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Making Space for Sand
Site No 28 - Porthcothan
Ecological Assessment

CEC3683
30 July 2024

Document Control

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Rev A			
Rev B			

Disclosure

The information, opinion and advice which we have prepared and provided is true and has been prepared and provided in accordance with the CIEEM's Code of Professional Conduct and the British Standard for Biodiversity – Code of Practice for Planning and Development (2013). We confirm that the opinions expressed are our true and professional bona fide opinions.

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Summary

Site and methods	
Purpose of report	To identify the ecological constraints and opportunities associated with the management of the dune system at Porthcothan.
Site assessed	Porthcothan
Area (ha)	Vegetated area ~ 0.8ha
Location:	Grid reference: SW 85738 72016 What3words: crazy.prefix.crunching
Planning Authority involved	Cornwall Council
Survey methods	Extended Phase 1 Habitat Survey UK Habitat Classification Biodiversity Net Gain Condition Assessment
Surveyor's name	Rebecca Golder BSc (Hons) ACIEEM Emily Cooper BSc (Hons), PG Cert, MSc, ACSM
Date of assessment	UK Habitat Classification: June 2023 BNG Condition Assessment: January 2024
Weather on date of assessment	UK Habitat Classification - Sunny, ~20°C BNG Condition Assessment - Overcast ~8°C

Results	
Designated sites	Adjacent to Bristol Channel Approaches SAC Porthcothan CWS Padstow Bay and Surrounds MCZ Carnewas to Stepper Point Cornwall National Landscape Area
Important habitats present	Coastal Sand Dunes Reedbeds

Non-native invasive species present	Japanese rose, montbretia, Michaelmas daisy, red valerian, *Gaulteria sp.*
Protected species present	Nesting Birds
Potential for protected species	Reptiles, amphibians, birds and nesting birds, botany, small mammals, invertebrates
Enhancement recommendations	Removal of invasive species Removal and reduction of scrub Deterrence of dumping of green waste Reduction in nutrient loading Further engagement with the public and local community
Biodiversity Net Gain	Baseline habitat units 9.1



Map 1: UK Habitat Classification

1. Introduction

1.1. Background

1.1.1. The United Nations General Assembly (UNGA) declared 2021-2030 a 'Decade on Ecosystem Restoration'. The process of ecological restoration involves restoring the biodiversity and integrity of a native reference system (Gann *et al* 2019), to achieve successful restoration, the 'end point' should be defined within the planning stage of a project (Rieger *et al* 2014).

1.1.2. Making Space for Sand is a partnership project from Cornwall Council, with Cornwall Wildlife Trust (CWT), University of Plymouth (UoP) and South West Coastal Monitoring (SWCM). The project is funded by DEFRA as part of the Flood and Coastal Innovation Programmes, which are managed by the Environmental Agency (EA). The programmes will drive innovation in flood and coastal resilience and adaptation to a changing climate.

1.1.3. The purpose of Stage 1 of the project was to conduct an analysis of dune systems at 40 locations around Cornwall, and by using modelling techniques to predict the future of the dunes in relation to climate change and rising sea levels. A 'State of the Dunes' report will be developed which will include the modelling predictions, ecological, social and heritage findings and considerations.

Table 1: Timeline of events

Date	Assessments Undertaken
2016	Beach Dune Management Plan (CH2M)
MS4S Stage 1 - February 2022	Baseline Assessment and Ground truthing
MS4S – Stage 2 – June 2023	Phase 1 Classification, UK Habitat Classification, BNG Baseline

1.1.4. As part of the current stage of works, Stage 2, CEC are working collaboratively with Cornwall Wildlife Trust and the Environmental Records Centres for Cornwall and the Isles of Scilly (ERCCIS) to produce an ecological baseline report for 23 sites which will be used to inform restoration objectives and guide landowners and volunteer groups in these efforts. This will involve the ecological survey of the sites and assessment under Phase 1, UK Habitat Classification and Biodiversity Net Gain survey methodologies, along with the mapping of invasive species recorded on site.

1.1.5. In the recently published DEFRA list of irreplaceable habitats, sand dunes are listed, however an estimated 70% of dune systems have been lost globally during the last century due to anthropogenic pressures such as development and poor habitat management. Sand dunes are an important ecological feature, providing a unique and diverse habitat for flora and fauna, and protection against flooding, storm surges and wave attack (D'Alessandro *et al* 2020). Dunes are a multifunctional landscape and should be managed as such, allowing for interventions. Legally required stabilisation along the Dutch coast has led to a decline in pioneer species and biodiversity, coupled with increased nitrogen deposition and reduction in grazers such as rabbit. This led to a dominant climax community, and it is now recognised that this is creating a fossilised and partly acidified landscape.

1.1.6. The aim of the Making Space for Sand Project is to encourage the more sustainable use and development of the coastal fringe to allow for a more natural, ecosystem approach to coastal management where traditional coastal protection is not possible.

1.2. The Site

1.2.1. Site 3, Porthcothan (Figure 1) is a small cove, on the North coast of Cornwall. Porthcothan lies approximately 6.7km west of the town of Padstow. Cliffs are present to the north and south of the beach itself. There is a main car park to the east of the site and residential dwellings are present to the south and east. The site is bound to the east by the B3276. An unnamed stream discharges on the beach at its northeast point.

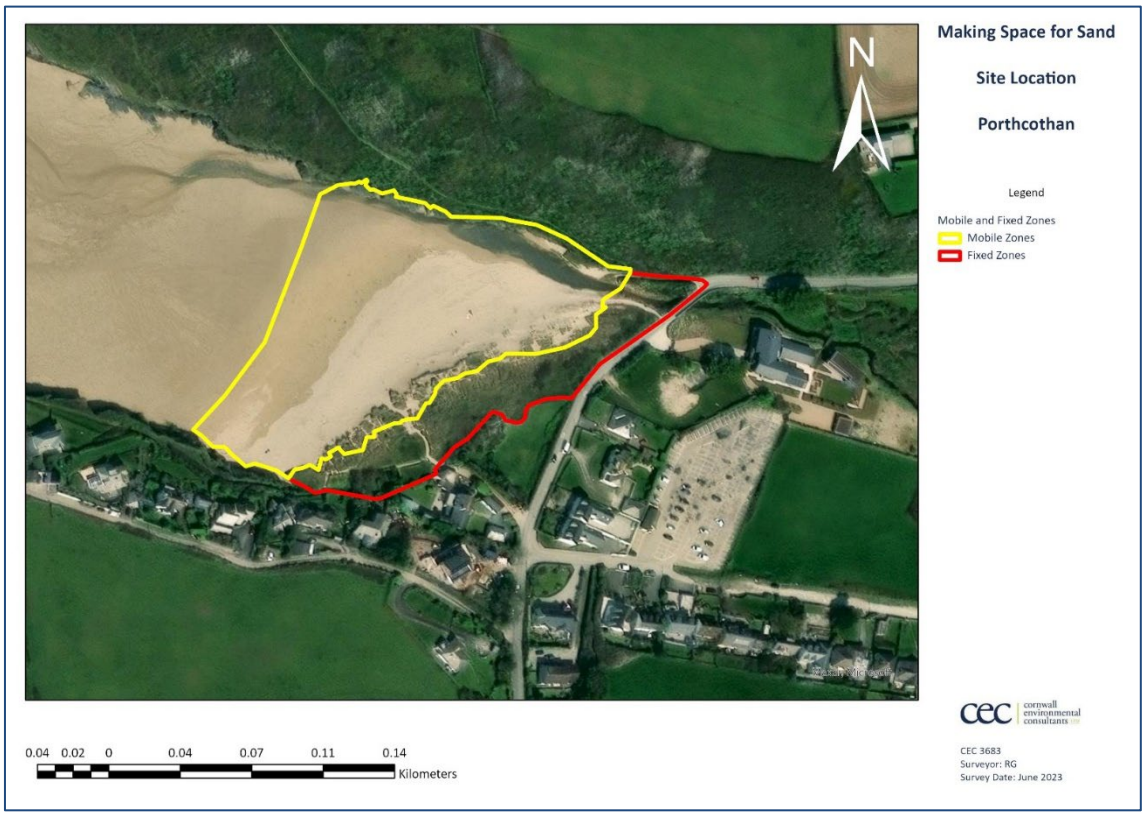


Figure 1: Site location

1.2.2. This report has been prepared by Rebecca Golder who has 13 years experience and Emily Cooper, who has four years' experience in preparing ecological reports such as this.

1.2.3. This report follows the desk study and ground truthing report 'CEC3683 Making Space for Sand – Porthcothan – Site 28, February 2022' which details the baseline information from Stage 1 of the project.

2. Proposals

2.1.1. At this stage of the project, Stage 2, there are no plans for the site. However, there is potential for this to change as the project progresses.

3. Conservation Designations

3.1. Conservation Designations

Sites of Special Scientific Interest (SSSI)

3.1.1. SSSIs are designated under the Wildlife & Countryside Act 1981 where they support habitats and/or species of national importance, this is overseen by Natural England. SSSIs represent the best sites for wildlife and geology. Many SSSIs are internationally important and play an important part in local culture and economy. The natural wildlife and geological features of SSSI's are considered to be irreplaceable parts of the national heritage. These are protected in order to preserve their importance, and to prevent damage and development.

Special Areas of Conservation (SAC)

3.1.2. A SAC is land designated under the Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora. This land is designated under the Conservation of Habitats and Species Regulations 2017 (as amended). Land with SACs is considered to be part of a network of high-quality conservation sites, and those considered to be most in need of conservation at a European level. SACs are a European Marine Protected Area.

Marine Conservation Zones (MCZ)

3.1.3. MCZs are designated under the Marine and Coastal Access Act 2009 to protect marine species and habitats by halting and reverse the damage and degradation caused by human activity.

County Wildlife Sites (CWS)

3.1.4. CWS are non-statutory designations for areas of semi-natural habitat in Cornwall, outside of the protection of SSSIs and SACs. CWS were selected based on their high nature conservation value, and on distinctive, important or threatened habitats and species.

Designated Cornwall National Landscape Area

3.1.5. From November 2023, all areas previously known as Areas of Outstanding Natural Beauty, or AONBs, were re-named National Landscape and in Cornwall became Cornwall National Landscape. However, the Management Plan still references the term AONB as this was formally adopted by Cornwall Council and cannot be amended until the next plan is produced.

3.1.6. Cornwall National Landscape areas are protected landscapes whose distinctive character and natural beauty are so outstanding that it is in the nation's interest to safeguard them. As such they have been nationally designated by the same legislation as National Parks and have the same status and level of protection.

4. Legislation

4.1. Legislation

4.1.1. The Wildlife and Countryside Act (HM Government, 1981, as amended) is the main piece of legislation relating to nature conservation in Great Britain. It transposes into British law the Berne, Bonn and RAMSAR Conventions, and the European 'Birds Directive' (CEC, 1979). This legislation covers protection of wildlife (birds, other animals and plants), Sites of Special Scientific Interest (SSSI's) (with some SSSI's also designated as Special Protection Areas, SPA's), National Nature Reserves (NNR's) and RAMSAR sites.

4.1.2. The Conservation of Habitats and Species Regulations (HM Government, 2019) transposes into British law the European 'Habitats Directive' (CEC, 1992), and covers Special Areas of Conservation (SAC's) and European Protected Species (EPS) (see below). It also provides further protection for SPA's and RAMSAR sites.

4.1.3. The Countryside and Rights of Way (CRoW) Act (HM Government, 2000) increases protection for SSSIs and threatened species. It specifies the duty of Local Authorities to further the conservation of listed (UK BAP priority) habitats and species.

4.1.4. The Natural Environment and Rural Communities (NERC) Act (HM Government, 2006) confers a legal duty on every public authority to conserve biodiversity under Section 40(1). Section 41 required the publication of lists of habitats and species of principal importance for the conservation of biodiversity in England. This list contains the habitats and species previously known as 'UK BAP' (Biodiversity Action Plan) priorities for conservation, and the terminology of habitats and species of principal importance supersedes the UK BAP terminology. Such features will be referred to as Habitats of Principal Importance (HPIs) and Species of Principal Importance (SPIs), throughout this report.

4.1.5. The Environment Act 2021 (HM Government, 2021) sets clear statutory targets for the recovery of the UK's natural world in four priority areas: air quality, biodiversity, water and waste, and includes an important new target to reverse the decline in UK species abundance by the end of 2030. It will also require new developments to improve and/ or create habitats for nature, and tackle deforestation overseas.

4.1.6. The Hedgerows Regulations 1997 protects historically / ecologically important hedgerows.

4.1.7. The Protection of Badgers Act 1992 provides specific protection for badgers.

5. Policy

5.1.1. Shoreline Management Plan (SMP) is a strategy for managing flood and erosion risk for a particular stretch of coastline over short (0-20 years), medium (20-50 years) and long (50-100 years) term time periods. An SMP is considered to be the most sustainable approach to managing flood and coastal erosions risks. Cornwall adopted SMP2 in 2011, though the epochs date back to a 2005 start. Within SMP there are four policy approaches which have been assigned to stretches of coastlines (known as management units) and will vary between epochs. The four policies as defined by DEFRA are: No Active Intervention (NAI), Hold the Line (HTL), Managed realignment (MR), and Advance the line (ATL). Additional to the main policies, there are five sub policies: Do not Defend (DnD), Repair not Replace (RnR), Local Activity Only (LAO), Natural Features (NF) and Placeholder (P).

5.1.2. Porthcothan is covered under policy unit MA33: 33.6. Table 2 below shows the policy plans under SMP2.

Table 2: Shoreline Management Plan Policies

MA33.6 Porthcothan beach

Timeframe	SMP Policy	Sub Policy
Epoch 1 (2005 - 2025)	No Active Intervention (with localised Hold The Line)	Local Activity Only
Epoch 2 (2025 -2055)	No Active Intervention (with localised Hold The Line)	Local Activity Only
Epoch 3 (2055 - 2105)	No Active Intervention (with localised Hold The Line)	Local Activity Only

6. Methodology

6.1. Desk Study

6.1.1. As part of Stage 1 of the Making Space for Sand project, a desk study was undertaken recording the key features of the site, including statutory and non-statutory designations, invasive species records, Phase 1 habitat analysis, landscape features and historical features.

6.1.2. Information regarding notable plant species was obtained from the Environmental Records Centre for Cornwall and the Isles of Scilly (ERCCIS), supplementary to the information provided in Stage 1 of the project.

6.1.3. A desk study search for statutory designated sites within 1km of the site was completed using the online Multi-Agency Geographic Information for the Countryside (MAGIC) mapping tool. In addition, the Cornwall Council Interactive mapping website was used to look for County Wildlife Sites (CWS) within the search area.

6.2. Field Survey

6.2.1. A walkover site survey was undertaken to identify plant species and map habitats present. Signs of faunal species were also searched for; including tracks, prints, droppings, hairs, feeding remains, nests and burrows.

UK Habitat Classification (UK Habs) Survey

6.2.2. UKHabs is a surveying technique which maps parcels of land within a defined area and classifies them according to their habitat type, covering terrestrial, freshwater and coastal habitat types. The UKHabs system largely superseded the previous system of Phase 1 Habitat Classification. UKHabs works by classifying habitats at different levels, with level 1 being the differentiation between terrestrial, coastal and freshwater, there are nine ecosystem types at level 2, which filters down in 20 broad habitat types in level 3. In some cases, the habitat will be further classified under levels 4 and 5.

6.2.3. Secondary codes can be applied to a habitat parcel to signify the presence of other features within that habitat.

6.2.4. The UKHabs survey was carried out by Rebecca Golder in July 2023. The study area included mobile and fixed dune areas as shown in Figure 1. The weather conditions at the time of survey were sunny and warm.

Biodiversity Net Gain (BNG)

6.2.5. The Biodiversity Net Gain metric is a tool for development, it measures habitat 'units' through a series of criteria (size, habitat type, condition, strategic significant and habitat distinctiveness). The tool has applications in conservation projects as it provides a quantifiable measure of the habitat as an existing baseline, unit change can be calculated through enhancements to the habitats and baselines can be reassessed to calculate unit difference.

6.2.6. Land parcels are classified by habitat type, and condition assessed against a number of criteria which determine the outcome condition of the parcel (resulting in good/moderate/poor condition).

6.2.7. For the purposes of this study, BNG Metric 4.0 version has been used. At the time this report is being produced, this is considered to be the most suitable version of the metric for conservation use as there is an assigned habitat unit value to irreplaceable habitats.

6.2.8. The Biodiversity Net Gain Condition Assessment was undertaken by Emily Cooper and Rebecca Haines during January 2024, and covered the previously surveyed areas.

6.2.9. The survey work was carried out in accordance with the following documents:

- UKHab Ltd: UK Habitat Classification Version 2.0 (2023)
- CIEEM Guidelines for Preliminary Ecological Appraisal (2017)
- BS42020:2013 Biodiversity – Code of practice for planning and development (BSI, 2013)

6.2.10. The scale of habitat classification will be based on the size of the site, where it is considered the site is medium/large (>1ha), the scale of surveying will be approximately 25m x 25m, smaller sites will be surveyed at a finer scale of 5m x 5m.

6.3. Limitations

6.3.1. The conclusions and recommendations presented within this report are based on the current ecological features identified, and the current dune boundary as shown in Figure 1 and in Map 1. Ecological features can change over time, particularly if site management/ use changes, or in the case of a dune system there is a particularly stormy winter; as a guide it is recommended that this report is valid until June 2025.

6.3.2. June is within the optimal season to undertake vegetation surveys: as many plant species are in bloom, accurate identification of the habitats has taken place.

6.3.3. Condition assessment of the habitats were undertaken in January, outside of the optimal season. Criteria for assessment within these habitats is largely based on structural components of the vegetation which are less susceptible to seasonal variation.

6.3.4. This ecological assessment does not include a search for Tree Preservation Orders (TPOs) or Conservation Area status.

6.3.5. Some areas of the site were not accessible as the vegetation was too dense or the areas were privately owned. It is possible that some notable species or habitats could be present within these areas.

6.4. Habitat Designations

Habitats of Principal Importance – Coastal Sand Dunes and Maritime Cliff and Slope

6.4.1. Coastal Sand Dunes (Broad habitat supralittoral sediment) and maritime cliff and slopes (supralittoral rock) classify as a Habitat of Principal Importance (HPI) under Section 41 of the Natural Environment and Rural Communities Act 2006.

6.4.2. Sand dune habitats are classified as Annex 1 habitats under the EU Habitats Directive 1992, this is transposed into UK law under The Conservation of Habitats and Species Regulations 2017. This requires member states to designate, protect and manage these habitats.

6.4.3. Within the requirements of BNG, Coastal Sand Dunes are listed as irreplaceable habitat, this means that any classification as HPI must be retained.

7. Baseline Ecological Conditions

7.1. Sand Dune Ecology

7.1.1. Sand dunes are formed through a successional process. Embryo dunes form closest to the sea where an obstruction is in place and windblown sand accumulates. Pioneer halophilic (salt tolerant) species then have the capacity to colonise this area, the typical species here being lyme and sand couch grasses.

7.1.2. Fore dunes establish where the embryo dunes have created stability in the substrate, marram grass begins to establish and further stabilise the substrate by allowing more sand to accumulate. There is now the addition of more organic matter where marram dies back. Water retention is increased and microhabitats within the dune area allow a wider diversity of vegetation to colonise.

7.1.3. Within the fixed dunes, the diversity of species will out compete marram, red fescue being a key competitor. The diversity of herbs and grasses leads to an increase in the humic content of the substrate making it more suitable for the establishment of scrub species, and eventually woodland.

7.1.4. 'Blowouts' are areas of bare sand where plant roots have been damaged leading to exposed bare sand. Erosion within these areas can accelerated by excessing trampling, grazing and burrowing. Sand sedge a key coloniser of these areas and starts the process of stabilising the area. Despite this, blowouts and other exposed bare sand areas are an important feature of the dune landscape and ecology.

7.1.5. Dune slacks occur where the terrain drops to the level of the water table and can be seasonally or permanently wet. These areas will support different species to the other areas of the dune including reeds, rushes, sedges and horsetails. Nutrients and organic matter will accumulate in these areas supporting these different plant communities.

7.2. Sand Dune Ecological Management

7.2.1. Sand dune management historically has been to stabilise and prevent erosion. This has been achieved through strategic planting of species such as sea buckthorn, or through preventing access into areas of the dunes. This approach facilitates the stabilising of fixed dune and scrub areas, but limits the establishment of embryo and foredunes, and the key dune features such as blowouts and dune slacks.

7.2.2. Hard management approaches include the placement of rock armour and other sea defences at the toe of the dune, this limits the dunes capacity to establish seaward. Softer management approaches include the placement of old Christmas trees to act as a barrier to allow sand to accumulate against.

7.2.3. Where dunes have become over stabilised through management approaches and limits imposed by human development, within some dune systems artificial recreation of the mosaic of habitats occurs. These approaches include scraping back of scrub and cutting of notches to encourage wind blown erosion to take place.

7.2.4. Low nutrient levels are essential for dune health. Nutrient enrichment is a key management issue facing dune ecology, with species such as bramble, nettle and dock able to thrive in nutrient rich environments and outcompete dune specialist species. Sources of nutrient enrichment include atmospheric deposition, agricultural runoff and dog waste.

7.3. Indicator Species

7.3.1. The National Plant Monitoring Scheme has compiled a list of 30 plant species as indicators of dune

health, with 25 being +ve, and 5 being -ve, and 17 being 'wild flower' level. See Table 3below for full list.

Table 3: Dune Indicator Species

Name	Common Name	Wildflower Indicator	Indicator +/-
Alopercurus geniculatus	Marsh Foxtail		+
Carex flacca	Glaucous Sedge		+
Carlina vulgaris	Carline Thistle		+
Cerastium arvense	Field Mouse-ear		+
Cirsium arvense	Creeping Thistle	✓	-
Equisetum palustre	Marsh Horsetail		+
Filago minima	Small Cudweed		+
Geranium sanguineum	Bloody Cranes-bill		+
Lysimachia vulgaris	Yellow Loosestrife	✓	+
Medicago lupulina	Black Medick		+
Ophiglossum vulgatum	Adder's tongue	✓	+
Pilosella officinarum	Mouse-ear Hawkweed	✓	+
Plantago coronopus	Buck's-horn Plantain	✓	+
Potentilla reptans	Creeping Cinquefoil	✓	+
Ranunculus acris	Meadow Buttercup	✓	+
Ranunculus repens	Creeping Buttercup	✓	+
Rosa ruogsa	Japanese Rose	✓	-
Rubus fruiticosus	Bramble	✓	-
Rumex acetosella	Sheep's Sorrel	✓	+
Sagina nodosa	Knotted Pearlwort		+
Salix repens	Creeping Willow	✓	+
Senecio erucifolius	Hoary Ragwort		+
Senecio jacobaea	Common Ragwort	✓	-
Thalictrum minus	Lesser Meadow-rue		+

Name	Common Name	Wildflower Indicator	Indicator +/-
Trifolium fragiferum	Strawberry Clover		+
Trifolium pretense	Red Clover	✓	+
Trifolium repens	White Clover	✓	+
Urtica dioica	Common Nettle	✓	-
Valerianella locusta	Common Cornsalad		+
Vica cracca	Tufted Vetch	✓	+

7.3.2. In addition to these species, Red Valerian (*Centranthus ruber*), Alexanders (*Smyrnium olusatrum*), Tamarisk (*Tamerix*), Hebe (*Veronica x franiscana*) and Sea Buckthorn (*Hippophae rhamnoides*) have been classified as negative indicators for the purposes of this study, this is based on them being non-native species to Cornwall and having capacity to become invasive in the dune environment. This is in addition to the commonly listed and Schedule 9 invasive non-native species.

7.4. Site Description

7.4.1. The dune area at Porthcothan was well vegetated with marram grass covering approximately 0.25ha. There were large areas of scrub and large numbers of non-native and invasive plants are present across the site, particularly around garden boundaries. The site is small and experiences recreational pressure.

7.4.2. UK Habitat Classification habitat distribution is shown in Map 1.

7.5. Statutory and Non-Statutory Designated Sites

7.5.1. Designated sites which are on or in proximity to the site are show in Table 4 and Figure 2**Error! Reference source not found.** below.

Table 4: Designated Sites

Designation	Qualifying Features	Condition
Porthcothan is adjacent to the Bristol Channel Approaches/ Dynesfeydd Môr Hafren SAC	Harbour porpoise (*Phocoena phocoena*)	No condition assessment available
Porthcothan is within the Porthcothan CWS	HPI – Maritime Cliff and Slopes, Lowland Heath, Coastal Sand Dunes SPI - Brown-banded carder bee *Bombus humilis*; adder *Vipera berus*; linnet *Carduelis cannabina*, skylark *Alauda*	No condition assessment available

Designation	Qualifying Features	Condition
	arvensis, herring gull *Larus argentatus*; brown long-eared bat *Plecotus auratus.*	
Porthcothan is in the Padstow Bay and Surrounds MCZ	Intertidal coarse sediment Intertidal sand and muddy sand Moderate energy intertidal rock Moderate energy infralittoral rock High energy intertidal rock High energy infralittoral rock High energy circalittoral rock Pink sea-fan (*Eunicella verrucosa*) Spiny lobster (*Palinurus elephas)*	No condition assessment available
Porthcothan is in the Carnewas to Stepper Point Cornwall National Landscape Area	The variety of coastal scenery	No condition assessment available

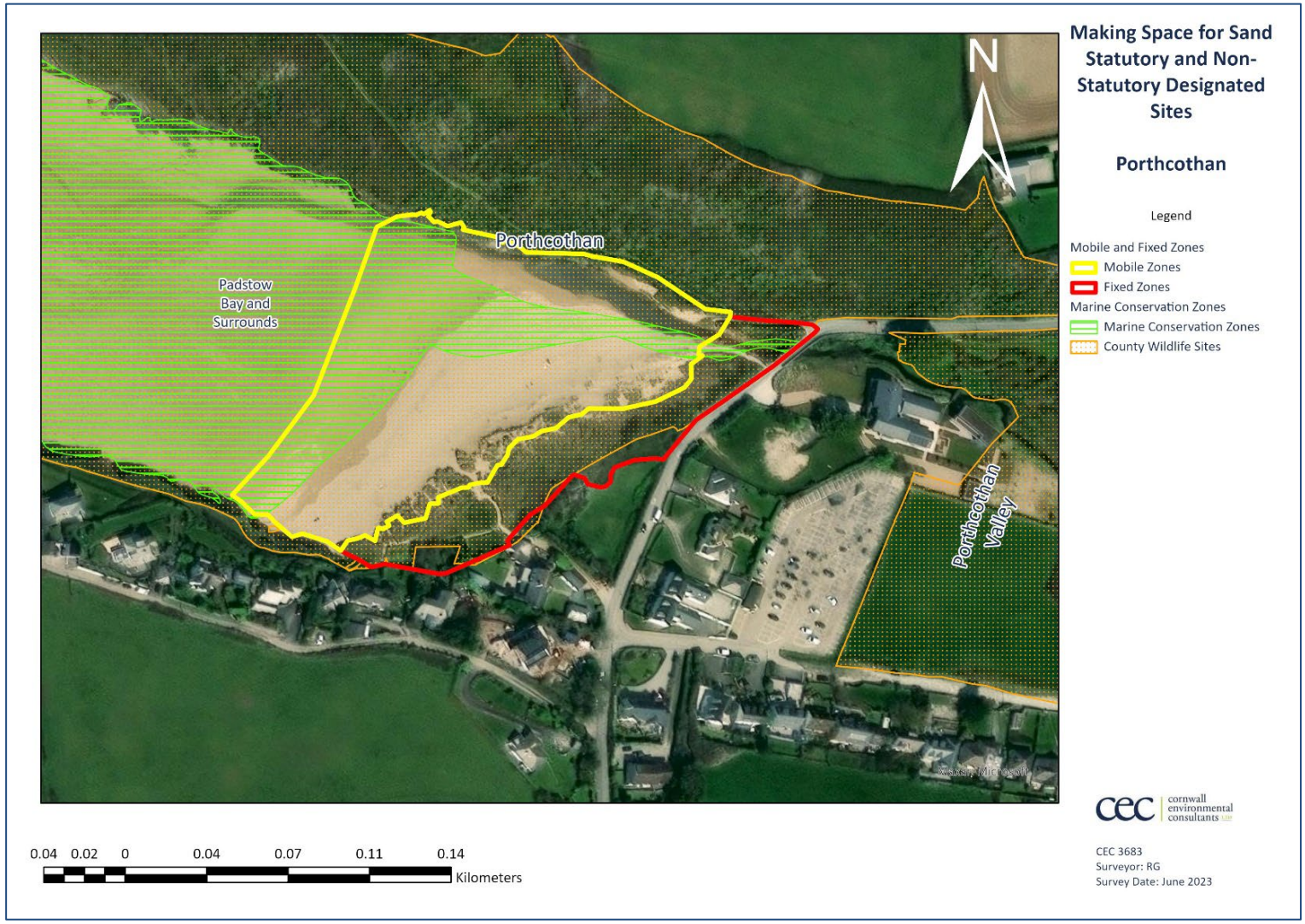


Figure 2: Designated Sites

7.6. Site survey recorded habitats.

7.6.1. Across the site 0.8ha of vegetated habitat was mapped. Areas of beach extending into the sea were not mapped. See Appendix A for full details of recorded habitats on site and their appropriate classifications.

Open Dune

Shifting dunes with marram

7.6.2. The Open Dune area equates to ~0.27ha, approximately 36% of the site and includes habitats of Shifting Dunes with Marram (s3a6). This habitat type refers to polygon number 862 & 876 and shown in blue on Figure 3. All polygons classify as open dune under Phase 1.

7.6.3. Polygons showing Shifting Dune with Marram (s3a6) under UK Habitat Classification are also classified as Habitats of Principal Importance. These areas are established dunes, where marram is the dominant species. The habitat condition is described as predominantly 'good' under BNG condition assessment. Other species recorded within the dune area include the notable botanical species sea bindweed and sea holly.

7.6.4. A number of non-native invasive species were recorded across this habitat. These included Schedule 9 non-native invasive species Japanese rose and montbretia listed on the Wildlife and Countryside Act 1981, as amended. These have the potential to impact further the condition of the dunes should efforts not be made to control the spread. Red valerian and *Gaulteria sp.* were also recorded within these habitats; these species are non-native and invasive; however, they are not Schedule 9 species. In order to maintain and enhance these habitats, removal of invasives within and in the surrounding polygons is key.

7.6.5. This area of shifting dune is subject to large numbers of visitors resulting in high recreational pressure, with paths crossing the whole area. This pressure was causing unnatural erosion and trampling across the habitat, in particular the paths which lead down to the beach. The presence of dog's results in nutrient enrichment from their fouling as well as potential disturbance of notable and protected species by dogs off-lead.

7.6.6. A large area of scrub to the east of this habitat was encroaching onto surrounding polygons. Scrub can negatively impact sensitive dune habitats, dominating the area and overstabilising the dunes. Overstabilisation will halt the natural succession of the dune complex.

Dune Grassland

7.6.7. The Dune Grassland area equates to ~0.02ha, approximately 2% of the site. This habitat type refers to polygon 867 shown in light blue on Figure 3. All polygons classify as open dune under Phase 1.

7.6.8. Polygons showing Dune Grassland (s3a7) under UK Habitat Classification are also classified as Habitats of Principal Importance. These areas are established dunes, where species such as lady's bedstraw and red fescue area present. The habitat condition is described as predominantly 'poor' under BNG condition assessment.

7.6.9. Non-native invasive species Michaelmas daisy was recorded within this habitat.

7.6.10. Dense mixed scrub was present to the north of this habitat and will encroach further on this habitat. Scrub can dominate an area resulting in the loss of sensitive habitats such as dune grassland.

7.6.11. This area of dunes is subject to large number of visitors resulting in high recreational pressure, with paths crossing the whole area. This pressure was causing unnatural erosion and trampling across the habitat. The presence of dog's results in nutrient enrichment from their fouling as well as potential disturbance of notable and protected species by dogs off-lead.

Coastal Sand Dunes

7.6.12. The Coastal Sand Dune area equates to ~0.02ha, approximately 2% of the site. This habitat type refers to polygon 873 & 874 on Figure 3. All polygons classify as open dune under Phase 1.

7.6.13. Polygons showing Coastal Sand Dunes (s3a7) under UK Habitat Classification are also classified as Habitats of Principal Importance. These areas are established dunes, where species such as lady's bedstraw and red fescue area present. The habitat condition is described as predominantly 'poor' and 'moderate' under BNG condition assessment.

7.6.14. This habitat was dominated by marram grass typical of Shifting Dune habitat, however, areas of scattered scrub and invasives were present, implying the dunes in this area were of a more fixed nature.

7.6.15. Schedule 9 non-native invasive species Japanese rose, as listed on the Wildlife and Countryside Act 1981, as amended was present in these polygons. This has the potential to impact further the condition of the dunes should efforts not be made to control the spread. Non-native invasive species red valerian and *Gaulteria sp*. were also recorded within this habitat, however, these species are not listed as Schedule 9. In order to maintain and enhance these habitats, removal of invasives within and in the surrounding polygons is key.

7.6.1. This area of Coastal Sand Dunes is subject to large number of visitors resulting in high recreational pressure, with paths crossing the whole area. This pressure was causing unnatural erosion and trampling across the habitat. The presence of dog's results in nutrient enrichment from their fouling as well as potential disturbance of notable and protected species by dogs off-lead.

7.6.2. A large area of scrub to the east of this habitat is encroaching onto surrounding polygons. Scrub can negatively impact sensitive dune habitats, dominating the area and overstabilising the dunes. Overstabilisation will halt the natural succession of the dune complex.

Maritime Cliffs and Slopes

7.6.3. The Maritime Cliffs and Slopes area equates to ~0.07ha, approximately 9% of the site. This habitat type refers to polygon 878 and shown in light blue on Figure 3. All polygons classify as maritime hard cliff under Phase 1.

7.6.4. Polygons showing Maritime Cliffs and Slopes (s2a) under UK Habitat Classification are also classified as Priority Habitats. The habitat condition is described as predominantly 'poor' under BNG condition assessment.

7.6.5. This area was covered in areas dense bramble scrub along its length.

Reedbeds

7.6.6. The Reedbeds area equates to ~0.07ha, approximately 9% of the site. This habitat type refers to polygon 869 and shown in purple in Figure 3. All polygons classify as inundation vegetation under Phase 1.

7.6.7. Polygons showing Reedbeds (f2e) under UK Habitat Classification are also classified as Priority Habitat. This habitat is present on an unnamed stream which enters the site in the northeast, passing under the B3276 to the east of the site. The habitat condition is described as predominantly 'moderate' under BNG condition assessment.

7.6.8. Scattered scrub was starting to encroach onto this priority habitat.

7.6.9. Nationally scarce wild leek was recorded within this habitat.

Blackthorn Scrub

7.6.10. The Blackthorn Scrub (h3a) area equates to ~0.008ha, approximately 1% of the site. This habitat type refers to polygon 864 and shown in dark pink on Figure 3. All polygons classify as dense scrub under Phase 1.

7.6.11. The habitat condition is described as predominantly 'poor' under BNG condition assessment.

7.6.12. There was only a small area of scattered blackthorn scrub on the site. Non-native species red valerian was present within this habitat.

7.6.13. Scrub can offer suitable habitat to protected and notable species, such as reptiles and nesting birds, however, this habitat type also has the ability to become dominant resulting in the loss and negative impact to the sensitive dune habitats. Therefore, this habitat type should be removed or reduced where possible.

Mixed Scrub

7.6.14. The Mixed Scrub area equates to ~0.27ha, approximately 34% of the site. This habitat type refers to polygon 863, 866, 865 868, 875 and 880 and shown in pink on Figure 3. All polygons classify as dense scrub under Phase 1.

7.6.15. The habitat condition is described as predominantly 'poor' under BNG condition assessment.

7.6.16. Schedule 9 invasive species Japanese rose, as listed on the Wildlife and Countryside Act 1981, as amended was recorded within polygon 880. Large areas of non-native species tamerisk is also present within the mixed scrub habitat. This has the potential to impact further the condition of the dunes should efforts not be made to control the spread. In order to maintain and enhance these habitats, removal of invasives within and in the surrounding polygons is key.

7.6.17. Mixed scrub can offer suitable habitat to protected and notable species, such as reptiles and nesting birds, however, this habitat type also has the ability to become dominant resulting in the loss and negative impact to the sensitive dune habitats. Therefore, this habitat type should be removed or reduced where possible.

Bramble Scrub

7.6.18. The Bramble Scrub (h3d) area equates to ~0.016ha, approximately 2% of the site. This habitat type refers to polygon 870 & 872 and shown in dark pink on Figure 3. All polygons classify as dense scrub under Phase 1.

7.6.19. There is a large amount of scattered and dense bramble cover within the dune system. Bramble scrub has a fixed condition within the BNG metric and therefore no condition assessment is undertaken.

7.6.20. Bramble scrub can offer suitable habitat to protected and notable species, such as reptiles and nesting birds, however, this habitat type also has the ability to become dominant resulting in the loss and negative impact to the sensitive dune habitats. Therefore, this habitat type should be removed or reduced where possible.

Built up areas and Gardens

7.6.21. At the southern section of the site there was a property and private garden equating to 0.06ha, <10% of the site area

7.6.22. As this was a private area, no assessment was undertaken.

7.6.23. A number of non-native invasive species were present close to the residential dwellings on the site. Polygon 872 had an area of discarded green waste with a number of non-native botanical species

within. This is a route for non-native species to enter the dune system. As well as this, discarded green waste will enrich the dune system with nutrients, encouraging overgrowth and undesirable botanical species.

Table 5: Summary of habitat types and percentage cover

Habitat Type	Percentage Cover
Reedbeds (f2e)	9%
Blackthorn scrub (h3a)	1%
Bramble scrub (h3d)	2%
Mixed scrub (h3h)	34%
Maritime cliff and slope (s2a)	9%
Coastal sand dunes (s3a)	2%
Shifting dunes with marram (s3a6)	36%
Dune grassland (s3a7)	2%
Built up areas and gardens (u1)	5%

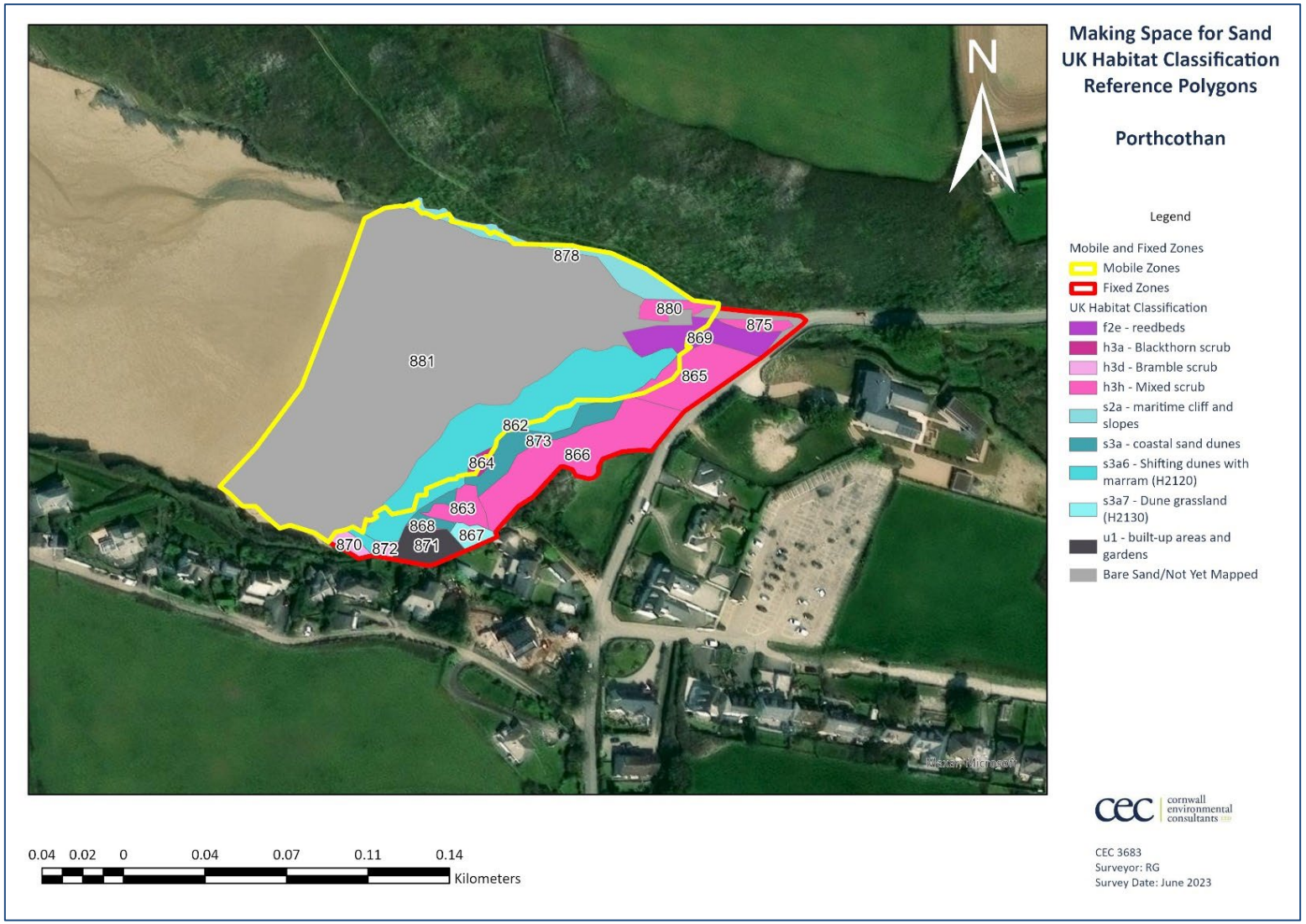


Figure 3: UK Habitat Classification Reference Polygons

7.7. Species

Flora

Vascular Plants

7.7.1. The desk study found numerous records for plant species of conservation concern within the 1km search area of the site. Examples of notable records include wild leek (nationally scarce; designated under Cornwall Red Data Book), dwarf spurge (Cornwall RDB; England Red List: Vulnerable), Portland spurge (Cornwall RDB), golden samphire (nationally scarce; Cornwall RDB), hoary stock (Cornwall RDB), sea pea (nationally scarce), weasel's snout (Cornwall RDB; England RL: Vulnerable), autumn squill (nationally scarce; Cornwall RDB), corn spurrey (Cornwall RDB; England RL: Vulnerable), field woundwort (Cornwall RDB; England RL: Vulnerable), and true fox-sedge (nationally rare; NERC Section. 41; Biodiversity Action Plan; England RL: Vulnerable). See Figure 4.

7.7.2. Porthcothan has some notable vascular plants recorded within the surveyed area including the nationally threatened sea holly and vulnerable sea bindweed as well as the nationally scarce wild leek. Additional halophytic species included sea spurge and sea rocket were also recorded, see target notes Figure 6 for distribution of notable species.

Lower Plants

7.7.3. A specialised survey for non-vascular plants, bryophytes and lichens, was outside the scope of this study. The desk study revealed records for the lower plant species sea-loch egg wrack (BAP), *Bifurcaria bifurcata* (Cornwall RDB), Starke's pottia (Cornwall RDB), rib-leaf moss (Cornwall RDB), dog screw-moss (Cornwall RDB), Wilson's pottia (NERC S.41; BAP; Cornwall RDB), and *Weissia longifolia var. longifolia* (Cornwall RDB).

Non-native Invasive Plants

7.7.1. The desk study returned results for three-cornered leek, buddleia, montbretia, winter heliotrope and wireweed within 1km of the site. See Figure 5.

7.7.2. The Schedule 9 species Japanese rose (polygons 880, 862, 874 & 872), and monbretia (polygons 865 & 870) were recorded during the site survey. Porthcothan had a high number of non-native invasive species across the site. There were large areas of red valerian and Michaelmas daisy and small patches of hebe, as well as tamerisk throughout the scrub habitats.

7.7.3. Non-native botanical species were frequently recorded close to the boundaries with residential dwellings. Polygon 872 in particular appeared to have an area where green waste was being discarded. It is likely that this is one of the routes which non native and invasive species are entering the dune system.

7.8. Target Notes

7.8.1. Target notes refer to areas of ecological interest that were recorded during the survey, both floral and fauna, see Figure 6.

7.8.2. Target notes for Porthcothan included recording of species such as the notable species sea holly, sea bindweed and wild leek.

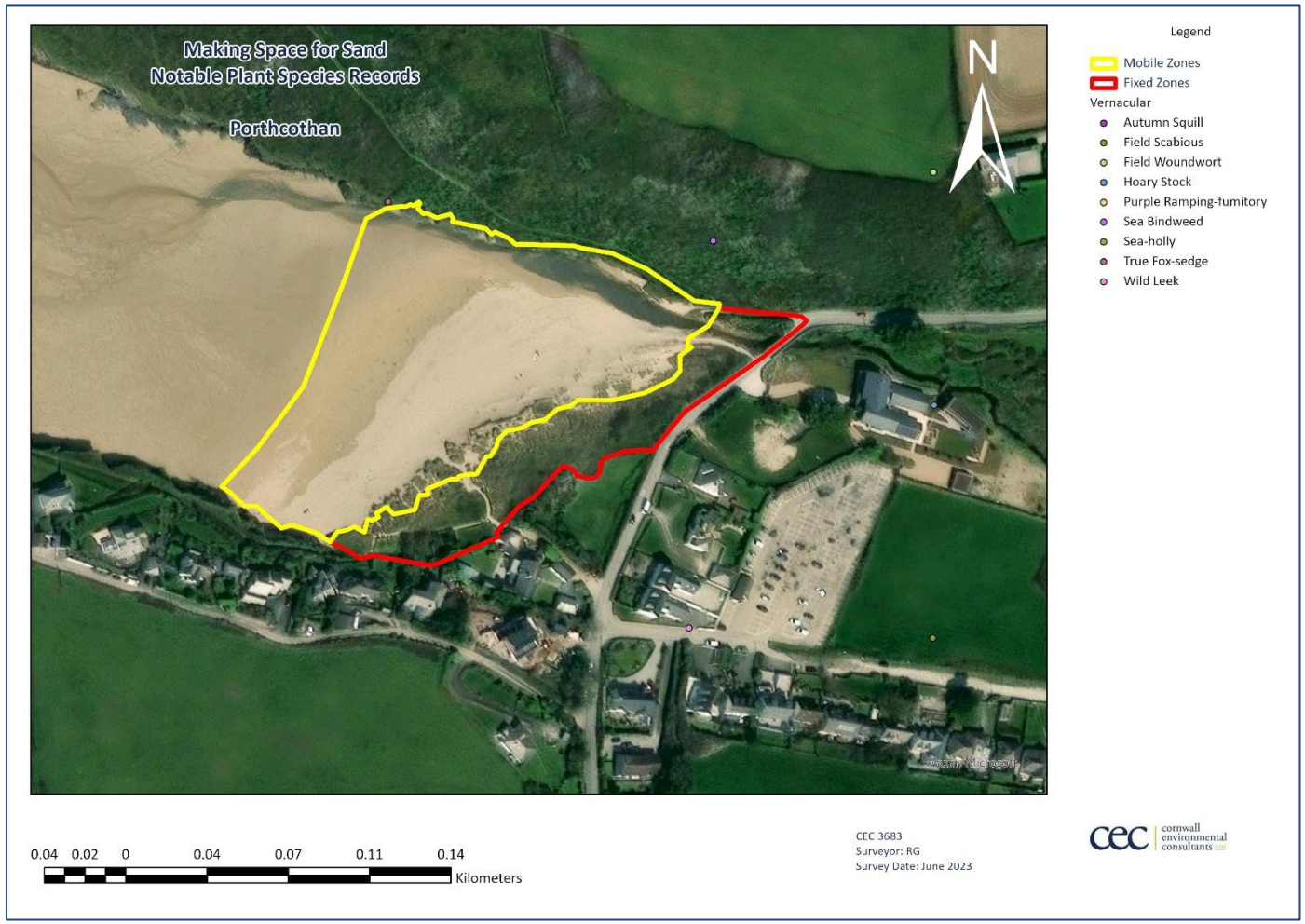


Figure 4: Notable Plant Species Records

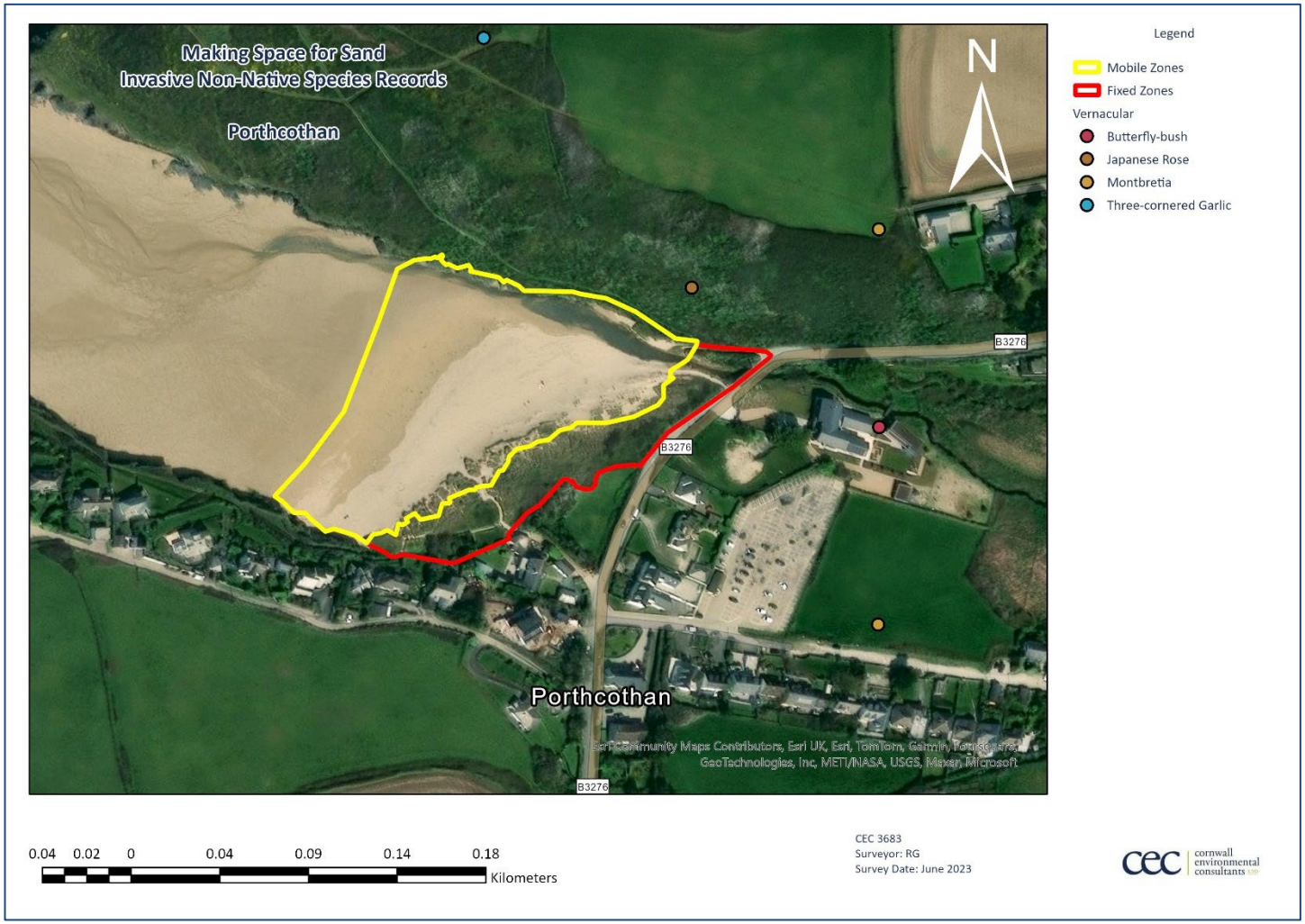


Figure 5: Invasive Non-Native Species Records

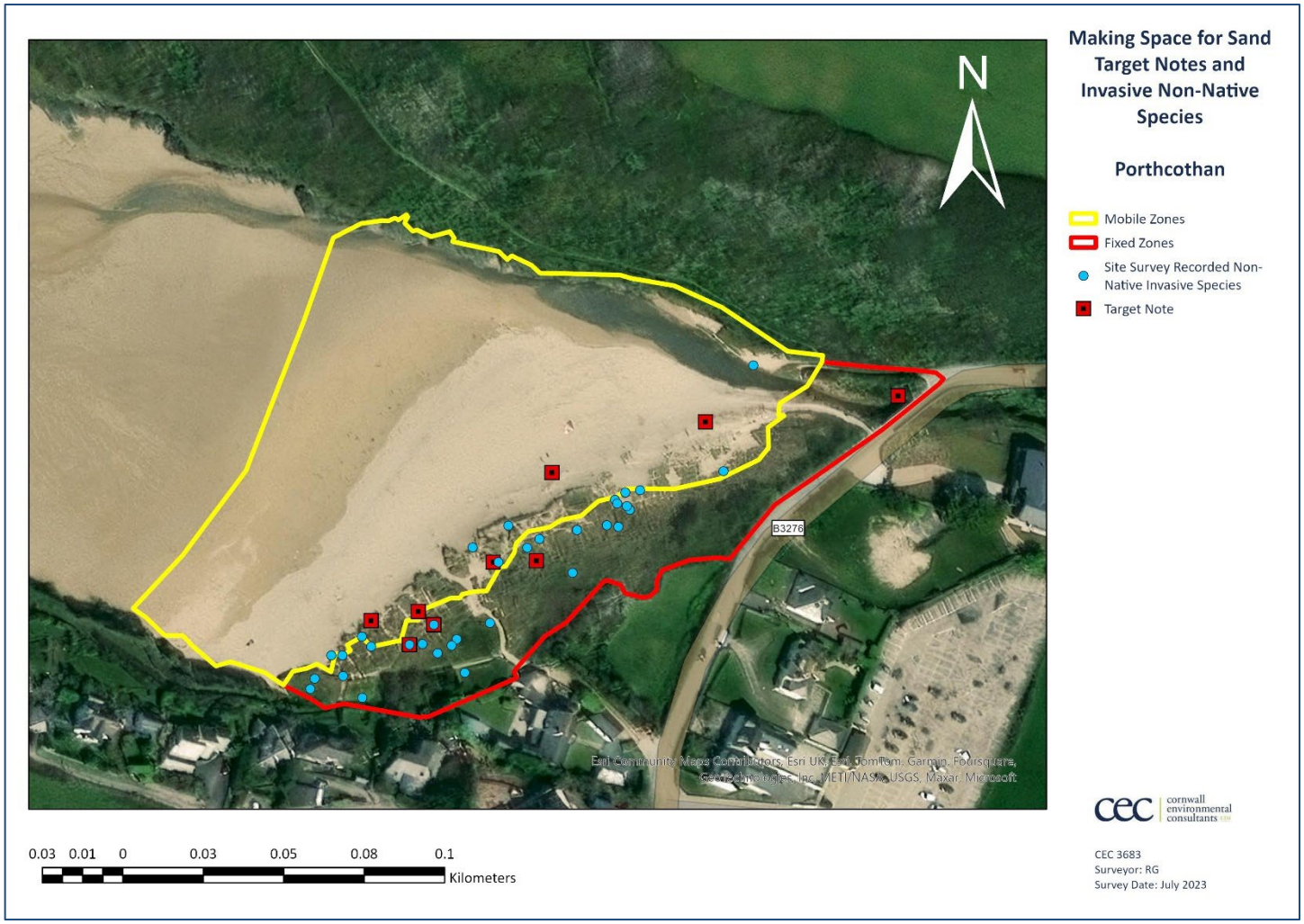
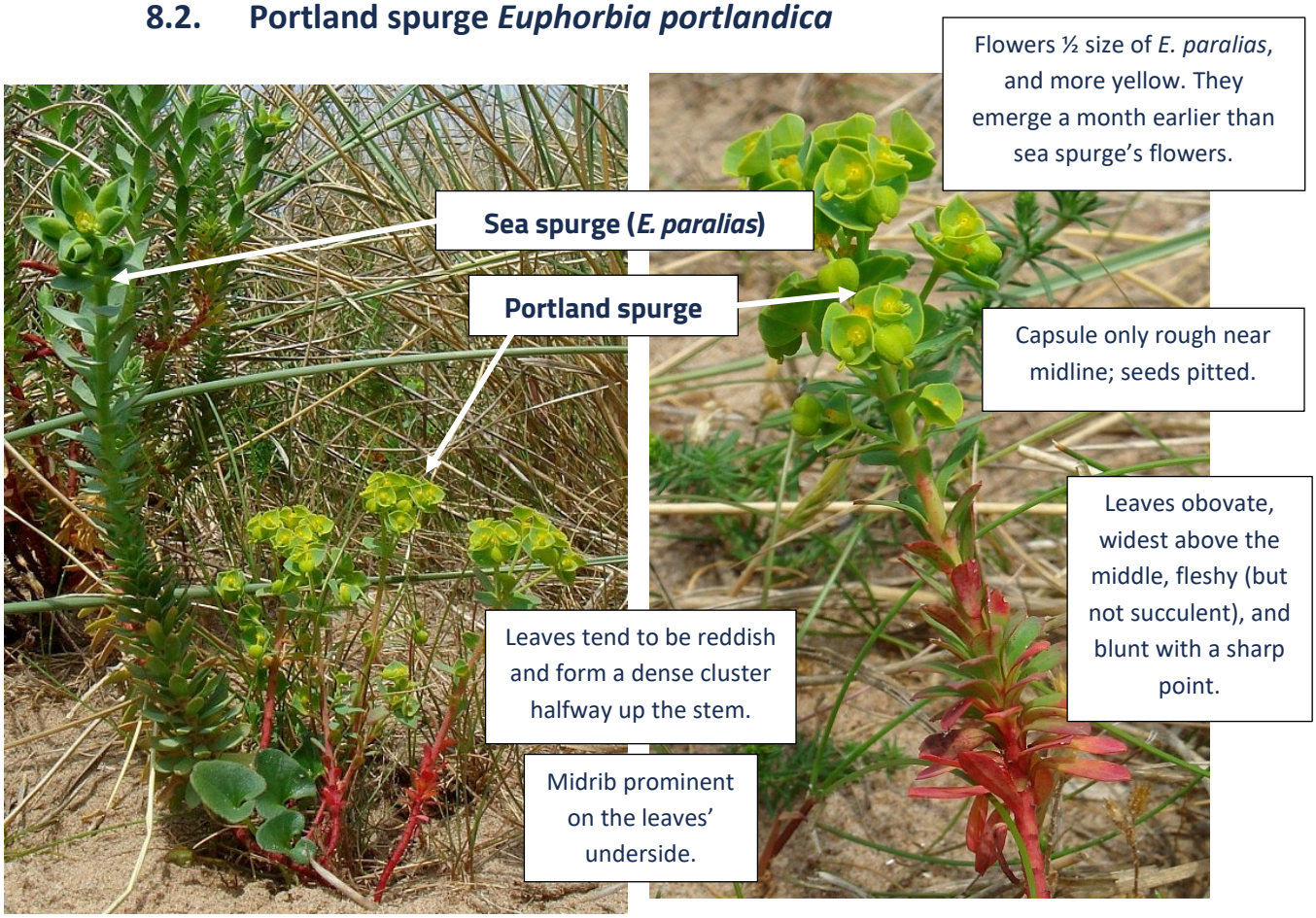


Figure 6: Site Survey Target Notes and Invasive Non-Native Species

8. Species Highlights

8.1.1. This section highlights species that have been either recorded within the dune complex, or are within the environmental records for the site.

8.2. Portland spurge *Euphorbia portlandica*



A smaller, scarcer cousin of sea spurge, this specialist of cliffs and dunes in southwest Britain helps to stabilise semi-fixed sand dunes, facilitating colonisation of other maritime species. Like all *Euphorbia*, seeds are dispersed as projectiles when the capsule (or perianth) explodes.

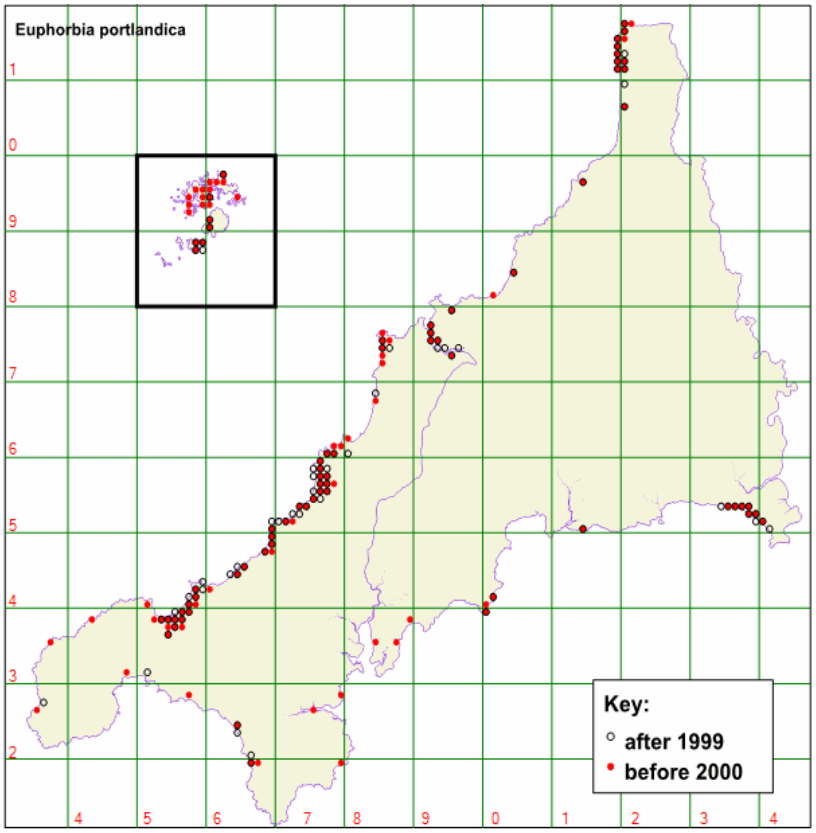
Threats to Portland spurge in Cornwall are similar to other coastal specialists – dune mismanagement leading to shrub encroachment or habitat loss from human development, and an increasingly stochastic and exacerbated risk of violent storms resulting from climate change.

Distribution: Patchy distribution along the South, with more recorded colonies along the North coast of Cornwall, predominantly from the Towans to the Gannel Estuary.

Habitat: well drained coastal habitats such as cliffs, rocky and grassy slopes, shingle and dunes..

Identification: Perennial herb growing to 40cm, flowers bright green, flowering April to September

Value to wider habitat: A specialist of the dune system, this species aids in the stabilisation of dunes.



9. Ecological Constraints and Opportunities

9.1. Ecological Constraints

Designated Sites

9.1.1. It is not anticipated that there will be any constraints from designated sites which would impact restoration and enhancement works at Porthcothan.

Invasive Non-Native Species

9.1.2. Japanese Rose and montbretia were recorded on site, and these are listed under Schedule 9 of the Wildlife and Countryside Act 1981, as amended. Red valerian, Michaelmas daisy, hebe and tamerisk which are also considered non-native plants on dune systems were also recorded on site, however these are not listed under Schedule 9.

9.1.3. Montbretia can be removed by hand, ensuring that all underground corms are removed.

9.1.4. For the control of Japanese rose, deciduous specific herbicide treatments should be used. This will target the Japanese rose without being detrimental to the grass species. Once the species has died back, allow six weeks before removal. Beyond this the material will be suitable for commercial composting. Alternatively, small stands of Japanese rose can be removed by hand.

9.1.5. People should be discouraged from disposing of any garden waste on this sensitive site. In addition to this all households close to the site could be discouraged from allowing plants from their gardens to spread into surrounding habitat.

9.1.6. A full management plan for these species should be put in place to facilitate the eradication of them and allow natural successional processes to take place and expand the presence of Annex 1 habitats. Alongside treatment, establishment of desirable vegetation within cleared areas is recommended to prevent other non-desirable species from establishing.

Nutrient Enrichment and Human Disturbance

9.1.7. Dogs can enrich the dune system through dog fouling; this impacts the dune system negatively, encouraging overgrowth of vegetation and undesirable botanical species. To reduce nutrient enrichment, signage could be used to explain to beach users the impact of nutrient enrichment from discarded dog waste and how this is impacting the delicate habitat. Dogs off-lead could also trample and disturb notable habitat and species.

9.1.8. The dune complex and beach is under pressure from human disturbance. The dunes are impacted by erosion and disturbance to the notable species and habitats present. It is unlikely this will reduce in the future. There is the possibility of fencing off sensitive areas and encourage visitors to use a single path to access the beach. Signage could be implemented on-site to explain to beach users of the impact of disturbance on these habitats.

Scrub Control

9.1.9. There were large areas of scrub within the site. Although scrub is part of the successional process of dunes and can offer habitat and a food source to a number of species, scrub control should be implemented in order to prevent overstabilisation and preserve and enhance irreplaceable habitats. In particular the Fixed Dune Grassland and Reedbed areas are susceptible to scrub encroachment, these habitats could be lost if scrub is not reduced and controlled.

Current control measures

9.1.10. The local community group are active in the restoration of the habitat and actively removing invasive species in the area.

10. Biodiversity Net Gain & Ecological Enhancements

10.1.1. The baseline BNG unit score is 9.10 Habitat Units.

Table 6: Biodiversity Net Gain Units

On site baseline	Coastal Sand Dunes	6.29
	Scrub (mixed)	1.32
	Scrub (blackthorn)	0.04
	Scrub (bramble)	0.08
	Reedbeds	0.91
	Maritime Cliff and Slopes	0.46
Total		**9.10**

10.1.2. Key opportunities for enhancement at Porthcothan are the removal of invasive species. By removing invasive species from within the dune area this will see an uplift in the condition of the dune habitat, which will ultimately result in an uplift of habitat units.

10.1.3. Scrub management should be undertaken to firstly stop the encroachment of this habitat into the dune habitat, and secondly to improve it as a habitat for protected species that use it for shelter and foraging. The creation of glades and rides, and the softening of the edges of the scrub will allow more light into the understory and improve the diversity of the vegetation as well as improving the habitat for the fauna that live within it.

10.1.4. The health of the dune grassland is limited by the heavy footfall and nutrient loading, this could be improved, and if the condition of these sections of habitat were to be undertaken then this would see an increase in units of 1.92 (15%).

11. Conclusions

11.1.1. This report details the ecological baseline for the Coastal Sand Dunes at Porthcothan, including UK Habitats Classification, Biodiversity Net Gain Condition Assessment and Invasives mapping.

11.1.2. Porthcothan hosts key dune habitats 'shifting dunes with marram' and 'dune grassland' – the site is small and is impacted by recreational pressure, the proximity of residential dwellings, dense scrub and the presence of hard engineering (roads and car parks, halting natural succession of the dunes), however the local community and voluntary groups are active.

11.1.3. There are a small number of possibilities for Biodiversity Net Gain by the enhancement of the dune grassland areas to the rear of the dune, and the expansion of both the shifting dune and dune grassland which can be achieved through scrub and invasive removal and additional planting at the site as well as fencing off of some more sensitive areas.

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13. List of Appendices

A. Table of Habitat Types

Polygon no	GIS Reference	Phase 1 Classification	UK Habitat Classification	Secondary Codes	BNG Broad Habitat Type	BNG Classification	BNG Condition Assessment	Area (ha)	BNG Habitat Units	Other Classification
869	22086656	Inundation vegetation (F2.2)	Reedbeds (f2e)		Wetland	Reedbeds	Moderate	0.07	0.91	
863	22087124	Dense Scrub (A2)	Mixed Scrub (h3h)		Heathland and Shrub	Mixed Scrub	Poor	0.03	0.12	
864	22087125	Dense Scrub (A2)	Blackthorn Scrub (h3a)		Heathland and Shrub	Blackthorn Scrub	Poor	0.008	0.04	
865	22087126	Dense Scrub (A2)	Mixed Scrub (h3h)		Heathland and Shrub	Mixed Scrub	Poor	0.08	0.35	
866	22087127	Dense Scrub (A2)	Mixed Scrub (h3h)		Heathland and Shrub	Mixed Scrub	Poor	0.15	0.71	
868	22087128	Dense Scrub (A2)	Mixed Scrub (h3h)		Heathland and Shrub	Mixed Scrub	Poor	0.01	0.00	
870	22087129	Dense Scrub (A2)	Bramble Scrub (h3d)		Heathland and Shrub	Bramble Scrub	N/A	0.01	0.05	
872	22087130	Dense Scrub (A2)	Bramble Scrub (h3d)		Heathland and Shrub	Bramble Scrub	N/A	0.13	0.03	

Polygon no	GIS Reference	Phase 1 Classification	UK Habitat Classification	Secondary Codes	BNG Broad Habitat Type	BNG Classification	BNG Condition Assessment	Area (ha)	BNG Habitat Units	Other Classification
875	22087131	Dense Scrub (A2)	Mixed Scrub (h3h)		Heathland and Shrub	Mixed Scrub	Poor	0.01	0.06	
878	22087162	Crevice and ledge vegetation (H8.3)	Vegetated sea cliffs (s2a5)		Sparsely Vegetated Land	Maritime cliff and slopes	Poor	0.07	0.46	Annex 1 – Vegetated sea cliffs of the Atlantic coast H1230
862	22087527	Open Dune (H6.8)	Shifting Dunes with Marram (S3a6)		Sparsely Vegetated Land	Coastal Sand Dunes	Good	0.27	5.61	Annex 1 – Shifting Dunes along the Shoreline with *Ammophila arenaria* H2120
867	22087528	Dune grassland (H6.5)	Dune grassland (s3a7)		Sparsely Vegetated Land	Coastal Sand Dunes	Poor	0.01	0.08	Annex 1 – Fixed coastal dunes with herbaceous vegetation 'grey dunes' H2130
873	22087529	Open Dune (H6.8)	Shifting Dunes with Marram (S3a6)		Sparsely Vegetated Land	Coastal Sand Dunes	Poor	0.06	0.38	Annex 1 – Shifting Dunes along the Shoreline with *Ammophila arenaria* H2120
874	22087530	Open Dune (H6.8)	Shifting Dunes with Marram (S3a6)		Sparsely Vegetated Land	Coastal Sand Dunes	Moderate	0.01	0.19	Annex 1 – Shifting Dunes along the Shoreline with *Ammophila arenaria*

Polygon no	GIS Reference	Phase 1 Classification	UK Habitat Classification	Secondary Codes	BNG Broad Habitat Type	BNG Classification	BNG Condition Assessment	Area (ha)	BNG Habitat Units	Other Classification
										H2120
876	22087531	Open Dune (H6.8)	Shifting Dunes with Marram (S3a6)		Sparsely Vegetated Land	Coastal Sand Dunes	Poor	0.005	0.03	Annex 1 – Shifting Dunes along the Shoreline with *Ammophila arenaria* H2120
880	22087533	Dense Scrub (A2)	Mixed Scrub (h3h)		Heathland and Shrub	Mixed Scrub	Poor	0.02	0.09	
871	22087590	Buildings (J3.6)	Developed land; sealed surface (u1b)		Urban	Developed land; sealed surface	N/A	0.04	0.00	

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