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Sent: 08 October 2021 10:43
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Roberts <Karl.Roberts@arun.gov.uk>
Subject: Finalised HRA for Pagham Spit

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Dear all,

I have attached my finalised version of the HRA. I have only managed to incorporate some of Angela's comments on the test of alternatives. I will move on to the derogation form but will be largely cutting and pasting from this HRA into that document.

Regards,

Tom



Tom Day
Environmental Co-ordinator
Environment
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[REDACTED]
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Habitats Regulations Assessment for Planning Application References P/93/21/PL (ADC) and 21/01921/FULEIA (CDC)

Introduction

Pagham Flood Defence Trust has submitted an application for the managed breach of the shingle spit within Pagham Harbour (the Project). The application site is covered by the Pagham Harbour Special Protection Area (SPA) Ramsar site, Pagham Harbour Site of Special Scientific Interest (SSSI), and Marine Conservation Zone, as well as Solent and Dorset Coast SPA. This means that the site is of international importance for certain wild bird species and their supportive habitats and has a high level of protection in the UK planning system. The application is subject to assessment under the Habitats Regulations 2017. The project straddles the boundary of Arun and Chichester Districts and so requires planning permission from both District Councils. It also requires a license from the Marine Management Organisation (MMO).

The first stage of the process is to determine if the project is likely to have a significant effect on the SPA and Ramsar site and then for the planning authorities (known as the 'competent authorities' in the regulations) to assess if there would be an adverse effect on the integrity of the site. This second stage is known as 'Appropriate Assessment'. In carrying out these assessments under the regulations, the competent authorities have to have regard to the advice of Natural England (NE) as the statutory Nature Conservation Body.

This report has been prepared by Chichester DC on behalf of all the competent authorities. It makes recommendations to the planning authorities, but the decision on granting planning permission will be made through the usual planning decision-making processes of the authorities. In drawing up this report, use has been made of information submitted by the applicants, specifically: the Environmental Statement (ref. R.2446), the Construction and Environment Management Plan and the Pagham Adaptive Management Report NO.1 - May 2021. However, the assessments and recommendations are the competent authorities' own.

Use has also been made of Natural England's conservation advice package for:

Pagham Harbour SPA

<https://designatedsites.naturalengland.org.uk/Marine/MarineSiteDetail.aspx?SiteCode=UK9012041&SiteName=pagham&SiteNameDisplay=Pagham%20Harbour%20SPA&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=4&HasCA=1> dated 2017, 2019 and 2021.

Solent and Dorset Coast SPA

<https://designatedsites.naturalengland.org.uk/Marine/MarineSiteDetail.aspx?SiteCode=UK9020330&SiteName=solent%20and%20dorset&SiteNameDisplay=Solent%20and%20Dorset%20Coast%20SPA&countyCode=&responsiblePerson=&SeaArea=&IFCAArea=&NumMarineSeasonality=3&HasCA=1> dated 19 March 2021.

The 'likely significant effect' stage is usually used to screen out projects that have a minor or indirect or peripheral impact that does not require any mitigation. The projected breach is a major intervention in the Harbour and the competent authorities have already determined that it is likely

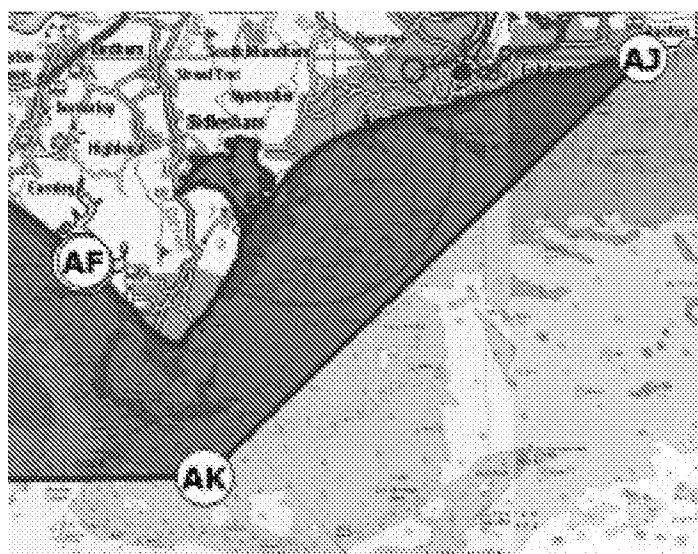
to have a significant effect and have advised the applicant of this. As Likely Significant Effect cannot be ruled out at this stage the application progresses onto the Appropriate Assessment stage.

It is worth noting that the Solent and Dorset Coast SPA at this location is not just the sea area adjacent to the coast, but it also covers the inside of the Harbour. This is significant because Pagham Harbour SPA is only designated for Common and Little terns, whereas the Solent and Dorset Coast also includes Sandwich terns. Over recent years Pagham Harbour is becoming an increasingly important for Sandwich Terns. The table below shows the significant number of tern species, this year and last.

Sandwich Terns do not currently nest on the spit, preferring to be on the islands with the other terns/birds. Therefore the current proposal would not impact their nesting habitat, however, the timing of works would also cover them nesting (functional linkage) within the harbour and all tern species feeding in the shallow waters that might be disturbed by any construction works.

Table from RSPB.

Species	Breeding Count	Unit	Fledged Count	Prod.	Last Year
Sandwich Tern	243	Pair	252	1.04	175 / AN
Common Tern	7	Pair	6	0.86	11 / AN
Little Tern	46	Pair	25	0.54	21 / AN



Part I – Appropriate Assessment

The purpose of Appropriate Assessment is to enable the competent authorities (Chichester DC, Arun DC and the Marine Management Organisation) to ascertain whether the Project will have an adverse effect on the integrity of the SPA. In doing so, following the 'Briels' judgement of the European Court, the effect of the proposed compensatory measures has not been taken into account at this stage of the assessment process. Specifically, the construction of new habitat for little terns is proposed elsewhere in the SPA as part of the project. As such, the measure in question does not mitigate or reduce the impact of carrying out the project but instead compensates for the impact ideally before impact occurs or in time for the compensation to address the impact on the feature/s. i.e. ready for the next breeding season. Such a compensation measure can only be considered in the final, derogation stage of the decision-making process.

In order to assess if the project will have an Adverse Effect on Integrity (AEoI) the competent authorities must have regard to the SPA qualifying features and the Conservation Objectives for the site.

Qualifying SPA Features

Pagham Harbour SPA

- 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)

Dorset and Solent Coast SPA

- A193 *Sterna hirundo*; Common tern (Breeding)
- A195 *Sterna albifrons*; Little tern (Breeding)
- A191 *Sterna sandvicensis*; Sandwich tern (Breeding)

Qualifying Ramsar site features

Pagham Harbour Ramsar

- Branta bernicla bernicla*; Dark-bellied Brent Goose (Non-breeding)
- Limosa limosa islandica*; Black-tailed godwit (Non-breeding) ¹

European Site Conservation Objectives for Pagham Harbour SPA

With regard to the SPA and the individual species and /or assemblage of species for which the site has been classified and subject to natural change:

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring;

¹ As a species identified subsequent to designation for possible future consideration under criterion 6, Black-tailed godwit (Non-breeding) have also been considered within this assessment.

- 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 population of each of the qualifying species, and,
- The distribution of the qualifying features within the site

European Site Conservation Objectives for Solent and Dorset Coast SPA

The site's conservation objectives apply to the site and the individual species and/or assemblage of species for which the site has been classified (the "Qualifying features" listed above).

The objectives are to ensure that, subject to natural change, the integrity of the site is maintained or restored as appropriate, and that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring:

- 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 each of the qualifying features, and,
- The distribution of qualifying features within the site

Identification of Potential Effects

In their advice letter of the 12th August 2021 Natural England advised on the following potential effects on the designated features:

1. The direct loss of breeding habitat for little terns.
2. The potential for the harbour to close as a result of the breach, thus removing the harbour from tidal influence, impacting on supportive habitats that occur within the harbour.
3. Construction phase impacts that may reduce foraging habitat for, and disturb, overwintering or breeding birds.

For each of these a more detailed analysis of the potential effects is carried out below:

1. The direct loss of breeding habitat for little terns.

Aspect of the project with the potential to cause this effect: This effect is due to the loss of area from Church Norton spit, including the direct cut through the area (where little terns currently nest) and then the loss of the remaining spit that the little terns may use as the distal end to the north-east of the breach rolls back over time onto Pagham Beach. The spit provides the main area where the little terns nest. Carrying out the project will cause the loss, instantly (for the following breeding season) and over time, of the habitat between the project breach and the end of the spit. The rollback is predicted to add area to Pagham Beach, but the high level of public access to this area compared to the remote end of the truncated Church Norton Spit will not provide suitable nesting sites.

2. The potential for the harbour to close as a result of the breach, thus removing the harbour from tidal influence, impacting on habitats that occur within the harbour.

Aspect of the project with the potential to cause this effect: Natural movement of shingle, wave action and /or a large storm event could push sufficient shingle into the project breach to reduce its depth significantly or even close it. The probability of this occurring is assessed to be small, due to the relatively high tidal exchange, but uncertain. Unlike the planning application in 2015, the existing channel will not be filled, although reduced tidal flow and the roll back of the cut end of the spit are likely to close this secondary channel over time. The Pagham Coastal Issues Advisory Group (PCIAG) will monitor the developing situation using the existing 'traffic light' system and advise on the need for future adaptive management measures. The coastal engineers and the Environment Agency have assessed the likelihood of closure as very low. However, this traffic light system would allow for reactive work to be undertaken in order to mitigate this potential effect. The Pagham Flood Defence Trust have guaranteed an amount to fund such works for a five year period (letter of 05/10/21).

3. Construction impacts that may reduce foraging habitat for, and disturb, to qualifying features of the designated sites.

Aspect of the project with the potential to cause this effect: The main aspect of the construction phase having the potential to cause this effect is disturbance of both overwintering and breeding birds by people and machinery. The current proposal is much smaller in size than the 2015 scheme and so requires only one access (from the Pagham side) and a shorter construction period (maximum four weeks).

The primary mitigation measure will be timing of works outside of the relevant seasons. The overwintering bird season typically commences around the 1st of November each year and ends around the 31st March each year (i.e. works are currently planned to take place before November). Likewise, undertaking the works during the breeding bird season 1st April – 31st August, would result in the disturbance of breeding Common, Little and Sandwich Terns by people and machinery. Undertaking the breach during the breeding bird season would directly impact Little Terns that use the spit as a nesting site, whereas vehicle movement and other construction impacts would impact all of the tern species' ability to feed within nearby shallow waters.

Secondary mitigation measures will be secured through the construction and environment management plan, and works should only take place after the start of November with an agreed cold weather working condition in order to mitigate the disturbance impacts to the qualifying features of the site at the times of greatest feeding stress.

Identification of how each potential effect could impact on the Conservation Objectives

Table 1 – Identification of potential effects on Pagham Harbour SPA and Ramsar site. The Site Conservation objectives, the targets (and supporting notes) are taken from Natural England’s conservation advice package for Pagham Harbour SPA and Ramsar site (updated 13 September 2019). * Please note that the additional habitat at the new “Tern Island” is a compensation measure and so cannot be included at this stage under ‘relevant mitigation measures’.

Potential Effect	Site Conservation Objective (s)	Qualifying Feature(s)	Relevant Target	Potential Impact (direct / indirect / cumulative)	Relevant Mitigation Measures
The direct loss of breeding habitat for little terns	Maintain or restore the extent and distribution of the habitats of the qualifying features; Maintain or restore the distribution of the qualifying feature within the site	Little Tern Common Tern	Maintain the extent, distribution and availability of suitable habitat (either within or outside the site boundary) which supports the feature for all necessary stages of its breeding cycle (courtship, nesting, feeding) at: Intertidal coarse sediment: 43.83ha. Intertidal mud: 116.76 ha. Intertidal sand and muddy sand 1.83ha. Coastal Lagoon: 13.21 ha Water column: Extent is unknown. The figures for extents are based on best available evidence, and due to a shifting baseline may differ from those at time of designation.	Yes Direct negative impact on extent and distribution of habitat and hence on distribution of the features	None*
			Maintain the availability of shallow sloping nesting sites, grading to <30 cm above water level, restricting the probability that they will flood.	Yes Direct negative impact on availability of suitable nesting sites and hence on the distribution of the feature	None*

Potential Effect	Site Conservation Objective (s)	Qualifying Feature(s)	Relevant Target	Potential Impact (direct / indirect / cumulative)	Relevant Mitigation Measures
	Maintain or restore the structure or function of the habitats of the qualifying features; Maintain or restore the supporting processes on which the habitats of the qualifying features rely	Little Tern	Maintain the structure, function and supporting processes associated with the feature and its supporting habitat through management or other measures (whether within and/or outside the site boundary as appropriate) and ensure these measures are not being undermined or compromised.	Yes Direct negative impact on structure and function of habitat	None*
	Maintain or restore the population of each of the qualifying features	Little Tern Common Tern	Maintain the size of the breeding population at 15 breeding pairs (Common Tern) and 14 breeding pairs (for Little Terns) whilst avoiding deterioration from its current level as indicated by the latest mean peak count or equivalent.	Potential for Impact. Loss of habitat may lead to decline in numbers if other sites in the SPA are not suitable for breeding	None
Increase in disturbance and predation [for Little Terns and Common Terns]	Maintain or restore the extent and distribution of the habitats of the qualifying features; Maintain or restore the structure or	Little Tern	Maintain the extent, distribution and availability of suitable habitat (either within or outside the site boundary) which supports the feature for all necessary stages of its breeding cycle (courtship, nesting, feeding) at: Intertidal coarse sediment: 43.83ha. Intertidal mud: 116.76 ha. Intertidal sand and muddy sand 1.83ha. Coastal Lagoon: 13.21 ha Water column: Extent is unknown. The figures for extents are based on best available evidence, and due to a shifting baseline may differ from those at time of designation	Yes, but mitigatable Potential impact from visual and noise disturbance during construction, reduced to non-significant impact following implementation of mitigation measures.	This will be mitigated by construction being timed outside of the breeding season

Potential Effect	Site Conservation Objective (s)	Qualifying Feature(s)	Relevant Target	Potential Impact (direct / indirect / cumulative)	Relevant Mitigation Measures
	function of the habitats of the qualifying features; Maintain or restore the supporting processes on which the habitats of the qualifying features rely		Maintain the availability of shallow sloping nesting sites, grading to <30 cm above water level, restricting the probability that they will flood.	Yes, but mitigatable Potential for impacts during construction	Ensuring machinery only works within designated paths or within the active intertidal zone to ensure minimum impact on shingle ridges where little terns nest. Secured through the CEMP.
		Little Tern Common Tern	Maintain the structure, function and supporting processes associated with the feature and its supporting habitat through management or other measures (whether within and/or outside the site boundary as appropriate) and ensure these measures are not being undermined or compromised.	No No impact from disturbance or predation on structure or function of the habitats	N/a

Potential Effect	Site Conservation Objective (s)	Qualifying Feature(s)	Relevant Target	Potential Impact (direct / indirect / cumulative)	Relevant Mitigation Measures
	Maintain or restore the population of each of the qualifying features; Maintain or restore the distribution of the qualifying feature within the site	Little Tern	Restrict the frequency, duration and/or intensity of disturbance affecting roosting, nesting, foraging, feeding, moulting and/or loafing birds so that they are not significantly disturbed.	Yes Indirect impact. Population would be reduced and/or re-distributed by increased access for visitors leading to increased disturbance	Fencing, wardening, and signage. See section 1.5.3 of the 'Further information' report for details
			Restrict predation and disturbance caused by native and non-native predators	Yes Indirect impact. Population would be reduced and/or re-distributed by increased access for predators	Yes Fencing. See section 1.5.3 of the 'Further information' report for details

Potential Effect	Site Conservation Objective (s)	Qualifying Feature(s)	Relevant Target	Potential Impact (direct / indirect / cumulative)	Relevant Mitigation Measures
The potential for the harbour to close as a result of the breach, thus removing the harbour from tidal influence, impacting on habitats that occur within the harbour, and on the food availability for feeding terns	Maintain or restore the structure or function of the habitats of the qualifying features; Maintain or restore the supporting processes on which the habitats of the qualifying features rely.	Dark-bellied Brent Goose and Black-tailed Godwit. Common and Little Tern.	Maintain a high cover/abundance of preferred food plants (e.g. <i>Agrostis stolonifera</i> , <i>Lolium perenne</i> , <i>Trifolium repens</i>). Maintain an open harbour mouth/tidal influence so that food sources (i.e., small fish) for the Common and Little Tern to feed on.	Uncertain The species composition of the food plants in seagrass beds is likely to change should the breach close up. Likewise, any closure of the harbour entrance would prevent the movement of small fish species coming in/out of the harbour.	Yes Ongoing monitoring of the breach by the stakeholder group and re-opening of the breach if required
	Maintain or restore the extent and distribution of the habitats of the qualifying features	Ruff	Maintain the extent, distribution and availability of suitable habitat (either within or outside the site boundary) which supports the feature for all necessary stages of the non-breeding/wintering period (moulting, roosting, loafing, feeding) at: Intertidal coarse sediment/shingle: 44.8ha. Coastal Lagoon: 13.21ha. Freshwater and coastal grazing marsh: 81.71 ha. Intertidal mud: 116.76 ha. Intertidal sand and muddy sand 1.83ha. Saltmarsh 139.94ha. The figures for extents are based on best available evidence, and due to a shifting baseline may differ from those at time of designation	Yes Direct impact through alterations in the intertidal habitats could affect Ruff habitats however these impacts may not be adverse overall.	Yes Ongoing monitoring of the breach by the stakeholder group and re-opening of the breach if required

Potential Effect	Site Conservation Objective (s)	Qualifying Feature(s)	Relevant Target	Potential Impact (direct / indirect / cumulative)	Relevant Mitigation Measures
Construction impacts that may reduce foraging habitat for, and disturb, overwintering birds	Maintain or restore the population of each of the qualifying features; Maintain or restore the distribution of the qualifying feature within the site	Dark-bellied Brent Goose; Ruff	Restrict the frequency, duration and / or intensity of disturbance affecting roosting, foraging, feeding, moulting and/or loafing birds so that they are not significantly disturbed.	Yes Indirect impact on population and distribution of the features through disturbance from people and machinery during construction.	Yes Access routes, Timing of works, Cold weather working restrictions. See section 1.5.2 of the 'Further Information' report for details.

Table 2 – Identification of potential effects on The Solent and Dorset Coast SPA. The Site Conservation objectives, the targets (and supporting notes) are taken from Natural England's conservation advice package for Solent and Dorset Coast SPA (updated 19 March 2021).

Potential Effect	Site Conservation Objective (s)	Qualifying Feature(s)	Relevant Target	Potential Impact (direct / indirect / cumulative)	Relevant Mitigation Measures
Increase in disturbance and predation [for Sandwich Tern, Little Tern and Common Tern]	Maintain or restore the extent and distribution of the habitats of the qualifying features;	Sandwich Terns, Little Terns and Common Terns.	Maintain the extent, distribution and availability of suitable habitat (either within or outside the site boundary) which supports the feature for all necessary stages of its breeding cycle (courtship, nesting, feeding) at: Intertidal coarse sediment: 43.83ha. Intertidal mud: 116.76 ha. Intertidal sand and muddy sand 1.83ha. Coastal Lagoon: 13.21 ha Water column: Extent is unknown. The figures for extents are based on best available evidence, and due to a shifting baseline may differ from those at time of designation	Yes, but mitigatable Potential impact from visual and noise disturbance during construction, reduced to non-significant impact following implementation of mitigation measures.	This will be mitigated by construction being timed outside of the breeding season
	Maintain or restore the structure or function of the habitats of the qualifying features; Maintain or restore the supporting processes on which the habitats of the qualifying features rely		Maintain the availability of shallow sloping nesting sites, grading to <30 cm above water level, restricting the probability that they will flood.	Yes, but mitigatable Potential for impacts during construction	Ensuring machinery only works within designated paths or within the active intertidal zone to ensure minimum impact on shingle ridges where little terns nest. Secured through the CEMP

Potential Effect	Site Conservation Objective (s)	Qualifying Feature(s)	Relevant Target	Potential Impact (direct / indirect / cumulative)	Relevant Mitigation Measures
			Maintain the structure, function and supporting processes associated with the feature and its supporting habitat through management or other measures (whether within and/or outside the site boundary as appropriate) and ensure these measures are not being undermined or compromised.	No No impact from disturbance or predation on structure or function of the habitats	N/a
	Maintain or restore the population of each of the qualifying features; Maintain or restore the distribution of the qualifying feature within the site	Sandwich Terns, Little Terns and Common Terns.	Restrict the frequency, duration and/or intensity of disturbance affecting roosting, nesting, foraging, feeding, moulting and/or loafing birds so that they are not significantly disturbed.	Yes Indirect impact. Population would be reduced and/or re-distributed by increased access for visitors leading to increased disturbance	Fencing, wardening, and signage. See section 1.5.3 of the 'Further information' report for details
			Restrict predation and disturbance caused by native and non-native predators	Yes Indirect impact. Population would be reduced and/or re-distributed by increased access for predators	Yes Fencing. See section 1.5.3 of the 'Further information' report for details

Potential Effect	Site Conservation Objective (s)	Qualifying Feature(s)	Relevant Target	Potential Impact (direct / indirect / cumulative)	Relevant Mitigation Measures
The potential for the harbour to close as a result of the breach, thus removing the harbour from tidal influence, impacting on habitats that occur within the harbour	Maintain or restore the structure or function of the habitats of the qualifying features; Maintain or restore the supporting processes on which the habitats of the qualifying features rely	Sandwich Terns, Little Terns and Common Terns.	Maintain an open harbour mouth/tidal influence so that food sources (i.e., small fish) for the Common and Little Tern to feed on.	Uncertain The species composition of the food plants in seagrass beds is likely to change should the breach close up.	Yes Ongoing monitoring of the breach by the stakeholder group and re-opening of the breach if required

Assessment of the scale and seriousness of the potential effects

Those effects that are identified in the table above as having a potential impact on the site's conservation objectives are taken forward to a second stage of assessment. This stage assesses the scale and seriousness of the potential effects, including their:

- magnitude
- duration
- reversibility
- likelihood of occurrence
- how the impact may change over time

These assessment criteria are taken from the DEFRA 'Core guidance' document (2021). This stage includes consideration of the mitigation measures that form part of the revised application and an assessment of the degree of uncertainty in the assessment findings.

Table 3 – Assessment of Impacts

Effect	Magnitude	Duration	Reversibility	Likelihood of Occurrence	Changes over time
The direct loss of breeding habitat for little terns (all conservation objectives)	The project breach site is some 240 meters from the current end of the spit. This section of breached habitat, plus that of the project breach will eventually be lost as a Tern habitat, as the shingle rolls back to Pagham Beach. The area of habitat loss is not stated in the further information provided by the applicant. Natural England advises (e-mail of 25 August 2021) that “The proposed location of the cut is directly through the current nesting area of the Little Tern population”. The shingle once on the beach would not form suitable habitat. The magnitude is therefore assessed as Major Adverse	The main loss of habitat where the little terns nest to occur during the breach event and then subsequently over a number of years (without compensatory measures). It is uncertain if the little terns will nest on the isolated part of the breached spit. They never nested on the naturally (2016) breached island of the spit preferring to nest on the newly accreted spit in the proposed breach area. The longer term net loss of habitat on the spit is dependent on coastal and dynamic processes of spit formation and morphology	The project would not easily be reversed as it depends on dynamic coastal processes. Short-medium term: It is anticipated that the spit will reform under the current coastal regime (sediment supply) however, this is also uncertain to a degree, due to the dynamic processes involved. In the medium-long term Church Norton spit may again extend but this is uncertain	High likelihood of habitat loss immediately The previously much longer spit that breached naturally is reworking onto Pagham beach rapidly. The severed section of the 2016 spit is continuing to roll back towards the revetment and ‘I’ expect it will meet the main foreshore ‘wholesale’ this winter – <i>pers.comm.</i> Arun coastal engineer. The little terns never nested on the naturally breached island of the spit preferring to nest on the newly accreted spit in the proposed breach area.	The area of the project breach site will be lost upon implementation. The Church Norton spit may start to accrete and extend once again creating new habitat.

Effect	Magnitude	Duration	Reversibility	Likelihood of Occurrence	Changes over time
The potential for the harbour to close as a result of the breach, thus removing the harbour from tidal influence, impacting on habitats that occur within the harbour	A long-term closure would have a variety of impacts on the over-wintering SPA features, not all of them negative. There would be more negative outcomes for several SSSI species of birds but that does not form part of this assessment. Combined with the low likelihood of occurrence and the provision of funding for mitigation over five years, then the magnitude is assessed to be negligible .	Once a closure is deemed to have occurred by the Pagham Coastal Interest Advisory Group (red-light situation), re-opening should occur within as short a time frame as possible so the effect of closure is as short in duration as possible. Works may have to be delayed until the nesting season has finished.	A closure is easily reversible provided the funding available is sufficient.. Construction phase mitigation measures will need to be re-implemented.	This effect has a low likelihood of occurrence in any one year.	If the closure were not reversed, the habitats of the harbour would change substantially over time. The potential for a closure is continual. It is usual for mitigation measures to be implemented whilst the impact is still present. However a judgement will have to be made as regards the point in time at which the harbour entrance has moved naturally far enough from the project breach position that the project applicants are no longer legally or financially liable for implementing re-opening in the event of a closure.

Effect	Magnitude	Duration	Reversibility	Likelihood of Occurrence	Changes over time
Construction impacts that may reduce foraging habitat for, and disturb, overwintering birds	With mitigation measures as outlined in section 1.5.2 of the 'Further information report May 2016' and secured through the Construction and Environment Management plan (CEMP) for the present application the impact on SPA features is considered to be negligible .	Construction is scheduled to occur between 1 October and the end of November. If works are required after 1 November a cold weather working condition will stop works in times of high stress for the birds. A re-opening of the breach if required would result in a repetition of the effect and would have to be subject to the same mitigation.	A temporary effect only, so not applicable	Without mitigation there is a high likelihood of disturbance of over-wintering birds, however these are unlikely to be SPA feature species	The risk of disturbance increases the longer the works go on such as into November as numbers of over-wintering birds increase and as the colder weather means that the impact of disturbance becomes more severe.

Overall assessment of Adverse Effect on Integrity (AEol)

The Appropriate Assessment above indicates in Table 2 that the scale and seriousness of the habitat loss for nesting little terns will have a major adverse impact on the Conservation Objectives for the site and that this is not mitigatable. The effects of compensation measures do not form part of this assessment.

For this reason, this assessment concludes that there would be an Adverse Effect on the Integrity of the site due to the loss of nesting sites for little terns. This will substantially reduce the area of the site which supports this key species on the site.

The competent authorities must consult Natural England on this assessment and have regard to their advice. As well as consulting NE, the competent authorities may also consult the public. The competent authorities must then come to a final decision whether the project gives rise to an Adverse Effect on Integrity of the site (AEol).

This assessment recommends to the competent authorities that they conclude that the project, including mitigation measures but excluding compensation measures, does have an Adverse Effect on the Integrity of Pagham Harbour Special Protection Area and Ramsar Site.

If, as recommended, a decision is made that AEol would occur then permission for the project could only be granted lawfully by means of a derogation under regulation 64 of The Conservation of Habitats and Species Regulations 2017 (as amended).

Before permission on the basis of a derogation can be granted there are three further tests that must be met. In order to expedite the determination of the application this assessment report now goes on to consider these derogation tests in advance of a formal decision being made on AEol.

Part II – Derogation Tests

A project that has an adverse effect on the integrity of a European site can only proceed under the derogation requirements provided three sequential tests are met:

- There are no feasible alternative solutions that would be less damaging or avoid damage to the site.
- The proposal needs to be carried out for imperative reasons of overriding public interest.
- The necessary compensatory measures can be secured.

Test 1 – Alternative Solutions

The DEFRA core guidance (February 2021) states that:

“You should work with the proposer and consider whether any alternative solutions are available. This might include considering whether the proposal could:

- happen at a different location
- use different routes across a site

- change its scale, size, design, method or timing

Alternatives must be suitable

Alternatives need to meet the original objectives of the proposal.”

The Further Information document (R.2614, May 2016) re-submitted by the applicant as part of the present applications sets out alternatives but these are mostly no longer relevant to the present planning application. The process of drawing up the Pagham Adaptive Management Plan (PAMP, November 2020) examined anew the potential options for management of the coastal frontage and “provide[s] a technical assessment of the possible flood and coastal erosion risk scenarios and interventions that could be undertaken within the operational and legislative boundaries.” This document is more up to date than the options examined as part of the 2016 application and so the alternatives considered here are taken from the PAMP (table1), including only those that address “Beach narrowing through spit proximity” as that is the immediate cause of risk to properties in West Front Road and in Haven Church Farm Holiday Park. The two engineered linear defences options (sheet steel pile wall and concrete seawall) are considered together as the proposed location of the linear defence is the same (PAMP figure 2), only the materials used differing. The three alternatives from the PAMP are therefore; Sediment recycling within the sediment cell, Spit Management (cutting the spit) and building an engineered linear defence.

These alternatives are considered to be suitable and broadly meeting the project objectives of protecting property from flood risk and erosion. In addition a ‘do nothing’ alternative has also been considered, although only in the light of the Environment Agency preparation of a draft Contingency Plan to manage the tidal flood risk on an emergency basis should a connection to the lagoon become imminent. Cost/benefit has not been considered as a project objective in the test of alternatives, although issues with certainty of protection, overall costs and the timescales over which the objectives are achieved and maintained have been taken into consideration, as these affect the degree to which an alternative can be considered to be a feasible alternative.

In revising the project proposal the applicants have defined the project objectives. These are:

- 1) Avoid/reduce the risk of a tidal breach into Pagham Lagoon with associated flood risk to properties on Pagham Beach and large parts of the caravans Haven Church Farm Holiday Park
- 2) Avoid/reduce the risk of coastal erosion leading to property loss at the southern end of Pagham Beach

This loss could occur through the formation of a second, unconstrained tidal inlet to the Pagham Lagoon with associated erosion risk to properties on Pagham Beach – (NB the morphology of a second entrance is extremely unpredictable) or through the continuing erosion of the open coastal frontage. The movement of the Pagham Harbour Outflow Channel (PHOC) since 2017 has led to the loss of some 66m of beach width, breaching a small lagoon there and leading to erosion of the beach in front of the larger Pagham Lagoon. In the case of a breach into Pagham Lagoon the Environment Agency assess that a 1 in 100 RP event would flood 31 properties on Pagham Beach, 13 properties either side of Church Lane and thus by definition Church Lane up to the corner with Sea Lane and Pagham Road. In addition, 549 caravan plots would be impacted.

Table 4 – Assessment of Alternatives

Objective	1. Sediment Recycling within Sediment Cell	2. Proposed project – cut the spit	3. Engineered linear defence (e.g. steel sheet pile wall) on the line show in the PAMP (fig 2)	4. Do nothing and rely on EA contingency plan to mitigate flood risks
Avoid/reduce the risk of a tidal breach into Pagham Lagoon with associated flood risk to properties on Pagham Beach and large parts of the caravans Haven Church Farm Holiday Park	Meets the objective but only over a short time scale. In the medium term the EA contingency plan notes “The attempt to balance current scour with recycling has proven to be difficult during the situation in 2013 leading to the construction of the rock revetment at West Front Road. Issues with sourcing material for recycling its transport to site and the risk of erosion outpacing supply make this a challenging option [to implement]”	Meets the short term objective of deflecting the channel away from Pagham Lagoon provided that the breach results in the cut spit re-joining the eroded beach as predicted (and as is occurring with the natural breach of 2016).	Meets the objective, but only in the medium to long term. The line of defence is designed to protect the tidal lagoon. The additional time taken to construct such a defence also impacts this alternative’s short term effectiveness.	Partially meets the objective. The EA contingency plan would result in cutting of the spit, but at a much later stage in the erosion of Pagham Beach than the proposed project. The ability of a by then much narrower beach to sustain itself until the material from the cut spit recharges it leads to greater uncertainty.

Objective	1. Sediment Recycling within Sediment Cell	2. Proposed project – cut the spit	3. Engineered linear defence (e.g. steel sheet pile wall) on the line show in the PAMP (fig 2)	4. Do nothing and rely on EA contingency plan to mitigate flood risks
Avoid/reduce the risk of coastal erosion leading to property loss at the southern end of Pagham Beach	Meets the objective but only over a short time scale As above – past experience has shown this to be difficult to implement.	Meets the short term objective provided that the breach results in the cut spit re-joining the eroded beach as predicted (and as is occurring with the natural breach of 2016).	Meets the objective in the medium term. In the long term there is the risk that without shingle the structure erodes. The line of defence is designed to protect the tidal lagoon and also the southern-most properties. The additional time taken to construct such a defence also impacts on the feasibility of this alternative's short term effectiveness.	Only partially meets the objective. The EA plan addresses flood risk not erosion. The triggering of emergency work (cutting the spit) would achieve the same outcomes as Option2.
Derogation test: Is the Adverse Effect on the Integrity of the European site less than proposed project?	Yes – less damaging to SPA features provided off shore source of material, but this damages the SSSI geomorphological interest	N/a This is the project others are tested relative to	Yes, the direct loss of tern nesting habitat is less as the engineered defence lies in an area not used by the terns. In the long term there is a risk of unintended consequences from an additional hard defence. If the hard defence is on the open coast they are potential issues but it could protect the majority of flood risk via the Pagham lagoon	No, the impact of carrying out eh project as an emergency work would be at best the same impact on the SPA features of interest and could be slight worse impact due to less favourable timing than planned works. As part of any emergency works EA would also need to retrospective address impacts to the SPA so would need to provide compensation little tern nesting habitat.

The natural breach of the spit that occurred around 2016 demonstrated that a comparatively shallow channel would keep itself open without blocking-off the longer residual channel. Thus the present applications propose a straight but relatively shallow excavation for the breach of 7,500 cubic metres with no infilling of the current PHOC. This reduces the time required for construction (mitigating disturbance impacts) and reduces access to the distal end of the spit (until such time as it rolls back onto Pagham Beach. However, it does not avoid direct loss of tern nesting sites currently located within the breach section hence the conclusion of Adverse Effect on Integrity in Part I

From the analysis above it is clear that option 1 is less damaging to the SPA, but this does not achieve the same objectives in terms of certainty of protecting property and managing flood risk. Option 4 is at best no more damaging to the SPA features than the project option and is more uncertain in meeting the same project objectives, particularly on timing and on addressing the threat of erosion. Option 2 and 3 are technically feasible and Natural England advise that option 3 is likely to be less damaging to the SPA features. However, Option 3 is not considered to be a truly feasible alternative due to the additional costs and the lead in time to implement it. As a result, it is considered that there is no feasible alternative solution which would better respect the integrity of the site in question, and so the test of no alternative can be assessed as being met.

Where no viable alternative with less damage to the site's conservation objectives exists then the planning authorities can proceed to the tests of Imperative Reasons of Overriding Public Interest (IROPI) and compensatory measures.

Part III – the IROPI and compensatory measures tests

Test 2 - Imperative Reasons of Overriding Public Interest (IROPI)

The competent authorities must consider each element of this test. Firstly is the interest or benefit of the project public or private?

The public interest can occur at a national, regional or local level. In this case the benefits are local ones but there is clearly a wider public interest in terms of coastal defences protecting housing.

Secondly, does the public interest override the harm (or risk of harm) to the integrity of the site?

The economic and social cost of not achieving the coastal defence objectives and so housing being damaged or even lost to the sea is considered to outweigh the environmental damage that would be caused by carrying out the project.

The final part of the test is for those reasons of overriding public interest to be “imperative”. Is it essential that the project is carried out?

On the basis that no alternative is feasible (see above), the project is essentially compared to the ‘do-nothing’ baseline position.

Conclusion: the project does meet the derogation requirement of there being Imperative Reasons of Overriding Public Interest.

Test 3 – Compensatory Measures

If a project that harms the integrity of a European site is to be allowed under derogation because there is no alternative and IROPI can be shown, then the competent authorities and the appropriate authority (i.e. the Secretary of State) are responsible for ensuring that all necessary compensatory measures are identified and delivered.

The documents submitted by the applicant propose the creation of new habitat for nesting terns by using 3,000 cubic metres of shingle from the excavated breach to raise levels on an alternative site within the harbour to create some 0.3Ha of new island. This new site is more remote from human and predator disturbance than that proposed in 2016 and does not require any access along Church Norton spit, so reducing the construction phase impacts. Provision for ongoing maintenance of the compensatory site in a suitable condition and clearance of vegetation will have to be secured.

The key considerations for this test are:

- A) Are the measures technically feasible?
- B) Is there a clear plan for undertaking the work and the ongoing provision of maintenance?
- C) Are the measures close to the original site?
- D) Will the measures be established to the required quality in time to compensate for the harm when it occurs?
- E) Is the habitat creation methodology considered reasonable?

Addressing each of these points in turn:

- A) Yes, the measures are considered technically feasible (subject to any further NE advice). The design includes a crest area of 0.15Ha at 1m above MHWL and graded slopes (application Drawing B).
- B) There is a clear plan for the implementation of the work and funding for the ongoing maintenance can be secured through s106 agreement. The RSPB as site managers are able and willing to carry out monitoring and maintenance of the surface, the shingle requirements are to be carried out by the applicant.
- C) The measures are within the existing SPA / Ramsar site on a shingle shoal not supporting other features.
- D) The loss of the little terns habitat due to the immediate cut (0.3 ha that the little terns are currently using) and roll-back of the remaining shingle from spit to beach will be both immediate and longer term over several years, although it is unclear if the little terns will use the breach spit as they did not previously. Therefore, compensatory habitat in the form of a shingle island will be constructed immediately during the breaching of the spit and will be ready for the little terns the following breeding season. The bare nature of the shingle preferred by little terns means no substantial time period for habitat establishment is required.
- E) The compensatory habitat is more sheltered than the exposed site of the spit. However, the new compensation site is more exposed to erosion due to tidal flows through the newly created project breach. Natural England have advised (e-mail 25/08/21) that "Reassurance on the likelihood of this [the island being eroded] and how this would be managed needs to set out" and a commitment need to be made to maintaining the compensatory habitat for

the lifetime of the proposal. In the event of the compensatory habitat being re-worked by natural processes, any shingle that is required to maintain it will be provided – in line with the mitigatory considerations outlined within Tables 1 & 2 – and supplied from a source outside of the designated site(s), as to further mitigate any impacts to the qualifying features of the site(s).

The compensatory measures will be fully secured as part of any permission granted and a clear mechanism for ongoing maintenance and monitoring of the compensatory island being agreed, the measures are assessed to be adequate to meet the derogation requirements.

Therefore, all elements of the derogation test are considered to be met. It is recommended to the competent authorities that the Habitats Directive does not require the application to be refused, subject to the usual call-in period for the Secretary of State, and subject to the mitigation and compensation measures being secured by legal agreement. Other ecological matters, including those relating to the impact on the SSSI features, will need to be considered separately as part of assessing the application.