



Net Zero Teesside – Environmental Statement

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Volume III – Appendices

Appendix 12H: Supplementary Habitat Information Report: Coatham Sands (Teessmouth and Cleveland Coast SSSI)

The Infrastructure Planning (Environmental Impact Assessment) Regulations 2017 (as amended)



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12H Supplementary Habitat Information Report: Coatham Sands

12.1 Introduction

- 12.1.1 This report describes the approach and findings of habitat surveys undertaken within Coatham Sands (approximate central grid reference NZ 569 261), part of Teesmouth and Cleveland Coast Site of Special Scientific Interest (SSSI), in support of the ecological impact assessment (EclA) of the Proposed Development. It is noted that Coatham Sands is also subject to international Special Protection Area (SPA) and Ramsar site designations, but as these have not been specifically selected for habitats or flora they are not directly relevant to the scope of this report and therefore are not considered further (see Appendix 12C: Preliminary Ecological Appraisal Report, ES Volume III, Document Ref. 6.4).
- 12.1.2 The terms of reference used to describe the Proposed Development in this report are consistent with those defined within the main chapters of the Environmental Statement (ES) (Volume I, Document Ref. 6.2). However, the Site boundary as referenced in this report denotes the Proposed Development as it was at the time of writing. The Site boundary has continued to be further refined as the design and assessment of the Proposed Development progressed, reducing the overall extent of the Site boundary. Figure 12H1 to 12H3 illustrate the extent of the Site boundary as referred to in this report.
- 12.1.3 Coatham Sands comprises the majority of the sand dune system within Teesmouth and Cleveland Coast SSSI, and the SSSI holds the largest sand dune complex within north-east England. Further information on the habitat and botanical interest of Coatham Sands and the relevant features of interest of the SSSI are provided in Section 12.2 of this report.
- 12.1.4 The Site boundary encompasses part of Coatham Sands, coinciding with terrestrial habitat Units 28 (South Gare and Coatham Dunes) and 29 (Coatham Quarries and Lagoons) of the SSSI. Natural England (2020) considers that there is no identified condition threat to these units, there is no recent condition assessment for these units (recent condition assessments are available for just three of the 33 units comprising the SSSI).
- 12.1.5 A supplementary Phase 1 Habitat survey was undertaken by AECOM on 4th June 2020 within the area of Coatham Sands covered by the Site boundary, with the survey data updated later into the growing season on 8th July 2020.
- 12.1.6 The purpose of the above habitat surveys was to:
- define in more detail the habitat types present, their relative extent, and their associated botanical composition and interest;
 - identify which of the habitats present are reasons for designation of Teesmouth and Cleveland Coast SSSI; and

- identify the relative nature conservation importance of the component habitats present and their potential sensitivity to inform development design and subsequent impact assessment.

12.1.7 The following figures are provided to support this supplementary habitat survey report:

- Figure 12H.1 Phase 1 Habitat Survey Map;
- Figure 12H.2 NERC Act Section 41 Priority Habitats; and
- Figure 12H.3 Distribution of National Vegetation Classification Sand Dune and Grassland Communities.

12.2 Background Information

Reasons for Designation of Teesmouth and Cleveland Coast SSSI

12.2.1 The Teesmouth and Cleveland Coast SSSI is designated for a number of geological, habitat and species features (Natural England, 2018a). The relevant terrestrial habitat interest features are sand dunes and saltmarsh. The SSSI is not designated for any specific plant species.

12.2.2 The SSSI was selected and designated because it meets the following national coastal habitat selection guidelines (Natural England, 2018b):

- *Representing the largest dune system with calcareous substrate in the Area of Search* (which in this case is the Tees Lowland National Character Area (NCA)): the Tees Bay Dunes are the only dune system in the Tees Lowlands NCA;
- *Demonstrating the best combinations of dune with other coastal habitats (particularly saltmarsh or shingle)*: there are transitions to saltmarsh in the Seaton, Seal Sands Peninsula and Coatham Dunes;
- *Demonstrating the best examples of the range of physiographic features, representing the different processes of dune formation*: the Tees Bay Dunes demonstrate two modes of dune formation – bay and spit;
- *Demonstrating the widest range and the best examples of the main National Vegetation Classification (NVC) communities within the Area of Search*: the Tees Bay Dunes include all of the significant stands of sand dune vegetation within the Tees Lowlands NCA including the largest and most diverse stands;
- *Demonstrating a complete succession or zonation of sand dune habitats*: The Tees Bay Dunes support a complete succession of vegetation types from embryo to fixed dunes. They also include a number of transitions from various wet slack communities to dry dune communities; and
- *Demonstrating a large area*: the Tees Bay dunes support over 180 ha of sand dune vegetation.

- 12.2.3 Coatham Sands makes a substantive contribution to the above reasons for selection of the SSSI, as described further in the next section of this report. The designated terrestrial habitats within the section of Coatham Dunes relevant to the Proposed Development are sand dunes, with the other designated habitat interest features absent from this area.

Habitats Present Within Coatham Sands

- 12.2.4 A summary of the terrestrial habitat and botanical interest of Coatham Sands, including those features that are reasons for designation of Teessmouth and Cleveland Coast SSSI, is provided below based on the citation for the SSSI (Natural England, 2018a). This is supported by additional supplementary information subsequently published by Natural England (Natural England, 2018b), as well as information from the archived citation for the preceding South Gare and Coatham Sands SSSI (Natural England, 1988). The latter SSSI is no longer a standalone designation and instead is subsumed into Teessmouth and Cleveland Coast SSSI.
- 12.2.5 The existing topography and habitat conditions of the Coatham Sands dune system have been heavily influenced by a long history of human intervention, including sand extraction and use of the area for the disposal of furnace slag originating from the adjacent former Redcar Steelworks. Construction of the South Gare breakwater has influenced sediment dynamics within the dune system (increasing sand dune stability), influencing the extent of early successional dune habitats.
- 12.2.6 The designated sand dune interest of the SSSI is considered notable because it represents a particularly large area of sand dune habitat (approximately 130 ha), and because it comprises a complete succession of typical sand dune vegetation from strandline vegetation at the head of the beach, through (in order of occurrence) foredunes, mobile dunes (both of which are also referred to as 'yellow dunes') and semi-fixed dunes ('grey dunes'), to fixed dune grassland and associated transitions to wetter dune slack habitats, and small stands of dune scrub.
- 12.2.7 Small pockets of strandline vegetation occur just above the tideline throughout the site and include sea sandwort (*Honckenya peploides*) and sea rocket (*Cakile maritima*).
- 12.2.8 Foredunes (also known as pioneer dunes) of sand couch (*Elymus junceiformis*) are much more extensive and grade into mobile dunes with stands dominated by both marram (*Ammophila arenaria*) and lyme-grass (*Leymus arenarius*). As the maritime influence ameliorates within the semi-fixed grey dunes the dominance of marram and lyme-grass wanes and other plants such as red fescue (*Festuca rubra*), ragwort (*Jacobaea vulgaris*) and common cat's-ear (*Hypochaeris radicata*) become prominent. The mobile dunes support the Nationally Scarce rush-leaved fescue (*Festuca arenaria*).
- 12.2.9 The bulk of the dune system at Coatham Sands comprises semi-fixed dunes where grasses occur in association with a higher cover and greater diversity of herbs. The latter include prominent contributions from common bird's-foot trefoil (*Lotus corniculatus*), lady's bedstraw (*Galium verum*), fairy flax (*Linum catharticum*) and common restharrow (*Ononis repens*). The fixed dunes also support a number of scarce and threatened species, including purple milk-

- vetch (*Astragalus danicus*), lesser meadow-rue (*Thalictrum minus*), field mouse-ear (*Cerastium arvense*) and carline thistle (*Carlina vulgaris*).
- 12.2.10 Dune grassland extends inland beyond the limit of the dunes and can support a comparable flora to the fixed dunes. However, in contrast, there are also large areas with a coarse sward dominated by false oat-grass (*Arrhenatherum elatius*).
- 12.2.11 Many of the herb species present in the fixed dunes and good quality dune grassland, including purple milk-vetch, can also be found on areas where lime-rich furnace slag was tipped in the past. Other species of lime-rich habitats are also present, including yellow-wort (*Blackstonia perfoliata*) and blue fleabane (*Erigeron acris*). Deposits of blown sand blurs the distinction between these slag deposits and dune vegetation resulting in some complex mosaics of vegetation.
- 12.2.12 There are also a number of dune slacks (damp depressions) within the dune system, which support a range of ground water dependent vegetation types, usually with a sward dominated by mixtures of red fescue, Yorkshire-fog (*Holcus lanatus*) and creeping bent (*Agrostis stolonifera*). Creeping willow (*Salix repens*), a typical woody species of dune slacks elsewhere, is extremely scarce in the Tees Estuary and, while it is present locally, it does not form a regular component of these dune slacks. Some of the slacks also support salt tolerant species and are considered to have arisen through isolation and absorption of previous areas of saltmarsh. These areas support species such as saltmarsh rush (*Juncus gerardii*), sea plantain (*Plantago maritima*) and sea-milkwort (*Lysimachia maritima*), although none of these species is exclusively found in saltmarsh habitats. More consistently wetter areas within the dune system support taller swamp communities.
- 12.2.13 Table 12H.1 summarises the NVC sand dune vegetation communities recorded from Coatham Sands as identified and quantified in Natural England (2018b).

Table 12H.1: Sand dune vegetation communities at Coatham Sands (after Natural England, 2018b)

Sand Dune NVC Community	Area Present at Coatham Sands	Total Area Within the SSSI	Percentage of Total Area in SSSI
SD2 <i>Honckenya peploides</i> - <i>Cakile maritima</i> strandline community	Present	Present	-
SD4 <i>Elymus farctus</i> ssp. <i>boreali-atlanticus</i> foredune community	6.09ha	8.07ha	75%
SD5 <i>Leymus arenarius</i> mobile dune community	1.85ha	1.96ha	94%
SD6 <i>Ammophila arenaria</i> mobile dune community	13.00ha	20.09ha	65%
SD7 <i>Ammophila arenaria</i> - <i>Festuca rubra</i> semi-fixed dune community	28.90ha	40.77ha	71%

Sand Dune NVC Community	Area Present at Coatham Sands	Total Area Within the SSSI	Percentage of Total Area in SSSI
SD8 <i>Festuca rubra</i> - <i>Galium verum</i> fixed dune grassland	31.35ha	52.00ha	60%
SD9 <i>Ammophila arenaria</i> - <i>Arrhenatherum elatius</i> dune grassland	47.33ha	60.93ha	77%
SD16 <i>Salix repens</i> - <i>Holcus lanatus</i> dune slack	0.98ha	0.98ha	100%
SD19 <i>Phleum arenarium</i> - <i>Arenaria serpyllifolia</i> dune annual community	Present	Present	-

Wildlife Legislation and Planning Policy

- 12.2.14 The following wildlife legislation, planning policy and guidance is specifically relevant to the identification and assessment of potential constraints posed by the extension of the Proposed Development Site into Coatham Sands, as part of a designated SSSI, and the presence of notable habitats and flora. At this stage of assessment, this legislation, policy and guidance is primarily listed to demonstrate that an appropriate level of survey and assessment has been undertaken to meet likely data requirements for future decision-making regarding these material considerations.
- 12.2.15 Wider relevant biodiversity legislation, policy and guidance is detailed in Appendix 12A Legislation and Policy Relevant to Ecology (ES Volume III, Document Ref. 6.4).
- 12.2.16 The habitats and flora of Coatham Sands, as part of a designated SSSI, is legally protected under the Wildlife and Countryside Act 1981 (as amended). This legislation means that certain activities within the SSSI are prohibited, and that there are legal duties concerning how the areas should be managed and protected. Of specific relevance to the habitats and botanical interest of Coatham Sands:
- It is an offence to intentionally or recklessly damage, disturb or destroy land known to be an SSSI or intentionally or recklessly disturb the wildlife in an SSSI;
 - If you are owner or occupier of an SSSI, it an offence to carry out any activity that is likely to damage the SSSI without consent from Natural England;
 - Under the Act, the owner or occupier may enter into a management agreement for the purposes of securing the SSSI special interest;
 - Statutory bodies have a general duty to take reasonable steps to further the conservation and enhancement of the special feature of SSSIs, including when making planning decisions; and
 - Where statutory bodies propose to undertake or permit activities that could affect a SSSI they must consult Natural England. If the activity

cannot be avoided it must be undertaken in a way least damaging to the SSSI.

- 12.2.17 The sand dune habitats of Coatham Sands are a habitat type specifically named within the National Planning Policy Framework (NPPF) (Ministry of Housing, Communities and Local Government, 2019) as an example of an irreplaceable habitat type i.e. habitats that are technically very difficult (or takes a very significant time) to restore, recreate or replace once destroyed, taking into account their age, uniqueness, species diversity or rarity.
- 12.2.18 The NPPF indicates that development resulting in the loss or deterioration of irreplaceable habitats should be refused, unless there are wholly exceptional reasons and a suitable compensation strategy exists. Wholly exceptional reasons are defined in the NPPF and are considered to be infrastructure projects (including nationally significant infrastructure projects), where the public benefit would clearly outweigh the loss or deterioration of the affected habitat(s).
- 12.2.19 The Overarching National Policy Statement for Energy (EN-1) advises that *“Where a proposed development on land within or outside an SSSI is likely to have an adverse effect on an SSSI (either individually or in combination with other developments), development consent should not normally be granted. Where an adverse effect, after mitigation, on the site’s notified special interest features is likely, an exception should only be made where the benefits (including need) of the development at this site, clearly outweigh both the impacts that it is likely to have on the features of the site that make it of special scientific interest and any broader impacts on the national network of SSSIs.”*
- 12.2.20 If such circumstances apply, then it is expected that use would be made of *“requirements and/or planning obligations to mitigate the [significant] harmful aspects of the development and, where possible, to ensure the conservation and enhancement of the site’s biodiversity or geological interest.”*
- 12.2.21 In support of compliance with the above legislation and planning policy, Natural England has identified a list of operations that require its consent (Natural England, 2018c). Of these, the operations likely to affect habitats and flora and that are therefore of potential relevance to the Proposed Development encompass:
- Cultivation, including ploughing, rotovating, harrowing and re-seeding (potentially including actions necessary for habitat reinstatement following construction of the Proposed Development);
 - Destruction, displacement, removal or cutting of any plant or plant remains, including tree, shrub, herb, hedge, dead or decaying wood, moss, lichen, fungal fruiting bodies, leaf-mould, turf or peat;
 - Tree and/ or woodland management and alterations to tree and/ or woodland management (including, planting, felling, pruning and tree surgery, thinning, coppicing, changes in species composition, removal of fallen timber);
 - Alterations to water levels and tables and water utilisation (including irrigation, storage and abstraction from existing water bodies and

through boreholes). Also, the modification of current drainage operations (including the installation of new pumps);

- Destruction, construction, removal, re-routing, or re-grading of roads, tracks, walls, fences, hardstands, banks, ditches or other earthworks, including soil and soft rock exposures or the laying, maintenance or removal of pipelines and cables, above or below ground;
- Storage of materials on sensitive features (notified geological features, sand dunes, saltmarshes and wetland habitats);
- Erection of permanent or temporary structures or the undertaking of engineering works, including drilling;
- Modification of natural or man-made features and clearance of boulders, large stones, loose rock; and
- Use of vehicles or craft.

12.1.3 Several of the habitats, including the designated sand dune habitats, within Coatham Sands are priority habitats for nature conservation in England under Section 41 (S41) of the Natural Environment and Rural Communities (NERC) Act 2006. Similarly, one of the plant species present, purple milk-vetch, is a priority species under S41. Section 40 of the same Act places a duty on all public bodies to *“have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity”*, including but not necessarily restricted to those habitats and species listed under S41.

12.3 Methods

Desk Study

- 12.3.1 A desk study was carried out as part of the PEA (Appendix 12C, ES Volume III, Document Ref. 6.4) that was completed in advance of the survey and informed the scoping of requirements for further survey.
- 12.3.2 Desk study results of relevance to the assessment have been carried forward into this report, where appropriate this data is presented in more detail or re-interrogated for the needs of the current assessment.

Habitat Survey

- 12.3.3 A Phase 1 Habitat survey was completed by an experienced botanist and an assistant on the 4th June 2020 in accordance with the published methods and habitat classification (JNCC, 2016). The extent of the Site boundary within Coatham Sands and results of the survey are shown on Figure 12H.1 of this report. The Site boundary has since been further refined as the design of the Proposed Development has progressed.
- 12.3.4 Phase 1 Habitat survey is a standard method of environmental audit. It involves categorising, mapping and describing different habitat types and habitat features within a survey area. The information gained from the survey can be used to determine the likely ecological value of a site, and to direct any more specific survey work which may need to be carried out prior to the submission of a planning application.
- 12.3.5 During Phase 1 Habitat survey, notes ('target notes') are collected on the habitats present, and also on the locations and characteristics of notable or small-scale habitat features, and protected, notable and invasive species. The target notes recorded are provided in Annex A and the position of these is shown on Figure 12H.1. Typical and notable plant species were recorded for all habitat types present and reflect the conditions at the time of survey. The relative abundance of each species present being recorded within the target notes using the DAFOR scale as follows:
- D = Dominant (greater than 75% total cover);
 - A = Abundant (51 to 75% total cover);
 - F = Frequent (26 to 50% total cover);
 - O = Occasional (11 to 25% total cover; and
 - R = Rare (1 to 10% total cover).
- 12.3.6 The prefix L was used where species are Local (patchy) in distribution. If a species appeared to be intermediate between two categories, it was generally assigned to the lower category.
- 12.3.7 The draft habitat map from the above survey was verified further during a survey on 8th July 2020, when additional botanical data was collected to supplement the target notes and the habitat descriptions provided in this report. At this time, botanical data was also collected for the two standing waterbodies present (Waterbodies 9 and 14). More information on these

waterbodies can be found in Chapter 13: Aquatic Ecology (ES Volume I, Document Ref. 6.2).

- 12.3.8 In addition to the identification of Phase 1 Habitat types, care was also taken to consider and identify the presence of any additional composite habitats that are of nature conservation importance but that are not encompassed within the Phase 1 Habitat classification. Typically, such composite habitats encompass two or more discrete Phase 1 habitat types. Specifically, given the known historic use Coatham Sands for the disposal of furnace slag, it was considered that there was high potential for Open Mosaic Habitats (OMH) on Previously Developed Land (Maddock, 2010) to occur.

Identification of NVC Communities

- 12.3.9 The sand dune NVC communities present within Coatham Sands are well understood (see Table 12H-1) but there was a need to clarify the presence and extent of these within the Site boundary. In addition, there was potential for other communities to be present that are not reasons for designation of the SSSI, but that may otherwise have a high intrinsic nature conservation value or add materially to the biodiversity interest of Coatham Sands.
- 12.3.10 Most of the sand dune NVC communities recorded for the SSSI are relatively straightforward for an experienced botanist to identify based on their species composition (which is often restricted to a relatively limited suite of specialist plant species), and because they usually occur in clearly defined bands and in sequence from seashore to the rear of the dune system. Indeed, it was the intention of the original work for the NVC classification (Rodwell, 2000) to identify and circumscribe vegetation communities in such a way that they could be identified using representative botanical species lists, without a need to apply the same survey methods that were used to construct the classification.
- 12.3.11 NVC communities were therefore assigned with reference to the botanical data gathered and mapped by eye. NVC survey (quadrat survey) was not necessary for the identification of the sand dune NVC communities present, or to understand the potential implications of the Proposed Development for these communities when making the subsequent ecological impact assessment.
- 12.3.12 It is emphasised that the potential need for NVC survey was considered on-site before reaching a final decision on this with reference to the conditions encountered. No requirements for NVC survey were identified during the survey. It is also emphasised that NVC survey may be appropriate later, prior to the construction of the Proposed Development, to collect focussed detailed data for locations where construction works would be undertaken (this was not fixed at the time of survey) suitable to inform and agree (with relevant stakeholders) final specifications for habitat mitigation and reinstatement, post-reinstatement aftercare, and any associated requirements for habitat monitoring.

Nature Conservation Evaluation Approach

- 12.3.13 An essential prerequisite step to allow EclA of the Proposed Development is an evaluation of the relative nature conservation value of the identified

ecological features (encompassing nature conservation designations, ecosystems, habitat and species). This is necessary to set the terms of reference for EclA. This first step is made in this report, but it is not the purpose of the report to make the formal ecological impact assessment of the Proposed Development. This is provided in Chapter 12: Terrestrial Ecology and Nature Conservation of ES Volume I, Document Ref. 6.2.

- 12.3.14 The method of evaluation that has been utilised has been developed with reference to the Chartered Institute of Ecology and Environmental (CIEEM) *Guidelines for Ecological Impact Assessment in the UK and Ireland – Terrestrial, Freshwater and Coastal and Marine – Second Edition* (CIEEM, 2019). These give advice on scoping and carrying out environmental assessments and place appraisal in the context of relevant policies. Data received through consultation, desk-based studies and field-based surveys are used to allow ecological features of nature conservation value or potential value to be identified, and the main factors contributing to their value described and related to available guidance. These data can also be used to identify other relevant values e.g. socio-economic or ecosystem services values, but this is beyond the remit of this report and requires the involvement of other relevant specialists.
- 12.3.15 The value of habitats and floral species may relate, for example, to geographic location (habitats and species may be rare and more valued towards the edge of their geographic range), the extent to which the habitats and species are threatened throughout their range, or to their rate of decline. Where confirmed as present, the value of the habitats and species associated with the site has been defined with reference to the geographical level at which it is considered to matter. This assessment has been made with reference to published guidance and criteria where available e.g. criteria to assess relative value within the context of Tees Valley are given by Tees Valley Nature Partnership (2010).

Limitations

- 12.3.16 There are no limitations to the survey work undertaken. The surveys were completed in appropriate weather conditions and were completed in the appropriate survey season (late spring to summer) for recording the habitats and flora present.

12.4 Results

Desk Study

- 12.4.1 The desk study returned five recent records of notable native plants species in association with the habitats of Coatham Sands (Table 12H-2). The nature conservation status of these plant species has been identified within reference to Joint Nature Conservation Committee (2020) and the Tees Valley Local Biodiversity Action Plan (LBAP) (Tees Valley Biodiversity Partnership, 2012).

Figure 12H-2: Desk study records of notable native plant species

Species	Status	Record Details	Record Within the Site	Source of Record
Bloody crane's-bill (<i>Geranium sanguineum</i>)	Near Threatened in England	Sand dunes at NZ 557 273 (2016)	No	Environmental Records Information Centre North East (ERIC)
Carline thistle	Near Threatened in England	Coatham Sands	Not known	Natural England 2018a
Proliferous pink (<i>Petrorhagia prolifera</i>)	Nationally Rare, Endangered in Great Britain	Sand dunes at NZ 5569 2752 (2018)	No	ERIC
Purple milk-vetch	S41, Endangered in England, Tees Valley LBAP	Sand dunes at NZ 5588 2725 (2018)	No	ERIC
Rush-leaved fescue	Nationally Scarce, not threatened	Coatham Sands	Not known	Natural England 2018a

Phase 1 and Related Habitat Types

Sand Dune Habitats

- 12.4.2 The following sand dune habitats are present in the Site boundary at Coatham Sands and are described in series from the head of the beach (above the intertidal zone) to the most inland extent of these habitats. This sequence broadly accords with the natural successional sequence of sand dune habitats.
- 12.4.3 All of the identified habitats are encompassed within the scope of the S41 coastal sand dunes priority habitat (Maddock, 2008a), as well as being a Tees Valley LBAP priority habitat. S41 priority habitats are mapped on Figure 12H.2.

Strandline Vegetation

- 12.4.4 Strandline vegetation (Target Note 24, Annex A) is comprised of annual plant species and occurs on the drift line at the head of the beach. The habitat was not well developed at the time of survey (Photograph 1, Annex B), and it is possible that its cover and composition varies between years due to factors

such as weather (spring 2020 was unusually dry and may have affected plant germination), storm surges and recreational pressures.

- 12.4.5 Some limited germination of component plant species was observed at the time of the second survey visit in July 2020. At this time, small numbers of young plants of sea rocket and frosted orache (*Atriplex laciniata*) were present.

Open Dune

- 12.4.6 Open dune habitat encompasses the full succession of sand dune habitats from foredune to semi-fixed dunes (Target Note 23, Annex A). Each of the dunes in this sequence is quite different in character due to variation in (increasing) substrate age and stability, and the organic content of these substrates.
- 12.4.7 The foredune is located immediately landward of the strandline and is a small dune (less than 5 m wide and 1.5 m high) of very loose sand with negligible organic content (Photograph 2, Annex B). The vegetation present is limited both in terms of its species composition and total cover. The prevailing plant species in this habitat is sand couch, accompanied by rush-leaved fescue (as subspecies *oraria*) and locally small stands of lyme-grass. Sea sandwort is also present but is rare.
- 12.4.8 The mobile dune is a much larger dune (to 5 m high) and is only weakly stabilized. It has a marked but incomplete plant cover dominated by marram in association with rush-leaved fescue and localised small stands of lyme-grass (Photograph 3, Annex B). A limited suite of herbs occurs in association with these grasses, the most frequently encountered of which were cat's-ear (as subsp. *radicata*) rough hawkbit (*Leontodon hispidus*), wild parsnip (*Pastinaca sativa* subsp. *sylvestris*), prickly sow-thistle (*Sonchus asper* subsp. *asper*), common rest-harrow and dandelion (*Taraxacum* agg.).
- 12.4.9 The majority of the open dune habitat is represented by a series of semi-fixed dunes of comparable height to the preceding mobile dune. The substrate of these dunes has an obvious organic content, and the dunes are almost completely vegetated. However, the vegetation still has an open structure with bare sand visible between plants (Photographs 5 and 6, Annex B).
- 12.4.10 The semi-fixed dunes are one of the most botanically diverse habitats within Coatham Sands (along with areas of good quality dune grassland and the vegetation on some of the historic deposits of lime-rich furnace slag). Typical flora includes abundant marram, kidney-vetch (*Anthyllis vulneraria* subsp. *vulneraria*), lady's bedstraw (as subspecies *maritimum*), little mouse-ear (*Cerastium semidecandrum*) and Uig hawkweed (*Hieracium uiginskyense*), frequent common whitlow-grass (*Erophila verna*), fern-grass (*Catapodium rigidum* subsp. *rigidum*), sand sedge (*Carex arenaria*), cat's-ear, common ragwort (*Jacobaea vulgaris*) and red fescue (*Festuca rubra*), and occasional red valerian (*Centranthus ruber*), Oxford ragwort (*Senecio squalidus*), rough hawkbit, intermediate polypody (*Polypodium interjectum*), common toadflax (*Linaria vulgaris*), common bird's-foot-trefoil, perennial wall-rocket (*Diplotaxis tenuifolia*) and carline thistle.

- 12.4.11 Small blow-outs (depressions caused by the removal of sand by wind) occur frequently, and where they approach the water table a discrete community characterised by abundant sand cat's-tail and sand-hill screw-moss (*Syntrichia ruralis* subsp. *ruraliformis*) is present (Photograph 4, Annex B).

Dune Grassland

- 12.4.12 Dune grassland (Target Note 22, Annex A) occurs in association with the most fixed (consolidated) areas of sand dune, and consequently it is of limited extent within the Site boundary and is largely restricted to the southern-most edge of the dune system and land immediately adjacent to this. This habitat was recorded and mapped conservatively with reference to the precise definition given in the Phase 1 habitat survey manual, which excludes areas of sand dunes that are "*markedly hilly or undulating, and by the sand not being fully consolidated*". This definition therefore excludes most of the dune system, which instead is covered by the open dune habitat.
- 12.4.13 While the dune grassland is of limited extent within the Site boundary it is species-rich (Photographs 10-12, Annex B). Within this grassland, the contribution from marram declines substantively and is replaced by a mixture of false oat-grass, red fescue, soft brome (*Bromus hordeaceus* subsp. *hordeaceus*) and cock's-foot (*Dactylis glomerata*). A diverse assemblage of herb species is present as described above for the semi-fixed dunes, but also including locally frequent purple milk-vetch.
- 12.4.14 Immediately inland from the dune grassland are extensive areas of rank species-poor grassland supporting a limited diversity and cover of herb species. This grassland is directly comparable to inland grassland habitats where management regimes are sub-optimal. Historically, this grassland may have been more botanically diverse but there is no obvious affinity with dune grassland. Consequently, this poor-quality grassland is not considered to form part of the dune grassland and is covered below under 'other habitats.'

Dune Slack

- 12.4.15 Dune slacks are valleys or hollows between dune ridges where the water table is close to the surface for at least several months in the year, providing ground conditions suitable for marshy vegetation or flora of marshy habitats. The reliability and duration of the water supply determines the relative contribution from marshy vegetation/ flora relative to other plant species. The dune slacks within the Site boundary are located at the drier end of the hydrological gradient suitable for sustaining dune slack vegetation and consequently show a strong affinity with adjacent areas of dune grassland (Photographs 7-10, Annex B). Plant species requiring reliably marshy ground are no more than occasional within the slacks.
- 12.4.16 There are three areas of dune slack, all of which are species-rich, within the Site boundary. No plant species were recorded that are strong indicators of saltmarsh, although some species were recorded that tolerate salinity and consequently occur in a wide variety of coastal habitats. From east to west the dune slacks are located at:
- Target Note 20 (Annex A), this tends towards dune grassland but supports some wetland indicator plant species, including lesser

spearwort (*Ranunculus flammula* subsp. *flammula*), wild angelica (*Angelica sylvestris*), marsh pennywort (*Hydrocotyle vulgaris*), marsh fragrant-orchid (*Gymnadenia densiflora*), northern marsh-orchid (*Dactylorhiza purpurella*), sea plantain, silverweed (*Potentilla anserina*) and yellow-rattle (*Rhinanthus minor* subsp. *stenophyllus*);

- Target Note 19 (Annex A), where there is a comparable community to that described above; and
- Target Note 7 (Annex A), this again tends towards dune grassland but there is additional interest in association with bare ground and vehicle ruts. Wetland species recorded include yellow-rattle, greater plantain (*Plantago major* subsp. *intermedia*), distant sedge (*Carex distans*), few-flowered spike-rush (*Eleocharis quinqueflora*), sea milkwort (*Lysimachia maritima*), marsh fragrant-orchid, meadowsweet (*Filipendula ulmaria*), northern marsh-orchid, hemlock water-dropwort (*Oenanthe crocata*) and common valerian (*Valeriana officinalis* subsp. *sambucifolia*). Young trees of alder (*Alnus glutinosa*) are also present in this dune slack. Further west beyond the Site boundary this slack system develops a greater saline influence more consistent with saltmarsh.

12.4.17 This community, in accordance with the description of the habitat given in the Phase 1 habitat survey manual, is not taken to encompass areas of rank wetland and swamp vegetation. These are described below under 'other habitats.' Aerial imagery indicates that as recently as 2008 these areas were under standing water, and therefore this rank wetland and swamp has established through natural succession from open water habitats.

Dune Scrub

12.4.18 Dune scrub habitat is not well developed within the Site boundary and comprises small patches of dense or scattered scrub in association with the above sand dune habitats. Typical native species, often occurring as monospecific stands, include sea buckthorn (*Hippophae rhamnoides*), brambles (*Rubus fruticosus* agg.), dog-roses (*Rosa canina* and *Rosa squarrosa*), burnet rose (*Rosa spinosissima*) and rarely, in or at the edge of dune slack habitats, immature common alder (Target Note 26, Annex A) or creeping willow (*Salix repens* subsp. *argentea*) (Target Note 17, Annex A). While dewberry (*Rubus caesius*) is considered indicative of certain dune slack habitats, this species was rare to absent within the Site boundary being replaced by other bramble species and/ or hybrids (*Rubus fruticosus* agg.).

Other Phase 1 Habitat Types

12.4.19 The following additional habitats were recorded from Coatham Sands. In accordance with the habitat definitions given in the Phase 1 Habitat survey manual these cannot be considered sand dune habitats, indeed comparable habitats can be found in non-coastal settings. Accordingly, these habitats are not considered features of interest for which the SSSI was designated.

12.4.20 Certain of the habitats present are examples of, or contribute to, S41 and Tees Valley LBAP priority habitats. This is clarified further below and in the following section on OMH. S41 priority habitats are mapped on Figure 12H.2.

Neutral Semi-improved Grassland

- 12.4.21 The extensive neutral semi-improved grassland community has been segregated from the dune grassland described above because it lacks plant species typical of the wider dune system, is species-poor and shows a greater floristic affinity with inland rank grassland types (Photographs 15-19, Annex B). Review of historic mapping indicates that much of this grassland is likely to coincide with land that pre-dates establishment of the current dune system and was previously in use as tramways and slag works for the former Redcar Steelworks.
- 12.4.22 The grassland is dominated by false oat-grass, with abundant cock's-foot, Yorkshire-fog, and red fescue. Other typical plant species comprise a limited variety of tall and ruderal herbs present at low cover, particularly colt's-foot (*Tussilago farfara*), wild angelica, hogweed (*Heracleum sphondylium*), common fleabane (*Pulicaria dysenterica*), creeping thistle (*Cirsium arvense*) and hemlock water-dropwort. Common reed is locally frequent where the neutral grassland is in transition towards wetland, accompanied locally by common scurvygrass (*Cochlearia officinalis*). The grassland is being invaded, significantly in places, by scrub of brambles, elder (*Sambucus nigra*), grey willow (*Salix cinerea* subsp. *oleifolia*) and non-native Japanese rose (*Rosa rugosa*).

Ephemeral / Short Perennial Vegetation

- 12.4.23 Ephemeral/ short perennial vegetation habitat coincides with land previously used for, and disturbed by, historic tramways and slag works for the former steelworks and associated historic tipping of furnace slag. It occurs in two discrete settings that are best segregated for purposes of subsequent EclA. These are (a) extensive areas of relatively level substrate comprised of rolled out (crushed) clinker-sized slag materials and supporting a relatively simple ruderal plant community (Photographs 20-25, Annex B), and (b) bings of consolidated slag standing above the surrounding ground level and supporting a more complex matrix of vegetation types with gradations towards drought-stressed calcareous grassland and scrub (Photographs 26-29, Annex B). This latter transitional vegetation is considered best treated as an atypical example of ephemeral / short perennial habitat.
- 12.4.24 The level areas (Target Notes 2 and 13, Annex A) support a diverse assemblage of ruderal and ephemeral plant species, dominated by herb species. Of particular abundance are kidney vetch, viper's-bugloss (*Echium vulgare*), buck's-horn plantain (*Plantago coronopus*), biting stonecrop (*Sedum acre*) and red valerian. Other typical species include hemp agrimony (*Eupatorium cannabinum*), carline thistle, reflexed stonecrop (*Petrosedum rupestre*), fairy flax, common bird's-foot-trefoil, yellow-wort, lesser hawkbit (*Leontodon saxatilis*), common mouse-ear-hawkweed (*Pilosella officinalis*), rat's-tail fescue (*Vulpia myuros*), wild carrot (*Daucus carota* subsp. *carota*), common centaury (*Centaureum erythraea* var. *erythraea*), common toadflax, weld (*Reseda luteola*), tall melilot (*Melilotus altissimus*) and sand spurrey (*Spergularia rubra*). It was notable both how little vegetation cover was present in this area during the June visit as a consequence of a prolonged and unusually dry spring, and how rapidly vegetation cover increased after rainfall in June and July. This suggests the presence of a resilient community

of ephemerals and short-lived perennials able to respond rapidly to environmental perturbations. Despite the low cover in June, a plant assemblage was recorded comparable to that present in July. So, the drought conditions did not affect the ability to detect relevant species, including winter and spring annuals such as little mouse-ear and sand cat's-tail.

12.4.25 The bings (Target Notes 4 and 10, Annex A) support a similarly diverse assemblage of ruderal and ephemeral plants but are further enhanced by additional contributions from grassland species (comparable to dune grassland), notable native plant species, and garden escapes. Typical native plant species include all the species listed above as well as lady's bedstraw (as subspecies *maritimum*), slender knapweed (*Centaurea debeauxii*), hop trefoil (*Trifolium campestre*), a rarely reported coastal variety (ecotype) of common centaury (*Centaureum erythraea* var. *fasiculare*), wild strawberry (*Fragaria vesca*), purple milk-vetch, wild mignonette (*Reseda lutea*), sheep's fescue (*Festuca ovina*), perennial wall-rocket, common eyebright (*Euphrasia nemorosa*), beaked hawk's-beard (*Crepis vesicaria*), little mouse-ear and ploughman's spikenard (*Inula conyzae*).

12.4.26 These areas of ephemeral/ short perennial vegetation represent the predominant components of the composite OMH within Coatham Sands, see below for further information on this S41 habitat.

Broad-leaved Plantation Woodland

12.4.27 A small semi-mature plantation of oak (*Quercus* sp.) trees stunted by the coastal environment. All trees are less than 3 m tall.

Scrub

12.4.28 Scrub present is comprised of the same species as the dune scrub but occurs in locations outside of the dune system.

Swamp

12.4.29 Swamp habitat covers a variety of stands of tall emergent vegetation typical of the transition between open water and adjacent land (Target Notes 3, 6, 8, 14 and 18, Annex A; Photographs 31-34, Annex B). Historic mapping indicates that it occurs primarily on land that was disturbed historically by the tramways and slag works of the former steelworks.

12.4.30 Typically, the stands of swamp are dominated by one to a few plant species, of which the most typical are common reed (*Phragmites australis*), sea club-rush (*Bolboschoenus maritimus*) and grey club-rush (*Schoenoplectus tabernaemontanii*). Amongst these dominants, a limited suite of other plant species can occur, including common spike-rush (*Eleocharis palustris*), lesser spearwort, hemp agrimony, soft rush (*Juncus effusus*) and celery-leaved buttercup (*Ranunculus sceleratus*).

12.4.31 One large stand of common reed occurs in association with a water table that is clearly at or above ground level for most of the year (Photographs 33 and 34), and therefore is considered to be an example of the NERC Act S41 reedbed priority habitat (Maddock, 2008b), and the Tees Valley LBAP priority reedbed habitat. This reedbed is located at Target Note 6, Annex A. Other common reed dominated vegetation within Coatham Sands is less clearly

associated with predominantly wet ground and is therefore not considered to be an example of the priority habitat.

Marsh/ Marshy Grassland

- 12.4.32 This is an area of wetland vegetation located outside of the dune system (Target Note 15, Annex A; Photograph 35, Annex B). It is dominated by a sward of creeping bent, yellow iris (*Iris pseudacorus*), false oat-grass and Yorkshire-fog, with associated wild angelica, marsh pennywort, northern marsh-orchid, common spotted-orchid (*Dactylorhiza fuchsii*), hemp agrimony and common spike-rush.

Inundation Vegetation

- 12.4.33 This is present where Waterbody 14 (see below) draws-down over the course of the summer (Target Note 1, Annex A; Photograph 30, Annex B). This draw-down zone is predominantly bare mud and silt with a sparse cover of ephemeral and other species, including buck's-horn plantain, creeping bent, spear-leaved orache (*Atriplex prostrata*), red goosefoot (*Oxybasis rubra*), knotted pearlwort (*Sagina nodosa*), lesser centaury (*Centaurea pulchellum*), frog rush (*Juncus ranarius*) and marsh pennywort.

Standing Water

- 12.4.34 There are two standing waterbodies within the Site boundary, Waterbody 9 and waterbody 14, as described below.
- 12.4.35 Waterbody 9 (Target Note 6, Annex A; Photograph 33, Annex B) is a remnant of a previously larger waterbody that is now dominated by swamp (reedbed). It supports horned-pondweed (*Zannichellia palustris* subsp. *pedicellata*), common water-crowfoot (*Ranunculus aquatilis*) and small pondweed (*Potamogeton berchtoldii*).
- 12.4.36 Waterbody 14 (Target Note 3, Annex A; Photograph 30, Annex B) is shallow and subject to significant seasonal drawdown, such that it fragments into several discrete waterbodies during the summer months. Marginal plant species (excluding cohesive areas of swamp which are described separately) include common reed, sea club-rush, common spike-rush, grey club-rush and bittersweet (*Solanum dulcamara*). Open water areas are dominated by horned-pondweed. Spiked water-milfoil (*Myriophyllum spicatum*) and common stonewort (*Chara vulgaris*) are also present.
- 12.4.37 The potential for these standing waterbodies to be priority habitats is assessed in Chapter 13: Aquatic Ecology (ES Volume I, Document Ref. 6.2).

Open Mosaic Habitats on Previously Development Land

- 12.4.38 In addition to the sand dune habitats for which the SSSI is designated, Coatham Sands is also of nature conservation importance for its extensive OMH. This OMH, as a composite habitat, does not align with habitat definitions in the Phase 1 Habitat survey manual (JNCC, 2016).
- 12.4.39 The OMH at this location, as mapped on Figure 12H-2, is considered to comprise all of the ephemeral / short perennial vegetation (Target Notes 2, 4, 10, 12, 13, Annex A), any patches of scrub and grassland in intimate matrix with the ephemeral/ short perennial vegetation, and Waterbody 14 and its associated drawdown habitat (Target Note 1, Annex A). It meets published

criteria (Maddock, 2010) for recognition as the S41 OMH priority habitat type as set out below in Table 12H-3, and accordingly is also an example of the Tees Valley LBAP brownfields priority habitat.

Table 12H-3: Summary of criteria for the recognition of OMH

Criterion*	Requirement	Criteria met
1	The area of open mosaic habitat is at least 0.25 ha in size.	An area of OMH greater than 0.25 ha is present as mapped on Figure 12.H2.
2	Known history of disturbance at the site or evidence that soil has been removed or severely modified by previous use(s) of the site. Extraneous materials/substrates such as industrial spoil may have been added.	The Site has a known history of industrial disturbance linked to sand extraction and use for disposal of lime-rich iron slag. Areas of crushed and consolidated slag deposits occur extensively, with accumulations of windblown sand also occurring locally.
3	The site contains some vegetation. This will comprise early successional communities consisting mainly of stress-tolerant species (e.g. indicative of low nutrient status or drought). Early successional communities are composed of (a) annuals, or (b) mosses/liverworts, or (c) lichens, or (d) ruderals, or (e) inundation species, or (f) open grassland, or (g) flower-rich grassland, or (h) heathland.	The Site contains early successional communities of annuals, mosses (present locally as a bryophyte crust or as discrete patches in other vegetation), ruderals, inundation species, open grassland and flower-rich grassland.
4	The site contains un-vegetated, loose bare substrate [i.e. substrates potentially colonisable by plants and with no substantive organic content] and pools may be present.	The Site contains un-vegetated substrates, both as level areas of ground with clinkered sized deposits of slag, and other areas with rubble mounds and cliffs. One waterbody (14) and its silty seasonal drawdown zone is considered to be a component of the OMH.
5	The site shows spatial variation, forming a mosaic of one or more of the early successional communities (a)–(h) above (criterion 3) plus bare substrate, within 0.25ha.	The above characteristics occur as a mosaic in accordance with the requirements of this criterion.

* All criteria must be met for the OMH to be the priority habitat type

NVC Communities

Sand Dune NVC Communities

12.4.40 The survey confirmed the presence of all but one of the NVC communities previously reported for Coatham Sands (see Table 12H-1) within the Site boundary.

12.4.41 The locations of these communities are shown on Figure 12.H3. In summary, these communities are located and characterised as follows:

- SD2 *Honckenya peploides* - *Cakile maritima* strandline community – this coincides directly with the Phase 1 Habitat survey strandline vegetation (Target Note 23, Annex A);

- SD4 *Elymus farctus* ssp. *boreali-atlanticus* foredune community– this coincides with the foredune (Target Note 23, Annex A);
- SD6 *Ammophila arenaria* mobile dune community – this coincides with the mobile dune (Target Note 23, Annex A);
- SD7 *Ammophila arenaria* - *Festuca rubra* semi-fixed dune community - this coincides with the semi-fixed dunes (Target Note 23, Annex A);
- SD8 *Festuca rubra* - *Galium verum* fixed dune grassland – this coincides with the species-rich dune grassland supporting purple milk-vetch and occurs on level ground along the landward edge of the grey dunes (Target Note 22, Annex A). It grades towards dune slack in places, as well as with the SD7 community. It is of relatively limited extent within the Site boundary;
- SD9 *Ammophila arenaria* - *Arrhenatherum elatius* dune grassland – this rank grassland community is of localised distribution within the Site boundary typically being found on the outer and most landward side of the grey dunes. It is possible that this community was more extensive in the past and has declined through succession to MG1 grassland (see other communities, below) or has been confused with the more extensive MG1 community (see below) due to this latter community also being typified by false oat-grass. In this community (Rodwell, 2000) false oat-grass should be no greater than co-dominant with marram and red fescue. In addition, marram should remain common in the sward, albeit typically patchily represented, and a variety of herb species typical of dune grasslands should also be present. This is how this grassland has been interpreted during the current survey;
- SD16 *Salix repens* - *Holcus lanatus* dune slack – this is the community associated with all of the dune slacks (Target Note 7, 19 and 20, Annex A), noting that creeping willow is very rare and not typical of dune slacks within the SSSI. There is a rank grassy aspect to the sward, but a diversity of herb species is also present. This community is divided into two sub-communities of which only the SD16a *Ononis repens* sub-community was considered to occur; and
- SD19 *Phleum arenarium* - *Arenaria serpyllifolia* dune annual community – this community occurs widely in the semi-fixed dunes but at such a small scale that it is not practical to map its distribution. It shows a strong association with blow-outs within the dunes, so it is not of stable distribution and instead it is likely to vary in extent and distribution over time. It is characterised by ephemeral plant species that make a brief appearance in the dampness of spring and early summer, especially where the water table is near to the surface (Target Note 23, Annex A).

12.4.42 The only previously recorded NVC communities that was not found within the Site boundary is the SD5 *Leymus arenarius* mobile dune community. This is defined by lyme-grass replacing sand couch as the predominate species present. Within the Site, lyme-grass is no more than a very minor and localised component of the sand dune vegetation.

12.4.43 It should be noted that despite sea buckthorn being present within the dune system, it does not attain sufficient cover permit recognition as the SD18 *Hippophae rhamnoides* dune scrub community. This is consistent with the NVC sand dune communities previously identified for the SSSI (Natural England, 2018b) and the published description for this community (Rodwell, 2000).

Other Vegetation Communities

12.4.44 The following additional NVC communities occur within the Site boundary and merits specific mention due to their potential for confusion with sand dune vegetation communities:

- MG1 *Arrhenatherum elatius* grassland – this is extensive and comprises all of the rank species-poor grasslands on the landward side of the dune system that are lacking in both marram (as any more than a rare component) and herb species indicative of good quality grassland (Target Notes 9, 12, Annex A). It is prevailing of the MG1a *Festuca rubra* sub-community. Similar grassland has been reported elsewhere within Coatham Sands (Denning, 2017) with similar conclusions on its relationship to the NVC classification; and
- M28 *Iris pseudacorus* – *Filipendula ulmaria* mire – this considered to be the closest match for the marshy vegetation present at Target Note 15 (Annex A) rather than one of the dune slack community types. This community is found on moist and more nutrient-rich soils in coastal areas, and in this case may occur in association with an area of sub-surface groundwater flow.

Notable Native Plant Species

12.4.45 Eleven notable native plants were recorded during the surveys at Coatham Sands (Table 12H-4).

Table 12H-4: Survey records of notable native plant species

Species	Status	Location
Carlina thistle	Near Threatened in England	Widely scattered including: <ul style="list-style-type: none"> • OMH around Target Note 2; • dune slacks at Target Note 7 and 19; • slag bing at Target Note 10; and • through the semi-fixed dunes.
Common centaury (var. <i>fasiculare</i>)	No formal assessment (data deficient), a distinct coastal ecotype that may be Nationally Rare	Slag bing at Target Note 4 (NZ 56678 26099)
Creeping willow	Near Threatened in England, rare in Teesmouth and Cleveland Coast SSSI	Semi-fixed dune at Target Note 17 (NZ 5756 2574)
Knotted pearlwort	Vulnerable in England	Drawdown of pond at Target Note 1 (NZ 56941 25933)
Lesser spearwort	Near Threatened in England	Swamp at Target Note 14 (NZ 57042 25978)

Species	Status	Location
Marsh pennywort	Near Threatened in England	Drawdown of pond at Target Note 1 (NZ 56982 25870) Marsh at Target Note 15 (NZ 57472 25688) Dune slack at Target Note 20 (NZ 57139 26073) Swamp at Target Note 21 (NZ 57101 26003)
Purple milk-vetch	S41, Endangered in England, Tees Valley LBAP	Slag bin at Target Note 10 (NZ 56448 26298) Dune grassland at Target Note 22 (NZ 57149 26088)
Rush-leaved fescue (as subspecies <i>oraria</i>)	Nationally Scarce, not threatened	Abundant throughout the mobile dune and adjacent (least established) semi-fixed dunes
Sand cat's-tail	Near Threatened in England	Abundant through semi-fixed dunes and within the dune slack at Target Note 7, many 1000's of plants
Sea buckthorn	Nationally Scarce (as a native plant, widely planted and sometime spreading from plantings), not threatened	Scattered throughout including larger stands at: <ul style="list-style-type: none"> dune slack at Target Note 26; and Target Note 27.
Uig hawkweed	Endemic to Great Britain, Endangered in England	Abundant throughout the mobile and semi-fixed dunes, many 100's (perhaps 1000's) of plants

12.5 Discussion and Conclusion

Relative Nature Conservation Value of the Identified Habitats

- 12.5.1 The Phase 1 habitat survey has clarified the distribution and characteristics of sand dune habitats within the Site boundary at Coatham Sands, as well as identifying a suite of additional habitats present on the landward side of the dune system.
- 12.5.2 Only the sand dune habitats are a specific reason for designation of Teesmouth and Cleveland Coast SSSI, and these habitats are part of a sand dune system of national (Great Britain) nature conservation value.
- 12.5.3 While the other habitats present are likely to complement the designated sand dune interest or otherwise result in valuable habitat mosaics, particularly the ephemeral / short perennial vegetation (OMH) of the slag deposits (Natural England, 2018a), it is considered that the stated reasons for designation stop short of suggesting that these other habitats are types of dune habitat.
- 12.5.4 The above acknowledged, the remaining habitats undoubtedly contribute to the integrity and biodiversity value of Coatham Sands and the wider Teesmouth and Cleveland Coast SSSI, but when considered on their own merits some of the component habitats are of markedly higher biodiversity value than others. This is considered further below.

Open Mosaic Habitat

- 12.5.5 Joint Nature Conservation Committee (1989) provides guidelines for the identification of sites of national biodiversity importance for their artificial habitats. Given the existence of this guidance, it is assumed (with reference to the reasons for designation given in Natural England 2018a) that in notifying the Teesmouth and Cleveland Coast SSSI, Natural England considered whether the OMH qualified as a reason for site selection and judged this was not appropriate. Therefore, it is considered that the OMH presence is not of national or higher nature conservation value.
- 12.5.6 However, there remains a need to further assess the relative nature conservation value of the OMH, as it may have value at the sub-national level. In support of this, Natural England (2013) provides context for the Tees Lowlands NCA, while Tees Valley Biodiversity Partnership (2010) provides criteria for the identification of notable of artificial habitats.
- 12.5.7 Natural England (2013) emphasises the nature conservation value within the NCA of slag-derived substrates on previously developed land, particularly for early successional grassland habitats and dependent terrestrial invertebrate assemblages. However, the extent of such habitats within the NCA is not quantified. It considered that the extent of OMH at Coatham Sands, its relative botanical interest and quality, and the unusual setting in matrix with coastal and sand dune habitats together indicate that the OMH present is likely to be notable within the NCA.

- 12.5.8 Review against criterion U1 of Tees Valley Biodiversity Partnership (2010) identifies a list of plant species considered to be indicative of good quality OMH, with a minimum of 10 species required to merit consideration as a potential Local Wildlife Site (LWS). The OMH within Coatham Sands exceeds this target, supporting at least 16 species from this list (beaked hawk's-beard, carline thistle, common centaury, common eyebright, common toadflax, kidney-vetch, perennial wall-rocket, rat's-tail fescue, stonecrops, soft brome, tall melilot, viper's-bugloss, weld, wild carrot, wild mignonette and yellow-wort).
- 12.5.9 As noted in Section 12.4, the OMH also tends towards coastal grassland in its species composition. Because of this it also achieves the grassland criterion C2 of Tees Valley Biodiversity Partnership (2010). This criterion requires a minimum of five grassland plant species, but the OMH on the bings exceeds this target and supports at least six species (common centaury, common eyebright, common restharrow lady's bedstraw, lesser hawkbit and purple milk-vetch).
- 12.5.10 Taking the above into account, the OMH resource of Coatham Sands is considered to be of regional nature conservation value.

Other Habitats

- 12.5.11 Following review of relevant guidance (Tees Valley Biodiversity Partnership, 2010), none of the other habitats present (i.e. excluding sand dune habitats, and components of the OMH), when considered individually, are considered to be of county or higher value based on their botanical diversity and other characteristics. Instead, they are collectively considered to be of borough nature conservation value in recognition of their combined extent, the contribution they make to the integrity an important wildlife/habitat corridor, and/ or because with sensitive management they could likely be enhanced and achieve a greater botanical diversity.

Relative Condition of the Identified Habitats

- 12.5.12 As noted above in Section 12.1, the condition assessment published by Natural England indicates that the relevant terrestrial habitat units of Coatham Sands (Unit 28 and 29) are considered to be in favourable condition and there are no perceived threats to this status. This is likely to be correct in relation to the habitats that are reasons for designation of Teesmouth and Cleveland Coast SSSI, and it is not considered necessary to interrogate this assessment further within this report.
- 12.5.13 However, it is considered of potential value to future decision-making to make the following points in relation to the current condition of the wider habitat resource within Coatham Sands and their associated habitat management regimes:
- The survey recorded extensive areas of rank species-poor MG1 grassland that is of relatively low nature conservation value. The potential nature conservation value of this grassland is limited by the dominance of grasses, particularly false oat-grass. These grasses dominate to the extent that they exclude other flora, and this dominance is possible because the grassland is not in active nature conservation

management (e.g. through grazing and/ or mowing and removal of arisings);

- The time series of aerial imagery accessible using Google Earth indicates that Coatham Sands once contained more extensive open water and fringing wetland habitat than it does at present. The survey found that remaining areas of wetland are generally dominated by one or a few tall emergent plant species, particularly common reed, with a water table largely at or below ground level during the summer. The most likely explanation for this is natural habitat succession. First these wetlands have become dominated by these tall emergent species, and then subsequently the accumulation of plant matter and the associated loss of open water has led to drying out (terrestrialisation) of the wetlands. While unknown hydrological impacts or changes may have (at least in part) driven this habitat succession, it is equally plausible that lack of habitat management has been the main contributing factor. In the absence of habitat management there is nothing to suppress or reset habitat succession; and
- The survey found scrub, particularly brambles, to be locally abundant, and this scrub is likely to continue to increase in time without management intervention. This is potentially of greatest nature conservation concern in areas of OMH and species-rich dry grassland on the bings of furnace slag, where the prevailing environmental conditions are not sufficient to impede the establishment of scrub (unlike, for example, the situation within the sand dune system). Without management there is potential for areas of species-rich vegetation to be lost to scrub encroachment and over-shading. Ultimately, this is also likely to be the fate of the above wetland areas also.

Notable Flora

12.5.14 Eleven notable plant species were recorded during the survey (Table 12H-4). In summary these are:

- carline thistle;
- common centaury (as its coastal ecotype var. *fasiculare*);
- creeping willow;
- knotted pearlwort;
- lesser spearwort;
- marsh pennywort;
- purple milk-vetch;
- rush-leaved fescue;
- sand cat's-tail;
- sea buckthorn; and
- Uig hawkweed.

- 12.5.15 Of the above, the most notable species are considered to be purple milk-vetch and Uig hawkweed. Both of these species are of restricted national and local distribution, of specific nature conservation concern (Endangered in England) and present in large numbers. Given this, the notable populations of these two species at Coatham Sands are considered to be of national (England) nature conservation value.
- 12.5.16 The next most notable plant species are the Vulnerable knotted pearlwort, and the Nationally Scarce rush-leaved fescue, the former because of its relative threat status and localised distribution in England (Botanical Society of Britain and Ireland (BSBI), 2020) and the latter because of its restricted geographic distribution across Britain as a whole and its reliance on sand dune habitats. The distinct coastal ecotype of common centaury (var. *fasiculare*) is also likely to fall into this category, and there are no other records in the region (BSBI, 2020). Weighing the national status of these three species against their relatively (or likely, where not well understood) favourable status in their core habitats and range (often being abundant where suitable habitat conditions occur) they are assessed as having regional nature conservation value.
- 12.5.17 Sea buckthorn is defined as Nationally Scarce within the context of its limited native range within Great Britain. However, it is not threatened and is now widespread in coastal areas outside its native range, as well as being widely distributed inland. Given this, it is considered to be of local value.
- 12.5.18 The remaining species all fall into the Near Threatened category, so are declining in range but have not yet reached a level at which they are at imminent threat of loss. Of these, two species are of restricted range within the region. Creeping willow, while widespread in coastal habitats nationally, is rare within the Teesmouth and Cleveland Coast SSSI, and sand cat's-tail is a sand dune specialist so has a limited habitat niche and it is limited by the availability of suitable habitats (BSBI, 2020). The populations of these two species are considered to be of regional nature conservation value.
- 12.5.19 This leaves marsh pennywort, carline thistle and lesser spearwort to consider, all of which remain widespread nationally (BSBI, 2020) despite the loss of some populations.
- 12.5.20 Marsh pennywort is now very uncommon in the lowlands of north-east England (it is more widespread in upland areas) so its population at Coatham Sands is considered to be of county nature conservation value.
- 12.5.21 In contrast, carline thistle remains relatively widespread on calcareous soils in lowland areas but is rare in upland areas. Given the presence of a viable population in association with suitable habitats, the Coatham Sands population is assessed as being of county nature conservation value.
- 12.5.22** Lesser spearwort remains widespread nationally and within the region. It is also relatively widespread within the Tees Valley, albeit of patchy distribution. Only small numbers were observed during the survey, but with management to reduce the vigour of other vegetation and to reinstate standing water it would likely increase in cover. Given these considerations, the Coatham Sands populations is considered to be of borough nature conservation value.

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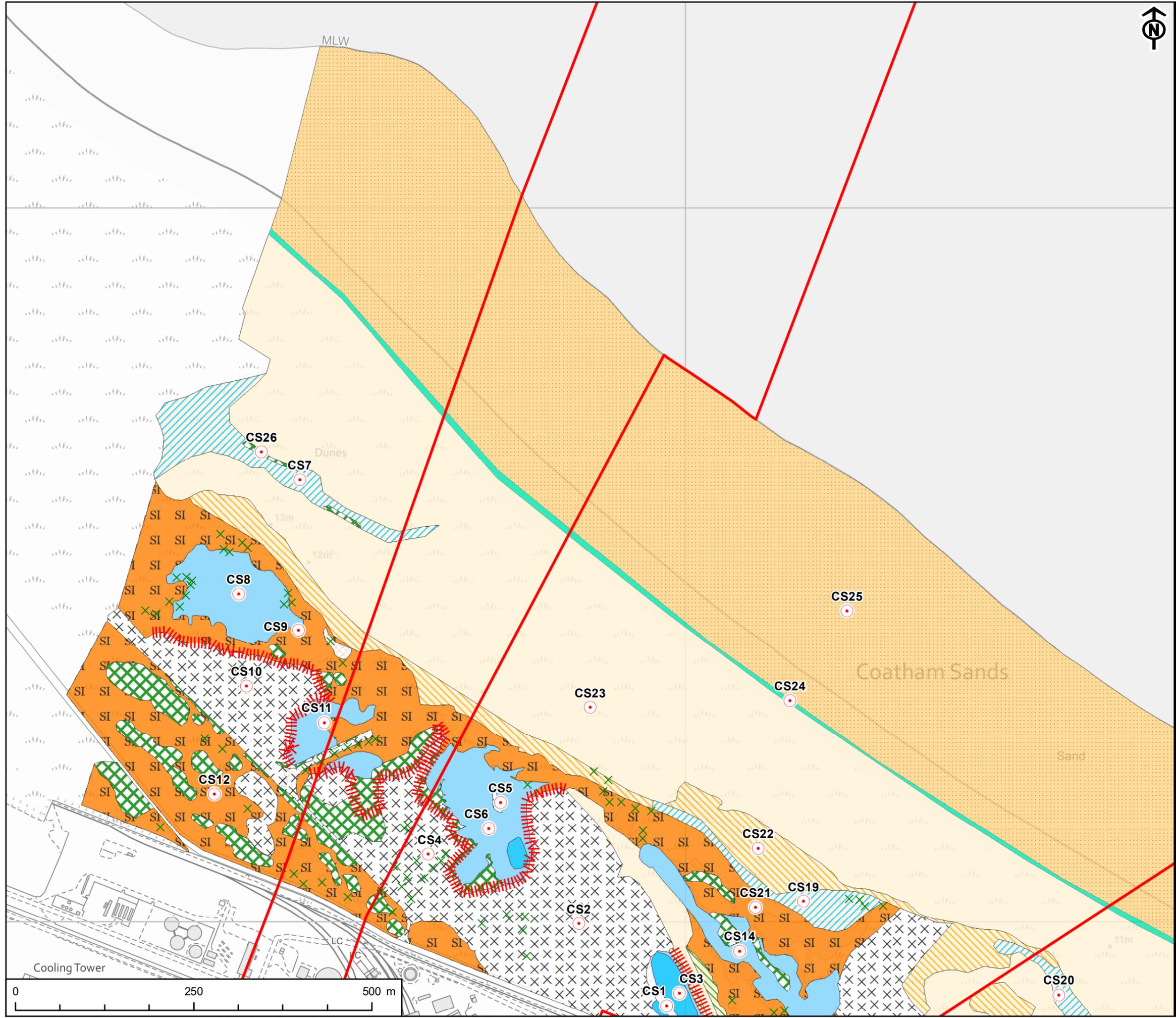
Figures

Figure 12H-1: Phase 1 Habitat Survey Map



KEY

	Site Boundary
	Target note
	Scrub - scattered
	Hard cliff
	Strandline Vegetation
	Cultivated/disturbed land - ephemeral/short perennial
	Dune grassland
	Dune scrub
	Dune slack
	Intertidal - mud/sand
	Introduced shrub
	Marginal and inundation - inundation vegetation
	Neutral grassland - semi-improved
	Open dune
	Scrub - dense/continuous
	Standing water
	Swamp



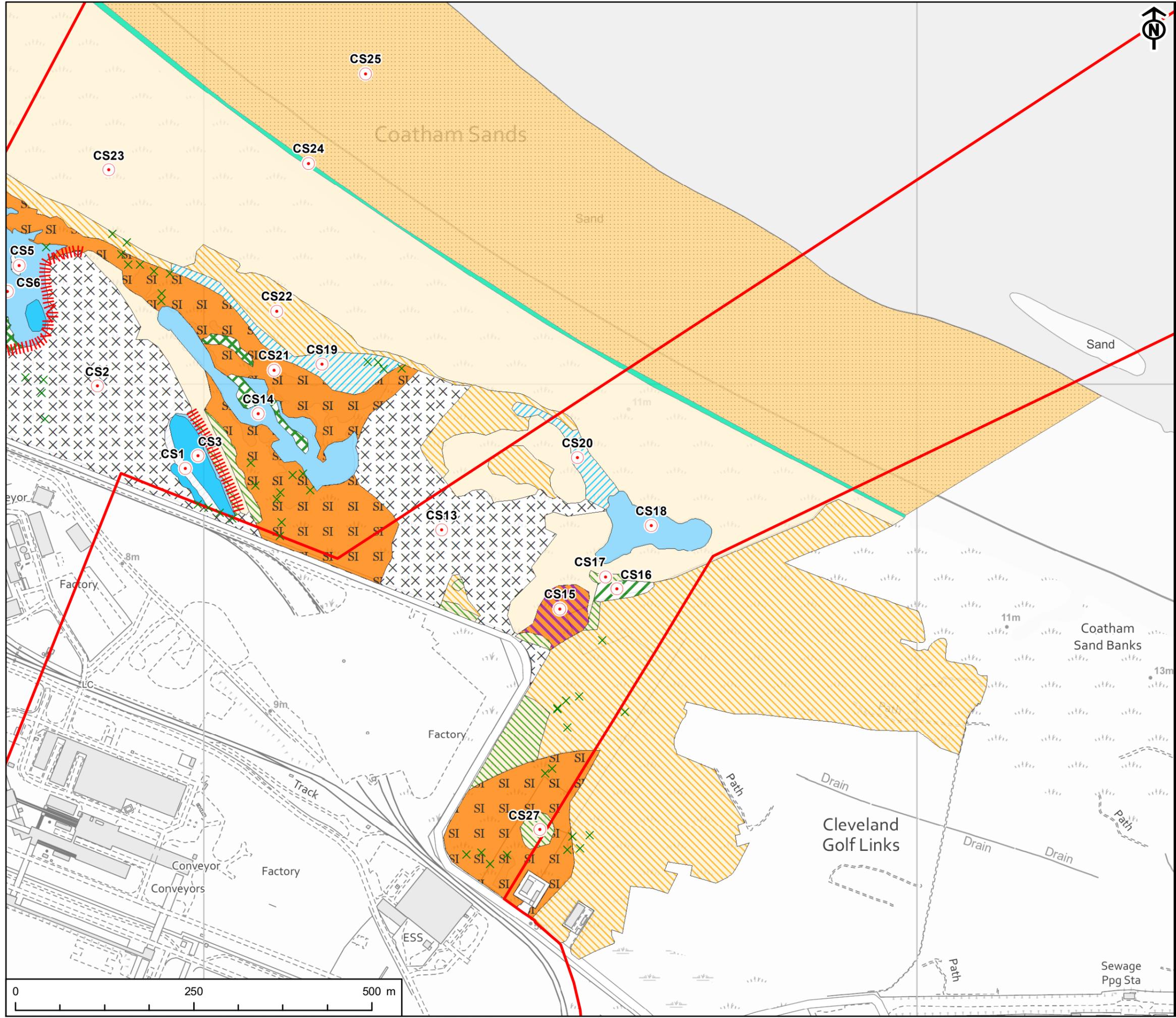
TITLE
FIGURE 1
PHASE 1 HABITAT MAP

REFERENCE
NZT_210115_CDHS_1_v3

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Project Management Initials: RL Designer: LC Checked: AR Approved: DB

Scale @ A3 1:5,000



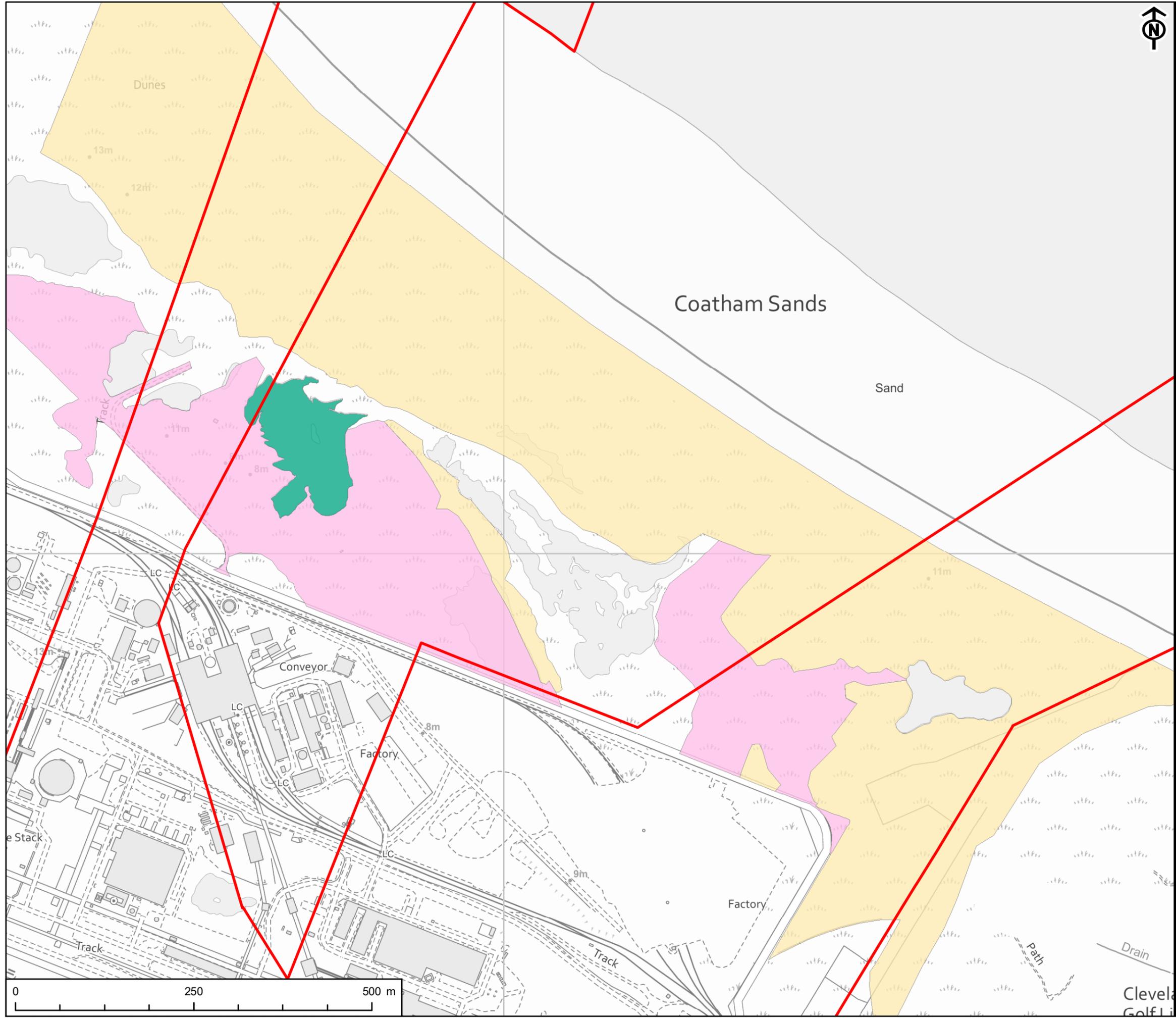
- KEY
- Site Boundary
 - Target note
 - × Scrub - scattered
 - Hard cliff
 - Strandline Vegetation
 - Broadleaved woodland - plantation
 - Cultivated/disturbed land - ephemeral/short perennial
 - Dune grassland
 - Dune scrub
 - Dune slack
 - Intertidal - mud/sand
 - Marginal and inundation - inundation vegetation
 - Marsh/marshy grassland
 - Neutral grassland - semi-improved
 - Open dune
 - Scrub - dense/continuous
 - Standing water
 - Swamp

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Figure 12H-2: NERC Act Section 41 Priority Habitats

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KEY

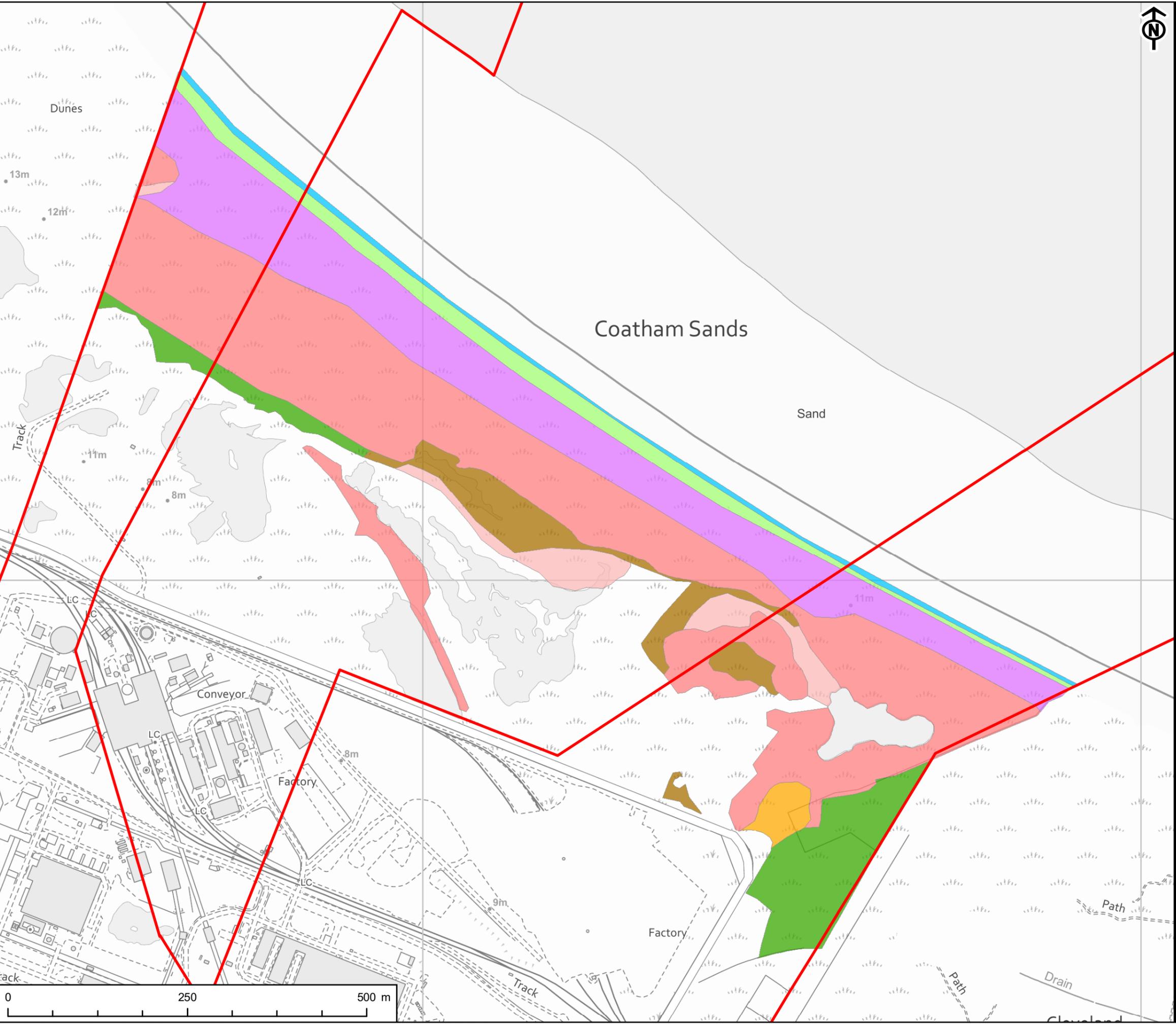
	Site Boundary
Priority Habitat	
	Open Mosaic Habitat on Previously Developed Land
	Reedbed
	Sand dune

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Figure 12H-3: Distribution of National Vegetation Classification Sand Dune and Grassland Communities

Project Management Initials: RL Designer: LC Checked: AR Approved: DB

Scale @ A3 1:5,000



- KEY
- Site Boundary
 - NVC Community
 - M28 *Iris pseudacorus* - *Filipendula ulmaria* mire
 - SD16 *Salix repens* - *Holcus lanatus* dune slack
 - SD2 *Honckenya peploides* - *Cakile maritima* strandline community
 - SD4 *Elymus farctus* ssp. *boreali-atlanticus* foredune community
 - SD5 *Leymus arenarius* mobile dune community
 - SD7 *Ammophila arenaria* - *Festuca rubra* semi-fixed dune community
 - SD8 *Festuca rubra* - *Galium verum* fixed dune grassland
 - SD9 *Ammophila arenaria* - *Arrhenatherum elatius* dune grassland

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Annex A Target Notes

Target Note	Description	Photograph reference
1	Mud/silt exposed by seasonal drawdown of the pond. Supporting a sparse cover of ephemeral and other species, including buck's-horn plantain (<i>Plantago coronopus</i>) (A), creeping bent (<i>Agrostis stolonifera</i>) (F), spear-leaved orache (<i>Atriplex prostrata</i>) (O), red goosefoot (<i>Oxybasis rubra</i>) (F), knotted pearlwort (<i>Sagina nodosa</i>) (LF), lesser centaury (<i>Centaurea pulchellum</i>) (F), frog rush (<i>Juncus ranarius</i>) (O), marsh pennywort (<i>Hydrocotyle vulgaris</i>) (R). Contributes to Open Mosaic Habitats (OMH) within the dune system.	30
2	Predominantly level made ground with a coarse stone/ slag substrate. Supports a species-rich ephemeral/ short perennial vegetation that can be considered to be OMH. Species recorded include kidney vetch (<i>Anthyllis vulneraria</i> subsp. <i>vulneraria</i>) (A), buck's-horn plantain (A), hemp agrimony (<i>Eupatorium cannabinum</i>) (LF), carline thistle (<i>Carlina vulgaris</i>) (O), biting stonecrop (<i>Sedum acre</i>) (A), reflexed stonecrop (<i>Petrosedum rupestre</i>) (O), fairy flax (<i>Linum catharticum</i>) (F), common bird's-foot-trefoil (<i>Lotus corniculatus</i>) (F), red valerian (<i>Centranthus ruber</i>) (F), narrow-leaved ragwort (<i>Senecio inaequidens</i>) (O), yellow-wort (<i>Blackstonia perfoliata</i>) (F), lesser hawkbit (<i>Leontodon saxatilis</i>) (O), viper's-bugloss (<i>Echium vulgare</i>) (F), common mouse-ear-hawkweed (<i>Pilosella officinalis</i>) (F), daisy (<i>Bellis perennis</i>) (LF), musk thistle (<i>Carduus nutans</i>) (O), common eyebright (<i>Euphrasia nemorosa</i>) (O), common restharrow (<i>Ononis repens</i>) (F), blue fleabane (<i>Erigeron acris</i>) (O), southern hawkweed (<i>Hieracium argillaceum</i>) (O), rat's-tail fescue (<i>Vulpia myuros</i>) (R), wild carrot (<i>Daucus carota</i> subsp. <i>carota</i>) (O), common centaury (<i>Centaureum erythraea</i>) (O), common toadflax (<i>Linaria vulgaris</i>) (F), tall melilot (<i>Melilotus altissimus</i>) (F), sand spurrey (<i>Spergularia rubra</i>) (R).	20-25
3	Shallow pond subject to significant seasonal drawdown, such that it fragments into several discrete waterbodies during the summer months. Marginal species comprise common reed (<i>Phragmites australis</i>) (D), sea club-rush (<i>Bolboschoenus maritimus</i>) (A), common spike-rush (<i>Eleocharis palustris</i>) (F), grey club-rush (<i>Schoenoplectus tabernaemontanii</i>) (LF), bulrush (<i>Typha latifolia</i>) (O), bittersweet (<i>Solanum dulcamara</i>) (O) and Hart's pennyroyal (<i>Metha cervina</i>) (R). Horned-pondweed (<i>Zannichellia palustris</i> subsp. <i>pedicellata</i>) is (A) within the open water of the pond, with common stonewort (<i>Chara vulgaris</i>) (F). Part of the OMH.	30
4	Species-rich drought-stressed ephemeral/ short perennial vegetation transitional towards open grassland. Established over historic deposits of lime-rich slag. Shows strong affinities with ephemeral/ short perennial elsewhere within the dune system, and it therefore comprises part of the OMH. This core flora is supplemented by other herbs	28-29

Target Note	Description	Photograph reference
	<p>typical of lime-rich coastal habitats, and garden escapes. This includes lady's bedstraw (<i>Galium verum</i> subsp. <i>maritimum</i>) snow-in-summer (<i>Cerastium tomentosum</i>) (LA), bearded iris (<i>Iris germanica</i>) (O), slender knapweed (<i>Centaurea debeauxii</i>) (O), hop trefoil (<i>Trifolium campestre</i>) (F) and a rare sand dune variety of common centaury (<i>Centaureum erythraea</i> var. <i>fasiculare</i>) (LO). Stands of brambles (<i>Rubus fruticosus</i> agg.) are scattered throughout, often in association with great bindweed (<i>Calystegia sylvatica</i> subsp. <i>disjuncta</i>).</p>	
5	<p>Outcrop of lime-rich slag within wetland complex. Supports a sparse flora of ruderals, particularly red valerian.</p>	34
6	<p>Extensive area of swamp vegetation characterised by common reed (D), soft-rush (<i>Juncus effusus</i>) (LD), sea clubrush (A to LD). These species exclude other flora, but celery leaved-buttercup (<i>Ranunculus sceleratus</i>) is present at the margins (LO). An area of standing water supports horned-pondweed (F), common water-crowfoot (<i>Ranunculus aquatilis</i>) (O) and small pondweed (<i>Potamogeton berchtoldii</i>) (R).</p>	33-34
7	<p>Species-rich dune slack community associated with a lower lying area between dune ridges where the water table remains at or near the ground surface for some of the year. The flora recorded indicates that this is a relatively dry slack community that tends towards dune grassland. Species typical of wetland habitats were relatively localised in distribution, often only in low-lying areas associated with paths and vehicle tracks. Typical flora present included yellow-rattle (<i>Rhinanthus minor</i> subsp. <i>stenophyllus</i>) (A), Yorkshire-fog (<i>Holcus lanatus</i>) (A), red fescue (<i>Festuca rubra</i>) (A), common bird's-foot-trefoil (A), common mouse-ear-hawkweed (A), fairy flax (F), kidney vetch (A), common restharrow (A), sand cat's-tail (<i>Phleum arenarium</i>) (LA), smooth meadow-grass (<i>Poa pratensis</i>) (F), greater plantain (<i>Plantago major</i> subsp. <i>intermedia</i>) (F), ribwort plantain (<i>Plantago lanceolata</i>) (F), soft brome (<i>Bromus hordeaceus</i> subsp. <i>hordeaceus</i>) (F), fern-grass (<i>Catapodium rigidum</i> subsp. <i>rigidum</i>) (O), Uig Hawkweed (<i>Hieracium uiginskyense</i>) (LA), yellow-wort (F), wild carrot (F), sand sedge (<i>Carex arenaria</i>) (F), distant sedge (<i>Carex distans</i>) (F), hoary ragwort (<i>Jacobaea erucifolius</i>) (F), sea plantain (<i>Plantago maritima</i>) (LF), confused eyebright (<i>Euphrasia confusa</i>) (O), carline thistle (O), oxeye daisy (<i>Leucanthemum vulgare</i>) (O), thyme-leaved sandwort (<i>Arenaria serpyllifolia</i>) (O), smooth hawk's-beard (<i>Crepis capillaris</i>) (O), few-flowered spike-rush (<i>Eleocharis quinqueflora</i>) (LF), sea milkwort (<i>Lysimachia maritima</i>) (O), marsh fragrant-orchid (<i>Gymnadenia densiflora</i>) (F), glaucous sedge (<i>Carex flacca</i>) (F), meadowsweet (<i>Filipendula ulmaria</i>) (LO), pyramidal orchid (<i>Anacamptis pyramidalis</i>) (O), northern marsh-orchid (<i>Dactylorhiza purpurella</i>) (F), sea rocket (<i>Cakile maritima</i>) (R), hemlock water-dropwort (<i>Oenanthe crocata</i>) (R), procumbent pearlwort (<i>Sagina procumbens</i>) (R), common valerian (<i>Valeriana officinalis</i> subsp. <i>sambucifolia</i>) (R).</p>	7-8

Target Note	Description	Photograph reference
8	Dense stand of common reed (D).	13
9	Rank herb-poor grassland heavily invaded by bramble scrub, and more locally stands of elder (<i>Sambucus nigra</i>), grey willow (<i>Salix cinerea</i> subsp. <i>oleifolia</i>) and Japanese rose (<i>Rosa rugosa</i>). Includes false oat-grass (<i>Arrhenatherum elatius</i>) (D), cock's-foot (<i>Dactylis glomerata</i>) (A), Yorkshire-fog (A), colt's-foot (<i>Tussilago farfara</i>) (LA), wild angelica (<i>Angelica sylvestris</i>) (LA), common reed (F), red fescue (F to LA), hogweed (<i>Heracleum sphondylium</i>) (F), common fleabane (<i>Pulicaria dysenterica</i>) (LF), creeping thistle (<i>Cirsium arvense</i>) (LF), hemlock water-dropwort (O), common scurvygrass (<i>Cochlearia officinalis</i>) (LO), great willowherb (<i>Epilobium hirsutum</i>) (O), cleavers (<i>Galium aparine</i>) (O), male fern (<i>Dryopteris filix-mas</i>) (O).	13
10	Species-rich drought-stressed ephemeral/ short perennial vegetation established over historic deposits of lime-rich slag. Shows strong affinities with ephemeral/ short perennial elsewhere within the dune system, and it therefore comprises part of the OMH. This core flora is supplemented by other herbs typical of lime-rich coastal habitats, and garden escapes. The flora includes buck's-horn plantain (A), common mouse-ear-hawkweed (A), wild strawberry (<i>Fragaria vesca</i>) (F), carline thistle (F), glaucous sedge (F), purple milk-vetch (<i>Astragalus danicus</i>) (LA), wild mignonette (<i>Reseda lutea</i>) (O), narrow-leaved ragwort (O), sheep's fescue (<i>Festuca ovina</i>) (O), biting stonecrop (O), male fern (O), perennial wall-rocket (<i>Diplotaxis tenuifolia</i>) (O), common bird's-foot-trefoil (O), viper's bugloss (F), fairy flax (F), cat's-ear (<i>Hypochaeris radicata</i> subsp. <i>radicata</i>) (O), kidney vetch (F), little mouse-ear (<i>Cerastium semidecandrum</i>) (A), lady's bedstraw (F), ribwort plantain (O), snow-in-summer (LO), bracken (<i>Pteridium aquilinum</i>) (LO), rough hawkbit (<i>Leontodon hispidus</i>) (R), ploughman's spikenard (<i>Inula conyzae</i>) (R).	26-27
11	Common reed (D) with bracken (LA).	-
12	Matrix of rough grassland and scrub by road, with the latter dominated by extensive stands of brambles. The OMH flora penetrates locally, but largely the grassland comprises a relatively species-poor false oat-grass community (see Target Note 9, a similar assemblage).	18
13	Extensive area of ephemeral/ short perennial directly comparable with the vegetation described under Target Note 2. Part of the OMH within the dune system.	-
14	A complex matrix of wetland vegetation interspersed with extensive stands of bramble scrub. Common reed (D) and sea club-rush (LA); these species bleed into a rank dry grassland community (as described under Target Note 9) at the margins. Other species occur sparingly in the wetland, and include hemp agrimony (LF), common spike-rush (LF), wild angelica (O), field horsetail (<i>Equisetum arvense</i>) (O), northern marsh-orchid (LO), lesser spearwort (<i>Ranunculus flammula</i> subsp. <i>flammula</i>) (R).	31

Target Note	Description	Photograph reference
15	Marshy grassland with creeping bent (A), yellow iris (<i>Iris pseudacorus</i>) (A), false oat-grass (F), Yorkshire-fog (F), wild angelica (O), marsh pennywort (F), northern marsh-orchid (F), common spotted-orchid (<i>Dactylorhiza fuchsii</i>) (O), hemp agrimony (O), common spike-rush (O), field horsetail (<i>Equisetum arvense</i>) (O), bush vetch (<i>Vicia sepium</i>) (O), common bird's-foot-trefoil (O).	35
16	Small plantation of oak (<i>Quercus</i> sp.). Trees stunted by coastal environment and less than 3m tall.	-
17	Semi-fixed dunes with discrete small stands of burnet rose (<i>Rosa spinosissima</i>) and creeping willow (<i>Salix repens</i>) respectively. The only stand of these species noted in the survey area.	6
18	Dense stand of common reed (D).	32
19	Species-rich dune slack community associated with a lower lying area between dune ridges where the water table remains at or near the ground surface for some of the year. As with the other slacks, the flora recorded tends towards dune grassland. It merges into the reedbed at its southern eastern end. Typical flora includes Yorkshire-fog (A), red fescue (A), creeping bent (A), red clover (A), common bird's-foot-trefoil (A), common restharrow (F), marsh pennywort (F), sea plantain (F), white clover (<i>Trifolium repens</i>) (F), yellow-rattle (F), common fleabane (F), yellow-wort (F), silverweed (<i>Potentilla anserina</i>) (LA), pyramidal orchid (O), marsh fragrant-orchid (O), kidney-vetch (O), northern marsh-orchid (O), bee orchid (<i>Ophrys apifera</i>) (O), wild carrot (O), tall melilot (O), common centaury (O), hoary ragwort (O), fairy flax (O), confused eyebright (O), carline thistle (O), lesser spearwort (O), wild angelica (LO) blue fleabane (R).	10
20	Species-rich dune slack consistent with that described above under Target Note 19.	-
21	Rank herb-poor grassland in matrix and transitional with associated swamp/ reedbed habitats. The general composition is consistent with that described for Target Note 9, supplemented with creeping bent (A), hemp-agrimony (F), common spike-rush (F), sea club-rush (LF), marsh pennywort (F), silverweed (F), pointed spear-moss (<i>Calliergonella cuspidata</i>) (F), soft rush (R), silverweed (R).	17, 31
22	Species-rich dune grassland is present on the southern edge of the dune system where the dunes grade down towards the slack habitats and other more species-poor dune grasslands. The extent of species-rich grassland is very limited in comparison with other dune grassland types. Within this community marram declines substantively and is accompanied by false oat-grass (F to A), red fescue (A), soft brome (A) and cock's-foot (F). The herb species present are otherwise typical of those present in the fixed dunes.	10-12
23	The main dune system, comprising a succession of dune habitats all of which are encompassed within the same Phase 1 Habitat type (open dune). Immediately landward of the strandline (Target Note 24) are narrow pioneer dunes	1-6, 13-14

Target Note	Description	Photograph reference
	<p>with sand couch (<i>Elymus junceiformis</i>) (A), sand fescue (<i>Festuca arenaria</i> subsp. <i>oraria</i>) (F), lyme-grass (<i>Leymus arenarius</i>) (R to LO).</p> <p>Next in the succession is the mobile dune with a community dominated by marram (<i>Ammophila arenaria</i>) (D) growing with sand fescue (F), lyme-grass (R to LO), rough hawkbit (O), wild parsnip (<i>Pastinaca sativa</i> subsp. <i>sylvestris</i>) (O), prickly sow-thistle (<i>Sonchus asper</i>) (O), cat's-ear (O), common rest-harrow (O), dandelion (<i>Taraxacum</i> agg.) (R).</p> <p>At the rear of the dune system are semi-fixed dunes where the contribution of sand dune grasses declines and is replaced by a greater diversity and cover of herb species. Typical flora includes marram (A), kidney-vetch (A), little mouse-ear (A), Uig hawkweed (A), common whitlow-grass (<i>Erophila verna</i>) (F), fern-grass (F), sand sedge (F), cat's-ear (F), common ragwort (<i>Jacobaea vulgaris</i>), red fescue (LF), red valerian (LO), Oxford ragwort (<i>Senecio squalidus</i>) (O), rough hawkbit (O), intermediate polypody (<i>Polypodium interjectum</i>) (O), common toadflax (O), common bird's-foot-trefoil (O), perennial wall-rocket (F), great lettuce (<i>Lactuca visosa</i>) (R), small-flowered evening-primrose (<i>Oenothera cambrica</i>) (LO), carline thistle (R).</p> <p>In hollows and blow-outs at the rear of the mobile dune and within the semi-fixed dunes, where substrates are closer to the underlying water-table, sand cat's-tail is (A) with sand-hill screw-moss (<i>Syntrichia ruralis</i> subsp. <i>ruraliformis</i>) (A). Locally within the fixed dunes, stands of dune scrub occur. The main species are brambles but stands of Japanese rose are also present (O), and other species occur rarely (see Target Note 17). Otherwise scrub is restricted to scattered bushes of common dog-rose (<i>Rosa canina</i>) and rarely glandular dog-rose (<i>Rosa squarrosa</i>).</p>	
24	Strandline community. No component species were observed in June, but some limited germination of strandline species was observed in July after a period of regular rainfall. Species present were sea rocket (R) and frosted orache (<i>Atriplex laciniata</i>) (R).	1
25	Intertidal sand deposits forming the beach of Coatham Sands.	1
26	Dune scrub at the edge of a dune slack. Sea buckthorn (<i>Hippophae rhamnoides</i>) (A) is the main species, but Japanese rose (LF) and alder (<i>Alnus glutinosa</i>) (LO) are also present.	7
27	Sea buckthorn scrub.	-

Annex B Photographs



Photograph 1 – View along the strandline in June 2020, no strandline vegetation



Photograph 2 – View along the pioneer dune dominated by sand couch



Photograph 3 – Mobile dune dominated by marram, with few herbs present



Photograph 4 – Typical blow-out with abundant sand-hill screw-moss, sand cat's-tail and other ephemerals



Photograph 5 – Semi-fixed dune with abundant marram and a greater diversity of associated grasses and herbs



Photograph 6 – Semi-fixed dune with scrub of burnet-rose and beyond this a stand of creeping willow



Photograph 7 – Typical dune slack, some colonisation by sea buckthorn



Photograph 8 – Dune slack



Photograph 9 – Dune slack



Photograph 10 – Dune slack at transition between dune grassland (left) and rank species-poor grassland (right)



Photograph 11 - Dune grassland



Photograph 12 – Diversity of flower-rich herbs within the dune grassland



Photograph 13 – Southern edge of the dune system where false oat-grass is co-dominant with marram, quickly giving way to rank species-poor MG1 grassland and common reed dominated swamp



Photograph 14 – view along the southern edge of the dunes with its rank marram/ false oat-grass grassland, with localised invasion by brambles (a dewberry hybrid in this case)