Technical Note

JBA Project Code	2021s1221
Contract	Brighton Marina to Shoreham Harbour FCERM
Client	Brighton & Hove City Council
Date	14 February 2023 and updated May 2023 and June 2024
Author	G James BSc (Hons) QCIEEM
Reviewer / Sign-off	Charlie Dwight BSc (Hons) CEcol MCIEEM
Subject	Biodiversity Net Gain Justification Report

1 Introduction

The coastal frontage between the River Adur and Brighton Marina, is at risk of flooding from wave overtopping. The total length of coastal frontage is approximately 11km with 2.15km located within the local authority of Adur District Council (ADC) and 8.85km located along the frontage within the Brighton & Hove City Council (BHCC) local authority.

There are significant erosive forces at the Shoreham end of the frontage. There is a natural drift of sediment along the South coast, Brighton included, from west to east. The supply of natural sediment (shingle beach) drift material to the western beaches of the study area (Shoreham frontage) is impeded by the mouth of the River Adur and associated training walls. Limited sediment supply, coupled with wave action, has resulted in significant erosive forces at the western end of the frontage. As a result, the residual life of the existing defences is inadequate. The coast frontage is also at risk of flooding from wave overtopping due to a combination of significant variations in defence heights and beach widths, poor maintenance and deterioration of defence assets.

The shingle beach along the frontage provides the main form of coastal defence and is controlled by a series of timber, rock, masonry and concrete groynes. Historic storm events have previously led to flooding of commercial premises and properties along Brighton seafront and on adjacent roads. Emergency repair works have been undertaken to repair breaches in seawalls and some structures, but many remain in a collapsed or partially collapsed condition. There are significant variations in defence heights and beach widths along the frontage which have resulted in a number of weak points susceptible to flooding. Deteriorated and aged assets along the frontage have resulted in a poorly controlled beach susceptible to significant storm draw down and breach risk.

The Brighton Marina to River Adur Flood and Coastal Erosion Risk Management Strategy (FCERM) has been put forward by BHCC in association with ADC. The FCERM (the Proposed Development) aims to manage risks associated with flooding and coastal erosion through implementation of a defences with a 0.5% Annual Exceedance Probability (AEP) (1 in 200 year) standard of protection for the first 15 years of the strategy. The FCERM Strategy is split into seven areas and this is shown on Figure 1-1 below.

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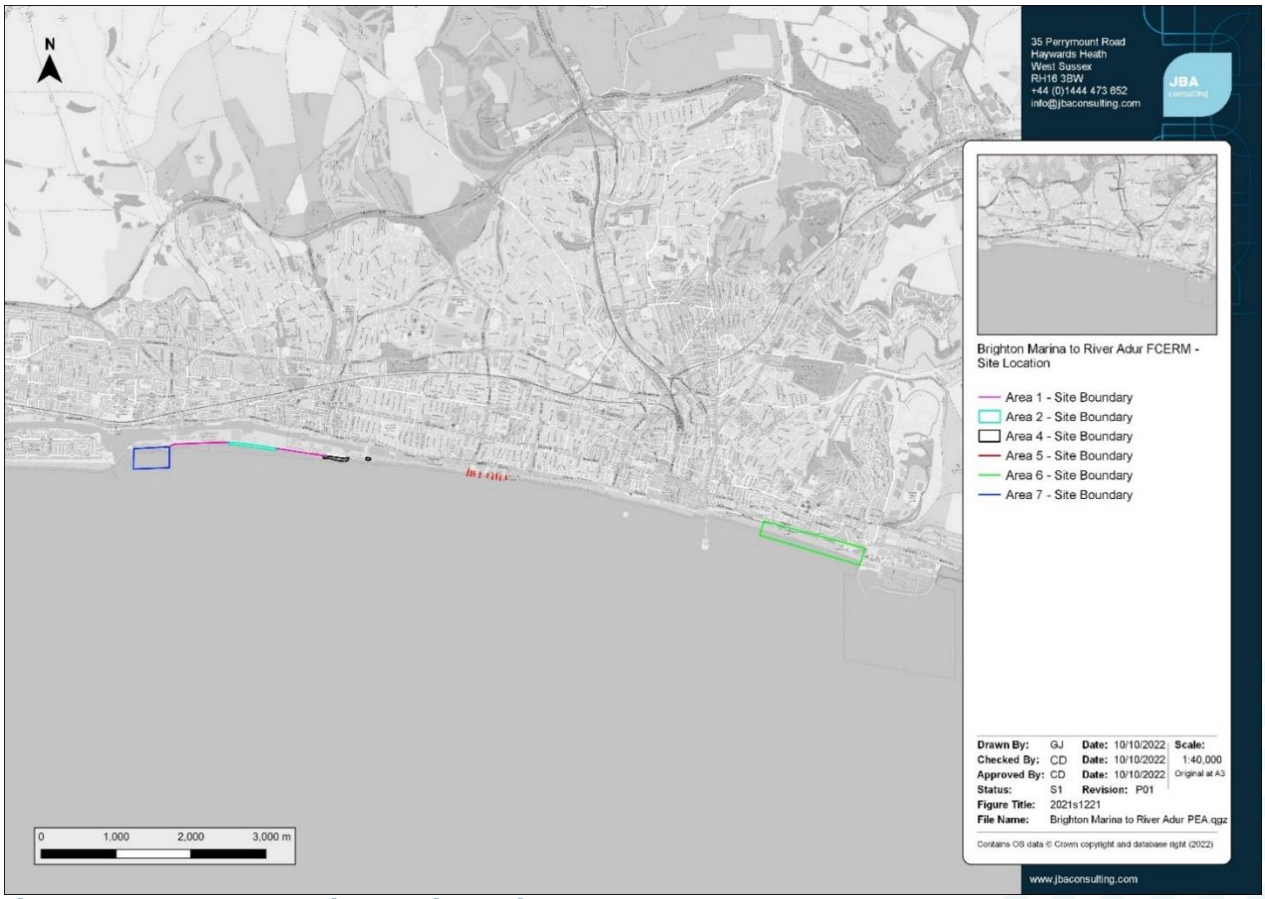


Figure 1-1: FCERM and overview of Areas 1-7

1.1 Proposed development

Planning permission is being sought for the construction of two rock armour revetments in Area 2 and Area 4, and a footpath, access steps and an access ramp in Area 2. A summary of the works proposed in each location is outlined below.

1.1.1 Section 73 Update

Planning permission was granted for Area 2 works in June 2023 by Adur District Council (AWDM/0321/23) and Area 4 works in September 2023 by Brighton and Hove City Council (BH2023/00627). However, this assessment has been updated in support of applications under Section 73 of the Town and Country Planning Act to amend the works for the Area 2a rock revetment and areas of compensatory Coastal Vegetated Shingle habitat, detailed below.

The following changes to the Area 2a rock revetment works have been made:

- Change to the rock revetment crest height from 5.5m AOD to 6m AOD and the toe of the rock revetment from 3.5m AOD to 4m AOD due to the presence of the sheet pile wall.
- Reduction in the length of the rock revetment at its western end by 20 metres.

- Change to the alignment of the proposed footpath above the eastern end of the rock revetment. This is due to the presence of a new emergency sheet pile wall which has been installed by Shoreham Port.

The coastal vegetated shingle compensatory habitat was amended due to concerns regarding the suitability and longevity of some of the approved locations for compensatory habitat. Table 1-1 below outlines the key changes that have taken place, however the overall aim of the scheme to compensate on an 8:1 ration remains the same. Changes are also proposed to the design of the rock revetment in Area 2.

Table 1-1: Comparison of approved compensatory habitat vs proposed for the Section 73 update

Compensatory Habitat Reference	Approved Area (ha)	Proposed Area (ha)	Reason
Area 2 Enhancement	0.22	0.22	Changes to the design of the rock revetment and associated works are proposed however overall area of enhancement is the same. The design drawings have been updated to reflect this (JBA, 2024a, b and c).
Area 4 creation	0.09*	0.021	Reduced area as location is exposed and recent storm has reduced the size beach crest available.
Spending Beach	-	0.065	Introduced as no further suitable compensation sites found within BHCC and due to high potential for enhancement, being closed to the public and existing vegetation is in moderate condition.
Carats cafe	-	0.017	Added as no further suitable compensation sites found within BHCC and due to the area of beach being semi-sheltered on a raised upper section of the beach.
Totals	0.31	0.32	
*The figure in the approved EDS (May, 2023) stated this to be 0.9, however this was a typo fault and should have been 0.09.			

1.1.2 Planning permission

Adur District Council

Construction of a new rock revetment defense along central Shoreham frontage facing Basin Road in Area 2. The proposed alignment follows the seaward perimeter of the existing beach crest. Construction of a new footpath along the top of the existing sheet piles, along with a new beach access ramp and steps.

The rock revetment would span an area of approximately 740m in length, with a width range between 8.6m and 11.8m, and a height range of between 2m and 3m from toe to crest.

The footpath will be approximately 3m wide and approximately 570m long.

An access ramp will be located at the eastern end of the rock armour revetment, providing access from the carparking space to the beach. The access ramp will provide safe access for vehicles to the beach (for maintenance only), and access for pedestrians.

Two access steps will be built providing save access to the beach from the new footpath. The first access steps are located at the western extent of the new footpath, and the second access steps are located centrally along the footpath providing access to the beach between the two existing rock armour groynes, where at present, there is no safe pedestrian access.

Brighton and Hove City Council

Construction of a rock armour revetment along the seaward edge of the beach ridge, in Area 4.

A rock armour, 130m in length has been built to date, however the remaining 120m revetment (total of 250m) has been put on hold whilst additional material is being sourced. The Area 4 General Arrangement drawing (JBA, 2024f) shows the rock revetment works to date. It is the current working assumption that the remainder of 4 revetment will be completed simultaneously with the Area 2a rock revetment works. The rock armour is 10.6 to 10.9m wide and 3m from toe to crest.

Approximately 7000 ton of rocks for the revetment were imported from Lydd Ranges Sea Defence scheme (in Lydd, Kent, approximately 40 miles from the site) by road to complete the first 130m of revetment. The remaining 120m would be constructed of rock imported from another source.

1.1.3 Permitted development and further planning permission

Other works that form part of the Brighton Marina to River Adur FCERM are likely to constitute permitted development (or require a separate planning application) are as outlined below.

Adur District Council

Area 1 (permitted development): construction of new concrete upstand flood wall along the top of the existing sheet pile wall.

Area 2: patching repair to the concrete wall (likely planning permission required for any rebuilding of wall).

Area 7: Beach nourishment through regular recycling undertaken by BHCC.

Brighton and Hove City Council

Area 6: Beach shingle material will be obtained from Area 6 to undertake recharge for regular recycling undertaken by BHCC (planning permission application submitted).

1.2 Methodology

A UKHab survey was undertaken by Gareth James BSc (Hons) QCIEEM in June 2022 and updated by Gareth James and Max Robards in October 2022 with Gareth James undertaking another walkover in November 2022. The majority of habitats on site were mapped to level 4 of the UK Habitat Classification scheme (UK Habitat Classification Working Group, 2018a)

implemented using the field key (Carey & Butcher, 2018) with reference to the relevant definitions (UK Habitat Classification Working Group, 2018b). Secondary codes were added where relevant to provide information on the management and environment relating to any particular habitat parcel.

1.3 Biodiversity Net Gain

Since the projects' original approval, the Statutory Biodiversity Metric (2024) has been introduced and it is now a legal requirement to meet a 10% net gain in biodiversity in the UK. However, given the original scheme was already granted approval and this is a minor update, the same metric version (Metric 3.1) as the original application was used in this instance and statutory obligations do not apply. However, policy DM37 of City Plan Part 2 (Local Plan) still requires that an additional measurable net gain in biodiversity is achieved.

Biodiversity Net Gain (BNG) was measured using Defra's Biodiversity Metric (version 3.1 and habitats will need to be secured for at least 30 years. This sits alongside:

- a strengthened legal duty for public bodies to conserve and enhance biodiversity,
- new biodiversity reporting requirements for local authorities, and
- mandatory spatial strategies for nature: Local Nature Recovery Strategies or 'LNRS'.

The Biodiversity Metric 3.1 calculation tool (Natural England, 2021) was used to calculate all biodiversity losses and gains for this site, following the good practice principles (Baker et al., 2016) and guidelines (Baker et al., 2019). Increase in habitat units is achieved through compensation and enhancement measures.

2 Habitat loss & compensation for the scheme

2.1 Loss and Temporary Impact of coastal vegetated shingle owing to the scheme

In the absence of compensation, the works will result in a permanent loss of 0.03ha of coastal vegetated shingle within Area 4 (within a Basin Road South Local Wildlife Site (LWS), due to placement of new rock armour to form a rock armour revetment. A further 0.07ha of coastal vegetated shingle will be subject to temporary impacts (minor disturbance of seedbank) during the construction of a coastal new footpath within Area 2.

Coastal vegetated shingle is identified as an irreplaceable habitat, and this habitat type is found across all areas apart from Area 5 (Hove Beach). It is found in a varying range of condition types with the best example being at the Basin Road South LWS (Area 4). Permanent losses of this habitat type are required to be compensated at an 8:1 ratio, to ensure all habitat trading deficits associated with any loss of this high distinct habitat are balanced through appropriate compensation.

2.2 What is coastal vegetated shingle?

Coastal vegetated shingle is a priority habitat and is an extremely rare habitat type which displays both ecological and geomorphological interest (Green & McGregor, 1990) and has a very limited global range. Many of the species found within this habitat type are shingle specialists. Coastal habitats are dynamic and are dominated by wave and storm events and as such are constantly changing (Smith, 2009).

2.3 Issues around coastal squeeze and location of compensatory coastal vegetated shingle within Brighton & Hove and Adur & Worthing boundaries

Throughout the life cycle of this project, JBA ecologists have looked at various locations for the delivery of compensatory coastal vegetated shingle within Brighton & Hove and Adur & Worthing administrative boundaries. The search covered the following sites:

- Brighton Beach (to east of Palace Pier) – unsuitable due to human disturbance and large music events held in this location
- Rottingdean Beach – unsuitable due to human disturbance and coastal vegetated shingle already in this location
- Saltdean Beach – unsuitable due to human disturbance and coastal vegetated shingle already in this location
- Shoreham Port & Southwick Beach – most suitable location
- Shoreham Beach Local Nature Reserve (LNR) – unsuitable due to presence of coastal vegetated shingle already in this location.
- Volk's Railway – unsuitable due to human disturbance and large music events held in this location

A meeting was held with the Brighton & Hove City Council Estates Team who offered a small strip of land adjacent to Volk's Railway for compensatory coastal vegetated shingle, however, this was considered unsuitable due to human disturbance and large-scale music events in this location and would be impracticable for safeguarding.

Shoreham Port & Southwick Beach are the most favourable locations to deliver compensation, as this is where the loss of coastal vegetated shingle will occur. The main issues surrounding the location of compensatory coastal vegetated shingle is coastal squeeze and making sure that the habitat is secured and safeguarded for 30 years and will be viably functionable. The areas of shingle beach between Shoreham Harbour and Brighton Marina are all urban on the landward side of the beach, the succession of urbanisation has led to fragmented pockets of coastal vegetated shingle now occurring along this section of the Sussex coastline. After an extensive search for suitable locations, two proposed locations for the delivery of compensatory coastal vegetated shingle are described below in Section 2.4.

2.4 Proposed locations of compensatory coastal vegetated shingle

The permanent loss of 0.3ha of existing coastal vegetated shingle within Area 4 (Basin South Local Wildlife Site (LWS) and temporary impacts to 0.07ha within Area 2, location of the new footpath. The loss and impacts will be compensated at an 8:1 ratio at the following locations:

- Enhancement of 0.22ha of existing poor condition (to moderate condition) of coastal vegetated shingle, within Area 2 (ADC);
- Creation of 0.021ha of new coastal vegetated shingle in Area 2d (within BHCC);
- Creation of 0.017ha of new coastal vegetated shingle within Area 1, near Carat's café (ADC);
- Enhancement of 0.065ha of existing moderate condition coastal vegetated shingle (to good condition) within Area 7, Spending Beach (ADC)

2.5 Justification for change in compensatory habitat locations

The original compensation strategy for the proposed works sought to create coastal vegetated shingle in fewer but larger areas across the coastal frontage, with the majority falling within

Area 4 where the impacts occur. However, due to risks foreseen with exposure and coastal erosion, and the limited space available on the beach crest, the long-term viability of creating coastal vegetated shingle within Area 4 was seen as not viable. Therefore, further compensation areas were sought across the wide extent.

This has resulted in a greater number of scattered areas being proposed to fulfil the 8:1 ratio of compensation. However, this approach may have greater benefits in providing stepping stone habitat of this important habitat across a highly urbanised coastline. The majority of compensation now falls within the Adur and Worthing administrative boundary which is outside of the jurisdiction of BHCC, where the impacts occur. However, due to limited options and good suitability of these areas it is considered the best approach in terms of ecology functionality.

3 Biodiversity Net Gain

3.1 Greening the Grey: Biodiversity Wall

To provide a biodiversity net gain (on-site) for the scheme, the existing concrete sea wall along Basin Road South in Area 2c will be enhanced, to create a Biodiversity Wall based upon the 'Greening the Grey' concept (Naylor et al., 2017). Design details are provided within the Ecological Design strategy (JBA, 2024d), however these are still in draft stage and will be finalised and approved by the council prior to implementation. A summary of the design detail is provided below.

The existing concrete wall currently provides no opportunities for biodiversity and is located in an urban coastal setting, which is dominated by commercial buildings and sealed surfaces. A photo of both the landward and seaward side of the wall at present is shown below in Table 3-1.

Current landward side of wall	Current seaward side of wall
	

Table 3-1: Existing concrete sea wall in current condition

The planters will be made from Accoya material and weepholes will be created by small diameter pipe inserts through the timber. Substrate will be added comprising recycled crushed brick with 10% recycled organic compost (cockleshell mulch). This will provide a

suitable medium for locally sourced seeds of native salt tolerant species to be added, including the following species:

- Rock Samphire *Crithmum maritimum*
- Common Sea-lavender *Limonium vulgare*
- Sea Beet *Beta vulgaris var. maritima*
- Fescue grasses (various species) *Festuca spp.*
- Viper's-bugloss *Echium vulgare*
- Large-flowered Evening-primrose *Oenothera glazioviana*
- English Stonecrop *Sedum anglicum*
- Dune Pansy *Viola tricolor ssp, curtisii*
- Sea Campion *Silene uniflora*

A range of bug hotels will be incorporated into the landward side of the wall to provide additional habitat for are invertebrate species recorded on or adjacent to the site (Lyons, 2018):

Brown-banded Carder *Bombus humilis*, *Lixus scabricollis* (A Beetle), *Medon fusculus* (A Beetle), *Mogulones geographicus* (A Beetle), *Orthochaetes setiger* (A Beetle), Mallow Flea Beetle *Podagrica fuscicornis*, *Psilothrix viridicoerulea* (A Beetle), Five-spot Ermel *Ethmia terminella*, Viper's Bugloss (moth) *Hadena irregularis*, L-album Wainscot *Mythimna l-album*, Common Wainscot *Mythimna pallens*, Mallow Groundling *Platyedra subcinerea*, Beet Moth *Scrobipalpa ocellatella* and *Chlamydatus (Eurymerocoris) evanescens* (A True Bug).

The Biodiversity Wall will be subject to detailed design which will be submitted for the approval of the local planning authority, and prior to creation.

3.2 Issues around the Biodiversity Metric tool outputs for this proposal

The current Biodiversity Metric tool (v3.1 at the time of assessment), was designed as a simple matrix, to help to inform decisions and not lead them. It is not sufficiently complex or equipped to assess biodiversity gains and losses for irreplaceable habitats, including coastal grazing marsh. The associated Defra Metric 3.1 user guide recommends irreplaceable habitats are compensated through a bespoke mitigation strategy, and outside of the Biodiversity Metric. Therefore, compensation where losses of coastal vegetated shingle occurred on this scheme were agreed (with the ecologist working on behalf of the local planning authority) to be compensated at an 8:1 ratio.

Similarly, the Biodiversity Metric fails to recognise the value and importance of creating new green infrastructure in an urban setting, and has subsequently only awarded low BNG (0.5 habitat units), for creation of the new Biodiversity Wall.

Due to the difficulties in quantifying BNG for urban coastal environments using a Biodiversity Metric where irreplaceable habitats are present and enhancement opportunities are limited to 'Greening the Grey', the outputs generated by the Biodiversity Metric indicates a biodiversity net loss of -0.47% for the project as a whole.

However, when splitting the habitat parcels out per administrative boundary, Brighton and Hove receive a net loss of -0.32% whilst Adur & Worthing receive a net loss of -2.11%.

A meeting was held with local authority ecologists to discuss these issues, and all at the meeting agreed that there were only two options to deliver BNG on this scheme and this would be through enhancement of existing linear or vertical urban features (creation of green

walls or green roofs). Other than greening the grey of existing urban features i.e., existing walls, there are no other suitable sites within Brighton & Hove and Shoreham, that can provide suitable BNG opportunities. Where use of existing urban features is not undertaken to deliver BNG for the project use, BNG off-setting provisioned through an off-setting provider is the only alternative option open to the project. This was not considered a viable option as it will provide no benefits for local biodiversity or communities within Brighton & Hove or Shoreham. Therefore, following Principle 6 of the biodiversity net gain good practice principles which is 'achieving the best outcomes for biodiversity by using robust, credible evidence and local knowledge to make clearly justified choices' (Baker et al., 2016). A bespoke Ecological Design Strategy (which falls outside the and limitations of the Biodiversity Metric) was deemed to be more appropriate for delivery of Biodiversity Net Gain for the scheme.

4 Conclusions

Whilst the Biodiversity Metric Tool fails to recognise the value of the newly created Biodiversity Wall, the overall ecological benefits associated with creation of this feature within the site to deliver BNG for the project is based on ecological expertise rather than a numeric number driven approach derived by the Biodiversity Metric. The ecological benefits for species and local communities delivered via the creation of the biodiversity wall far outweigh the very low number of biodiversity units (0.5 habitat units), quantified by the Biodiversity Metric.

In 2018, an invertebrate survey on Shoreham Beach recorded a total of 248 species with 31 of these species being considered 'notable' either on a national or county wide scale (Lyons, 2018). The beaches to the east of Shoreham Beach are mostly unvegetated and consist of shingle whilst the adjacent habitats to the beach are mainly comprised of residential properties and commercial businesses. The Biodiversity Wall will provide a stepping stone habitat and help to improve the connectivity and functionality of the habitats present throughout the site. A desk-based review of available bird data for Southwick Beach also indicated that several notable Sussex bird species had been recorded in the vicinity of the newly created Biodiversity Wall. Most of these records were of migrating seabirds offshore however there is a population of the red-listed House Sparrow *Passer domesticus* within the vicinity of Shoreham Port. Monitoring of this species in the UK suggests that there has been a severe decline in the UK population, with an estimated 71% decline between 1977 and 2008 in both rural and urban populations (RSPB, 2023). The provision for nest boxes for birds incorporated into the Biodiversity Wall will benefit House Sparrow as well as other birds using the area. The habitats found along the northern bank of Southwick Canal adjacent to the A259 support some notable species including Greenfinch *Chloris chloris* and Dunnock *Prunella modularis* whilst this area is not immediately within the footprint of these works, the Biodiversity Wall will also support these species as they forage across the wider area. The seaward side of the wall will also benefit wading birds such as Ringed Plover and Turnstone which would now have further foraging resource once colonising species established on this side of the wall.

As well as benefits to wildlife, the Biodiversity Wall will have social and educational benefits to the local community. Physical and health benefits from connecting with nature are well documented as well as improvement in mental health and emotional wellbeing. Basin Road South is frequently used by runners and cyclists, the visual aspect of the wall will make exercising or commuting along this section a more enjoyable experience. The Biodiversity Wall will also provide opportunities for research projects for aspiring ecologists in the local area and also local schools could run trips to the Biodiversity Wall to inspire children to get enthusiastic and interested in the living world.

4.1 References

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