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Brighton Marina to River Adur FCERM Strategy

Ecological Impact Assessment (EcIA)

Final Report

May 2023

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Brighton and Hove City Council

Brighton & Hove City Council

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February 2023	P01 Final Report	Brighton & Hove City Council Adur District Council
May 2023	P02 Updated Report to reflect changes in proposed compensatory coastal vegetated shingle	Brighton & Hove City Council Adur District Council

Contract

This report describes work commissioned by Brighton & Hove City Council. Charlie Dwight and Gareth James of JBA Consulting carried out this work.

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Purpose

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Executive summary

JBA working on behalf of Brighton and Hove City Council (BHCC) propose to undertake flood and coastal erosion defence works and creation of a new public footpath between Brighton Marina (eastern extent, East Sussex) and Shoreham Harbour (western extent, West Sussex). These works form the Brighton Marina to River Adur Flood and Coastal Erosion Risk Management Strategy (FCERM), hereafter referred to as 'the scheme'.

An Ecological Impact Assessment (EcIA) to assess the likely ecological effects associated with the scheme has been carried out. Construction of a coastal sea defence (placement of rock armour) in works Area 4 and creation of a new coastal footpath on the beach in works Area 2, will result in permanent and temporary impacts upon Coastal Vegetation Shingle, a priority habitat and sub littoral rock (shingle beach).

Coastal vegetated shingle is a priority habitat and will be compensated through a bespoke at an 8:1 ratio through new creation (0.09ha) and enhancement (0.22ha) and retention and protection of existing.

A net gain for Biodiversity will be delivered for the scheme via 'Greening the Grey', which will seek to create a Biodiversity Wall with ecological design features for terrestrial and intertidal species, whilst providing a stepping stone habitat for national rare invertebrates.

Following the application of mitigation, compensation and enhancement measures specified in this report, no significant residual impacts will result from the scheme.

Contents

1	Introduction	9
1.1	Site description	9
1.2	Proposed development	12
2	Methodology	13
2.1	Scope of the assessment	13
2.2	Desk-based assessment	14
2.3	Field surveys	14
2.3.1	UK Habitat Classification Survey	14
2.3.2	Terrestrial Protected Species Assessment	14
2.4	Marine Protected Species Assessment	16
2.5	INNS Assessment	16
2.6	Biodiversity Net Gain	16
2.7	Impact Assessment Methodology	16
2.8	Important Ecological Features	17
2.9	Legally protected species	18
2.9.1	Residual impacts	19
2.10	Determining ecologically significant effects	19
2.11	Precautionary principle	19
2.12	Limitations	19
3	Baseline Ecological Results	21
3.1	Desk-based assessment	21
3.1.1	Statutory designated sites	21
3.1.2	Non-statutory designated sites	23
3.1.3	Priority Habitats	28
3.2	Field surveys	28
3.2.1	UKHab Survey	28
3.3	Area 1 (Southwick Beach)	29
3.3.1	s3b – Coastal Vegetated Shingle (priority habitat)	29
3.3.2	t2h – Beach	29
3.3.3	u1b – Developed land; sealed surface	29
3.3.4	u1e – Built Linear Features	29
3.4	Area 2 (Southwick Beach)	29
3.4.1	s – Sparsely Vegetated Land	29
3.4.2	s3b – Coastal Vegetated Shingle (priority habitat)	29
3.4.3	t2h – Beach	30
3.4.4	u1b – Developed Land; sealed surface	30
3.4.5	u1e – Built Linear Features	30
3.5	Area 4 (Shoreham Port)	30
3.5.1	s3b – Coastal Vegetated Shingle (priority habitat)	30
3.5.2	t2h – Beach	30
3.5.3	u1b – Developed Land; sealed surface	30
3.5.4	u1b5 – Buildings	30
3.5.5	u1e – Built Linear Features	30
3.6	Area 5 (Hove Beach)	30
3.6.1	g3c – Other Neutral Grassland	30
3.6.2	t2h – Beach	31
3.6.3	u1b – Developed Land; sealed surface	31
3.6.4	u1e – Built Linear Features	31
3.7	Area 6 (Black Rock)	31

3.7.1	g3c – Other Neutral Grassland	31
3.7.2	s3b – Coastal Vegetated Shingle (priority habitat)	31
3.7.3	t2h – Beach	31
3.7.4	u1 – Built-up areas and gardens	31
3.7.5	u1a – Open mosaic habitats on previously developed land (priority habitat)	31
3.7.6	u1b5 – Buildings	31
3.7.7	u1e – Built Linear Features	31
3.8	Area 7 (Southwick Beach)	32
3.8.1	s3b – Coastal Vegetated Shingle	32
3.8.2	t2h – Beach	32
3.8.3	u1e – Built Linear Features	32
3.9	Protected and notable species	32
3.9.1	Amphibians (including Great Crested Newt)	32
3.9.2	Badger	32
3.9.3	Bats	33
3.9.4	Birds	33
3.9.5	Fish & Marine Mammals	33
3.9.6	Invasive Non-Native Species	34
3.9.7	Invertebrates	34
3.9.8	Otter	34
3.9.9	Reptiles	35
3.9.10	Water Vole	35
3.10	Summary of ecological features	35
4	Assessment of Ecological Effects	38
4.1	Statutory Designated Sites	38
4.1.1	Beachy Head West MCZ	38
4.1.2	Brighton Marina to Newhaven Cliffs SSSI	38
4.2	Non-statutory Designated Sites	38
4.2.1	Brighton and Lewes Downs Biosphere Reserve	38
4.2.2	Basin Road South LWS	38
4.2.3	Black Rock Beach LWS	38
4.2.4	Brighton Marina LWS	39
4.2.5	Madeira Drive Green Wall LWS	39
4.2.6	Volks Railway LWS	39
4.3	Habitats	39
4.3.1	Coastal Vegetated Shingle	39
4.3.2	Intertidal Mudflat	40
4.3.3	Open Mosaic Habitats on Previously Developed Land	40
4.3.4	Other habitats	40
4.4	Protected and notable species	42
4.4.1	Breeding Birds	42
4.4.2	Wintering Birds	42
4.4.3	Fish & Marine Mammals	43
4.4.4	INNS	43
4.4.5	Terrestrial Invertebrates	43
4.5	Summary	43
5	Mitigation, compensation and enhancement	45
5.1	General mitigation measures	45
5.2	Mitigation during construction	46
5.2.1	Designated Sites & Habitats	46
5.2.2	Breeding birds	46

5.2.3 Wintering Birds 46
5.2.4 Fish & Marine Mammals 46
5.2.5 INNS 46
5.2.6 Terrestrial Invertebrates 47
5.3 Compensation 47
6 Cumulative effects 51
6.1.1 Black Rock Site and Surroundings Madeira Drive Brighton BN2 1EN (BH2020/00442) 51
6.2 Planning applications 52
6.3 Brighton & Hove Local Plan 52
7 Biodiversity net gain 52
7.1 Biodiversity Net Gain (BNG) Baseline 53
7.1.1 Habitat Condition Baseline 53
7.1.2 Habitat Creation to Deliver Biodiversity Net Gain 54
8 Maintenance and Monitoring 57
8.1 Habitats 57
8.2 Research and Post Monitoring: Biodiversity Wall 57
9 Conclusions and summary 58

List of Figures

Figure 1-1: Site location 11
Figure 3-1: Statutory Designated Sites within 2km of the scheme extents 21
Figure 4-1: Loss of Coastal Vegetated Shingle in Area 4 (FID2). 40
Figure 4-2: Temporary Disturbance of existing habitats in Area 2 for new 3m wide footpath 41
Figure 4-3: Loss of existing beach habitats in Area 2 for new beach access ramp 42
Figure 5-1: Habitat creation on Southwick Beach to west of Basin Road South LWS in Area 4 50
Figure 7-1: Location of Biodiversity Wall Area 2 56

List of Tables

Table 3-1: Non-statutory designated sites within 2km of the scheme 23
Table 3-2: Priority habitats within the site boundary 28
Table 3-12: Summary of ecological features on site, as derived from the baseline data collected 35
Table 4-1: Summary of ecological features and potential unmitigated impacts 43
Table 7-1: Project wide biodiversity metric calculation 54
Table 7-2: Project Area of habitat loss, retention and enhancement 55
Table 7-3: Area and unit change in each habitat type 55

Abbreviations

ADC	Adur District Council
AEP	Annual Exceedance Probability
BAP	Biodiversity Action Plan
BCT	Bat Conservation Trust
BHCC	Brighton & Hove City Council
BNG	Biodiversity Net Gain

CEMP	Construction and Environmental Management Plan
CIEEM	Chartered Institute of Ecology and Environmental Management
EcIA	Ecological Impact Assessment
EPS	European Protected Species
FCERM	Flood Coastal Erosion Risk Management
FID	Feature ID
GCN	Great Crested Newt
GI	Ground Investigation
GPPs	Guidance for Pollution Prevention
HPI	Habitats of Principal Importance
INNS	Invasive Non-native Species
JBA	Jeremy Benn Associates
JNCC	Joint Nature Conservative Committee
LBAP	Local Biodiversity Action Plan
LEMP	Landscape and Environmental Management Plan
LNR	Local Nature Reserve
LPA	Local Planning Authority
LWS	Local Wildlife Site
MCZ	Marine Conservation Zone
NERC	Natural Environment and Rural Communities Act
NGR	National Grid Reference
OS	Ordnance Survey
PEA	Preliminary Ecological Appraisal
PRF	Potential Roost Feature
SAC	Special Area of Conservation
SINC	Site of Importance for Nature Conservation
SPA	Special Protection Area
SPI	Species of Principal Importance
SSSI	Site of Special Scientific Interest
SxBRC	Sussex Biodiversity Record Centre
UKBAP	UK Biodiversity Action Plan
UKHab	UK Habitat Classification Survey
WCA	Wildlife and Countryside Act

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.

1.1 Site description

The Proposed Development covers three areas of coastline:

- Shoreham Port frontage: Located between Southwick Beach and the start of Western Lawns and includes frontage related to Shoreham Port, Hove Deep Sea Anglers' Buildings, and Western Esplanade.
- Kings Esplanade, Hove: Located between the Western Lawns and Hove Lawns and includes frontage related to the King Alfred Centre and King's Esplanade.
- Kemp Town, Brighton: Located along the eastern section of the frontage between Brighton Pier and Brighton Marina and includes frontage related to the Kemp Town beaches.

These locations have been split into six areas of work along the frontage between approximate Ordnance Survey (OS) Grid References (NGR) TQ2341 0490 and TQ3344 0328 and covers approximately 500.3 hectares (ha).

These six areas are outlined below and shown on Figure 1-1:

- Area 1: Shoreham frontage (entirely within ADC boundary). Located on western frontage of Shoreham Port in front of Carats Café and a row of beach huts.
- Area 2: Shoreham frontage (partly within ADC boundary and partly within BHCC boundary). This area covers the area located along the central Shoreham frontage fronting Basin Road.
- Area 4: Lorry Park, Western Esplanade and Hove Deep Sea Anglers Club (entirely within BHCC boundary). This area covers the eastern section of

Shoreham Port Authority frontage (known as asset 574/3814) which is a beach ridge consisting of concrete rubble armour with shingle. The area between the beach and the road is known as the lorry park. This area also includes the beach fronting Western Esplanade, a row of private housing. The fronting beach is owned by the residents of Western Esplanade. The eastern section of Area 4 covers the coastal frontage in front of Hove Lagoon.

- Area 5: Kings Esplanade (entirely within BHCC boundary). This is an area of residential and business properties that is located south of the A259 directly on the sea front with only a narrow promenade area between the property and the beachfront.
- Area 6: Kemp Town (entirely within BHCC boundary). This area covers the area from Royal Crescent east to Brighton Marina in the eastern area of Brighton known as Kemp Town. This is an area of accreting beach which has been used as a source of beach material for recycling programmes by BHCC on three previous occasions in recent years: May 2010, Autumn 2013 and Spring 2017.
- Area 7: Shoreham outer layby beach (entirely within ADC boundary). This covers an area of beach from the east breakwater at the mouth of the River Adur to the western edge of Area 1.

Due to the historical development of the scheme, Area 3 is not included as part of the Proposed Development.

There are numerous residential and commercial properties located adjacent to the six areas:

- The western extent of the scheme is Shoreham Port. Carats Café, Shoreham Power Station, and an industrial units and warehouses associated with Shoreham Port are located adjacent to areas 1, 2 and 7.
- Area 4 is located adjacent to residential properties and the Hove Deep Sea Anglers Club.
- Area 5 is located adjacent to seafront leisure facilities including King Alfred Leisure Centre and residential properties.
- Area 6 is located adjacent to Brighton Marina, which includes a boatyard, supermarket and leisure facilities.
- Area 7 is located adjacent to Shoreham Harbour. This covers an area of beach from the east breakwater at the mouth of the River Adur to the western edge of Area 1.

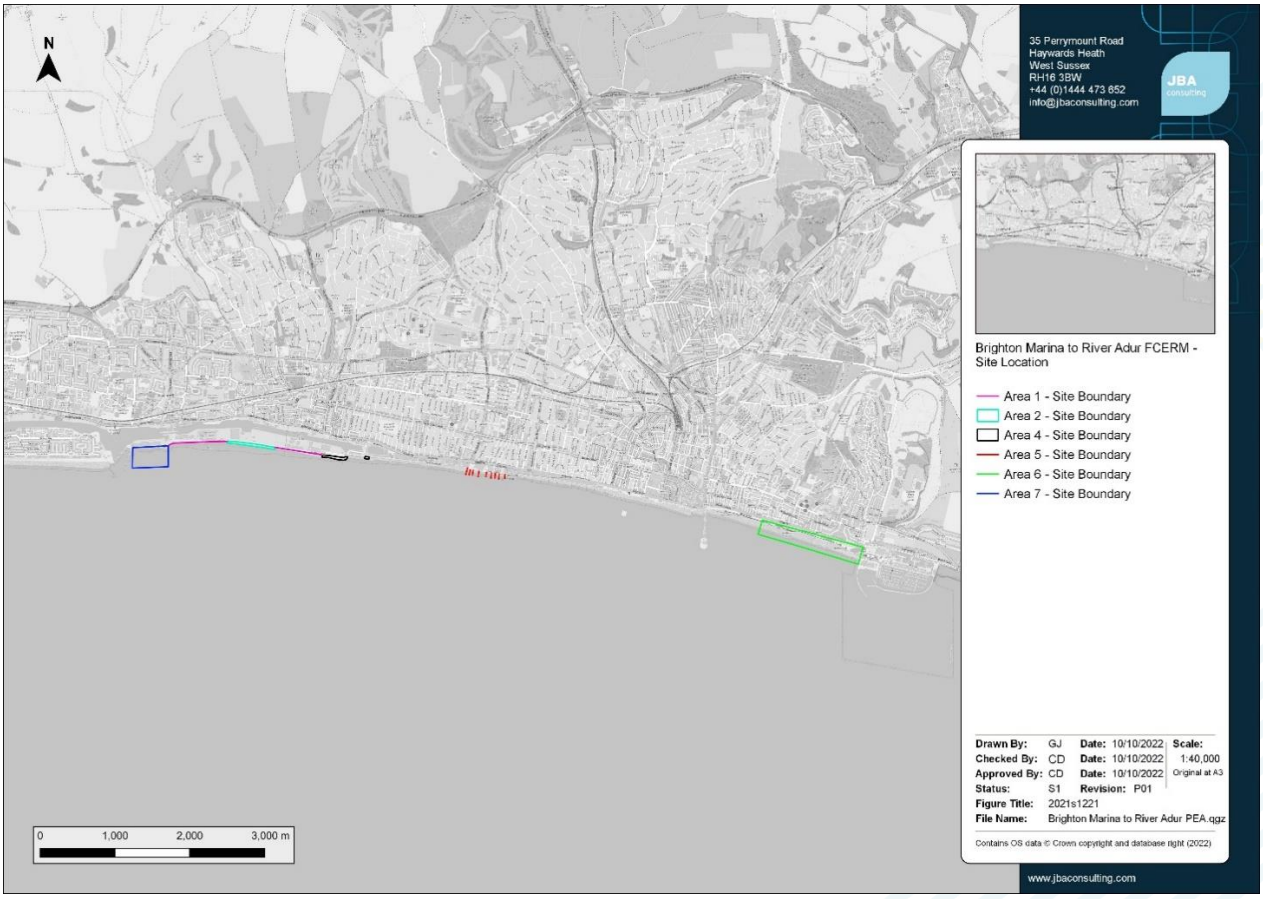


Figure 1-1: Site location

1.2 Proposed development

The scheme aims to achieve a consistent standard of protection along the frontage to reduce the risk of coastal erosion and coastal flooding through the refurbishment of existing defence assets, where required, and the construction of new assets. Consequently, it will provide material benefits by reducing erosion and flood risk to people, property and the environment. This will include the provision of protection for 8 residential and 73 commercial properties (including Shoreham Sewage Pumping Station and Shoreham Power Station), and reduction in flood risk for a further six residential and eight commercial properties.

The scheme entails works at each of the six locations, however, planning permission is being sought only 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. All other proposals are considered to be permitted development. A summary of the works proposed in each location is outlined below.

The new footpaths, access steps and access ramp within Area 2 will be subject to further detailed design and may differ slightly from the specification detailed within this EcIA. Biodiversity losses and gains will be re calculated using a Biodiversity Metric, where any changes result in additional habitat loss.

This EcIA has been undertaken to support the planning applications for these two rock revetments, along with the implementation of new footpath, access steps and ramp in Area 2. This EcIA includes assessment of the likely ecological impacts of these proposed works, and also gives consideration to the ecological impacts of the wider scheme (permitted development).

Planning permission

Adur District Council

Area 2: Construction of a new rock revetment along the existing defence along central Shoreham frontage facing Basin Road. 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 within Adur 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 would be approximately 3m wide and approximately 545 m long. The location of the access ramp and steps is to be determined. The new access ramp will be 55 m length and 5 m width, and would be sited on existing littoral rock (beach shingle) within Area 2.

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

The rock revetment within Brighton and Hove would span an area of approximately 261m in length, with a width range between 9.8m and 11.8m, and a height range of between 2m and 3m from toe to crest.

Permitted development:

Other works that form part of the Brighton Marina to River Adur FCERM and constitute permitted development 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: Replacement of existing timber wall (574/3701) and concrete/timber wall (574/3815) and patching repair to the concrete wall.

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

Brighton and Hove City Council

Area 4: Construction of a flood wall to the seaward perimeter of the Hove Deep Sea Anglers Club. Improved connectivity of existing footpath. Beach recharge to be undertaken.

Area 5: Construction of new timber groyne field to replace existing groyne field in front of King's Esplanade comprising nine new groynes.

Area 6: Beach shingle material will be obtained from Area 6 to undertake recharge for regular recycling undertaken by BHCC.

Construction programme

Works will be undertaken over an approximate 10 year period. It is proposed that the rock armour revetments in Area 2 and Area 4 will be constructed in 2023.

Rock used for the revetments would be delivered from the Lydd Ranges Sea Defence scheme (in Lydd, Kent, approximately 40 miles from the site) by road or by barge to be used for the proposed development. Any additional rock required would be imported and delivered by road.

2 Methodology

2.1 Scope of the assessment

This EcIA has taken into account the following ecological features that may be influenced by the proposed development:

- Statutory designated sites for nature conservation;
- Non-statutory designated sites for nature conservation;
- Legally protected species;
- Species and habitats of principal importance for nature conservation; and
- Legally controlled species, such as invasive non-native species.

Appendix 1 details the legislation, planning and biodiversity policies that have been taken into account.

For the purposes of the impact assessment, the site boundary has been defined based on the study area for assessing impacts of the scheme on these ecological features.

2.2 Desk-based assessment

A background data search was requested by JBA Consulting from Sussex Biodiversity Records Centre (SxBRC) in September 2022. The search area included records of protected and notable species, Invasive Non-Native Species (INNS), and statutory and non-statutory designated sites within 2km of the proposed scheme.

2.3 Field surveys

The following field surveys were undertaken at all six sites:

- Initial site walkover to inform Ground Investigation (GI) works (November 2021);
- UKHab Survey (June 2022) and updated walkover (October & November 2022)

2.3.1 UK Habitat Classification Survey

A UKHab survey was undertaken by Gareth James BSC 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. The classification was made using surveyor judgement by eye, with a species list collected for each of the main habitat parcels. No quadrats were used as assigning habitats proved straight forward. Botanical nomenclature follows Stace (2019).

2.3.2 Terrestrial Protected Species Assessment

An assessment of the suitability of habitats found at the site to support protected species was carried out at the time of the UKHab survey and in accordance with current guidance.

- **Bats** - Structures and trees likely to be impacted by the proposed works were inspected externally and from ground level to determine the potential for roosting bats, using the methods specified in the Bat Conservation Trust (BCT) guidelines (Collins, 2016). Buildings, structures and trees on the site were categorised as having either 'negligible', 'low', 'moderate' or 'high' roosting potential and this was determined by applying the definitions given within the BCT Guidelines. Evidence of bat activity associated with potential roost sites includes bat droppings, urine staining, feeding remains, scratch marks and dead/alive bats. Potential Roost Features (PRF) on trees include cracks/splits, crevices, rot cavities, fluting, loose bark, woodpecker holes and areas of ivy Hedera helix. Evidence indicating the existence of a bat roost may include dark stains running below holes or cracks, bat droppings, odours, or scratch marks. However, roosting bats may still be present without any external evidence being visible. Furthermore, the suitability of habitats across the site to support commuting and foraging bats was assessed in terms of habitat type, abundance, connectivity and distribution. These were categorised as having either 'negligible', 'low', 'moderate' or 'high' suitability for bats which was determined by applying the categories given within the BCT Guidelines.

- **Badger** - The site was searched for field signs of Badgers and, where evidence was found, details were recorded following Harris et al. (1989). In addition to recording the presence of setts and the level of activity at them, the following signs of activity were also searched for: latrines, footprints, evidence of feeding activity and well-worn paths through vegetation. Badgers will use a number of setts throughout their territory at different times of year; any large holes with the potential to be used by badgers, but not showing obvious signs of recent activity, were therefore also recorded.
- **Birds** - Vegetation and habitats around the site were assessed for their suitability to support nesting birds. Special consideration was given to bird species listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended). Furthermore, any birds seen or heard on site during the survey were recorded as incidental observations.
- **Hazel Dormouse** – The UKHab survey assessed the suitability of the habitats recorded on site for Hazel Dormouse *Muscardinus avellanarius* in accordance with Bright (2006). Dormice in the UK are primarily arboreal and typically require extensive or well-connected woodland, scrub and hedgerows (Juskaitis & Büchner, 2013).
- **Otter** - Watercourses and surrounding areas within the site were assessed for their potential to support Otter *Lutra lutra*, based on RSPB (1994) and Chanin (2003). This involved walking the survey section and recording any spraints (droppings), slides, feeding remains and footprints. A search was also made for possible holt and couch (resting) sites. Otters are extremely difficult to observe, and this method provides the most effective and efficient means of investigating presence or absence.
- **Water Vole** - The UKHab survey assessed watercourse suitability for Water Vole *Arvicola amphibius*, based on initial habitat assessment criteria outlined in Dean et al. (2016). The assessment of habitat suitability for Water Vole is based on the availability and nature of dry areas above water level for burrowing/nesting (e.g. bank profile, bank substrate), vegetation (i.e. the quantity and cover of herbaceous species) and the presence of water. Any field signs observed within the survey area, informed by Strachan et al. (2011), were also noted. The most important, diagnostic field sign for Water Vole is the presence of latrine sites. These are locations repeatedly used by Water Vole to deposit their droppings, often in prominent locations along the bank. Other field signs include the presence of burrows, feeding sites and footprints. Although these other signs provide indications of presence and are useful supporting evidence to latrines, they are of limited value on their own as they can be confused with other species such as Field Vole *Microtus agrestis* and Brown Rat *Rattus norvegicus*.
- **Great Crested Newts (GCN)** – The UKHab survey assessed habitat features with the potential to support Great Crested Newt (GCN), and other amphibians, were recorded. Such features can include ponds with habitat suitable for breeding newts within 500m of the proposed works; piles of logs, stones, or other debris; cracks in the ground; stone or rubble covered ground, and any other features that could support newts. Where access was possible, any substantial waterbodies within 500m of the site, and which had ecological connectivity to the site, were assessed for their potential to support newts. This assessment was based on the Habitat Suitability Index (HSI) (Oldham et al., 2000; ARG UK, 2010). This system involves assessment of ten suitability indices per waterbody and is an accepted method of assessing the likelihood for a particular pond to hold breeding GCN.

- **Reptiles** – The UKHab survey made an assessment of the habitat suitability for common reptiles. This involved inspection of the site for key habitat features/microhabitats which may be favoured by reptiles, such as embankments, log, brash or rock piles, dry stone walls, hedgerows, open sandy areas, woodland edges and rides and interfaces between different habitat types (Froglife, 1999).
- **Terrestrial invertebrates** - an assessment of the suitability of the site to support invertebrate communities was undertaken during the UKHab assessment. This involved assessing whether any habitats or features of significant value to invertebrates were present, such as coastal vegetated shingle, open mosaic habitats on previously developed land, sparsely vegetated land, and whether species of conservation interest (priority species, legally protected species or Red Data Book, Nationally or Regionally Notable species) are present or likely to be present (Buglife, 2015).

2.4 Marine Protected Species Assessment

Habitats within the sub littoral, intertidal and marine areas were assessed in terms of their suitability to support protected or rare species including:

- Cetaceans - Common Porpoise *Phocoena phocoena*; Bottle-Nosed Dolphin *Tursiops truncates*; Long-finned Pilot Whale *Globicephala melas*.
- Seals - Harbour Seal *Phoca vitulina*; Grey Seal *Halichoerus grypus*
- Fish/European Eels - European Eel *Anguilla Anguilla*; Short-snouted Seahorse *Hippocampus hippocampus*; Whiting *Merlangius merlangus*; Plaice *Pleuronectes platessa*; Mackerel *Scomber scombrus*; Thornback Ray *Raja clavate*;
- Crustaceans – Native Oyster *Ostrea edulis*

2.5 INNS Assessment

During the UKHab survey a search for terrestrial and aquatic INNS was undertaken and species present were marked onto the UKHab map.

2.6 Biodiversity Net Gain

Under the Environment Act 2021, all planning permissions granted in England (with a few exemptions) will have to deliver at least 10% biodiversity net gain from an as yet unconfirmed date, expected to be in November 2023. Biodiversity Net Gain (BNG) will be measured using Defra's Biodiversity Metric (version 3.1 at the time of assessment) 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 the scheme, 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.

2.7 Impact Assessment Methodology

This assessment has been undertaken with reference to the CIEEM Guidelines for Ecological Impact Assessment in the UK and Ireland - Terrestrial, Freshwater and Coastal (CIEEM, 2019). Appendix 1 details the legislation, planning and biodiversity policies that have been taken into account.

Ecological features include nature conservation sites, habitats, species assemblages / communities or populations or groups of species. The assessment of the significance of predicted impacts on ecological features is based on both the 'importance' of a feature and the nature and magnitude of the impact that the development will have on it. Impacts may be direct (e.g. the loss of species or habitats), or indirect (e.g. effects due to noise, dust or disturbance).

The impact assessment process involves:

- Identifying and characterising impacts;
- Incorporating measures to avoid and mitigate these impacts;
- Assessing the significance of any residual effects after mitigation;
- Identifying appropriate compensation measures to offset residual effects; and
- Identifying opportunities for ecological enhancement.

The assessment includes potential impacts (direct, indirect, secondary and cumulative) on each ecological feature determined as important from all phases of the project and describes in detail the impacts that are likely to be significant, making reference to the following characteristics:

- Positive or negative;
- Extent;
- Magnitude;
- Duration;
- Timing;
- Frequency; and
- Reversibility.

2.8 Important Ecological Features

It is impractical for an assessment of the ecological impacts of a project to consider every ecological feature (species, habitat etc.) that may be affected; instead it should focus on those that are considered to be important. These are ecological features that are valued in some way and could be affected by the proposed project. Other valued ecological features may occur on or in the vicinity of the proposed works area, but do not need to be considered because there is no potential for them to be affected significantly.

Various characteristics contribute towards the importance of ecological features, for example naturalness, rarity, diversity, and connectivity to other areas.

The importance of an ecological feature should be considered within a defined geographical context. For the purposes of this assessment the following frame of reference has been used:

- International and European;
- National;
- Regional;
- County;
- Local;
- Site; and
- Negligible.

Consideration of impacts at all scales is important, and essential if no net loss of biodiversity and maintenance of healthy ecosystems is to be achieved.

Ecological features have been valued using the scale set out in Table 2- with examples provided of criteria used when defining the level of importance.

Table 2-1: Criteria used to determine the level of importance of ecological features

Level of Importance	Examples of Criteria
International	An internationally important site e.g. Special Protection Area (SPA), Special Area of Conservation (SAC), Ramsar (or a site considered worthy of such designation); A regularly occurring substantial population of an internationally important species (listed on Annex IV of the Habitats Directive).
National	A nationally designated site e.g. Site of Special Scientific Interest (SSSI), or a site considered worthy of such designation; A viable area of a habitat type listed in Annex I of the Habitats Directive or of smaller areas of such habitat which are essential to maintain the viability of a larger whole; A regularly occurring substantial population of a nationally important species, e.g. listed on Schedules 5 and 8 of the Wildlife and Countryside Act 1981 (as amended);
Regional (South East)	Areas of internationally or nationally important habitats which are degraded but are considered readily restored; or A regularly occurring, substantial population of a Regionally scarce species.
County (East & West Sussex)	A site designated as a Site of Importance for Nature Conservation (SINC); or A regularly occurring, substantial population of a species scarce in the County
Local (Brighton, Hove and Shoreham)	Areas of internationally or nationally important habitats which are degraded and have little or no potential for restoration; Viable areas of local Biodiversity Action Plan (BAP) Priority Habitat, or small areas of such habitat which are essential to maintain the viability of a larger whole; Species of national or local importance, but which are only present very infrequently or in very low numbers within site area.
Site	Habitats with low value that are in poor condition, that are common and widespread in the wider landscape; Individuals of species that are commonly found in the local area; Habitats for particular species is present, but species are confirmed to be absent from the site.
Negligible	A habitat which offers little value for nature conservation, e.g. arable field

The approach of this assessment is to consider the value of the site for the species under consideration, rather than the nature conservation importance of the species itself. While the conservation importance of the species is taken into account, the number of individuals using the site, and the nature and level of use is also taken into account. An assessment is then made of the value of the site to that particular species.

2.9 Legally protected species

Notwithstanding what has been said above, there is also a need to identify all legally protected species that could be affected by the proposed works in order that measures can be taken to ensure that contravention of the legislation is avoided.

Where a protected species is not considered to be an important ecological feature, for example Badger, which is protected for animal welfare reasons rather than nature conservation value, the assessment will focus solely on compliance with legislation.

2.9.1 Residual impacts

Where impacts are identified, mitigation measures are proposed to avoid, reduce or minimise them. Those impacts remaining after implementation of mitigation are the residual impacts. An assessment of the residual impacts has then been undertaken to determine the significance of their effects on ecological features.

2.10 Determining ecologically significant effects

For the purposes of this assessment, a significant effect is an effect that either supports or undermines biodiversity conservation objectives for important ecological features or for biodiversity in general (CIEEM, 2019). Effects can be considered significant at a wide range of scales from international to local.

Significant effects encompass impacts on structure and function of defined sites, habitats or ecosystems and the conservation status of habitats and species (including extent, abundance and distribution). Table 2-2 details the factors that have been considered in the determination of significant effects on ecological features.

Table 2-2: Determining ecologically significant effects

Ecological Feature	Consideration
Designated sites	Will the project undermine the site's conservation objectives? Will the project positively or negatively impact the conservation status of habitats or species for which the site is designated? Will the project have positive or negative effects on the condition of the site or its interest / qualifying features? Will the project remove or change any key characteristics? Will there be an effect on the nature, extent, structure and function of component habitats? Will there be an effect on the average population size and viability of component species? Will there be an impact on wider ecosystem functions and processes?
Habitats	Will the project positively or negatively impact the conservation status of the habitat? Will it affect its extent, structure and function as well as its distribution and its typical species within a given geographical area?
Species	Will the project positively or negatively impact the conservation status of the species? Will it affect its abundance and distribution within a given geographical area?

2.11 Precautionary principle

The evaluation of significant effects has been based on current scientific evidence and professional judgement. Where sufficient information is not available to allow a robust and justifiable conclusion of no significant effect, a significant effect is assumed, and any uncertainty is acknowledged.

2.12 Limitations

Data from biological records centres or online databases is historical information, and datasets might be incomplete, inaccurate or missing. It is important to note that even where data is held, a lack of records for a defined geographical area does not necessarily mean that the species is absent; the area may simply be under-recorded or records may

not have been submitted. The data represents the information available at the date of the request.

3 Baseline Ecological Results

3.1 Desk-based assessment

3.1.1 Statutory designated sites

Figure 3-1 below shows the statutory designated sites within 2km of the scheme.

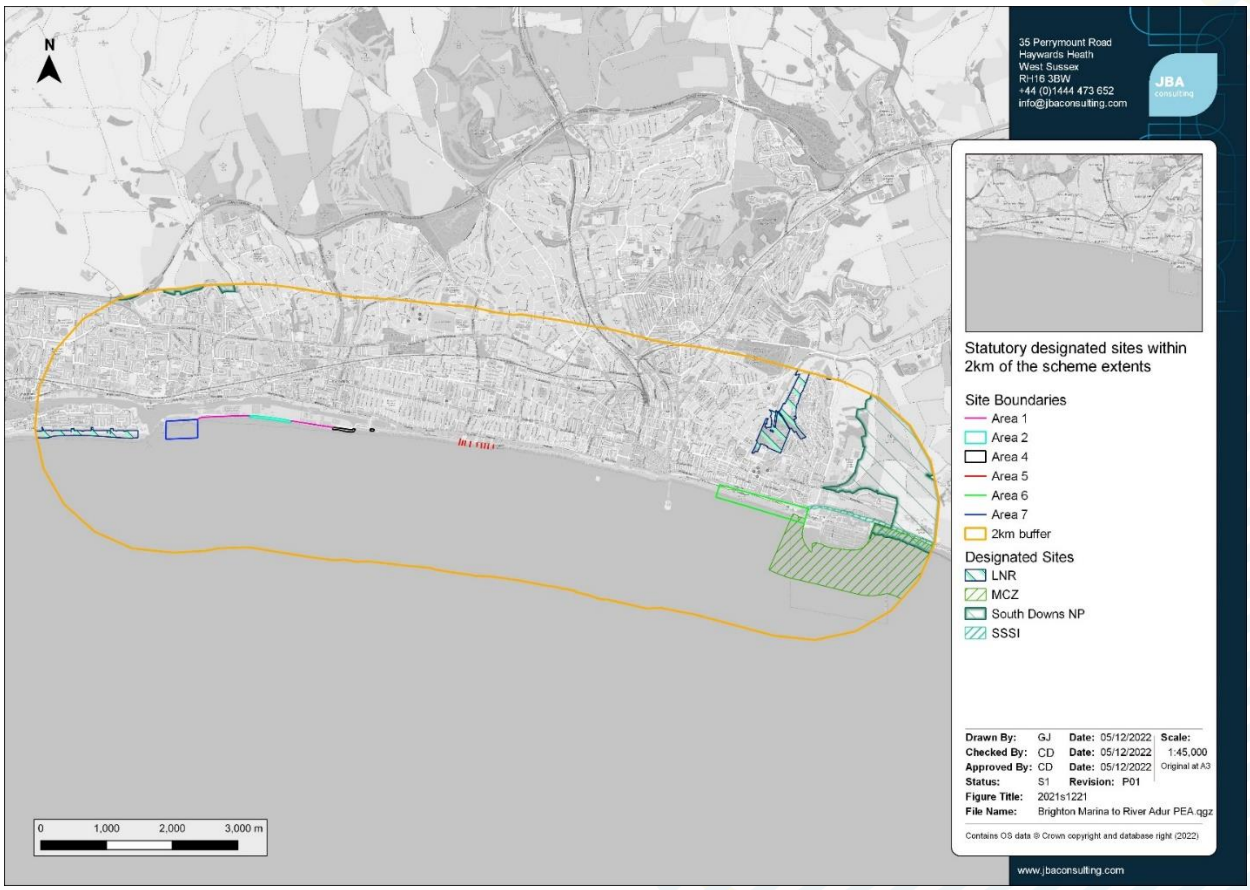


Figure 3-1: Statutory Designated Sites within 2km of the scheme extents

There are five statutory designated sites within 2km and one European statutory designated site within 5km of the scheme.

Site Name	Status	Description	Approximate Distance from Site
Brighton to Newhaven Cliffs SSSI	Site of Special Scientific Interest	Designated for a range of habitats and species including vegetated shingle.	Adjacent to Area 6
Beachy Head West	Marine Conservation Zone	Runs parallel to the coastline extending from Brighton to the Beachy Head Cliffs near Eastbourne. Contains best examples of chalk habitat in the region, chalk reefs, gullies and specialised	Adjacent to Area 6

Site Name	Status	Description	Approximate Distance from Site
		communities of intertidal flora and fauna.	
South Downs	National Park	Chalk grassland with scattered scrub and semi-improved grassland. Became a National Park in 2009.	50m north-west at its closest point (Area 6)
Shoreham Beach LNR	Local Nature Reserve	In June 2006, Shoreham Beach was declared a Local Nature Reserve (LNR). This is due to its unusual, vegetated shingle habitat.	255m – West of Area 7
Whitehawk/Race Hill LNR	Local Nature Reserve	Whitehawk Hill is an ancient habitat with areas of species-rich chalk grassland supporting colonies of Adonis and Chalkhill Blue butterflies. From the top there are panoramic views over the city to the downs and the sea, including the Isle of Wight on a clear day. Whitehawk Camp, near the top of Whitehawk Hill between the mast and Brighton Racecourse grandstand, was recognised as being the first Scheduled Ancient Monument (SAM) in Sussex.	715m – North of Area 6
Castle Hill	Special Area of Conservation	This site hosts the priority habitat type "orchid rich sites". This chalk grassland consists of a mosaic of calcareous semi-natural dry grasslands, notably CG2 *Festuca ovina – Avenula pratensis* grassland, CG3 *Bromus erectus* grassland and CG4 *Brachypodium pinnatum* grassland. Castle Hill's important assemblage of rare and scarce species includes Early Spider-orchid *Ophrys sphegodes* and Burnt Orchid *Orchis ustulata*. The colony of Early Spider-orchid is one of the largest in the UK.	4.4km - North-west of Area 6

3.1.2 Non-statutory designated sites

There are several non-statutory designated sites within 2km of the scheme (Table 3-1).

Table 3-1: Non-statutory designated sites within 2km of the scheme

Site Name	Status	Description	Approximate Distance from Site
Brighton and Lewes Downs Biosphere Reserve	Regional	The reserve forms part of the South Downs National Park. Chalk downland makes up most of the reserve which is bounded by each end by the Adur Valley and the Ouse Valley. The coastline is dominated by chalk cliffs. The area is nationally and internationally renowned for its arts and culture, distinctive settlements, independent mindset and its links to the surrounding iconic English landscape of downland, white chalk cliffs and beaches.	On site (All areas)
Black Rock Beach	Local Wildlife Site	One of only three sites for coastal vegetated shingle (an internationally threatened habitat) in Brighton & Hove. The site has established following the construction of the Brighton Marina in the 1970s and a diversity of coastal specialists, including Sea Kale Crambe *maritima* and Tree Mallow *Malva arborea* and historical records of the Nationally Rare Sea Knotgrass *Polygonum maritimum.*	On Site (Area 6)
Basin Road South	Local Wildlife Site	A narrow escarpment of shingle and imported materials (rubble, sand) at the top of the shingle beach contained coastal vegetated shingle.	On Site (Area 4)
Volks Railway	Local Wildlife Site	Important for being one of only three remaining sites for vegetated shingle (an	On Site (Area 6)

Site Name	Status	Description	Approximate Distance from Site
		internationally rare habitat) in Brighton & Hove (the others are at Shoreham Harbour and Black Rock). Silver Ragwort *Senecio cineraria* (a garden escape) is abundant in some places.	
Madeira Drive Green Wall	Local Wildlife Site	A green wall immediately below the A259 coast road (Marine Parade) and fronting onto Madeira Drive on Brighton seafront. It stretches 1.25km from the western terminus of the Volks Railway to the top of Duke's Mound in the East.	On & adjacent to the Site (Area 6)
Brighton Marina	Local Wildlife Site	Unusual combination of marine conditions has established a unique marine environment in the Brighton & Hove context (and beyond). Supports a diversity of marine habitats and species.	Adjacent to the east (Area 6)
Black Rock, Brighton	Local Geological Site	Bedrock: about 850m of chalk cliffs along the coastline behind Brighton Marina. The top of the cliffs is about 30m above sea level. The cliffs are protected by an undercliff road and harbour wall and slopes have been stabilised to reduce rockfall. 170m of the western end of the cliffs is netted and close-spaced soil nails also reinforce the weathered chalk at the contact with Pleistocene deposits. Exposes lower Newhaven Chalk and most of the sequence is accessible from a road at the eastern end.	100m North-East (Area 6)
Cliff Road Paddock	Local Wildlife Site	A former pony paddock on a sunny, gently sloping south facing site which has been abandoned for perhaps 10 years. Mosaic of developing scrub, chalk grassland and semi-	300m East (Area 6)

Site Name	Status	Description	Approximate Distance from Site
		improved grassland.	
Stevenson Road Quarry	Local Wildlife Site	Exposed chalk cliff surrounded by urban development which has been colonised by a few, opportunistic species. A key reptile site, supporting populations of at least three species.	530m North (Area 6)
Sheepcote Valley	Local Wildlife Site	Biodiversity and historical importance, with a diversity of habitat, including scrub and a large area of species-rich chalk grassland. Notable species recorded include Horseshoe Vetch *Hippocrepis comosa*, Round-headed Rampion *Phyteuma orbiculare* and Common Spotted Orchid *Dactylorhiza fuchsii.*	600m North-East (Area 6)
St Leonards Churchyard	Local Wildlife Site	Mediaeval parish church, built in the 13th century, extensively rebuilt during the 19th and early 20th centuries and listed in 1950. The Church building has potential for bats. Most of the churchyard grassland is left to grow long. The southern side is less eutrophic than the northern side, with a range of typical 'chalk lawn' plants. Mature Elm *Ulmus spp*.	640m North (Area 4)
Cliff Corner	Local Wildlife Site	A corner of species-rich chalk grassland on the coast under active management for nature conservation by the council, with free public access, although its location means that it is rarely visited.	700m East (Area 6)
Park Royal & High School	Local Wildlife Site	Complex of mature secondary woodland copses in Brighton city centre.	700m North (Area 6)
Coastal section: Friars Bay To Brighton Marina	Local Geological Site	Bedrock: 9km of chalk cliffs and wavecut platform extending from Friar's Bay to Brighton Marina. About	1km East (Area 6)

Site Name	Status	Description	Approximate Distance from Site
		6km of the section is protected by sea walls but there are two sections of undefended coastline at Friar's Bay and Telscombe Cliffs. Superficial: Pleistocene deposits overlie weathered chalk in the dry valleys truncated by the cliffs west of Peacehaven. A continuous layer of Pleistocene deposits also overlies the chalk along the top of the cliffs west of Friar's Bay towards Old Nore Point.	
Brighton Station	Local Wildlife Site	Semi-natural habitat, which is very unusual in central Brighton and is a mix of high forest, rank grassland, shrubs / perennials. The habitats are recently created as a consequence of a new development in central Brighton with several cultivated species.	1km North (Area 6)
Roedean School Bank	Local Wildlife Site	Supports an area of ancient chalk grassland on a west facing bank with notable species. Areas of less diverse grassland are included to ensure the integrity of the site as a viable unit. As a surviving example of a rare habitat, this site is also of value in the wider ecological context of the South Downs.	1.5km East (Area 6)
Cardinal Newman School	Local Wildlife Site	An area of mature deciduous woodland with a variety of tree species and ages in an otherwise urban landscape.	1.5km North (Area 6)
The Goldstone, Hove Park	Local Geological Site	Large sarsen about 1.5 x 3m set up on end in concrete in an enclosure near the south-western gate of Hove Park. The Goldstone is the largest sarsen known and is surrounded by 10 smaller stones. It forms a natural sculpture feature.	1.60km North (Area 5)

Site Name	Status	Description	Approximate Distance from Site
Emmaus Gardens & St Nicholas	Local Wildlife Site	A complex of sites, together comprising a comparatively large area of woodland and grassland in the urban context, which comprises good habitat for urban birds and has high amenity value.	1.7km North (Area 4)
Benfield Valley	Local Wildlife Site	Green space linking the Downs with urban communities to the west of the city. Close-mown grassland but there are also areas of very dense, mature scrub. The secondary woodland is very dense planting, which has not been thinned. Scrub, woodland and semi-improved grassland areas towards the south of the site have a number of well-developed ecotones where scrub has been allowed to spread naturally into rank grassland.	1.8km North (Area 4)
Wilson Avenue, Whitehawk	Local Wildlife Site	A mosaic of scrub, tall ruderal (predominant) and grassland on the eastern perimeter of Whitehawk Hill Local Nature Reserve. The site is the only known site for Whitehawk Soldier Beetle *Malthodes lobatus* in the UK.	1.8km North (Area 6)
Sidehill Scrub	Local Wildlife Site	Small but well-established area of mixed scrub on the urban fringe with a notable specimen of Wych Elm *Ulmus glabra*.	1.85km North (Area 2)
Woodvale, Extra-mural & Downs Cemeteries	Local Wildlife Site	Diversity of urban habitats, including mature trees, old grassland and woodland which support a wide range of woodland and chalk grassland species not normally associated with urban areas.	1.9km North (Area 6)
Highcroft Villas	Local Wildlife Site	Flower-rich grassland on old railway land which is rapidly becoming colonised by scrub and woodland.	1.95km North (Area 6)

Site Name	Status	Description	Approximate Distance from Site
London Road Station	Local Wildlife Site	Two railway embankments, surrounded by terraced housing, near the centre of Brighton. The majority of the site is densely wooded.	1.95km North (Area 6)
Ovingdean Church to Cattle Hill	Local Wildlife Site	Rank grassland with some surviving chalk grassland plants on a steep, north-east facing slope, together with two small copses. The less species-rich areas help maintain the integrity of the site as a viable unit by providing buffers to the chalk grassland and woodland. They also provide habitat for Grey Partridge *Perdix perdix* and Northern Lapwing *Vanellus vanellus*.	1.95km North-East (Area 6)

3.1.3 Priority Habitats

Several habitats of principal importance under Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006.

Table 3-2: Priority habitats within the site boundary

Habitat Type	Section 41 Habitat of Principal Importance	BHCC LBAP Priority Habitat
Coastal Vegetated Shingle	Y	Y
Open Mosaic Habitats on Previously Developed Land	Y	Y
Intertidal mudflat	Y	Y

3.2 Field surveys

3.2.1 UKHab Survey

The UKHab survey undertaken by JBA Consulting in June 2022, October 2022 and November 2022 identified various habitat types within each of the different areas and these are described below and shown in Appendix 2.

3.3 Area 1 (Southwick Beach)

3.3.1 s3b – Coastal Vegetated Shingle (priority habitat)

Coastal vegetated shingle is found in two locations within Area 1. It is found within planters between the Carats Café car park and Southwick Beach promenade (Feature ID 1 (FID1)). Species in this location include Silver Ragwort *Jacobaea maritima*, Tree Mallow *Malva arborea*, Sea Beet *Beta vulgaris subsp. maritima*, Rock Samphire *Crithmum maritimum*, Bittersweet *Solanum dulcamara,* Common Birdsfoot Trefoil *Lotus corniculatus*, Buck's-horn Plantain *Plantago coronopus*, Yellow Horned Poppy *Glacium flavum*, Bladder Campion *Silene vulgaris*, Sea Kale *Crambe maritima*, Red Valerian *Centranthus ruber*, Common Broomrape *Orobanche minor* and Ribwort Plantain *Plantago lanceolata*.

This habitat type is also found on the crest of Southwick Beach to the west of Carat's Café (FID4). In this location it is generally sparse, but species found here include Spear-leaved Orache *Atriplex prostrata*, Oxford Ragwort *Senecio squalidus*, Sea Beet, Sea Mayweed *Tripleurospermum maritimum* and Bittersweet.

3.3.2 t2h – Beach

Southwick Beach (FID3) is dominated by shingle. Human modifications are evident with a concrete wall being found at the far eastern end as well as wooden groynes along much of the frontage. The western end of the beach appeared to be subject to a shingle recharge programme. Algal growth appeared to be limited however it was noted on the wooden groynes at varying amounts of percentage cover and the beach was generally free of litter.

3.3.3 u1b – Developed land; sealed surface

The Carats Café car park (FID2) is concreted and found behind Southwick Beach off Basin Road South. This car park may potentially be used as a compound area for the works within Area 1.

3.3.4 u1e – Built Linear Features

Southwick Beach promenade (FID7) is linear and is found on top of the beach. This feature is frequently used by members of the public.

3.4 Area 2 (Southwick Beach)

3.4.1 s – Sparsely Vegetated Land

Three compounds on shingle (FID10, 11 & 12) used by Shoreham Port are found within Area 2. FID10 is used as car park, FID11 is used as a storage area and FID12 is also used as a car park.

3.4.2 s3b – Coastal Vegetated Shingle (priority habitat)

An isolated strip of coastal vegetated shingle (FID1) is found between the existing sheet pile wall and three compound areas. Species found here include Buck's Horn Plantain, Yellow Horned Poppy, Sea Beet, Sea Mayweed, Silver Ragwort, Ribbed Melilot *Melilotus officinalis*, Oxford Ragwort and Red Clover *Trifolium pratense*. Two other areas of coastal vegetated shingle (FID2 & FID3) are also found on bunds within Area 2 and run adjacent to Basin Road South. Species present on these bunds include Fat Hen *Chenopodium album*, Tree Mallow, Spear Thistle *Cirsium vulgare*, Kidney Vetch *Anythyllis vulneraria*, Black Medick *Medicago lupulina*, Sea Mayweed, Buck's-horn Plantain, Common Birdsfoot Trefoil and Sea Beet. However, following the updated site visit in November 2022, FID2 & FID3 had both been removed due to ongoing coastal defence works being undertaken by Shoreham Port and therefore are not considered further within this report.

3.4.3 t2h – Beach

The beach within Area 2 is dominated by shingle. At the foreshore, finer sediment is found which includes sand and fine stones. Human modifications to this section are evident and include sheet piling, rock revetment, eroded groynes and a concrete outfall. There is poor transition to other habitats due to the extensive sheet piling at the crest of the beach. Litter was evident with large items being deposited including some microplastics. Algal growth was also present here and almost covered up to the surf zone.

3.4.4 u1b – Developed Land; sealed surface

A concrete outfall which appears to be connected to the sewage works directly behind the beach is present within Area 2. A large lay-by connected to Basin Road South is also found just to the east of Area 2, this area may potentially be used as a compound area.

3.4.5 u1e – Built Linear Features

Two rock revetment sea defences (FID8 & FID9) are found on the beach.

3.5 Area 4 (Shoreham Port)

3.5.1 s3b – Coastal Vegetated Shingle (priority habitat)

Three area of coastal vegetated shingle are found within Area 4. FID1 runs adjacent to Basin Road South. FID2 is a large bund which is found on the crest of the beach and forms part of the Basin Road South LWS and is approximately 0.3ha in size. Species found here included Buck's-horn Plantain, Sea Beet, Sea Kale, Rock Samphire, Sea Mayweed, Yellow Horned Poppy, Kidney Vetch, Tree Mallow, Common Birdsfoot Trefoil and Ribwort Plantain. Sea Kale and Rock Samphire are dominant in this location. FID9 is a small area of coastal vegetated shingle located just to the east of Area 4, species found here include Tree Mallow, Sea Kale, Silver Ragwort, Sea Beet and Yellow Horned Poppy.

3.5.2 t2h – Beach

The beach (FID3 & FID4) in Area 4 is dominated by shingle. There is a transition from shingle to coastal vegetated shingle on the backshore which is comprised of the species mentioned above in Section 3.5.1. There is evidence of human modification; rock revetment, wooden groynes and concrete sea defences are all found here. Algal growth is also evident in this location ranging between 10-25% cover.

3.5.3 u1b – Developed Land; sealed surface

A large concrete lorry park (FID5) is found directly between FID1 and FID2.

3.5.4 u1b5 – Buildings

A small building (FID8) is found directly behind the small area of coastal vegetated shingle (FID9).

3.5.5 u1e – Built Linear Features

Two rock revetment sea defences (FID6 & FID7) are found on the beach.

3.6 Area 5 (Hove Beach)

3.6.1 g3c – Other Neutral Grassland

An area of other neutral grassland (FID2) is found just to the west of the King Alfred Leisure Centre and forms part of the Western Lawns. This area is frequently mown and small present here included Wall Barley *Hordeum murinum*, Yorkshire Fog *Holcus lanatus*, Ribwort Plantain, Red Clover, Tree Mallow and Common Dandelion *Taraxacum officinale*. This area may potentially be used as a compound area.

3.6.2 t2h – Beach

The beach (FID1, FID4 & FID7) is dominated by shingle. Six concrete groynes are found here and at the backshore is a concrete wall which acts as a sea defence. There is no algal growth on the beach itself however on the groynes there is up to 75% cover.

3.6.3 u1b – Developed Land; sealed surface

The King Alfred Leisure Centre car park (FID3) is capped with tarmac, this area may potentially be used as a compound area. A small lay-by/car park (FID5) is situated just to the east of the King Alfred Leisure Centre, this area may be used as a compound area and has some marginal vegetation including Sea Beet, Ribwort Plantain and Buck's-horn Plantain.

3.6.4 u1e – Built Linear Features

One of the main features of Area 5 is Hove Promenade, this area is a large walkway and cycle path which is used by members of the public frequently.

3.7 Area 6 (Black Rock)

3.7.1 g3c – Other Neutral Grassland

A small strip of other neutral grassland (FID16) is found between the beach and Volk's Railway. Species found here include Ribwort Plantain, Buck's-horn Plantain, Cock's-foot *Dactylis glomerata*, Tree Mallow, Red Valerian, Common Mallow *Malva sylvestris* and Sea Beet.

3.7.2 s3b – Coastal Vegetated Shingle (priority habitat)

Six areas of coastal vegetated shingle are found within Area 6. Five (FID4, FID13, FID14, FID15 and FID17) of these six areas have been planted/act as compensation for the loss of coastal vegetated shingle through other coastal schemes. FID28 at the far eastern end of Area 6 is adjacent to Brighton Marina West Arm, the habitat here has severely degraded through other coastal defence works and species present within this area included Sea Beet, Fat Hen, Silver Ragwort, Yellow Horned Poppy, Rock Samphire and Sea Kale.

3.7.3 t2h – Beach

The beach (FID12) is dominated by shingle and a single concrete groyne which acts as a sea defence is found here. On the crest of the beach are five areas of coastal vegetated shingle which act as compensation. The beach here is frequently used by members of the public.

3.7.4 u1 – Built-up areas and gardens

At the far eastern end of Area 6 is a large area of amenity planting and gardens, this area is set back from the beach and runs adjacent to Madeira Drive.

3.7.5 u1a – Open mosaic habitats on previously developed land (priority habitat)

This habitat type (FID27) is found at the eastern end of Area 6 is surrounded by Heras fencing. It would appear likely that this area has been abandoned for many years. Species present within this area include Rock Samphire, Sea Beet, Bristly Oxtongue *Helminthotheca echioides* and Silver Ragwort.

3.7.6 u1b5 – Buildings

Several buildings are found along the coastal frontage in Area 6 including businesses and a crazy golf course.

3.7.7 u1e – Built Linear Features

Set back from the beach is Madeira Drive and associated footpaths and cycle path, all of which are frequently used by members of the public.

3.8 Area 7 (Southwick Beach)

3.8.1 s3b – Coastal Vegetated Shingle

Two area of coastal vegetated shingle are found within Area 7. The first area (FID1) is found at the western end of Area 7 at the East Spending Beach. In this location, a small access track runs through the middle of it between the warehouses and the main gate connected to Southwick Beach. Species present within this area include Rock Samphire, Silver Ragwort, Sea Mayweed, Yellow Horned Poppy, Spear-leaved Orache and Buck's-horn Plantain. The second area is found at the far eastern end of Area 7 on the crest of the beach and is very sparsely vegetated, species found here included Sea Beet, Sea Kale, Oxford Ragwort and Spear-leaved Orache.

3.8.2 t2h – Beach

The beach (FID6) at the western end of Southwick Beach is dominated by shingle. Human modification includes Southwick Harbour Arm, areas of shingle recharge and rock revetment. Algal growth is limited to the rock revetment at around 50% cover. The eastern end (FID8) is also dominated by shingle however human modifications vary here including rock revetment, concrete wall and two wind turbines. At the crest is an area of coastal vegetated shingle as mentioned above in Section 3.8.1. Algal growth again is limited to just areas of rock revetment and at around 50% cover.

3.8.3 u1e – Built Linear Features

Shoreham Harbour East Arm (FID3) is a prominent feature of Area 7 and is used by members of the public for fishing. An area of rock revetment (FID4) is situated to the east and sits adjacent to the harbour arm, this is intertidal and therefore no access was possible. This rock revetment sea defence is used by Turnstone *Arenaria interpres* and Purple Sandpiper *Calidris maritima*. A further two areas of rock revetment (FID2 & FID7) are found within Area 7 both of which are dominant features within the landscape.

3.9 Protected and notable species

3.9.1 Amphibians (including Great Crested Newt)

There are 92 SxBRC records of Common Toad *Bufo bufo* last recorded in 2020 within 2km of the Site. There are also, 52 records Palmate Newt *Lissotriton helveticus* (recorded in 2008), 9 records of Smooth Newt *Lissotriton vulgaris* (2020) and 230 records of Common Frog *Rana temporaria* recorded (2021) within 2km of the Site. No recent records of Great Crested Newts *Triturus cristatus* (GCN) have been recorded within 2km of the Site.

The habitats found throughout the scheme are considered unsuitable to support Great Crested Newt, it is not considered likely that GCN will be present on site and therefore are excluded from further assessment.

3.9.2 Badger

Records of badger within 2km of the scheme remain confidential.

Habitat for Badger is limited across the scheme extents. The built-up areas and gardens (Duke's Mound) at the far eastern end of the scheme provide the most suitable habitat for this species. During the UKHab Survey in June 2022, October 2022 & November 2022, no evidence of Badger was found. Based upon the amount of suitable habitat in wider landscape it is not considered likely that Badger is present on site, and therefore be excluded from further assessment.

3.9.3 Bats

The SxBRC desk study data returned numerous records of 13 species of bat within 2km of the site. These records included Common Pipistrelle *Pipistrellus pipistrellus*, Soprano Pipistrelle *Pipistrellus pygmaeus*, Brown Long-eared *Plecotus auritus*, Long-eared Bat sp. *Plecotus spp*., Grey Long Eared *Plecotus austriacus*, Noctule *Nyctalus noctula*, Serotine *Eptesicus serotinus*, Myotis spp. *Myotis spp*., Whiskered *Myotis mystacinus,* bat spp*. Chiroptera spp*, Whiskered/Brandt's *Myotis mystacinus/brandtii* and Nathusius's Pipistrelle *Pipistrellus nathusii.* The majority of these records relate to bats within the wider city although there are two relevant records. These include a Whiskered/Brandt's Bat found grounded at Volks Railway in 2010, the note on this record states it was thought to be disturbed during construction work. A Nathusius's Pipistrelle was also found grounded on Madeira Drive in 2006 and was considered to be a possible migrant.

The closest record to the scheme extent of roosting bats was for a pipistrelle sp. recorded during the winter of 1987 on the Palace Pier which is halfway between Area 5 and Area 6. Foraging and roosting opportunities within the scheme extents are considered to be limited due to lack of suitable habitat therefore bats are excluded from further assessment.

3.9.4 Birds

A total of 67 Schedule 1 species have been recorded within 2km of the site. Of these 67 species, only Black Redstart is considered to have potential to be present on the site within the breeding season.

61 Red-listed species have been recorded within 2km of the site. Of these 61 species, offshore habitats in winter are considered likely to support Common Scoter *Melanitta nigra* and occasionally Velvet Scoter *Melanitta fusca*. During this same period, the beach may support Dunlin *Calidris alpina* and Ringed Plover *Charadrius hiaticula,* whilst Purple Sandpiper occur on both Brighton Marina Harbour Arms and Shoreham Harbour Arms. Herring Gull *Larus argentatus* is present all year round and stands of scrub located close to the coastal frontage are considered likely to support House Sparrow *Passer domesticus*.

The scheme provides suitable habitat for breeding birds, including beach, built up areas and gardens, sparsely vegetated land and built linear features. During the UKHab survey in June 2022, October 2022 and November 2022, several species of bird were noted including Chiffchaff *Phylloscopus collybita*, Blackcap *Sylvia atricapilla*, Rock Pipit *Anthus petrosus*, House Sparrow *Passer domesticus*, Turnstone and Herring Gull. Suitable nesting habitat/cover for resident passerines or passage migrants is mainly found along road verges or at the far eastern end of the scheme in Area 6, FID22.

The beach will also be used by small numbers of wintering birds between the months of October and March, however, the entire coastal frontage is prone to large amounts of human disturbance. Species using the frontage in winter will include Turnstone which occur in small numbers along the entire frontage but will have favoured feeding and roosting areas. Purple Sandpiper also occurs in winter but are only found on Southwick & Shoreham Harbour arms and the Brighton Marina Harbour arms. Herring Gull, Black-headed Gull *Chroicocephalus ridibundus*, Great Black-backed Gull *Larus marinus* will all be found along the frontage either loafing or feeding.

A full Sussex notable species list for birds recorded on Southwick Beach can be found in Appendix 3.

3.9.5 Fish & Marine Mammals

Records of NERC S41 species were returned from the Data Search, including European Eel *Anguilla Anguilla*, Short-snouted Seahorse *Hippocampus hippocampus*, Whiting *Merlangius merlangus*; Plaice *Pleuronectes platessa*, Mackerel *Scomber scombrus*, Thornback Ray *Raja clavate*. The data search also returned records of Common Porpoise, Bottle-nosed Dolphin, Long-finned Pilot Whale, Harbour Seal and Grey Seal. The works will be focused on the

beach although due to the proximity of these works to the sea potential effects on fish and marine mammals should be considered and therefore are scoped in for further assessment.

3.9.6 Invasive Non-Native Species

The Data Search returned invasive non-native species (INNS) listed on Schedule 9 of the Wildlife and Countryside Act (WCA), which were associated with the coastal environment including American Slipper Limpet *Crepidula fornicate*; Chinese Mitten Crab *Eriocheir sinensis*; A Flatworm *Kontikia ventrolineata* and Wireweed *Sargassum muticum*. No INNS were recorded during any of the site visits.

3.9.7 Invertebrates

The Data Search returned four notable species of invertebrates associated with the coastal habitats including Dingy Skipper *Erynnis tages;* Common Darter *Sympetrum striolatum;* Mottled Rustic *Caradrina Morpheus* and Jersey Tiger *Euplagia quadripunctaria.*

Coastal vegetated shingle is known to support an important assemblage of terrestrial invertebrate species. There are six UK BAP priority species associated with this habitat type including Toadflax Brocade Moth *Calophasia lunula*, White Spot Moth *Hadena albimacula*, Brown-banded Carder Bee *Bombus humilis*, Large Garden Bumble Bee *Bombus ruderatus*, Short-haired Bumble Bee *Bombus subterraneus* and a Leafhopper *Aphrodes duffieldi.* Of these six UK BAP species, Toadflax Brocade Moth and Brown-banded Carder Bee have both been recorded within 2km of the scheme extents. Toadflax Brocade Moth has been recorded twice, the first record was 0.62km west of the scheme extents at Old Fort Road, Shoreham Beach in 2007 whilst the second record was 0.84km west of the scheme extents at Shoreham Beach in 2018 indicating there may be a small population of this species on Shoreham Beach. Brown-banded Carder Bee has also been recorded twice; the first record was 483m north of the scheme extents in Fishersgate whilst the second record was 1.67km north from Brighton General Hospital in 2021.

Two 'notable' species have been recorded within the footprint of the works at Area 4, these include Mullein Wave *Scopula marginepunctata* and Wasp Spider *Argiope bruennichi.* Mullein Wave is mainly coastal and occurs over a large part of the UK in these habitat types. This species was recorded on the beach in 2020 whilst the Wasp Spider was recorded from the adjacent block of Tamarisk scrub that sits adjacent to Basin Road South in 2001.

A further 51 'notable' species have been recorded from the scheme extents and adjacent areas. Of these 51 species, 30 were recorded from Shoreham Beach in 2018 when a terrestrial invertebrate survey was undertaken by Graeme Lyons. A full species list of 'notable' species recorded from this survey can be found in Appendix 4. Twenty-four of these 51 species have been recorded from a variety of locations including Black Rock, Brighton Marina, Hove Beach, Shoreham Harbour, Southwick Canal and Volks Railway, of these six locations Black Rock sits within the footprint of Area 6. A list of these 24 species can be found in Appendix 5. Based upon the proximity of all these locations to the scheme extents and the occurrence of coastal vegetated shingle in all working areas other than Area 5 (Hove Beach), it is considered likely that some of these species will occur within the scheme extents therefore terrestrial invertebrates are scoped in for further assessment.

3.9.8 Otter

No records for Otter were returned from Data search. The habitats found throughout the scheme are considered unsuitable to support Otter, it is not considered likely that Otter will be present on within the scheme extents and therefore are excluded from further assessment.

3.9.9 Reptiles

The 2km Data Search from SxBRC returned records of reptiles species listed under the WCA Schedule 5 and NERC S41 Species including, Slow-worm *Anguis fragilis*, Leathery Turtle *Dermochelys coriacea*, Grass Snake *Natrix helvetica*, Adder *Vipera berus*, Common Lizard *Zootoca vivipara*. All records of Slow Worm, Grass Snake, Adder & Common Lizard were north of the Areas 1-7. The A259 and Basin Road South are considered to act as a barrier to movement of reptile species and connectivity between the scheme extents and inland habitats is poor. In addition to these species, Leathery Turtle was recorded offshore near the Rampion Windfarm in 2019. Based upon limited habitat within the scheme extents and barriers for these species, reptiles are scoped out for further assessment.

3.9.10 Water Vole

No records for Water Vole were returned from Data search. The habitats found throughout the scheme are considered unsuitable to support Water Vole, it is not considered likely that Water Vole will be present on within the scheme extents and therefore are excluded from further assessment.

3.10 Summary of ecological features

An evaluation of each ecological feature, summarised from the baseline data collected, is presented in Table 3-3. Several ecological features are considered to need further assessment due their known or potential presence within the zone of impact of the proposed scheme. Impacts are considered unlikely for Great Crested Newt, Badger, Bats, Otter, Reptiles and Water Vole.

Table 3-3: Summary of ecological features on site, as derived from the baseline data collected

Ecological feature	Evaluation	Geographical importance	Further assessment required?
Basin Road South LWS	Designated for coastal vegetated shingle.	Local	Yes
Beachy Head West MCZ	Runs Parallel to the coastline extending from Brighton to the Beachy Head Cliffs near Eastbourne. Contains best examples of chalk habitat in the region, chalk reefs, gullies and specialised communities of intertidal flora and fauna.	National	Yes
Black Rock Beach LWS	One of only three sites for coastal vegetated shingle (an internationally threatened habitat) in Brighton & Hove. The site has established following the construction of the Brighton Marina in the 1970s and a diversity of coastal specialists, including Sea Kale and Tree Mallow and historical records of the nationally rare Sea Knotgrass.	Local	Yes
Brighton to Newhaven Cliffs SSSI	Designated for a range of habitats and species including vegetated shingle.	National	Yes

Ecological feature	Evaluation	Geographical importance	Further assessment required?
Brighton and Lewes Downs Biosphere Reserve	The Brighton and Lewes Downs Biosphere Reserve. The reserve forms part of the South Downs National Park. Chalk downland makes up most of the reserve which is bounded by each end by the Adur Valley and the Ouse Valley. The coastline is dominated by chalk cliffs. The area is nationally and internationally renowned for its arts and culture, distinctive settlements, independent mindset and its links to the surrounding iconic English landscape of downland, white chalk cliffs and beaches.	Regional	Yes
Brighton Marina LWS	Unusual combination of marine conditions has established a unique marine environment in the Brighton & Hove context (and beyond). Supports a diversity of marine habitats and species.	Local	Yes
Madeira Drive Green Wall LWS	A green wall immediately below the A259 coast road (Marine Parade) and fronting onto Madeira Drive on Brighton seafront. It stretches 1.25km from the western terminus of the Volks Railway to the top of Duke's Mound in the East.	Local	Yes
Volks Railway LWS	Important for being one of only three remaining sites for vegetated shingle (an internationally rare habitat) in Brighton & Hove (the others are at Shoreham Harbour and Black Rock). Silver Ragwort (a garden escape) is abundant in some places.	Local	Yes
Habitats	Coastal vegetated shingle, open mosaic habitats on previously developed land & intertidal mudflat.	Regional	Yes
Amphibians	No evidence of Great Crested Newts on site, and they are considered absent for the purposes of this assessment. Potential for other common amphibians such as Common Frog and Common Toad to be present.	Negligible	No
Badgers	No evidence of Badger on site.	Negligible	No
Bats	No roosts have been found on site. Common Pipistrelle *Pipistrellus pipistrellus* were recorded close to the site, with relatively low activity.	Negligible	No
Breeding & wintering birds	Foraging and nesting opportunities for widespread bird species.	Site (Breeding) Local (Wintering)	Yes

Ecological feature	Evaluation	Geographical importance	Further assessment required?
Fish & Marine Mammals	Works are restricted to the beach however due to the proximity to the sea, fish & marine mammals are scoped in.	Local	Yes
Hazel Dormouse	No suitable habitat to support this species is present within scheme extents.	Negligible	No
Hedgehogs	No evidence was found but suitable foraging habitat at the far eastern end of the scheme within the area of built-up area and garden.	Local	Yes
Invasive non-native species	American Slipper Limpet, Chinese Mitten Crab, a Flatworm and Wireweed have all been recorded within 2km of the site.	Local	Yes
Invertebrates	51 'notable' species have been recorded with 2km of the site including some nationally scarce and rare species. Some of these are associated with coastal vegetated shingle.	Regional	Yes
Otter	No suitable habitat to support this species is present within scheme extents.	Negligible	No
Reptiles	The A259 and Basin Road South are considered to act as a barrier to movement of reptile species and connectivity between the scheme extents and inland habitats is poor.	Negligible	No
Water Vole	No suitable habitat to support this species is present within scheme extents.	Negligible	No

4 Assessment of Ecological Effects

4.1 Statutory Designated Sites

There are six statutory designated sites within 5km of the site. Of these six, two have been scoped in for further assessment.

4.1.1 Beachy Head West MCZ

Short-term indirect temporary impacts are expected during the works to the Beachy Head West MCZ. These impacts include increased disturbance to marine life, there is also a risk of the release of sediment and pollutants. These risks will be managed through pollution control measures and best working practices. The implementation of best working practices and pollution control measures would reduce the magnitude of these impacts and therefore negligible with no significant effects to the integrity of the Beachy Head West MCZ.

4.1.2 Brighton Marina to Newhaven Cliffs SSSI

Short-term indirect temporary impacts are expected during the works to the Brighton Marina to Newhaven Cliffs SSSI. Temporary impacts include increased risk of dust and other pollutants. These risks will be managed through pollution control measures and best working practices. The implementation of these would reduce the magnitude of these impacts and therefore negligible with no significant effects to the integrity of the Brighton Marina to Newhaven Cliffs SSSI.

4.2 Non-statutory Designated Sites

There are 26 non-statutory designated sites within 5km of the site. Of these 26, six have been scoped in for further assessment.

4.2.1 Brighton and Lewes Downs Biosphere Reserve

Coastal vegetated shingle is a priority habitat identified within the Brighton and Lewes Biosphere Reserve designation. The proposed coastal defence works in Area 4 (FID2) would result in the permanent loss of 0.03ha of this habitat type and the permanent loss of 0.07ha in Area 2 (FID1). The remaining 0.27ha of coastal vegetated shingle in Area 4 is proposed to be retained whilst in Area 2, the remaining 0.22ha is proposed to be enhanced from poor to moderate condition. The scheme will also deliver 0.31ha of compensatory coastal vegetated shingle for the loss in Area 4. The Brighton and Lewes Downs Biosphere Reserve designation states through management are looking at the "effective conservation and recovery of marine habitat condition". As these works will result in the permanent loss of coastal vegetated shingle from the biosphere reserve, an effect of major magnitude is a significant negative effect at regional scale.

4.2.2 Basin Road South LWS

Basin Road South LWS contains coastal vegetated shingle which is an internationally rare habitat and is one of three sites in the local area to support this habitat type. Coastal vegetated shingle is a priority habitat under NERC S41. It is also identified within the Sussex Biodiversity Action Plan (BAP) and Brighton & Hove BAP. The proposed coastal defence works in Area 4 will result in the permanent loss of 0.03ha of coastal vegetated shingle to FID2, the remaining 0.27ha is proposed to be protected and retained. The scheme will also deliver 0.30ha of compensatory (creation and enhancement) coastal vegetated shingle for the loss in Area 4. An effect of this major magnitude is a significant negative effect at county scale.

4.2.3 Black Rock Beach LWS

Black Rock Beach LWS is designated for coastal vegetated shingle however most of this habitat was lost from the LWS due to coastal defence works. During operation of this

scheme, there may be short-term temporary impacts to the LWS during the works due to increased risk of dust and other pollutants settling on existing vegetation that is in poor condition. These risks will be managed through pollution control measures and best working practices. An effect of this low magnitude is negligible with no significant effects to the integrity of the Black Rock Beach LWS.

4.2.4 Brighton Marina LWS

Short-term indirect temporary impacts are expected during the works to the Brighton Marina LWS. During operation of the scheme, temporary impacts include increased risk of dust and other pollutants. These risks will be managed through pollution control measures and best working practices. The implementation of these would reduce the magnitude of these impacts and therefore are negligible with no significant effects to the integrity of the Brighton Marina LWS.

4.2.5 Madeira Drive Green Wall LWS

Short-term indirect temporary impacts are expected during the works to the Madeira Green Wall LWS. During operation of the scheme, temporary impacts include increased risk of dust and other pollutants. These risks will be managed through pollution control measures and best working practices. The implementation of these would reduce the magnitude of these impacts and therefore are negligible with no significant effects to the integrity of the Madeira Green Wall LWS.

4.2.6 Volks Railway LWS

Volks Railway LWS is designated for coastal vegetated shingle however most of this habitat was lost from the LWS due to coastal defence works. During operation of the scheme there may be temporary impacts to the LWS during the works due to increased risk of dust and other pollutants settling on existing vegetation. These risks will be managed through pollution control measures and best working practices. An effect of this low magnitude is negligible with no significant effects to the integrity of the Volks Railway LWS.

4.3 Habitats

There are a range of habitats within the site. Habitats listed as Priority Habitats (previously UK BAP habitats) under NERC S41 which are present on or adjacent to the site are coastal vegetated shingle, intertidal mudflat and open mosaic habitats on previously developed land.

4.3.1 Coastal Vegetated Shingle

There will be a permanent loss of 0.03ha coastal vegetated shingle due to the creation of new coastal defences within Area 4 (0.03ha) and temporary disturbance to 0.07ha of existing poor condition coastal vegetated shingle to enable the creation of the new coastal within Area 2 footpath. This habitat type is found across all areas of the scheme except 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). Due to the permanent loss of this habitat type, the effect is of major magnitude and is significant effect at county scale.

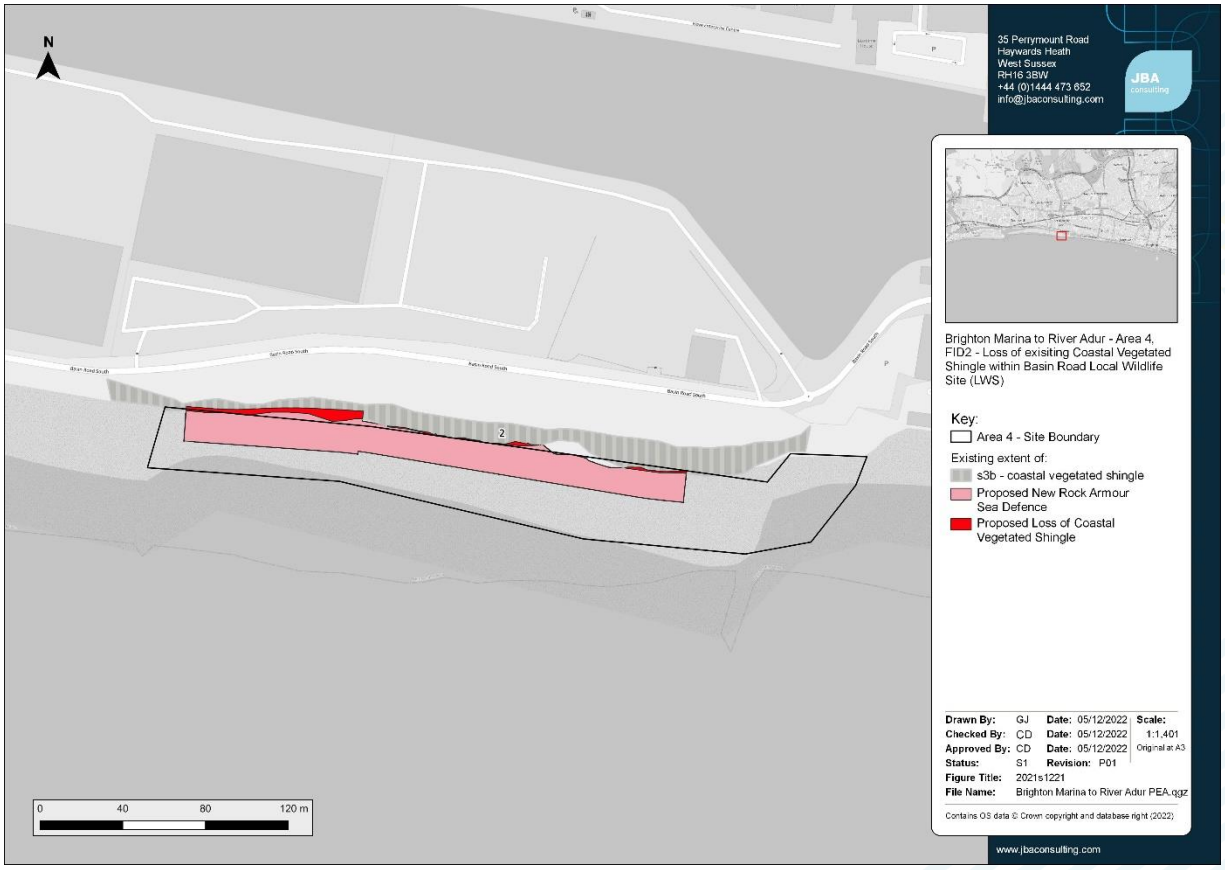


Figure 4-1: Loss of Coastal Vegetated Shingle in Area 4 (FID2).

4.3.2 Intertidal Mudflat

Intertidal mudflats are not situated within the footprint of the scheme extents and are found at Shoreham Harbour to the west of Area 7. The potential for temporary impacts to this habitat type is from pollution or dust due to shingle recharge within Area 7 on Southwick Beach. These risks will be managed through pollution control measures and best working practices. The implementation of these would reduce the magnitude of these impacts and therefore are considered to be negligible with no significant effects to the integrity of this priority habitat type.

4.3.3 Open Mosaic Habitats on Previously Developed Land

Open mosaic habitats on previously developed land are found within the footprint of the scheme extents at Black Rock in Area 6. This habitat type is currently behind Heras fencing and set back from the beach and promenade. The potential for temporary impacts to this habitat type is from pollution or dust due to shingle being removed from Area 6. These risks will be managed through pollution control measures and best working practices. The implementation of these would reduce the magnitude of these impacts and therefore are considered to be negligible with no significant effects to the integrity of this priority habitat type.

4.3.4 Other habitats

Loss of other non-priority habitat will result from the construction of the scheme. This includes the permanent loss of 0.01ha of shingle beach in Area 1 (FID3) and a combined total loss of 0.11ha shingle beach in Area 2 (FID 5 & 7) for a new coastal footpath, beach access steps and a new beach access ramp. The effect is of moderate magnitude and is

significant at the local scale. There will also be temporary impacts to this habitat type through shingle recharge in Area 6 & Area 7.

There is a risk to all other terrestrial habitats found within the scheme extents through a pollution event during construction or decommissioning adversely impacting other habitats adjacent to construction areas, and haulage and access routes. This could lead to the loss of plant species and reduce the quality of these habitats.

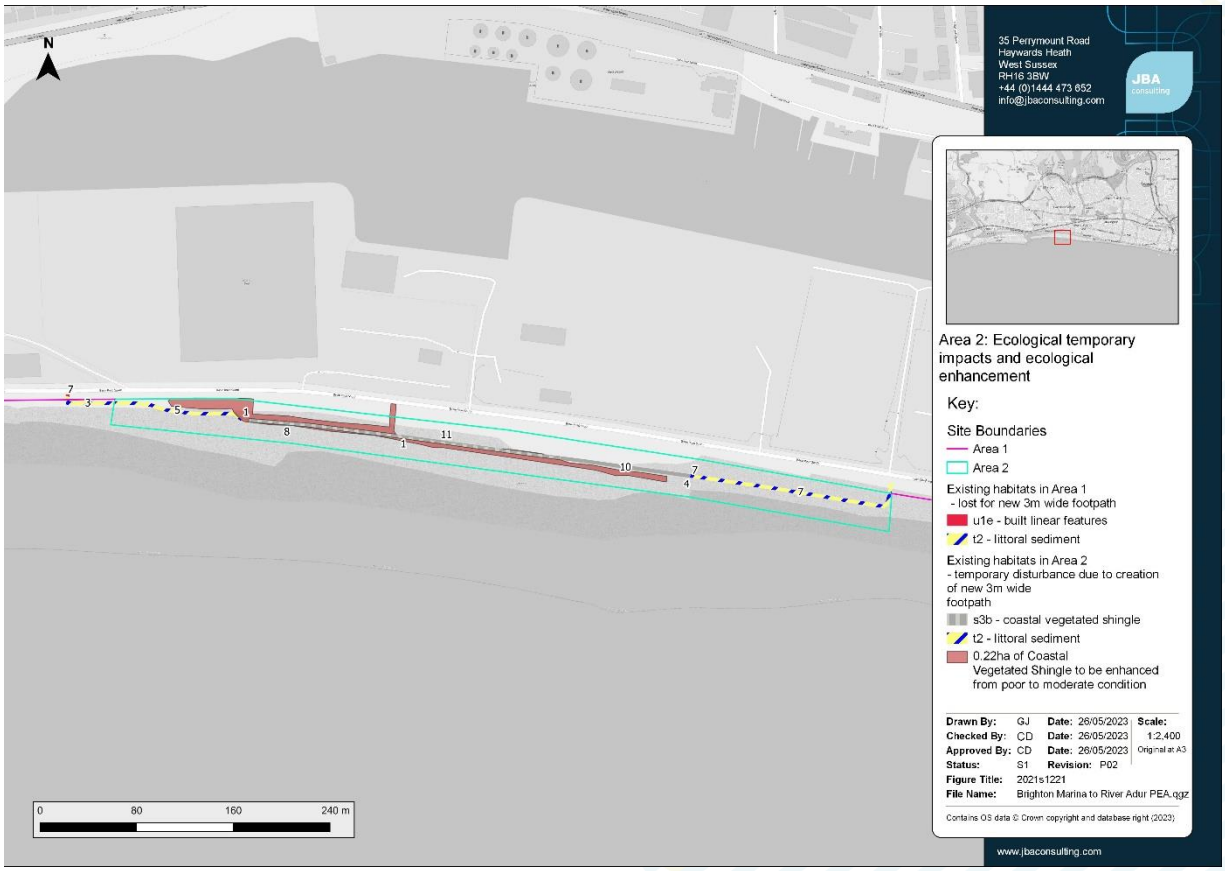


Figure 4-2: Temporary Disturbance of existing habitats in Area 2 for new 3m wide footpath

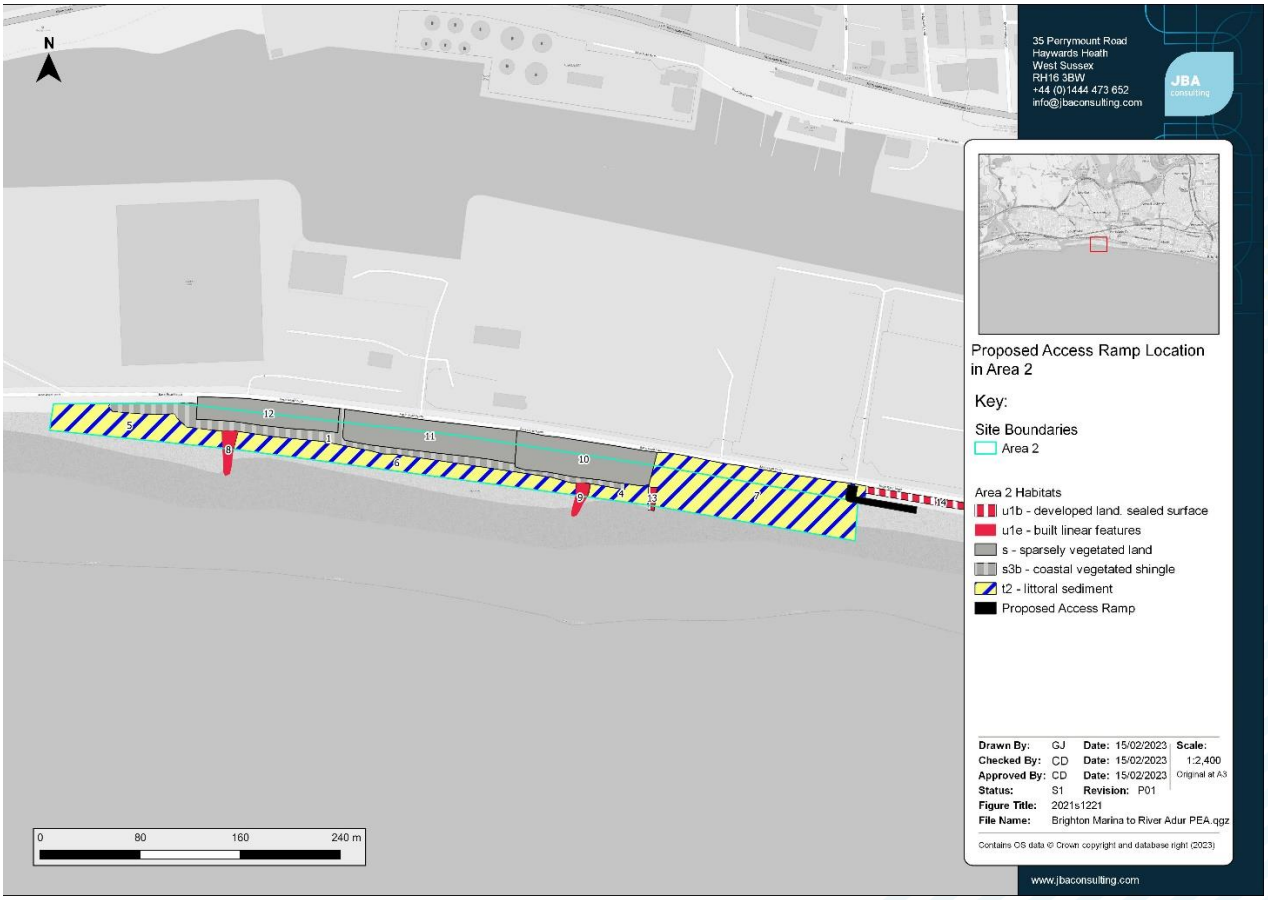


Figure 4-3: Loss of existing beach habitats in Area 2 for new beach access ramp

4.4 Protected and notable species

4.4.1 Breeding Birds

A number of common and widespread bird species have been observed on site including Rock Pipit, Chiffchaff, Blackcap and House Sparrow. All birds and their nests are legally protected during the breeding season. Of these the most notable is Rock Pipit, this species could potentially breed adjacent to Area 7 within the Eastern Spending Beach although this area is outside of the footprint of the shingle recharge area. Chiffchaff and Blackcap were both recorded in October in Tamarisk scrub at Duke's Mound and were considered to be migratory rather than resident. House Sparrow is the most abundant passerine across the scheme extents and uses isolated blocks of scrub set back from the beach.

No clearance of vegetation of scrub is anticipated. If scrub clearance is required, this could damage or destroy bird nests and their young. Without mitigation and/or compensation, this could cause a breach of legislation and would have a significant impact on the bird assemblage on site.

The coastal habitats offer limited nesting opportunities for birds in what is already a highly disturbed area by members of the public. Any impacts provided there is no scrub clearance would be temporary, the effects of these temporary impacts is of minor magnitude at site scale.

4.4.2 Wintering Birds

The works during construction could cause temporary impacts to wintering birds using coastal habitats as a foraging and roosting resource. Turnstone, Ringed Plover,

Oystercatcher, Herring Gull, Black-headed Gull and Common Gull have all been recorded with the footprint of the scheme extents during the winter period. Wintering birds recorded offshore include Scaup, Common Scoter, Slavonian Grebe, Red-throated Diver, Black-throated Diver and Great Northern Diver. Sufficient like for like habitat is available to all of these species across the wider landscape. The effect of these temporary impacts is of minor magnitude at local scale.

4.4.3 Fish & Marine Mammals

The works are situated on the beach therefore impacts to fish and marine mammals will be from any unexpected pollution event. These risks will be managed through pollution control measures and best working practices. The implementation of these would reduce the magnitude of these impacts and therefore are considered to be negligible with no significant effects to the integrity of fish and marine mammals.

4.4.4 INNS

American Slipper Limpet, Chinese Mitten Crab, Flatworm and Wireweed are known to be present along this coastline. During construction and operation, if not mitigated for, these could be spread to other areas within the site during the transfer of shingle between different areas. This effect is of moderate magnitude at local scale.

4.4.5 Terrestrial Invertebrates

The loss of coastal vegetated shingle will impact upon terrestrial invertebrate assemblages within the footprint of the scheme extents. 51 'notable' species have been recorded within 2km of the scheme extents, some of which are associated with coastal vegetated shingle and are considered likely to occur within Area 2 and Area 4. The permanent loss of coastal vegetated shingle and the effect this will have on terrestrial invertebrate assemblages is of moderate magnitude at local scale. The creation of 0.31ha compensatory coastal vegetated shingle and a new biodiversity wall, post construction would benefit terrestrial invertebrates and would result in significant positive effect at local scale.

4.5 Summary

There will be potentially significant unmitigated impacts on several ecological features during construction and operation, including several important habitats (including priority habitats), breeding birds, wintering birds, fish and marine mammals, INNS and terrestrial invertebrates (Table 4-1). Mitigation will be required to avoid and reduce these impacts to an insignificant level.

Table 4-1: Summary of ecological features and potential unmitigated impacts

Feature	Importance	Potential significant unmitigated impacts
Designated sites	National	Pollution (construction and operation)
Brighton & Lewes Down Biosphere Reserve	Regional	Permanent loss of coastal vegetated shingle (feature of Biosphere Reserve)
Local Wildlife Sites	Local	Permanent loss of coastal vegetated shingle Damage/degradation of existing habitat (construction) Pollution (construction and operation)
Habitats	Regional	Permanent loss Damage/degradation (construction)

		Pollution (construction and operation)
Breeding birds	Site	Permanent loss of habitat Damage/destruction of bird nests and young (construction)
Wintering birds	Local	Permanent loss of habitat Disturbance to foraging and roosting birds (construction)
Fish & Marine Mammals	Site	Pollution (construction and operation)
INNS	Local	Spread of American Slipper Limpet, Chinese Mitten Crab, Flatworm and Wireweed (construction and operation)
Terrestrial Invertebrates	Local	Permanent loss of habitat Damage/degradation of retained coastal vegetated shingle (construction)

5 Mitigation, compensation and enhancement

5.1 General mitigation measures

Mitigation measures including pollution control measures will be defined within the Outline Construction Environmental Management Plan to ensure there are no significant impacts to the important ecological features present on-site during construction. This will further be re-iterated to all contractors and site personnel on site induction. An Ecological Design Strategy and an Ecological Management Plan will detail the compensation, enhancement and biodiversity net gain measures that will be implemented and their management and post monitoring in the long-term, during operation of the scheme.

Standard industry pollution prevention measures will be implemented throughout construction to ensure that habitats within the proximity of the works are not degraded as a result of pollution events during the construction phase. This mitigation will include:

- Implementing good construction practice throughout the works to reduce the risk of dust and a pollution incident. Working practice guidance to be followed includes, but is not limited to topics covered as Guidance for Pollution Prevention (GPPs) - http://www.netregs.org.uk/environmental-topics/pollution-prevention-guidelines-ppgs-and-replacement-series/guidance-for-pollution-prevention-gpps-full-list/.
- An emergency response kit present on site throughout the duration of the construction works, with staff trained in their use.
- Removal of all potentially contaminated materials from site to an appropriate licenced facility for disposal.
- Removal of any material accidentally contaminated during the works by potentially polluting substances such as fuels and oils from site to an appropriate licenced facility for disposal.
- Locating any chemical, fuel and oil stores on impervious bases within a secured bund with a storage capacity 110% of the stored volume.
- Using biodegradable oils and fuels where possible.
- Placing drip trays underneath any standing machinery to prevent pollution by oil/fuel leaks. Refuelling of vehicles and machinery will be carried out on an impermeable surface in one designated area well away from any watercourse or drainage (at least 10m).
- Operators will check their vehicles on a daily basis before starting work to confirm the absence of leakages. Any leakages will be reported immediately.
- Dust particles to managed by dampening down works areas, to prevent spread of dust particles into designated sites.

Standard biosecurity procedures will also be implemented throughout construction to ensure that there is no spread of any INNS during construction:

- Training during induction for all site personnel on the identification and location of INNS within the site and adjacent areas, as well as biosecurity measures and legal requirements/obligations;
- A pre-construction check of worksite in areas where INNS are potentially present;
- In the event of INNS being newly recorded within the works or access footprints, invasive species (including INNS associated with Intertidal habitats) will be demarcated and signage erected to ensure no accidental intrusion – exclusion zone to be a minimum of 7m. No tools or materials will be stored on top of or within 10m of areas of INNS;

- Cleaning areas will be designated at all site egress points for plant and machinery. The cleaning area will be covered in a heavy-duty impermeable sheet. All PPE, machinery and tools used to carry out the works will be cleaned thoroughly with stiff-haired brushes in a designated area following completion of control measures;
- Boot washes will be set up at all entry and exit points to the work site and should be used at all sites where invasive species have been identified;
- Where contaminated material will be removed from site this material will be placed in designated skips. Skips will be stored in a restricted area as close to the source of excavated material as possible to avoid contaminating uninfected areas onsite. The skip or trailer used will have a lining and will be covered with a membrane to avoid contamination during transport. The waste to be disposed of offsite will be accompanied by a Waste Transfer Note (WTN), which will list any material that contains invasive non-native plants or their seeds; and
- Biosecurity measures to avoid the introduction, movement and spread of invasive non-native species on and off the site, including cleaning vehicles, footwear, clothing and plant before entering site (use the check, clean, dry approach) and on leaving site.

5.2 Mitigation during construction

5.2.1 Designated Sites & Habitats

Damage/degradation

Fencing will be erected around all stands of existing retained coastal vegetated shingle, to mitigate against the damage of this habitat type during construction. Storage of all materials, parking of vehicles and any compound areas are to be restricted to existing areas of hardstanding. Pollution prevention measures will be implemented (Section 5.1) during construction to mitigate against damage to designated sites and habitats from pollution events.

5.2.2 Breeding birds

Damage/destruction of nests

Vegetation clearance required to facilitate the works, will be undertaken November and February where possible. If vegetation clearance is required during the bird breeding season, generally taken to be March to September (e.g. specifically for areas of dense scrub an ecologist will be present on site to supervise the removal. If any nests are found no removal will take place until young have successfully fledged.

5.2.3 Wintering Birds

Disturbance

Where works are undertaken during the winter period, a pre-works check for any roosting/feeding waders for species such as Turnstone and Ringed Plover on the foreshore will be undertaken. If any birds are present, then they will be allowed to rest/feed before works commence.

5.2.4 Fish & Marine Mammals

Pollution

Pollution prevention measures outlined in Section 5.1 will be followed at all times during construction in close proximity to the foreshore and sea to prevent pollution events.

5.2.5 INNS

Spread of American Slipper Limpet, Chinese Mitten Crab, Flatworm & Wireweed

Prior to the works commencing a toolbox talk will be given highlighting the potential for American Slipper Limpet, Chinese Mitten Crab, Flatworm and Wireweed to be present on site during the construction phase of the works. If any of these four species are found during construction within the works area, they will be removed to prevent the spread of these species in the wild.

INNS method statements will be followed during construction to prevent spread of this invasive non-native species (Section 5.1).

5.2.6 Terrestrial Invertebrates

There will be a loss of 0.1ha of coastal vegetated shingle during the construction of this scheme, this habitat type is known to support assemblages of rare and scarce terrestrial invertebrate species. To prevent death or injury to rare invertebrates, sweep netting will be undertaken by an ecologist, immediately prior to the removal of 0.1ha of existing coastal vegetated shingle, to encourage dispersal of these species into retained 'like for like' habitats (LWS coastal vegetated shingle road verge, located north of the existing lorry park).

5.3 Compensation

The loss of 0.03ha of existing coastal vegetated shingle (refer Table 5-1 and Figure 7-1) will occur as a result of placement of a new rock armour within Area 4 (Basin South LWS). Temporary disturbance to 0.07ha of existing coastal vegetated shingle seedbank within Area 2 will occur during the construction of the new footpath. The loss will be compensated at an 8-1 ratio at the following locations:

- Creation of 0.9ha of new coastal vegetated shingle, located to the west of Basin Road South LWS (within BHCC) (refer Table 5-1 and Figure 5-1)
- Enhancement of 0.22ha of existing poor condition coastal vegetated shingle within Area 2 to moderate condition (refer Figure 5-3).

Table 5-1: Compensation for coastal vegetated shingle

Habitat	Loss	Compensated habitat
Coastal Vegetated Shingle	0.03ha in Area 4 (FID2) within Basin Road South LWS. 0.07ha in Area 2 (FID1) to be subject to temporary disturbance, located adjacent to Shoreham Port storage areas and existing sheet pile wall.	0.9ha created to the west of Basin Road South LWS with Brighton and Hove 0.22ha of existing coastal vegetated shingle enhanced to moderate condition and located within Area 2 adjacent to Shoreham Port

It should be noted that detailed planting schemes for the compensatory coastal vegetated shingle will be confirmed on detailed design and incorporated into the Ecological Design Strategy and Ecological Management Plan. All species will be native and of local provenance and chosen to complement existing habitats and species found on the site.

Table 5-2: Summary of ecological features, mitigation and residual effects

Feature	Potential unmitigated impacts	Mitigation, compensation, creation enhancement.	Significant residual effect?
Designated sites	Pollution (construction and operation)	Pollution prevention measures.	Neutral
Habitats	Permanent loss of 0.11ha of existing shingle beach	Coastal vegetated shingle within the vicinity of the new footpath to be enhanced to improve the shingle beach at this location and prevent use for commercial storage in the future. Storage of all materials, parking of vehicles and compound areas to be restricted to hardstanding areas. Loss of coastal vegetated shingle compensated at an 8-1 ratio Creation new Biodiversity Wall	Neutral
Breeding Birds	Permanent loss of habitat Damage/destruction of bird nests and young (construction)	Creation of Biodiversity Wall with installation of bird boxes and beneficial management. Vegetation clearance (if required) to be undertaken outside bird breeding season, or under ecological supervision.	Neutral
Wintering Birds	Permanent loss of habitat Disturbance to foraging and roosting birds (construction)	If any of the works are to be undertaken during the winter period, then a pre-works check for any roosting/feeding waders for species such as Turnstone and Ringed Plover on the foreshore should be undertaken. If any birds are present, then they should be allowed to rest/feed before works commence.	Neutral
Fish & Marine Mammals	Pollution (construction and operation)	Pollution prevention measures will be	Neutral

Feature	Potential unmitigated impacts	Mitigation, compensation, creation enhancement.	Significant residual effect?
		followed at all times during construction in close proximity to the foreshore and sea to prevent pollution events	
INNS	Spread of American Slipper Limpet, Chinese Mitten Crab, Flatworm and Wireweed (construction and operation)	INNS method statements to be followed during construction.	Neutral
Terrestrial Invertebrates	Permanent loss of habitat Damage/degradation of retained coastal vegetated shingle (construction)	Creation of 0.31ha of coastal vegetated shingle. Creation of a Biodiversity wall Fencing of existing retained coastal vegetated shingle.	Neutral

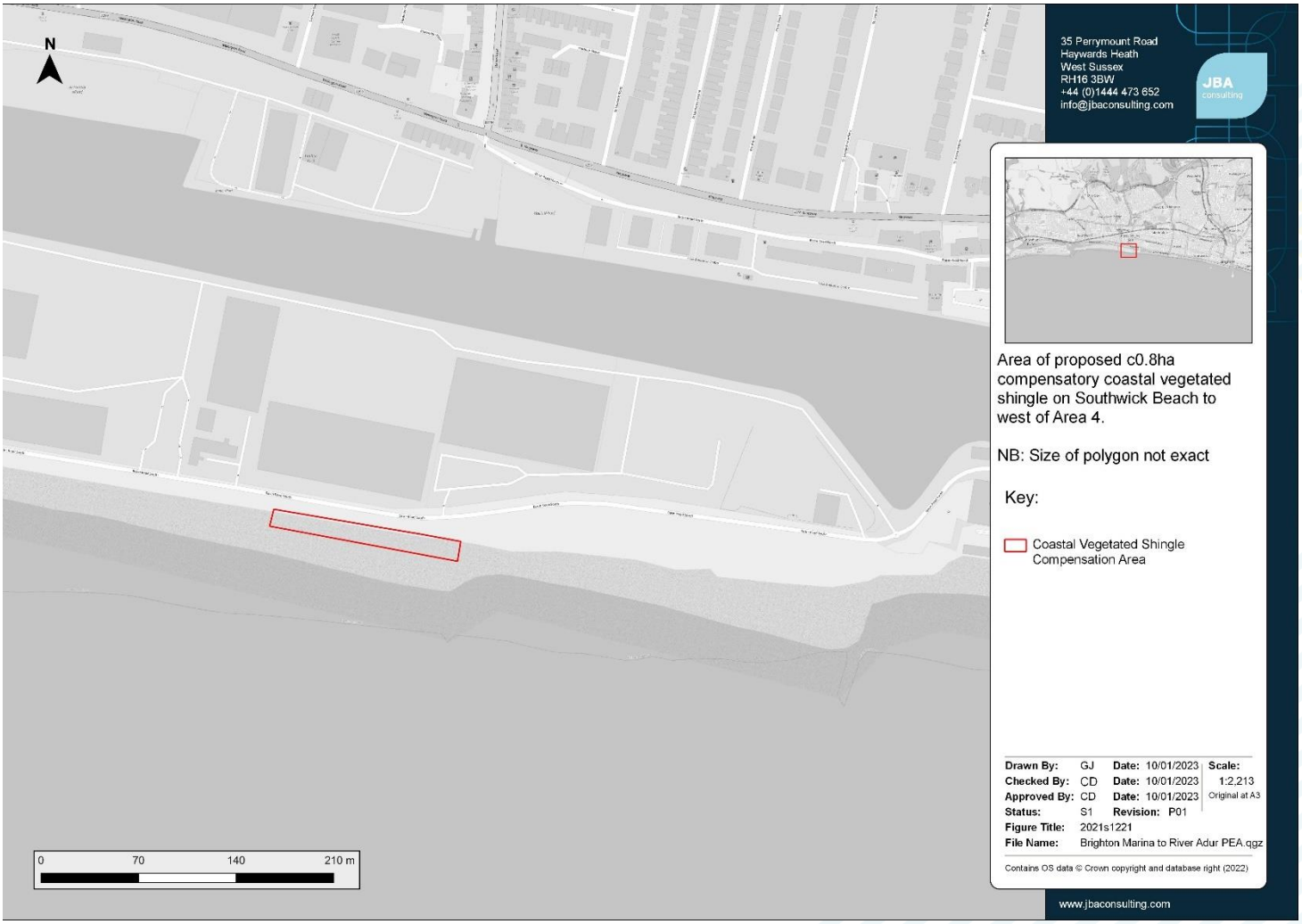


Figure 5-1: Habitat creation on Southwick Beach to west of Basin Road South LWS in Area 4

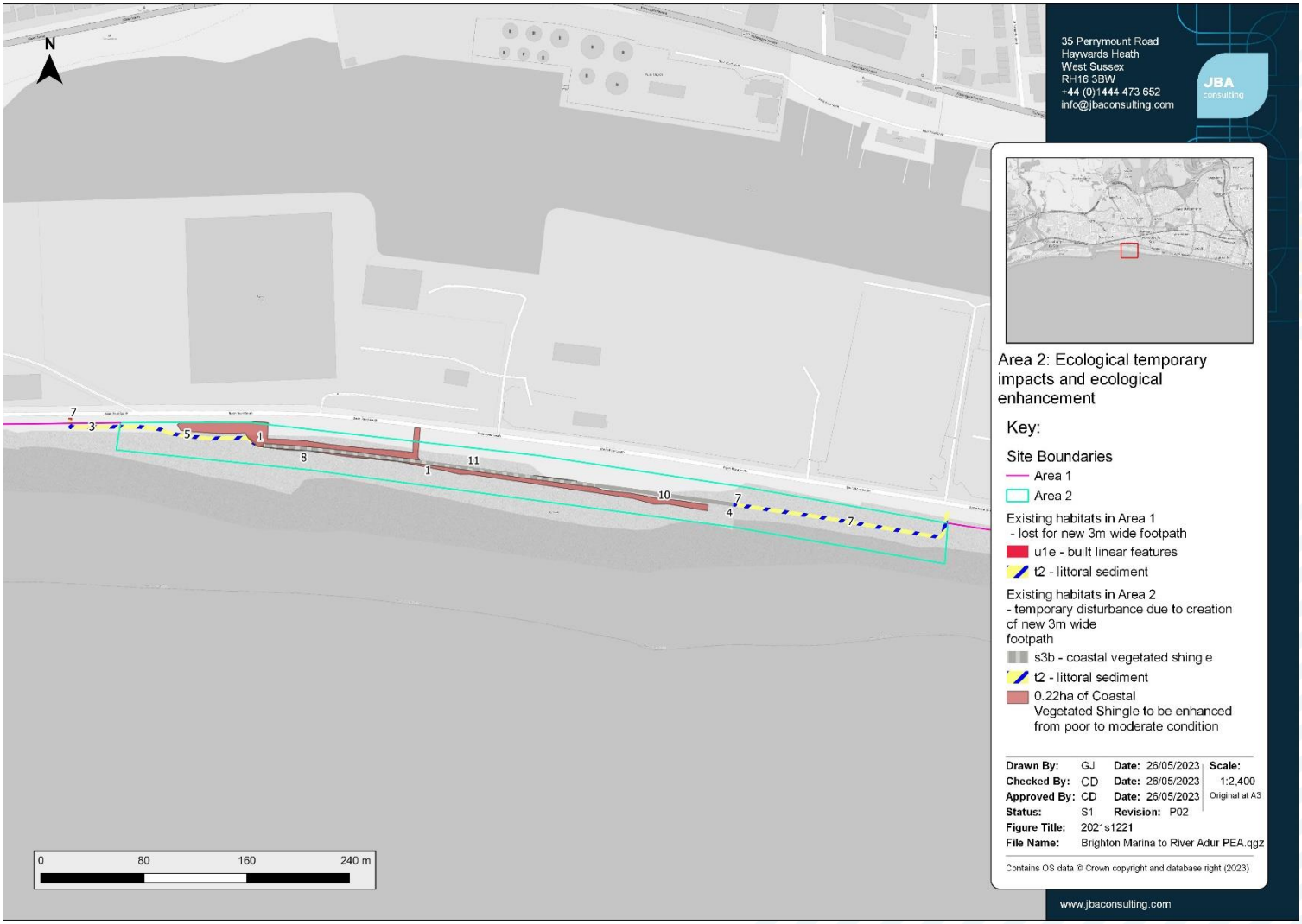


Figure 5-2: Ecological enhancement 0.22ha of coastal vegetated shingle enhancement in Area 2

6 Cumulative effects

The Brighton & Hove City Council planning register (https://planningapps.brighton-hove.gov.uk/online-applications/search.do?action=simple) and the Adur & Worthing Planning Public Access System (https://www.adur-worthing.gov.uk/planning/applications/view/) were searched for any other projects within the zone of influence or wider landscape that may have cumulative impacts with the proposed scheme.

6.1.1 Black Rock Site and Surroundings Madeira Drive Brighton BN2 1EN (BH2020/00442)

Planning permission was approved in December 2020 for the replacement of existing sea wall with a realigned free-standing structure; the formation of an access route from Black Rock extending to Brighton Marina; enhancement of highways infrastructure for Duke's Mound at its junctions with Marine Parade and Madeira Drive; restoration of The Old Reading Room and The Temple and change of use for flexible A1, A3, D1 or D2 Use; widespread enhancement of public realm for pedestrians and cyclists via new amenities, facilities and landscaping, with associated ecological enhancement.

The Ecological Impact Assessment (EcIA) document indicated that this development resulted in entire loss of the Black Rock LWS which was one of three sites in Brighton & Hove containing coastal vegetated shingle. Due to the entire loss of coastal vegetated shingle owing to the Black Rock Site and Surroundings scheme and the proposed loss of 0.03ha at Basin Road South LWS owing to this scheme is a significant in-combination effect on the extent of coastal vegetated shingle within Brighton & Hove.

6.2 Planning applications

A search of the Brighton & Hove City Council planning register and the Adur & Worthing Planning Public Access System revealed no planning applications for other FCERM schemes along the coastal frontage.

Outline planning for 'Redevelopment of Hove Western Lawns as a Linear Park, incorporating refurbishment of existing and new public leisure and recreation amenities including (east to west): Temporary Events Space; Garden; Bowls; Demolition of existing buildings and Erection of Two-storey Outdoor Sports Hub building (including Bowls Club (Class Use F2), Public Cafe (E) and Public WCs); Garden; Croquet; Sand Sports (F2); Sunken Garden; Padel Tennis (F2); Tennis including new Single-storey Tennis and Padel Tennis Pavilion (E); Garden; Wheeled Sports including Skate Park, Pump Track and Roller Area (F2); relocation of Hove Lagoon Amusements and Public WC improvements at the Big Beach Cafe. New and replacement Hard and Soft Landscaping and Planting, including continuous new accessible and connected route throughout linking all spaces, and associated Public Realm improvements.' (Reference: BH2022/02830) and is currently awaiting a decision. There will be no cumulative effects between the redevelopment of Hove Western Lawns and the Brighton Marina to Shoreham Harbour FCERM scheme.

The Preliminary Ecological Appraisal (PEA) document indicated that final development plans were unknown at the time of the report however there could be changes or losses of up to c9.6ha incorporating modified grassland, pond, hedgerows and built-up areas and gardens. These potential losses are dependent on the extent and layout of development proposals. There are potential impacts during construction on amphibians, nesting birds, roosting bats & reptiles. Birds are more susceptible to in-combination effects due to the larger distances they cover making it more likely they would be impacted by both developments. However, given the urban nature of the intervening land and that the species present on site are commonly found in such environments they are considered unlikely to cross between Hove Lagoon & Area 4.

6.3 Brighton & Hove Local Plan

There are two proposed housing sites situated to the north of Basin Road South on the northern side of the main coast road (A259). These sites are located 0.98 to 1.06km north of the site, with the intervening land comprising residential developments and the town centre of Portslade with little connecting habitat. Given the distance between these sites and Area 4, and that all future developments should produce and implement CEMP and a LEMP (or similar), it is considered unlikely that there would be any significant in-combination effects between these site allocations and the proposed scheme.

7 Biodiversity net gain

The Environment Bill Policy Statement was released in October 2019 and passed as the Environment Act 2021 in November 2021. The Act introduces mandatory 10% BNG for all projects requiring planning permission after a two-year transition period (i.e. in 2023) and this will be confirmed by the passing of secondary legislation in due course. In the interim period, BNG is expected to be an increasingly integral part of all projects.

A summary of the results from this metric is provided in Appendix 2 shows maps of these areas.

A summary of each type of habitat lost, gained and enhanced is presented in Table 7-2, and further split by habitat type in Table 7-3.

7.1.1 Habitat Creation to Deliver Biodiversity Net Gain

To provide BNG for the scheme, ecological enhancements to an existing concrete sea defence wall (approx.200m length x 4m height), to create a Biodiversity Wall along Basin Road South (Shoreham Port, Hove) (refer Figure 7-1) and based upon the 'Greening the Grey' concept (Naylor et al., 2017) are proposed.

The existing concrete sea defence wall is devoid of any vegetation and provides no ecological value or opportunities for biodiversity. The wall is within an industrial urban coastal locality and the surrounding landscape is dominated by commercial buildings, sealed surfaces, shingle beach and the English Channel.

The existing wall will be adapted on both the landward (northern aspect) and the seaward (southern aspect), to create a Biodiversity Wall broadly based upon the following adaptations:

- The landward side of the Biodiversity Wall (northern aspect) will incorporate four planted cassettes, comprising native shade tolerant species and a range of bird boxes and bug hotels and an integrated irrigation system which will act as a stepping stone habitat and improve the connectivity and functionality of the habitats throughout the site.
- The seaward side of the Biodiversity Wall (southern aspect) will incorporate the creation of eight planters made from old, recycled timber groynes. These structures will be fixed to the existing concrete wall at the base of the wall. Experimental artificial habitats may be created upon the seaward side of wall to enable collection of sediment, seaweeds and potentially bivalves and shellfish.

The Biodiversity Metric tool (v 3.1) fails to recognise the ecological value or importance of urban Green Walls awards very low BNG (0.5 habitat units), in quantifiable terms. Subsequently, habitat losses and gains for the project (calculated using the Biodiversity Metric tool) and based upon the loss of shingle beach (0.11ha), the compensation of coastal vegetated shingle at an 8:1 ratio and creation of a Biodiversity Wall delivers a -0.28% BNG loss for the overall scheme.

However, in accordance with Principle 6 of the biodiversity net gain good practice principles, ecological expertise has been applied to 'achieve the best outcomes for biodiversity by using robust, credible evidence and local knowledge to make clearly justified choices' (Baker et al., 2016). Creation of new habitats on-site were considered to be ecologically more valuable for biodiversity at a local level, compared to the delivery of quantifiable BNG, driven by outputs generated by the Biodiversity Metric, which could only deliver a quantifiable (>10%) BNG for the project, through off-site mitigation and provisioned through an off-setting provider, which would provide no ecological benefits for the local communities/biodiversity within Brighton, Hove and Shoreham.

Table 7-1. A digital copy of the Defra Biodiversity Metric 3.1 calculator showing the net gain calculations for the site is in Appendix 7.

7.2 Biodiversity Net Gain (BNG) Baseline

During the UKHab Survey, a total of 78 habitat features (FIDS) were identified across the six different areas within the scheme extents. Seven of these (FIDS) were in Area 1, 14 in Area 2, 13 in Area 4, seven in Area 5, 28 in Area 6 and nine in Area 7.

7.2.1 Habitat Condition Baseline

Appendix 7 shows each habitat parcel, the condition score from the survey, and the ecological baseline units from the Biodiversity Metric. Appendix 2 shows maps of these areas.

A summary of each type of habitat lost, gained and enhanced is presented in Table 7-2, and further split by habitat type in Table 7-3.

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Table 7-1: Project wide biodiversity metric calculation

	Existing baseline: biodiversity units	Predicted project biodiversity % change
Habitats	252.60 units	-0.28%

Table 7-2: Project Area of habitat loss, retention and enhancement

	Habitats (ha)
Area existing (ha)	29.21
Area retained (ha)	28.73
Area enhanced (ha)	0.22
Area lost (ha)	0.26

Table 7-3: Area and unit change in each habitat type

Habitat group	Area change (ha)	Unit change
Grassland	0.00	0.00
Sparsely Vegetated Land	0.10	0.02
Urban	0.29	0.87
Intertidal Sediment	-0.11	-1.45

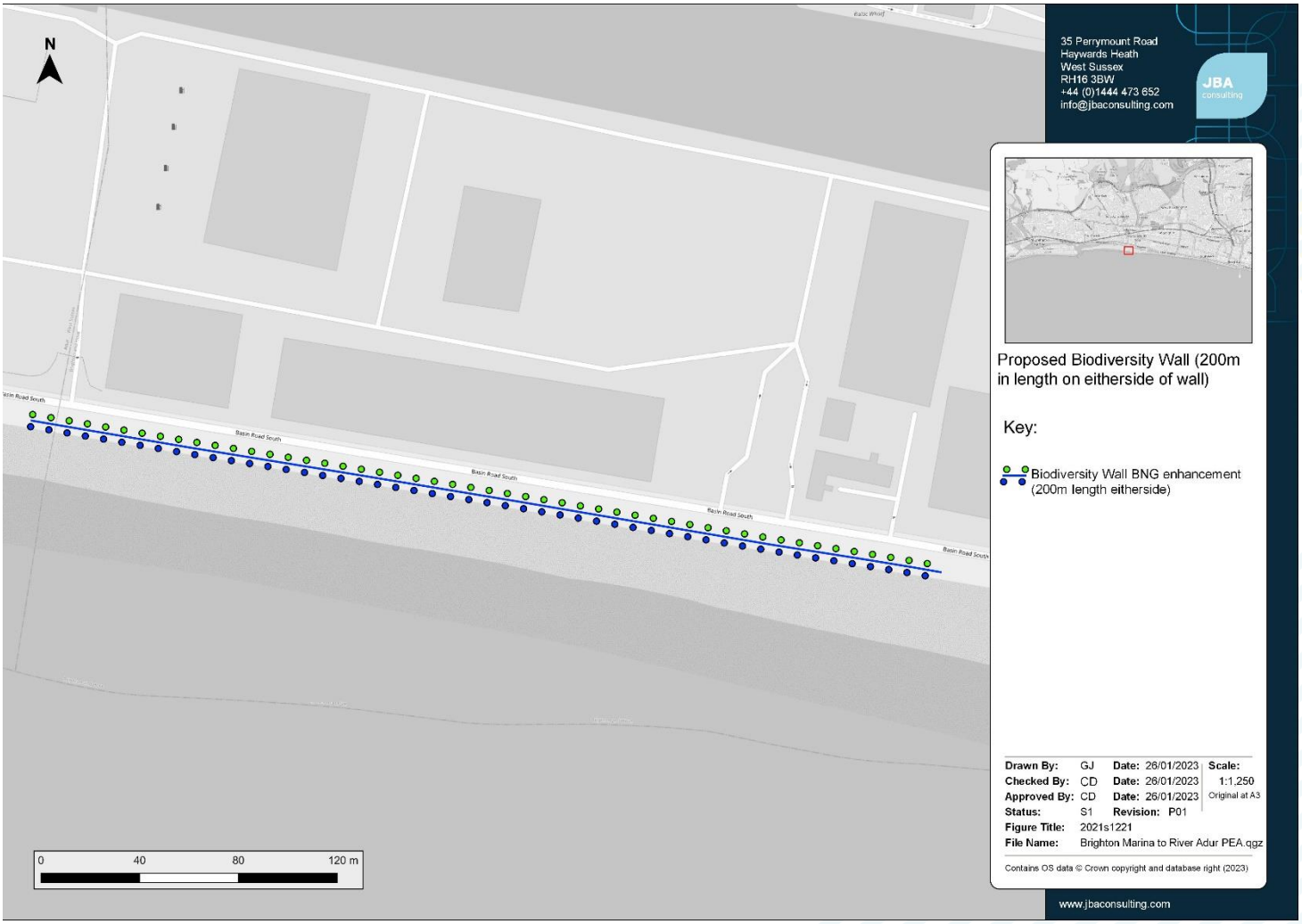


Figure 7-1: Location of Biodiversity Wall Area 2

8 Maintenance and Monitoring

To ensure that mitigation, compensation, enhancement and biodiversity net gain measures are effective, and to understand the ecological value for biodiversity ongoing monitoring of both on-site and off-site mitigation and compensation is required. All monitoring must be undertaken by suitably qualified and experienced ecologists. Should the monitoring visits show that the mitigation, compensation or enhancement measures are not effective, remedial action must be taken. Details of all monitoring to be undertaken will be included in the Ecological Design Strategy and Ecological Management Plan, with annual monitoring reports produced documenting progress and outcomes.

8.1 Habitats

The creation (0.09 ha) and enhancement (0.22ha) of compensatory of coastal vegetated shingle will be managed and monitored for 30 years post construction in accordance with the Biodiversity Metric 3.1 – Technical Supplement (Panks et al., 2022). Annual surveys of the coastal vegetated shingle and will be undertaken for the first five years post construction, to ensure that the habitat becomes established. After the first five years, surveys will be carried out every five years thereafter.

The monitoring of the coastal vegetated shingle should assess:

- Vegetation composition
- Vegetation structure
- Sequence of colonisation and succession
- Habitat Condition
- Coastal processes
- Percentage cover of INNS
- Percentage cover of scrub

All post monitoring data will be complied into a report and made available to the local records centre.

8.2 Research and Post Monitoring: Biodiversity Wall

Working in collaboration with ecological scientific researchers from the University of Brighton, the project team will develop a research project which will collect biological data from the Biodiversity Wall to enable an assessment of the walls value for biodiversity. The following data will be collected to enable statistical analysis:

- Plants – species composition, percentage cover and overall habitat condition/structure
- Invertebrates – species, distribution and preferred habitat type or feature
- Birds – species, usage (nesting)
- Intertidal and marine – species, percentage cover, preferred habitat features

Baseline data will be collected in year 0 (pre-intervention/control) and for five consecutive years post intervention (post construction) and data will be analysed to determine how species diversity, composition and distribution occurs overtime, and identify potential correlations between species and preferred habitat features, associated with both the landward and seaward sides of the Biodiversity Wall.

Results from the study will be shared with the local records centre and presented within a scientific publication to help inform future projects.

9 Conclusions and summary

The proposed scheme will result in no significant residual negative effects on habitats, priority or legally protected species, based upon the proposed mitigation, compensation, habitat creation and enhancements. These will be detailed in an Ecological Design Strategy and Ecological Management Plan, to ensure that biodiversity within the site is protected during construction and the long-term operation of the scheme. Through monitoring of the mitigation measures taken to prevent significant negative impacts to species and habitats present, it will be ensured that the long-term biodiversity interest of the site will be delivered and maintained.

It has not been possible to deliver a quantifiable Net Gain for Biodiversity, using the current version of the Biodiversity Metric, due to lack of suitable habitats within the local area which provide option for habitat creation or ecological enhancements of existing poor condition habitats.

A Net Gain for Biodiversity for the project will be delivered through the creation of a Biodiversity Wall incorporating habitats for both plants, terrestrial invertebrates, birds, intertidal and marine species. The Biodiversity Wall provides an opportunity to trial experimental habitat features, particularly on the seaward side and presents an opportunity to collect data for scientific research purposes which will help inform future projects.

Appendices

Appendix 1: Legislation, planning Policy and Biodiversity Policy

1. Legislation

Conservation of Habitats and Species Regulations 2017

The Conservation of Habitats and Species Regulations 2017 (as amended) (HMSO, 2017), commonly referred to as the Habitat Regulations, are how the European Commission (EC) Habitats Directive (92/43/EC) is transposed in England and Wales and updates and consolidates previous legislation.

The Habitat Regulations provide protection for European Protected Species (EPS) (animals and plants listed in Annexe IV Habitats Directive which are resident in the wild in Great Britain) and focus on maintaining favourable conservation status for the species listed. This includes all bat species and Great Crested Newts. Public bodies (including the Local Planning Authority (LPA)) have a duty to have regard to the requirements of the Habitats Directive in carrying out their duties, i.e. when determining a planning application.

European protected species are afforded a high level of protection under the Habitat Regulations. In addition, the Wildlife and Countryside Act 1981 (as amended) (HMSO, 1981) affords additional protection in relation to disturbance (see Section 2.1.3).

Under Regulation 41 of the Habitat Regulations 2017 it is an offence to:

- Deliberately capture, injure or kill any wild animal of a European protected species
- Deliberately disturb animals of any such species. Disturbance of animals includes any disturbance which is likely
- To impair their ability-
- to survive, breed or reproduce, or to rear or nurture their young.
- In the case of animals of a hibernating or migratory species, to hibernate or migrate.
- To affect significantly the local distribution or abundance of the species to which they belong
- Deliberately take or destroy the eggs of any such animal; and
- Damage or destroy a breeding site or resting place of such an animal (including sites that are currently unoccupied).

A number of plant species are protected under Schedule 4 of this legislation meaning it is an offence to pick, cut, uproot, collect, destroy, possess or trade in the plants listed. Such plants include Fen Orchid *Liparis loeselii* and Marsh Saxifrage *Saxifraga hirculus*. There are no European protected plant species associated with the site.

The designation and protection of European Sites including Special Protection Areas (SPAs) and Special Areas of Conservation (SACs) falls within these Regulations.

The Wildlife and Countryside Act 1981 (as amended)

The Wildlife and Countryside Act (WCA) 1981 (as amended) is the primary legislation for England and Wales for the protection of flora, fauna and the countryside. Part 1 of the Act deals with the protection of wildlife.

Most EPS are now covered under the Conservation of Habitats and Species Regulations (see above) but some activities are still covered by the WCA such as obstructing access to a bat roost.

All British birds, their nests and eggs are protected in law. It is an offence to deliberately take, kill or injure any wild bird or to take, damage, or destroy any nest or egg of any wild bird under Section 1 of the Act. In addition, certain species such as the Barn Owl *Tyto alba* are included in Schedule 1 of the Act and are protected against disturbance while nesting and when they have dependent young. Offences against birds listed on Schedule 1 are subject to special penalties.

All species of reptile and amphibian are protected by the WCA. Under Schedule 5, reptiles such as Adder *Vipera berus*, Common Lizard *Lacerta vivipara*, Slow Worm *Anguis fragilis* and Grass Snake *Natrix helvetica* are protected against intentional killing, injuring or selling, and Smooth Newt *Lissotriton vulgaris*, Palmate Newt *Lissotriton helveticus*, Common Frog *Rana temporaria* and Common Toad *Bufo bufo* are protected only against sale. Species such as the Smooth Snake *Coronella austriaca*, Sand Lizard *Lacerta agilis* and Great Crested Newt are afforded additional protection by European legislation as described above.

Schedule 8 of the WCA 1981 (as amended) lists protected plant species, for example Bluebell Hyacinthoides non-scripta is protected against sale.

Certain Invasive Non-native Species (INNS) of plants are listed under Schedule 9 of the WCA 1981 (as amended). This makes it an offence to plant them, or otherwise cause them to grow, in the wild. The WCA 1981 (Variation of Schedule 9) (England and Wales) Order 2010 added a number of plant species to the list including Himalayan Balsam *Impatiens glandulifera*, Montbretia *Crocosmia x crocosmiiflora*, Rhododendron *Rhododendron ponticum* and Three-cornered Leek *Allium triquetrum*.

Several invasive non-native animal species are also listed under Schedule 9 of the WCA 1981 (as amended). This makes it illegal to release them or allow them to escape into the wild. Species on this list include Signal Crayfish *Pacifastacus leniusculus*, American Mink *Mustela vison* and Muntjac *Muntiacus reevesi*.

The WCA also provides the mechanism for the designation and protection of SSSIs.

Natural Environment and Rural Communities Act 2006

The Natural Environment and Rural Communities (NERC) Act requires all public authorities, including planning authorities to have regard to the purpose of conserving biodiversity whilst carrying out their normal functions. The NERC Act includes lists of Habitats and Species of Principal Importance (HPIs and SPIs) to the conservation of biodiversity (Section 41) which should be considered in the implementation of duties under the NERC Act. In line with government circular 06/2005 (ODPM, 2005) which provides supplementary guidance, the presence of a Priority species may be a material consideration when a planning authority is considering a development proposal.

The HPI and SPI listed under the NERC Act are largely also UK Biodiversity Action Plan (BAP) Priority habitats and species. The UK Post-2010 Biodiversity Framework succeeds the UK BAP partnership; though its list of Priority species and habitats agreed under the UK BAP still form the basis of much biodiversity work in the UK. The current strategy for England is 'Biodiversity 2020: A Strategy for England's wildlife and ecosystem services'. Although the UK BAP has been superseded, Species Action Plans (SAPs) developed under the UK BAP still remain important and valuable reference sources for background information on Priority species under the UK Post-2010 Biodiversity Framework.

Environment Act 2021

The Environment Act 2021 sets clear statutory targets for the recovery of the natural world in four priority areas: air quality, biodiversity, water and waste, and includes an important new target to reverse the decline in species abundance by the end of 2030.

2. Planning Policy

National Planning Policy Framework (NPPF)

The National Planning Policy Framework (NPPF) sets out the Government's planning policies for England and how these are expected to be applied, with a presumption in favour of sustainable development, a core element of the framework. Twelve core planning principles are identified within the framework, with principle 7 relevant to biodiversity stating it will:

'Contribute to conserving and enhancing the natural environment and reducing pollution. Allocations of land for development should prefer land of lesser environmental value, where consistent with other policies in this Framework'.

The Framework recognises that, when determining planning applications, local planning authorities have an obligation to promote the conservation and enhancement of biodiversity by:

- Ensuring that adverse impacts are avoided, adequately mitigated or compensated for;
- Refusing developments that may adversely impact on Sites of Special Scientific Interest (SSSIs) or their interest features unless the benefits of the development clearly outweigh the impacts;
- Permitting developments where the primary objective is to conserve or enhance biodiversity;
- Encouraging proposals to incorporate biodiversity in and around developments; and
- Refusing planning permission for developments that would result in the damage or deterioration of irreplaceable habitats (e.g. ancient woodland, veteran trees).

***Brighton and Hove Local Plan 2022* (Brighton and Hove City Council, 2022)**

Brighton and Hove City Plan Part Two was adopted in October 2022, its role is to support City Plan Part 1 which was adopted in March 2016. The City Plan Part Two was adopted 20 October 2022.

The three objectives of the City Plan Part 2 are to support the implementation and delivery of City Plan Part 1 to:

- Build on the strategic policy framework set out in the adopted City Plan Part One
- Identify and allocate additional development sites
- Set out a detailed policy framework to assist in the determination of planning applications

The City Plan has 46 Design Management Policies (DM), of these the most relevant to the scheme in terms of ecology is DM37 Green Infrastructure and Nature Conservation. DM37 is described in detail below.

DM37: Green Infrastructure and Nature Conservation

DM37 is split into two categories Green Infrastructure and Nature Conservation. Green Infrastructure objectives include:

- Development proposals will be required to demonstrate that they safeguard and/or contribute positively to the existing multifunctional network of Green Infrastructure that covers all forms of green and open spaces; the interrelationship between these spaces and; ensure that the natural capital of the area is retained, enhanced and complements UNESCO Biosphere objectives.
- Where practicable, green infrastructure should be integral to the design and layout of the scheme ensuring it is planned and managed to realise current and potential value to communities and to support the widest delivery of linked environmental, social and economic benefits.

Nature Conservation objectives include:

Development should avoid adverse impacts and seek to conserve and enhance biodiversity and geodiversity features ensuring:

- Accordance with the mitigation hierarchy requirements of the NPPF65
- An additional measurable net gain in biodiversity is achieved
- That recognised protected and notable species and habitats are protected and supported
- Ancient woodland and irreplaceable habitats are protected
- That appropriate and long-term management of new or existing habitats is secured and opportunities to connect habitats are secured to ensure a network of nature recovery
- Where relevant, the control and eradication of any invasive non-native species present on site.

Developers will be expected to work with existing partnerships to support and enhance the following green infrastructure and nature conservation features:

- The Nature Improvement Area
- Protected and notable species and habitats
- Ancient woodland
- Aged/veteran trees

- Protected trees
- The City's National Elm Collection
- Marine and coastal biodiversity
- Geodiversity

Proposals liable to affect green infrastructure and nature conservation features either directly or indirectly must be supported by an appropriate and detailed site investigation/ assessment and accord with provisions set out in the mitigation hierarchy. Measures to avoid or prevent harmful effects will be required.

Designated Sites

Where proposals are liable to impact to designated sites, they must provide:

- evidence to demonstrate that the objectives of the designation and integrity of the area will not be undermined
- funded management plans that secure the long-term protection and enhancement of remaining features; and
- up-to-date information about the biodiversity/geodiversity which may be affected.

Proposals must also satisfy the following criteria:

Internationally protected sites

All development must comply with the Conservation of Habitats and Species Regulations (as amended). Development likely to have significant effects on an international site (either individually or in combination with other plans or projects) and which would affect the integrity of the site will not be permitted unless the council is satisfied that:

- There is no alternative solution (which can be adequately demonstrated by the developer); and
- There are imperative reasons of overriding public health or public safety for the development; and
- Adequate compensatory provision is secured.

Nationally protected sites

Development proposals should avoid impacts on nationally protected sites. Development proposals likely to have an adverse effect on the site's notified special interest features will not be permitted, the only exception is if:

- The benefits of the development, at this site, clearly outweigh both the likely impact to notified features on the site and any broader impacts on the network of nationally protected sites
- The impacts can be mitigated in accordance with the mitigation hierarchy

Locally protected sites

Development proposals that will result in an adverse effect on any local site will not be permitted, unless:

- The site is allocated for development in the City Plan or there are exceptional circumstances that justify the development of the site and can be demonstrated to outweigh the adverse effects on the local designation; and
- The impacts can be mitigated through on or off-site habitat creation; and
- On site or off site as part of a local strategic ecological network additional measurable net gains in biodiversity/geodiversity can be achieved.

***Adur Local Plan 2017-2032* (Adur District Council, 2017)**

The Adur Local consists of four elements:

- The Adur Local Plan
- A Strategy for Change and Prosperity
- Policies for Places
- Development Management Policies

Of these four elements some of the applicable policies are described in detail below.

Policy 8: Shoreham Harbour Regeneration

The Shoreham Harbour Regeneration Area is identified as a broad location for change. Adur District Council are working in partnership with Brighton & Hove City Council, West Sussex County Council and Shoreham Port Authority to support the regeneration of the area. The regeneration partnership will prepare a Joint Area Action Plan (JAAP) for the regeneration area. The plan will jointly be adopted by Adur, Brighton & Hove and West Sussex County Councils. The JAAP includes a spatial strategy, area-wide policies, and specific proposals for individual character areas within the regeneration area. New development at the harbour will be expected to meet high standards of environmental efficiency and a Sustainability Statement will be required as supporting information to accompany all development proposals in the parts of the Shoreham Harbour Regeneration Area within Adur. The Sustainability Statement should be set out in accordance with the Sustainability Statements Guidance Note for Shoreham Harbour Regeneration Area. Development will be expected to incorporate low and zero carbon decentralised energy generation, in particular heat networks, and required to either connect, where a suitable system is in place (or would be at the time of construction) or design systems so they are compatible with future connection to a network. All development will be required to protect and enhance the area's important environmental assets and wildlife habitats and in particular minimise impact on the Adur Estuary SSSI. As part of new development, north-south links will be improved to enhance access to greenspace in the rest of Adur including the South Downs National Park. All new development proposals must take into account contaminated land, local noise and air quality impacts and improvements should be sought wherever possible. Until the Joint Area Action Plan (JAAP) is adopted, the Port Masterplan, Interim Planning Guidance, Development Briefs and this policy will be material considerations in determining applications within the harbour. Area vision and detailed proposals are defined for the seven Character Areas within the regeneration area through the JAAP process. Of these seven areas, five are applicable to the scheme and are described in detail below:

Area 1: South Quayside Area Priorities:

- To support Shoreham Port Authority in improving operational efficiencies, developing new trade and exploring opportunities for sustainable energy generation, in line with the adopted Port Masterplan.
- To accommodate the relocation of existing port operators from elsewhere within the Port.
- To identify and where appropriate accommodate the future capacity requirements for the Waste Water Treatment Plant.
- To improve Basin Road South as a popular recreational route for walking and cycling, providing access to the beaches.
- With the exception of the existing Power Station, renewable energy generation (such as solar or wind) and the Waste Water Treatment Plant, non-port operations will not be permitted in this area.

Character Area 4: Southwick and Portslade Beaches Area Priorities:

- To seek improvements to the quality, access, appearance and maintenance of the Public Right of Way corridor, beach promenade, public areas and beach environment.

Character Area 5: Southwick Waterfront and Fishersgate Area Priorities:

- To designate Southwick Waterfront as a strategic employment area.
- To support the comprehensive redevelopment of Southwick Waterfront to accommodate a mix of new and improved employment uses (classes B1, B2 and B8).
- To safeguard and develop port operational areas to accommodate new and relocated port uses with limited land reclamation and a new access road (within the port boundary) in line with the Port Masterplan.
- To support the comprehensive reconfiguration of Lady Bee Marina.
- To address deprivation through partnership working with Action Eastbrook Partnership and local service providers.
- To improve sustainable transport links with surrounding communities.
- To support improvements to local community facilities, including enhancing Fishersgate recreation ground.
- To enhance biodiversity by creating and improving habitats and improved green infrastructure links, including landscape enhancements to social housing estates.

Character Area 6: Harbour Mouth Area Priorities:

- To support the conservation of Shoreham Fort.
- To enhance connections between Shoreham town centre, Shoreham Beach and Shoreham Fort through environmental and landscaping improvements.
- To support the redevelopment of Shoreham Rowing Club and enhance the public realm environment of Kingston Beach.

Character Area 7: Western Harbour Arm Area Priorities:

- To designate the Western Harbour Arm (Waterfront) as a strategic mixed-use area.
- To facilitate the comprehensive redevelopment of the Western Harbour Arm (Waterfront) to become an exemplar sustainable, mixed-use area (classes B1 and C3).

It should be noted that two of the Character Areas (1 – South Quayside (Port Operational) and 4 -Southwick and Portslade Beaches) straddle the boundary with Brighton & Hove and are therefore included in both Local Plans. Character Areas 2-Aldrington Basin and 3-North Quayside / South Portslade are entirely within Brighton & Hove and therefore addressed in the Brighton & Hove City Plan.

Policy 14: Local Green Gaps

Policy 14 aims to protect Local Green Gaps between the settlements of Lancing/Sompting – Worthing, and Lancing-Shoreham-by-Sea, the aim is to retain the separate identities and avoid coalescence of these settlements. Within these areas any development permitted must be consistent with other policies of the Adur Local Plan and must not (individually or cumulatively) lead to the coalescence of settlements.

Policy 18: Sustainable Design

Policy 18 sets out three requirements, these are described below:

- Residential: All new dwellings must achieve a water efficiency standard of no more than 110 litres/person/day (lpd).

- Non-residential: Non-domestic floorspace must achieve a minimum standard of BREEAM 'Very Good' with a specific focus on water efficiency.
- Developers will be expected to provide certification evidence of the levels for BREEAM at the design stage and on completion of development.

As well as these relevant policies the Adur Local Plan sets out several visions and objectives to achieve by 2032, visions or objectives relevant to the scheme are described below:

Vision 9:

- Flood risk will have been minimised and/or mitigated through investment in flood defences, flood risk management initiatives and careful consideration of the location of new development.

Objective 7:

- To protect and improve the setting of the South Downs National Park, the character and setting of the River Adur, the coastal waterfront, countryside and the Local Green Gaps, conservation areas and other cultural and historic assets and where appropriate, access to them. Areas of nature conservation value will be preserved and enhanced. New development will avoid impacts on biodiversity and the natural environment as far as possible and mitigate and/or compensate where necessary.

Objective 11:

- To ensure that the risks associated with flooding are avoided and mitigated through directing development to appropriate locations and, where this is not possible, through appropriate flood mitigation measures. Where feasible, new flood defences and other measures to reduce flood risk, should take the form of ecologically sustainable solutions. Water quality will be protected and where possible, enhanced.

Objective 12:

- To ensure that a range of sustainable construction and design measures will be utilised in new developments. New development will be more resilient to the effects of climate change.

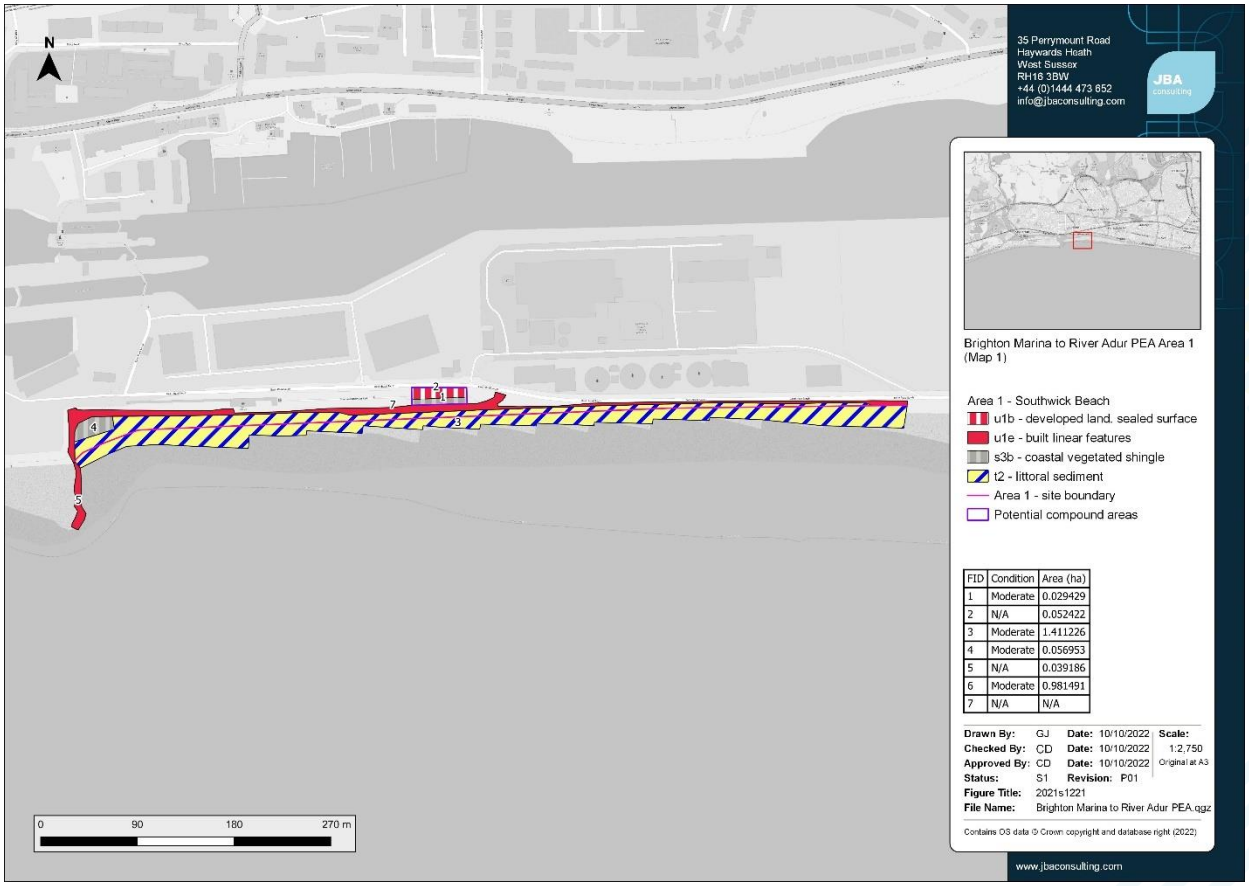
3. Biodiversity Policies

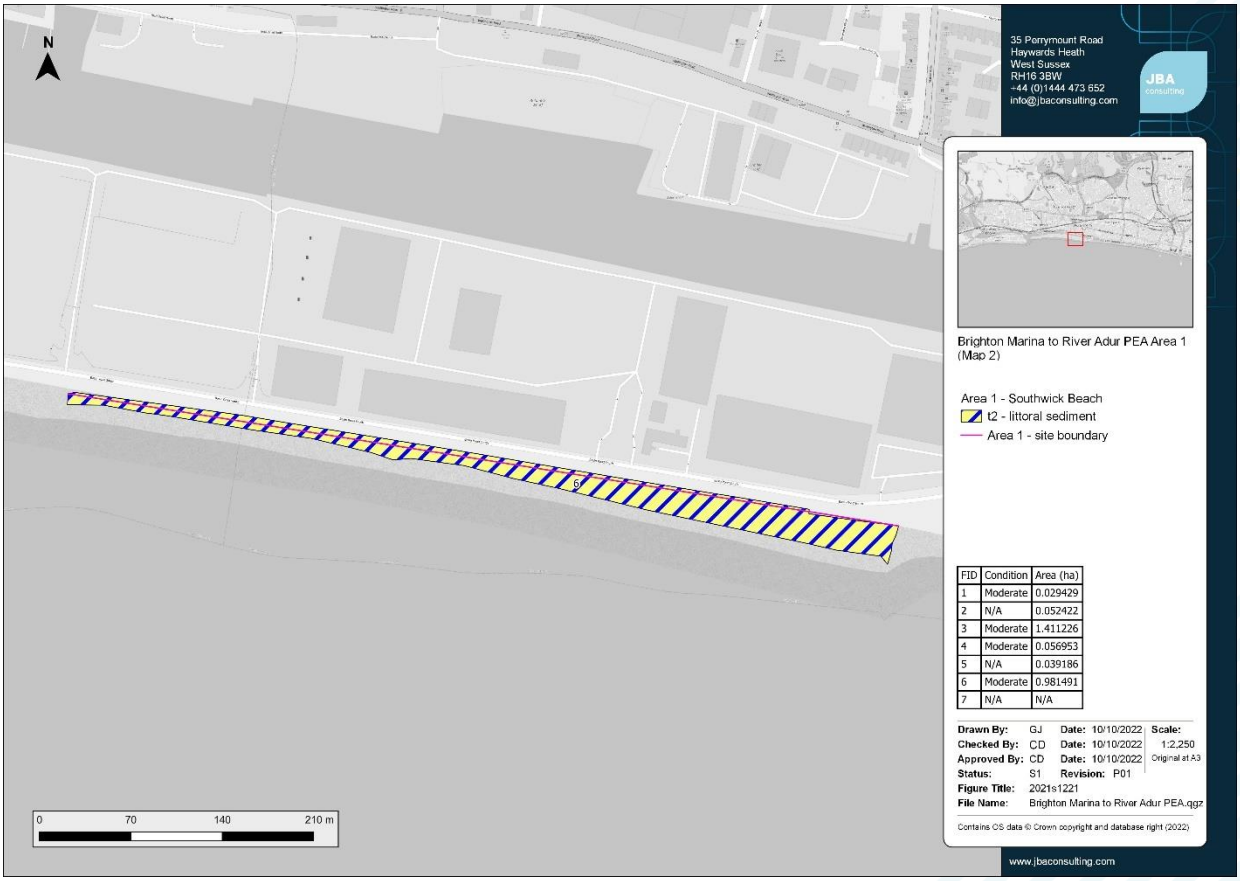
Brighton and Hove LBAP (Brighton and Hove City Council, 2012)

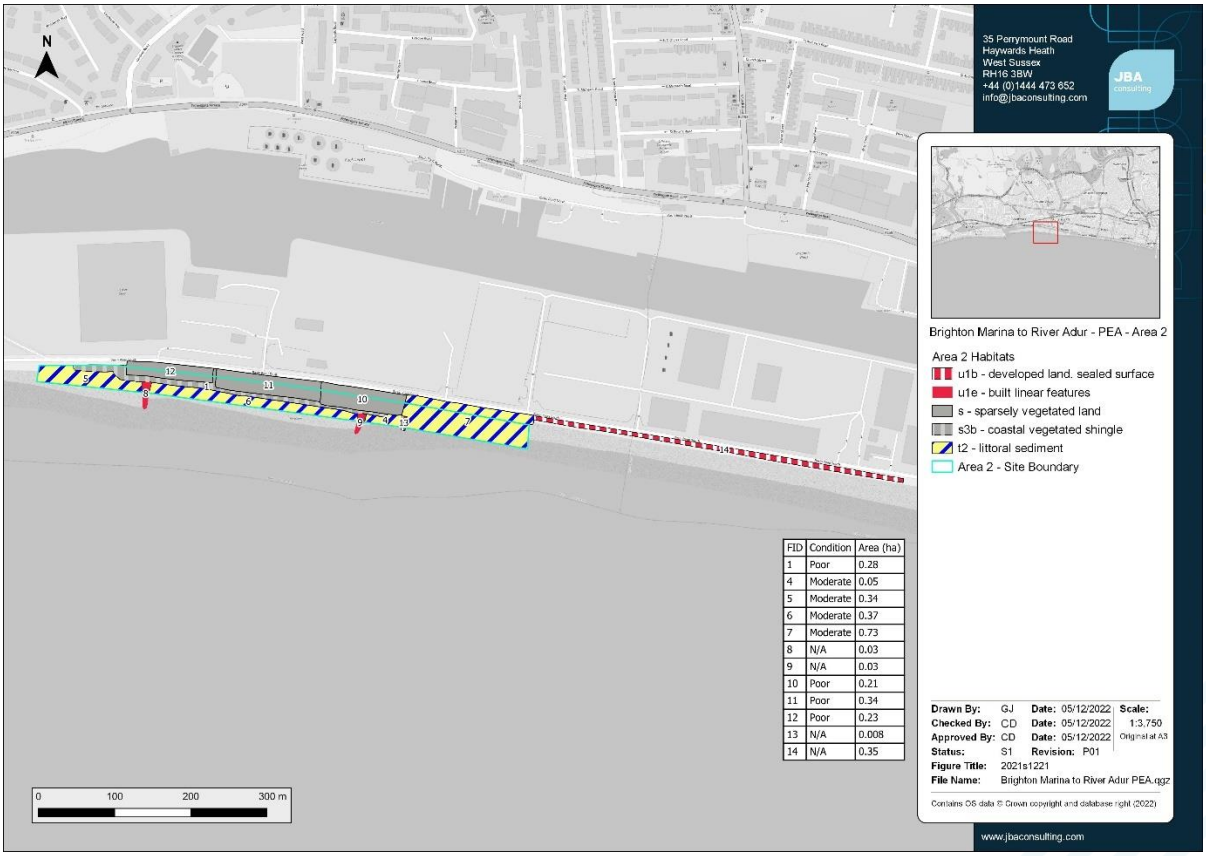
The Habitats of Principal Importance (HPI) and Species of Principal Importance (SPI) listed under the UK BAP of the NERC Act have also been subdivided into county importance levels. Brighton & Hove LBAPs overall aim (or 'vision') for biodiversity in Brighton and Hove is that by 2020, 'biodiversity will be integrated into decision-making by the Brighton and Hove Strategic Partnership and its member organisations. Local communities will be fully involved in developing and progressing biodiversity conservation and there will be a common understanding of the value of biodiversity and the action needed to maintain and enhance it. The habitats and species of importance in Brighton and Hove will be successfully conserved. Brighton and Hove will be richer in biodiversity, with healthy ecosystems delivering essential benefits for people.' Five principles have been defined to ensure the vision for biodiversity is achieved and the action taken to conserve it is successful. These are:

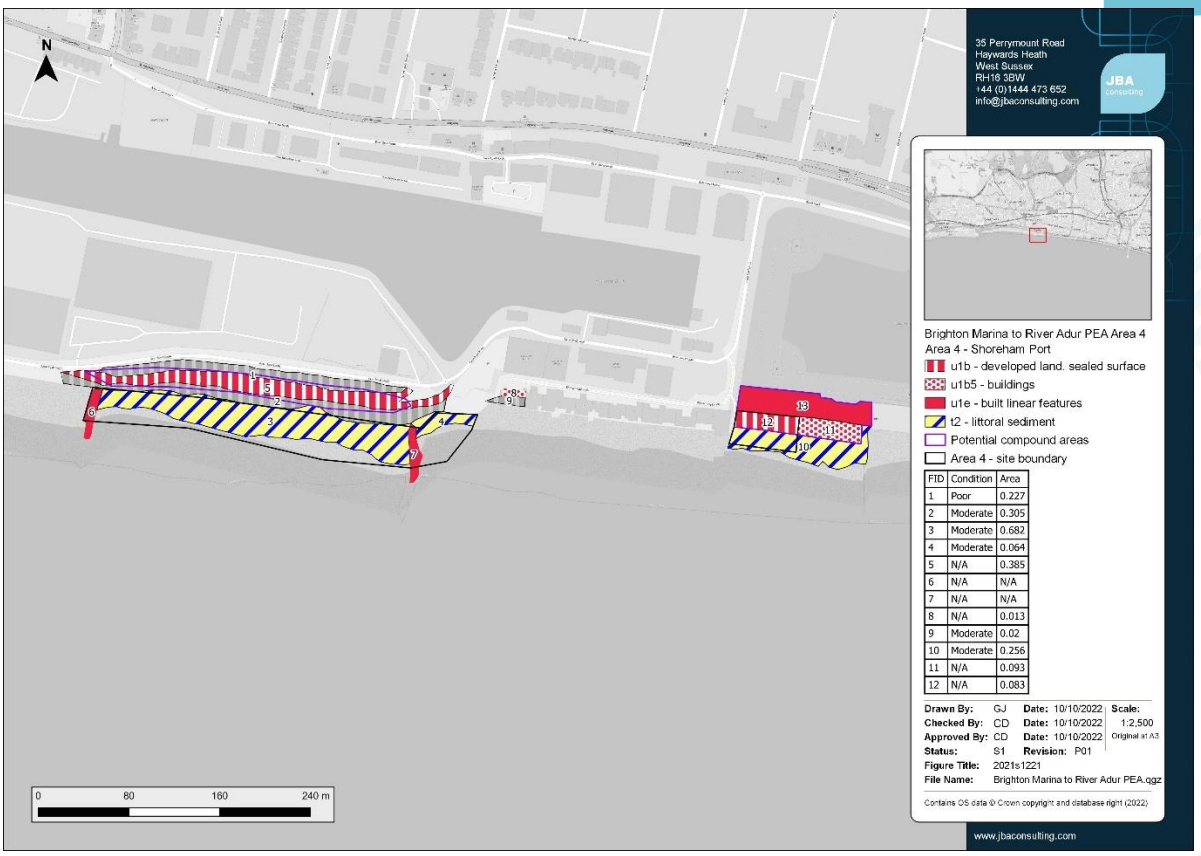
- Principle 1: Mainstream biodiversity in society
- Principle 2: Integrate the conservation of biodiversity across other land uses
- Principle 3: Conserve Important habitats and species on a landscape scale
- Principle 4: Share the benefits of biodiversity and ecosystem services
- Principle 5: Establish a strong evidence base

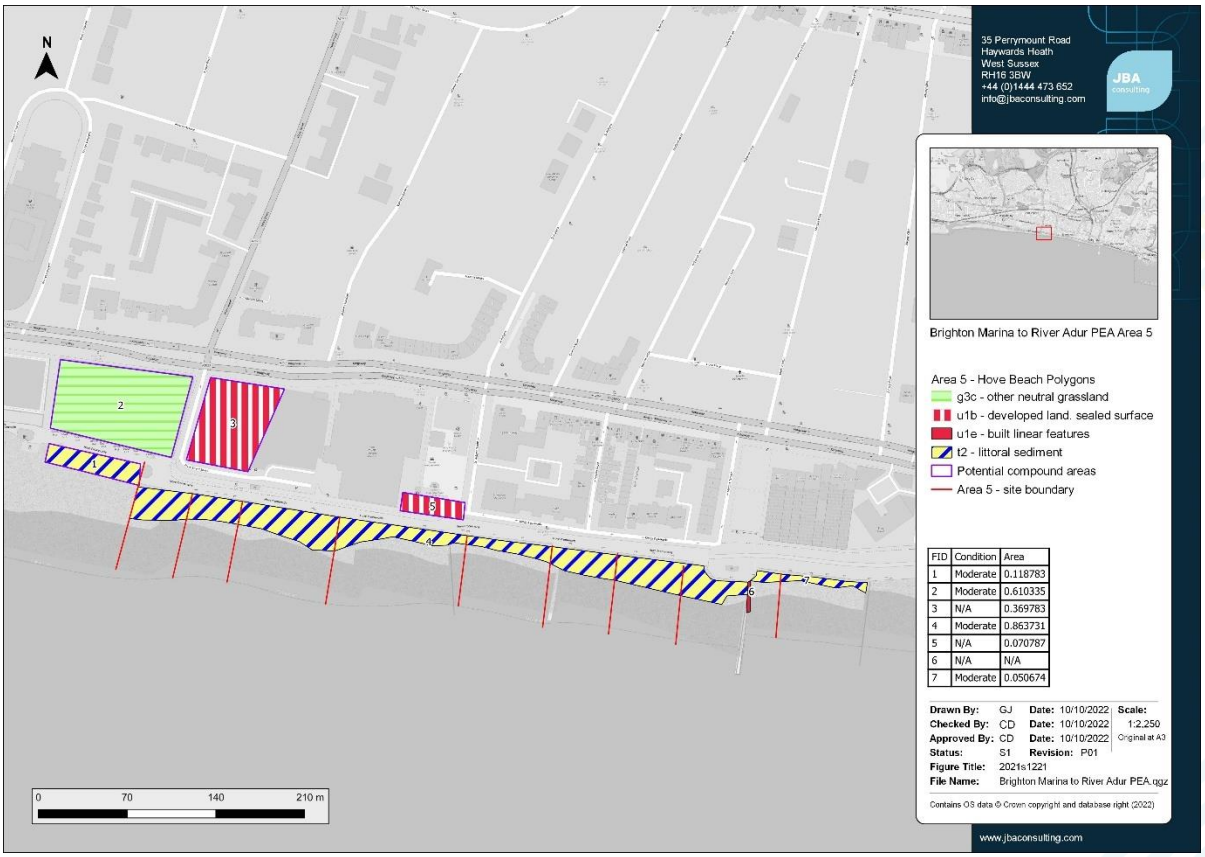
Appendix 2: UKHab Maps

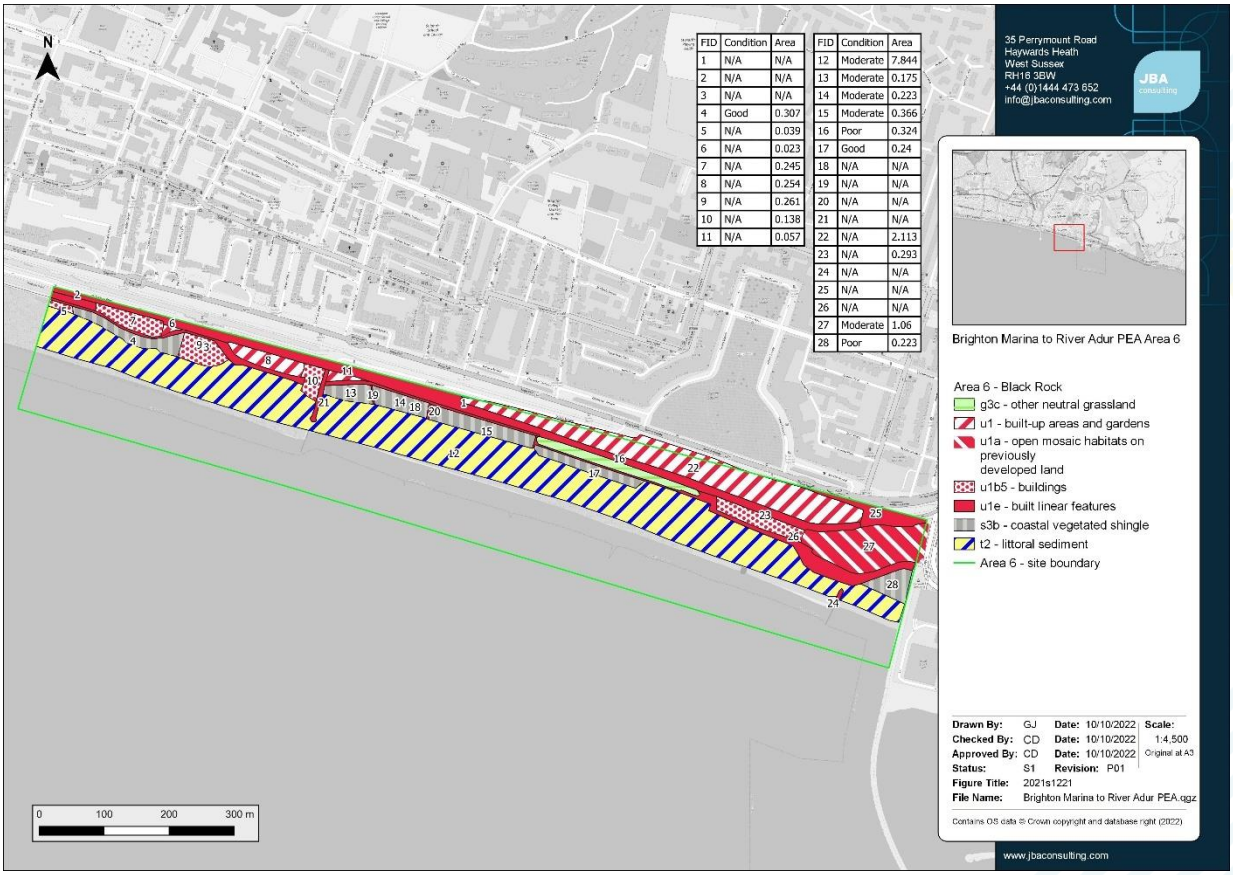


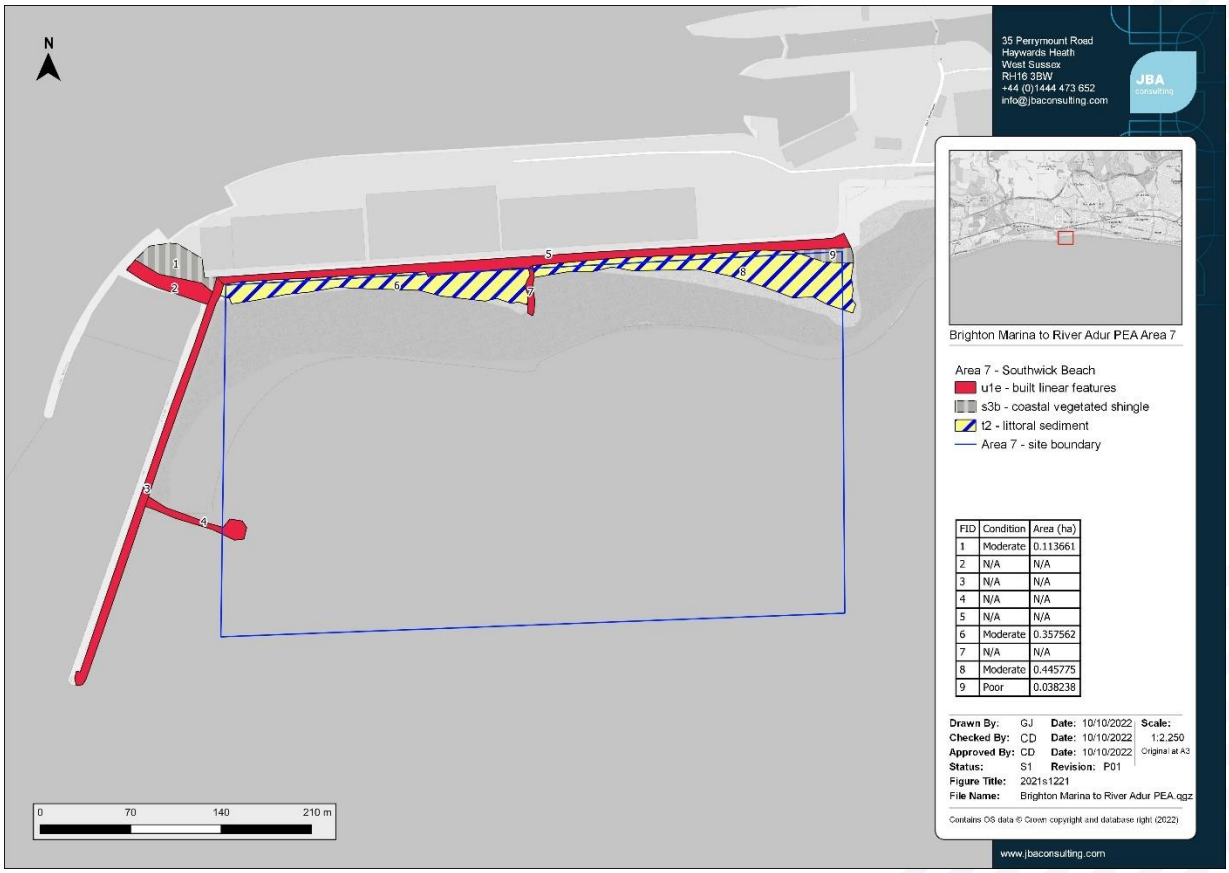

N
35 Perrymount Road
Haywards Heath
West Sussex
RH16 3BW
+44 (0)1444 473 652
info@jbaconsulting.com
Brighton Marina to River Adur PEA Area 1 (Map 2)
Area 1 - Southwick Beach
t2 - littoral sediment
Area 1 - site boundary
FID | Condition | Area (ha)
1 | Moderate | 0.029429
2 | N/A | 0.052422
3 | Moderate | 1.411226
4 | Moderate | 0.056953
5 | N/A | 0.039186
6 | Moderate | 0.981491
7 | N/A | N/A
Drawn By: GJ Date: 10/10/2022
Checked By: CD Date: 10/10/2022
Approved By: CD Date: 10/10/2022
Status: S1 Revision: P01
Figure Title: 2021s1221
File Name: Brighton Marina to River Adur PEA.qgz
Scale: 1:2,250 Original at A3
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0 70 140 210 m


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Brighton Marina to River Adur - PEA - Area 2
Area 2 Habitats
u1b - developed land. sealed surface
u1e - built linear features
s - sparsely vegetated land
s3b - coastal vegetated shingle
t2 - littoral sediment
Area 2 - Site Boundary
FID | Condition | Area (ha)
1 | Poor | 0.28
4 | Moderate | 0.05
5 | Moderate | 0.34
6 | Moderate | 0.37
7 | Moderate | 0.73
8 | N/A | 0.03
9 | N/A | 0.03
10 | Poor | 0.21
11 | Poor | 0.34
12 | Poor | 0.23
13 | N/A | 0.008
14 | N/A | 0.35
0 100 200 300 m
Drawn By: GJ Date: 05/12/2022 Scale: 1:3,750
Checked By: CD Date: 05/12/2022
Approved By: CD Date: 05/12/2022 Original at A3
Status: S1 Revision: P01
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Brighton Marina to River Adur PEA Area 4
Area 4 - Shoreham Port
u1b - developed land, sealed surface
u1b5 - buildings
u1e - built linear features
t2 - littoral sediment
Potential compound areas
Area 4 - site boundary
FID | Condition | Area
1 | Poor | 0.227
2 | Moderate | 0.305
3 | Moderate | 0.682
4 | Moderate | 0.064
5 | N/A | 0.385
6 | N/A | N/A
7 | N/A | N/A
8 | N/A | 0.013
9 | Moderate | 0.02
10 | Moderate | 0.256
11 | N/A | 0.093
12 | N/A | 0.083
Drawn By: GJ Date: 10/10/2022
Checked By: CD Date: 10/10/2022
Approved By: CD Date: 10/10/2022
Status: S1 Revision: P01
Figure Title: 2021s1221
File Name: Brighton Marina to River Adur PEA.qgz
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0 80 160 240 m
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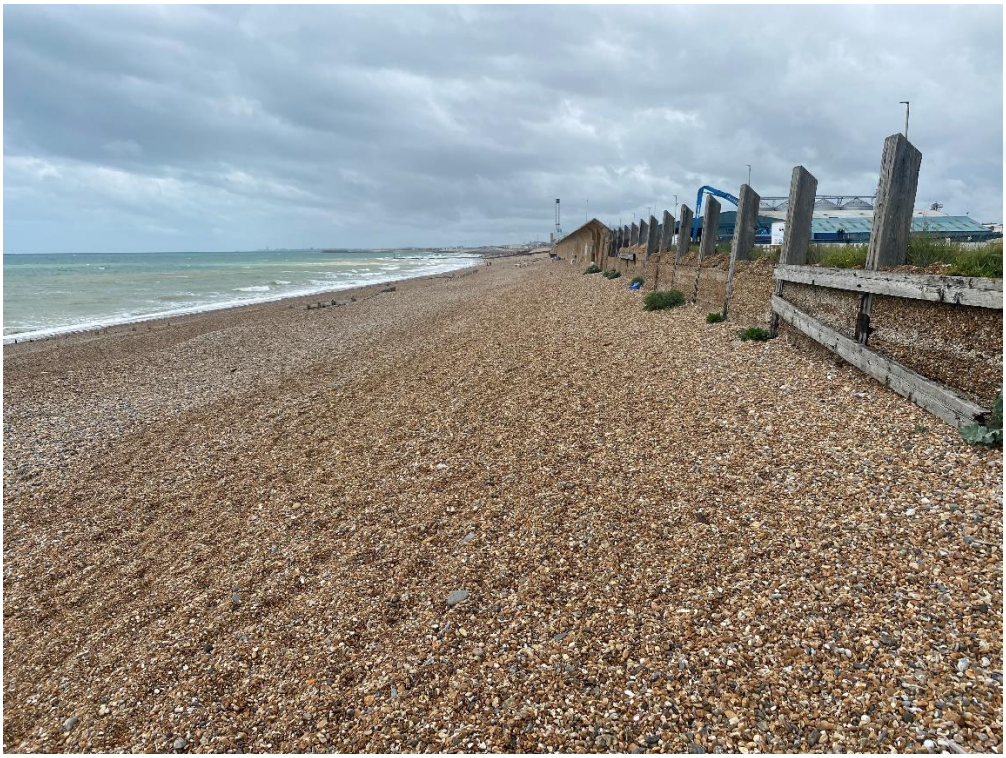

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Brighton Marina to River Adur PEA Area 5
Area 5 - Hove Beach Polygons
g3c - other neutral grassland
u1b - developed land, sealed surface
u1e - built linear features
t2 - littoral sediment
Potential compound areas
Area 5 - site boundary
FID | Condition | Area
1 | Moderate | 0.118783
2 | Moderate | 0.610335
3 | N/A | 0.369783
4 | Moderate | 0.863731
5 | N/A | 0.070787
6 | N/A | N/A
7 | Moderate | 0.050674
Drawn By: GJ Date: 10/10/2022 Scale: 1:2,250
Checked By: CD Date: 10/10/2022
Approved By: CD Date: 10/10/2022 Original at A3
Status: S1 Revision: P01
Figure Title: 2021s1221
File Name: Brighton Marina to River Adur PEA.qgz
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N
FID Condition Area
1 N/A N/A
2 N/A N/A
3 N/A N/A
4 Good 0.307
5 N/A 0.039
6 N/A 0.023
7 N/A 0.245
8 N/A 0.254
9 N/A 0.261
10 N/A 0.138
11 N/A 0.057
FID Condition Area
12 Moderate 7.844
13 Moderate 0.175
14 Moderate 0.223
15 Moderate 0.366
16 Poor 0.324
17 Good 0.24
18 N/A N/A
19 N/A N/A
20 N/A N/A
21 N/A N/A
22 N/A 2.113
23 N/A 0.293
24 N/A N/A
25 N/A N/A
26 N/A N/A
27 Moderate 1.06
28 Poor 0.223
35 Perrymount Road
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West Sussex
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info@jbaconsulting.com
Brighton Marina to River Adur PEA Area 6
Area 6 - Black Rock
g3c - other neutral grassland
u1 - built-up areas and gardens
u1a - open mosaic habitats on previously developed land
u1b5 - buildings
u1e - built linear features
s3b - coastal vegetated shingle
t2 - littoral sediment
Area 6 - site boundary
Drawn By: GJ Date: 10/10/2022 Scale: 1:4,500
Checked By: CD Date: 10/10/2022
Approved By: CD Date: 10/10/2022 Original at A3
Status: S1 Revision: P01
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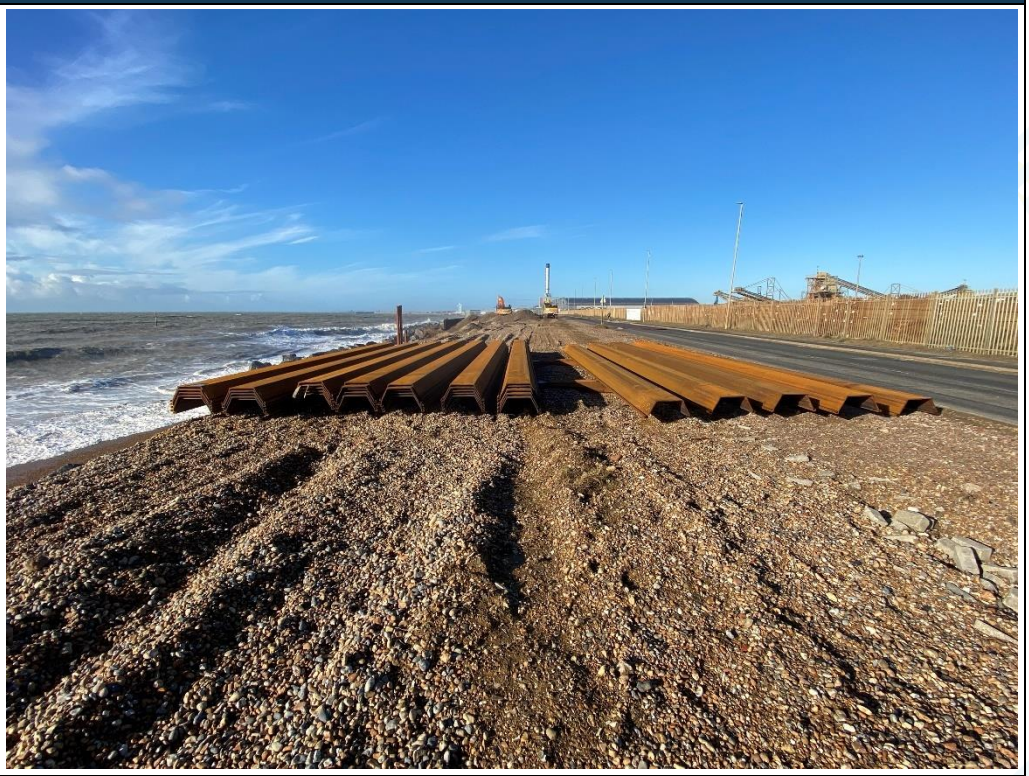
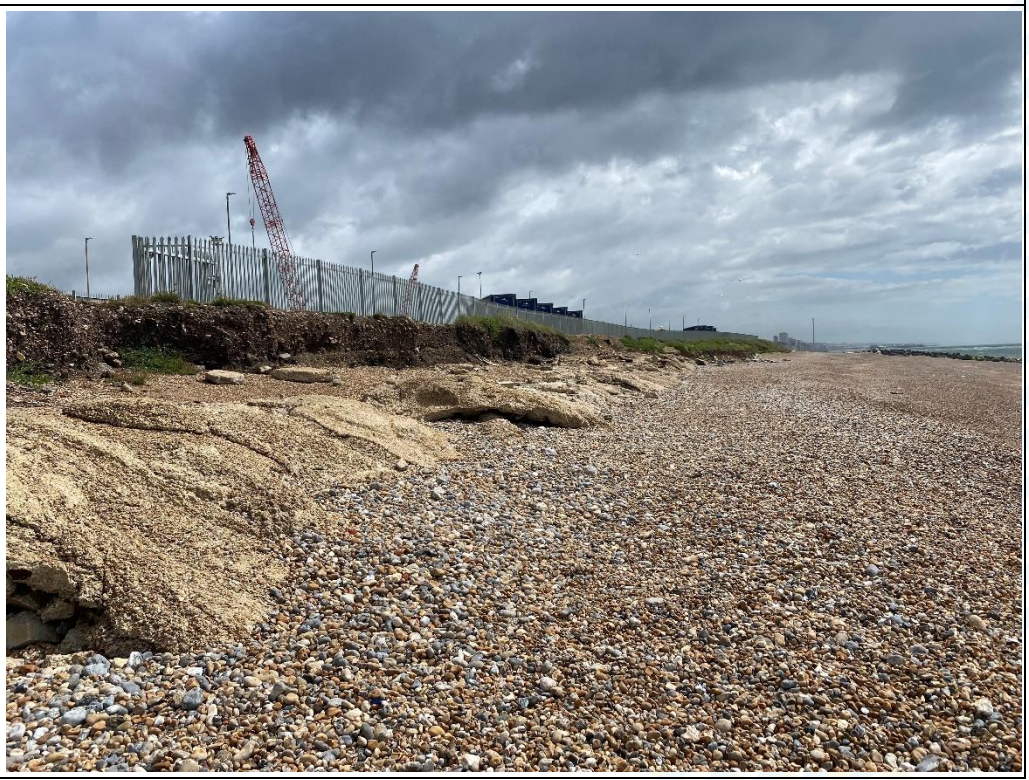

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JBA consulting
Brighton Marina to River Adur PEA Area 7
Area 7 - Southwick Beach
u1e - built linear features
s3b - coastal vegetated shingle
t2 - littoral sediment
Area 7 - site boundary
FID | Condition | Area (ha)
1 | Moderate | 0.113661
2 | N/A | N/A
3 | N/A | N/A
4 | N/A | N/A
5 | N/A | N/A
6 | Moderate | 0.357562
7 | N/A | N/A
8 | Moderate | 0.445775
9 | Poor | 0.038238
Drawn By: GJ Date: 10/10/2022 Scale: 1:2,250
Checked By: CD Date: 10/10/2022
Approved By: CD Date: 10/10/2022 Original at A3
Status: S1 Revision: P01
Figure Title: 2021s1221
File Name: Brighton Marina to River Adur PEA.qgz
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Appendix 3: UKHab Survey Photographs

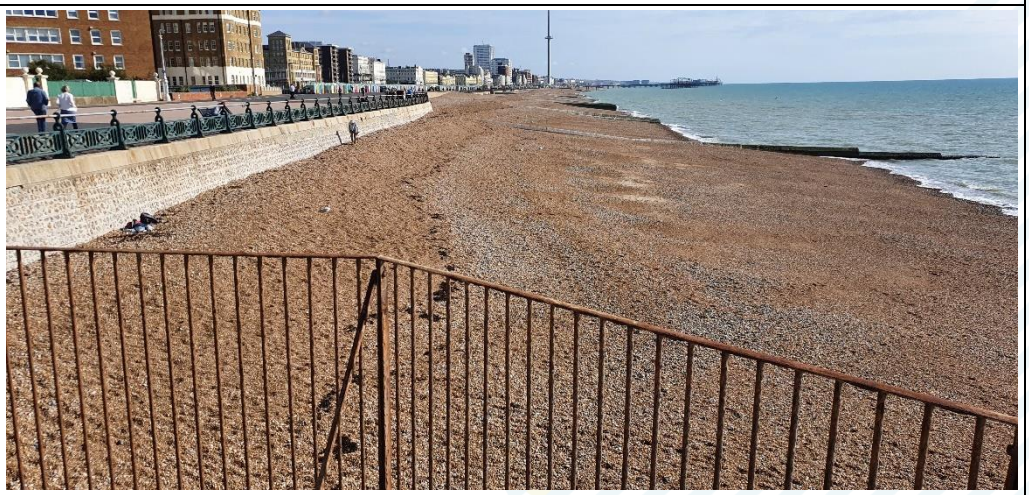
UKHab code, description & Area	Photo
s3b – Coastal Vegetated Shingle on edge of Carat's Café Car Park (Area 1, FID1)	

UKHab code, description & Area	Photo
t2h – Shingle Beach at eastern end of Southwick Beach (Area 1, FID6)	
s3b – Coastal Vegetated Shingle on crest of Southwick Beach (Area 1, FID4).	

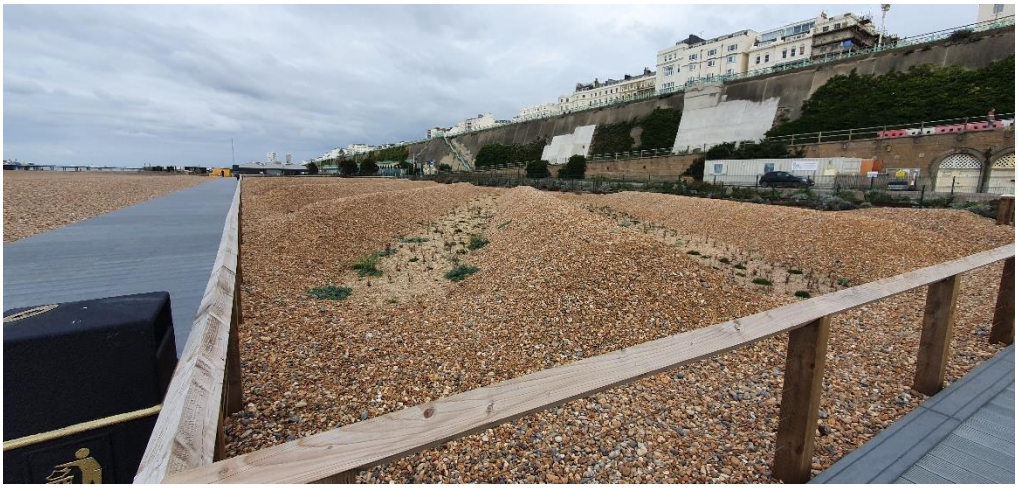
UKHab code, description & Area	Photo
s3b – Coastal Vegetated Shingle on western edge of Area 2 adjacent to Basin Road South (Area 2, FID1).	
s3b – Coastal Vegetated Shingle in poor condition between sheet piled wall on coastal frontage and compound areas used by Shoreham Port (Area 2, FID 1).	

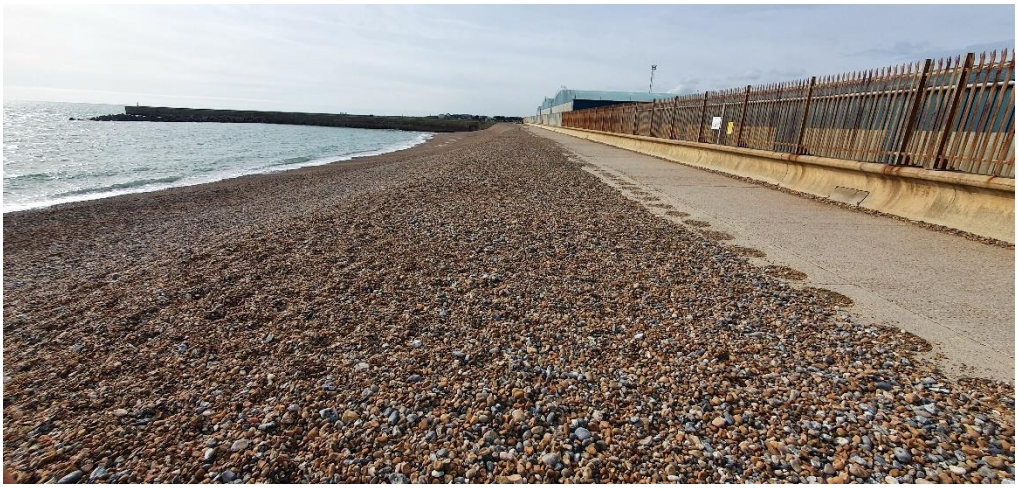
UKHab code, description & Area	Photo
t2h – Shingle Beach at Southwick Beach with ongoing maintenance works undertaken by Shoreham Beach. Location of new proposed access ramp. Photo taken in November 2022 (Area 2, FID7).	
s3b – Coastal Vegetated Shingle within Basin Road South LWS (Area 4, FID2).	

UKHab code, description & Area	Photo
s3b – Coastal Vegetated Shingle within Basin Road South LWS (Area 4, FID2).	
s3b – Coastal Vegetated Shingle within Basin Road South LWS (Area 4, FID2).	

UKHab code, description & Area	Photo
s3b – Coastal Vegetated Shingle within Basin Road South LWS on roadside (Area 4, FID1).	
t2h – Shingle Beach at Hove Beach (Area 5, FID7).	

UKHab code, description & Area	Photo
t2h – Shingle Beach at Hove Beach (Area 5, FID4).	
s3b – remains of Coastal Vegetated Shingle at Black Rock (Area 6, FID28).	
u1a – Open Mosaic Habitats on Previously Developed Land at Black Rock (Area 6, FID27).	

UKHab code, description & Area	Photo
s3b – Coastal Vegetated Shingle, compensatory habitat areas at Black Rock (Area 6, FID15).	
s3b – Coastal Vegetated Shingle, compensatory habitat area in front of Volks Railway (Area 6, FID4).	
s3b – Sparse Coastal Vegetated Shingle at crest of Southwick Beach next to wind turbines (Area 7, FID9).	

UKHab code, description & Area	Photo
t2h – Shingle Beach at Southwick Beach (Area 7, FID6).	
t2h – Shingle Beach at Southwick Beach (Area 7, FID6).	

Appendix 4: Sussex notable birds species recorded on Southwick Beach in Areas 2 & 4.

Species	Species Status	Date of latest record	Comments
Scaup	WCA Sch1, NERC S41, UK BAP Priority, Red BoCC.	1999	2 birds present in November, will be offshore. This species in Sussex is a very scarce winter visitor and passage migrant; rare non-breeder in summer (Sussex Bird Report, 2021).
Common Scoter	WCA Sch1, NERC S41, UK BAP Priority, Red BoCC.	2020	2 birds present off Southwick Power Station in 2020. This species in Sussex is a common spring passage migrant and fairly common winter visitor; scarce in summer and autumn (Sussex Bird Report, 2021).
Slavonian Grebe	Birds Dir A1, WCA Sch1, Red BoCC.	2014	All records restricted to Southwick Canal & offshore. This species in Sussex is a scarce winter visitor and passage migrant (Sussex Bird Report, 2021).
Oystercatcher	Amber BoCC, Notable Bird.	2007	Unknown number of individuals present in December 2007. This species in Sussex is a scarce breeder; fairly common passage migrant and common winter visitor (Sussex Bird Report, 2021).
Ringed Plover	Red BoCC, Notable Bird	2016	Positive breeding on Southwick Canal & Beach but not since 2016. Suitability of habitat has reduced due to loss of shingle habitat in previous favoured area in Area 2. This species in Sussex is a scarce breeder; fairly common passage migrant and winter

			visitor (Sussex Bird Report, 2021).
Black-headed Gull	Amber BoCC, Notable Bird	Unknown	This species in Sussex is a common breeding species and very common to abundant passage migrant and winter visitor (Sussex Bird Report, 2021).
Common Gull	Amber BoCC, Notable Bird	2020	Peak count of 1600 birds in 2009 - however such numbers of individuals have not been emulated since. This species in Sussex is very common, sometimes abundant winter visitor and very common passage migrant; scarce in summer; bred until 1963 and then in 2006 and in some years since then (Sussex Bird Report, 2021).
Herring Gull	NERC S41, UK BAP Priority, Red BoCC, Notable Bird	Unknown	This species in Sussex is a very common resident; status uncertain as passage migrant and winter visitor (Sussex Bird Report, 2021).
Black Tern	Birds Dir A1, WCA Sch1	1995	One in August 1995. This species in Sussex is a scarce passage migrant (Sussex Bird Report, 2021).
Red-throated Diver	Birds Dir A1, WCA Sch1	2017	All records of this species restricted to Southwick Canal and offshore. This species in Sussex is a fairly common winter visitor and passage migrant (Sussex Bird Report, 2021).
Black-throated Diver	Birds Dir A1, WCA Sch1, UK BAP Priority, Amber BoCC	1997	Three records of this species during winter, will be found offshore. This species in Sussex is a scarce winter visitor and passage

			migrant (Sussex Bird Report, 2021).
Great Northern Diver	Birds Dir A1, WCA Sch1, Amber BoCC	2015	All records of this species restricted to Southwick Canal and offshore. This species in Sussex is a scarce winter visitor and passage migrant (Sussex Bird Report, 2021).
Balearic Shearwater	NERC S41, UK BAP Priority, RedList Global Post2001 CR, Red BoCC	2001	Two, August records of this species. This species in Sussex is a very scarce spring to autumn visitor (Sussex Bird Report, 2021).
Kestrel	Amber BoCC, Notable Bird	2000	Two birds present on Southwick Beach in June. This species in Sussex is a fairly common or common resident and passage migrant (Sussex Bird Report, 2021).
Hobby	WCA Sch1, Notable Bird	2001	Two records of this species at Southwick Beach. This species in Sussex is a scarce breeding summer visitor and passage migrant (Sussex Bird Report, 2021).
Black Redstart	WCA Sch1, Amber BoCC, Notable Bird	2014	Recorded from Southwick Beach, Canal & Power Station although breeding has never been proved in any of these locations. This species in Sussex is a rare resident; scarce passage migrant and very scarce winter visitor (Sussex Bird Report, 2021).
Wheatear	Amber BoCC, Notable Bird	2008	Seven records of this species at Southwick Beach all within passage period. This species in Sussex is a very scarce breeding

			summer visitor and common passage migrant; very rare in mid-winter (Sussex Bird Report, 2021).

Appendix 5: Notable terrestrial invertebrate species recorded on Shoreham Beach in 2018 (Lyons, 2018)

Species	Species Status	Food/Plant	Comments
Toadflax Brocade Moth	Red List GB Pre94 R, Sussex Rare	Toadflax spp.	N/A
Mullein Wave	NERC S41, UK BAP Priority	Yarrow, Plantain spp., Mugwort, Knotgrass spp. and other herbaceous plants.	Mainly coastal
White-footed Furrow Bee	Red List GB Pre94 R	Dandelions, Hawk-bits and daisies	N/A
Myrmica specioides (An Ant, Bee, Sawfly or Wasp)	Red List GB Pre94 R, Sussex Rare	Insufficient data	Ant typically found by the coast
Bee Wolf	Red List GB Pre94 VU, Sussex Rare	Common Honey Bee (only prey)	N/A
Cathormiocerus spinosus (A Beetle)	Notable A	Insufficient Data	N/A
Lixus scabricollis (A Beetle)	Insu, Sussex Rare	Sea Beet	N/A
Medon fusculus (A Beetle)	Red List GB Pre94 Inde, Sussex Rare	Associated with leaf litter, artifical habitats and mould straw	Adult male
Mogulones geographicus (A Beetle)	Notable B, Sussex Rare	Viper's Bugloss (only)	N/A
Olibrus corticalis (A Beetle)	Sussex Rare	Insufficient data	N/A
Orthochaetes insignis (A Beetle)	Notable B, Sussex Rare	Roots of various plants but particularly *Asteraceae* (daisies)	N/A
Orthochaetes setiger (A Beetle)	Notable B, Sussex Rare	Bugles, Hawkweed, Lettuces, Plantains, Thistles and Dandelions	N/A
Barley Flea Beetle	Sussex Rare	Insufficient data	N/A
Pselactus spadix (A Beetle)	Notable B, Sussex Rare	Insufficient data	Found within stems of dead Tree Mallow. Strictly coastal and found in or just above intertidal zone
Psilothrix viridicoerulea (A Beetle)	Sussex Rare	Yellow composite flowers	N/A

Sitona waterhousei (A Beetle)	Notable B, Sussex Rare	Bird's-foot Trefoil	Mainly coastal but not strictly
Stenocarus ruficornis (A Beetle)	Notable B, Sussex Rare	Poppies	N/A
Syntomus truncatellus (A Beetle)	Nat Scarce, Sussex Rare	Insufficient data	Favours a wide variety of habitats
Tychius schneideri (A Beetle)	Notable B, Sussex Rare	Kidney Vetch (sole food plant)	N/A
Long-winged Cone-head	Sussex Rare	Grasses	N/A
Garden Tiger (moth)	NERC S41, UK BAP Priority	Common Nettle, Broad-leaved Dock, Water Dock, Burdock spp., Hound's-tongue and many garden plants	N/A
Six-belted Clearwing	Sussex Rare	Bird's-foot Trefoil or Kidney Vetch	N/A
Mallow Groundling	Notable, Sussex Rare	Seeds and flowers of Mallow spp.	N/A
Long-legged Tabby	Notable B, Sussex Rare	Mosses	N/A
Calositticus inexpectus (A Spider)	Nat Scarce, Sussex Rare	Insufficient data	N/A
Drassyllus lutetianus (A Spider)	Nat Scarce	Insufficient data	Probably new for Sussex (Lyons, 2018).
Chlamydatus (Eurymerocoris) evanescens (A True Bug)	Red List GB Pre94 R	Stonecrop spp.	N/A
Lygus pratensis (A True Bug)	RedList GB Pre94 R, Sussex Rare	Insufficient data	By late summer one of the commonest plant bugs in many parts of the southeast
Megalonotus sabulicola (A True Bug)	Notable B, Sussex Rare	Insufficient data	Exceptionally common on shingle (Lyons, 2018)
Rhombic Leatherbug	Sussex Rare	Insufficient data	Mainly coastal
Tuponia (Tuponia) mixticolor (A True Bug)	Sussex Rare	Insufficient data	N/A

Appendix 6: Notable terrestrial invertebrate species recorded from adjacent areas to the scheme extents

Species	Species Status	Food/Plant	Location (year) & Comments
Harlequin Ladybird	Sussex INNS	N/A	Black Rock, 2019. Within red line boundary of Area 6.
Chrysolina oricalcia (A Beetle)	Sussex Rare	Insufficient data	Black Rock, 2011. Within red line boundary of Area 6.
Longitarsus pellucidus (A Beetle)	Sussex Rare	Insufficient data	Southwick Canal, 2014. Recorded on northern side of canal opposite Area 2.
Microlestes minutulus (A Beetle)	Sussex Rare	Insufficient data	Black Rock, 2001. Within red line boundary of Area 6.
Olibrus flavicornis (A Beetle)	Insu, Sussex Rare	Insufficient data	Shoreham Beach, 2012. West of Area 7, Southwick Beach.
Ophonus ardosiacus (A Beetle)	Sussex Rare	Insufficient data	Black Rock, 2011. Within red line boundary of Area 6.
Ophonus parallelus (A Beetle)	Red List GB post2001 VU, Nat Rare, Sussex Rare	Insufficient data	Brighton Marina, 2008. Adjacent to Area 6.
Mallow Flea Beetle	Nat Scarce, Sussex Rare	Mallows	Black Rock, 2005. Within red line boundary of Area 6.
Psilothrix viridicoerulea (A Beetle)	Sussex Rare	Yellow composite flowers	Black Rock, 2010. Within red line boundary of Area 6, recorded on open mosaic habitat.
Small Blue	WCA Sch5, NERC S41	Kidney Vetch (sole food plant)	Shoreham Fort, 2007. West of Area 7, Southwick Beach.
Red-veined Darter	Sussex Rare	N/A	Southwick Canal, 2013, Shoreham Beach, 2006 & Brighton Marina 1999.
Common Darter	RedList GB Post2001 DD	N/A	Black Rock, 2019. Within red line boundary of Area 6, recorded on open mosaic habitat. Also recorded on Black Rock cliffs in 2006.

Grey-bush Cricket	Nat Scarce, Sussex Rare	Omnivorous	Southwick Canal, 2014. Recorded on northern side of canal opposite Area 2.
Long-legged China-mark	Notable B, Sussex Rare	Insufficient data	Shoreham Fort, 2013. West of Area 7, Southwick Beach.
Five-spot Ermel	Red List GB Pre94 VU, Sussex Rare	Viper's Bugloss	Shoreham Fort, 2013. West of Area 7, Southwick Beach.
Viper's Bugloss (moth)	Red List GB Pre94 EN	Tree Mallow	Volks Railway, 2011. Within red line boundary of Area 6.
Lackey	NERC S41, UK BAP Priority	Broadleaved trees and shrubs	Shoreham Fort, 2007. West of Area 7, Southwick Beach.
L-album Wainscot	Sussex Rare	Various grasses	Shoreham Fort, 2007. West of Area 7, Southwick Beach.
Common Wainscot	Sussex Rare	Various grasses	Shoreham Fort, 2007. West of Area 7, Southwick Beach.
Grass Rivulet	UK BAP Priority, Sussex Rare	Ripening seeds of Yellow Rattle	Shoreham Fort, 2013. West of Area 7, Southwick Beach.
Beet Moth	Notable, Sussex Rare	Sea Beet	Shoreham Fort, 2007. West of Area 7, Southwick Beach.
Wasp Spider	Sussex Rare	N/A	Southwick Canal, 1996/97. Recorded on northern side of canal opposite Area 2.
Megalonotus sabulicola (A True Bug)	Notable B, Sussex Rare	Insufficient data	Volks Railway, 2014. Within red line boundary of Area 6. Exceptionally common on shingle (Lyons, 2018).
Tuponia (Tuponia) mixticolor (A True Bug)	Sussex Rare	Insufficient data	Hove Beach, Medina Terrace, 1998. Adjacent to works at Area 5.

Appendix 7: Biodiversity net gain metric calculations

Attached as a separate documents

Appendix 7: Biodiversity Net Gain (baseline units for habitats found within scheme extents)

FID Number	Habitat	UKHab Code	Secondary Code	Condition Score	Area (ha)	Baseline Habitat Units
Area 1 (Southwick Beach)						
1	Coastal Vegetated Shingle (priority habitat)	s3b	N/A	Moderate	0.02	0.26
2	Developed land; sealed surface	u1b	N/A	N/A	0.05	0.00
3	Beach	t2h	N/A	Moderate	1.47	19.40
4	Coastal Vegetated Shingle (priority habitat)	s3b	N/A	Moderate	0.06	0.79
5	Built Linear Features	u1e	113 (sea wall)	N/A	0.03	0.00
6	Beach	t2h	N/A	Moderate	1.05	13.86
7	Built Linear Features	u1e	115 (track)	N/A	0.32	0.00
Area 2						
1	Coastal Vegetated Shingle (priority habitat)	s3b	N/A	Poor	0.29	1.91

4	Beach	t2h	N/A	Moderate	0.05	0.66
5	Beach	t2h	N/A	Moderate	0.28	3.70
6	Beach	t2h	N/A	Moderate	0.37	4.88
7	Beach	t2h	N/A	Moderate	0.73	9.64
8	Built Linear Features	u1e	113 (sea wall)	N/A	0.03	0.00
9	Built Linear Features	u1e	113 (sea wall)	N/A	0.02	0.00
10	Sparsely Vegetated Land	s	89 (car park)	Poor	0.32	0.64
11	Sparsely Vegetated Land	s	89 (car park)	Poor	0.35	0.70
12	Sparsely Vegetated Land	s	89 (car park)	Poor	0.22	0.44
13	Developed land; sealed surface	u1b	N/A	N/A	0.01	0.00
14	Developed land; sealed surface	u1b	89 (car park), 111 (lay-by on side of road)	N/A	0.29	0.00
Area 4						
1	Coastal Vegetated Shingle (priority habitat)	s3b	N/A	Poor	0.23	1.52

2	Coastal Vegetated Shingle (priority habitat)	s3b	N/A	Moderate	0.3	3.96
3	Beach	t2h	N/A	Moderate	0.68	8.98
4	Beach	t2h	N/A	Moderate	0.06	0.79
5	Developed land; sealed surface	u1b	89 (car park)	N/A	0.38	0.00
6	Built Linear Features	u1e	113 (sea wall)	N/A	0.03	0.00
7	Built Linear Features	u1e	113 (sea wall)	N/A	0.04	0.00
8	Buildings	u1b5	N/A	N/A	0.01	0.00
9	Coastal Vegetated Shingle (priority habitat)	s3b	N/A	Moderate	0.02	0.26
10	Beach	t2h	N/A	Moderate	0.26	3.43
11	Buildings	u1b5	N/A	N/A	0.09	0.00
12	Developed land; sealed surface	u1b	N/A	N/A	0.08	0.00
13	Built Linear Features	u1e	N/A	N/A	0.24	0.00
Area 5						
1	Beach	t2h	N/A	Moderate	0.12	1.52

2	Other neutral grassland	g3c	64 (mown)	Moderate	0.61	4.88
3	Developed land; sealed surface	u1b	89 (car park)	N/A	0.37	0.00
4	Beach	t2h	N/A	Moderate	0.86	11.35
5	Developed land; sealed surface	u1b	N/A	N/A	0.07	0.00
6	Built Linear Features	u1e	113 (sea wall)	N/A	0.005	0.00
7	Beach	t2h	N/A	Moderate	0.05	0.66
Area 6						
1	Built Linear Features	u1e	111 (road)	N/A	1.61	0.00
2	Built Linear Features	u1e	115 (track)	N/A	0.08	0.00
3	Built Linear Features	u1e	107 (railway)	N/A	0.23	0.00
4	Coastal Vegetated Shingle	s3b	35 (biodiversity offset)	Good	0.31	6.14
5	Buildings	u1b5	N/A	N/A	0.04	0.00
6	Built up areas & gardens	u1	N/A	N/A	0.02	0.04
7	Buildings	u1b5	N/A	N/A	0.24	0.00

8	Built up areas & gardens	u1	540 (golf course)	N/A	0.25	0.50
9	Buildings	u1b5	N/A	N/A	0.26	0.00
10	Buildings	u1b5	N/A	N/A	0.14	0.00
11	Built up areas & gardens	u1	N/A	N/A	0.06	0.12
12	Beach	t2h	N/A	Moderate	7.84	103.49
13	Coastal Vegetated Shingle (priority habitat)	s3b	35 (biodiversity offset)	Moderate	0.17	2.24
14	Coastal Vegetated Shingle (priority habitat)	s3b	35 (biodiversity offset)	Moderate	0.22	2.90
15	Coastal Vegetated Shingle (priority habitat)	s3b	35 (biodiversity offset)	Moderate	0.37	4.88
16	Other neutral grassland	g3c	N/A	Poor	0.32	1.28
17	Coastal Vegetated Shingle (priority habitat)	s3b	35 (biodiversity offset)	Good	0.24	4.75
18	Built Linear Features	u1e	115 (track)	N/A	0.13	0.00

19	Built Linear Features	u1e	N/A	N/A	0.007	0.00
20	Built Linear Features	u1e	N/A	N/A	0.01	0.00
21	Built Linear Features	u1e	N/A	N/A	0.05	0.00
22	Built up areas & gardens	u1	N/A	N/A	2.11	4.22
23	Buildings	u1b5	N/A	N/A	0.29	0.00
24	Built Linear Features	u1e	113 (sea wall)	N/A	0.01	0.00
25	Built Linear Features	u1e	115 (track)	N/A	0.28	0.00
26	Built Linear Features	u1e	115 (track)	N/A	0.56	0.00
27	Open Mosaic Habitats on Previously Developed Land (priority habitat)	u1a	N/A	Moderate	1.06	13.99
28	Coastal Vegetated Shingle (priority habitat)	s3b	N/A	Poor	0.22	1.45
Area 7						
1	Coastal Vegetated Shingle (priority habitat)	s3b	N/A	Moderate	0.11	1.45

2	Built Linear Features	u1e	113 (sea wall)	N/A	0.07	0.00
3	Built Linear Features	u1e	113 (sea wall)	N/A	0.2	0.00
4	Built Linear Features	u1e	113 (sea wall)	N/A	0.05	0.00
5	Built Linear Features	u1e	115 (track)	N/A	0.32	0.00
6	Beach	t2h	N/A	Moderate	0.36	4.75
7	Built Linear Features	u1e	113 (sea wall)	N/A	0.02	0.00
8	Beach	t2h	N/A	Moderate	0.44	5.81
9	Coastal Vegetated Shingle (priority habitat)	s3b	N/A	Poor	0.04	0.26
Total number of baseline units across all areas:						252.60

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