cornwall environmental consultants LTD





Making Space for Sand
Site No 29 - Treyarnon
Ecological Assessment

CEC3683
22 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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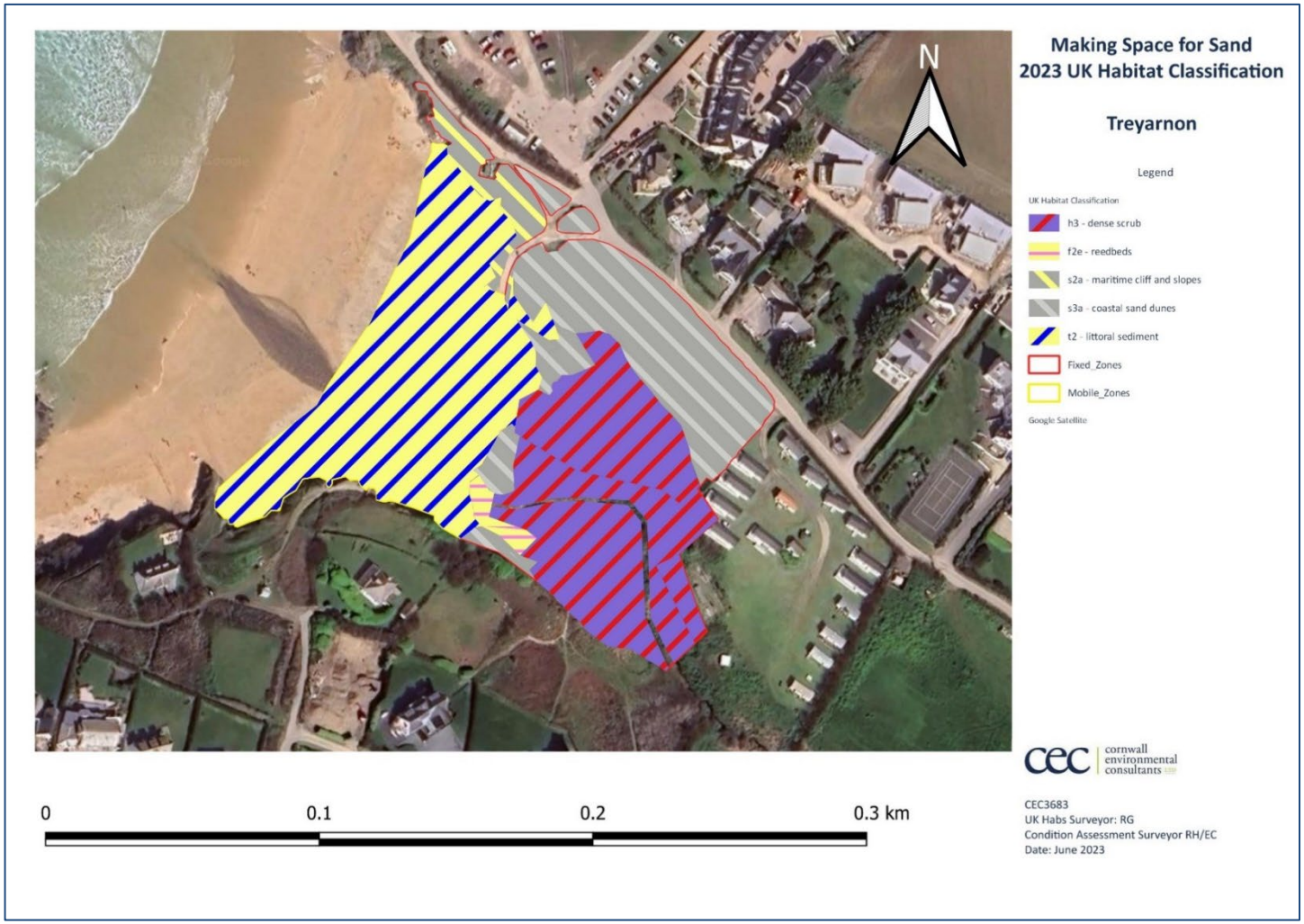
Summary

Site and methods	
Purpose of report	To identify the ecological constraints and opportunities associated with the management of the dune system at Treyarnon.
Site assessed	Treyarnon
Area (ha)	Vegetated area ~1.1ha
Location:	Grid reference: SW 85957 73906 What3words: sideboard.circles.scripted
Planning Authority involved	Cornwall Council
Survey methods	UK Habitat Classification Biodiversity Net Gain Condition Assessment
Surveyor's name	Emily Cooper BSc (Hons), PGCert, MSc, ACSM Rebecca Golder BSc (Hons) ACIEEM
Date of assessment	UK Habitat Classification: June 2023 BNG Condition Assessment: February 2024
Weather on date of assessment	UK Habitat Classification - Sunny, ~20°C BNG Condition Assessment - Overcast ~8°C

Results	
Designated sites	Adjacent to the Bristol Channel Approaches SAC Porthcothan CWS Padstow Bay and Surrounds MCZ Carnewas to Stepper Point AONB
Important habitats present	Coastal Sand Dunes

Non-native invasive species present	Montbretia (WCA Sch9), red valerian, tamarisk (not Sch9 listed)
Protected species present	Nesting Birds
Potential for protected species	Reptiles
Enhancement recommendations	Removal of invasive species Scrub control Expansion of the dune by improving the health of the fixed dune
Biodiversity Net Gain	Baseline habitat units 6.22

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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
MS4S Stage 1 - February 2022	Baseline Assessment and Ground truthing
MS4S – Stage 2 – June 2023	UK Habitat Classification
MS4S – Stage 2 – January 2024	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 29, Treyarnon (Figure 1) is a small cove located as the crow flies 10km west of Padstow, on the north coast of Cornwall. Treyarnon is bound by cliffs to the north and south. The village of Treyarnon, to the east is a small settlement, with a large holiday park, youth hostel and holiday homes at the northern end, and residential dwellings to the south. There is a small caravan park to the east of the dunes. A watercourse discharges into the sea at Treyarnon.



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 – Treyarnon – Site 29, 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

Special Areas of Conservation (SAC)

3.1.1. 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)

3.1.2. 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)

3.1.3. 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

3.1.4. From November 2023, all areas previously know 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.

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 supercedes 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. Treyarnon is covered under policy unit MA33: 33.7. Table 2 below shows the policy plans under SMP2.

Table 2: Shoreline Management Plan Policies

MA33.7 Treyarnon

Timeframe	SMP Policy	Sub Policy
Epoch 1 (2005 - 2025)	No Active Intervention	Do not Defend
Epoch 2 (2025 -2055)	No Active Intervention	Do not Defend
Epoch 3 (2055 - 2105)	No Active Intervention	Do not Defend

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 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)
- CIEEM Guidelines for Ecological Impact Assessment in the UK and Ireland (2018)
- 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.

6.4. Habitat Designations

Habitats of Principal Importance – Coastal Sand Dunes

6.4.1. Coastal Sand Dunes (Broad habitat supralittoral sediment) classify as a Habitat of Principle 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 +/-	Present on site
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		+	
Trifolium fragiferum	Strawberry Clover		+	
Trifolium pretense	Red Clover	✓	+	

Name	Common Name	Wildflower Indicator	Indicator +/-	Present on site
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 mobile zone of the dunes at Treyarnon is largely unvegetated, with a small amount of patchy marram. There is an incremental increase in the mobile zone into the fixed where the vegetation is more representative of mobiles dune. The fixed zone is predominant scrub, with abundant reed and tamarisk cover, small areas of dune are present. There is also a temporary car park and smaller patches of dune on roadside verge areas.

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 3 and Figure 3 below.

Table 4: Designated Sites

Designation	Qualifying Features	Condition
Treyarnon is adjacent to the Bristol Channel Approaches SAC	Harbour porpoise	No condition assessment available
Treyarnon is in the Porthcothnan CWS	HPI - Maritime Cliffs and Slopes Lowland Heathland Coastal Sand Dunes SPI - brown-banded carder bee *Bombus humilis*; adder *Vipera berus*; linnet *Carduelis cannabina*, skylark *Alauda arvensis*, herring gull *Larus argentatus*; brown long-eared bat *Plecotus auritus*	No condition assessment available
Treyarnon is in the Padstow	Intertidal coarse sediment Intertidal sand and muddy sand	No condition

Designation	Qualifying Features	Condition
Bay and Surrounds MCZ	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)*	assessment available
Treyarnon is in the Carnewas to Stepper Point Cornwall National Landscape Area	Variety of coastal scenery	No condition assessment available

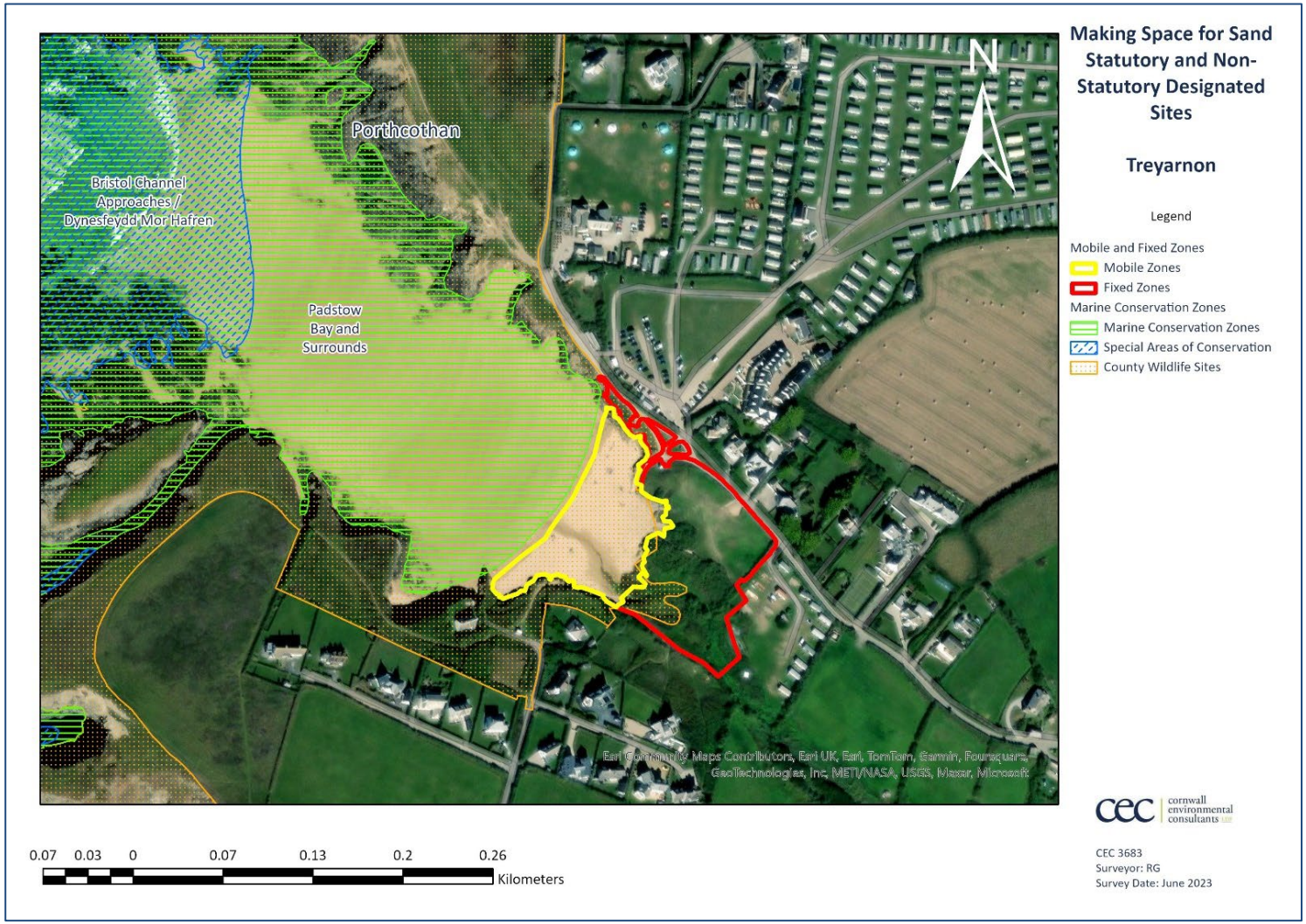


Figure 2: Designated Sites

7.6. Habitats

7.7. Site survey recorded habitats.

7.7.1. Across the site 1.10 ha 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

7.7.2. Treyarnon's s3a6 habitat, shifting dunes with marram equates to around 4% of the vegetated area at 0.04ha. This is seen in polygons 910, 912 and 914.

7.7.3. The area of shifting dunes is restricted to small patches on the seaward edge, there is some established marram in this area.

7.7.4. This habitat is classified as a habitat of principal importance. Some polygons have been condition assessed as being 'good' and some polygons are 'moderate'. In its current condition it is largely free of invasives and scrub, however there is scrub pressure from the landward side which threaten to outcompete this habitat type.

Dune Grassland

7.7.5. Inland of the shifting dunes with marram, are small patches of more established dune, which classify as dune grassland (s3a7) equating to 0.39ha, ~35% of the vegetated area; this is also a habitat of principal importance. This refers to polygons 904, 905, 909, 913 and 918. These patches of habitat are constrained by tarmac and are subject to heavy footfall. They have a short sward and low species diversity.

7.7.6. This habitat has been assessed as being largely in poor condition owing to the high footfall preventing growth, lack of naturally open ground, presence of scattered scrub and invasive species.

Reedbeds

7.7.7. Reedbeds (f2e) equate to 0.021 ha, approximately 2% of the surveyed area. This refers to polygons 911 and 912. This habitat has been assessed as being in moderate condition, although the species composition is representative of this habitat, there are signs of enrichment with species such as nettle and cleavers becoming prominent.

Bramble Scrub

7.7.8. Bramble scrub (h3d) is the dominant habitat on site, with cover of ~0.6ha, around 53% of the site. Bramble scrub has a fixed condition under the BNG metric. Within the scrub there are large patches of tamarisk which is also considered to be native in the dune environment. The scrub is starting to outcompete the dune habitat and efforts should be made to control it and allow marram to establish.

Vegetated Sea Cliffs

7.7.9. Vegetated Sea Cliffs (s2a5) cover an area of 0.08ha, approximately 6% of the site. This refers to polygons 908 and 920. This habitat has been assessed as being in poor condition owing to the lack of species diversity and composition for this type of habitat, presence of sub optimal species such as red valerian, heavy amounts of scrub and the lack of bare ground.

Table 5: Summary of habitat types and percentage cover

Habitat Type	Percentage Cover
Open Dune (s3a6, H2120)	4%
Dune Grassland (s3a7, H2130)	35%
Reedbeds (f2e)	2%
Bramble Scrub (h3d)	53%
Vegetated Sea Cliffs (s2a5, H1230)	6%

7.7.10.

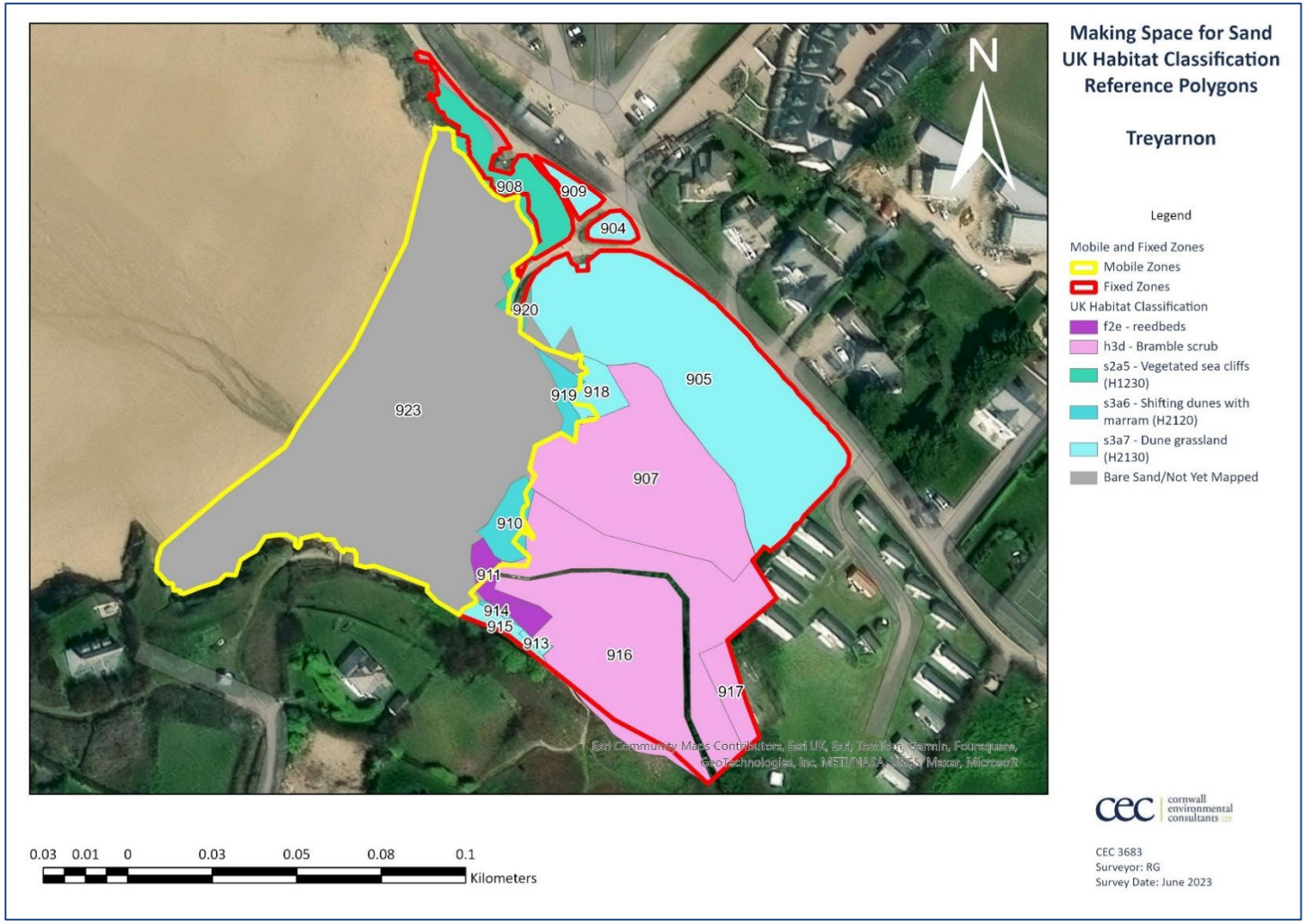


Figure 3: UK Habitat Classification Reference Polygons

7.8. Species

Flora

Vascular Plants

7.8.1. 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), dodder (Cornwall RDB; England Red List: Vulnerable), prostrate broom (nationally rare; Cornwall RDB; Great Britain RL: Near-Threatened), purple viper's bugloss (Cornwall RDB), musk stork's-bill (Cornwall RDB), Portland spurge (Cornwall RDB), dyer's greenweed (nationally rare), golden samphire (nationally scarce; Cornwall RDB), hairy bird's-foot-trefoil (nationally scarce; Cornwall RDB), weasel's snout (Cornwall RDB; GB RL: Vulnerable), shore dock (nationally scarce; NERC Section.41; Biodiversity Action Plan; Habitat Regulatory Schedule 5; Wildlife and Countryside Act Schedule 8; Cornwall RDB; GB RL: Endangered), autumn squill (nationally scarce; Cornwall RDB), small-flowered catchfly (nationally scarce; NERC S.41; BAP; GB RL: Endangered), night-flowering catchfly (Cornwall RDB; GB RL: Vulnerable), corn spurrey (Cornwall RDB; GB RL: Vulnerable), and field woundwort (Cornwall RDB; GB RL: Near-Threatened). See Figure 4 for records of notable plant species on site.

7.8.2. Treyarnon has some notable vascular plants recorded within the surveyed area including sea bindweed and the nationally scarce shore dock.

Lower Plants

7.8.3. 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 rib-leaf moss (Cornwall RDB) and bristly pottia (Cornwall RDB) within 1km of the site.

Non-native Invasive Plants

7.8.4. The Schedule 9 species montbretia was recorded during the site survey. Red valerian and tamarisk (Non Schedule 9 listed) were also recorded on site.

7.8.5. The desk study returned results for buddleia, angular sea-fig, and montbretia within 1km of the site – see Figure 5.

7.9. Target Notes

7.9.1. Target notes refer to areas of ecological interest that were recorded during the survey, both floral and faunal, see Figure 6 for target note locations.

7.9.2. Target notes for Treyarnon included recording a large mound that was noted from a distance and inaccessible due to dense scrub, this could have floral or faunal intertest.

7.9.3. The nationally scare shore dock was recorded on the foreshore of Treyarnon but the location not recorded.

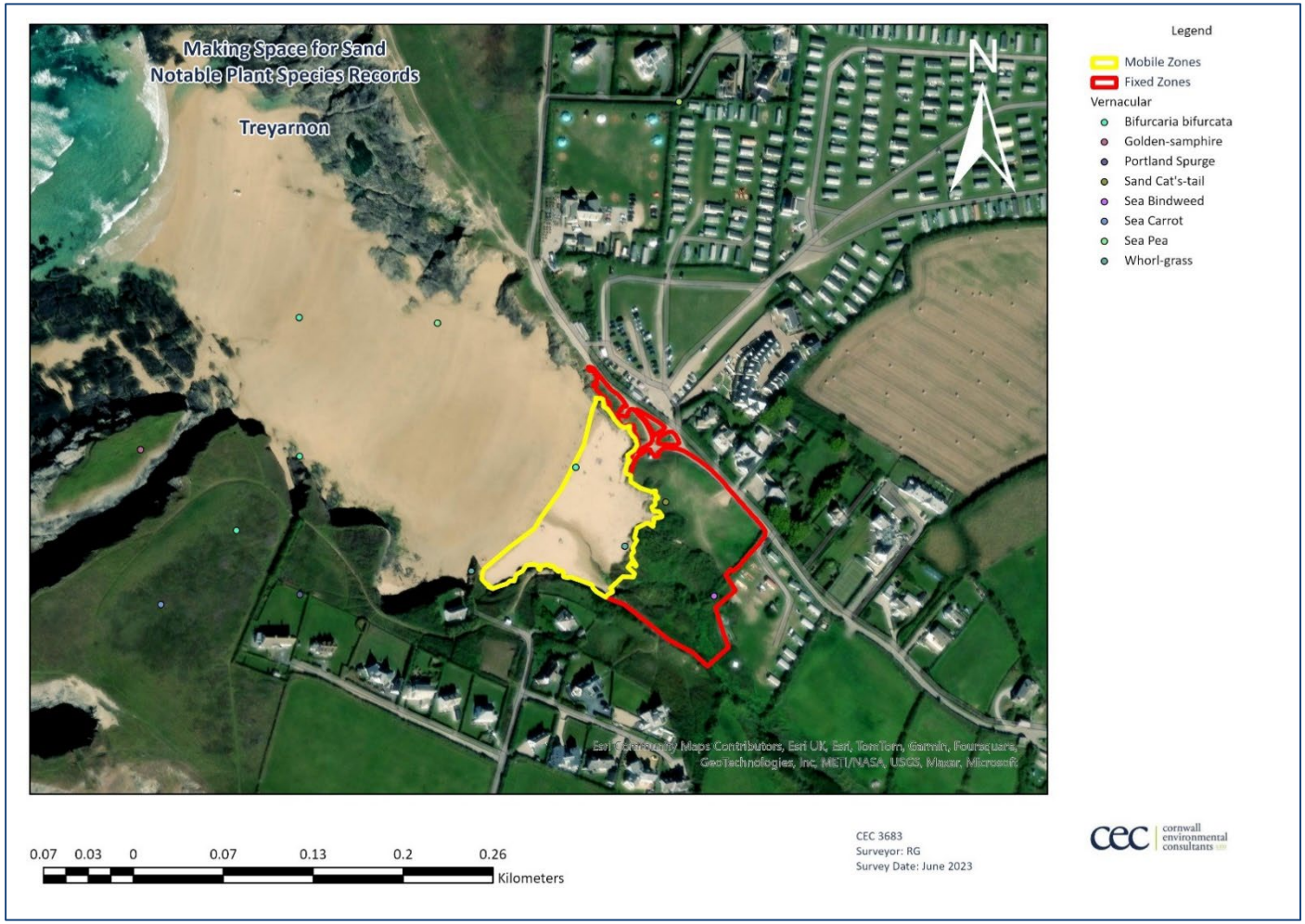


Figure 4: Notable Species Records

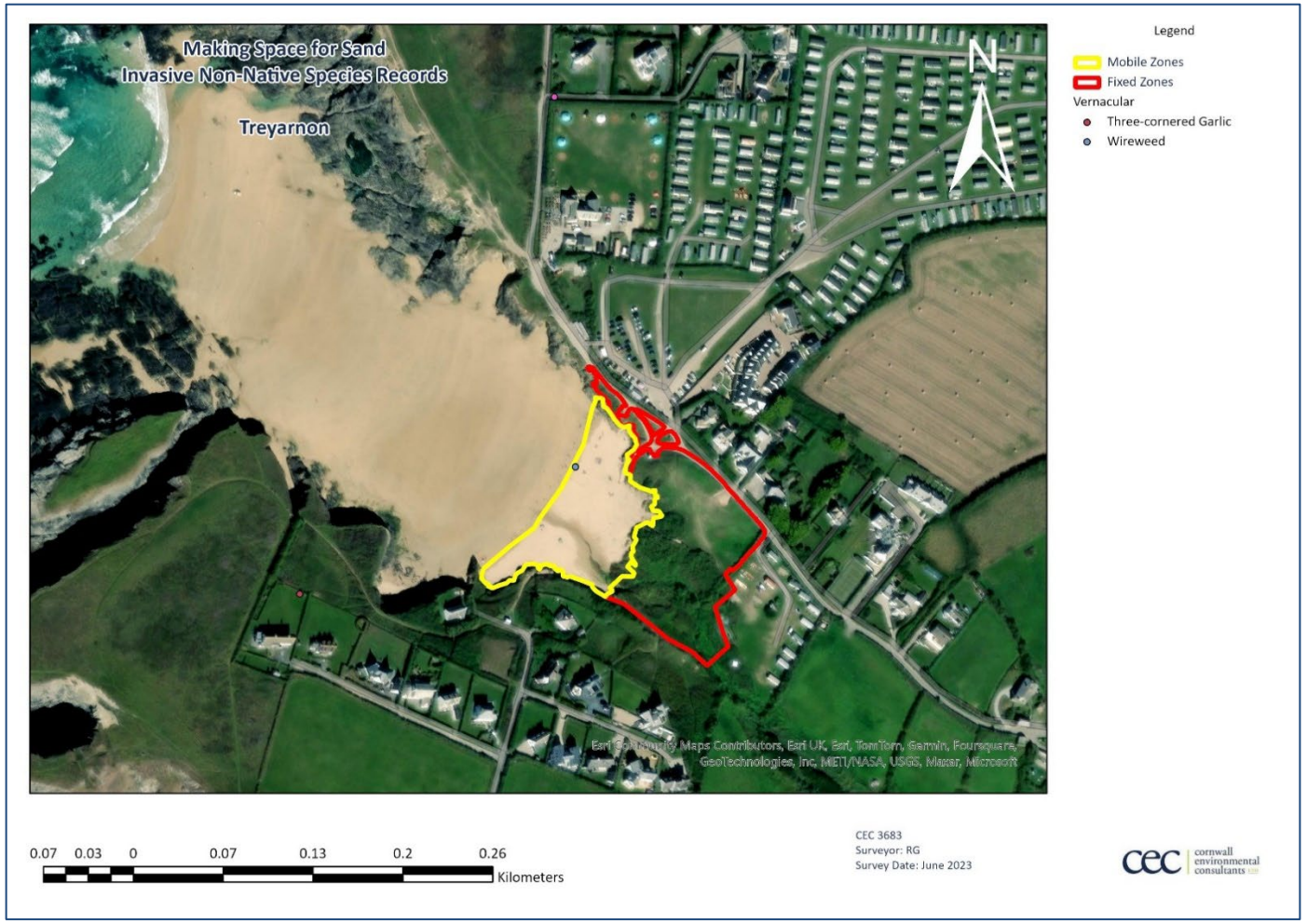


Figure 5: Invasive Non-Native Species Records

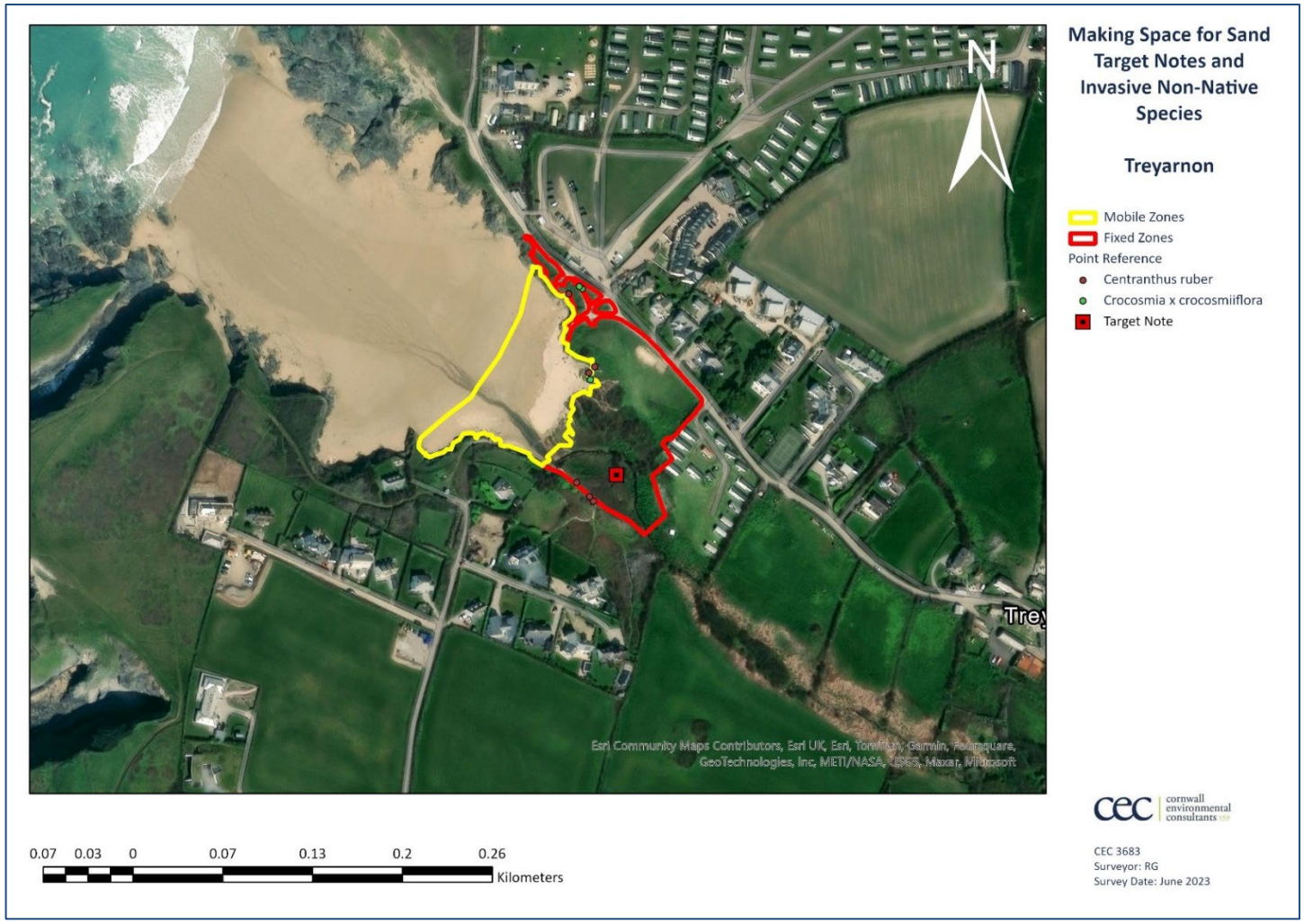
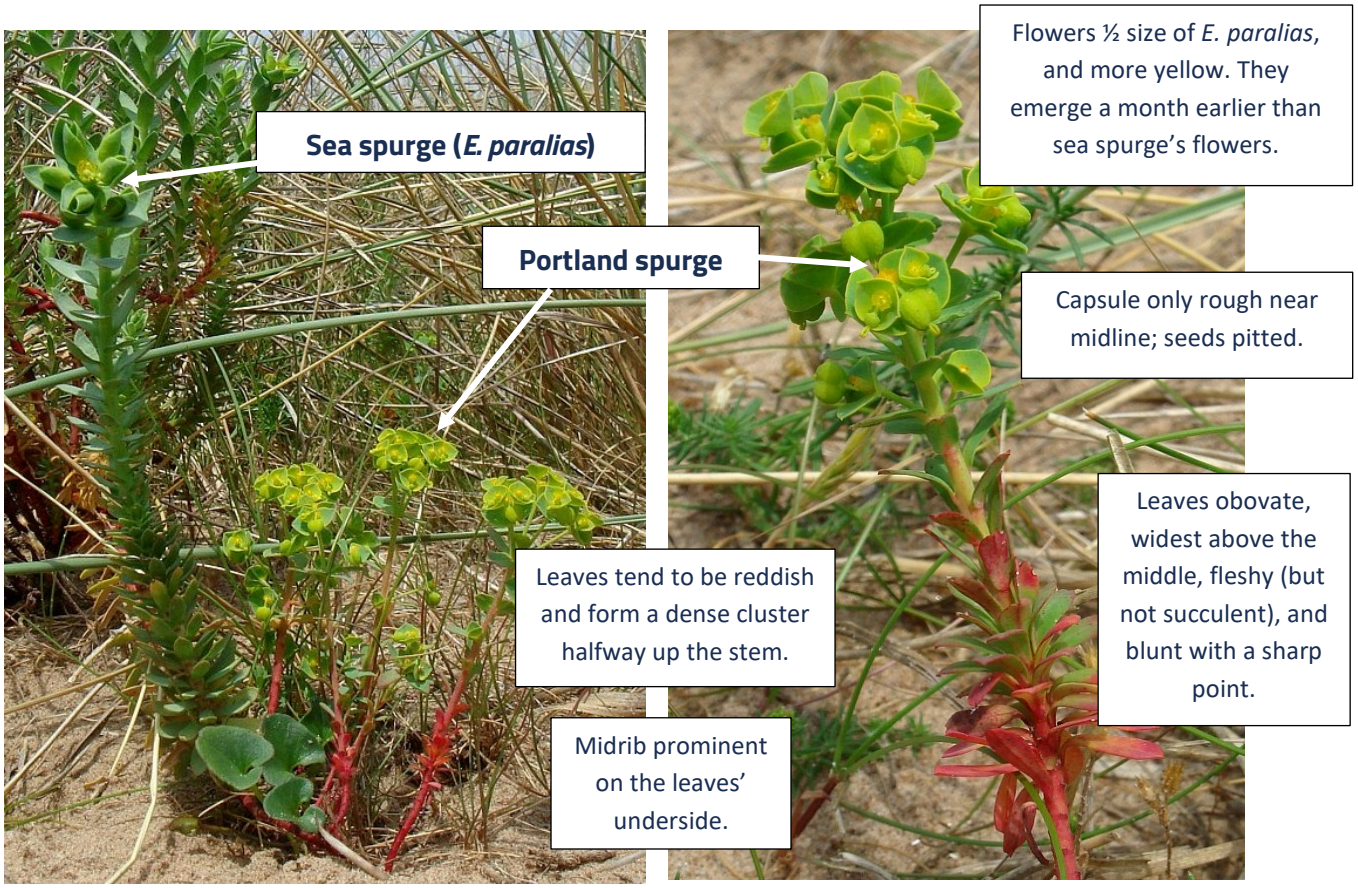


Figure 6: Site Survey Target Notes and Invasive Non-Native Species

8. Species Highlights

8.1.1. Below highlights some key species that have been recorded at the site, either during the survey or through existing data 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.

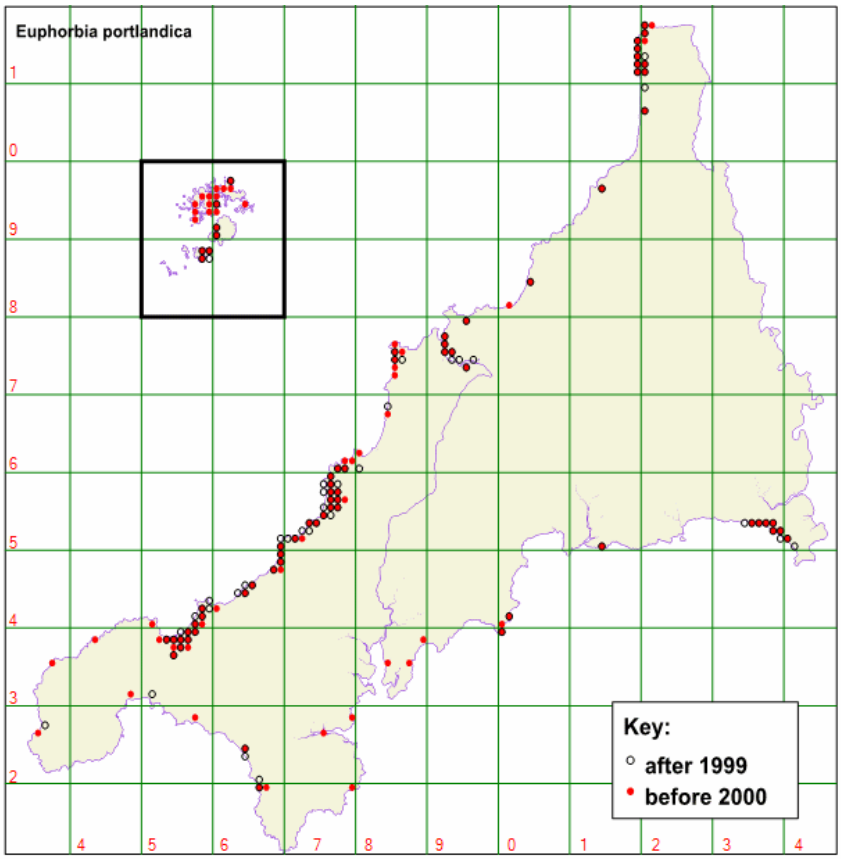
Threats to Portland spurge in Cornwall are similar to other coastal specialists – dune mismanagement leading to shrub encroachment or habitat loss from human development, and an increasingly stochastic and exacerbated risk of violent storms resulting from climate change.

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.



8.3. Shore dock *Rumex rupestris*

One of Europe's most threatened endemic vascular plants, shore dock is a perennial herb belonging to the Polygonaceae or buckwheat family.

***Distribution*:** Tiny and threatened populations along the coastal margins of Normandy and Brittany in France, and Galicia in Spain; Britain is its stronghold. Shore dock has become extinct from Dorset, and the UK is estimated to contain only 700 plants (Stroh *et al*, 2014). Sea defence works, visitor pressure, and more frequent and violent winter storms have all contributed to the decline of this hardy specialist species.

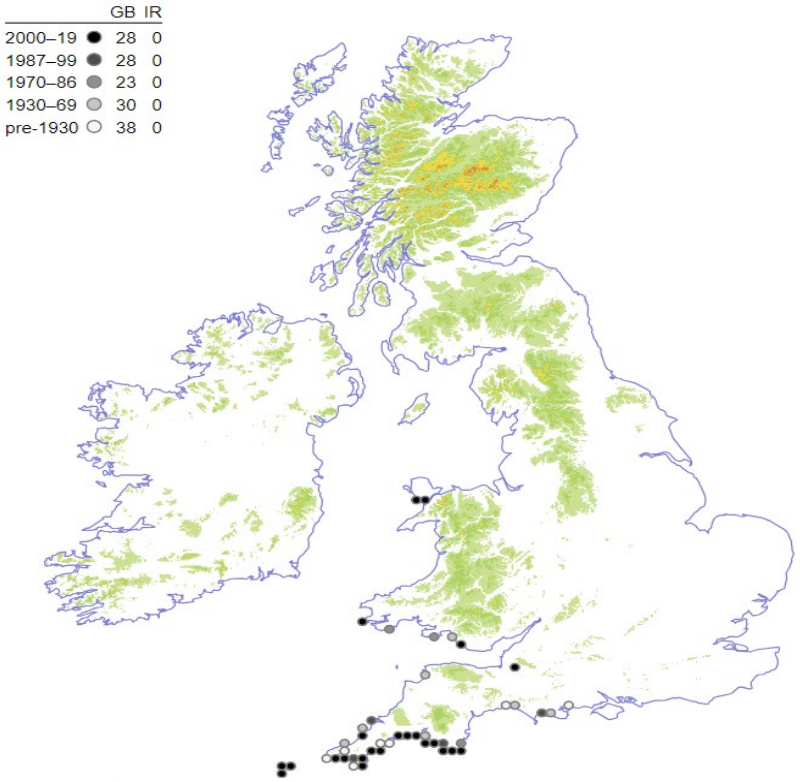
***Habitat**:* Shore Dock can be found on rocky, sandy, and raised beaches, as well as shore platforms and lower slopes of cliffs. However, it only occurs where there's a constant source of freshwater, either running or static.





Identification: Leaves are oblong, taper and have a smooth texture. The tepals have large, swollen tubercles.

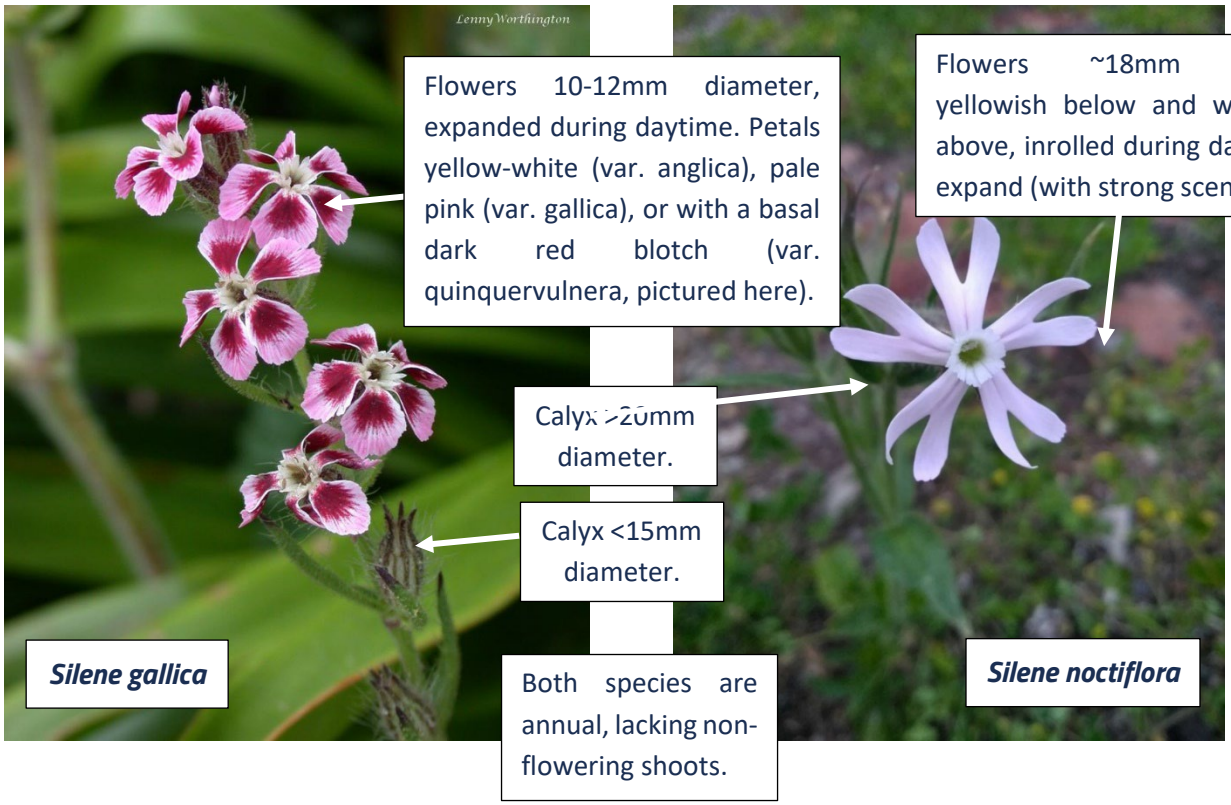
Value to wider habitat: An important nectar source for coastal bee species. Shore dock also plays a role in dune stabilisation, which in turn helps to defend seaside communities from flooding.



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8.4. Small-flowered catchfly *Silene gallica* and night-flowering catchfly *S. noctiflora*



Both rare, declining Silene species in Britain, the sandy coastal arable fields bordering Cornish dune systems offer refuge for both these catchfly species.

Distribution: Agricultural intensification – especially fertiliser and herbicide use and a preference for rapidly growing cereal crops (which create a light-deprived canopy for catchflies) – alongside increased pressure on natural sand dune systems, have caused severe declines in both species, with nationally scarce *S. gallica* listed in Section 41 of the Natural Environment and Rural Communities Act 2006, the Biodiversity Action Plan 2007, and both the Great Britain and England Red Lists (classified as Endangered). *S. noctiflora* is listed in the Cornwall Red Data Book, and the GB and England Red Lists as Vulnerable.

Habitat: Cornwall is the county with the greatest population of small-flowered catchfly, and most here are var. *anglica* and can still be found in several locations, including near Fistral sand dunes in Newquay. Var. *gallica* ('windmill pink') is exceptionally rare in Cornwall, whilst var. *quinquervulnera* is virtually limited to the Isles of Scilly, where mild winters and traditional farming for spring bulbs offer a safe haven, whilst this old method of land management persists.

Value to wider habitat: These catchflies offer important nectar sources for endangered invertebrates – night-flowering catchfly emits a potent, sweet scent as its flowers open each night, attracting several night-flying moth species which this catchfly relies on for pollination.

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 Treyarnon.

Invasive Non-Native Species

9.1.2. There are a small number of invasives noted at Treyarnon, montbretia can be removed by hand, ensuring that all underground corms are removed. Red valerian which is within the dune grassland and vegetated sea cliff can also be removed by hand. Although the invasive species do not present an immediate problem, early control will help to retain and enhance dune health.

Nutrient Enrichment

9.1.3. Treyarnon is a dog friendly beach all year round, with some restrictions in place over the summer months, however this does not apply to the dune area. Dog waste contributes to a high nutrient load on the dune system. Additional signage to explain to beach users the impact of nutrient enrichment from discarded dog waste and how this is impacting the delicate habitat could be placed on site.

Development Pressures

9.1.4. The developments pressures have constrained the landward side of the dune system preventing the rollback of the dune and pushing scrub habitat seaward.

Current control measures

9.1.5. There are no know management measures for the dunes at this site, although Beach Guardian are involved with beach cleans at this location.

10. Biodiversity Net Gain & Ecological Enhancements

10.1.1. The baseline BNG unit score is 6.22 Habitat Units.

Table 6: Biodiversity Net Gain Units

On site baseline	Coastal Sand Dunes	2.9
	Reedbeds	0.29
	Maritime Cliff and Slopes	0.42
	Bramble Scrub	2.52
Total		**6.22**

10.1.2. Key opportunities for enhancement at Treyarnon is for the clearing of some scrub areas to allow for the coastal sand dune habitat to roll back, this could be enhanced by the planting of marram grass and other key dune species such as sea bindweed and sand sedge. Historic imagery has shown that the site has becoming heavily scrubbed over and constricted.

10.1.3. The health of the dune grassland is limited by the heavy footfall and nutrient loading, it appears that part of the dune grassland habitat is used as a temporary car park. By limiting access into this area, the grassland has the opportunity to become more diverse, measures to improve the coastal sand dune habitat health could see an increase in units of circa +4.09 units.

10.1.4. Scrub control at the site would, and the restoration of this to dune habitat in poor condition would see an increase in units of circa 3.23 and see an increase in priority habitat at the site in excess of 100%.

11. Conclusions

11.1.1. This report provides a comprehensive overview of the ecological baseline for the Coastal Sand Dunes at Treyarnon. The assessment includes the application of the UK Habitats Classification system, a Biodiversity Net Gain (BNG) Condition Assessment, and the mapping of invasive species present in the area. These elements collectively offer a detailed understanding of the current ecological status and potential areas for enhancement.

11.1.2. Treyarnon hosts key dune habitats 'shifting dunes with marram' and 'dune grassland', however, the dune system is becoming increasingly fragmented, which threatens its ecological integrity. Additionally, there is a risk of over-stabilisation caused by the encroachment of scrub vegetation on the landward side. This over-stabilisation can alter the natural processes and lead to a decline in habitat quality and diversity.

11.1.3. To counteract these threats and promote ecological resilience, there are several opportunities for achieving Biodiversity Net Gain at Treyarnon. Expanding both the shifting dunes and dune grassland areas is feasible by undertaking scrub clearance at the site. Removing the encroaching scrub will help restore the natural dynamics of the dunes, allowing for the re-establishment of characteristic dune vegetation and the maintenance of open, mobile dune habitats. This approach not only enhances biodiversity but also ensures the long-term ecological health of the coastal sand dune system at Treyarnon.

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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
911	22086658	Inundation vegetation (F2.2)	Reedbeds (f2e)		Wetland	Reedbeds	Moderate	0.01	0.18	
912	22086659	Inundation vegetation (F2.2)	Reedbeds (f2e)		Wetland	Reedbeds	Moderate	0.08	0.11	
908	22087169	Crevice and ledge vegetation (H8.3)	Vegetated sea cliffs (s2a5)		Sparsely Vegetated Land	Maritime cliff and slopes	Poor	0.06	0.41	Annex 1 – Vegetated sea cliffs of the Atlantic coast H1230
920	22087170	Crevice and ledge vegetation (H8.3)	Vegetated sea cliffs (s2a5)		Sparsely Vegetated Land	Maritime cliff and slopes	Poor	0.002	0.01	Annex 1 – Vegetated sea cliffs of the Atlantic coast H1230
905	22087538	Dune grassland (H6.5)	Dune grassland (s3a7)		Sparsely Vegetated Land	Coastal Sand Dunes	Poor	0.31	2.15	Annex 1 – Fixed coastal dunes with herbaceous vegetation 'grey dunes' H2130
907	22087540	Dense Scrub (A2)	Bramble Scrub (h3d)		Heathland and Shrub	Bramble Scrub	N/A	0.20	0.92	
910	22087541	Open Dune (H6.8)	Shifting Dunes with Marram (S3a6)		Sparsely Vegetated Land	Coastal Sand Dunes	Good	0.02	0.48	Annex 1 – Shifting Dunes along the Shoreline with *Ammophila arenaria* H2120

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
913	22087542	Dune grassland (H6.5)	Dune grassland (s3a7)		Sparsely Vegetated Land	Coastal Sand Dunes	Poor	0.002	0.01	Annex 1 – Fixed coastal dunes with herbaceous vegetation 'grey dunes' H2130
914	22087543	Open Dune (H6.8)	Shifting Dunes with Marram (S3a6)		Sparsely Vegetated Land	Coastal Sand Dunes	Poor	0.001	0.01	Annex 1 – Shifting Dunes along the Shoreline with *Ammophila arenaria* H2120
915	22087544	Dune grassland (H6.5)	Dune grassland (s3a7)		Sparsely Vegetated Land	Coastal Sand Dunes	Poor	0.007	0.05	Annex 1 – Fixed coastal dunes with herbaceous vegetation 'grey dunes' H2130
916	22087545	Dense Scrub (A2)	Bramble Scrub (h3d)		Heathland and Shrub	Bramble Scrub	N/A	0.22	1.0	
918	22087546	Dune grassland (H6.5)	Dune grassland (s3a7)		Sparsely Vegetated Land	Coastal Sand Dunes	Poor	0.02	0.13	Annex 1 – Fixed coastal dunes with herbaceous vegetation 'grey dunes' H2130

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
919	22087547	Open Dune (H6.8)	Shifting Dunes with Marram (S3a6)		Sparsely Vegetated Land	Coastal Sand Dunes	Moderate	0.01	0.17	Annex 1 – Shifting Dunes along the Shoreline with *Ammophila arenaria* H2120
921	22087548	Dense Scrub (A2)	Bramble Scrub (h3d)		Heathland and Shrub	Bramble Scrub	N/A	0.13	0.6	

Key Secondary Codes (UK Habs Version 1.1)

10: Scattered Scrub

17: Ruderal/Ephemeral

48: Non-native

75: Management

381 Beaches and Sand Dunes

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