to go as far as compensation then investigations into potential compensatory measures should be made).

It is therefore important to think about techniques, methods and timing of proposed intervention works and where possible avoid adverse effects.

2.23 What is the best way to take forward potential intervention measures for closer consideration?

It was agreed that the next stage would be to produce a brief consultation document outlining the potential intervention measures for closer examination and submit it to ADC, NE and the EA for informal advice.

As discussed in the meeting the likely options would be:-

- Upgrading and/or extending of the existing rock revetment and training arm possibly complemented by beach management.

- Cutting a new channel across the spit east of the existing steel sheet piled wall training arm. To maintain the channel it is anticipated that a substantial new training arm will be required.

- Closing the existing channel.

Depending on the results of the present upgrading of the existing rock revetment and training arm it was recognised that as a minimum the first option outlined above would need to be the short term solution along with potential beach recycling / recharge. This would allow the necessary time to investigate the other options which may provide a longer term more sustainable solution.

3 APPENDICES

Appendix A – Site Plan

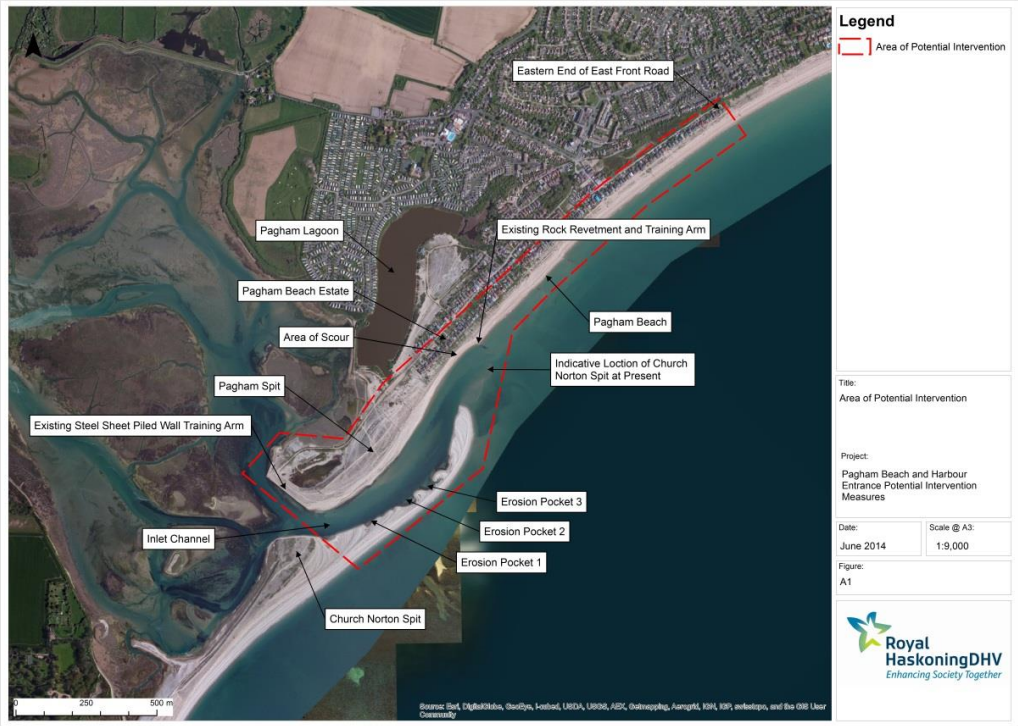

Figure A1: Area of Potential Intervention and Key Features

Appendix B – Environmental Conservation Designation Plans

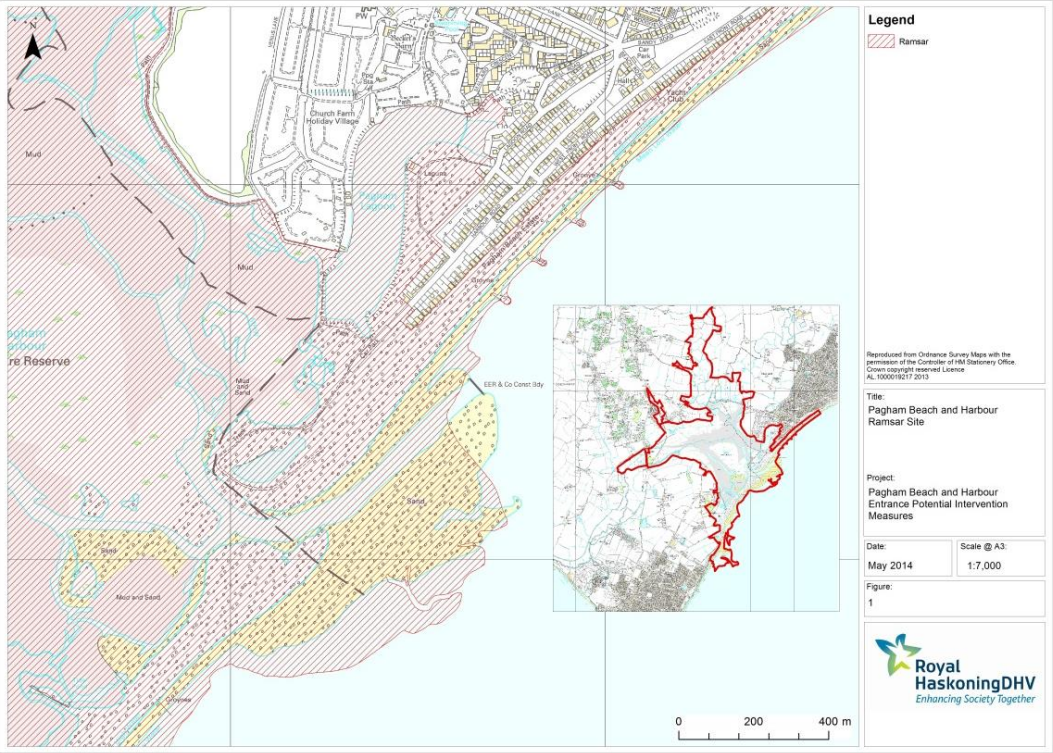

Figure B1: Pagham Beach and Harbour Ramsar Site

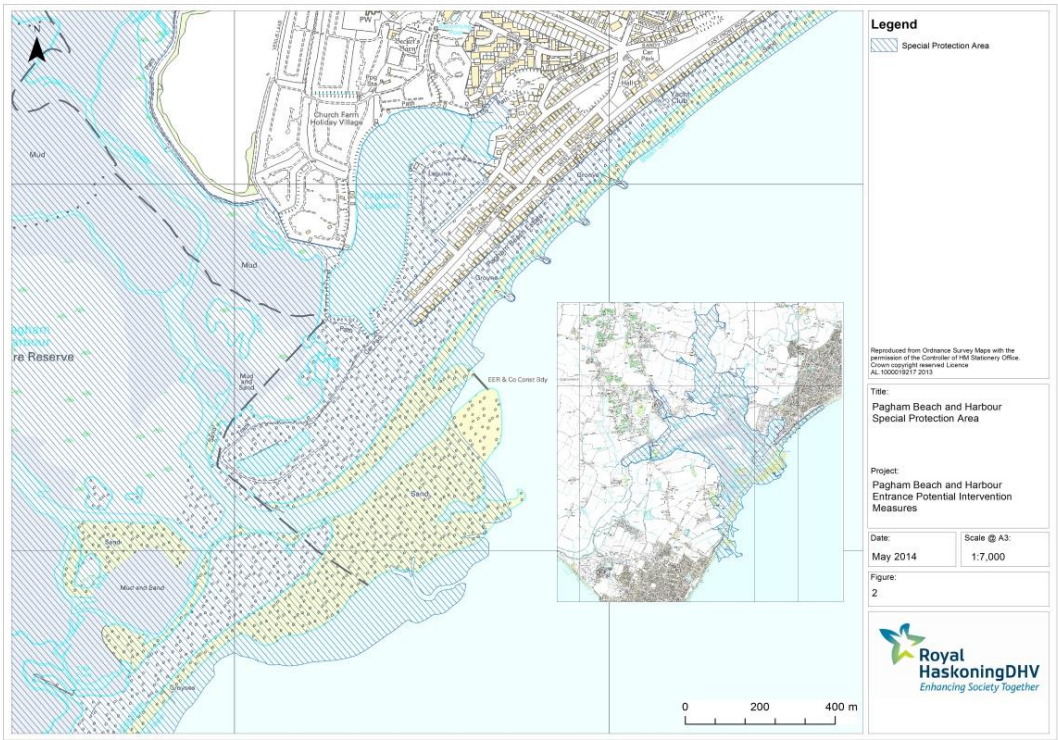

Figure B2: Pagham Beach and Harbour Special Protection Area

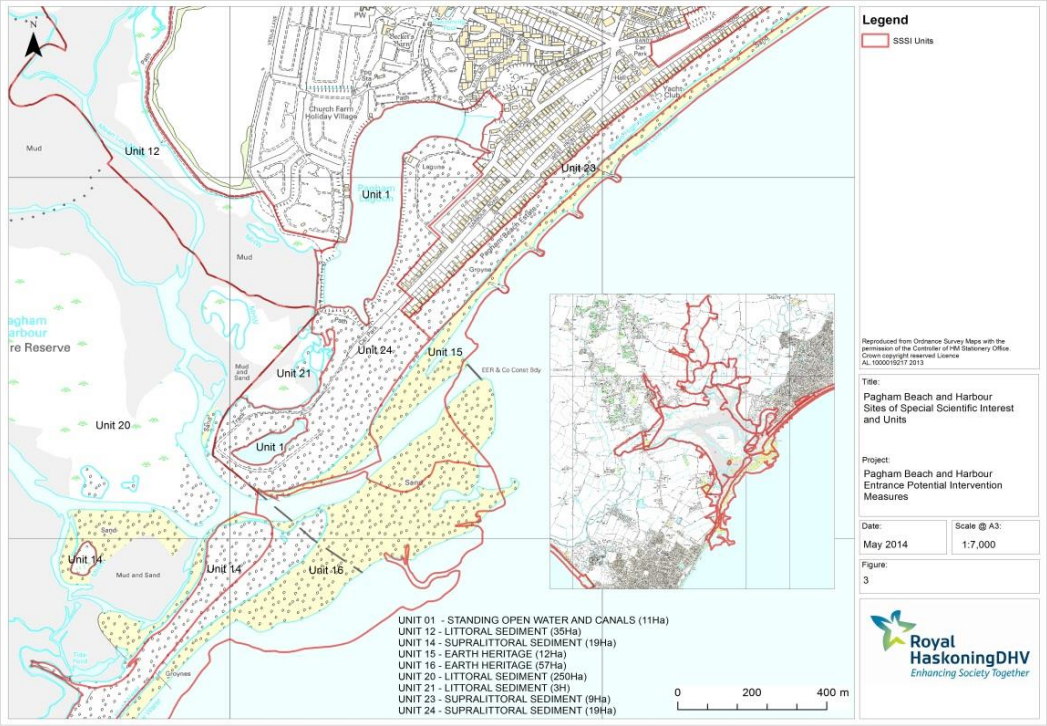

Figure B3: Pagham Beach and Harbour Site of Special Scientific Interest and Individual Units

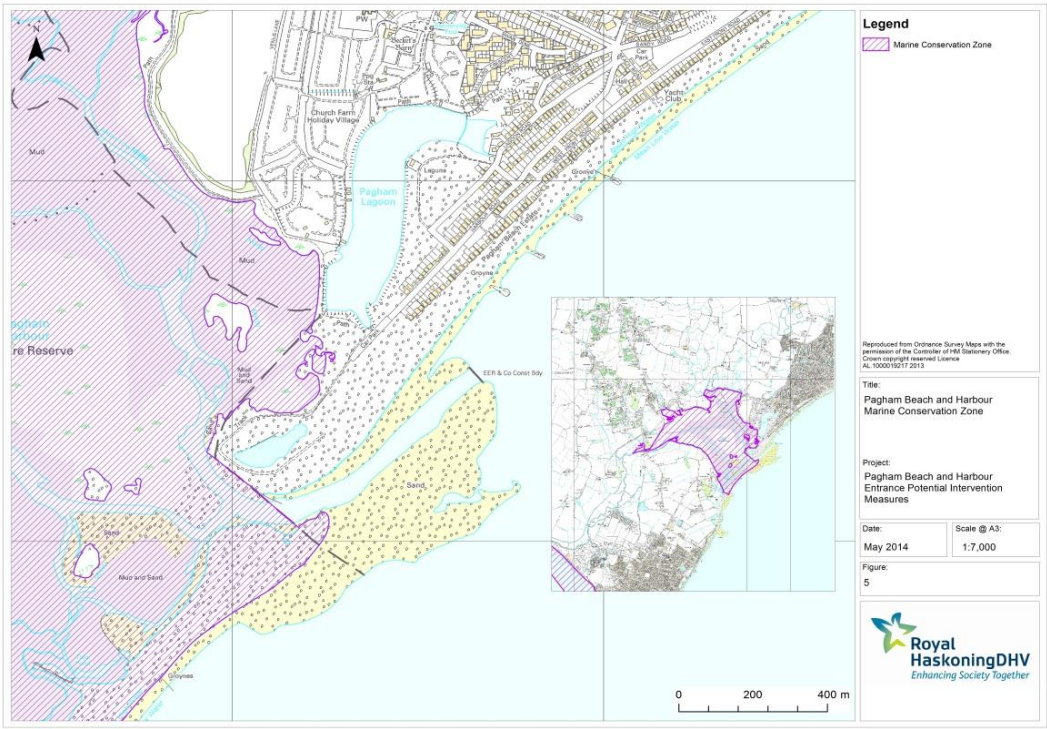

Figure B4: Pagham Beach and Harbour Marine Conservation Zone

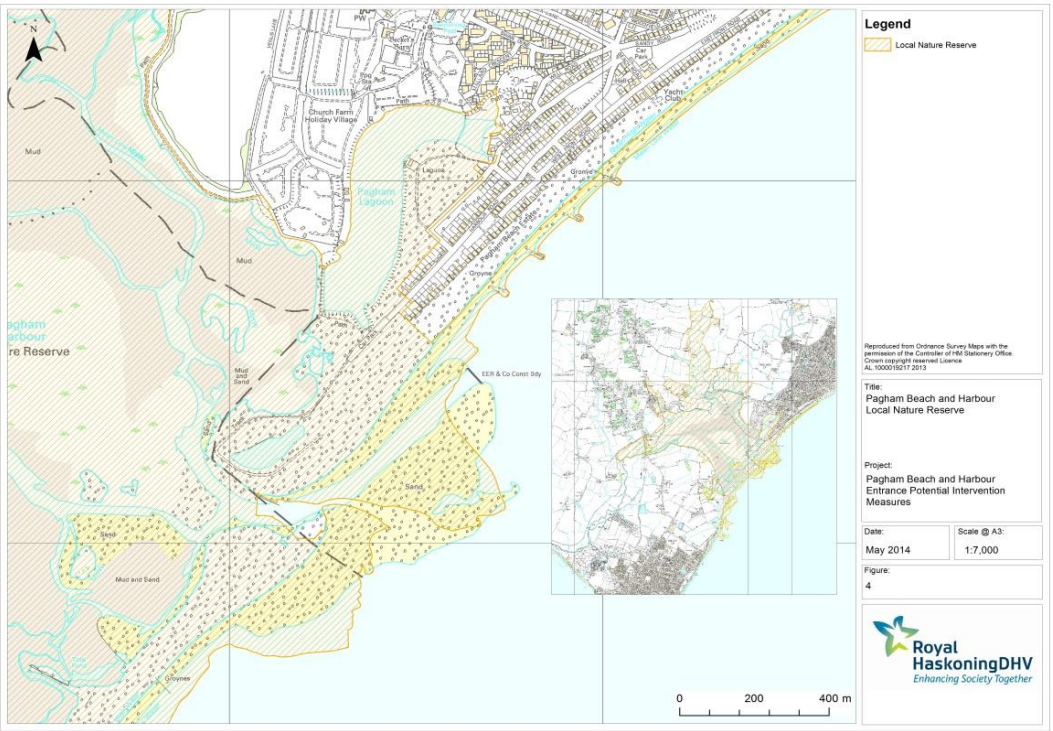

Figure B5: Pagham Beach and Harbour Local Nature Reserve

Ramsar Site

Information Sheet on Ramsar Wetlands (RIS)

Categories approved by Recommendation 4.7 (1990), as amended by Resolution VIII.13 of the 8th Conference of the Contracting Parties (2002) and Resolutions IX.1 Annex B, IX.6, IX.21 and IX. 22 of the 9th Conference of the Contracting Parties (2005).

Notes for compilers:

1. The RIS should be completed in accordance with the attached *Explanatory Notes and Guidelines for completing the Information Sheet on Ramsar Wetlands*. Compilers are strongly advised to read this guidance before filling in the RIS.
2. Further information and guidance in support of Ramsar site designations are provided in the *Strategic Framework for the future development of the List of Wetlands of International Importance* (Ramsar Wise Use Handbook 7, 2nd edition, as amended by COP9 Resolution IX.1 Annex B). A 3rd edition of the Handbook, incorporating these amendments, is in preparation and will be available in 2006.
3. Once completed, the RIS (and accompanying map(s)) should be submitted to the Ramsar Secretariat. Compilers should provide an electronic (MS Word) copy of the RIS and, where possible, digital copies of all maps.

1. Name and address of the compiler of this form:

FOR OFFICE USE ONLY.
DD MM YY
Designation date | Site Reference Number

Joint Nature Conservation Committee
Monkstone House
City Road
Peterborough
Cambridgeshire PE1 1JY
UK
Telephone/Fax: +44 (0)1733 – 562 626 / +44 (0)1733 – 555 948
Email: RIS@JNCC.gov.uk

2. Date this sheet was completed/updated:
Designated: 30 March 1988

3. Country:
UK (England)

4. Name of the Ramsar site:
Pagham Harbour

5. Designation of new Ramsar site or update of existing site:

This RIS is for: Updated information on an existing Ramsar site

6. For RIS updates only, changes to the site since its designation or earlier update:
a) Site boundary and area:

** Important note: If the boundary and/or area of the designated site is being restricted/reduced, the Contracting Party should have followed the procedures established by the Conference of the Parties in the Annex to COP9 Resolution IX.6 and provided a report in line with paragraph 28 of that Annex, prior to the submission of an updated RIS.

b) Describe briefly any major changes to the ecological character of the Ramsar site, including in the application of the Criteria, since the previous RIS for the site:

7. Map of site included:

Refer to Annex III of the *Explanatory Notes and Guidelines*, for detailed guidance on provision of suitable maps, including digital maps.

a) A map of the site, with clearly delineated boundaries, is included as:

i) **hard copy** (required for inclusion of site in the Ramsar List): *yes* ✓ -or- *no* □;
ii) **an electronic format** (e.g. a JPEG or ArcView image) Yes
iii) **a GIS file providing geo-referenced site boundary vectors and attribute tables** *yes* ✓ -or- *no* □;

b) Describe briefly the type of boundary delineation applied:

e.g. the boundary is the same as an existing protected area (nature reserve, national park etc.), or follows a catchment boundary, or follows a geopolitical boundary such as a local government jurisdiction, follows physical boundaries such as roads, follows the shoreline of a waterbody, etc.

The site boundary is the same as, or falls within, an existing protected area.

For precise boundary details, please refer to paper map provided at designation

8. Geographical coordinates (latitude/longitude)**:**

50 45 48 N 00 45 38 W

9. General location:

Include in which part of the country and which large administrative region(s), and the location of the nearest large town.

Nearest town/city: Chichester

10 km south-east of Chichester.

Administrative region: West Sussex

10. Elevation (average and/or max. & min.) (metres)**:** **11. Area** (hectares)**:** 636.68

Min. -1
Max. 5
Mean 1

12. General overview of the site:

Provide a short paragraph giving a summary description of the principal ecological characteristics and importance of the wetland.

Pagham Harbour comprises an extensive central area of saltmarsh and tidal mudflats with surrounding habitats including lagoons, shingle, open water, reed swamp and wet permanent grassland.

The intertidal mudflats are rich in invertebrate and algae, and provide important feeding areas for birds. The lower saltmarsh is dominated by common cord-grass but also includes patches of glasswort. At higher levels sea-purslane is abundant. The area supports internationally important numbers of wintering pintail and nationally important numbers of dark-bellied brent goose, grey plover and black-tailed godwit.

13. Ramsar Criteria:

Circle or underline each Criterion applied to the designation of the Ramsar site. See Annex II of the *Explanatory Notes and Guidelines* for the Criteria and guidelines for their application (adopted by Resolution VII.11).

6

14. Justification for the application of each Criterion listed in 13 above:

Provide justification for each Criterion in turn, clearly identifying to which Criterion the justification applies (see Annex II for guidance on acceptable forms of justification).

Ramsar criterion 6 – species/populations occurring at levels of international importance.

Qualifying Species/populations (as identified at designation):

Species with peak counts in winter:

Dark-bellied brent goose, *Branta bernicla bernicla*,	2512 individuals, representing an average of 1.1% of the population (5 year peak mean 1998/9-2002/3)

Species/populations identified subsequent to designation for possible future consideration under criterion 6.

Species with peak counts in winter:

Black-tailed godwit , *Limosa limosa islandica*, Iceland/W Europe	377 individuals, representing an average of 1% of the population (5 year peak mean 1998/9-2002/3)

Contemporary data and information on waterbird trends at this site and their regional (sub-national) and national contexts can be found in the Wetland Bird Survey report, which is updated annually. See www.bto.org/survey/webs/webs-alerts-index.htm.

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15. Biogeography (required when Criteria 1 and/or 3 and /or certain applications of Criterion 2 are applied to the designation):

Name the relevant biogeographic region that includes the Ramsar site, and identify the biogeographic regionalisation system that has been applied.

a) biogeographic region:

Atlantic

b) biogeographic regionalisation scheme (include reference citation):

Council Directive 92/43/EEC

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16. Physical features of the site:

Describe, as appropriate, the geology, geomorphology; origins - natural or artificial; hydrology; soil type; water quality; water depth, water permanence; fluctuations in water level; tidal variations; downstream area; general climate, etc.

Soil & geology	neutral, shingle, sand, mud, clay, alluvium, nutrient-rich, sedimentary, gravel
Geomorphology and landscape	lowland, coastal, floodplain, shingle bar, subtidal sediments (including sandbank/mudbank), intertidal sediments (including sandflat/mudflat), open coast (including bay), enclosed coast (including embayment), estuary, islands, lagoon, pools
Nutrient status	mesotrophic
pH	circumneutral
Salinity	brackish / mixosaline, fresh, saline / euhaline
Soil	mainly mineral
Water permanence	usually permanent

Summary of main climatic features	Annual averages (Bognor Regis, 1971–2000) (www.metoffice.com/climate/uk/averages/19712000/sites/bognor_regis.html) Max. daily temperature: 13.7° C Min. daily temperature: 7.7° C Days of air frost: 24.0 Rainfall: 717.4 mm Hrs. of sunshine: 1902.9

General description of the Physical Features:

Pagham Harbour is an estuarine basin that comprises an extensive central area of saltmarsh and intertidal mudflats, surrounded by lagoons, shingle, open water, reed swamp and wet permanent grassland.

17. Physical features of the catchment area:

Describe the surface area, general geology and geomorphological features, general soil types, general land use, and climate (including climate type).

Pagham Harbour is an estuarine basin that comprises an extensive central area of saltmarsh and intertidal mudflats, surrounded by lagoons, shingle, open water, reed swamp and wet permanent grassland.

18. Hydrological values:

Describe the functions and values of the wetland in groundwater recharge, flood control, sediment trapping, shoreline stabilization, etc.

Shoreline stabilisation and dissipation of erosive forces, Sediment trapping

19. Wetland types:

Marine/coastal wetland

Code	Name	% Area
G	Tidal flats	33.3
Other	Other	31
E	Sand / shingle shores (including dune systems)	20.1
H	Salt marshes	5.2
F	Estuarine waters	3.3
J	Coastal brackish / saline lagoons	2.4
Sp	Saline / brackish marshes: permanent	2.2
Tp	Freshwater marshes / pools: permanent	0.8
W	Shrub-dominated wetlands	0.6
A	Shallow marine waters	0.6
M	Rivers / streams / creeks: permanent	0.3
9	Canals and drainage channels	0.2

20. General ecological features:

Provide further description, as appropriate, of the main habitats, vegetation types, plant and animal communities present in the Ramsar site, and the ecosystem services of the site and the benefits derived from them.

This site comprises an extensive central area of saltmarsh and tidal mudflats with surrounding habitats including shingles, open water, reed swamp and wet permanent grassland. Pagham Harbour is of national importance for wintering, wildfowl and waders and also for breeding birds both within the Harbour and the surrounding grazing pasture. The site supports nationally important communities of plants and invertebrates.

Ecosystem services

21. Noteworthy flora:

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in **12**. Justification for the application of the Criteria) indicating, e.g. which species/communities are unique, rare, endangered or biogeographically important, etc. *Do not include here taxonomic lists of species present – these may be supplied as supplementary information to the RIS.*

Nationally important species occurring on the site.

Higher Plants.

Petrorhagia nanteuilii

22. Noteworthy fauna:

Provide additional information on particular species and why they are noteworthy (expanding as necessary on information provided in **12**. Justification for the application of the Criteria) indicating, e.g. which species/communities are unique, rare, endangered or biogeographically important, etc., including count data. *Do not include here taxonomic lists of species present – these may be supplied as supplementary information to the RIS.*

Birds

Species currently occurring at levels of national importance:

Species with peak counts in spring/autumn:

Little egret , *Egretta garzetta*, West Mediterranean	60 individuals, representing an average of 3.6% of the GB population (5 year peak mean 1998/9-2002/3)
Whimbrel , *Numenius phaeopus*, Europe/Western Africa	104 individuals, representing an average of 3.4% of the GB population (5 year peak mean 1998/9-2002/3 - spring peak)
Common greenshank , *Tringa nebularia*, Europe/W Africa	20 individuals, representing an average of 3.3% of the GB population (5 year peak mean 1998/9-2002/3)

Species with peak counts in winter:

Slavonian grebe , *Podiceps auritus*, Northwest Europe	14 individuals, representing an average of 1.9% of the GB population (5 year peak mean 1998/9-2002/3)
Northern pintail , *Anas acuta*, NW Europe	462 individuals, representing an average of 1.6% of the GB population (5 year peak mean 1998/9-2002/3)
Grey plover , *Pluvialis squatarola*, E Atlantic/W Africa -wintering	704 individuals, representing an average of 1.3% of the GB population (5 year peak mean 1998/9-2002/3)
Spotted redshank , *Tringa erythropus*, Europe/W Africa	5 individuals, representing an average of 3.6% of the GB population (5 year peak mean 1998/9-2002/3)

Species Information

Nationally important species occurring on the site.

Invertebrates.

Nematostella vectensis

23. Social and cultural values:

Describe if the site has any general social and/or cultural values e.g. fisheries production, forestry, religious importance, archaeological sites, social relations with the wetland, etc. Distinguish between historical/archaeological/religious significance and current socio-economic values.

Aesthetic
Aquatic vegetation (e.g. reeds, willows, seaweed)
Archaeological/historical site
Environmental education/ interpretation

Fisheries production
Livestock grazing
Non-consumptive recreation
Scientific research
Sport fishing
Sport hunting
Tourism

b) Is the site considered of international importance for holding, in addition to relevant ecological values, examples of significant cultural values, whether material or non-material, linked to its origin, conservation and/or ecological functioning? No

If Yes, describe this importance under one or more of the following categories:

i) sites which provide a model of wetland wise use, demonstrating the application of traditional knowledge and methods of management and use that maintain the ecological character of the wetland:

ii) sites which have exceptional cultural traditions or records of former civilizations that have influenced the ecological character of the wetland:

iii) sites where the ecological character of the wetland depends on the interaction with local communities or indigenous peoples:

iv) sites where relevant non-material values such as sacred sites are present and their existence is strongly linked with the maintenance of the ecological character of the wetland:

24. Land tenure/ownership:

Ownership category	On-site	Off-site
Non-governmental organisation (NGO)	+	+
Local authority, municipality etc.	+	+
National/Crown Estate	+	+
Private	+	+

25. Current land (including water) use:

Activity	On-site	Off-site
Nature conservation	+	
Tourism	+	+
Recreation	+	+
Current scientific research	+	
Bait collection	+	+
Arable agriculture (unspecified)		+
Permanent arable agriculture		+
Livestock watering hole/pond	+	+
Permanent pastoral agriculture	+	+
Hunting: recreational/sport	+	+
Sewage treatment/disposal	+	+
Flood control	+	+
Irrigation (incl. agricultural water supply)		+
Transport route		+

Urban development		+

26. Factors (past, present or potential) adversely affecting the site's ecological character, including changes in land (including water) use and development projects:

Explanation of reporting category:

1. *Those factors that are still operating, but it is unclear if they are under control, as there is a lag in showing the management or regulatory regime to be successful.*
2. *Those factors that are not currently being managed, or where the regulatory regime appears to have been ineffective so far.*

NA = Not Applicable because no factors have been reported.

Adverse Factor Category	Reporting Category	Description of the problem (Newly reported Factors only)	On-Site	Off-Site	Major Impact?
No factors reported	NA				

For category 2 factors only. What measures have been taken / are planned / regulatory processes invoked, to mitigate the effect of these factors?
Is the site subject to adverse ecological change? NO

27. Conservation measures taken:

List national category and legal status of protected areas, including boundary relationships with the Ramsar site; management practices; whether an officially approved management plan exists and whether it is being implemented.

Conservation measure	On-site	Off-site
Site/ Area of Special Scientific Interest (SSSI/ASSI)	+	+
Special Protection Area (SPA)	+	
Land owned by a non-governmental organisation for nature conservation	+	
Management agreement	+	
Site management statement/plan implemented	+	

b) Describe any other current management practices:

The management of Ramsar sites in the UK is determined by either a formal management plan or through other management planning processes, and is overseen by the relevant statutory conservation agency. Details of the precise management practises are given in these documents.

28. Conservation measures proposed but not yet implemented:

e.g. management plan in preparation; official proposal as a legally protected area, etc.

No information available

29. Current scientific research and facilities:

e.g. details of current research projects, including biodiversity monitoring; existence of a field research station, etc.

Contemporary.

Fauna.
Numbers of migratory and wintering wildfowl and waders are monitored annually as part of the national Wetland Birds Survey (WeBS) organised by the British Trust for Ornithology, Wildfowl & Wetlands Trust, the Royal Society for the Protection of Birds and the Joint Nature Conservation Committee.

Completed.

Environment, Flora and Fauna.
Extensive research and surveys into tidal regimes, sediment movement and the distribution of all major animal and plant groups has been carried out in Pagham Harbour.

30. Current communications, education and public awareness (CEPA) activities related to or benefiting the site:

e.g. visitor centre, observation hides and nature trails, information booklets, facilities for school visits, etc.

There is an interpretative centre for the Local Nature Reserve.
A full time Education Officer is employed, the programme being particularly directed at schoolchildren.

31. Current recreation and tourism:

State if the wetland is used for recreation/tourism; indicate type(s) and their frequency/intensity.

Activities, Facilities provided and Seasonality.
Land based recreation:

Walking including dog walking - all year.

Bird watching - all year.

Sea bathing - mostly summer.

Wildfowling: Only in agreed areas - 1 September to 20 February

Adjacent seasonal caravan parks - mainly summer.

32. Jurisdiction:

Include territorial, e.g. state/region, and functional/sectoral, e.g. Dept. of Agriculture/Dept. of Environment, etc.

Head, Natura 2000 and Ramsar Team, Department for Environment, Food and Rural Affairs, European Wildlife Division, Zone 1/07, Temple Quay House, 2 The Square, Temple Quay, Bristol, BS1 6EB

33. Management authority:

Provide the name and address of the local office(s) of the agency(ies) or organisation(s) directly responsible for managing the wetland. Wherever possible provide also the title and/or name of the person or persons in this office with responsibility for the wetland.

Site Designations Manager, English Nature, Sites and Surveillance Team, Northminster House, Northminster Road, Peterborough, PE1 1UA, UK

34. Bibliographical references:

Scientific/technical references only. If biogeographic regionalisation scheme applied (see **15** above), list full reference citation for the scheme.

Site-relevant references

Barne, JH, Robson, CF, Kaznowska, SS, Doody, JP & Davidson, NC & Buck, AL (eds.) (1998) *Coasts and seas of the United Kingdom. Region 8 Sussex: Rye Bay to Chichester Harbour*. Joint Nature Conservation Committee, Peterborough. (Coastal Directories Series.)

Buck, AL (ed.) (1997) *An inventory of UK estuaries. Volume 6. Southern England*. Joint Nature Conservation Committee, Peterborough

Burd, F (1989) *The saltmarsh survey of Great Britain. An inventory of British saltmarshes*. Nature Conservancy Council, Peterborough (Research & Survey in Nature Conservation, No. 17)

Covey, R (1998) Chapter 7. Eastern Channel (Folkestone to Durlston Head) (MNCR Sector 7). In: *Benthic marine ecosystems of Great Britain and the north-east Atlantic*, ed. by K. Hiscock, 199-218. Joint Nature Conservation Committee, Peterborough. (Coasts and Seas of the United Kingdom. MNCR series)

Cranswick, PA, Waters, RJ, Musgrove, AJ & Pollitt, MS (1997) *The Wetland Bird Survey 1995–96: wildfowl and wader counts*. British Trust for Ornithology, Wildfowl and Wetlands Trust, Royal Society for the Protection of Birds & Joint Nature Conservation Committee, Slimbridge

Doody, JP, Johnston, C & Smith, B (1993) *Directory of the North Sea coastal margin*. Joint Nature Conservation Committee, Peterborough

Fojt, W (1985) *The saltmarsh survey of Great Britain. Sussex county report*. Unpublished, Nature Conservancy Council

Holder, CS & Woolven, SC (1990) Sand dune survey of Great Britain. Site report No. 79. Pagham Beach Dune, West Sussex, 1990. *Nature Conservancy Council, CSD report*, No. **1111**

Irving, R (1994) *Report of the West Sussex Seasearch Project. 1992–1993: Chichester Harbour to Littlehampton*. West Sussex Seasearch Project, Coldwaltham

James, CM (1987) Pagham Harbour. In: *Birds in Sussex 1962 – 1987*, 14-18. Sussex Ornithological Society

May, VJ & Hansom, JD (eds.) (2003) *Coastal geomorphology of Great Britain*. Joint Nature Conservation Committee, Peterborough (Geological Conservation Review Series, No. 28)

Musgrove, AJ, Langston, RHW, Baker, H & Ward, RM (eds.) (2003) *Estuarine waterbirds at low tide. The WeBS Low Tide Counts 1992–93 to 1998–99*. WSG/BTO/WWT/RSPB/JNCC, Thetford (International Wader Studies, No. 16)

Musgrove, AJ, Pollitt, MS, Hall, C, Hearn, RD, Holloway, SJ, Marshall, PE, Robinson, JA & Cranswick, PA (2001) *The Wetland Bird Survey 1999–2000: wildfowl and wader counts*. British Trust for Ornithology, Wildfowl and Wetlands Trust, Royal Society for the Protection of Birds & Joint Nature Conservation Committee, Slimbridge. www.wwt.org.uk/publications/default.asp?PubID=14

Pagharn Harbour Project (in prep.) *Pagham Harbour Management Plan*. West Sussex County Council, Chichester

Rayner, RW (ed.) (1975) *The natural history of Pagham Harbour*. Bognor Regis Natural Science Society

Robinson, AWH (1995) The harbour entrances of Poole, Christchurch and Pagham. *Geographical Journal*, **121**(1), 33 50

Sheader, M & Sheader, A (1989) Lagoon survey of the south coast, Dorset to East Sussex, 1989. Final report. *Nature Conservancy Council, CSD Report*, No. **1116**

Sneddon, P & Randall, RE (1994) *Coastal vegetated shingle structures of Great Britain: Appendix 3. Shingle sites in England*. Joint Nature Conservation Committee, Peterborough

Stroud, DA, Chambers, D, Cook, S, Buxton, N, Fraser, B, Clement, P, Lewis, P, McLean, I, Baker, H & Whitehead, S (eds.) (2001) *The UK SPA network: its scope and content*. Joint Nature Conservation Committee, Peterborough (3 vols.) www.jncc.gov.uk/UKSPA/default.htm

West Sussex County Council (1987) *A guide to Pagham Harbour Nature Reserve*. West Sussex County Council, Chichester

Wood, C (ed.) (1984) Sussex sublittoral survey. Selsey Bill to Beachy Head. *Nature Conservancy Council, CSD Report*, No. **527**

Please return to: **Ramsar Secretariat, Rue Mauverney 28, CH-1196 Gland, Switzerland**
Telephone: **+41 22 999 0170** • Fax: **+41 22 999 0169** • email: **ramsar@ramsar.org**

Special Protection Area

UK SPA data form

NATURA 2000

STANDARD DATA FORM

FOR SPECIAL PROTECTION AREAS (SPA)
FOR SITES ELIGIBLE FOR IDENTIFICATION AS SITES OF COMMUNITY IMPORTANCE (SCI)
AND
FOR SPECIAL AREAS OF CONSERVATION (SAC)

1. Site identification:

1.1 Type A **1.2 Site code** UK9012041

1.3 Compilation date 198803 **1.4 Update** 199902

1.5 Relationship with other Natura 2000 sites

1.6 Respondent(s) International Designations, JNCC, Peterborough

1.7 Site name Pagham Harbour

1.8 Site indication and designation classification dates

date site proposed as eligible as SCI	
date confirmed as SCI	
date site classified as SPA	198803
date site designated as SAC	

2. Site location:

2.1 Site centre location

longitude	latitude
00 45 38 W	50 45 48 N

2.2 Site area (ha) 636.68 **2.3 Site length (km)**

2.5 Administrative region

NUTS code	Region name	% cover
UK533	West Sussex	100.00%

2.6 Biogeographic region

Alpine	Atlantic	Boreal	Continental	Macaronesia	Mediterranean
	X				

3. Ecological information:

3.1 Annex I habitats

Habitat types present on the site and the site assessment for them:

Annex I habitat	% cover	Representativity	Relative surface	Conservation status	Global assessment

3.2 Annex I birds and regularly occurring migratory birds not listed on Annex I

		Population				Site assessment			
		Resident	Migratory						
Code	Species name		Breed	Winter	Stage	Population	Conservation	Isolation	Global
A046a	*Branta bernicla bernicla*			1794 I		C		C	
A151	*Philomachus pugnax*			10 I		C		C	
A195	*Sterna albifrons*		7 P			C		C	
A193	*Sterna hirundo*		0 P			C		C	

4. Site description:

4.1 General site character

Habitat classes	% cover
Marine areas. Sea inlets	0.6
Tidal rivers. Estuaries. Mud flats. Sand flats. Lagoons (including saltwork basins)	39.2
Salt marshes. Salt pastures. Salt steppes	5.2
Coastal sand dunes. Sand beaches. Machair	
Shingle. Sea cliffs. Islets	20.2
Inland water bodies (standing water, running water)	1.0
Bogs. Marshes. Water fringed vegetation. Fens	2.8
Heath. Scrub. Maquis and garrigue. Phygrana	
Dry grassland. Steppes	
Humid grassland. Mesophile grassland	
Alpine and sub-alpine grassland	
Improved grassland	30.3
Other arable land	
Broad-leaved deciduous woodland	0.7
Coniferous woodland	
Evergreen woodland	
Mixed woodland	
Non-forest areas cultivated with woody plants (including orchards, groves, vineyards, dehesas)	
Inland rocks. Screes. Sands. Permanent snow and ice	
Other land (including towns, villages, roads, waste places, mines, industrial sites)	
Total habitat cover	**100%**

4.1 Other site characteristics

Soil & geology:

Alluvium, Clay, Gravel, Mud, Neutral, Nutrient-rich, Sand, Sedimentary, Shingle

Geomorphology & landscape:

Coastal, Estuary, Floodplain, Intertidal sediments (including sandflat/mudflat), Islands, Lagoon, Lowland, Open coast (including bay), Pools, Shingle bar, Subtidal sediments (including sandbank/mudbank)

4.2 Quality and importance

ARTICLE 4.1 QUALIFICATION (79/409/EEC)

During the breeding season the area regularly supports:

Sterna albifrons (Eastern Atlantic - breeding)	0.3% of the GB breeding population 5 year mean, 1992-1996
Sterna hirundo (Northern/Eastern Europe - breeding)	% of the GB breeding population Count, as at 1996

Over winter the area regularly supports:

Philomachus pugnax (Western Africa - wintering)	1.4% of the GB population 5 year mean, 1995-1999

ARTICLE 4.2 QUALIFICATION (79/409/EEC)

Over winter the area regularly supports:

Branta bernicla bernicla (Western Siberia/Western Europe)	0.6% of the population 5 year peak mean 1991/92-1995/96

4.3 Vulnerability

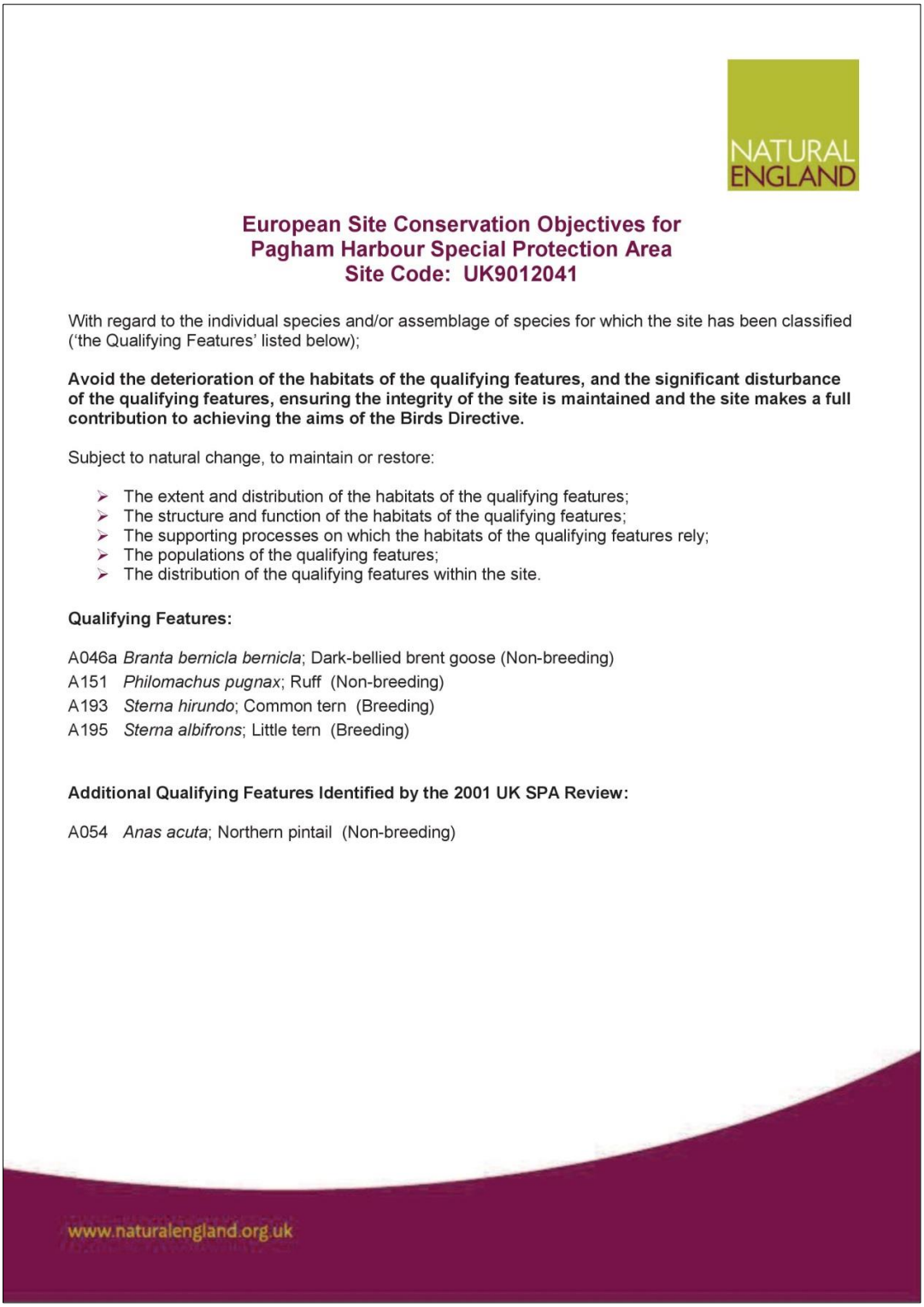
Pagham Harbour comprises an extensive central area of salt marsh and tidal mudflats, with surrounding habitats including lagoons, shingle, open water, reed swamp and wet permanent grassland.

The majority of the site is a Local Nature Reserve managed by West Sussex County Council. Historical land drainage for agricultural purposes is being addressed through the Local Nature Reserve Management Plan and Management Agreements, while pollution from inadequate treatment of sewage discharges will be reviewed by the Environmental Agency.

5. Site protection status and relation with CORINE biotopes:

5.1 Designation types at national and regional level

Code	% cover
UK04 (SSSI/ASSI)	100.0



NATURAL ENGLAND

European Site Conservation Objectives for Pagham Harbour Special Protection Area Site Code: UK9012041

With regard to the individual species and/or assemblage of species for which the site has been classified ('the Qualifying Features' listed below);

Avoid the deterioration of the habitats of the qualifying features, and the significant disturbance of the qualifying features, ensuring the integrity of the site is maintained and the site makes a full contribution to achieving the aims of the Birds Directive.

Subject to natural change, to maintain or restore:

- The extent and distribution of the habitats of the qualifying features;
- The structure and function of the habitats of the qualifying features;
- The supporting processes on which the habitats of the qualifying features rely;
- The populations of the qualifying features;
- The distribution of the qualifying features within the site.

Qualifying Features:

A046a *Branta bernicla bernicla*; Dark-bellied brent goose (Non-breeding)
A151 *Philomachus pugnax*; Ruff (Non-breeding)
A193 *Sterna hirundo*; Common tern (Breeding)
A195 *Sterna albifrons*; Little tern (Breeding)

Additional Qualifying Features Identified by the 2001 UK SPA Review:

A054 *Anas acuta*; Northern pintail (Non-breeding)

www.naturalengland.org.uk

This is a European Marine Site

This site is a part of the Pagham Harbour European Marine Site. These conservation objectives should be used in conjunction with the Regulation 35 Conservation Advice Package, for further details please contact Natural England's enquiry service at enquiries@naturalengland.org.uk, or by phone on 0845 600 3078, or visit the Natural England website at:
http://www.naturalengland.org.uk/ourwork/marine/protectandmanage/mpa/europeansites.aspx

Explanatory Notes: European Site Conservation Objectives

European Site Conservation Objectives are those referred to in the Conservation of Habitats and Species Regulations 2010 (the "Habitats Regulations") and Article 6(3) of the Habitats Directive 1992. They are for use when either the appropriate nature conservation body or competent authority is required to make an Appropriate Assessment under the relevant parts of the respective legislation.

These conservation objectives are set for each bird feature for a Special Protection Area (SPA). Where the objectives are met, the site can be said to demonstrate a high degree of integrity and the site itself makes a full contribution to achieving the aims of the Birds Directive for those features. On the first page of this document there may be a list of 'Additional Qualifying Features identified by the 2001 UK SPA Review'. These are additional features identified by the UK SPA Review published in 2001 and, although not yet legally classified, are as a matter of Government policy treated in the same way as classified features.

This document is also intended for those who are preparing information to be used for an appropriate assessment by either the appropriate nature conservation body or a competent authority. As such this document cannot be definitive in how the impacts of a project can be determined. Links to selected sources of information, data and guidance which may be helpful can be found on Natural England's website. This list is far from exhaustive.

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Joint Nature Conservation Committee

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SPA description

(information as published 2001)

Pagham Harbour

Country	England
Unitary Authority	West Sussex
SPA status	Classified 30/03/1988
Latitude	50 45 48 N
Longitude	00 45 38 W
SPA EU code	UK9012041
Area (ha)	636.68
Component SSSI/ASSIs	Pagham Harbour

Pagham Harbour is located on the south coast of England in West Sussex. It is an estuarine basin that comprises an extensive central area of saltmarsh and intertidal mud-flats, surrounded by lagoons, shingle, open water, reed swamp and wet permanent grassland. The mud-flats are rich in invertebrates and algae, and provide important feeding areas for birds. The lower saltmarsh is dominated by Common Cord-grass *Spartina anglica*, with patches of Glasswort *Salicornia* spp. The area supports breeding Little Tern *Sterna albifrons* in summer, as well as wintering concentrations of Ruff *Philomachus pugnax* and Pintail *Anas acuta*.

Qualifying species

For individual species accounts visit the Species Accounts section

This site qualifies under **Article 4.1** of the Directive (79/409/EEC) by supporting populations of European importance of the following species listed on Annex I of the Directive:

During the breeding season;

Little Tern *Sterna albifrons*, 12 pairs representing 0.5% of the breeding population in Great Britain (Count as at 1995)

Over winter;

Ruff *Philomachus pugnax*, 160 individuals representing at least 22.9% of the wintering population in Great Britain

This site also qualifies under **Article 4.2** of the Directive (79/409/EEC) by supporting populations of European importance of the following migratory species:

Over winter;

Pintail *Anas acuta*, 628 individuals representing at least 1.0% of the wintering Northwestern Europe population (5 year peak mean 1991/2 - 1995/6)

Note:

Many designated sites are on private land: the listing of a site in these pages does not imply any right of public access.

Note that sites selected for waterbird species on the basis of their occurrence in the breeding, passage or winter periods also provide legal protection for these species when they occur at other times of the year.

Site of Special Scientific Interest

COUNTY: WEST SUSSEX **SITE NAME:** PAGHAM HARBOUR

DISTRICT: CHICHESTER: ARUN

Status: Site of Special Scientific Interest (SSSI) notified under Section 28 of the Wildlife and Countryside Act 1981. Part of this site is a Local Nature Reserve (under S21 of The National Parks and Access to the Countryside Act 1949)

Local Planning Authority: CHICHESTER DISTRICT COUNCIL; ARUN DISTRICT COUNCIL

National Grid Reference: SZ 875 970 **Area:** 615.9 ha 1521.9 acres

Ordnance Survey Sheet 1:50,000: 197 **1:10,000:** SZ 89 NW, NE, SE

Date Notified (under 1949 Act): 1954 **Date of Last Revision:** 1980

Date Notified (under 1981 Act): 1986 **Date of Last Revision:**

Other Information: This site lies within the South Coast Plain. Pagham Harbour is a proposed NCR site. This site contains Pagham Harbour GCR site and part of Bognor Regis (Palaeobotany) GCR site. This is also a proposed Ramsar/SPA site.

Reasons for Notification:

This site comprises an extensive central area of salt-marsh and tidal mudflats with surrounding habitats including shingle, open water, reed swamp and wet permanent grassland.Pagham Harbour is of national importance for wintering wildfowl and waders and also for breeding birds both within the Harbour and the surrounding grazing pasture. The site supports nationally important communities of plants and invertebrates.

Pagham Harbour was reclaimed for agriculture in the late nineteenth century but was flooded again by a storm in the early twentieth century. The extensive intertidal mudflats are rich in algae and invertebrates and provide important feeding areas for birds.

Salt-marsh is a habitat threatened nationally through reclamation for agriculture.The lower part of the salt-marsh is dominated by the hybrid common cord-grass *Spartina anglica* with patches of the glassworts *Salicornia* spp. Above this zone sea-purslane *Halimione portulacoides* covers large areas with other species such as sea aster *Aster tripolium* in the periphery. At one part of the site within a mixed salt-marsh community greater sea-spurrey *Spergularia media* and sea lavender *Limonium vulgare* are found.The upper margin of the salt-marsh has developed a narrow strip of grassland dominated by sea couch *Elymus pycnanthus*.

Vegetated shingle is a nationally rare community. At Pagham, the type and extent of plant cover is dictated by the shifting nature of the substrates, the sea defence works, and by its relative exposure to the elements. In sheltered areas a diverse grass sward has developed with herbs such as early forget-me-not *Myosotis ramosissima*, biting stonecrop *Sedum acre* and the nationally endangered childing pink *Petrorhagia nanteuilli*. This contrasts with the sparse vegetation of the shingle ridge where the uncommon sea-kale *Crambe maritima* and yellow-vetch *Vicia lutea* are found.

Pagham Harbour has a wide variety of wetland habitats. Brackish drainage ditches dissect the land where common reed *Phragmites australis* dominates. This forms fairly extensive swamps in some areas including the Severals to the west of the Harbour which are important for breeding and migrating reed and sedge warblers. Sidlesham ferry to the north-west provides high water feeding and roosting areas for waders while Pagham Lagoon in the east is a stormy weather sheltering site for sea duck. Here may also be found the nationally endangered starlet sea anemone *Nematostella vectensis*.

The small amount of woodland at Pagham Harbour is dominated by willow and oak. One of these areas supports a small heronry. In contrast, the ancient woodland at Norton Priory is drier with oak standards and a rich ground flora. Scrub is found both in the form of hedges and as more extensive patches with hawthorn *Crataegus monogyna* and gorse *Ulex europaeus* being the main constituents. The damp unimproved grassland surrounding the Harbour is used as a major wader roost and is grazed by large numbers of Brent Geese. Some fields of improved grassland are included in the site as they too, support nationally important populations of birds.

Pagham Harbour is an overwintering area for over 120 species of bird. The numbers of wintering pintail, ringed and grey plover and black-tailed godwit regularly reach 1% of British populations and the site is of international importance for wintering ruff and Brent Geese. The mudflats also provide food for a diverse breeding community of birds including oystercatcher, shelduck and redshank.

Notable invertebrates include the sand dart *Agrotis ripae*, Matthew's wainscot moth *Mythimna favicolor* and the long-winged conehead grasshopper *Conocephalus discolor*.

Geology:

Pagham Harbour is a key site for coastal geomorphology. It is significant both as a classic shingle spit landform and for the links that have been demonstrated between the coastal near shore and offshore forms and sediments. The shingle spit system comprises a series of sub-parallel ridges and recurves, marking different phases of extension and frontal accretion. Shingle reaches the beach *via* the intertidal zone, and the so-called "Pagham delta" and the behaviour of the spits and delta are intimately linked with water and sediment circulation around the Selsey peninsula. The area also provides an excellent example of the role of weed rafting of shingle in coastal sediment budgets.

This site also includes, at the north-eastern end, part of a key site for plant fossils from the London Clay (divisions B_1 and B_2). It is the only locality in the Hampshire Basin to yield abundant London Clay plants and the only site known to have yielded plants from the B_2 division of this formation. The site has yielded examples of some one hundred and thirty species (representing seventy families), including numerous type specimens. Dominant families include the Vitaceae, Menispermaceae and Burseraceae.The genera *Bognoria* and *Aldwichia* are only found here, as are some thirty species. An outstanding palaeobotanical site of great importance to studies of Tertiary floras.

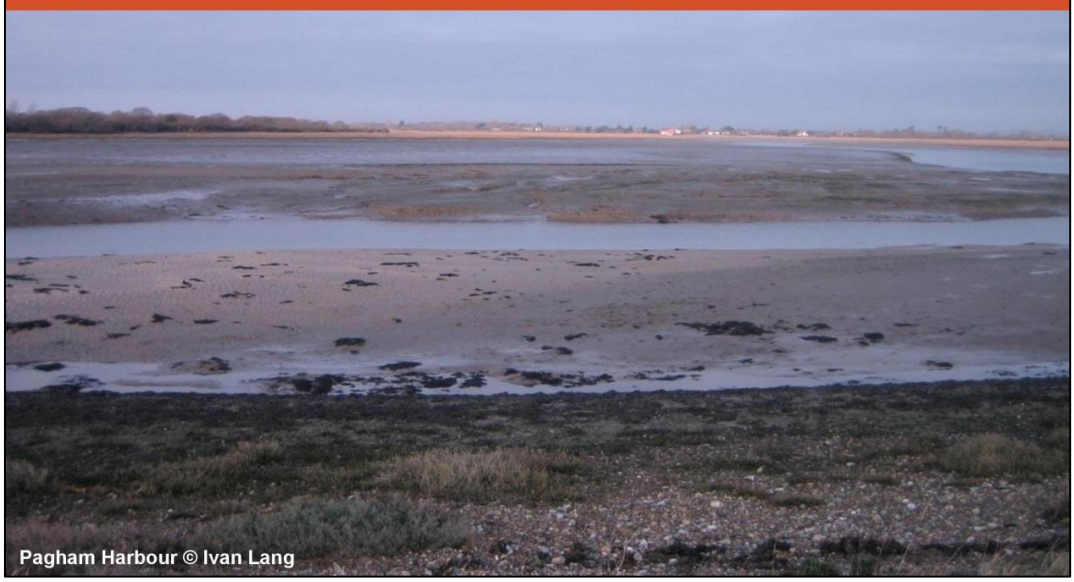
Pagham Harbour
Marine Conservation Zone

Where is this site?

Pagham Harbour MCZ lies between Bognor Regis and Chichester in West Sussex. This naturally occurring harbour is a tidal inlet which is fronted by two dynamic shingle spits. The MCZ protects features within the harbour area, Ferry Pool lagoon and Church Norton spit covering a total area of nearly 3 km^2 – making it one of the smallest MCZs.

Why is this site important?

Pagham Harbour is renowned for its rich wildlife and as such the area is already protected by several designations including Pagham Harbour Site of Special Scientific Interest, Special Protection Area and Ramsar site. The MCZ builds upon this by offering protection to features not already covered by the existing designations. Church Norton spit runs parallel to the mouth of the harbour, creating a sheltered environment that is capable of supporting a different range of species than are found on the open coast.



Pagham Harbour © Ivan Lang

What does this Marine Conservation Zone protect?

The site offers specific protection to two different species and one habitat type. The environment within Ferry Pool lagoon supports the rare lagoon sand shrimp. These are small animals that only grow to about 2 cm in length, and are typically found within sheltered shallow environments that are made up of a mixture of silty sediments.

Defolin's lagoon snail is another rare species protected by this site, with colonies only known to occur in three locations in the UK. It is extremely small measuring only 2 mm long and tends to live within particular areas on shingle beaches that have suitable salinity levels. Both species are not only rare but also very vulnerable to disturbance and habitat loss.

Seagrass beds, made up of grass-like flowering plants, occur within the harbour itself. These provide an important food source for wildfowl and also contain nutrients which support a range of animal communities. The seagrass beds within the site are intertidal so they can offer protection to the juvenile fish and shellfish found amongst them at high tides. Seagrass beds are sensitive to physical disturbance caused by some activities.

Features	General management approach
Seagrass beds	Maintain in favourable condition
Defolin's lagoon snail(*Caecum armoricum*)	Maintain in favourable condition
Lagoon sand shrimp (*Gammarus insensibilis*)	Maintain in favourable condition

Who will manage Marine Conservation Zones?

Many activities within the marine environment are regulated through marine licences. More information regarding the marine licensing process in relation to MCZs can be found on the MMO website www.marinemanagement.org.uk/licensing/marine.htm

Other activities are regulated through different mechanisms. For example fishing activities are managed through European legislation, national statutory instruments, byelaws and self-imposed voluntary agreements. Similar arrangements are in place to manage the range of activities that may impact MCZs including pollution, coastal development and recreation.

Management of sites is currently being prioritised nationally according to the potential or actual adverse impacts of activities on the features designated in relation to fishing activities. This prioritisation will be further refined at a local level taking into account relevant information and will guide regulators to those sites which may need protection before others.

Any management measures that are required for MCZs will be applied on a case-by-case basis. Management measures will be implemented at sites most at risk of damage first, regulating only those activities which have a detrimental impact on the features. In cases where there is a high risk to designated features being damaged emergency measures may be put in place to ensure the protection of vulnerable habitats and species.

What happens now this site has been designated?

The site specific information below provides an overview of which activities may be affected by the designation of the MCZ and the current management measures. As with all management measures, they may, of course, be subject to change in the light of new evidence becoming available.

No activities have been identified at this MCZ which could be affected as a result of site designation. The impact of any future activities on the MCZ and its features will be assessed and managed as appropriate.

With regards to fisheries management the site is within jurisdiction of the Sussex IFCA. All existing Sussex IFCA and local byelaws will apply to this site, in addition to all relevant national and EU fisheries legislation such as Cod and Hake recovery control measures.

For further information visit the Sussex IFCA website at www.sussex-ifca.gov.uk or the MMO website at www.marinemanagement.org.uk/protecting/conservation/mcz.htm

Where can I find out further information?

An interactive map showing this MCZs and other marine protected areas is available at http://jncc.defra.gov.uk/page-5201

Additional information about this site and other MCZs is available at https://www.gov.uk/government/policies/protecting-and-sustainably-using-the-marine-environment
and within Natural England's advice available at
http://publications.naturalengland.org.uk/category/1499649

Department for Environment Food & Rural Affairs

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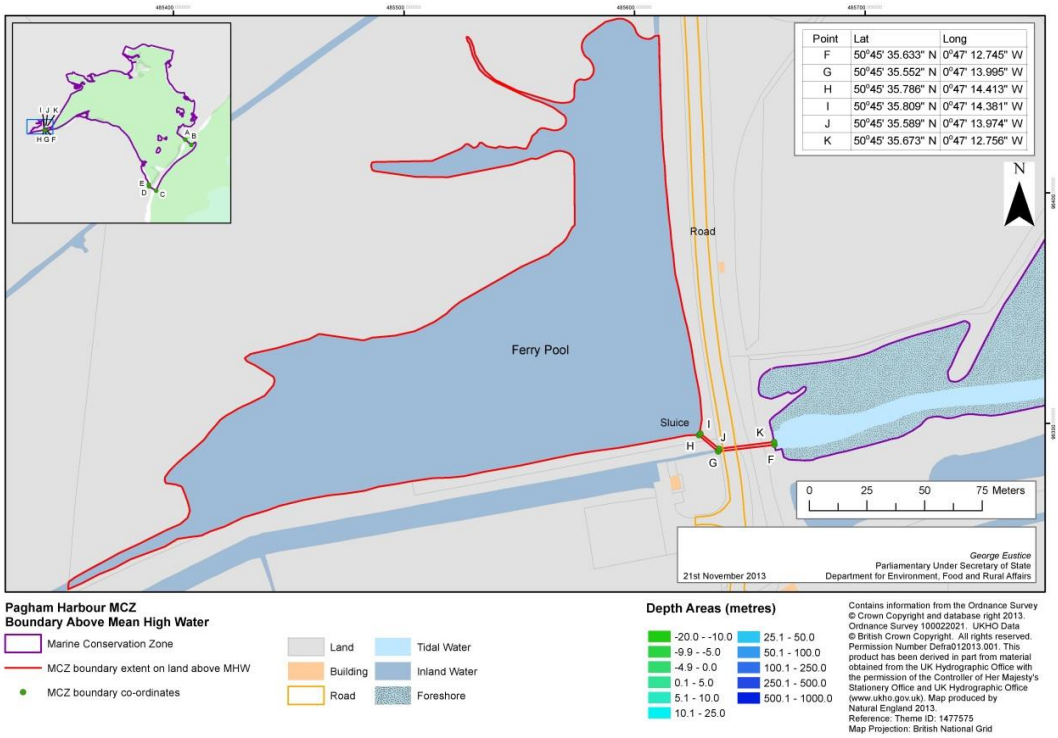
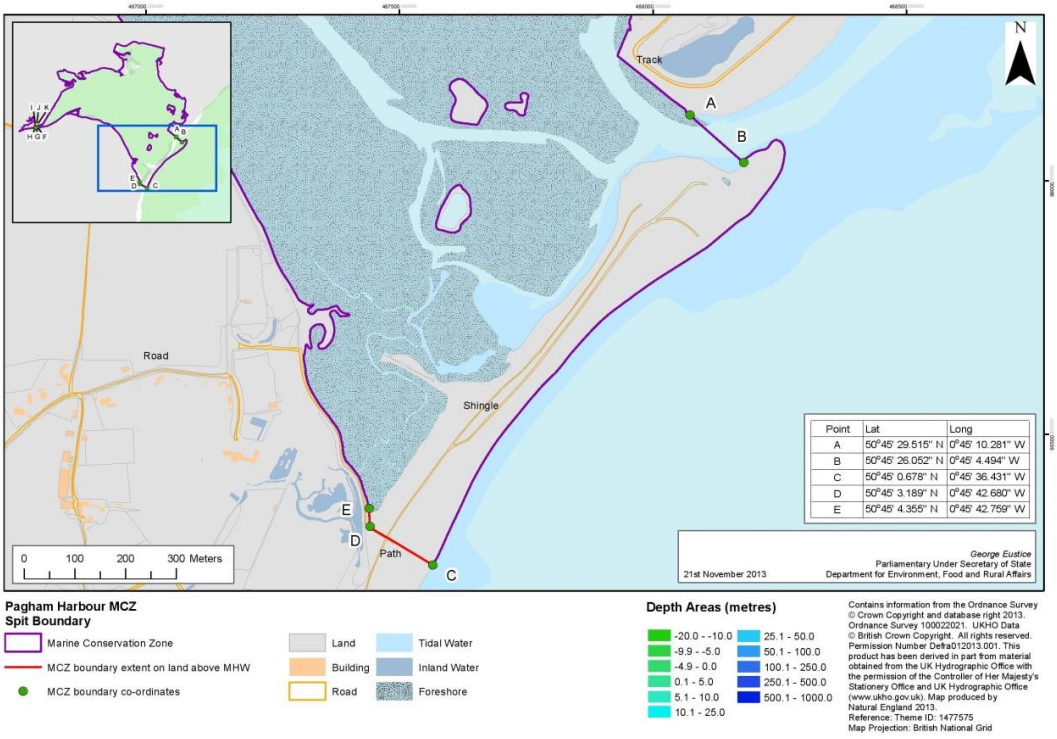
Annex: Management

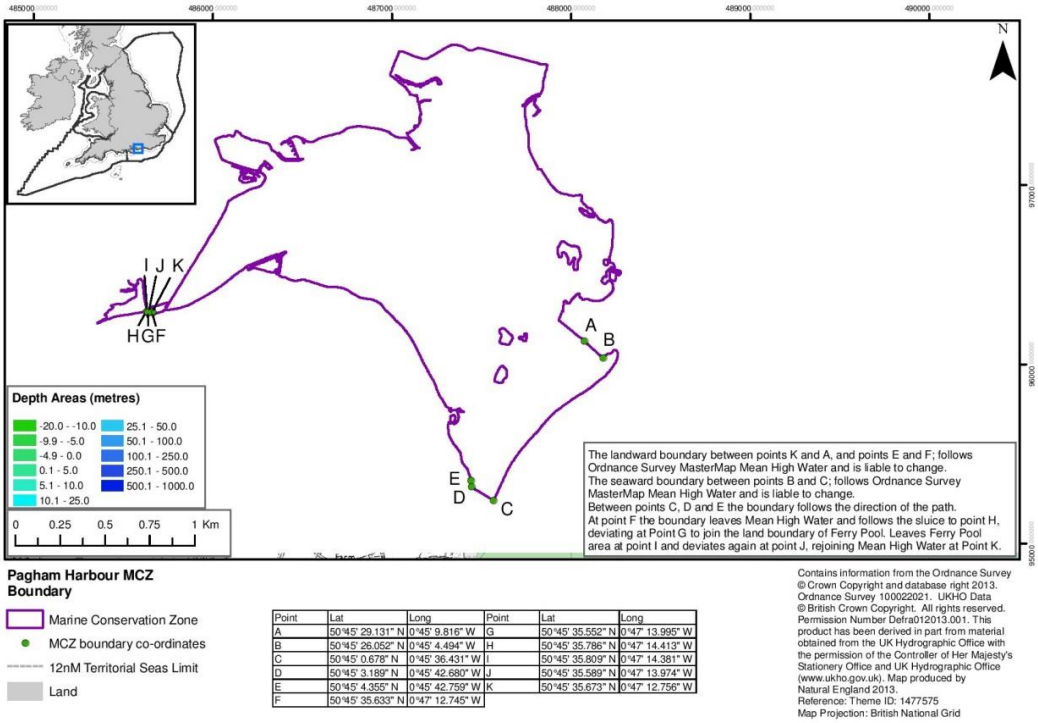
Lead organisation	Activities
Inshore Fisheries and Conservation Authorities (IFCAs)	• Fisheries (0-6nm) including commercial fisheries and recreational fishing activities such as sea angling For further information visit www.association-ifca.org.uk
Marine Management Organisation (MMO)	• Fisheries (management) (6-12nm) • Fisheries (enforcement) national and EU legislation • Licensable activities such as deposit and removal activities below mean high water springs, including subsea cables (up to 12nm), construction (including renewables <100MW, ports and costal protection), dredging and disposal • Harbour Orders and Harbour Empowerment Orders • Section 36 and safety zone consents • Enforcement of licensable activity and other consents (including deemed marine licences) • Development of marine plans integrating the social requirements, economic potential and environmental priorities of marine plan areas • Activities requiring a wildlife licence For further information visit www.marinemanagement.org.uk/fisheries or www.marinemanagement.org.uk/licensing/marine.htm
Environment Agency (EA)	• Fisheries management for migratory and fresh water fish • Coastal protection and flood management • Water quality • Permitted discharges from terrestrial sources For further information visit www.environment-agency.gov.uk/default.aspx
Department of Energy and Climate Change (DECC)	• Oil and Gas related activities • Renewable energy related activities For further information visit www.gov.uk/government/organisations/department-of-energy-climate-change
Harbour Authorities and local planning authorities	• Harbour authorities have management responsibilities for the port and coastal waters within their jurisdiction • Local authorities have role to manage, regulate and facilitate activities at the coast. These include management of coastal recreation, tourism, economic regeneration, flood protection, spatial planning and coastal zone and estuary management, For further information contact your local authority or IFCA
Department for Transport (DfT)	• Responsible for shipping, harbours, ship pollution and offshore safety For further information visit www.gov.uk/government/organisations/department-for-transport
Natural England (NE)	• Public access For further information visit www.naturalengland.org.uk/



Pagham Harbour MCZ Boundary Above Mean High Water



Pagham Harbour MCZ Spit Boundary



Pagham Harbour MCZ Boundary

Marine Conservation Zone
MCZ boundary co-ordinates
12nM Territorial Seas Limit
Land

Point	Lat	Long	Point	Lat	Long
A	50°45' 29.131" N	0°45' 9.816" W	G	50°45' 35.552" N	0°47' 13.995" W
B	50°45' 26.052" N	0°45' 4.494" W	H	50°45' 35.786" N	0°47' 14.413" W
C	50°45' 0.678" N	0°45' 36.431" W	I	50°45' 35.809" N	0°47' 14.381" W
D	50°45' 3.189" N	0°45' 42.680" W	J	50°45' 35.589" N	0°47' 13.974" W
E	50°45' 4.355" N	0°45' 42.759" W	K	50°45' 35.673" N	0°47' 12.756" W
F	50°45' 35.633" N	0°47' 12.745" W			

Local Nature Reserve

Pagham Harbour Local Nature Reserve

The transfer of the management of Pagham Harbour Local Nature Reserve from West Sussex County Council to the Royal Society for the Protection of Birds (RSPB) was signed on 1 February 2012.

The 1,500 acre site has been managed as a local nature reserve by the County Council since 1964 and its facilities include a visitor centre. The Harbour attracts more than 200,000 visits a year and is a vital amenity for local communities.

As part of the agreement, the County Council will have an executive role and will guarantee an annual payment to help support the service until 2021.

Following a recent review, the County Council has determined that boating, fishing and bait digging in Pagham Harbour cannot be restricted through the use of permit systems. Therefore, a permit to carry out these activities will no longer be needed and the associated byelaws will not be enforced in relation to these activities.

A full review of the byelaws will be completed in the future when the boundary of the Local Nature Reserve is re declared. It is anticipated that this will take place in 2014. The current byelaws can be found in the document below.

Information about Pagham Harbour and its events is now available from the RSPB website.

Supporting document

- Pagham Harbour Local Nature Reserve bylaws
  (PDF, 7 pages, 1.5MB)

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