Proposed Energy from Waste Combined Heat and Power Facility at Canford Resource Park

Shadow HRA Report

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On behalf of:
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Executive Summary

S1 The potential for Likely Significant Effects (LSEs) on European sites within the potential zone of influence of the Proposed Development have been considered. These sites comprise:

- Dorset Heathlands Special Protection Area (SPA) and Ramsar, and Dorset Heaths Special Area of Conservation (SAC);
- Poole Harbour SPA and Ramsar; and
- Dorset Heaths (Purbeck and Wareham) & Studland Dunes SAC.

S2 Potential impacts that were considered in more detail due to the potential for LSEs included air pollution and habitat fragmentation in relation to Dorset Heaths SAC/SPA/Ramsar, and air pollution in relation to Poole Harbour SPA and Ramsar.

S3 LSEs on the European sites from all other potential impact pathways were able to be screened out of the assessment at Stage 1: Screening.

S4 At Stage 2: Appropriate Assessment, mitigation is able to be considered within the assessment. This mitigation comprised:

- Sensitive construction and operation lighting schemes in relation to habitat fragmentation for nightjar (*Caprimulgus europaeus*);
- Air pollution control systems to reduce levels of pollutants in the facility's emissions, including application of a lower ammonia Emission Limit Value of 5 mg/Nm^3;
- Increasing the stack height from the initial design of 90m to 110m above ground level; and
- Contributions towards appropriate management of Dorset Heaths SAC/SPA/Ramsar in the form of a Biodiversity Enhancement Contribution and Trickle Fund, in addition to a future monitoring strategy, to be secured through a Section 106 agreement.

S5 With consideration of the above mitigation, it was able to be concluded that habitat fragmentation in relation to Dorset Heathlands SPA and Ramsar and air pollution in relation to Poole Harbour SPA and Ramsar no longer constitute LSEs, both alone and in combination with other projects.

S6 Regarding impacts from air pollution on Dorset Heaths SAC/SPA/Ramsar, habitat surveys, soil sampling and bryophyte and lichen monitoring was undertaken to inform the impact assessment and provide baseline conditions. Following the assessment, it was concluded that with the identified mitigation, there will be no adverse effects on the integrity of the European sites as a result of the Proposed Development, both alone and in-combination with other projects.

Section 1
Introduction

1.1 This Shadow Habitats Regulations Assessment (sHRA) has been prepared by The Environmental Dimension Partnership Ltd (EDP) on behalf of MVV Environment Limited (hereafter referred to as 'the Applicant') in relation to a Carbon Capture Retrofit Ready (CCRR) Energy from Waste Combined Heat and Power (EfW CHP) Facility at Canford Resource Park (CRP), off Magna Road, in the northern part of Poole. Together with associated CHP Connection, Distribution Network Connection (DNC) and Temporary Construction Compounds (TCCs), these works are 'the Proposed Development'. This assessment has been prepared to provide the information necessary to enable Bournemouth, Christchurch and Poole (BCP) Council, as the competent authority, to undertake a Habitats Regulations Assessment of the Proposed Development.

1.2 EDP is an independent environmental planning consultancy with offices in Cirencester, Cardiff, and Cheltenham. The practice provides advice to private and public sector clients throughout the UK in the fields of landscape, ecology, archaeology, cultural heritage, arboriculture, rights of way and masterplanning. Details of the practice can be obtained at our website (www.edp-uk.co.uk).

SITE CONTEXT

1.3 The Proposed Development Boundary is centred at National Grid Reference SZ 03436 96720 and comprises four main components, namely:

- The 'EfW CHP Facility Site' - this refers to the main area where the EfW CHP Facility will be located;
- The 'CHP Connection' - the corridor of land south of the EfW CHP Facility Site identified to connect to the Magna Business Park through which the underground pipes, cables and associated infrastructure would be located to supply heat and/or power;
- The 'DNC' - the corridor of land and location for a substation south of the EfW CHP Facility Site identified to connect electricity to the National Electricity Transmission Network through underground pipes, cables and associated overground infrastructure; and
- 'TCC 1' and 'TCC 2' - there are two TCCs - TCC1 located in the arena field to the north of the EfW CHP Facility Site, and TCC2 located in a grassland field (known as the greenhouse) to the south of the EfW CHP Facility Site. One of these areas will be required to contain the construction compound for the duration of construction of the EfW CHP Facility.

1.4 The EfW CHP Facility Site measures approximately 2.3 hectares (ha) and is located in the south-western part of an existing integrated waste management park, within the Bournemouth, Christchurch and Poole Council authority area. The EfW CHP Facility Site comprises predominantly bare ground/hardstanding with natural habitats limited to borders

of tall ruderal/ephemeral, and scattered scrub and a strip of semi-natural broadleaved woodland. The TCCs comprise predominantly grassland with some ephemeral vegetation and some scattered scrub. The CHP Connection and DNC corridor include existing hardstanding roads, grassland and small sections of woodland.

1.5 The EfW CHP Facility Site is almost entirely surrounded by semi-natural broadleaf and mixed woodland, and conifer plantation. Despite the degradation of local habitats associated with the existing waste management operations, the Proposed Development falls within an ecologically rich landscape, as reflected by the presence of both statutory and non-statutory designations and nearby records of a variety of protected and/or notable species.

1.6 The principal ecological features within the Proposed Development Boundary (identified through site survey) are illustrated on Figure 8.1: Phase 1 Habitat Plan of Environmental Statement (ES) Chapter 8: Ecology and Nature Conservation, which are being submitted as part of the Environmental Statement which accompanies the full planning application.

PROPOSED DEVELOPMENT

1.7 The primary purpose of the Proposed Development is to treat Local Authority Collected Household residual waste and similar residual Commercial and Industrial waste from Bournemouth, Christchurch, Poole and surrounding areas, that cannot be recycled, reused or composted and that would otherwise be landfilled or exported to alternative EfW facilities further afield, either in the UK or Europe.

1.8 The Proposed Development will recover useful energy in the form of electricity and hot water from up to 260,000 tonnes of non-recyclable (residual), non-hazardous municipal, commercial and industrial waste each year. The Proposed Development has a generating capacity of approximately 31 megawatts (MW), exporting around 28.5 MW of electricity to the grid. Subject to commercial contracts, the Proposed Development will have the capability to export heat (hot water) and electricity to occupiers of the Magna Business Park.

1.9 A full description of the Proposed Development is provided in ES Chapter 3: Description of the Proposed Development.

CONSULTATION, SCREENING AND SCOPING

1.10 The project was screened in as requiring an Environmental Impact Assessment (EIA) due to the potential for significant environmental effects to arise. As part of the EIA scoping process, pre-application advice was received from BCP Council and the statutory nature conservation body Natural England (NE).

1.11 The scoping opinions and associated consultation confirmed the need to assess the potential for Likely Significant Effects (LSE) upon European sites in accordance with the protection they are afforded by the Conservation of Habitats and Species Regulations 2017 (as amended). The following designations require consideration given the nature of the proposed development and their proximity to the Proposed Development:

- Dorset Heathlands Special Protection Area (SPA) and Ramsar;
- Dorset Heaths Special Area of Conservation (SAC);
- Poole Harbour SPA and Ramsar; and
- Dorset Heaths (Purbeck and Wareham) & Studland Dunes SAC.

1.12 NE stated that "*Should a likely significant effect on a European/Internationally designated site be identified (either alone or in-combination) or be uncertain, the competent authority (in this case the Local Planning Authority) may need to prepare an appropriate assessment in addition to the consideration of impacts through the EIA process*."

1.13 Through NE's Discretionary Advice Service, a senior advisor for the region was consulted via email/telephone correspondence and three project team meetings (on 21 September 2022, 08 February 2023 and 30 March 2023) to discuss the ecological sensitivities of the area and the Proposed Development. Details of these meetings are provided in **Appendix EDP 1**. Following NE's advice, habitat and soil sampling surveys were undertaken across SAC/SPA/Site of Special Scientific Interest (SSSI) parcels in the area to inform the assessment of impacts upon these designations.

1.14 As such, this sHRA has been prepared to address the potential for LSE upon the above-named European sites in respect of the Proposed Development.

PURPOSE OF THIS REPORT

1.15 The purpose of this sHRA is to provide relevant technical information to enable competent authorities to discharge their functions under Regulations 7 and 63 (requirement to carry out Appropriate Assessment) of the Conservation of Habitats and Species Regulations 2017 (as amended) in relation to the Proposed Development.

1.16 Regulation 63 (1) of the Conservation of Habitats and Species Regulations 2017 (as amended) states that: "*a competent authority, before deciding to undertake, or give any consent, permission or other authorisation for, a plan or project which (a) is likely to have a significant effect on a European site or a European offshore marine site (either alone or in combination with other plans or projects), and (b) is not directly connected with or necessary to the management of that site, must make an appropriate assessment of the implications of the plan or project for that site in view of that site's conservation objectives.*"

1.17 Regulation 63 (2) further states that "*a person applying for any such consent, permission or other authorisation must provide such information as the competent authority may reasonably require for the purposes of the assessment or to enable it to determine whether an appropriate assessment is required.*"

1.18 Regulation 63 (3) states that "*the competent authority must for the purposes of the assessment consult the appropriate nature conservation body and have regards to any representations made by that body within such reasonable time as the authority specifies.*"

1.19 Regulation 63 (5) goes on to state that "*in the light of the conclusions of the assessment, and subject to regulation 64, the competent authority may agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the European Site or the European offshore marine site (as the case may be).*"

1.20 Regulation 63 (6) concludes that "*in considering whether a plan or project will adversely affect the integrity of the site, the competent authority must have regard to the manner in which it is proposed to be carried out or to any conditions or restrictions subject to which it proposes that the consent, permission or other authorisation should be given.*"

1.21 This sHRA describes the potential for LSE on European sites to arise as a result of the Proposed Development at the first stage of the HRA process, and the potential for adverse effects on the integrity of European sites at the second stage of the HRA process. European sites are SPAs and SACs designated under the Conservation of Habitats and Species 2017 (as amended). This report will also consider sites designated under the Ramsar Convention on Wetlands of International Importance (1971, Ramsar Sites) as per UK Government Policy (set out in Paragraph 181 of the National Planning Policy Framework, 2021). This policy also brings candidate SACs (cSACs) and potential SPAs (pSPAs) within the requirement for HRA. For ease of reference, all of these sites will hereafter be referred to as “European sites”.

1.22 It is noted that s6(3) of the European Union (EU) (Withdrawal) Act 2018 (as amended) requires retained EU law (such as the Conservation of Habitats and Species Regulations 2017 (as amended)) to be interpreted in line with 'retained caselaw' which includes retained EU caselaw.

Section 2
Methodology

2.1 The HRA assessment process follows four sequential stages, with guidance having been published to aid competent authorities to fulfil their responsibilities (e.g. European Commission 2001[1]; DCLG, 2006[2]):

- Stage 1: Habitat Screening;
- Stage 2: Appropriate Assessment;
- Stage 3: Alternative Solutions; and
- Stage 4: Interests of Overriding Public Interest.

2.2 In this case, owing to the nature of potential LSE and mitigation proposed, it was not necessary to take the assessment of the Proposed Development to Stage 3 or 4.

2.3 Further details pertaining to the methodology and approach taken with regards to Stage 1 and 2 are provided below, with details relating to European sites considered within this sHRA provided in **Section 3**.

STAGE 1: SCREENING

2.4 Each European site will be considered in the context of the Proposed Development and screened for any LSE. This stage of the report presents the findings of the screening assessment undertaken to identify LSE of the Proposed Development on European sites.

2.5 This stage considers the possibility for LSE to occur based on high-level analysis of risks, taking into account the spatial relationship between impact sources and designated sites (and functionally linked habitats and species), the magnitude of changes predicted with regard to atmospheric, coastal/estuarine and freshwater receptor pathways (with reference to the relevant specialist studies), and any physical or other relationships between the Proposed Development Boundary and each European site. Stage 1 screening for LSE considers the project alone and in combination with other projects.

2.6 If it can be confidently predicted on the basis of objective information that no LSE are identified for all the European sites considered, then HRA Stages 2 and 3 are not required and the report would take the form of a No Significant Effects Report.

2.7 The judgment of People over Wind and Sweetman (12 April 2018) ruled that mitigation measures intended to avoid or reduce the harmful effects of the plan or project on a European site cannot be considered at the Stage 1 Screening Stage. Therefore, in this sHRA

[1] European Commission (2001). Assessment of plans and projects significantly affecting Natura 2000 sites. Oxford Brookes University.

[2] DCLG (2006). Planning for the Protection of European Sites: Appropriate Assessment. Guidance for Regional Spatial Strategies and Local Development Documents. Department for Communities and Local Government, HMSO, London.

report, such measures will only be taken into account as part of Stage 2: Appropriate Assessment. Only measures that constitute part of the project design and are not intended to avoid or reduce effects on European site features, are therefore considered at the Screening Stage.

2.8 Evidence gathering and consultation, including the collation of baseline data on pertinent qualifying features within the Proposed Development's Zone of Influence (ZoI), is an integral part of Stage 1 screening. Desk and field-based investigations have been undertaken, in addition to consultation with NE, to provide robust baseline information appropriate to inform the HRA. The full results from this work are presented in ES Chapter 8: Ecology and Nature Conservation and Appendix 8.1: Baseline Ecology Report, which accompany the planning application, and **Appendix EDP 2** and **Appendix EDP 3** of this report. Detailed air quality assessments have also been undertaken to inform the HRA, as described in detail later in this section.

STAGE 2: APPROPRIATE ASSESSMENT

2.9 Those LSE screened in will then be subject to progression to Stage 2: Appropriate Assessment. Under the Habitats Regulations, the Competent Authority is required to carry out an Appropriate Assessment if there are deemed to be LSE on European sites when considered alone or in combination with other projects, and where those LSE arise from a plan or project not directly connected with, or necessary to the management of, that site or sites.

2.10 If Stage 1 identifies LSE upon a European site, an assessment of the effects of the project upon the European sites conservation objectives/interest features is carried out either from the project alone or in combination with other plans and projects, which cannot be discounted. Conservation objectives for European sites are defined and published by NE and the assessment refers to the relevant objectives as necessary. The assessment will include sufficient information to enable an Appropriate Assessment to be undertaken by the competent authority and will detail mitigation designed to reduce or eliminate identified LSE upon those European sites screened into the assessment.

Section 3
Baseline Information and Relevant European Sites

BASELINE INFORMATION

3.1 To inform the assessment of ecological impacts of the Proposed Development, a suite of desk and field-based investigations have been completed at the Proposed Development Boundary. The methodology, results and conclusions of these investigations can be found within ES Chapter 8: Ecology and Nature Conservation and Appendix 8.1: Baseline Ecology Report, which accompany the planning application.

3.2 Pertinent data collated and surveys completed include:

- Desk studies undertaken in 2022, with information obtained from the Dorset Environmental Records Centre (DERC) and Multi-Agency Geographic Information for the Countryside (MAGIC) website in addition to a detailed review of existing information on nightjar usage of the Proposed Development Boundary and wider area;
- Habitat surveys in August 2021, based on Phase 1 Habitat survey technique with an update to cover further areas earmarked for TCCs including a more detailed botanical survey to confirm grassland value in June 2022;
- A pilot breeding bird survey undertaken in July 2021;
- A preliminary bat roost assessment of trees and buildings in August 2021 and June 2022;
- Spring, summer and autumn bat activity transect and automated detector surveys in August 2021, September 2021 and May 2022;
- Badger walkover surveys in August 2021 and June 2022;
- Great crested newt eDNA survey in June 2021; and
- Reptile survey comprising artificial refugia (tins and mats) across May to July 2022.

3.3 The key findings that are applicable to the HRA can be summarised as follows:

- The Proposed Development Boundary does not contain any designated habitat features;
- With the exception of nightjar, the Proposed Development Boundary does not support any of the species that are qualifying features of the nearby designations, with little to no suitable habitat for these species present, and confirmed absence of great crested newt (*Triturus cristatus*); and
- In relation to nightjar, there is limited and suboptimal (due to level of human/vehicle disturbance) suitable habitat confined to the woodland edges around the EfW CHP

Facility Site, however, both TCC1 and TCC2 predominantly comprise of habitat that could be used by this species for foraging. The review of existing studies found that none of the tracked birds were recorded foraging within any area of the Proposed Development Boundary (including TCC1 and TCC2), with several birds recorded passing over the Proposed Development Boundary to reach preferred foraging areas to the north. This suggests that although habitat within the TCCs is suitable, nightjar were preferentially making use of the higher quality habitats present within the wider area.

3.4 Relevant desk study and survey findings are referenced in the sHRA screening and assessment where applicable.

3.5 This sHRA has also been informed by the air quality assessment of the Proposed Development, presented in ES Chapter 6: Air Quality of the EIA.

3.6 In addition to the above surveys within and adjacent to the Proposed Development Boundary, additional surveys were undertaken within several of the nearby designated site parcels in order to provide a baseline assessment of the areas potentially impacted by the Proposed Development. These surveys included:

- A Phase 1 Habitat survey to determine broad habitat categories undertaken on 01 August 2022 within sections of Canford Heath SSSI and Turbary & Kinson Commons SSSI; and on 14 – 15 December 2022 across sections of Ferndown Common SSSI and Parley Common SSSI;

- Soil sampling was undertaken at 32 locations across Canford Heath SSSI, Turbary and Kinson Commons SSSI, Ferndown Common SSSI and Parley Common SSSI on 11 – 12 January 2023. The samples taken were sent to a laboratory for measurement of variables including pH, nitrate, ammonium, organic matter, aluminium and calcium. Full details of this sampling are provided in **Appendix EDP 2**; and

- A lichen and bryophyte survey undertaken over three days between 27 October and 09 November 2022. The survey targeted six locations within Canford Heath SSSI that were previously surveyed in 2009 and 2012, along with a total of 11 new survey locations within Turbary & Kinson Commons SSSI, Ferndown Common SSSI and Parley Common SSSI. Full details of this survey are provided within **Appendix EDP 3**.

3.7 A review of this baseline information, in addition to responses received during consultation, screening and scoping, identified six European sites to be considered within this sHRA. These sites are all located within 10km of the Proposed Development, and no impact pathways have been identified for any European sites beyond this distance.

RELEVANT EUROPEAN SITES

3.8 This section presents desk and field-based evidence to allow potential impacts on the following European sites to be screened and assessed:

- Dorset Heathlands SPA and Ramsar;
- Dorset Heaths SAC;
- Poole Harbour SPA and Ramsar; and
- Dorset Heaths (Purbeck and Wareham) and Studland Dunes SAC.

3.9 These sites and their spatial relationship to the Proposed Development Boundary is illustrated on **Plan EDP 1**.

Qualifying Criteria

3.10 The qualifying criteria and relative distance of relevant European sites from the Proposed Development Boundary are summarised in **Table EDP 3.1**.

Table EDP 3.1: Summary of European Sites

European Site and Distance	Qualifying Features
Dorset Heathlands SPA Adjacent to southern boundary of the Proposed Development	From the Natura 2000 Data Sheet (December 2015): Under Article 4.1, the SPA supports breeding populations of the following Annex I listed species: • Nightjar (*Caprimulgus europaeus*): at least 12.8% of the GB breeding population; • Woodlark (*Lullula arborea*): at least 6.8% of the GB breeding population; and • Dartford warbler (*Sylvia undata*): at least 26.1% of the GB breeding population. Under Article 4.1, this SPA supports wintering populations of the following species: • Hen harrier (*Circus cyaneus*): 2.7% of the GB population; and • Merlin (*Falco columbarius*): 1.2% of the GB population.
Dorset Heathlands Ramsar Adjacent to southern boundary of the Proposed Development	This Ramsar is designated under Ramsar criterion 1 for supporting particularly good examples of Northern Atlantic wet heaths with cross-leaved heath (*Erica tetralix*) and acid mire with Rhynchosporion. It also contains the largest example in Britain of Southern Atlantic wet heaths with Dorset heath (*Erica ciliaris*) and cross-leaved heath (*Erica tetralix*). This Ramsar is designated under Ramsar criterion 2 for supporting one nationally rare and 13 nationally scarce wetland plant species, and at least 28 nationally rare wetland invertebrate species.

European Site and Distance	Qualifying Features
	This Ramsar is designated under Ramsar criterion 3 for supporting a high species richness and high ecological diversity of wetland habitat types and transitions and lying in one of the most biologically-rich wetland areas of lowland Britain, being continuous with three other Ramsar sites: Poole Harbour, Avon Valley and The New Forest.
Dorset Heaths SAC Adjacent to southern boundary of the Proposed Development	This SAC supports the following Annex I habitats that are a primary reason for selection: • Northern Atlantic wet heaths with cross-leaved heath (*Erica tetralix*); • European dry heaths; and • Depressions on peat substrates of the Rhynchosporion. This SAC also supports the following Annex I habitats that are present as a qualifying feature but are not a primary reason for selection: • Molinia (*Molinion caeruleae*) meadows on calcareous, peaty or clayey-silt-laden soils; • Calcareous fens with great fen-sedge (*Cladium mariscus*) and species of the *Caricion davallianae*; • Alkaline fens; and • Old acidophilous oak woods with pedunculate oak (*Quercus robur*) on sandy plains. This SAC supports the following Annex II species that are a primary reason for selection: • Southern damselfly (*Coenagrion mercuriale*). This SAC supports the following Annex II species that are present as a qualifying feature but are not a primary reason for selection: • Great crested newt.
Poole Harbour SPA 4.8km south-west of the Proposed Development Boundary	From the Natura 2000 Data Sheet (October 2012): Under Article 4.1, the SPA supports breeding populations of the following Annex I listed species: • Mediterranean gull (*Larus melanocephalus*): 38.5% of the GB breeding population; and • Common tern (*Sterna hirundo*): 1.3% of the GB breeding population. Under Article 4.1, this SPA supports wintering populations of the following species: • Pied avocet (*Recurvirostra avosetta*): 36.1% of the GB population. Under Article 4.2, this SPA supports wintering populations of the following species: • Black-tailed godwit (*Limosa limosa islandica*): 2.4% of the population; and • Common shelduck (*Tadorna tadorna*): 1.2% of the population.

European Site and Distance	Qualifying Features
	Under Article 4.2, this SPA supports an internationally important overwintering assemblage (25,091 waterfowl) of the following species: • Common shelduck; • Pied avocet; and • Black-tailed godwit.
Poole Harbour Ramsar 4.8km south-west of the Proposed Development Boundary	This Ramsar is designated under Ramsar criterion 1 for supporting the best and largest example of a bar-built estuary with lagoonal characteristics (a natural harbour) in Britain. This Ramsar is designated under Ramsar criterion 2 for supporting two species of nationally rare plant and one nationally rare alga, and at least three British Red data book invertebrate species. This Ramsar is designated under Ramsar criterion 3 for supporting examples of natural habitat types of community interest - Mediterranean and thermo Atlantic *halophilous* scrubs, in this case dominated by shrubby sea-blite (*Suaeda vera)*, as well as calcareous fens with great fen-sedge (*Cladium mariscus)*. Transitions from saltmarsh through to peatland mires are of exceptional conservation importance as few such examples remain in Britain. In addition, the site supports nationally important populations of breeding waterfowl including common tern and Mediterranean gull. Over winter the site also supports a nationally important population of pied avocet. This Ramsar is designated under Ramsar criterion 5 for an internationally important assemblage of wintering waterfowl. This Ramsar is designated under Ramsar criterion 6 for its internationally important populations of the following species: • Common shelduck; and • Black-tailed godwit. And the following species were identified subsequent to designation but are noted for possible future consideration under criterion 6: • Pied avocet.
Dorset Heaths (Purbeck and Wareham) & Studland Dunes SAC 9.1km south-west of the Proposed Development Boundary	This SAC supports the following Annex I habitats that are a primary reason for selection: • Embryonic shifting dunes; • "Shifting dunes along the shoreline with marram grass (*Ammophila arenaria)* ("white dunes")"; • Atlantic decalcified fixed dunes (*Calluno-Ulicetea*); • Humid dune slacks; • Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*); • Northern Atlantic wet heaths with cross-leaved heath;

European Site and Distance	Qualifying Features
	• Temperate Atlantic wet heaths with Dorset heath (Erica ciliaris) and *Erica tetralix*; • European dry heaths; • Depressions on peat substrates of the Rhynchosporion; and • Bog woodland. This SAC also supports the following Annex I habitats that are present as a qualifying feature but are not a primary reason for selection: • Molinia meadows on calcareous, peaty or clayey-silt-laden soils; • Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae*; • Alkaline fens; and • Old acidophilous oak woods with *Quercus robur* on sandy plains. This SAC supports the following Annex II species that are a primary reason for selection: • Southern damselfly. This SAC supports the following Annex II species that are present as a qualifying feature but are not a primary reason for selection: • Great crested newt.

Conservation Objectives

Dorset Heathlands SPA and Ramsar

3.11 The Conservation Objectives (version 3, 27 February 2019) for the Dorset Heathlands SPA are available in the document titled European Site Conservation Objectives for Dorset Heathlands Special Protection Area Site Code: UK9010101, on the NE website. They state the conservation objectives are to:

"*Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring:*

- *The extent and distribution of the habitats of the qualifying features;*
- *The structure and function of the habitats of the qualifying features;*
- *The supporting processes on which the habitats of the qualifying features rely;*
- *The population of each of the qualifying features; and*
- *The distribution of the qualifying features within the site.*"

3.12 There are no specific conservation objectives for the Dorset Heathlands Ramsar, however, it is considered that the Dorset Heathlands SPA and SAC objectives provide an adequate

conservation framework against which to assess potential effects upon the Ramsar qualifying habitats and species.

Dorset Heaths SAC

3.13 The Conservation Objectives (version 3, November 2018) for Dorset Heaths SAC are available in the document entitled European Site Conservation Objectives for Dorset Heaths Special Area of Conservation Site Code: UK0019857, on the NEwebsite. They state the conservation objectives are to:

"*Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:*

- *The extent and distribution of qualifying natural habitats and habitats of qualifying species;*
- *The structure and function (including typical species) of qualifying natural habitats;*
- *The structure and function of the habitats of qualifying species;*
- *The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely;*
- *The populations of qualifying species, and*
- *The distribution of qualifying species within the site*."

Poole Harbour SPA and Ramsar

3.14 The Conservation Objectives (version 5, February 2019) for Poole Harbour SPA are available in the document titled European Site Conservation Objectives for Poole Harbour Special Protection Area Site Code: UK9010111, on the NE website. They state the conservation objectives are to:

"*Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the aims of the Wild Birds Directive, by maintaining or restoring:*

- *The extent and distribution of the habitats of the qualifying features;*
- *The structure and function of the habitats of the qualifying features;*
- *The supporting processes on which the habitats of the qualifying features rely;*
- *The population of each of the qualifying features; and*
- *The distribution of the qualifying features within the site*."

3.15 There are no specific conservation objectives for Poole Harbour Ramsar, however, it is considered that the Poole Harbour SPA objectives provide an adequate conservation

framework against which to assess potential effects upon the Ramsar qualifying habitats and species.

Dorset Heaths (Purbeck and Wareham) and Studland Dunes SAC

3.16 The Conservation Objectives (version 3, January 2019) for Dorset Heaths (Purbeck and Wareham) and Studland Dunes SAC are available in the document entitled European Site Conservation Objectives for Dorset Heaths (Purbeck & Wareham) & Studland Dunes Special Area of Conservation Site Code: UK0030038, on the NE website. They state the conservation objectives are to:

"*Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:*

- *The extent and distribution of qualifying natural habitats and habitats of qualifying species;*
- *The structure and function (including typical species) of qualifying natural habitats;*
- *The structure and function of the habitats of qualifying species;*
- *The supporting processes on which qualifying natural habitats and the habitats of qualifying species rely;*
- *The populations of qualifying species, and*
- *The distribution of qualifying species within the site*."

Vulnerability of the SAC, SPA and Ramsar Sites

3.17 The relevant issues to which the SAC, SPA and Ramsar sites are vulnerable is highlighted in **Table EDP 3.2** for Dorset Heathlands SPA, Dorset Heaths SAC and Dorset Heaths (Purbeck and Wareham) & Studland Dunes SAC; and in **Table EDP 3.3** for Poole Harbour SPA. This information has been extracted from NE's 'Site Improvement Plan' (SIP) for Dorset Heaths (dated 10 October 2014) and Poole Harbour (dated 30 October 2014) respectively.

3.18 It is recognised that not all of these vulnerabilities could potentially be impacted by the Proposed Development. This is considered in greater detail in **Section 4**.

Table EDP 3.2: Summary of Vulnerabilities of Dorset Heaths SAC/SPA (and Ramsar) and Dorset Heaths (Purbeck and Wareham) and Studland Dunes SAC

Issue	Detail
Inappropriate scrub control	Invasion of heath by trees and scrub results, in the long term, loss of heathland vegetation. The process is at different stages on different sites, but scrub control is necessary on the majority of these sites. A large amount of work has already been done (e.g. through Wildlife Enhancement Scheme and Higher Level Stewardship) but the need is ongoing.

Issue	Detail
Public access/ disturbance	Public access and disturbance affect large parts of the site mainly in the area of Poole/Bournemouth. Disturbance of breeding birds, mostly by dogs, can affect their breeding success, with implications for population level effects. Other effects include predation by domestic cats and urban foxes, habitat change from nutrients in dog faeces, and dumping of garden rubbish. On a number of sites, the illicit use of heaths for motorcycle scrambling is resulting in disturbance and erosion.
Undergrazing	Generally, grazing has now been successfully introduced on most of the larger heathland sites, but there remain some ungrazed areas (usually where the greatest practical difficulties are present), which would benefit from the introduction of an extensive grazing regime.
Forestry and woodland management	Several of the heathlands have conifer plantations on former heathland or mature conifers (or sometimes birch) that have invaded heathland. Favourable condition requires removal of these plantations for heathland restoration or, at least, management to increase the heath component within the woodland. Two large projects to remove the two largest of these plantation areas are underway, although one is dependent on funding availability.
Drainage	Drainage is generally the result of ditches made within the site to endeavour to drain wet heath or mire. These drains invariably result in adverse changes to wet heath and mire communities in the vicinity.
Water pollution	Pollution from different sources affect a number of areas. It comprises of pollution from adjacent agricultural land (run-off causing nutrient enrichment); leaching from adjacent landfill sites; pollution from foul drainage; and urban run-off. Poor water quality from the sources listed can also impede the ability to restore the sites' natural hydrology.
Invasive species	Various invasive species are present including rhododendron and gaultheria, and these have the potential to impact negatively on the site's features. A population of carp has recently become established in Little Sea lake (previously there were no fish) and has virtually eliminated the assemblage of macrophytes. The interest of Little Sea is also affected by Australian swamp stonecrop (*Cressula helmsii*) and Canadian pondweed (*Elodia canadensis*). Invasion of bracken on unmanaged sites is a concern although ongoing bracken management is required on most sites.
Habitat fragmentation	Dorset's lowland heathland is a fragmented remnant of a once extensive landscape. Some 86% of Dorset's heathland has been lost since the 1800s, and the surviving area is broken into many fragments. This curtails the genetic and physical interchange of a number of species and leads to edge effects on smaller sites. Moreover, species populations that are dependent on the wider habitat network of heath and forest beyond the designated site boundaries are vulnerable to changes within that wider network.
Conflicting conservation objectives	Heathland management aimed at maintaining open heathland does not cater for a number of rare species that require more specific management measures.
Wildfire/arson	Fire predominantly affects the urban heaths (about a third of the heathland area in and around Poole and Bournemouth) which are subject to arson. The result is that some heaths are burned too frequently and in spring and summer.

Issue	Detail
Deer	High deer numbers have affected heathland and mire on Arne Heath, Holton Heath and Stokeford Heath. Deer numbers are now being reduced and the habitats are recovering.
Air pollution: impact of atmospheric nitrogen deposition	Air pollution impacts on the site's vegetation diversity. As with most lowland heathlands and mires in England, nitrogen deposition is close to, and in some cases exceeds critical loads.

Table EDP 3.3: Summary of Vulnerabilities of Poole Harbour SPA (and Ramsar)

Issue	Detail
Water pollution	Nutrient enrichment has resulted in extensive algal mats across the mudflats with potential consequential impacts on bird prey availability and bird foraging behaviour.
Air pollution: impact of atmospheric nitrogen deposition	Aerial nitrogen deposition exceeds site relevant critical loads. Aerial nitrogen deposition is part of the overall nitrogen pressure on the SPA, the vast majority of which comes from agriculture, from much the same agricultural activities that lead to water pollution. The aerial nitrogen contribution originates from a much bigger area than the water catchment, mainly going westward. Deposition in the wider catchment is then conveyed to the site by water, either through surface drainage or via groundwater into rivers, then to the rivers that finally flow into the harbour. In addition, nitrogen deposition can have direct local effects in altering the vegetation structure of roosting and breeding sites, although these effects locally are unknown.
Fisheries: commercial marine and estuarine	Baitdigging, baitdragging and unlicensed fishing were identified as high-risk activities to the European marine site in the European Marine Sites (EMS) Risk Review (2010) due to high levels of the activity at key times of year for birds in sensitive locations and potential impacts through disturbance and bird prey availability.
Costal squeeze	Sea level rise is predicted to result in the substantial loss of supporting habitats for the SPA, including intertidal mudflats, saltmarsh and Brownsea lagoon.
Public access/ disturbance	A recreational disturbance study (2012/2013) indicated that disturbance from recreation was a significant factor influencing the distribution of birds in Poole Harbour. An increase in residential development in the locality is expected to increase the recreational pressure on the Harbour.
Deer	The main effects are trampling; creating bare areas within saltmarsh; modification of saltmarsh to a short grassy sward, and conversion of reedbed to rushy swamp. Saltmarsh effects are mainly confined to Arne. The reedbed has been affected in several areas.

Section 4
Stage 1: Screening of Likely Significant Effects

4.1 This section considers the potential for LSE to occur on the European sites identified in **Section 3**, as a result of the implementation of the Proposed Development. In accordance with best practice, this discussion is focused on the potential of the development to impact upon the conservation objectives of these designations. Each of the areas of vulnerability listed in **Section 3** are discussed below.

IN-COMBINATION/CUMULATIVE EFFECTS

4.2 During consultation with NE, it was agreed that the following development proposals in the vicinity of the Proposed Development Boundary should be considered with respect to the potential for in-combination or cumulative LSE upon European sites:

- The emergency diesel generator (EDG) which is part of the Proposed Development for use in the rare occurrence of an emergency situation (complete loss of electrical power to the EfW CHP Facility). For safety reasons, this EDG must be tested for up to 30 minutes fortnightly, resulting in a total maximum usage of 50 hours per annum (assuming no emergency situation arose);

- Eco Sustainable Solutions Energy Recovery Facility (ESS ERF) at Chapel Lane, Parley, Christchurch (located approximately 6.9 km north-east of the Proposed Development Boundary); and

- Whittle Power Energy Facility at Ferndown Industrial Estate, Wimborne (located approximately 4.3 km north-east of the Proposed Development Boundary).

4.3 The EDG has potential in-combination impacts due to its emissions to air, and the two above named separate projects comprise similar developments to the proposed EfW CHP Facility at the Proposed Development Boundary. Also, the ESS ERF development is located adjacent to another parcel of Dorset Heaths SPA, SAC and Ramsar. As such, their potential impact pathways are very similar. In light of this, no in-combination or cumulative effects are anticipated in respect of the following: inappropriate scrub control, public access/disturbance, undergrazing, forestry and woodland management, drainage, water pollution, invasive species, habitat fragmentation, conflicting conservation objectives, wildfire/arson, deer, water pollution, fisheries or coastal squeeze.

4.4 Given the processes involved in the operation of the EDG and Energy Facilities at Chapel Lane and Ferndown Industrial Estate, there will be potential impacts from increased air pollution. In the absence of mitigation, these impacts, in combination with potential air quality impacts from the Proposed Development, have the potential to result in LSE upon Dorset Heaths SPA, SAC and Ramsar and Poole Harbour SPA designations, as described further in the appropriate sections below.

DORSET HEATHS SAC, SPA AND RAMSAR SITE

Inappropriate Scrub Control

4.5 The construction and operation of the Proposed Development will have no influence on any type of scrub control within the SPA, SAC and Ramsar. No LSE in regard to this issue are predicted.

Public Access/Disturbance

4.6 The construction and operation of the Proposed Development will not comprise any recreational activities or lead to any increase in recreational activities or public access to the SPA, SAC and Ramsar. No LSE in regard to this issue are predicted.

Undergrazing

4.7 The construction and operation of the Proposed Development will have no influence on any grazing activities within the SPA, SAC and Ramsar. No LSE in regard to this issue are predicted.

Forestry and Woodland Management

4.8 The construction and operation of the Proposed Development will have no influence on any forestry or woodland management within the SPA, SAC and Ramsar. No LSE in regard to this issue are predicted.

Drainage

4.9 The construction and operation of the Proposed Development will result in no changes to any drainage processes within the SPA, SAC and Ramsar and no abstraction of water resources is proposed to facilitate the development. No LSE in regard to this issue are predicted.

Water Pollution

4.10 The Proposed Development is not hydrologically linked to the SPA, SAC and Ramsar, and given its current land use as an existing waste management facility comprising predominantly hardstanding, any increases in urban run-off as a result of the Proposed Development are not anticipated. The construction and operation of the Proposed Development will therefore result in no changes to water pollution within the SPA, SAC and Ramsar. No LSE in regard to this issue are predicted.

Invasive Species

4.11 The construction and operation of the Proposed Development will have no influence on the introduction or spread of invasive species within the SPA, SAC and Ramsar. No LSE in regard to this issue are predicted.

Habitat Fragmentation

4.12 Being located on the edge of an urban area within an existing operational waste management park, the Proposed Development will not result in any direct changes to the level of fragmentation the SPA, SAC and Ramsar habitats are already subject to.

4.13 Nightjar (a qualifying feature of the SPA that are nocturnal and thereby likely to be sensitive to artificial light) are known from previous radiotracking data to commute across the Proposed Development Boundary, and the habitats within both TCC1 and TCC2, although suboptimal, have potential to provide suitable foraging resource for this species. Given that the habitat is suboptimal, and no tracked nightjars were recorded foraging within any part of the Proposed Development Boundary during the studies, the temporary loss of potential suboptimal foraging habitat within either TCC1 or TCC2 would have a negligible impact on nightjars and therefore no LSE in regard to this issue are predicted.

4.14 However, in the absence of mitigation, temporary lighting used within the TCC during the construction period and non-sensitively designed permanent external lighting on the EfW CHP Facility could result in effective fragmentation for this species due to displacement/disturbance of nightjar commuting from Canford Heath to their preferred foraging areas located to the north and east of the Proposed Development. This could impact breeding success of this species.

4.15 Therefore, in the absence of mitigation, LSE on Dorset Heathlands SPA due to detrimental impacts on nightjar from habitat fragmentation caused by artificial lighting cannot be screened out. Therefore, habitat fragmentation effects are taken forward to Appropriate Assessment in **Section 5** of this sHRA.

Conflicting Conservation Objectives

4.16 The construction and operation of the Proposed Development will have no influence on the conservation objectives or management actions to achieve these objectives within the SPA, SAC and Ramsar. No LSE in regard to this issue are predicted.

Wildfire/Arson

4.17 The construction and operation of the Proposed Development will result in no changes to the incidents of wildfire or arson within the SPA, SAC and Ramsar. No LSE in regard to this issue are predicted.

Deer

4.18 The construction and operation of the Proposed Development will have no influence on the population numbers or distribution of deer within the SPA, SAC and Ramsar. No LSE in regard to this issue are predicted.

Air Pollution: Impact of Atmospheric Nitrogen Deposition

4.19 During operation of the Proposed Development, the combustion process will result in emissions to air. These emissions will include pollutants such as nitrogen oxides (NOx), sulphur dioxide (SO_2), hydrogen chloride (HCl) and hydrogen fluoride (HF). Additionally, the

injection of urea during the process, used to reduce NOx emissions, will result in emissions of ammonia (NH_3).

4.20 The EU and the United Nations Economic Commission for Europe (UNECE) have adopted 'Critical Levels' for these gaseous pollutants, which are defined as "*concentrations of pollutants in the atmosphere above which direct adverse effects on receptors, such as human beings, plants, ecosystems or materials, may occur according to present knowledge*"[3].

4.21 These pollutants in the atmosphere will eventually be deposited on to the ground, either directly from the surrounding air (known as dry deposition) or in the form of rain, snow or fog after mixing with suspended water in the atmosphere (wet deposition). Deposition of these pollutants on particular habitats can result in detrimental impacts resulting from the pollutant individually. Additionally, pollutants such as nitrogen, sulphur and HCl cumulatively also contribute to acid deposition, which can result in its own detrimental impacts on certain habitats.

4.22 In relation to this deposition (as opposed to airborne concentration) UNECE has therefore also adopted 'Critical Loads' which are defined as "*a quantitative estimate of exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge.*" Critical Loads are available for nitrogen deposition (which leads to eutrophication) and acid deposition (which leads to acidification). The values are given as a range to reflect variation in ecosystem responses across Europe, and different values are given to different habitat types depending on their sensitivity and vegetation type (which impacts deposition velocity).

4.23 The Air Quality Chapter of the Environmental Statement assesses the impact the Proposed Development may have on changes in air quality in the context of sensitive receptors, including sites designated for ecological reasons. Full details of that assessment can be found in in ES Chapter 6: Air Quality and ES Appendix 6.1: Operational Air Quality Assessment.

4.24 With regard to the assessment on ecological receptors, the Institute of Air Quality Management (IAQM) guidance[4] and the Environment Agency (EA) guidance[5] suggest that detailed modelling is undertaken to predict concentrations, and the results at sensitive receptors compared with the EA screening criteria for insignificance.

4.25 This guidance also introduces the following terms:

- Process contribution (PC) - predicted pollutant concentration or deposition rate as a result of emissions from the Proposed Development only; and

[3] Air Pollution Information System: https://www.apis.ac.uk/critical-loads-and-critical-levels-guide-data-provided-apis#_Toc279788050

[4] Holman et al (2020). A guide to the assessment of air quality impacts on designated nature conservation sites – version 1.1, Institute of Air Quality Management, London.

[5] https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit

- Predicted environmental concentration (PEC) - total predicted pollutant concentration as a result of emissions from the Proposed Development and existing baseline levels (i.e. PC plus baseline levels).

4.26 When considering impacts at Dorset Heaths SAC/SPA/Ramsar sites and associated underpinning SSSIs, impacts can be considered insignificant, and no further assessment is required if the emissions meet both of the following criteria:

- The short-term PC is less than 10% of the short-term environmental standard; and
- The long-term PC is less than 1% of the long-term environmental standard.

4.27 Should the PC not exceed the screening criteria, the EA states that detailed dispersion modelling is not required to consider air quality impacts associated with the Proposed Development on ecological receptors.

4.28 It should be noted that the long-term 1% screening threshold is widely accepted to represent a reasonable quantum of pollution which is not likely to be discernible from background fluctuations, and that exceeding this threshold does not in itself, imply damage to a habitat.

4.29 Ecological receptors were modelled by the air quality consultant and Critical Loads have been based on the sensitivity and relevant features of the receiving habitat. A review of the Air Pollution Information System (APIS)[6] website was undertaken in order to identify the worst-case habitat description and associated Critical Load, for which the lower end of the range was used, for the designation considered within the model. The air quality modelling also adopted worst-case assumptions including:

- That the EfW CHP Facility operates continuously at full load (although during operation, the EfW CHP Facility will have an availability of 89.4%, equating to approximately 7,830 full load operational hours per year);
- Predictions are based on the worst-case meteorological year of the five years' data available (which results in impacts that are approximately 10% higher than results for the average meteorological conditions over the five year period); and
- The maximum predicted concentration anywhere in the model domain is presented.

4.30 This ensures that a conservative approach has been taken.

4.31 The assessment finds that, in the absence of mitigation (i.e. a 90m chimney stack height and a standard ammonia Emission Limit Value of 10 mg/Nm^{-3}), predicted long-term concentrations of ammonia and short-term concentrations of nitrous oxides are above the screening threshold 1% and 10% of the Critical Levels respectively (at 2.2% for annual NH_3 and 11.2% for daily NOx) at the receptors modelled within the SAC/SPA/Ramsar.

4.32 Regarding pollutant deposition, 1% of the relevant Critical Loads have been exceeded in relation to nitrogen and acid deposition on woodland habitats (2.5% and 4.7% respectively) and also both nitrogen and acid deposition on grassland/moorland habitats (1.6% of the

[6] Air Pollution Information System, https://www.apis.ac.uk/

nitrogen Critical Load for grassland; and for acid deposition 4.5% for bog habitats, 2.9% for dwarf shrub heath and 4.4% for acid grassland).

4.33 Results of the assessment, which does not include in-combination considerations, can be found in **Tables EDP 4.1** - **4.3** below.

Table EDP 4.1: Predicted maximum airborne concentrations for Dorset Heaths SAC/SPA/Ramsar

Airborne Concentrations	**Receptor: H1 Dorset Heaths SAC/SPA/Ramsar**		
	Predicted PC (µg/m³)	**Critical Level (µg/m³)**	**Proportion of Critical Level**
Annual Mean NOx	0.27	30	0.9%
Annual Mean NH_3	0.0224	1	2.2%
Annual Mean SO_2	0.067	10	0.7%
Weekly Mean HF	0.0257	0.5	5.1%
Daily Mean HF	0.0700	5	1.4%
Daily Mean NOx	8.4	75	11.2%
Annual HCl	0.013	n/a	n/a

Table EDP 4.2: Predicted maximum nitrogen deposition on habitats for Dorset Heaths SAC/SPA/Ramsar

Nutrient Nitrogen Deposition by Habitat Type	**Receptor: H1 Dorset Heaths SAC/SPA/Ramsar**		
	Predicted PC (kg N $ha^{-1}a^{-1}$)	**Critical Load (kg N $ha^{-1}a^{-1}$)**	**Proportion of Critical Load**
Woodland	0.252	10 (from a range of 10-15)	2.5%
Grassland/Moorland	0.155	10 (from a range of 10-15)	1.6%

Table EDP 4.3: Predicted maximum acid deposition on habitats for Dorset Heaths SAC/SPA/Ramsar

Acid Deposition by Habitat Type	**Receptor: H1 Dorset Heaths SAC/SPA/Ramsar**	
	Predicted PC for Total Acidification Impact (keq $ha^{-1}a^{-1}$)	**APIS Proportion of Critical Load Function Tool Result**
Woodland Habitats		
Woodland	0.048	4.7%
Grassland/Moorland Habitats		
Bogs	0.025	4.5%
Dwarf shrub heath	0.025	2.9%
Acid grassland	0.025	4.4%

4.34 As such, in the absence of mitigation, LSE on Dorset Heaths SAC/SPA/Ramsar due to air pollution impacts cannot be screened out. As this LSE has been identified from the Proposed Development alone, an in-combination assessment (where the impact would be greater) is not necessary so has not been undertaken at this stage. Therefore, air quality effects are taken forward to Appropriate Assessment in **Section 5** of this sHRA, where in-combination impacts will also be considered.

POOLE HARBOUR SPA AND RAMSAR SITE

Water Pollution

4.35 The Proposed Development Boundary is not hydrologically linked to the SPA and Ramsar and given its current land use as an existing waste management facility comprising predominantly hardstanding, any changes in urban run-off as a result of the Proposed Development are not anticipated. The construction and operation of the Proposed Development will therefore result in no changes to water pollution within the SPA and Ramsar. No LSE in regard to this issue are predicted.

Air Pollution: Impact of Atmospheric Nitrogen Deposition

4.36 Following the same process as described above at Paragraph 4.19 in relation to Dorset Heaths, ecological receptors for Poole Harbour SPA and Ramsar were modelled and Critical Loads based on the sensitivity and relevant features of the receiving habitat. A review of the APIS website was undertaken in order to identify the worst-case habitat description and associated Critical Load, for which the lower end of the range was used. The air quality modelling also adopted worst-case assumptions including that the EfW CHP Facility operates continuously at full load, that results are based on the worst-case meteorological year of the five years' data available and that the maximum predicted concentration anywhere in the model domain is presented. This ensures that a conservative approach has been taken.

4.37 The assessment finds that in the absence of mitigation (i.e. a 90m chimney stack height and a standard ammonia Emission Limit Value of 10 mg/Nm^{-3}), predicted long-term concentrations of ammonia and short-term concentrations of nitrous oxides are below the 1% and 10% of the Critical Levels respectively (at 0.5% for annual NH_3 and 1.3% for daily NOx) at the receptor modelled within the SPA/Ramsar.

4.38 Regarding pollutant deposition, 1% of the relevant Critical Loads for habitats supporting the designated bird species have not been exceeded in relation to nitrogen and acid deposition (0.4% of the nitrogen Critical Load for grassland habitats; and 0.9% for acid deposition on bog habitats).

4.39 However, when considering these impacts in combination with other projects described above at **Paragraph 4.2** and in the absence of mitigation, 1% of the Critical Load for acid deposition on bog habitats has been exceeded (1.1%). Results of this in-combination assessment are provided in **Tables EDP 4.4** - **4.6** below.

Table EDP 4.4: Predicted maximum airborne concentrations for Poole Harbour SPA/Ramsar in-combination

Airborne Concentrations	Receptor: H2 Poole Harbour SPA/Ramsar		
	Predicted PC from all Sources (µg/m^3)	Critical Level (µg/m^3)	Proportion of Critical Level
Annual Mean NOx	0.082	30	0.3%
Annual Mean NH_3	0.0051	1	0.5%
Annual Mean SO_2	0.017	10	0.2%
Weekly Mean HF	0.0035	0.5	0.7%
Daily Mean HF	0.0080	5	0.2%
Daily Mean NOx	1.09	75	1.5%
Annual HCl	0.0033	n/a	n/a

Table EDP 4.5: Predicted maximum nitrogen deposition on habitats for Poole Harbour SPA/Ramsar in-combination

Nutrient Nitrogen Deposition by Habitat Type	Receptor: H2 Poole Harbour SPA/Ramsar		
	Predicted PC from all Sources (kg N ha^{-1}a^{-1})	Critical Load (kg N ha^{-1}a^{-1})	Proportion of Critical Load
Grassland/Moorland	0.039	8 (from lowest range of 8-10)	0.5%

Table EDP 4.6: Predicted maximum acid deposition on habitats for Poole Harbour SPA/Ramsar in-combination

Acid Deposition by Habitat Type	Receptor: H2 Poole Harbour SPA/Ramsar	
	Predicted PC for Total Acidification Impact (keq ha^{-1}a^{-1})	APIS Proportion of Critical Load Function Tool Result
Grassland/Moorland Habitats		
Bogs	0.0062	1.1%

4.40 As such, when considered in combination with other projects and in the absence of mitigation, LSE on Poole Harbour SPA/Ramsar due to air pollution impacts cannot be screened out. Therefore, air quality effects are taken forward to Appropriate Assessment in **Section 5** of this sHRA.

Fisheries: Commercial Marine and Estuarine

4.41 The construction and operation of the Proposed Development will have no influence on any commercial marine and estuarine fishery activities within the SPA and Ramsar. No LSE in regard to this issue are predicted.

Costal Squeeze

4.42 The construction and operation of the Proposed Development will result in no changes to the coastline or sea level. No LSE in regard to this issue are predicted.

Public Access/Disturbance

4.43 The construction and operation of the Proposed Development will not comprise any recreational activities or lead to any increase in recreational activities or public access to the SPA and Ramsar. No LSE in regard to this issue are predicted.

Deer

4.44 The construction and operation of the Proposed Development will have no influence on the population numbers or distribution of deer within the SPA and Ramsar. No LSE in regard to this issue are predicted.

DORSET HEATHS (PURBECK AND WAREHAM) & STUDLAND DUNES SAC

Inappropriate Scrub Control

4.45 The construction and operation of the Proposed Development will have no influence on any type of scrub control within the SAC. No LSE in regard to this issue are predicted.

Public Access/Disturbance

4.46 The construction and operation of the Proposed Development will not comprise any recreational activities or lead to any increase in recreational activities or public access to the SAC. No LSE in regard to this issue are predicted.

Undergrazing

4.47 The construction and operation of the Proposed Development will have no influence on any grazing activities within the SAC. No LSE in regard to this issue are predicted.

Forestry and Woodland Management

4.48 The construction and operation of the Proposed Development will have no influence on any forestry or woodland management within the SAC. No LSE in regard to this issue are predicted.

Drainage

4.49 The construction and operation of the Proposed Development will result in no changes to any drainage processes within the SAC and no abstraction of water resources is proposed to facilitate the development. No LSE in regard to this issue are predicted.

Water Pollution

4.50 The Proposed Development Boundary is not hydrologically linked to the SAC and given its current land use as an existing waste management facility comprising predominantly hardstanding, any increases in urban run-off as a result of the Proposed Development are not anticipated. The construction and operation of the Proposed Development will therefore result in no changes to water pollution within the SAC. No LSE in regard to this issue are predicted.

Invasive Species

4.51 The construction and operation of the Proposed Development will have no influence on the introduction or spread of invasive species within the SAC. No LSE in regard to this issue are predicted.

Habitat Fragmentation

4.52 Given the distance between the Proposed Development and this SAC (c. 9.1km) and the intervening land uses, the construction and operation of the Proposed Development will have no influence on habitat fragmentation for this SAC. No LSE in regard to this issue are predicted.

Conflicting Conservation Objectives

4.53 The construction and operation of the Proposed Development will have no influence on the conservation objectives or management actions to achieve these objectives within the SAC. No LSE in regard to this issue are predicted.

Wildfire/Arson

4.54 The construction and operation of the Proposed Development will result in no changes to the incidents of wildfire or arson within the SAC. No LSE in regard to this issue are predicted.

Deer

4.55 The construction and operation of the Proposed Development will have no influence on the population numbers or distribution of deer within the SAC. No LSE in regard to this issue are predicted.

Air Pollution: Impact of Atmospheric Nitrogen Deposition

4.56 Following the same process as described above at Paragraph 4.19 in relation to Dorset Heaths, ecological receptors for Dorset Heaths (Purbeck and Wareham) and Studland Dunes SAC were modelled and Critical Loads based on the sensitivity and relevant features of the receiving habitat. A review of the APIS website was undertaken in order to identify the worst-case habitat description and associated Critical Load, for which the lower end of the range was used. The air quality modelling also adopted worst-case assumptions including that the EfW CHP Facility operates continuously at full load, that results are based on the worst-case meteorological year of the five years' data available and that the

maximum predicted concentration anywhere in the model domain is presented. This ensures that a conservative approach has been taken.

4.57 The assessment finds that in the absence of mitigation (i.e. a 90m chimney stack height and a standard ammonia Emission Limit Value of 10 mg/Nm^{-3}) and when also considering in combination effects with the schemes listed at **Paragraph 4.2**, predicted long- and short-term concentrations of pollutants are well below the 1% and 10% of the Critical Levels respectively at the receptor modelled within the SAC.

4.58 Similarly, for pollutant deposition, 1% of the Critical Loads for the relevant habitats have not been exceeded in relation to nitrogen and acid deposition (0.8% of the nitrogen Critical Load for bog woodland habitats; and 0.7% for acid deposition on bog habitats). Results of this in-combination assessment are provided in **Tables EDP 4.7** - **4.9** below.

Table EDP 4.7: Predicted maximum airborne concentrations for Dorset Heaths (Purbeck and Wareham) & Studland Dunes SAC in-combination

Airborne Concentrations	**Receptor: H3 Dorset Heaths (Purbeck and Wareham) & Studland Dunes SAC**		
	Predicted PC from all Sources (µg/m^3)	**Critical Level (µg/m^3)**	**Proportion of Critical Level**
Annual Mean NOx	0.051	30	0.2%
Annual Mean NH_3	0.0031	1	0.3%
Annual Mean SO_2	0.011	10	0.1%
Weekly Mean HF	0.0022	0.5	0.4%
Daily Mean HF	0.0044	5	0.1%
Daily Mean NOx	0.60	75	0.8%
Annual HCl	0.0020	n/a	n/a

Table EDP 4.8: Predicted maximum nitrogen deposition on habitats for Dorset Heaths (Purbeck and Wareham) & Studland Dunes SAC in-combination

Nutrient Nitrogen Deposition by Habitat Type	**Receptor: H3 Dorset Heaths (Purbeck and Wareham) & Studland Dunes SAC**		
	Predicted PC from all Sources (kg N $ha^{-1}a^{-1}$)	**Critical Load (kg N $ha^{-1}a^{-1}$)**	**Proportion of Critical Load**
Woodland	0.039	5 (from lowest range of 5-10)	0.8%

Table EDP 4.9: Predicted maximum acid deposition on habitats for Dorset Heaths (Purbeck and Wareham) & Studland Dunes SAC in-combination

Acid Deposition by Habitat Type	**Receptor: H3 Dorset Heaths (Purbeck and Wareham) & Studland Dunes SAC**	
	Predicted PC for Total Acidification Impact (keq $ha^{-1}a^{-1}$)	**APIS Proportion of Critical Load Function Tool Result**
Grassland/Moorland Habitats		
Bogs	0.0038	0.7%

4.59 As such, when considered in combination with other projects and in the absence of mitigation, no LSE on Dorset Heaths (Purbeck and Wareham) and Studland Dunes SAC due to air pollution impacts are anticipated.

SUMMARY

4.60 **Table EDP 4.10** below provides a summary of the Stage 1: Screening Assessment of the Proposed Development in isolation and in combination.

Table EDP 4.10: Summary of Stage 1: Screening Assessment

Designated Site	**Potential Impact Pathway - Alone and In-combination**	**Potential for Likely Significant Effect?**
Dorset Heaths SAC, SPA and Ramsar	Inappropriate scrub control	No
	Public access/disturbance	No
	Undergrazing	No
	Forestry and woodland management	No
	Drainage	No
	Water pollution	No
	Invasive species	No
	Habitat fragmentation	Yes
	Conflicting conservation objectives	No
	Wildfire/arson	No
	Deer	No
	Air pollution: impact of atmospheric nitrogen deposition	Yes
Poole Harbour SPA and Ramsar	Water pollution	No
	Air pollution: impact of atmospheric nitrogen deposition	Yes
	Fisheries: commercial marine and estuarine	No
	Costal squeeze	No
	Public access/disturbance	No
	Deer	No

Designated Site	Potential Impact Pathway - Alone and In-combination	Potential for Likely Significant Effect?
Dorset Heaths (Purbeck and Wareham) and Studland Dunes SAC	Inappropriate scrub control	No
	Public access/disturbance	No
	Undergrazing	No
	Forestry and woodland management	No
	Drainage	No
	Water pollution	No
	Invasive species	No
	Habitat fragmentation	No
	Conflicting conservation objectives	No
	Wildfire/arson	No
	Deer	No
	Air pollution: impact of atmospheric nitrogen deposition	No

Section 5
Stage 2: Appropriate Assessment

5.1 The HRA Screening Assessment undertaken in **Section 4** concluded that as a precaution in the context of case law, LSE on the conservation objectives of the Dorset Heaths SAC, SPA and Ramsar cannot be completely discounted as a result of the Proposed Development with respect to the following impact pathways:

- Habitat fragmentation; and
- Air pollution: impact of atmospheric nitrogen deposition.

5.2 In addition, when assessed in combination with other relevant projects, LSE on the conservation objectives of the Poole Harbour SPA and Ramsar cannot be completely discounted as a result of the Proposed Development with respect to the following impact pathway:

- Air pollution: impact of atmospheric nitrogen deposition.

5.3 Accordingly, an assessment of these potential effects resulting from the Proposed Development alone and in combination with other plans or projects is undertaken in this section.

DORSET HEATHS SAC, SPA AND RAMSAR SITE

Habitat Fragmentation

Mitigation

5.4 During the construction phase, lighting mitigation and best practice that will be followed has been set out within the Outline Construction Environmental Management Plan (CEMP) accompanying the planning application. It states that:

- Unnecessary lighting will be avoided;
- Lights will be switched off when they are not needed; this will include periods outside of normal site working hours;
- Any security lighting will be kept to a minimum at all times; and
- Checks will be made each evening to ensure no lights are left on in error.

5.5 It further states that nighttime illumination, outside of working hours, would be reduced to a minimum commensurate with the need to maintain the site's security requirements to reduce the environmental impact and reduce light pollution. Furthermore, that lighting arrangements will also take into consideration the potential disturbance of wildlife and ecology, through the attachment of directional hoods to lights and non-essential lighting fitted with automatic cut-off switches.

5.6 During the operational phase, external lighting will be designed to ensure a safe working environment whilst minimising impacts on nocturnal wildlife and landscape receptors. The lighting strategy is set out within ES Appendix 3.1: Operational Lighting Scheme, where two night-time scenarios for external lighting are described:

- Scenario 1 – low light periods when the EfW CHP Facility is in normal operation, this is anticipated over the late autumn/winter/early spring months when sunrise and sunset are within the normal working hours of 07:00 to 20:00; and

- Scenario 2 – low light periods when there are no waste deliveries or other operational traffic movements and the minimum staff occupation. This will occur outside of the normal opening hours of the EfW CHP Facility.

5.7 The document states that the design will take account of the recommendations of Bat Conservation Trust Guidance Note 08/18 – Bats and artificial lighting in the UK[7], and the external lighting will be shielded to avoid light spill on habitats within and surrounding the EfW CHP Facility Site. To reduce light pollution at night-time, essential external lights which stay on all night will be arranged on a separate electrical circuit and the remaining non-essential external lights will be on a circuit which is switched off automatically outside of normal operational opening hours.

5.8 It is anticipated that these construction and operation measures would be secured by a condition attached to the planning consent requiring approval of a detailed CEMP and Operational Lighting Scheme prior to commencement of the Proposed Development, along with full adherence to the documents thereafter.

Appropriate Assessment

5.9 The effective implementation of the sensitive lighting principles set out within the Outline CEMP for the construction period and the Operational Lighting Scheme for the operational period would prevent fragmentation of nightjar habitats due to excessive light spill along their commuting routes.

5.10 There will still be a level of external lighting during both construction and operation due to safety and security reasons. However, this will be sensitively designed to avoid light spill upon adjacent habitats. Furthermore, the nightjar tracking studies showed that surrounding built-up areas (which are subject to levels of illuminance at night) were visited and flown over by nightjar, so appear to not present a barrier to their foraging excursions. As such, impacts to nightjar from this remaining safety/security lighting are considered to be negligible.

5.11 Through inclusion of the identified mitigation measures, habitat fragmentation effects on nightjar arising because of the Proposed Development would no longer constitute an LSE and are therefore not anticipated to have an adverse effect upon Dorset Heaths SPA/Ramsar either alone or in-combination.

[7] Bat Conservation Trust and Institute of Lighting Professionals (2018) Guidance Note 08/18: Bats and artificial lighting in the UK. ILP, Rugby

Air Pollution

Mitigation

5.12 An Air Pollution Control system will be integrated into the EfW CHP Facility to ensure gases released from the combustion process are suitable for release from the chimney. This will involve cleaning the gas with a dry reagent injection system before being filtered. Further details are provided in ES Chapter 3: Description of The Proposed Development. The injection of urea at this stage, undertaken to reduce NOx emissions, results in emissions of ammonia, so is itself subject to Emission Limit Values as part of the required environmental permitting. To determine potential impacts in the absence of mitigation, the current Environmental Permitting Regulations 4.02 benchmark ammonia emission limit value of 10 mg/Nm^3 was used for the screening stage. To further reduce ecological impacts from ammonia emissions, an ammonia Emissions Limit Value of 5 mg/Nm^3 will be adopted by the EfW CHP Facility. This will be agreed with the Environment Agency and specified within the Environmental Permit for the Proposed Development.

5.13 The height of the chimney stack can change the impacts from emissions as a higher stack allows greater dispersion of the emission gasses, thereby reducing the concentration of pollutant deposition on surrounding habitats. The chimney height has therefore been raised as high as feasible whilst balancing landscape impacts and aerodrome safeguarding constraints from the initial design which proposed a 90m stack height. The Proposed Development chimney stack height therefore now stands at 110m above ground level (154.65m above ordnance datum).

5.14 Whilst, as described below, the above measures are anticipated to be effective in reducing the majority of air pollution effects identified in **Section 4** to insignificant levels, minor exceedances of relevant acid deposition thresholds are predicted for grassland/moorland habitats within Dorset Heaths SAC/SPA/Ramsar Site. Following discussions with NE, an additional mitigation package is proposed to address this, namely a financial contribution towards monitoring and management of the designation by NE to be delivered via:

- A Biodiversity Enhancement Contribution and Trickle Fund; and
- A Monitoring and Supportive Management Plan.

5.15 This is to be secured by a planning obligation with the Section 106 agreement attached to planning consent and is to be agreed with the Local Planning Authority and NE. This is described further in the relevant section below.

Appropriate Assessment

5.16 Detailed air quality modelling has been undertaken for ecological receptors within Dorset Heaths SAC/SPA/Ramsar with inclusion of the above noted mitigation. A review of the APIS website was undertaken in order to identify the worst-case habitat description and associated Critical Load, for which the lower end of the range was used. The air quality modelling also adopted worst-case assumptions including that the EfW CHP Facility operates continuously at full load, that results are based on the worst-case meteorological year of the five years' data available and that the maximum predicted concentration

anywhere in the model domain is presented. This ensures a conservative approach has been considered.

5.17 The assessment finds that with mitigation (i.e. a 110m chimney stack height and a reduced ammonia Emission Limit Value of 5 mg/Nm^{-3}), predicted maximum short- and long-term mean concentrations of pollutants are now below the screening threshold long-term 1% and short-term 10% of the relevant Critical Levels at the receptors modelled within Dorset Heaths SAC/SPA/Ramsar. Details are provided below in **Table EDP 5.1**.

Table EDP 5.1: Predicted maximum airborne concentrations for Dorset Heaths SAC/SPA/Ramsar with mitigation

Airborne Concentrations	**Receptor: H1 Dorset Heaths SAC/SPA/Ramsar**		
	Predicted PC (µg/m^3)	**Critical Level (µg/m^3)**	**Proportion of Critical Level**
Annual Mean NOx	0.13	30	0.4%
Annual Mean NH_3	0.006	1	0.6%
Annual Mean SO_2	0.034	10	0.3%
Weekly Mean HF	0.0120	0.5	2.4%
Daily Mean HF	0.0366	5	0.7%
Daily Mean NOx	4.4	75	5.9%
Annual HCl	0.007	n/a	n/a

5.18 Regarding pollutant deposition on habitats within Dorset Heaths SAC/SPA/Ramsar, maximum predicted nitrogen deposition has been reduced to below the threshold 1% of the Critical Loads for the habitats present, as shown in **Table EDP 5.2** below.

Table EDP 5.2: Predicted maximum nitrogen deposition on habitats for Dorset Heaths SAC/SPA/Ramsar with mitigation

Nutrient Nitrogen Deposition by Habitat Type	**Receptor: H1 Dorset Heaths SAC/SPA/Ramsar**		
	Predicted PC (kg N $ha^{-1}a^{-1}$)	**Critical Load (kg N $ha^{-1}a^{-1}$)**	**Proportion of Critical Load**
Woodland	0.08	10 (from a range of 10-15)	0.8%
Grassland/Moorland	0.05	10 (from a range of 10-15)	0.5%

5.19 As for acid deposition, utilising the CLmaxN (the maximum Critical Load of acidity for nitrogen assuming there is no sulphur deposition) values provided by APIS, 1% of the relevant Critical Loads for the various habitats present have still been exceeded. Results of this assessment are provided in **Table EDP 5.3**.

Table EDP 5.3: Predicted maximum acid deposition on habitats for Dorset Heaths SAC/SPA/Ramsar with mitigation

Acid Deposition by Habitat Type	Receptor: H1 Dorset Heaths SAC/SPA/Ramsar		
	Predicted PC for Total Acidification Impact (keq $ha^{-1}a^{-1}$)	CLmaxN	APIS Proportion of Critical Load Function Tool Result
Woodland Habitats			
Woodland	0.021	1.013	2.1%
Grassland/Moorland Habitats			
Bogs	0.010	0.553	1.9%
Dwarf shrub heath	0.010	0.842	1.2%
Acid grassland	0.010	0.566	1.8%

5.20 These predicted maximum acid deposition results are discussed in more detail in relation to each habitat type in the following sections.

Acid Deposition Impact on Woodland Habitats

5.21 For woodland, modelled pollutant impacts are comparatively higher due to their increased deposition velocity compared to other habitat types with short vegetation (such as all grassland/moorland habitats, which is mainly due to the increased surface area of the vegetation within woodland). Although the predicted PC of the Proposed Development is over 1% of this habitat's Critical Load for acid deposition, this impact is considered to have no adverse effect on the integrity of the SAC/SPA/Ramsar designations for the following reasons.

5.22 In relation to the SPA and Ramsar designations, woodland habitat is of some value in relation to nightjar and woodlark (qualifying features of the SPA) that can utilise this habitat for foraging and nesting (usually only within clearings before the canopy closes over), however, heathland is their usual preferred habitat and the SIP for this designation recommends the removal of woodland plantations for heathland restoration. Furthermore, the APIS website summary of the features for this SPA states that these species are not sensitive due to acidity impacts on their broad habitat type. This is due to there being no expected negative impact on these species as a result of impacts on the species' broad habitats.

5.23 In relation to the SAC designation, the only Annex I feature with a woodland habitat acidity Critical Load class is old acidophilous oak woods with pedunculate oak on sandy plains (feature code H9190), which is present as a qualifying feature, but is not a primary reason for selection of the site. The only areas within the 1% Critical Load contour for woodland where this habitat has been recorded as present is within the southern Parley Common SSSI units 007, 008, 015 and 017, which total an area of approximately 13.9ha. The current condition assessment of this feature within these units is categorised as unfavourable in units 007 and 017 (which total 2.0ha) and not recorded in 008 and 015 (covering 11.9ha).

5.24 Background acidification levels at Parley Common SSSI for woodland habitats are reported on APIS website as 2.14 keq $ha^{-1}a^{-1}$ (2019 mid-year value), which already exceeds the Critical Load (at 211%). On APIS, this background acidity shows a decreasing trend since a peak of 2.99 keq $ha^{-1}a^{-1}$ in 2010, which is expected to continue.

5.25 It is considered that this small additional acid deposition exceedance of up to 0.021 keq $ha^{-1}a^{-1}$ in a worst-case scenario, affecting a small area of habitat that is not a primary reason for designation of the site, along with consideration of reducing background levels, would have no adverse effect on the integrity of the designation.

5.26 When considering the in-combination impact of acid and nitrogen deposition on woodland habitats, as set out within the cumulative assessment section of the ES Appendix 6.1: Operational Air Quality Assessment, deposition of above 1% of the habitats Critical Load for both acid and nitrogen are predicted. The ESS ERF is by far the largest contributor to this for acid deposition (at 8.5% of the habitat's Critical Load, compared to 2.1% for the Proposed Development including EDG and 1.3% for the Whittle Power Facility) and to a lesser extent the main contributor for nitrogen deposition (at 1.9% of the habitat's Critical Load, compared to 1.8% for the Whittle Power Facility and 0.8% for the Proposed Development including EDG).

5.27 It is understood and is assumed that the ESS ERF will be providing its own mitigation for this impact in the form of a Monitoring and Supportive Management Plan alongside financial contributions, agreed with NE and controlled by a Section 106 agreement. Therefore, in addition to the mitigation proposed for the Proposed Development and in consideration of the reasons set out above, the in-combination impacts would also result in no adverse effect on the integrity of the designation.

Acid Deposition Impact on Grassland/Moorland Habitats

5.28 In relation to grassland/moorland habitats, the acidification results are shown on a contour plot at **Plan EDP 1**. This plot illustrates the area of SAC/SPA/Ramsar where 1% of each relevant habitat type's Critical Load is exceeded in a worst-case scenario.

5.29 The relevant Critical Load habitat class types for the designation are bog (due to depressions on peat substrates of the Rhynchosporion, code H7150, being a primary reason for selection of this SAC), acid grassland (due to Molinia meadows on calcareous, peaty or clayey-silt-laden soils, code H6410, being present as a qualifying feature, but not a primary reason for selection of this SAC) and heathland (due to European dry heaths (code H4030) and Northern Atlantic wet heaths with cross-leaved heath (code H4010) being primary reasons for selection of this site).

5.30 On NE's website[8], information on monitored features on units of the SAC shows no Annex I habitat Molinia meadows on calcareous, peat or clay-silt soil are recorded as present within any of the SSSI units covered by the acid grassland 1% Critical Load contour. Nonetheless, habitat surveys have recorded approximately 32.8ha of broad acid grassland habitat within the acid grassland 1% Critical Load contour area.

[8]https://designatedsites.naturalengland.org.uk/SiteSACFeaturesMatrix.aspx?SiteCode=UK0019857&SiteName=Dorset%20Heaths%20SAC

5.31 Annex I habitat depressions on peat substrates of the Rhynchosporion are known to be present at Canford Heath SSSI within units 005, 006 and 015; at Kinson Common (unit 001); at Turbary Common in unit 003 and at Parley Common SSSI within units 004 - 006, 011 – 014, 016, 018 – 020, 025 and 026. Habitat surveys have recorded approximately 9.2ha of marshy grassland type habitats within these units covered by the bog 1% Critical Load contour area. It is not known how much of this area represents Annex I habitat. A total of 19.9ha of marshy grassland habitats have been recorded within all designated site parcels across the whole of the contour area. This habitat type is considered to cover approximately 457.6ha across the SAC designation (8% of the designated land within the SAC), so the proportion covered by this 1% Critical Load contour is approximately 4.3%.

5.32 The majority of Dorset Heaths SAC designated site area (approximately 86%) is heathland habitat. Both Annex I habitats Northern Atlantic wet heath and European dry heath are known to be present within every SSSI unit within Canford Heath, Turbary and Kinson Commons and Ferndown Common, as well as within most units at Parley Common. As this habitat is less sensitive to acid impacts than bogs or acid grassland (with a higher CLmaxN of 0.842 keq $ha^{-1}a^{-1}$ compared to 0.553 and 0.566 for bogs and acid grassland respectively), the 1% Critical Load contour covers a smaller extent, with an area in the centre of Canford Heath and another separate area that clips the very edge of Canford Heath and Ferndown Common, as shown on **Plan EDP 1**. A total of approximately 36.3ha of heath habitats have been recorded within the designated area covered by the dwarf shrub heath 1% Critical Load contour line. This habitat type is known to cover approximately 4918.8ha across the SAC designation, so the proportion covered by this 1% Critical Load contour is approximately 0.7%.

5.33 Background acidity levels for grassland/moorland habitats are reported on APIS website as 1.26 keq $ha^{-1}a^{-1}$ (2019 mid-year value) at Canford Heath, and 1.25 keq $ha^{-1}a^{-1}$ at the southern ends of Ferndown Common and Parley Common, which already exceeds the habitat's Critical Loads (at 228% for bog, 227% for acid grassland and 150% for dwarf shrub heath). On APIS, this background acidity shows different trends in the separate 5km grid squares for which background levels are calculated that cover these designations. At Ferndown and Parley Commons, a slow general decrease from a peak in 2010 (of 1.72 keq $ha^{-1}a^{-1}$) is shown. At Canford Heath, past data shows a decreasing trend from a peak of 1.51 keq $ha^{-1}a^{-1}$ in 2010, which slows from 2014 and ends in a sharp rise from 2018 to 2019 (no estimate is available for 2017). Given the incongruence of this sharp rise with the other year's data, and in the context of overall local and national declines in background acidification levels, this is likely to be an anomaly.

5.34 As advised by NE through their Discretionary Advice Service, to inform the assessment of potential impacts on the area within the SAC/SPA designation over which 1% of each habitat's Critical Load may be exceeded in a worst-case scenario and to establish a robust baseline, soil sampling (to determine the potential capacity of the soils across the area to buffer any increases in acid deposition) and a bryophyte and lichen survey (to determine if current species compositions are indicative of the habitat being effected by pollutants) have been undertaken.

Soil Sampling

5.35 A total of 32 soil sample locations across a variety of habitats within parts of the designated site covered by the 1% Critical Load contour lines for acid grassland, bog and dwarf shrub heath were selected and agreed with NE. Soil samples were taken by Hydrock engineers on 11 and 12 January 2023 and analysed in a laboratory to provide the following parameters, which were noted in a study by Houdijk et al. as being the most discriminating soil variables of different plant species that grow in heathlands[9]:

- pH;
- Ammonium (NH_4);
- Nitrate (NO_3);
- Calcium (Ca);
- Aluminium (Al);
- Al/Ca ratio;
- NH_4/NO_3 ratio; and
- Organic matter content.

5.36 Full details and results of the soil sampling are provided in **Appendix EDP 2**. In discussion with NE and based on the Houdijk et al. study, the Al/Ca ratio was considered to be of most importance in determining acid buffering capacity of the soil, with a ratio of above three suggesting limited buffering capacity and therefore higher vulnerability to impacts from acid deposition. This study is in relation to dry heathland habitats only, and other studies have noted that acidification in wet heaths is also impacted through lowering of groundwater tables[10]. Owing to this, it was considered that this parameter may not be a reliable measure of acidity buffering capacity in habitats other than dry heath, so greater caution is required when drawing conclusions on the buffering capacity of soil samples from other habitat types. The influence of other factors, such as groundwater tables, on the measured Al/Ca ratio may be evidenced in the soil sampling results, which show a much greater range and interquartile spread for samples taken within marshy grass/bog, wet heath and acid grass habitats compared to the samples from within dry heath.

5.37 **Table EDP 5.4** therefore presents the sampling results, including Al/Ca ratios, for samples taken within dry heathland habitats only across the entire sampling area. Those samples with an Al/Ca ratio of above three are highlighted in red. See **Plan EDP 1** for sample locations.

[9] Houdijk, A.L.F.M., Verbeek, P.J.M., Van Dijk, H.F.G. et al. Distribution and decline of endangered herbaceous heathland species in relation to the chemical composition of the soil. Plant Soil 148, 137–143 (1993)

[10] Van Den Berg, L.J.L., Dorland, E., Vergeer, P., Hart, M.A.C., Bobbink, R. and Roelofs, J.G.M. (2005), Decline of acid-sensitive plant species in heathland can be attributed to ammonium toxicity in combination with low pH. New Phytologist, 166: 551-564.

Table EDP 5.4: Soil Sampling Results for Dry Heath Habitat

Location ID	SSSI Parcel	Habitat	pH	NH_4	NO_3	NH_4/NO_3 Ratio	Organic Matter	Aluminium	Calcium	Al/ Ca Ratio
3	Canford	Heath	4.16	2.89	<1	<1.0	8.7	264	192	1.4
6	Canford	Heath	4.09	6.06	<1	<1.0	12	418	260	1.6
7	Canford	Heath	4.4	6.65	<1	<1.0	5.4	4020	482	8.3
8	Canford	Heath	3.92	1.68	<1	<1.0	7.6	386	108	3.6
16	Canford	Heath	4.22	4.76	<1	<1.0	8.1	451	225	2.0
18	Turbary	Heath	4.16	11.7	<1	<1.0	12	1510	410	3.7
25	Ferndown	Heath	3.61	<0.26	<1	<1.0	5.1	282	96	2.9
28	Parley	Heath	4.31	1.95	<1	<1.0	2.8	262	393	0.7
29	Parley	Heath	5.36	1.8	5	<1.0	2.3	383	880	0.4

5.38 These results suggest that soils supporting dry heath habitat around sample locations 7 and 8, which are located in the central and south-western parts of Canford Heath, and location 18, located in the western half of Turbary Common, may have a limited acid buffering capacity, and the heath habitat supported may therefore be more vulnerable to acidification impacts. Of these three locations, only location 8 is within the 1% Critical Load for dwarf shrub heath contour line. Locations 3 and 6, sampling dry heath habitats also within the contour area, have Al/Ca ratios of 1.4 and 1.6 respectively, potentially indicating buffering capacity of the soil and therefore less vulnerability of the habitats here to impacts from increased acid deposition.

Bryophyte and Lichen Survey

5.39 Bryophytes and lichens can be useful bioindicators for habitats as they absorb nutrients and water through exposed surfaces and therefore are particularly sensitive to atmospheric pollutants. The 2022 survey, undertaken between 27 October and 09 November by an experienced lichen and bryophyte surveyor from DERC, monitored lichens and bryophytes at six locations within Canford Heath that were previously surveyed in 2009 and 2012, allowing changes over time to be compared. In addition to this, new monitoring locations at Turbary and Kinson Commons SSSI, Ferndown Common SSSI and Parley Common SSSI were identified.

5.40 Bryophyte species can be divided into groups depending on their environmental preferences as defined by Ellenberg indicator values[11]. The Ellenberg values of relevance for exploring air pollution are the Nitrogen Value (N), which indicates a species tolerance of nitrogen (or fertile conditions) and Reaction Value (R), which is typically measured by pH and therefore indicates a species tolerance of acidity. Most bryophyte species expected to be found within the habitats present across the SAC have a low N value of one or two, showing that these are associated with infertile sites and will decline with habitat enrichment. Bryophyte

[11] Ellenberg, H., Düll, R., Wirth, V., Werner, W. & Paulißen, D. (1991) Zeigerwerte von Pflanzen in Mitteleuropa, 2nd edn. Verlag Erich Goltze KG, Göttingen. Scripta Geobotanica.

species R values show more variability, although most are between one and three, making them indicators of acidic conditions.

5.41 There are no Ellenberg values available for lichens, however, equivalent ecological traits have been developed in other countries in Europe[12], which describe pH and eutrophication values, and can be applied to British species. These values can be used to group some lichen species into the following indicator categories:

- Nitrophytes – species tolerant of high levels of nitrogen and ammonia and therefore usually absent from nutrient-poor habitats such as heathland; and
- Acidophytes – species intolerant of even low levels of nitrogen and ammonia and therefore usually only found in sites that are unpolluted or subject to only low levels of pollution.

5.42 Results from the 2022 survey show that epiphytic lichen (species that grow on tree bark) assemblages across the whole survey area indicate a level of enrichment by ammonia and nitrogen owing to the presence of nitrophytes and rarity of acidophytes. At Canford Heath, where previous survey data is available, assemblages have changed very little since 2009. This concurs with APIS data on background acidification levels, which although declining since 2010 are still well above the Critical Load for the various habitat types.

5.43 However, survey locations within heath and bog habitats across the survey area were found to show little evidence of enrichment, with the presence of sensitive bryophyte species recorded (those with low Ellenberg N values) and assemblages noted as being in good health. Changes noted in the lichen assemblage at Canford Heath since 2009 were primarily due to the increased maturity of the heath (meaning there is less bare ground upon which the lichen species rely). The full results of the lichen and bryophyte surveys are provided in **Appendix EDP 3**.

5.44 This suggests that despite the current levels of pollutants in the air at these locations, the heath and bog habitats are coping well with this deposition and still evidencing good condition. However, when a habitat's critical load is already exceeded, scope for further small increments is necessarily limited. In addition, NE's information on monitored features on units of the SAC shows that Annex I habitats depressions on peat substrates of the Rhynchosporion, European dry heaths and Northern Atlantic wet heaths to be in an unfavourable condition on most of the SSSI parcels covered by the relevant 1% Critical Load contours. This may limit their capacity to withstand additional small increases potentially caused by the Proposed Development.

Conclusions on Acidification on Grassland/Moorland

5.45 The additional baseline information summarised above suggests there is variable sensitivity of the grassland and moorland habitats within the 1% of Critical Load contours. Applying the precautionary principle, additional mitigation is therefore proposed to ensure there is no adverse effect on the integrity of the SAC/SPA/Ramsar site designation.

[12] For example, Nimis, P.L. 2016 The Lichens of Italy: A second annotated catalogue. Edizioni Università di Trieste.

5.46 A Biodiversity Enhancement Contribution is to be paid by the Applicant prior to commencement of the Proposed Development, in addition to an annual Trickle Fund to be paid during the lifetime of the Proposed Development. These funds will be used by the Local Planning Authority for the appropriate management of habitats within the SAC aiming to reduce and/or prevent potential effects from acid deposition and will be secured through a Section 106 agreement. This agreement will also include preparation of a Monitoring and Supportive Management Plan, which will set out a schedule of future soil sampling and bryophyte and lichen monitoring surveys and action to be taken should this monitoring indicate deterioration of the habitats.

5.47 A conclusion of no adverse effect on integrity from the project alone is reached in light of the additional mitigation summarised above together with the following factors:

- The very limited additional acid deposition exceedance of up to 0.010 keq $ha^{-1}a^{-1}$ in a worst-case scenario;
- The small extents of heath, acid grassland and bog habitat affected in proportion to the extent of these habitats present across the whole of the designated site;
- The likelihood that only a limited extent (possibly none) of the acid grassland potentially affected is Annex I habitat Molinia meadows on calcareous, peat or clay-silt soil; and
- A backdrop of generally declining local and national background acid deposition levels.

5.48 When considering the in-combination impact of acid and nitrogen deposition on grassland/moorland habitats, as set out within the cumulative assessment section of the ES Appendix 6.1: Operational Air Quality Assessment, deposition of above 1% of the habitat's Critical Load for both acid and nitrogen are predicted. The ESS ERF is by far the largest contributor to this for acid deposition (at 7.6% of the Critical Load for bog, 5.0% for heath and 7.5% for acid grassland, compared to 1.9% for bog, 1.2% for heath and 1.8% for acid grassland from the Proposed Development including EDG and 1.2% for bog, 0.8% for heath and 1.2% for acid grassland from the Whittle Power Facility) and to a lesser extent, the main contributor for nitrogen deposition (at 1.1% of heathland habitat's Critical Load, compared to 0.9% for the Whittle Power Facility and 0.5% for the Proposed Development including EDG).

5.49 It is understood and is assumed that the ESS ERF will be providing its own mitigation for this impact, in the form of a Monitoring and Supportive Management Plan alongside financial contributions, agreed with NE and controlled by a Section 106 agreement. Therefore, in addition to the mitigation proposed for the Proposed Development and with consideration of the reasons set out above, the in-combination impacts would also result in no adverse effect on the integrity of the designation.

POOLE HARBOUR SPA AND RAMSAR SITE

Air Pollution

Mitigation

5.50 Mitigation to reduce air pollution from the Proposed Development has been described within the previous section in relation to Dorset Heaths SAC/SPA/Ramsar. Of relevance to Poole Harbour SPA/Ramsar is the reduction of the ammonia Emissions Limit Value to 5mg/Nm^3 and the increase in chimney stack height to 110m above ground level.

Appropriate Assessment

5.51 Detailed air quality modelling has been undertaken for ecological receptors within Poole Harbour SPA and Ramsar with inclusion of the above noted mitigation both alone and in combination with other projects. Critical Loads are based on the sensitivity and relevant features of the receiving habitat. A review of the APIS website was undertaken in order to identify the worst-case habitat description and associated Critical Load, for which the lower end of the range was used. The air quality modelling also adopted worst-case assumptions including that the EfW CHP Facility operates continuously at full load, that results are based on the worst-case meteorological year of the five years' data available and that the maximum predicted concentration anywhere in the model domain is presented. This ensures a conservative approach has been considered.

5.52 The assessment finds that with mitigation (i.e. a 110m chimney stack height and a reduced ammonia Emission Limit Value of 5mg/Nm^{-3}) and when considered in combination with other projects (listed within **Section 4**), predicted maximum annual and 24-hour mean concentrations of nitrous oxides, SO_2 and ammonia are well below the screening threshold long-term 1% and short-term 10% of the relevant Critical Levels at the receptor modelled within Pool Harbour SPA/Ramsar. Details are provided below in **Table EDP 5.5**.

Table EDP 5.5: Predicted maximum airborne concentrations for Poole Harbour SPA/Ramsar in-combination and with mitigation

Airborne Concentrations	Receptor: H2 Poole Harbour SPA/Ramsar Proportion of Critical Level			
	All Sources	EfW CHP Facility and EDG	ESS ERF	Whittle Power
Annual Mean NOx	0.2%	0.2%	0.0%	0.1%
Daily Mean NOx	1.4%	1.3%	0.1%	0.4%
Annual Mean SO_2	0.1%	0.1%	0.0%	n/a*
Annual Mean NH_3	0.2%	0.2%	0.0%	n/a*
Weekly (and Daily) Mean HF	5.2% (1.0%)	2.4% (0.7%)	5.0% (1.0%)	n/a*

*The Whittle Power facility does not produce significant emissions of SO_2, NH_3 or HF.

5.53 Regarding pollutant deposition, 1% of the relevant Critical Loads for habitats supporting the designated bird species have not been exceeded in relation to acid and nitrogen deposition when considered with mitigation, both alone and in-combination. Results of this assessment are provided in **Tables EDP 5.6 and 5.7** below.

Table EDP 5.6: Predicted maximum acid deposition on habitats for Poole Harbour SPA/Ramsar in-combination and with mitigation

Acid Deposition by Habitat Type	Receptor: H2 Poole Harbour SPA/Ramsar Proportion of Critical Load			
	All Sources	EfW CHP Facility and EDG	ESS ERF	Whittle Power
Grassland/Moorland Habitats				
Bogs	0.7%	0.6%	0.1%	0.0%

Table EDP 5.7: Predicted maximum nutrient nitrogen deposition on habitats for Poole Harbour SPA/Ramsar in-combination and with mitigation

Nutrient Nitrogen Deposition by Habitat Type	Receptor: : H2 Poole Harbour SPA/Ramsar Proportion of Critical Load			
	All Sources	EfW CHP Facility and EDG	ESS ERF	Whittle Power
Grassland/Moorland Habitats	0.3%	0.2%	0.0%	0.0%

5.54 As such, with inclusion of the identified mitigation measures, impacts of atmospheric nitrogen deposition from changes in air quality associated with the Proposed Development would no longer constitute an LSE, and are therefore not anticipated to have an adverse effect upon Poole Harbour SPA/Ramsar either alone or in-combination.

Appendix EDP 1
Minutes from Consultation Meetings with NE

edp7095 Canford EfW Minutes

NE DAS Meeting; 21 September 2022 10:00 (Teams)

Introductions

- Meeting started with introductions from those present:

    - Nick Squirrell, Natural England, Senior Advisor (NS)
    - Georgia Croxford, EDP, project ecologist (GC)
    - Amanda Gair, Gair Consulting, project AQ consultant (AG)
    - Tim Marks, MVV, Head of Planning (TM)
    - John Wade, MVV, Head of Construction (JW)
    - Rob Asquith, Savills, project planner (RA)
    - Erin Banks, Savills, project EIA coordinator (EB)
    - Nathan Ross, WH White, landowner (NR)

The Project – General Information

- TM provided an introduction to MVV and the proposed EfW facility at Canford.
- Website now live: https://www.mvv-canfordchp.co.uk/
- The site boundary was explained, with the location of the EfW facility at the southern end of the existing waste management park, with access roads and two Temporary Construction Compounds (TCC) that will be in use for up to three years, then a smaller area used for a further two years. The northernmost TCC is the preferred location. Also, there will be an underground cable/hot water pipe route on a route previously forming part of planning permission for an earlier scheme and heading towards the nearby consented business park and overhead power lines for the District Network Connection (DNC).
- Savage and Chadwick Architects have been involved in the design of the building, which has potential to incorporate green/brown roofs and will be designed to facilitate educational visits/community engagement.
- NS noted that solar panels and rainwater harvesting could be a more environmentally beneficial use of the roof spaces.
- TM highlighted that EfW process requires potable water supply but could potentially use the roof to collect rainwater for service buildings.
- Highest point of the building is approx. 50m, with the lowest part of the roof at approx. 12m.
- NS suggested lighting to be kept to a minimum due to bat/nightjar sensitivities and as part of a general energy use reduction. A lighting strategy might be required by condition.
- TM confirmed no external lighting proposed for the building other than the minimum needed for H&S reasons, which will primarily be restricted to the office area. Limited windows on the building so there will be limited external light spill from internal lighting.
- NS advised there would need to be an assessment from the project ecologist of lighting impact on bats/nightjar. Particularly sensitive periods for lighting/activity is dusk during spring/summer/autumn.

- NS advised that detailed information on proposed site activity (e.g. operational hours, truck movements/delivery times) is included in the ecology reports.
- NS also advised that efforts to reduce AQ impacts should be incorporated throughout operation e.g. no idling of trucks allowed on site. An Operational Traffic Management Plan could cover this.
- NS asked about what diesel generators will be required on site for emergency use in the event of a power outage.
- JW confirmed that one unit is proposed, which, additional to any emergency use, will run for up to 50 hours per year for the required weekly testing.
- AG to investigate the impacts of this.
- NS advised that only one paper is currently available on the habitat impacts from short term high concentrations of pollutants so it isn't well researched. Also that the standard methodology of using 24hr periods for AQ modelling doesn't necessarily capture the impacts of this type of activity accurately. AG to consider if other methodology/modelling is possible to more accurately model the AQ impacts from the diesel generator.
- Team to consider if hydrogen powered generator is a possibility, and if the generator can be moved to a less sensitive position.

Ecology Surveys Undertaken and Results

- GC provided a brief overview of the ecological investigations undertaken at the site and a summary of the results. NS has been provided with the interim Baseline Report which provides more detail.

Discussion on AQ Impacts on SAC

- AG described the assumptions used in the AQ modelling: UK ADMS modelling with 5 years of met data from Bournemouth Airport 2016-2020 (which are the most recent 5 years available). 2017 is the worst case year and its impacts are approx. 10% higher than the average of the 5 years.
- Initial modelling done on a 90m stack assuming continuous emissions set at BREF maximum ELVs at full load so modelling represents a very much worst case scenario.
- 1% of critical levels (CL) for numerous pollutants were exceeded over a large area for this stack height, therefore the stack height was increased to 100m above ground level.
- Considerations for landscape/visual impact and airspace safety also need to be balanced when considering stack height.
- Lowest end of the published range of CL was applied to the assessment e.g. 10 for woodlands from a published range of 10-20.
- NS queried ammonia, AG confirmed that some ammonia slip from the control equipment is anticipated so has been included in the modelling. Ammonia is added to the combustion process to reduce NOx, so a balance between these pollutants is needed.
- Emission limit value applied is 5mg/NM3 – limiting ammonia from the stack to this amount. This compares to 10mg/NM3 for the initial modelling at 90m chimney height.
- NS noted that Bryan Edwards has undertaken lichen/bryophyte surveys across the area which indicate that sulphur dioxide is generally falling in the locality. Updated surveys would be useful to determine up-to-date trend in background levels. Surveys were also undertaken

near the airport for impact of acidification – records of presence of certain plant species sensitive to acidification (according to Ellenberg Reaction values) were made, in addition to soil sampling to determine buffering capacity of the soil.

- As the acidification impacts above the 1% CL are predicted on woodland, but soil sampling for buffering capacity isn't effective in woodland habitat, GC queried the limitation of this. NS advised that woodland isn't one of the Annex I habitats within the SAC, and management plans for the SAC include the removal of parts of woodland habitat for heathland restoration anyway.
- NS also noted that heathland ~~disturbance~~ damage resulting from illegal~~by~~ fire setting is becoming an increasing problem. Regarding NDep, evidence of background trends would be useful as they appear to be falling in general with the move from fossil fuels to cleaner energy systems. Therefore soil sampling and plant/lichen surveys (those species most likely to show impacts/recovery) are recommended. Phasing out of new diesel cars by 2025/30 will also improve the baseline in future. EfW facility won't be operational until 2027 so baseline will likely be better by that point, but caution required with these assumptions due to uncertainties around the current energy crisis.
- It is worth noting that there are other pollutants emitted from the stack eg heavy metals etc which will need consideration

Potential Mitigation Options

- If impacts suggest NDep may be significant, habitat management is an option to counteract these impacts e.g. sensitive grazing. Much of the heathland is in a recovery phase so will benefit from targeted management actions. Priority for AQ mitigation would be to encourage the habitat to grow into as good a condition as possible, and help recovery from fire damage. E.g. removing pine trees to increase area of heath, scraping pine needles from soil to reduce acidification and provide areas of bare ground which is good for invertebrates (5-10% of bare ground is targeted in the SAC for inverts).
- Management actions will need to be secured by condition for a management plan. Will likely also be a need for future habitat monitoring.
- BCP have a detailed habitat map for Canford – GC to contact Jez Martin at BCP to obtain this. Likely that there is limited typical acid grassland present at Canford Heath due to the land in these parcels being mown and grazed with urban surroundings. Priority habitat maps are also available to be downloaded I understand.
- There is also an enhancement fund that BCP could use, which would be beneficial to cast wider than just the SAC e.g. to enhance land at Gravel Hill, the greenhouse field, heathland support area located to the north of the Site. This would be secured through a s106 which would cover the duration of operation of the EfW facility. An annual payment is made which would be drawn on for smaller management actions yearly or saved up for several years to cover cost of a larger management action.
- The fund could also be used for wider carbon capture benefits e.g. water treatment works, tree planting, community engagement. TM noted the success of the education/community engagement programme at Devonport, which we would look to implement at Canford.

Road Vehicle Traffic Emissions

- NS noted that consideration of traffic emissions is needed – the layout of the site brings trucks right along the southern edge of the facility adjacent to the SAC boundary. NR noted that hydrogen and electric powered waste vehicles are becoming more common. Also, the tipping hall will be negative pressure, so vehicle emissions whilst tipping will be diverted up the stack, and measures can be taken to prevent trucks queuing up alongside the SAC boundary with engines on. Operational traffic management plan by condition.
- TM noted that operational traffic management plans have been produced/implemented on other MVV sites, so we can also prepare one for Canford.
- One factor that can't currently be controlled is how/where drivers fill their trucks up and with which fuel.
- NS advised that we need to consider the catchment area of the trucks travelling to the EfW facility, and potential for future contract changes which may result in trucks coming to the facility from further afield.
- Regarding traffic on roads, the long distance roads are not near the SAC so impacts not anticipated from this, it is only local traffic that will travel near the SAC and this is already on the road - 100% of Dorset's waste is already being processed at the Canford Waste Park.
- NS advised that we should look at current levels of activity at the site as a baseline so net change can be considered.
- RA confirmed that traffic is anticipated to decrease with the proposals as less waste will need to be moved off site than is done currently.

Cumulative effects

- Team agreed that the Parley Eco scheme is to be considered within the cumulative assessment.
- Portland is too far away so does not need to be considered.
- AG noted that regarding background levels, 1% habitat CL are already being exceeded for acid and N.
- AG queried inclusion of the positive impact that would result from the closure of the adjacent pyrolysis plant, NS advised this was not part of our application so should not be included as an impact from our scheme.

Conclusions

- Is the AQ impact presented today potentially acceptable? NS hasn't been sent the data so has only viewed the map on screen during the meeting. However, if following plant surveys, there's evidence the plants are sustaining themselves (i.e. acid sensitive species present) and there is evidence of good buffering capacity shown from soil sampling, then an argument can be made that impacts are acceptable.
- Soil sampling and plant/lichen/bryophyte surveys are to be undertaken asap.
- It was confirmed that MVV will be operating the plant in future, they are not just building it to sell on to a different operator. MVV is a very experienced and technically competent operator with many years of experience in Germany and the UK and is proposing highly proven and widely used technology.

- NS advised that two stack height options should be presented within the application to demonstrate an alternatives assessment.
- NS also advised that justification for the location of the EfW facility is needed within the application - e.g. explain why is it not located within the Arena Site that is further from the SAC. NR confirmed that the current location is an allocated site for waste management, the Arena is not. Given the distances involved, being located on the Arena site would make little difference to anticipated AQ impacts anyway.
- AG confirmed that the modelling undertaken takes account of differences in air flow at different heights.
- TM invited NS to Devonport if he is interested, and also welcomed a site visit/further meeting at Canford.

NS called GC just after the meeting to note a couple of additional points that were missed during the meeting:

- Biodiversity Net Gain (BNG) - NS advised we should have a discussion with BCP on how we deliver a gain, and he doesn't think green roofing is a good solution for offsetting losses.
- Nightjar: the habitat within the two TCC areas is potentially suitable for nightjar and may be considered functionally linked habitat – we will need to assess impact of lighting of the construction compounds (i.e. minimise/avoid security lighting that is often used at construction compounds).
- SNCI: the cable route goes through the adjacent SNCI. NS suggested a site visit might be useful for him to confirm value of the habitat in this SNCI as it hasn't been subject to regular management (e.g. is it now overrun with Rhododendron).

edp7095 Canford EfW Minutes

NE DAS Meeting; 08 February 2023 11:30 (Teams)

Introduction/general update on project

- Meeting started with quick re-introductions for those present:
  - Nick Squirrell, Natural England, Senior Advisor (NS)
  - Georgia Croxford, EDP, project ecologist (GC)
  - Amanda Gair, Gair Consulting, project AQ consultant (AG)
  - Tim Marks, MVV, Head of Planning (TM)
  - Rob Asquith, Savills, project planner (RA)
  - Nathan Ross, WH White, landowner (NR)
- RA and TM provided quick update on the project since last meeting – public consultation was undertaken in January, pre-app meetings held with LPA, ongoing discussion around aviation issues, aiming for planning application submission at end of March.
- Hoped for position from this meeting to be agreement on contents and indicated conclusion on Shadow HRA and ES Chapter.

Recap on previous call and outputs of further surveys

- RA and GC gave a brief recap of the first meeting (21 September 2022), including the main suggested action points of undertaking soil surveys for an assessment of acidity buffering capacity and update lichen and bryophyte surveys.
- The lichen and bryophyte surveys were undertaken in October/November 2022 and involved a repeat survey of the six areas at Canford Heath that were surveyed back in 2009, along with new sampling locations within Ferndown, Parley and Turbary & Kinson Commons.
- Soil sampling was undertaken in January 2023, and followed the methodology previously undertaken to inform the HRA for the nearby ESS scheme at Parley. NS was consulted prior to the sampling and confirmed he was happy with scope and locations across the area of interest for the MVV scheme.
- Results of the lichen/bryophyte survey and soil sampling was shared on 07/02/23.
- The key measure of Al/Ca ratio for samples taken in heath habitat was generally under or around the value of 3, noted in the ESS report as the value above which buffering limitations may be indicated.
- Al/Ca ratio results for samples taken within marshy grass/bog, wet heath and acid grass habitats were generally higher and showed significantly more variation. A review of the literature suggests that although Al/Ca ratio may be a useful tool for determining acid buffering capacity in heath habitats, there is no evidence for its use in other habitats, where the value may be impacted by other factors such as acidification due to lowering of groundwater tables.
- NS is aware of numerous things that could impact the ratio such as proximity to busy roads and organic matter content which is likely to be higher in the topsoil which is where the samples were taken from. He said he would also check with a colleague regarding the use of this ratio in other habitats, but he doesn't think that we need to do any further investigations/different analysis for acid grass/bog habitats as the results we have provide a good baseline picture and are consistent with the approach taken on the ESS application.

- NS said it would be useful to see the ratios and habitat type plotted on a thematic map – GC to get this produced and will send when available.
- GC noted that there is no registered Annex I acid grass habitat (H6410 Molinia meadows) within the SSSI parcels covered by the 1% CL for acid grassland/bog habitat contour, however there are several SSSI parcels known to contain Annex I bog habitats (H7150 depressions on peat substrates). Would be useful to know the extent of this habitat within the contour, as it is likely only a small area. GC to look at pulling this measurement from the habitat/contour mapping.
- NS said that the results provide a useful baseline measurement for the area, upon which future monitoring can be informed, alongside background pollutant levels provided by APIS.
- NE also noted that APIS recently updated its dataset, which has resulted in another scheme needing to re-consider their background NH_3 concentrations and nitrogen deposition fluxes. Following the meeting AG checked and found that none of our habitat sites are identified as being of issue (no new exceedances or new non-exceedances) . The background NH_3 and acidification impacts may not be entirely accurate but if they were exceeding before then they still are and vice versa. AG suggests we don't update the background with the 2018 mid year 5km grid data unless we want to look in detail at a particular site or location.
- NS noted that due to inherent limitations with lichen/bryophyte surveys, presence/absence of certain species does not necessarily infer that the habitat is or isn't being impacted by current background levels of pollutants (as the species are so tiny and difficult to find it may be that species are missed rather than not present), but instead may show that the habitat is coping/not coping with the impact.
- NS has questioned if lichen/bryophyte survey results could be indexed for easier comparison/assessment, but there doesn't seem to be a way of doing this.
- Overall, the Al/Ca ratio for bog/acid grass habitats is higher, and the critical question is how significant this is.

Mitigation

- Mitigation to be provided would be similar to that agreed with the ESS scheme i.e. through a S106 agreement and will involve a.) contribution towards ongoing monitoring at the SAC and b.) contribution towards additional and specific habitat management operations (which will be devised/undertaken by NE).
- A draft Heads of Terms needs to be prepared for the S106 agreement, this will draw from the details of the HRA report and Ecology ES chapter.

Other matters

- NS mentioned that emissions of heavy metals has come up at Portland – recommended that we check the various metals within our emissions and their potential impacts upon habitats to cover this off too. AG said this isn't usually done in relation to habitats, but she could look at the deposition of metals compared to typical amounts found within soils (e.g. comparison with soil guideline values or Environment Agency deposition to land benchmarks). AG to look into.
- Emergency Diesel Generator (EDG) – AG explained that this was originally located on the north-western boundary in close proximity to the SAC. However, following discussions at

the last meeting the layout has been reviewed and the EDG has been moved further north to minimise impacts within the SAC.

- The EDG would likely operate for half an hour every two weeks for testing purposes. Emergency use would only occur under 'black site' conditions. This would require the loss of the grid connection and a failure of island mode (i.e. when the steam turbine generator supplies just the parasitic load of the facility). Failure of island mode is a rare situation in a well set up plant. MVV estimate that the duration of an emergency condition would be less than 3 hours for DNO security of supply purposes.
- AG's modelling includes long-term (annual mean) calculations and short term (24 hour mean) estimates. For long-term impacts, it is assumed the EDG operates for 50 hours per annum. Short-term impacts have been calculated on the worst case assumption that the EDG is in use for three hours per day every day in order to assess the impact of the EDG operating during the worst-case meteorological conditions. In reality, the EDG would be operational for up to three hours during very rare emergency conditions.
- Predicted annual mean concentrations of NO_x are compared to the critical level of 30 $\mu g/m^3$. In combination with the EfW, the EDG increases concentrations by 0.1% of the critical level.
- As requested at the last meeting with NS, AG reviewed alternative short term (several hours) critical levels as the current critical level (75 $\mu g/m^3$) is based on a 24-hour mean. However, the source of this critical level (WHO, 2000) states that "a 24-hour mean can be assumed to be related both to peak concentrations of some hours and to air pollution episodes of some days." Therefore, this critical level was used as it would appear to allow for elevated concentrations above the 75 $\mu g/m^3$ for several hours during a 24-hour period.
- AG confirmed that the impacts from the EDG are very localised and the impact of the EDG on 24-hour means was 37% of the 24-hour mean critical level even assuming that the EDG operates for 3 hours a day every day of the year.
- NS still concerned that even a 24 hour mean may not be useful if the very short term but high impact emissions do such damage that species/habitats are irreparably damaged, but there is limited evidence for a shorter critical level.
- NS will discuss further with some colleagues regarding this issue and any evidence for an alternative short-term critical level.
- Green roofs - although in the last meeting NS expressed a preference for the environmental benefits of solar panels/rainwater harvesting on the building over green roofs, RA/TM explained that during consultation with the LPA they would prefer to see green roofs incorporated. NS confirmed this isn't an issue. RA noted that perhaps a combination could be achieved across the roof areas to deliver multiple benefits.

Next steps

- NS said that if useful, he could have a meeting with AG to discuss abatement of various pollutants within the emissions to reduce potential impacts on habitats. AG to arrange meeting with NS and technical advisor from MVV (and maybe also GC).
- On basis that the discussed approach to Shadow HRA indicates a likely conclusion of effects being acceptable with identified and deliverable mitigation, GC to progress the HRA report to submit with the application targeted for end of March. May contact NS in the meantime if any other queries arise.
- RA/NR/TM to prepare draft HoT/S106 for agreement with NS.

edp7095 Canford EfW DAS Meeting Minutes

NE DAS Meeting; 30 March 2023 16:00 (Teams)

Introduction/general update on project

- Meeting started with the following present:
  - Nick Squirrell, Natural England, Senior Advisor (NS)
  - Georgia Croxford, EDP, project ecologist (GC)
  - Tim Marks, MVV, Head of Planning (TM)
  - Rob Asquith, Savills, project planner (RA)
  - Nathan Ross, WH White, landowner (NR)
- Quick recap was provided and it was noted that preparations are almost complete and the planning application is anticipated shortly.

Section 106 Agreement further details

- A draft s106 agreement, based on the one prepared for the nearby ESS ERF scheme, was circulated to NS in advance of the meeting.
- NS noted that the management funded by the contributions should not be restricted to the designated site areas – best to keep flexibility so that management can be undertaken within non-designated habitats across the wider BCP Council area that provide an overall supporting function.
- NS noted that removal of Rhododendron within some parts of White's land adjacent to the SAC was agreed as part of a previous planning application but hasn't yet been implemented – this would be good to include in the s106 as a landowner commitment
- NS noted that the designated site is increasingly affected by arson and wildfires, and incidents of these could significantly impact the future lichen/bryophyte monitoring proposed in the s106, due to significant changes in the habitat type that may occur after fire (e.g. heathland becomes grassland due to Molinia being fire resistant and grasses growing back quickly). Therefore we should also include a couple of NVC plots around our lichen/bryophyte monitoring locations as part of the monitoring works to confirm the habitat type and allow more accurate conclusions to be drawn from any changes in species assemblages.
- NS also noted a typo the draft s106 referred to Plan 1 where it should have referred to Plan 2.
- Plans will be updated to remove restriction of s106 relevance to specific parts of the designated sites only.

Approach to delivering BNG

- NS was informed that despite the inclusion of green roofs on the EfW building (as requested by the LPA) both scenarios for the proposed development (depending on if TCC1 or TCC2 is utilised) will result in a net loss of BNG units within the redline. We will therefore be enhancing habitats within White's ownership surrounding the redline in order to ensure an overall BNG of 10% is achieved.
- NS suggested that enhancing the stream nearby e.g. making it less straight would be good, but GC noted that as the redline net loss was with habitat area units, we would be needing to deliver enhancements in area units, not river units, to achieve the targeted 10% gain.

- It was emphasised that the project team are keen to keep as much flexibility at this planning application stage, with NE/LPA having enough information to know for sure that a 10% can be delivered, and then details of exactly where and how it will be delivered will follow within a detailed BNG strategy.

Discussion of adjacent Heathland Support Area (HSA)

- NS raised a query on the HSA boundary shown on MVV's plan – there appears to be a discrepancy between the green belt boundary and the boundary of the adjacent consented business park development, and he thinks the drawn boundary of the HSA area may be incorrect.
- RA and NR will review plans and visit the site this week to investigate and clarify this.
- NS suggested that appropriate mitigation for the small encroachment into the HSA area for the DNC compound would be to provide a like-for-like replacement of the area lost – e.g. extend the HSA area into White's woodland to the north of the HSA, with the new boundary sufficiently re-fenced.
- Would need to be thoughtful of how any new area is brought into the HSA and public access routes regulated – would need to not encourage residents in the new nearby development to use this HSA as the SANG to the north of the road is being purpose built to provide their recreational opportunities and to divert footfall away from the SAC.
- NS thought that temporary restricted public access for up to a month within the HSA while the CHP cable is being installed underground is acceptable.
- NS confirmed that the main purpose of HSA designations is to reduce pressure from recreational activities on the adjacent SAC/SPA, but that they also act as protection for the non-designated habitats surrounding the SAC/SPA which provide a supporting function and green buffer around the designated site.
- NS noted that the HRA for the Portland project has to be split into two parts, as part of the assessment was more relevant for the Environment Agency and the other half for the LPA/NE, and he stressed the importance of keeping our air quality data clear and focussed.

Appendix EDP 2
Soil Sampling Surveys

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Document ref: 26802-HYD-XX-XX-LR-GE-1001_P02

For the attention of The Environmental Dimension Partnership Ltd
Tithe Barn,
Barnsley Park Estate,
Cirencester
Gloucestershire
GL7 5EG

2 March 2023

Dorset Heaths - Soil Sampling and Assessment

Dear Georgia Croxford,

Please find below a summary report discussing the recent site investigation works, comprising soil sampling from thirty-two handpits excavated across the sensitive habitats within and around Bournemouth, Christchurch and Poole. The nature designations (SSSI/SAC/SPA) surround the proposed development, an Energy from Waste Combined Heat and Power facility, which will be situated within Canford Resource Park, off Magna Road, Dorset.

1. Introduction

Hydrock were instructed by The Environmental Partnership Ltd (the Client) via email correspondence on 27th October 2022, to undertake soil sampling, including hand excavated trial pits. The exploratory holes were to be located within the nature designations known as Canford Heath, Turbary Park, Kinson Common, Ferndown Common and Parley Common Nature Reserve. The areas were selected by the client in order to demonstrate buffering capacity against the effects of acidification that could arise from the proposed process at the development site.

The works have been undertaken in accordance with Hydrock's fee proposal ref: 26802-HYD-XX-XX-FP-GE-0001 dated 9th January 2023, with grid reference coordinates for the handpits provided by the client. A site location plan (26802-HYD-XX-XX-DR-GE-1001) is provided in Appendix A.

2. Site works

Site works were undertaken on the 11th and 12th January 2023. In order to carry out the works, an ecologist was also present during the works (provided by the client) to safeguard rare reptile species that may hibernate in burrows under the ground. The exploratory trial holes were undertaken to depths of between 0.20m - 0.30m bgl. A sample was taken at each location to carry out site specific chemical laboratory testing. Sampling and logging of soils was undertaken in accordance with BS5930:2015+A1:2020 Code of Practice for Site Investigations and BS10175:2011+A2:2017 Investigation of Potentially Contaminated Sites – Code of Practice.

The initial sample locations provided to us by the client via email (dated 4th January 2023) are shown in drawing (edp7095_d008b) in Appendix A. A summary list of the handpit locations, their associated coordinates and targeted habitats are shown within Table 4 in Appendix B. Locations were positioned on site using the GPS app what3words and shown in the final exploratory hole location plans (26802-HYD-XX-XX-DR-GE-1002, 26802-HYD-XX-XX-DR-GE-1003, 26802-HYD-XX-XX-DR-GE-1004 and 26802-HYD-XX-XX-DR-GE-1005) included within Appendix A. All locations were accessible during the site works and undertaken as per the client's request.

A total of thirty-two trial pits were excavated by a Hydrock engineer using hand digging tools for minimal disturbance, to depths between 0.20m bgl and 0.30m bgl. Soil samples were taken at a depth of 0.05m bgl to 0.10m bgl. After collection of samples, all pits were backfilled with arisings. Exploratory hole logs are provided in Appendix C.

2.1 Ground conditions

The following presents a summary of the ground conditions encountered during the investigation, based on field observations and interpretations of the field data.

Exploratory hole logs are presented in Appendix C, a summary of the ground model is presented in Table 1 and the individual strata are described in the sections below.

Table 1: Strata encountered within HP01 – HP32

Stratum	No. locations encountered	Depth to top (m bgl)	Depth to base (m bgl)	Thickness (m) range
Topsoil	32	0.0	0.05 – >0.30	0.05 – 0.30
River Terrace Deposits	5	0.10 – >0.25	>0.20 – >0.30	0.05 - 0.15
Poole Formation	8	0.05 – 0.19	>0.20 – >0.25	0.01 – 0.20
Branksome Sand Formation	4	0.05 – 0.15	>0.25	0.05 – 0.20
> Depth of stratum not proven				

2.1.1 *Topsoil*

Topsoil was encountered in all exploratory holes from ground level and was proven to be between 0.05m and 0.30m in thickness. Typically, this consisted of dark brown gravelly sandy SILT/silty SAND with frequent roots and rootlets. Gravels noted to be of flint.

2.1.2 *River Terrace Deposits*

Superficial River Terrace Deposits were encountered within five locations within the Canford Heath area underlying the topsoil (HP09, HP11, HP12, HP15 and HP16) at depths of between 0.10m and 0.30m bgl. The thickness of the strata ranged between 0.05m to 0.30m. Typically, these deposits generally consisted of light brown to brownish grey gravelly silty fine to coarse SAND with occasional rootlets. Gravels noted to be of flint. The base of these deposits was not proven within any of the exploratory holes.

2.1.3 *Poole Formation*

Bedrock deposits comprising the Poole Formation were encountered within four locations within Canford Heath (HP03, HP04. HP06 and HP10); and four locations within Ferndown Common (HP22, HP23, HP24 and HP25). The depths of this strata were encountered between 0.05m bgl and 0.25m bgl, with thicknesses ranging from 0.1m to 0.20m. Typically, these deposits generally consisted of light grey/brownish grey gravelly silty fine to medium SAND with frequent roots and rootlets. Gravels noted to be of flint. HP10 encountered soft orange brown and grey brown sandy CLAY with occasional rootlets. The base of these deposits was not proven within any of the exploratory holes.

2.1.4 *Branksome Sand Formation*

Bedrock deposits comprising the Branksome Sand Formation were encountered within four locations within Parley Common (HP26, HP27, HP28 and HP29), at depths of between 0.05m bgl

to 0.25m bgl. The thickness of this strata ranged between 0.05m to 0.20m. Typically, the deposits consisted of light greyish brown gravelly fine to coarse SAND. HP27 encountered light brown slightly gravelly very clayey fine to medium SAND with frequent roots and rootlets. Gravel noted to be of flint. The base of these deposits was not proven within any of the exploratory holes.

3. Laboratory Test Results

Based on the client specifications, the chemical testing undertaken in soils collected are summarised in Table 2 overleaf. The thirty-two handpits were spread between the five areas: Canford Heath (sixteen handpits, HP01-HP16); Turbary Park (three handpits, HP17-HP19); Kinson Common (two handpits, HP20 and HP21); Ferndown (four handpits HP22-HP25) and Parley Common Nature Reserve (seven handpits, HP27-HP32). The testing was undertaken by specialist laboratories on behalf of Hydrock. Full results and chemical certificates are provided in Appendix D.

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Table 2: Summary of results of chemical analysis

Determinand	Canford Heath			Turbary Park			Kinson Common			Ferndown Common			Parley Common		
	Min	Max	Average	Min	Max	Average	Min	Max	Average	Min	Max	Average	Min	Max	Average
pH	3.92	5.04	4.31	4.16	4.54	4.31	4.84	4.93	4.89	3.61	4.6	4.23	3.67	5.63	4.45
NO_3 (mg/kg)	1	3	1	1	1	1	1	9	5	1	1	1	1	5	2
NH_4 (mg/kg)	0.79	14.9	7.0	3.66	19.2	11.52	10.9	63.7	37.3	0.26	7.55	2.37	0.26	54.4	12
Ca (mg/kg)	81	791	250	79	578	356	710	2650	1680	96	426	210	67	1690	592
Al (mg/kg)	264	17900	3414	1110	7100	3240	1240	6200	3720	178	697	400	262	5690	1715
Al/Ca ratio*	1.4	58.9	15.3	3.7	14.1	10.0	1.7	2.3	2.0	1.0	3.3	2.2	0.4	25.4	5.5
NH_4/NO_3 ratio*	1	3.7	1	1	1	1	1	7.1	4.1	0.3	1	0.6	0.1	2.3	0.9
Soil Organic Matter (% w/w)	3.9	31.7	9.8	5.8	49.7	22.5	6.5	23.4	14.95	1.2	11	5.9	2.3	68.9	15.1

***Ratios calculated based on chemical results for individual samples**

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4. Analysis of results

In general, across all areas the soils are acidic presenting low average pH values between 4.23 to 4.89.

Concentrations of nitrate (NO_3) are low with an average of 1mg/kg across Canford, Turbary and Ferndown, increasing to 2mg/kg in Parley and with the highest average occurring in Kinson at 5mg/kg. Average concentrations of ammonium (NH_4) vary from 2.37mg/kg occurring in Ferndown, increasing to 7.0mg/kg in Canford; 11.52mg/kg and 12mg/kg in Turbary Park and Parley Common, with the highest average concentration of 37.3mg/kg within Kinson. Average calcium concentrations (Ca) are recorded lowest within Ferndown Common at 210mg/kg, increasing to 250mg/kg in Canford Heath; 356mg/kg in Turbary Common; 592mg/kg in Parley Common, with a highest average concentration recorded in Kinson at 1680mg/kg. Average aluminium concentrations (Al) are recorded lowest within Ferndown at 400mg/kg and Parley at 1715mg/kg and highest within Turbary (3240mg/kg). Canford (3414mg/kg), and Kinson (3720mg/kg).

Al/Ca ratios were recorded at their lowest in Parley Common (0.4) and at their highest in Canford Heath (58.9). Average ratios ranged from 2.0 within Kinson Common, 2.2 within Ferndown Common, 5.5 within Parley Common, 10.0 within Turbary Park and 15.3 within Canford Heath.

NH_4/NO_3 average ratios were recorded lowest within Ferndown at 0.6. Parley Common at 0.9, Canford and Turbary at 1 and highest within Kinson at 4.1.

Soil Organic Matter (% w/w) were recorded at the lowest average of 5.9 within Ferndown, increasing to 9.8 within Canford, 14.95 within Kinson, 15.1 within Parley and the highest average recorded at 22.5 within Turbary Park.

According to the article published by Houdijk at al (1993) entitled 'Distribution of endangered herbaceous heathland species in relation to the chemical composition of the soil'. This study suggests endangered herbaceous heathland species can be divided into four groups depending on soils parameters. (Table 3).

Table 3: Distribution and decline of endangered herbaceous heathland species in relation to the chemical composition of the soil (Houdijk at al., 1993)

	Group 1	Group 2	Group 3	Group 4
pH range	3.9 – 4.1	4.1 – 4.2	4.4 – 4.5	4.6 – 5.4
Ellenberg species reaction range	2 – 3	1 – 3	2 – 4	2 – 7
Ellenberg average R value	2.3	2	3	4
Ca (water extractable)	10	37	66	157
Al	189	222	208	235
Al/Ca ratio	19.7	5.7	3.2	1.5
NH_4/NO_3 ratio	3.9	3.1	5.4	3.5

We trust the information presented in this letter is sufficient, however if you need to discuss further, please do not hesitate to contact the undersigned.

Yours sincerely,

Lily Cherry
Geo-environmental Consultant

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E: lilycherry@hydrock.com

Appendix

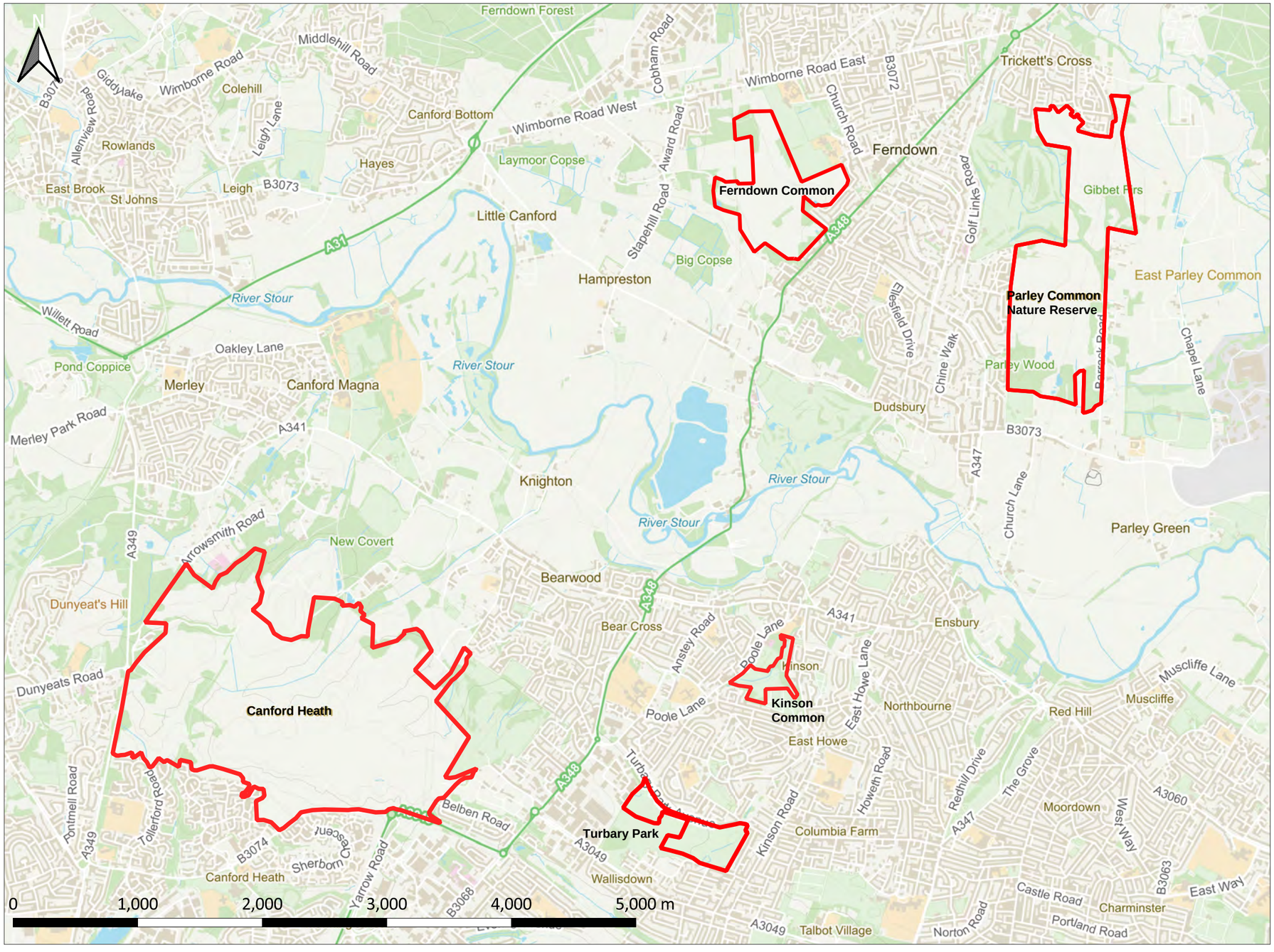
Appendix A – Drawings

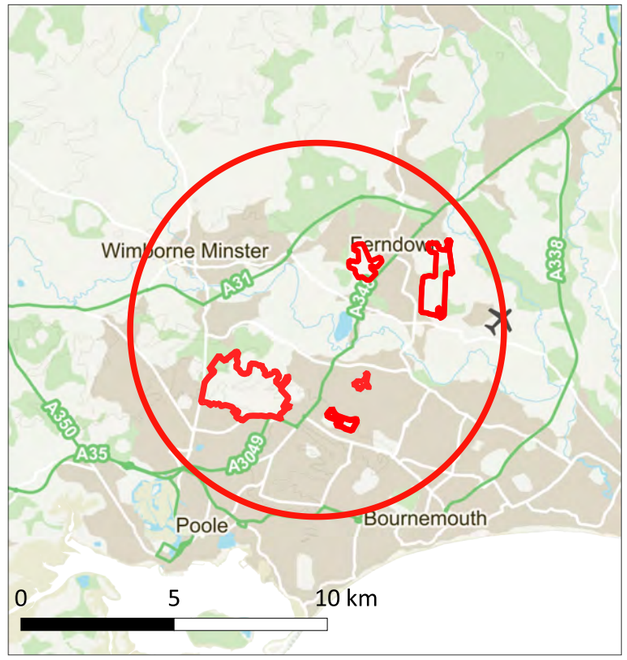
Appendix B – Location Coordinates

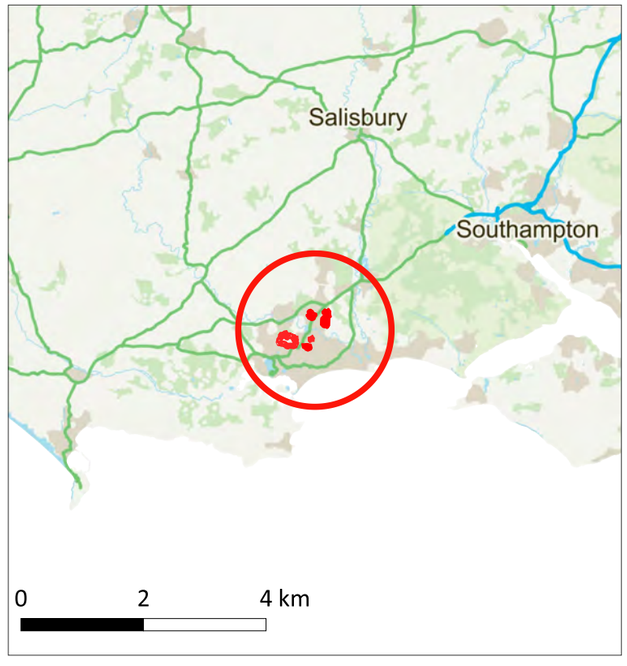
Appendix C – Exploratory Hole Logs and Photographs

Appendix D – Chemical Laboratory Test Results and Certificates

Appendix A: Trial Hole Location Plan







KEY PLAN

- Canford Heath Boundary
- Turbary Park Boundary
- Parley Common Nature Reserve
- Ferndown Common Boundary
- Kinson Common Boundary

NOTES

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TITLE: Site Location Plan

HYDROCK PROJECT NO.: 26802

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CLIENT: The Environmental Dimension Partnership Ltd

PURPOSE OF ISSUE: SUITABLE FOR INFORMATION

STATUS: S2

PROJECT: Dorset Heaths

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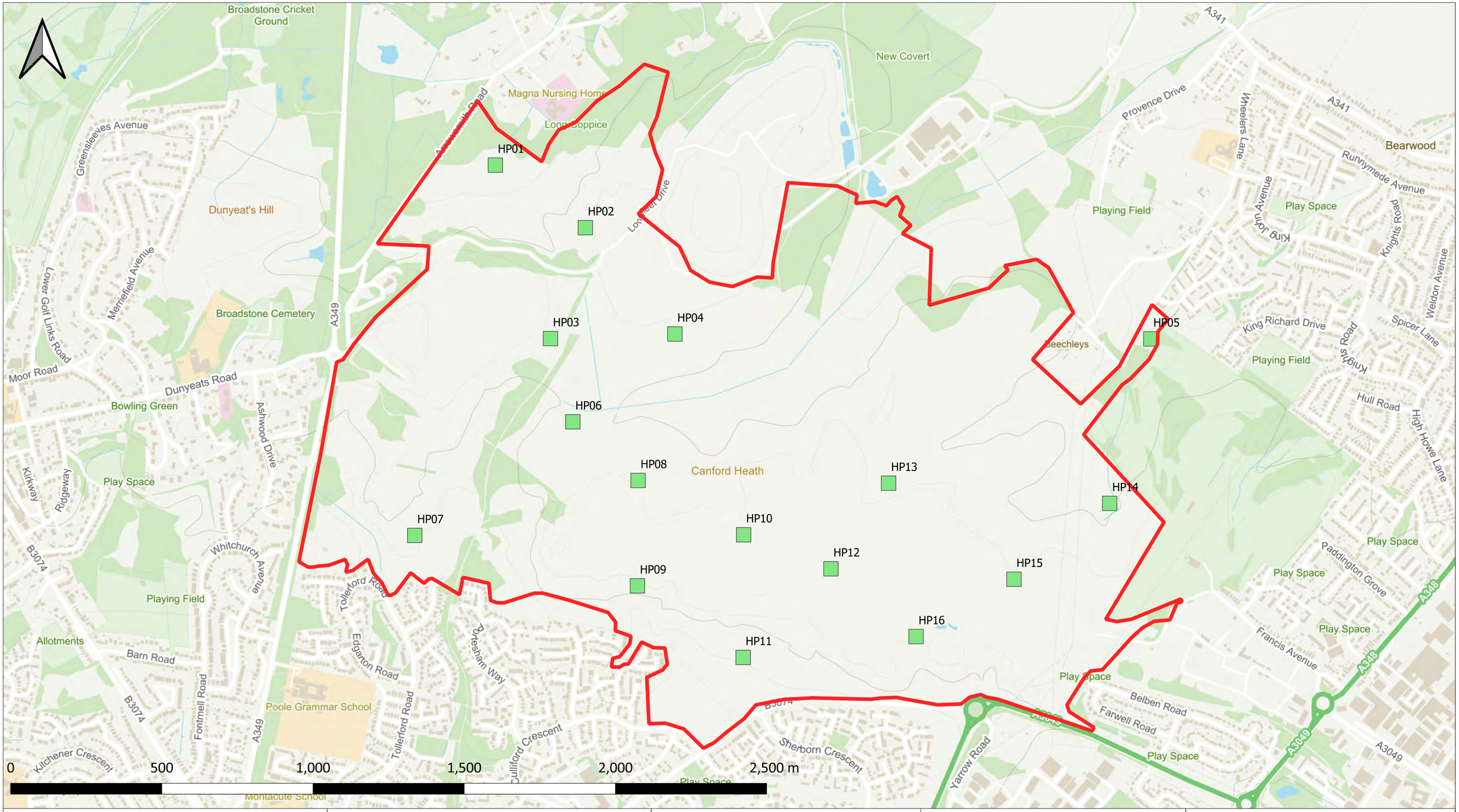

KEY PLAN

Canford Heath Boundary

Hand Pit

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TITLE
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HYDROCK PROJECT NO.
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KEY PLAN

Turbary Park Boundary

Hand Pit

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KEY PLAN

Kinson Common Boundary

Hand Pit

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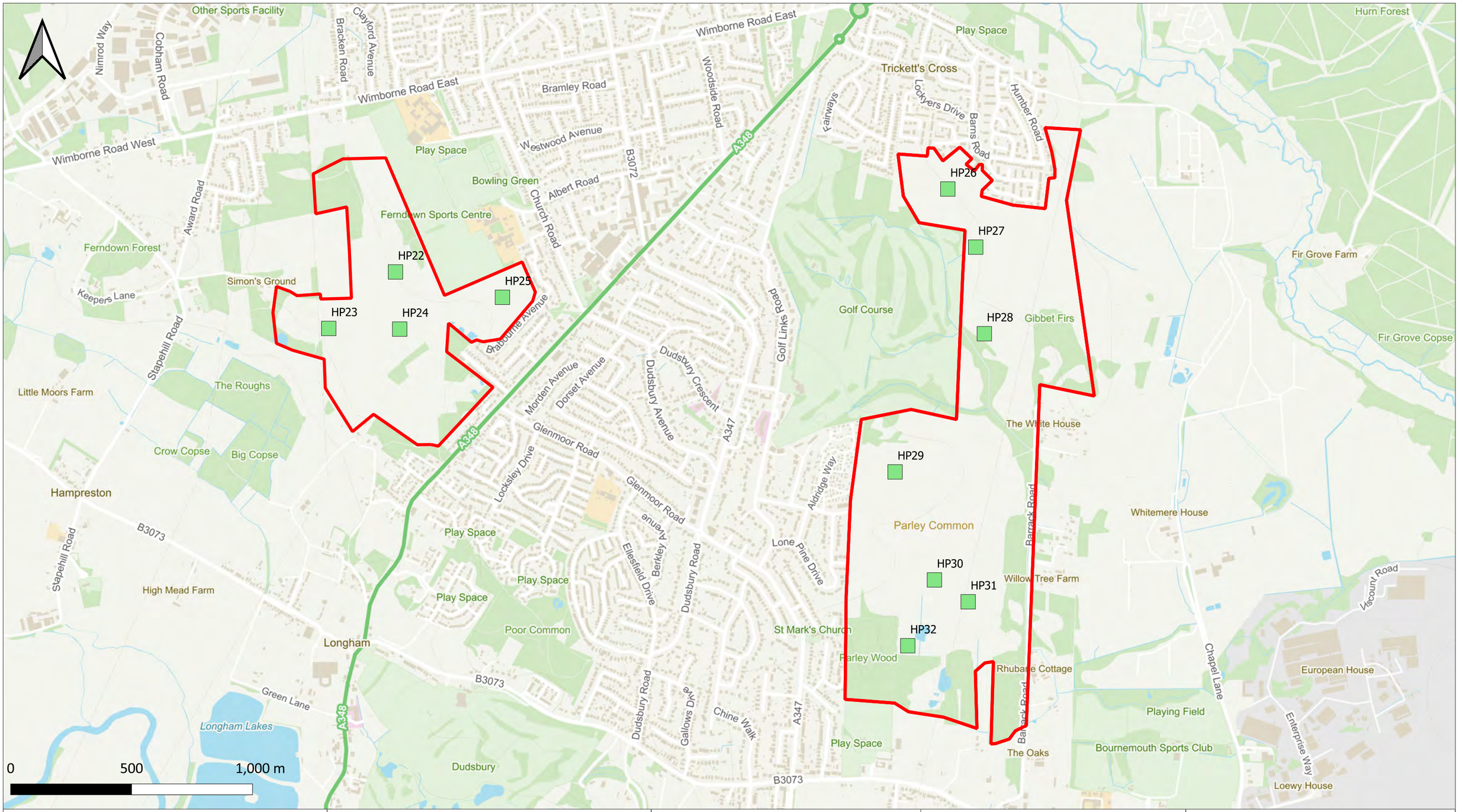

KEY PLAN

- Parley Common Nature Reserve
- Ferndown Common Boundary
- Hand Pit

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Ferndown Comon & Parley Common Handpit Locations

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PROJECT
Dorset Heaths

DRAWING NO.
26802-HYD-XX-XX-DR-GE-1005

REVISION
P01

Appendix B: Location Coordinates

Table 4: Summary of hand pit locations

Location	SSSI Parcel	Habitat	Grid Reference
HP01	Canford	Marshy grass/bog	402124, 96723
HP02	Canford	Wet heath	402419, 96517
HP03	Canford	Heath	402306, 96152
HP04	Canford	Marshy grass/bog	402715, 96167
HP05	Canford	Marshy grass/bog	404285, 96151
HP06	Canford	Heath	402376, 95868
HP07	Canford	Heath	401852, 95500
HP08	Canford	Heath	402594, 95680
HP09	Canford	Wet heath	402591, 95332
HP10	Canford	Wet heath	402942, 95503
HP11	Canford	Marshy grass/bog	402939, 95100
HP12	Canford	Acid Grass	403231, 95390
HP13	Canford	Acid Grass	403421, 95676
HP14	Canford	Acid Grass	404152, 95604
HP15	Canford	Acid Grass	403835, 95355
HP16	Canford	Heath	403512, 95167
HP17	Turbary	Acid Grass	405670, 95003
HP18	Turbary	Heath	405840, 94965
HP19	Turbary	Acid Grass	406361, 94736
HP20	Kinson	Marshy grass/bog	406743, 96033
HP21	Kinson	Acid Grass	406613, 95865
HP22	Ferndown	Acid Grass	406795, 100099
HP23	Ferndown	Mosaic	406517, 99864
HP24	Ferndown	Acid Grass	406812, 99861
HP25	Ferndown	Heath	407238, 99991
HP26	Parley	Mosaic	409077, 100439
HP27	Parley	Marshy grass/bog	409192, 100198
HP28	Parley	Heath	409228, 99841
HP29	Parley	Heath	408860, 99261
HP30	Parley	Wet heath	409021, 98817
HP31	Parley	Marshy grass/bog	409158, 98728
HP32	Parley	Marshy grass/bog	408911, 98550

Appendix C: Exploratory Hole Logs and Photographs

Hydrock

Project: Dorset Heaths

Trialpit No
HP01
Page No. 1 of 1

Method: Hand-dug Pit	Date(s): 11/01/2023	Logged By: AS	Checked By: AD
Client: EDP Ltd	Co-ords: 402124.00, 96723.00	Stability: Stable	Dimensions: 0.30m x 0.30m
Hydrock Project No: 26802		Plant: Hand tools	Scale: 1:10

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
0.05 - 0.10	D			Dark brown sandy gravelly SILT. Gravel is subangular to subrounded fine and medium of flint. Sand was fine and medium. (TOPSOIL)		(0.20)		
					0.20			
				Base of Excavation at 0.20m				

General Remarks:
1. Location cleared by ecologist and scanned with CAT & Genny by Hydrock engineer. 2. Hand pit dug to 0.20m bgl. 3. Soil sample taken between 0.05m and 0.10m bgl. 4. Water encountered and filled up pit. 5. Backfilled with arisings.

Logged in general accordance with BS5930:2015

Hydrock

Project: Dorset Heaths

Trialpit No
HP02
Page No. 1 of 1

Method: Hand-dug Pit	Date(s): 11/01/2023	Logged By: AS	Checked By: AD
Client: EDP Ltd	Co-ords: 402419.00, 96517.00	Stability: Stable	Dimensions: 0.30m x 0.30m
Hydrock Project No: 26802		Plant: Hand tools	Scale: 1:10

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
0.05 - 0.10	D			Dark brown slightly gravelly silty fine to coarse SAND with frequent roots and rootlets. Gravel is subangular to subrounded fine and medium of flint. (TOPSOIL)		(0.20)		
				Base of Excavation at 0.20m	0.20			

General Remarks:
1. Location cleared by ecologist and scanned with CAT & Genny by Hydrock engineer. 2. Hand pit dug to 0.20m bgl. 3. Soil sample taken between 0.05m and 0.10m bgl. 4. Backfilled with arisings.

Logged in general accordance with BS5930:2015

Hydrock

Project: Dorset Heaths

Trialpit No
HP03
Page No. 1 of 1

Method: Hand-dug Pit	Date(s): 11/01/2023	Logged By: AS	Checked By: AD
Client: EDP Ltd	Co-ords: 402306.00, 96152.00	Stability: Stable	Dimensions: 0.30m x 0.30m
Hydrock Project No: 26802		Plant: Hand tools	Scale: 1:10

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
0.05 - 0.10	D			Dark brown slightly gravelly silty fine to coarse SAND. Gravel is subangular to subrounded fine and medium flint. (TOPSOIL)	0.15	(0.15)		
				Light grey slightly gravelly silty fine and medium SAND with frequent roots and rootlets. (POOLE FORMATION)	0.20	(0.05)		
				Base of Excavation at 0.20m				

General Remarks:
1. Location cleared by ecologist and scanned with CAT & Genny by Hydrock engineer. 2. Hand pit dug to 0.20m bgl. 3. Soil sample taken between 0.05m and 0.10m bgl. 4. Backfilled with arisings.

Logged in general accordance with BS5930:2015

Hydrock

Project: Dorset Heaths

Trialpit No
HP04
Page No. 1 of 1

Method: Hand-dug Pit	Date(s): 11/01/2023	Logged By: AS	Checked By: AD
Client: EDP Ltd	Co-ords: 402715.00, 96167.00	Stability: Stable	Dimensions: 0.30m x 0.30m; Scale: 1:10
Hydrock Project No: 26802		Plant: Hand tools	

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
0.05 - 0.10	D			Dark brown slightly gravelly silty fine to coarse SAND. Gravel is subangular to subrounded fine and medium of flint. (TOPSOIL)	0.10	(0.10)		
				Light brownish grey slightly gravelly silty fine to coarse SAND with frequent rootlets. Gravel is subangular to subrounded fine and medium of flint. (POOLE FORMATION)	0.20	(0.10)		
				Base of Excavation at 0.20m				

General Remarks:
1. Location cleared by ecologist and scanned with CAT & Genny by Hydrock engineer. 2. Hand pit dug to 0.20m bgl. 3. Soil sample taken between 0.05m and 0.10m bgl. 4. Water encountered and filled up pit. 5. Backfilled with arisings.

Logged in general accordance with BS5930:2015

Hydrock

Project: Dorset Heaths

Trialpit No
HP05
Page No. 1 of 1

Method: Hand-dug Pit	Date(s): 11/01/2023	Logged By: LC	Checked By: AD
Client: EDP Ltd	Co-ords: 404285.00, 96152.00	Stability: Stable	Dimensions: 0.30m x 0.30m
Hydrock Project No: 26802		Plant: Hand tools	Scale: 1:10

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
0.05 - 0.10	D			Dark brown clayey SILT with frequent roots and rootlets. (TOPSOIL)		(0.30)		
					0.30			
				Base of Excavation at 0.30m				
					1			
					2			

General Remarks:
1. Location cleared by ecologist and scanned with CAT & Genny by Hydrock engineer. 2. Hand pit dug to 0.30m bgl. 3. Soil sample taken between 0.05m and 0.10m bgl. 4. Water encountered and filled pit - Very boggy conditions. 5. Backfilled with arisings.

Logged in general accordance with BS5930:2015

Hydrock

Project: Dorset Heaths

Trialpit No
HP06
Page No. 1 of 1

Method: Hand-dug Pit	Date(s): 11/01/2023	Logged By: AS	Checked By: AD
Client: EDP Ltd	Co-ords: 402376.00, 95869.00	Stability: Stable	Dimensions: 0.30m x 0.30m
Hydrock Project No: 26802		Plant: Hand tools	Scale: 1:10

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
0.05 - 0.10	D			Dark brown slightly gravelly fine to coarse SAND. Gravel is subangular to subrounded fine and medium of flint. (TOPSOIL)		(0.18)		
					0.18			
				Light grey slightly gravelly silty fine to coarse SAND. Gravel is subangular to subrounded medium of flint. (POOLE FORMATION)	0.20	(0.02)		
				Base of Excavation at 0.20m				

General Remarks:
1. Location cleared by ecologist and scanned with CAT & Genny by Hydrock engineer. 2. Hand pit dug to 0.20m bgl. 3. Soil sample taken between 0.05m and 0.10m bgl. 4. Water encountered at base of pit. 5. Backfilled with arisings.

Logged in general accordance with BS5930:2015

Hydrock

Project: Dorset Heaths

Trialpit No
HP07
Page No. 1 of 1

Method: Hand-dug Pit	Date(s): 11/01/2023	Logged By: AS	Checked By: AD
Client: EDP Ltd	Co-ords: 401852.00, 95501.00	Stability: Stable	Dimensions: 0.30m x 0.30m
Hydrock Project No: 26802		Plant: Hand tools	Scale: 1:10

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
0.05 - 0.10	D			Dark and light brown slightly gravelly silty fine coarse SAND with frequent roots and rootlets. (TOPSOIL)		(0.20)		
					0.20			
				Base of Excavation at 0.20m				
					1			
					2			

General Remarks:
1. Location cleared by ecologist and scanned with CAT & Genny by Hydrock engineer. 2. Hand pit dug to 0.20m bgl. 3. Soil sample taken between 0.05m and 0.10m bgl. 4. Backfilled with arisings.

Logged in general accordance with BS5930:2015

Hydrock

Project: Dorset Heaths

Trialpit No
HP08
Page No. 1 of 1

Method: Hand-dug Pit	Date(s): 11/01/2023	Logged By: AS	Checked By: AD
Client: EDP Ltd	Co-ords: 402594.00, 95681.00	Stability: Stable	Dimensions: 0.30m x 0.30m
Hydrock Project No: 26802		Plant: Hand tools	Scale: 1:10

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
0.05 - 0.10	D			Dark greyish brown slightly gravelly silty fine to coarse SAND. Gravel is subangular to subrounded fine and medium of flint. (TOPSOIL)		(0.20)		
					0.20			
				Base of Excavation at 0.20m				

General Remarks:
1. Location cleared by ecologist and scanned with CAT & Genny by Hydrock engineer. 2. Hand pit dug to 0.20m bgl. 3. Soil sample taken between 0.05m and 0.10m bgl. 4. Water encountered at base of pit. 5. Backfilled with arisings.

Logged in general accordance with BS5930:2015

Hydrock

Project: Dorset Heaths

Trialpit No
HP09
Page No. 1 of 1

Method: Hand-dug Pit	Date(s): 11/01/2023	Logged By: AS	Checked By: AD
Client: EDP Ltd	Co-ords: 402591.00, 95333.00	Stability: Stable	Dimensions: 0.30m x 0.30m; Scale: 1:10
Hydrock Project No: 26802		Plant: Hand tools	

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
0.05 - 0.10	D			Dark brown slightly gravelly silty fine to coarse SAND. Gravel is subangular to subrounded fine and medium of flint. (TOPSOIL)	0.10	(0.10)		
				Light brown slightly gravelly silty fine to coarse SAND. Gravel is subangular to subrounded fine and medium of flint. (RIVER TERRACE DEPOSITS)	0.20	(0.10)		
				Base of Excavation at 0.20m				

General Remarks:
1. Location cleared by ecologist and scanned with CAT & Genny by Hydrock engineer. 2. Hand pit dug to 0.20m bgl. 3. Soil sample taken between 0.05m and 0.10m bgl. 4. Water encountered at base of pit. 5. Backfilled with arisings.

Logged in general accordance with BS5930:2015

Hydrock

Project: Dorset Heaths

Trialpit No
HP10
Page No. 1 of 1

Method: Hand-dug Pit	Date(s): 11/01/2023	Logged By: LC	Checked By: AD
Client: EDP Ltd	Co-ords: 402942.00, 95504.00	Stability: Stable	Dimensions: 0.30m x 0.30m
Hydrock Project No: 26802		Plant: Hand tools	Scale: 1:10

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
0.05 - 0.10	D			Dark brown silty fine and medium SAND with occasional rootlets and rare subangular medium to coarse gravels of flint. (TOPSOIL)		(0.19)		
				Soft orange brown mottled grey brown sandy CLAY with occasional rootlets. (POOLE FORMATION)	0.19	(0.01)		
				Base of Excavation at 0.20m	0.20			

General Remarks:
1. Location cleared by ecologist and scanned with CAT & Genny by Hydrock engineer. 2. Hand pit dug to 0.20m bgl. 3. Soil sample taken between 0.05m and 0.10m bgl. 4. Water encountered and filled pit - Slightly boggy conditions. 5. Backfilled with arisings.

Logged in general accordance with BS5930:2015

Hydrock

Project: Dorset Heaths

Trialpit No
HP11
Page No. 1 of 1

Method: Hand-dug Pit	Date(s): 11/01/2023	Logged By: LC	Checked By: AD
Client: EDP Ltd	Co-ords: 402939.00, 95101.00	Stability: Stable	Dimensions: 0.30m x 0.30m; Scale: 1:10
Hydrock Project No: 26802		Plant: Hand tools	

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
0.05 - 0.10	D			Dark reddish brown sandy SILT with abundant roots and rootlets. Sand is fine and medium. (TOPSOIL)	0.05	(0.05)		
				Dark brown mottled light grey silty fine to coarse SAND with frequent rootlets. (RIVER TERRACE DEPOSITS)	0.20	(0.15)		
				Base of Excavation at 0.20m				

General Remarks:
1. Location cleared by ecologist and scanned with CAT & Genny by Hydrock engineer. 2. Hand pit dug to 0.20m bgl. 3. Soil sample taken between 0.05m and 0.10m bgl. 4. Surface covering noted to be significantly damaged by burning, as a result of wildfires. 5. Slight damp at base of pit. 5. Backfilled with arisings.

Logged in general accordance with BS5930:2015

Hydrock

Project: Dorset Heaths

Trialpit No
HP12
Page No. 1 of 1

Method: Hand-dug Pit	Date(s): 11/01/2023	Logged By: LC	Checked By: AD
Client: EDP Ltd	Co-ords: 403231.00, 95391.00	Stability: Stable	Dimensions: 0.30m x 0.30m
Hydrock Project No: 26802		Plant: Hand tools	Scale: 1:10

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
0.05 - 0.10	D			Dark brown slightly sandy slightly gravelly SILT with frequent roots and rootlets. Gravel is subangular to subangular fine and medium of flint. (TOPSOIL)	0.15	(0.15)		
				Light brownish grey fine to coarse SAND with occasional rootlets and rare subangular fine gravels flint. (RIVER TERRACE DEPOSITS)	0.25	(0.10)		
				Base of Excavation at 0.25m				

General Remarks:
1. Location cleared by ecologist and scanned with CAT & Genny by Hydrock engineer. 2. Hand pit dug to 0.25m bgl. 3. Soil sample taken between 0.05m and 0.10m bgl. 4. Backfilled with arisings.

Logged in general accordance with BS5930:2015

Hydrock

Project: Dorset Heaths

Trialpit No
HP13
Page No. 1 of 1

Method: Hand-dug Pit	Date(s): 11/01/2023	Logged By: LC	Checked By: AD
Client: EDP Ltd	Co-ords: 403421.00, 95677.00	Stability: Stable	Dimensions: 0.30m x 0.30m; Scale: 1:10
Hydrock Project No: 26802		Plant: Hand tools	

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
0.05 - 0.10	D			Dark brown sandy SILT with frequent roots and rootlets. Sand is fine and medium. (TOPSOIL)		(0.20)		
					0.20			
				Base of Excavation at 0.20m				

General Remarks:
1. Location cleared by ecologist and scanned with CAT & Genny by Hydrock engineer. 2. Hand pit dug to 0.20m bgl. 3. Soil sample taken between 0.05m and 0.10m bgl. 4. No water encountered. 5. Backfilled with arisings.

Logged in general accordance with BS5930:2015

Hydrock	Project: Dorset Heaths	Trialpit No HP14 Page No. 1 of 1

Method: Hand-dug Pit	Date(s): 11/01/2023	Logged By: LC	Checked By: AD
Client: EDP Ltd	Co-ords: 404152.00, 95605.00	Stability: Stable	Dimensions: 0.30m x 0.30m
Hydrock Project No: 26802		Plant: Hand tools	Scale: 1:10

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
0.05 - 0.10	D			Dark brown sandy SILT with rare subangular fine gravels of flint. Sand is fine and medium. (TOPSOIL)		(0.28)		
					0.28			
				Base of Excavation at 0.28m				
					1			
					2			

General Remarks:
1. Location cleared by ecologist and scanned with CAT & Genny by Hydrock engineer. 2. Hand pit dug to 0.28m bgl. 3. Soil sample taken between 0.05m and 0.10m bgl. 4. No water encountered. 5. Backfilled with arisings.

Logged in general accordance with BS5930:2015

Hydrock

Project: Dorset Heaths

Trialpit No
HP15
Page No. 1 of 1

Method: Hand-dug Pit	Date(s): 11/01/2023	Logged By: LC	Checked By: AD
Client: EDP Ltd	Co-ords: 403835.00, 95356.00	Stability: Stable	Dimensions: 0.30m x 0.30m
Hydrock Project No: 26802		Plant: Hand tools	Scale: 1:10

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
0.05 - 0.10	D			Dark brown slightly sandy SILT with frequent roots and rootlets and rare subangular fine and medium gravels of flint. (TOPSOIL)		(0.25)		
					0.25	(0.00)		
				Light brown fine to coarse SAND with occasional rootlets and rare subangular fine to medium gravels of flint. (RIVER TERRACE DEPOSITS)	0.25	(0.05)		
				Light brown fine to coarse SAND with occasional rootlets and rare subangular fine and medium gravels of flint. (RIVER TERRACE DEPOSITS)	0.30			
				Base of Excavation at 0.30m				

General Remarks:
1. Location cleared by ecologist and scanned with CAT & Genny by Hydrock engineer. 2. Hand pit dug to 0.30m bgl. 3. Soil sample taken between 0.05m and 0.10m bgl. 4. Water encountered and filled pit - Slightly boggy conditions. 5. Backfilled with arisings.

Logged in general accordance with BS5930:2015

Hydrock

Project: Dorset Heaths

Trialpit No
HP16
Page No. 1 of 1

Method: Hand-dug Pit	Date(s): 11/01/2023	Logged By: LC	Checked By: AD
Client: EDP Ltd	Co-ords: 403512.00, 95168.00	Stability: Stable	Dimensions: 0.30m x 0.30m
Hydrock Project No: 26802		Plant: Hand tools	Scale: 1:10

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
0.05 - 0.10	D			Dark brown silty fine and medium SAND with frequent roots and rootlets and rare subangular fine and medium gravels of flint. (TOPSOIL)	0.10	(0.10)		
				Brown gravelly silty fine to coarse SAND with occasional rootlets. Gravel is subangular fine to coarse of flint. (RIVER TERRACE DEPOSITS)	0.20	(0.10)		
				Base of Excavation at 0.20m				

General Remarks:
1. Location cleared by ecologist and scanned with CAT & Genny by Hydrock engineer. 2. Hand pit dug to 0.20m bgl. 3. Soil sample taken between 0.05m and 0.10m bgl. 4. No water encountered. 5.Backfilled with arisings.

Logged in general accordance with BS5930:2015

Hydrock

Project: Dorset Heaths

Trialpit No
HP17
Page No. 1 of 1

Method: Hand-dug Pit	Date(s): 11/01/2023	Logged By: LC	Checked By: AD
Client: EDP Ltd	Co-ords: 405670.00, 95004.00	Stability: Stable	Dimensions: 0.30m x 0.30m; Scale: 1:10
Hydrock Project No: 26802		Plant: Hand tools	

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
0.05 - 0.10	D			Dark brown gravelly silty fine to coarse SAND with frequent rootlets. Gravel is subangular fine to coarse of flint. (TOPSOIL)		(0.20)		
					0.20			
				Base of Excavation at 0.20m				
					1			
					2			

General Remarks:
1. Location cleared by ecologist and scanned with CAT & Genny by Hydrock engineer. 2. Hand pit dug to 0.20m bgl. 3. Soil sample taken between 0.05m and 0.10m bgl. 4. No water encountered. 5. Backfilled with arisings.

Logged in general accordance with BS5930:2015

Hydrock

Project: Dorset Heaths

Trialpit No
HP18
Page No. 1 of 1

Method: Hand-dug Pit	Date(s): 11/01/2023	Logged By: LC	Checked By: AD
Client: EDP Ltd	Co-ords: 405840.00, 94966.00	Stability: Stable	Dimensions: 0.30m x 0.30m; Scale: 1:10
Hydrock Project No: 26802		Plant: Hand tools	

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
0.05 - 0.10	D			Dark brown and greyish brown slightly gravelly silty fine and medium SAND with occasional roots and rootlets. Gravel is subangular fine to coarse of flint. (TOPSOIL)		(0.20)		
					0.20			
				Base of Excavation at 0.20m				

General Remarks:
1. Location cleared by ecologist and scanned with CAT & Genny by Hydrock engineer. 2. Hand pit dug to 0.20m bgl. 3. Soil sample taken between 0.05m and 0.10m bgl. 4. No water encountered. 5. Backfilled with arisings.

Logged in general accordance with BS5930:2015

Hydrock

Project: Dorset Heaths

Trialpit No
HP19
Page No. 1 of 1

Method: Hand-dug Pit	Date(s): 11/01/2023	Logged By: LC	Checked By: AD
Client: EDP Ltd	Co-ords: 406361.00, 94737.00	Stability: Stable	Dimensions: 0.30m x 0.30m
Hydrock Project No: 26802		Plant: Hand tools	Scale: 1:10

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
0.05 - 0.10	D			Dark brown clayey SILT with frequent rootlets. (TOPSOIL) *... At 0.05m bgl; Rare subangular cobble of flint.*		(0.20)		
				Base of Excavation at 0.20m	0.20			

General Remarks:
1. Location cleared by ecologist and scanned with CAT & Genny by Hydrock engineer. 2. Hand pit dug to 0.20m bgl. 3. Soil sample taken between 0.05m and 0.10m bgl. 4. Slightly damp at base of pit. 5. Backfilled with arisings.

Logged in general accordance with BS5930:2015

Hydrock

Project: Dorset Heaths

Trialpit No
HP20
Page No. 1 of 1

Method: Hand-dug Pit	Date(s): 11/01/2023	Logged By: AS	Checked By: AD
Client: EDP Ltd	Co-ords: 406743.00, 96034.00	Stability: Stable	Dimensions: 0.30m x 0.30m; Scale: 1:10
Hydrock Project No: 26802		Plant: Hand tools	

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
0.05 - 0.10	D			Dark brown slightly gravelly silty fine to coarse SAND with frequent roots. Gravel is subangular fine to coarse of flint. (TOPSOIL)		(0.20)		
					0.20			
				Base of Excavation at 0.20m				

General Remarks:
1. Location cleared by ecologist and scanned with CAT & Genny by Hydrock engineer. 2. Hand pit dug to 0.20m bgl. 3. Soil sample taken between 0.05m and 0.10m bgl. 4. Backfilled with arisings.

Logged in general accordance with BS5930:2015

Hydrock

Project: Dorset Heaths

Trialpit No
HP21
Page No. 1 of 1

Method: Hand-dug Pit	Date(s): 11/01/2023	Logged By: AS	Checked By: AD
Client: EDP Ltd	Co-ords: 406613.00, 95866.00	Stability: Stable	Dimensions: 0.30m x 0.30m
Hydrock Project No: 26802		Plant: Hand tools	Scale: 1:10

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
0.05 - 0.10	D			Dark brown gravelly silty fine to coarse SAND with frequent roots. Gravel is subangular to subrounded fine to coarse flint. (TOPSOIL)		(0.20)		
					0.20			
				Base of Excavation at 0.20m				
					1			
					2			

General Remarks:
1. Location cleared by ecologist and scanned with CAT & Genny by Hydrock engineer. 2. Hand pit dug to 0.20m bgl. 3. Soil sample taken between 0.05m and 0.10m bgl. 4. Backfilled with arisings.

Logged in general accordance with BS5930:2015

Hydrock

Project: Dorset Heaths

Trialpit No
HP22
Page No. 1 of 1

Method: Hand-dug Pit	Date(s): 12/01/2023	Logged By: LC	Checked By: AD
Client: EDP Ltd	Co-ords: 406795.00, 100100.00	Stability: Stable	Dimensions: 0.30m x 0.30m
Hydrock Project No: 26802		Plant: Hand tools	Scale: 1:10

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
0.05 - 0.10	D			Dark brown silty fine and medium SAND with frequent rootlets. (TOPSOIL)	0.15	(0.15)		
				Light brownish grey gravelly fine to coarse SAND with occasional rootlets. Gravel is subangular to rounded fine to coarse of flint. (POOLE FORMATION)	0.20	(0.05)		
				Base of Excavation at 0.20m				

General Remarks:
1. Location cleared by ecologist and scanned with CAT & Genny by Hydrock engineer. 2. Hand pit dug to 0.20m bgl. 3. Soil sample taken between 0.05m and 0.10m bgl. 4. No water encountered. 5. Backfilled with arisings.

Logged in general accordance with BS5930:2015

Hydrock

Project: Dorset Heaths

Trialpit No
HP23
Page No. 1 of 1

Method: Hand-dug Pit	Date(s): 12/01/2023	Logged By: LC	Checked By: AD
Client: EDP Ltd	Co-ords: 406517.00, 99865.00	Stability: Stable	Dimensions: 0.30m x 0.30m
Hydrock Project No: 26802		Plant: Hand tools	Scale: 1:10

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
0.05 - 0.10	D			Dark brown silty fine and medium SAND with frequent rootlets. (TOPSOIL)	0.15	(0.15)		
				Light greyish brown slightly gravelly fine to coarse SAND with occasional rootlets. Gravel is subangular to subrounded fine to coarse of flint. (POOLE FORMATION)	0.20	(0.05)		
				Base of Excavation at 0.20m				

General Remarks:
1. Location cleared by ecologist and scanned with CAT & Genny by Hydrock engineer. 2. Hand pit dug to 0.20m bgl. 3. Soil sample taken between 0.05m and 0.10m bgl. 4. Water ingress at base of pit. 5. Backfilled with arisings.

Logged in general accordance with BS5930:2015

Hydrock

Project: Dorset Heaths

Trialpit No
HP24
Page No. 1 of 1

Method: Hand-dug Pit	Date(s): 12/01/2023	Logged By: LC	Checked By: AD
Client: EDP Ltd	Co-ords: 406812.00, 99862.00	Stability: Stable	Dimensions: 0.30m x 0.30m
Hydrock Project No: 26802		Plant: Hand tools	Scale: 1:10

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
0.05 - 0.10	D			Dark brown silty fine to coarse SAND with frequent rootlets and rare subrounded fine gravels of flint. (TOPSOIL)	0.05	(0.05)		
				Light greyish brown slightly gravelly fine to coarse SAND with occasional rootlets. Gravel is subangular to rounded fine to coarse of flint. (POOLE FORMATION)	0.25	(0.20)		
				Base of Excavation at 0.25m				

General Remarks:
1. Location cleared by ecologist and scanned with CAT & Genny by Hydrock engineer. 2. Hand pit dug to 0.25m bgl. 3. Soil sample taken between 0.05m and 0.10m bgl. 4. No water encountered. 5. Backfilled with arisings.

Logged in general accordance with BS5930:2015

Hydrock

Project: Dorset Heaths

Trialpit No
HP25
Page No. 1 of 1

Method: Hand-dug Pit	Date(s): 12/01/2023	Logged By: LC	Checked By: AD
Client: EDP Ltd	Co-ords: 407238.00, 99992.00	Stability: Stable	Dimensions: 0.30m x 0.30m
Hydrock Project No: 26802		Plant: Hand tools	Scale: 1:10

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
0.05 - 0.10	D			Dark brown silty fine and medium SAND with frequent rootlets. (TOPSOIL)	0.05	(0.05)		
				Light greyish brown fine to coarse SAND with rare to occasional subangular to rounded fine to coarse gravels of flint. (POOLE FORMATION)	0.25	(0.20)		
				Base of Excavation at 0.25m				

General Remarks:
1. Location cleared by ecologist and scanned with CAT & Genny by Hydrock engineer. 2. Hand pit dug to 0.25m bgl. 3. Soil sample taken between 0.05m and 0.10m bgl. 4. Slight water ingress at base of pit. 5. Backfilled with arisings.

Logged in general accordance with BS5930:2015

Hydrock

Project: Dorset Heaths

Trialpit No
HP26
Page No. 1 of 1

Method: Hand-dug Pit	Date(s): 12/01/2023	Logged By: LC	Checked By: AD
Client: EDP Ltd	Co-ords: 409077.00, 100440.00	Stability: Stable	Dimensions: 0.30m x 0.30m
Hydrock Project No: 26802		Plant: Hand tools	Scale: 1:10

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
0.05 - 0.10	D			Dark brown silty fine to coarse SAND with frequent roots and rootlets. (TOPSOIL)	0.15	(0.15)		
				Light greyish brown slightly gravelly fine to coarse SAND with occasional rootlets. Gravel is subangular to subrounded fine to coarse of flint. (BRANKSOME SAND FORMATION)	0.20	(0.05)		
				Base of Excavation at 0.20m				

General Remarks:
1. Location cleared by ecologist and scanned with CAT & Genny by Hydrock engineer. 2. Hand pit dug to 0.20m bgl. 3. Soil sample taken between 0.05m and 0.10m bgl. 4. No water encountered. 5. Backfilled with arisings.

Logged in general accordance with BS5930:2015

Hydrock

Project: Dorset Heaths

Trialpit No
HP27
Page No. 1 of 1

Method: Hand-dug Pit	Date(s): 12/01/2023	Logged By: LC	Checked By: AD
Client: EDP Ltd	Co-ords: 409192.00, 100199.00	Stability: Stable	Dimensions: 0.30m x 0.30m
Hydrock Project No: 26802		Plant: Hand tools	Scale: 1:10

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
0.05 - 0.10	D			Dark brown slightly sandy SILT with frequent roots and rootlets. (TOPSOIL)	0.15	(0.15)		
				Light brown slightly gravelly very clayey fine and medium SAND with frequent roots and rootlets. Gravel is subangular to subrounded fine to coarse of flint. (BRANKSOME SAND FORMATION)	0.20	(0.05)		
				Base of Excavation at 0.20m				

General Remarks:
1. Location cleared by ecologist and scanned with CAT & Genny by Hydrock engineer. 2. Hand pit dug to 0.20m bgl. 3. Soil sample taken between 0.05m and 0.10m bgl. 4. No water encountered. 5. Backfilled with arisings.

Logged in general accordance with BS5930:2015

Hydrock

Project: Dorset Heaths

Trialpit No
HP28
Page No. 1 of 1

Method: Hand-dug Pit	Date(s): 12/01/2023	Logged By: LC	Checked By: AD
Client: EDP Ltd	Co-ords: 409228.00, 99842.00	Stability: Stable	Dimensions: 0.30m x 0.30m
Hydrock Project No: 26802		Plant: Hand tools	Scale: 1:10

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
0.05 - 0.10	D			Dark brown sandy SILT with frequent rootlets. (TOPSOIL)	0.05	(0.05)		
				Light brown gravelly fine to coarse SAND. Gravel is subangular to subrounded fine to coarse of flint. (BRANKSOME SAND FORMATION)	0.20	(0.15)		
				Base of Excavation at 0.20m				

General Remarks:
1. Location cleared by ecologist and scanned with CAT & Genny by Hydrock engineer. 2. Hand pit dug to 0.20m bgl. 3. Soil sample taken between 0.05m and 0.10m bgl. 4. No water encountered. 5. Backfilled with arisings.

Logged in general accordance with BS5930:2015

Hydrock

Project: Dorset Heaths

Trialpit No
HP29
Page No. 1 of 1

Method: Hand-dug Pit	Date(s): 12/01/2023	Logged By: LC	Checked By: AD
Client: EDP Ltd	Co-ords: 408860.00, 99262.00	Stability: Stable	Dimensions: 0.30m x 0.30m
Hydrock Project No: 26802		Plant: Hand tools	Scale: 1:10

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
0.05 - 0.10	D			Dark brown slightly sandy SILT with frequent rootlets. (TOPSOIL)	0.05	(0.05)		
				Light brown gravelly fine to coarse SAND. Gravel is subangular to subrounded fine to coarse of flint. (BRANKSOME SAND FORMATION)	0.25	(0.20)		
				Base of Excavation at 0.25m				

General Remarks:
1. Location cleared by ecologist and scanned with CAT & Genny by Hydrock engineer. 2. Hand pit dug to 0.25m bgl. 3. Soil sample taken between 0.05m and 0.10m bgl. 4. No water encountered. 5. Backfilled with arisings.

Logged in general accordance with BS5930:2015

Hydrock

Project: Dorset Heaths

Trialpit No
HP30
Page No. 1 of 1

Method: Hand-dug Pit	Date(s): 12/01/2023	Logged By: LC	Checked By: AD
Client: EDP Ltd	Co-ords: 409021.00, 98818.00	Stability: Stable	Dimensions: 0.30m x 0.30m
Hydrock Project No: 26802		Plant: Hand tools	Scale: 1:10

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
0.05 - 0.10	D			Dark brown slightly sandy SILT with abundant rootlets. Sand is fine and medium. (TOPSOIL)		(0.25)		
				Base of Excavation at 0.25m	0.25			

General Remarks:
1. Location cleared by ecologist and scanned with CAT & Genny by Hydrock engineer. 2. Hand pit dug to 0.25m bgl. 3. Soil sample taken between 0.05m and 0.10m bgl. 4. Water encountered and filled pit - Very boggy conditions. 5. Backfilled with arisings.

Logged in general accordance with BS5930:2015

Hydrock

Project: Dorset Heaths

Trialpit No
HP31
Page No. 1 of 1

Method: Hand-dug Pit	Date(s): 12/01/2023	Logged By: LC	Checked By: AD
Client: EDP Ltd	Co-ords: 409158.00, 98729.00	Stability: Stable	Dimensions: 0.30m x 0.30m; Scale: 1:10
Hydrock Project No: 26802		Plant: Hand tools	

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
0.05 - 0.10	D			Dark brown silty fine and medium SAND with frequent roots and rare subangular fine and medium gravels of flint. (TOPSOIL)		(0.25)		
				Base of Excavation at 0.25m	0.25			

General Remarks:
1. Location cleared by ecologist and scanned with CAT & Genny by Hydrock engineer. 2. Hand pit dug to 0.25m bgl. 3. Soil sample taken between 0.05m and 0.10m bgl. 4. Water encountered and filled pit - Very boggy conditions. 5. Backfilled with arisings.

Logged in general accordance with BS5930:2015

Hydrock

Project: Dorset Heaths

Trialpit No
HP32
Page No. 1 of 1

Method: Hand-dug Pit	Date(s): 12/01/2023	Logged By: LC	Checked By: AD
Client: EDP Ltd	Co-ords: 408911.00, 98551.00	Stability: Stable	Dimensions: 0.30m x 0.30m; Scale: 1:10
Hydrock Project No: 26802		Plant: Hand tools	

Samples / Tests			Water-Strikes	Stratum Description	Depth mbgl	Thickness (m)	Level m OD	Legend
Depth (m)	Type	Results						
0.05 - 0.10	D			Dark brown silty fine and medium SAND with frequent roots and rootlets. (TOPSOIL)		(0.25)		
				Base of Excavation at 0.25m	0.25			

General Remarks:
1. Location cleared by ecologist and scanned with CAT & Genny by Hydrock engineer. 2. Hand pit dug to 0.25m bgl. 3. Soil sample taken between 0.05m and 0.10m bgl. 4. Water encountered and filled pit - Very boggy conditions. 5. Backfilled with arisings.

Logged in general accordance with BS5930:2015

Site Investigation Photograph 1	
Date: 11/01/2023	
Direction Photograph Taken: n/a.	
Description: HP01 dug to 0.20m bgl.	

Site Investigation Photograph 2	
Date: 11/01/2023	
Direction Photograph Taken: n/a.	
Description: HP02 dug to 0.20m bgl.	

Site Investigation Photograph 3	
Date: 11/01/2023	
Direction Photograph Taken: n/a.	
Description: HP03 dug to 0.20m bgl.	

Site Investigation Photograph 4	
Date: 11/01/2023	
Direction Photograph Taken: n/a.	
Description: HP04 dug to 0.20m bgl.	

Site Investigation Photograph 5	
Date: 11/01/2023	
Direction Photograph Taken: n/a.	
Description: HP05 dug to 0.30m bgl.	

Site Investigation Photograph 6	
Date: 11/01/2023	
Direction Photograph Taken: n/a.	
Description: HP06 dug to 0.20m bgl.	

Site Investigation Photograph 7	
Date: 11/01/2023	
Direction Photograph Taken: n/a.	
Description: HP07 dug to 0.20m bgl.	

Site Investigation Photograph 8	
Date: 11/01/2023	
Direction Photograph Taken: n/a.	
Description: HP08 dug to 0.20m bgl.	

Site Investigation Photograph 9	
Date: 11/01/2023	
Direction Photograph Taken: n/a.	
Description: HP09 dug to 0.20m bgl.	

Site Investigation Photograph 10	
Date: 11/01/2023	
Direction Photograph Taken: n/a.	
Description: HP10 dug to 0.20m bgl.	

Site Investigation Photograph 11	
Date: 11/01/2023	
Direction Photograph Taken: n/a.	
Description: HP11 dug to 0.20m bgl.	

Site Investigation Photograph 12	
Date: 11/01/2023	
Direction Photograph Taken: n/a.	
Description: HP12 dug to 0.25m bgl.	

Site Investigation Photograph 13	
Date: 11/01/2023	
Direction Photograph Taken: n/a.	
Description: HP13 dug to 0.20m bgl.	

Site Investigation Photograph 14	
Date: 11/01/2023	
Direction Photograph Taken: n/a.	
Description: HP14 dug to 0.28m bgl.	

Site Investigation Photograph 15	
Date: 11/01/2023	
Direction Photograph Taken: n/a.	
Description: HP15 dug to 0.30m bgl.	

Site Investigation Photograph 16	
Date: 11/01/2023	
Direction Photograph Taken: n/a.	
Description: HP16 dug to 0.20m bgl.	

Site Investigation Photograph 17	
Date: 11/01/2023	
Direction Photograph Taken: n/a.	
Description: HP17 dug to 0.20m bgl.	

Site Investigation Photograph 18	
Date: 11/01/2023	
Direction Photograph Taken: n/a.	
Description: HP18 dug to 0.20m bgl.	

Site Investigation Photograph 19	
Date: 11/01/2023	
Direction Photograph Taken: n/a.	
Description: HP19 dug to 0.20m bgl.	

Site Investigation Photograph 20	
Date: 11/01/2023	
Direction Photograph Taken: n/a.	
Description: HP20 dug to 0.20m bgl.	

Site Investigation Photograph 21	
Date: 11/01/2023	
Direction Photograph Taken: n/a.	
Description: HP21 dug to 0.20m bgl.	

Site Investigation Photograph 22	
Date: 11/01/2023	
Direction Photograph Taken: n/a.	
Description: HP22 dug to 0.20m bgl	

Site Investigation Photograph 23	
Date: 12/01/2023	
Direction Photograph Taken: n/a.	
Description: HP23 dug to 0.20m bgl.	

Site Investigation Photograph 24	
Date: 12/01/2023	
Direction Photograph Taken: n/a.	
Description: HP24 dug to 0.25mbgl.	

Site Investigation Photograph 25	
Date: 12/01/2023	
Direction Photograph Taken: n/a.	
Description: HP25 dug to 0.25m bgl.	

Site Investigation Photograph 26	
Date: 12/01/2023	
Direction Photograph Taken: n/a.	
Description: HP26 dug to 0.20m bgl.	

Site Investigation Photograph 27	
Date: 12/01/2023	
Direction Photograph Taken: n/a.	
Description: HP27 dug to 0.20m bgl.	

Site Investigation Photograph 28	
Date: 12/01/2023	
Direction Photograph Taken: n/a.	
Description: HP28 dug to 0.20m bgl.	

Site Investigation Photograph 29	
Date: 12/01/2023	
Direction Photograph Taken: n/a.	
Description: HP29 dug to 0.25m bgl.	

Site Investigation Photograph 30	
Date: 12/01/2023	
Direction Photograph Taken: n/a.	
Description: HP30 dug to 0.25m bgl.	

Site Investigation Photograph 31	
Date: 12/01/2023	
Direction Photograph Taken: n/a.	
Description: HP31 dug to 0.25m bgl.	

Site Investigation Photograph 32	
Date: 12/01/2023	
Direction Photograph Taken: n/a.	
Description: HP32 dug to 0.25m bgl.	

Appendix D: Geo-environmental Laboratory Test Results and Certificates

envirolab
Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

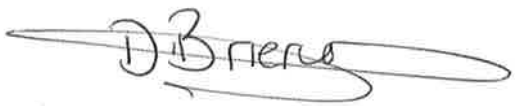
FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 23/00251
Issue Number: 1 **Date:** 19 January, 2023

Client: Hydrock (Southampton)
White Building
1-4 Cumberland Place
Southampton
SO15 2NP

Project Manager: Lily Cherry
Project Name: Dorset Heaths
Project Ref: 26802
Order No: PO23294
Date Samples Received: 13/01/23
Date Instructions Received: 13/01/23
Date Analysis Completed: 19/01/23

Approved by:



Danielle Brierley
Deputy Client Services Supervisor

Envirolab Job Number: 23/00251

Client Project Name: Dorset Heaths

Client Project Ref: 26802

Lab Sample ID	23/00251/1	23/00251/2	23/00251/3	23/00251/4	23/00251/5	23/00251/6	23/00251/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	HP01	HP02	HP03	HP04	HP05	HP06	HP07			
Depth to Top	0.05	0.05	0.05	0.05	0.05	0.05	0.05			
Depth To Bottom	0.10	0.10	0.10	0.10	0.10	0.10	0.10			
Date Sampled	11-Jan-23	11-Jan-23	11-Jan-23	11-Jan-23	11-Jan-23	11-Jan-23	11-Jan-23			
Sample Type	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D			
Sample Matrix Code	4AE	4AE	4AE	4AE	4AE	4AE	4AE			
% Stones >10mm$_A$	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	% w/w	0.1	A-T-044
pH$_D$$^{M\#}$	5.04	4.30	4.16	4.52	4.48	4.09	4.40	pH	0.01	A-T-031s
Ammonium / Ammoniacal Nitrogen as NH4$_D$	6.09	14.9	2.89	9.27	12.9	6.06	6.65	mg/kg	0.26	A-T-033s
Nitrate (water sol 2:1)$_D$	<1	<1	<1	<1	<1	<1	<1	mg/kg	1	A-T-026s
Organic Matter$_D$$^{M\#}$	10.0	12.0	8.7	4.1	31.7	12.0	5.4	% w/w	0.1	A-T-032s
Aluminium$_D$	17900	920	264	643	7120	418	4020	mg/kg	1	A-T-024s
Calcium$_D$	791	525	192	81	364	260	482	mg/kg	50	A-T-024s
Calcium/Aluminium Ratio	<0.1	0.6	0.7	0.1	<0.1	0.6	0.1	:1	0.1	Calc
Ammoniacal Nitrogen as NH4/Nitrate Ratio	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	:1	0.1	Calc

Envirolab Job Number: 23/00251

Client Project Name: Dorset Heaths

Client Project Ref: 26802

Lab Sample ID	23/00251/8	23/00251/9	23/00251/10	23/00251/11	23/00251/12	23/00251/13	23/00251/14	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	HP08	HP09	HP10	HP11	HP12	HP13	HP14			
Depth to Top	0.05	0.05	0.05	0.05	0.05	0.05	0.05			
Depth To Bottom	0.10	0.10	0.10	0.10	0.10	0.10	0.10			
Date Sampled	11-Jan-23	11-Jan-23	11-Jan-23	11-Jan-23	11-Jan-23	11-Jan-23	11-Jan-23			
Sample Type	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D			
Sample Matrix Code	4AE	4AE	4AE	4AE	4AE	4AE	4AE			
% Stones >10mm$_A$	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	% w/w	0.1	A-T-044
pH$_D$$^{M\#}$	3.92	4.11	4.22	4.30	4.28	4.19	4.20	pH	0.01	A-T-031s
Ammonium / Ammoniacal Nitrogen as NH4$_D$	1.68	1.06	4.95	0.79	14.1	3.48	11.2	mg/kg	0.26	A-T-033s
Nitrate (water sol 2:1)$_D$	<1	<1	<1	<1	<1	<1	3	mg/kg	1	A-T-026s
Organic Matter$_D$$^{M\#}$	7.6	3.9	9.5	5.2	6.2	5.4	8.6	% w/w	0.1	A-T-032s
Aluminium$_D$	386	1170	3770	294	906	2730	5950	mg/kg	1	A-T-024s
Calcium$_D$	108	90	113	159	169	81	101	mg/kg	50	A-T-024s
Calcium/Aluminium Ratio	0.3	<0.1	<0.1	0.5	0.2	<0.1	<0.1	:1	0.1	Calc
Ammoniacal Nitrogen as NH4/Nitrate Ratio	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	3.7	:1	0.1	Calc

Envirolab Job Number: 23/00251

Client Project Name: Dorset Heaths

Client Project Ref: 26802

Lab Sample ID	23/00251/15	23/00251/16	23/00251/17	23/00251/18	23/00251/19	23/00251/20	23/00251/21	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	HP15	HP16	HP17	HP18	HP19	HP20	HP21			
Depth to Top	0.05	0.05	0.05	0.05	0.05	0.05	0.05			
Depth To Bottom	0.10	0.10	0.10	0.10	0.10	0.10	0.10			
Date Sampled	11-Jan-23	11-Jan-23	11-Jan-23	11-Jan-23	11-Jan-23	11-Jan-23	11-Jan-23			
Sample Type	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D			
Sample Matrix Code	4AE	4AE	4AE	4AE	4AE	4AE	4AE			
% Stones >10mm$_A$	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	% w/w	0.1	A-T-044
pH$_D$$^{M\#}$	4.59	4.22	4.54	4.16	4.24	4.93	4.84	pH	0.01	A-T-031s
Ammonium / Ammoniacal Nitrogen as NH4$_D$	10.8	4.76	3.66	11.7	19.2	63.7	10.9	mg/kg	0.26	A-T-033s
Nitrate (water sol 2:1)$_D$	<1	<1	<1	<1	<1	9	<1	mg/kg	1	A-T-026s
Organic Matter$_D$$^{M\#}$	18.8	8.1	5.8	12.0	49.7	23.4	6.5	% w/w	0.1	A-T-032s
Aluminium$_D$	7680	451	1110	1510	7100	6200	1240	mg/kg	1	A-T-024s
Calcium$_D$	263	225	79	410	578	2650	710	mg/kg	50	A-T-024s
Calcium/Aluminium Ratio	<0.1	0.5	<0.1	0.3	<0.1	0.4	0.6	:1	0.1	Calc
Ammoniacal Nitrogen as NH4/Nitrate Ratio	<1.0	<1.0	<1.0	<1.0	<1.0	7.1	<1.0	:1	0.1	Calc

REPORT NOTES

General

This report shall not be reproduced, except in full, without written approval from Envirolab.
The results reported herein relate only to the material supplied to the laboratory.
The residue of any samples contained within this report, and any received with the same delivery, will be disposed of six weeks after initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of six months after the initial Asbestos testing is completed.
Analytical results reflect the quality of the sample at the time of analysis only.
Opinions and interpretations expressed are outside the scope of our accreditation.
If results are in italic font they are associated with an AQC failure, these are not accredited and are unreliable.
A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
The Client Sample No, Client Sample ID, Depth to Top, Depth to Bottom and Date Sampled were all provided by the client.

Soil chemical analysis:
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any “A” subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:
Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:
Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:
Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis.
Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:
1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample, 9 = INCINERATOR ASH.
Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.
Secondary Matrix Codes:
A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal,
E = contains roots/twigs.

Key:
IS indicates Insufficient Sample for analysis.
US indicates Unsuitable Sample for analysis.
NDP indicates No Determination Possible.
NAD indicates No Asbestos Detected.
N/A indicates Not Applicable.
Superscript # indicates method accredited to ISO 17025.
Superscript "M" indicates method accredited to MCERTS.
Subscript "A" indicates analysis performed on the sample as received.
Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve
Subscript "^" indicates analysis has dependant options against results. Testing dependant on results appear in the comments area of your sample receipt.
EPH CWG results have humics mathematically subtracted through instrument calculation
TPH results "with Cleanup" indicates results cleaned up with Silica during extraction

EPH CWG GCxGC ID from TPH CWG

Where we have identified humic substances in any ID's from TPH CWG with Clean Up please note that the concentration of these humic substances is not included in the quantified results and are included in the ID for information.

Please contact us if you need any further information.

v2

Envirolab Deviating Samples Report

Units 7&8 Sandpits Business Park, Mottram Road, Hyde, SK14 3AR
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client: Hydrock (Southampton), White Building, 1-4 Cumberland Place, Southampton, SO15 2NP

Project: Dorset Heaths

Clients Project No: 26802

Project No: 23/00251

Date Received: 13/01/2023 (am)

Cool Box Temperatures (°C): 6.0 - 8.1

NO DEVIATIONS IDENTIFIED

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

Envirolab Analysis Dates

Lab Sample ID	23/00251/1	23/00251/2	23/00251/3	23/00251/4	23/00251/5	23/00251/6	23/00251/7	23/00251/8	23/00251/9	23/00251/10	23/00251/11	23/00251/12
Client Sample No												
Client Sample ID/Depth	HP01 0.05-0.10m	HP02 0.05-0.10m	HP03 0.05-0.10m	HP04 0.05-0.10m	HP05 0.05-0.10m	HP06 0.05-0.10m	HP07 0.05-0.10m	HP08 0.05-0.10m	HP09 0.05-0.10m	HP10 0.05-0.10m	HP11 0.05-0.10m	HP12 0.05-0.10m
Date Sampled	11/01/23	11/01/23	11/01/23	11/01/23	11/01/23	11/01/23	11/01/23	11/01/23	11/01/23	11/01/23	11/01/23	11/01/23
A-T-024s	19/01/2023	18/01/2023	18/01/2023	18/01/2023	18/01/2023	18/01/2023	18/01/2023	18/01/2023	18/01/2023	18/01/2023	18/01/2023	18/01/2023
A-T-026s	17/01/2023	17/01/2023	17/01/2023	17/01/2023	17/01/2023	17/01/2023	17/01/2023	17/01/2023	17/01/2023	17/01/2023	17/01/2023	17/01/2023
A-T-031s	17/01/2023	17/01/2023	17/01/2023	17/01/2023	17/01/2023	17/01/2023	17/01/2023	17/01/2023	17/01/2023	17/01/2023	17/01/2023	17/01/2023
A-T-032s	17/01/2023	17/01/2023	17/01/2023	17/01/2023	17/01/2023	17/01/2023	17/01/2023	17/01/2023	17/01/2023	17/01/2023	17/01/2023	17/01/2023
A-T-033s	18/01/2023	18/01/2023	18/01/2023	18/01/2023	18/01/2023	18/01/2023	18/01/2023	18/01/2023	18/01/2023	18/01/2023	18/01/2023	18/01/2023
A-T-044	16/01/2023	16/01/2023	16/01/2023	16/01/2023	16/01/2023	16/01/2023	16/01/2023	16/01/2023	16/01/2023	16/01/2023	16/01/2023	16/01/2023
Calc	19/01/2023	19/01/2023	19/01/2023	19/01/2023	19/01/2023	19/01/2023	19/01/2023	19/01/2023	19/01/2023	19/01/2023	19/01/2023	19/01/2023

Lab Sample ID	23/00251/13	23/00251/14	23/00251/15	23/00251/16	23/00251/17	23/00251/18	23/00251/19	23/00251/20	23/00251/21
Client Sample No									
Client Sample ID/Depth	HP13 0.05-0.10m	HP14 0.05-0.10m	HP15 0.05-0.10m	HP16 0.05-0.10m	HP17 0.05-0.10m	HP18 0.05-0.10m	HP19 0.05-0.10m	HP20 0.05-0.10m	HP21 0.05-0.10m
Date Sampled	11/01/23	11/01/23	11/01/23	11/01/23	11/01/23	11/01/23	11/01/23	11/01/23	11/01/23
A-T-024s	18/01/2023	18/01/2023	18/01/2023	18/01/2023	18/01/2023	18/01/2023	18/01/2023	18/01/2023	18/01/2023
A-T-026s	17/01/2023	17/01/2023	17/01/2023	17/01/2023	17/01/2023	17/01/2023	17/01/2023	17/01/2023	17/01/2023
A-T-031s	17/01/2023	17/01/2023	17/01/2023	17/01/2023	17/01/2023	17/01/2023	17/01/2023	17/01/2023	17/01/2023
A-T-032s	17/01/2023	17/01/2023	17/01/2023	17/01/2023	17/01/2023	17/01/2023	17/01/2023	17/01/2023	17/01/2023
A-T-033s	18/01/2023	18/01/2023	18/01/2023	18/01/2023	18/01/2023	18/01/2023	18/01/2023	18/01/2023	18/01/2023
A-T-044	16/01/2023	16/01/2023	16/01/2023	16/01/2023	16/01/2023	16/01/2023	16/01/2023	16/01/2023	16/01/2023
Calc	19/01/2023	19/01/2023	19/01/2023	19/01/2023	19/01/2023	19/01/2023	19/01/2023	19/01/2023	19/01/2023

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

End of Report

envirolab
Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 23/00283
Issue Number: 1 **Date:** 25 January, 2023

Client: Hydrock (Southampton)
White Building
1-4 Cumberland Place
Southampton
SO15 2NP

Project Manager: Lily Cherry
Project Name: Dorset Heaths
Project Ref: 26802
Order No: PO23294
Date Samples Received: 16/01/23
Date Instructions Received: 16/01/23
Date Analysis Completed: 24/01/23

Approved by:

Richard Wong
Client Manager

Envirolab Job Number: 23/00283

Client Project Name: Dorset Heaths

Client Project Ref: 26802

Lab Sample ID	23/00283/1	23/00283/2	23/00283/3	23/00283/4	23/00283/5	23/00283/6	23/00283/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	HP22	HP23	HP24	HP25	HP26	HP27	HP28			
Depth to Top	0.05	0.05	0.05	0.05	0.05	0.05	0.05			
Depth To Bottom	0.10	0.10	0.10	0.10	0.10	0.10	0.10			
Date Sampled	12-Jan-23	12-Jan-23	12-Jan-23	12-Jan-23	12-Jan-23	12-Jan-23	12-Jan-23			
Sample Type	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D			
Sample Matrix Code	6AE	4AE	4AE	4AE	4AE	6AE	4ABE			
% Stones >10mm$_A$	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	% w/w	0.1	A-T-044
pH$_D$$^{M\#}$	4.22	4.48	4.60	3.61	3.67	3.96	4.31	pH	0.01	A-T-031s
Ammonium / Ammoniacal Nitrogen as NH4$_D$	1.42	7.55	<0.26	<0.26	1.15	23.7	1.95	mg/kg	0.26	A-T-033s
Nitrate (water sol 2:1)$_D$	<1	<1	<1	<1	<1	<1	<1	mg/kg	1	A-T-026s
Organic Matter$_D$$^{M\#}$	11.0	6.1	1.2	5.1	5.8	15.9	2.8	% w/w	0.1	A-T-032s
Aluminium$_D$	697	441	178	282	273	689	262	mg/kg	1	A-T-024s
Calcium$_D$	426	135	181	96	144	356	393	mg/kg	50	A-T-024s
Ammoniacal Nitrogen as NH4/Nitrate Ratio	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	:1	0.1	Calc
Calcium/Aluminium Ratio	0.6	0.3	1.0	0.3	0.5	0.5	1.5	:1	0.1	Calc

Envirolab Job Number: 23/00283

Client Project Name: Dorset Heaths

Client Project Ref: 26802

Lab Sample ID	23/00283/8	23/00283/9	23/00283/10	23/00283/11				Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	HP29	HP30	HP31	HP32						
Depth to Top	0.05	0.05	0.05	0.05						
Depth To Bottom	0.10	0.10	0.10	0.10						
Date Sampled	12-Jan-23	12-Jan-23	12-Jan-23	12-Jan-23						
Sample Type	Soil - D	Soil - D	Soil - D	Soil - D						
Sample Matrix Code	4AE	6AE	4AE	4AE						
% Stones >10mm$_A$	<0.1	0.1	<0.1	<0.1				% w/w	0.1	A-T-044
pH$_D$$^{M\#}$	5.36	5.63	3.91	4.34				pH	0.01	A-T-031s
Ammonium / Ammoniacal Nitrogen as NH4$_D$	1.80	54.4	0.59	<0.26				mg/kg	0.26	A-T-033s
Nitrate (water sol 2:1)$_D$	5	<4	<1	<1				mg/kg	1	A-T-026s
Organic Matter$_D$$^{M\#}$	2.3	68.9	5.1	4.6				% w/w	0.1	A-T-032s
Aluminium$_D$	383	5690	1700	3010				mg/kg	1	A-T-024s
Calcium$_D$	880	1690	67	613				mg/kg	50	A-T-024s
Ammoniacal Nitrogen as NH4/Nitrate Ratio	<1.0	<4.00	<1.0	<1.0				:1	0.1	Calc
Calcium/Aluminium Ratio	2.3	0.3	<0.1	0.2				:1	0.1	Calc

REPORT NOTES

General

This report shall not be reproduced, except in full, without written approval from Envirolab.
The results reported herein relate only to the material supplied to the laboratory.
The residue of any samples contained within this report, and any received with the same delivery, will be disposed of six weeks after initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of six months after the initial Asbestos testing is completed.
Analytical results reflect the quality of the sample at the time of analysis only.
Opinions and interpretations expressed are outside the scope of our accreditation.
If results are in italic font they are associated with an AQC failure, these are not accredited and are unreliable.
A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
The Client Sample No, Client Sample ID, Depth to Top, Depth to Bottom and Date Sampled were all provided by the client.

Soil chemical analysis:
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any “A” subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:
Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:
Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:
Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis.
Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:
1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample, 9 = INCINERATOR ASH.
Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.
Secondary Matrix Codes:
A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal,
E = contains roots/twigs.

Key:
IS indicates Insufficient Sample for analysis.
US indicates Unsuitable Sample for analysis.
NDP indicates No Determination Possible.
NAD indicates No Asbestos Detected.
N/A indicates Not Applicable.
Superscript # indicates method accredited to ISO 17025.
Superscript "M" indicates method accredited to MCERTS.
Subscript "A" indicates analysis performed on the sample as received.
Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve
Subscript "^" indicates analysis has dependant options against results. Testing dependant on results appear in the comments area of your sample receipt.
EPH CWG results have humics mathematically subtracted through instrument calculation
TPH results "with Cleanup" indicates results cleaned up with Silica during extraction

EPH CWG GCxGC ID from TPH CWG

Where we have identified humic substances in any ID's from TPH CWG with Clean Up please note that the concentration of these humic substances is not included in the quantified results and are included in the ID for information.

Please contact us if you need any further information.

v2

Envirolab Deviating Samples Report

Units 7&8 Sandpits Business Park, Mottram Road, Hyde, SK14 3AR
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client: Hydrock (Southampton), White Building, 1-4 Cumberland Place, Southampton, SO15 2NP

Project: Dorset Heaths

Clients Project No: 26802

Project No: 23/00283

Date Received: 16/01/2023 (am)

Cool Box Temperatures (°C): 4.9 & 5.0

NO DEVIATIONS IDENTIFIED

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.

Envirolab Analysis Dates

Lab Sample ID	23/00283/1	23/00283/2	23/00283/3	23/00283/4	23/00283/5	23/00283/6	23/00283/7	23/00283/8	23/00283/9	23/00283/10	23/00283/11
Client Sample No											
Client Sample ID/Depth	HP22 0.05-0.10m	HP23 0.05-0.10m	HP24 0.05-0.10m	HP25 0.05-0.10m	HP26 0.05-0.10m	HP27 0.05-0.10m	HP28 0.05-0.10m	HP29 0.05-0.10m	HP30 0.05-0.10m	HP31 0.05-0.10m	HP32 0.05-0.10m
Date Sampled	12/01/23	12/01/23	12/01/23	12/01/23	12/01/23	12/01/23	12/01/23	12/01/23	12/01/23	12/01/23	12/01/23
A-T-024s	24/01/2023	24/01/2023	24/01/2023	24/01/2023	24/01/2023	24/01/2023	24/01/2023	24/01/2023	24/01/2023	24/01/2023	24/01/2023
A-T-026s	23/01/2023	23/01/2023	23/01/2023	23/01/2023	23/01/2023	23/01/2023	23/01/2023	23/01/2023	23/01/2023	23/01/2023	23/01/2023
A-T-031s	23/01/2023	23/01/2023	23/01/2023	23/01/2023	23/01/2023	23/01/2023	23/01/2023	23/01/2023	23/01/2023	23/01/2023	23/01/2023
A-T-032s	23/01/2023	23/01/2023	23/01/2023	23/01/2023	23/01/2023	23/01/2023	23/01/2023	23/01/2023	23/01/2023	23/01/2023	23/01/2023
A-T-033s	20/01/2023	20/01/2023	20/01/2023	20/01/2023	20/01/2023	20/01/2023	20/01/2023	20/01/2023	20/01/2023	20/01/2023	20/01/2023
A-T-044	23/01/2023	23/01/2023	23/01/2023	23/01/2023	23/01/2023	23/01/2023	23/01/2023	23/01/2023	23/01/2023	23/01/2023	23/01/2023
Calc	24/01/2023	24/01/2023	24/01/2023	24/01/2023	24/01/2023	24/01/2023	24/01/2023	24/01/2023	24/01/2023	24/01/2023	24/01/2023

The above dates are the analysis completion dates, please note that these are not necessarily the date that the analysis was weighed/extracted.

End of Report

Appendix EDP 3
Bryophyte and Lichen Survey

BRYOPHYTE & LICHEN MONITORING

at

CANFORD HEATH SSSI

& SELECTED AREAS WITHIN

DORSET HEATHS SAC

Cladonia zopfii, Parley Common SSSI

For

The Environmental Dimension Partnership Ltd

November 2022

Bryan Edwards

Dorset Environmental Records Centre

SUMMARY OF FINDINGS

- Lichens indicating a level enrichment by Ammonia and Nitrogen compounds are widespread across all sites on the twigs of Oak trees, but are most abundant in the smaller sites or at the fringes of the heath. Species sensitive to these pollutants are generally scarce and confined to acidic bark and found in the centre of sites.

- Epiphytic lichens at the two monitoring plots on Canford Heath show a loss or absence of acidophytes that are very sensitive to pollutants. Species that have colonised the trees since the last survey in 2012 include a number of nitrophytes that are tolerant of higher levels of pollutants and would not normally be found in heathland habitats.

- In closed canopy woodland (Parley Wood) at Parley Common SSSI the canopy buffers the lower trunks from pollutants. The older Oaks have lichens typical of neutral to acid bark in long-established or ancient semi-natural woodland including a number of old woodland indicators such as *Anisomeridium ranunculosporum*, *Phaeographis dendritica* and *Snippocia nivea*.

- Species-rich *Cladonia* assemblages comparable to the richest sites in Dorset and some areas of the New Forest were only found in short open wet heath in the southern part of Parley Common SSSI. Species here include the peat specialists *Cladonia strepsilis* and *Pycnothelia papillaria*, plus a new Dorset site for the Nationally Scarce *Cladonia zopfii* which in Southern England is confined to the heaths of the New Forest and southeast Dorset.

- Loss of *Cladonia* species from the monitoring plots on Canford Heath is due to the maturing of the heath and natural loss of bare ground as the heather clumps mature and coalesce. Conversely bryophytes such as *Hypnum jutlandicum* have increased and in places form a distinct layer under the heather canopy.

- Wet heath and mire bryophytes were found to have changed little since the previous surveys and *Sphagnum* mosses with associated 'bog-liverworts' are well-developed at one plot on Canford Heath and in the mires at Kinson Common and Turbary Common. These habitats show very few signs of enrichment.

CONTENTS

Version control: Contract C22080			
1.0	Report prepared by:	Bryan Edwards	14/11/2022
	Checked by:	Carolyn Steele	14/11/2022

1.0 BACKGROUND

Bryophytes and lichens are intrinsic components of the internationally important heath and mire communities which are primary features in the designation of the Dorset Heaths Special Area of Conservation (SAC). Heaths are naturally nutrient-poor and develop on thin, infertile soils but valley mires are fed by acidic groundwater which makes these habitats susceptible to enrichment from a variety of atmospheric pollutants. Both bryophytes and lichens absorb water through exposed surfaces making them particularly vulnerable to these pollutants, consequently they have been widely used as bio-monitors.

Dorset Environmental Records Centre (DERC) was commissioned by The Environmental Dimension Partnership Ltd (edp) to undertake re-monitoring of six sites established within Canford Heath Site of Special Scientific Interest (SSSI) and to survey lichens and bryophytes and establish baseline monitoring in suitable habitats at four other SSSIs within the Dorset Heaths SAC to the north and east of Canford Heath. The results of the survey work are presented in this report.

2. METHODS

The survey work was undertaken over three days between 27th October and 9th November 2022. The weather during this period was generally unsettled and damp which aids the field identification of both bryophytes and lichens. At Canford Heath survey was restricted to the six locations where the monitoring was established in March 2009 (Edwards, 2009). For the four other locations within the Dorset Heaths SAC the sites were walked and locations were chosen for monitoring based on the following four criteria:

- Lichen-rich areas within H4030 European Dry Heaths
- Lichen-rich areas within H4010 Northern Atlantic wet heaths with *Erica tetralix*
- Bryophyte-rich areas with H7150 Depressions on peat substrates of the Rhynchosporion / H7140 Transition mires and quaking bogs
- Oak trees within or on the margins of the heaths with diverse epiphytic lichens

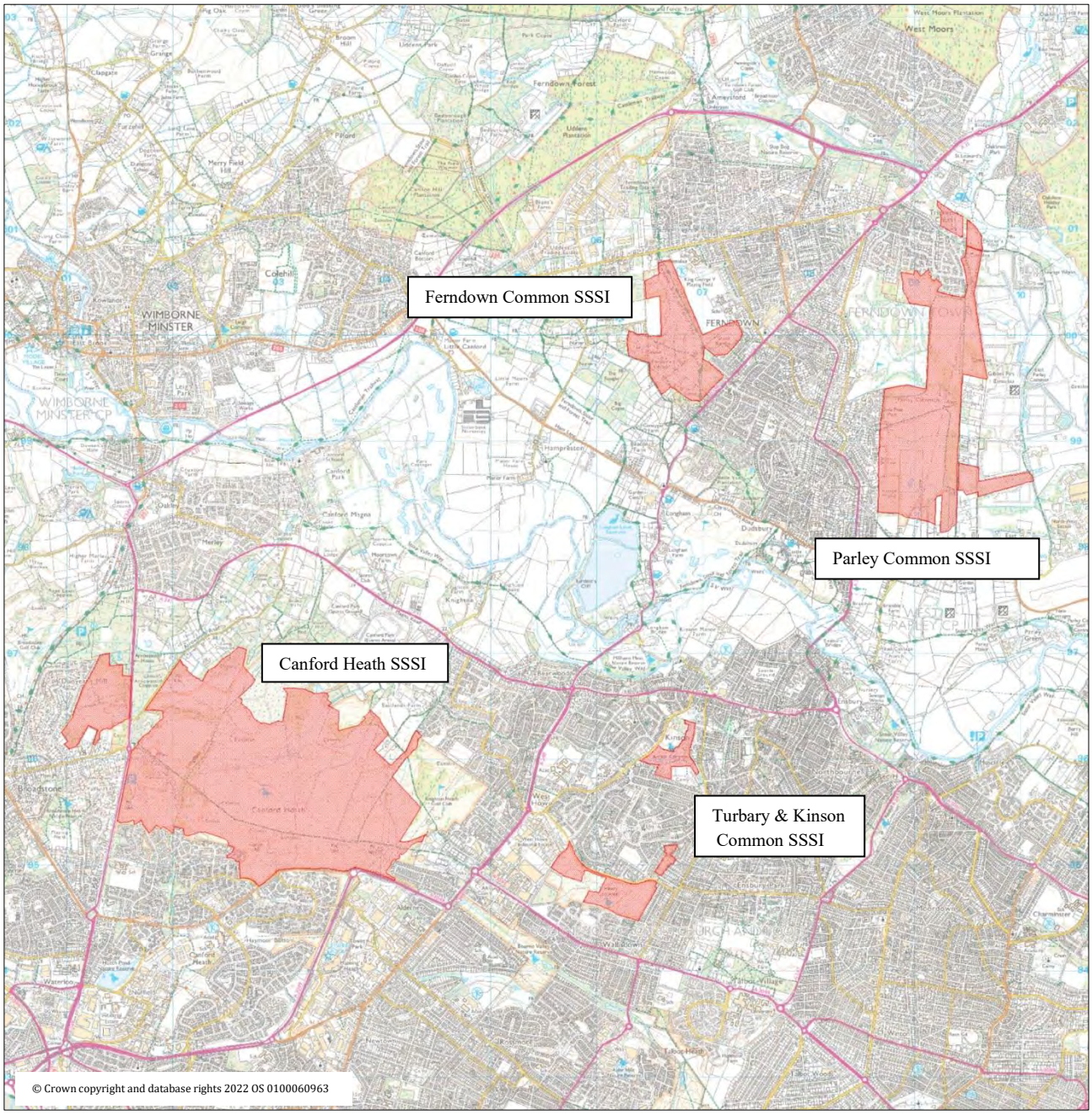
The monitoring sites were surveyed by searching suitable habitat within the sites with a x10 hand lens, compiling a species list and applying a frequency value to each species using the DAFOR scale. Most species were identified in the field but small quantities of several species had to be collected and identified by microscopic examination. Particular attention was paid to the presence of certain indicator species (see section 4.2 pages 11-14) which are either indicators of high quality heath and mire habitats or, for epiphytic lichens, indicate high levels of enrichment from Nitrogen and Ammonia compounds.

For bryophytes nomenclature follows Blockeel *et al*, 2020, and for lichens Smith *et al*, 2009, plus any changes made by the British Lichen Society available online on the Lichen Taxon Dictionary[1], or published online in the *Revisions of British and Irish Lichens*[2]. Since the last survey there have been significant taxonomic changes in the genus *Cladonia* and the names in this report follow Pin-Bodas *et al*, 2021.

[1] https://britishlichensociety.org.uk/resources/lichen-taxon-database

[2] https://britishlichensociety.org.uk/identification/lgbi3

Map 1. Location of sites surveyed



3. PREVIOUS SURVEYS & DATA

3.1 *Canford Heath SSSI*

Monitoring was set up in 2009 at six locations in the northeast of the SSSI and repeated in 2012, this data provides a baseline for assessing future change.

3.2 OTHER SITES WITHIN DORSET HEATHS SAC

3.2.1 *Turbary & Kinson Common SSSI*

These sites were included in a wider survey of bryophytes of mires across the Poole Basin (Edwards, 1997). Both sites were visited in November 1995 and a species list with frequencies was compiled for the wet heath and mire areas within the SSSI. More recently there is a list of bryophytes recorded from the sites in 2010 and 2011, although these have not been localised to any particular area within the site and are therefore of limited use for monitoring change. There are no records of lichens.

3.2.2 *Parley Common SSSI*

There are very few records of lichens or bryophytes from this site, except for three *Cladonia* species, including the local *C. strepsilis*.

3.2.3 *Ferndown Common SSSI*

Generally an under-recorded site, there is a list of bryophytes from February 2014 from the southern part of the SSSI. There are no records of lichens from the site.

4. BRYOPHYTES & LICHENS WITHIN SAC FEATURES

4.1 SAC FEATURES

The Dorset Heaths SAC was notified for a wide range of plant communities, three of which are Primary Features for the designation with four associated Qualifying Features[1]. The citation of the Dorset Heaths SAC is quite broad and bryophytes and lichens only receive and brief mention e.g. 'in places, where heather *Calluna vulgaris* occurs in mature stands, lichens of the genus *Cladonia* are very abundant' and 'typical mosses of the wet heath include *Sphagnum compactum*, *S. pulchrum* and *S. tenellum*'. The following paragraphs describe in more detail the bryophyte and lichen interest with the four SAC features that are relevant to this survey.

4.1.1 H4030 European Dry Heaths

This SAC feature encompasses what are broadly termed the dry and humid types of heath which in Dorset includes the four NVC communities **H2**, **H3**, **H4** and **H8** (Rodwell, 1992). These communities are dominated mostly by Ling *Calluna vulgaris* with varying quantities of Bell Heather *Erica cinerea*, Dwarf Gorse *Ulex minor* (**H2** & **H3**), Western Gorse *Ulex gallii* (**H4** & **H8**) and Bristle Bent *Agrostis curtisii*. Species characteristic of wetter heaths such as Cross-leaved Heath *Erica tetralix* and Purple Moor-grass *Molinia caerulea* are only rare to occasional. Herbs are generally sparse and restricted to scattered plants of Sheep's Sorrel *Rumex acetosella*, Heath Milkwort *Polygala serpyllifolia*, Tormentil *Potentilla erecta* and Heath Bedstraw *Galium saxatile*.

The diversity and abundance of bryophytes depends on the stage of the heath, with barer ground in the pioneer, building and senescent stages generally supporting more species, and conversely tall, closed mature heath generally has poor diversity. Severe summer wildfires, especially where these are regular, generally results in less diversity.

Bryophytes can form a dense layer both beneath the heather canopy as well as in gaps between the plants. *Hypnum jutlandicum* is typically the most abundant species with *Dicranum scoparium* and *Pleurozium schreberi* both widespread and occasionally frequent. Bare ground and edges of tracks may have smaller species such as *Cephaloziella divaricata*, *Polytrichum juniperinum* and *Pohlia nutans*. The Section 41 moss *Dicranum spurium* is found in open humid heath and is currently confined to the Purbeck Heaths. It was recorded on Canford Heath in the past but is very sensitive to summer wildfires and has not been seen recently. On disturbed or on regularly burnt sites the non-native moss *Campylopus introflexus* can be abundant.

[1] https://sac.jncc.gov.uk/habitat/

Lichens can be very abundant in some stands of dry heath with the cream-coloured and richly branched *Cladonia portentosa* by far the most abundant. It is robust enough to survive in quite closed mature stands.

Most other species are associated with open spaces between the heath clumps including *Cladonia ciliata*, *C. diversa*, *C. floerkeana*, *C. grayi*, *C. ramulosa* and *C. subulata*. While *Cetraria aculeata*, *Cladonia glauca*, *C. gracilis*, *C. rei* and *C. scabriuscula* are much more local.

4.1.2 H4010 Northern Atlantic wet heaths with *Erica tetralix*

In Dorset all the wet heath in this SAC feature is referrable to the **M16** *Erica tetralix – Sphagnum compactum* heath within the NVC (Rodwell, 1992). Ling is still frequent in wet heath but Cross-leaved Heath *Erica tetralix* is typically dominant and especially characteristic are the scattered clumps of Deer-grass *Trichophorum germanicum*. Purple Moor-grass *Molinia caerulea* is usually present and may be abundant in ungrazed stands. Other associated species include Round-leaved Sundew *Drosera rotundifolia*, Bog Asphodel *Narthecium ossifragum*, Carnation Sedge *Carex panicea* and Common Cottongrass *Eriophorum angustifolium*.

Typical bryophytes include *Leucobryum glaucum*, *Sphagnum compactum* and *S. tenellum*, with the regionally rare *Campylopus brevipilus* present locally. Hummock-forming mosses such *Leucobryum* and *Sphagnum* provides habitat for a number of small liverworts such as *Kurzia pauciflora*, *Mylia anomala*, *Odontoschisma denudatum*, *O. francisci* and *O. sphagni*.

The bare damp peat in open stands can support abundant lichens with *Cladonia portentosa* still the most abundant species. *Cladonia crispata* var. *cetrariiformis*, *C. squamosa* (heathland ecotype), *C. uncialis* subsp. *biuncialis* and *C. verticillata* are frequent with *Cetraria muricata*, *Cladonia arbuscula*, *C. callosa*, *C. subcervicornis* and *C. zopfii* much rarer and confined to richest sites. Of particular importance in the wet heath are *Cladonia strepsilis* and *Pycnothelia papillaria* which have declined significantly in lowland Britain with the New Forest and Dorset Heaths now the strongholds.

4.1.3 H7150 Depressions on peat substrates of the Rhynchosporion

The SAC feature '*Depressions on peat substrates of the Rhynchosporion*' has been broadly interpreted in Britain and includes seasonally inundated areas within both wet heath (**M16c**) and open valley mires (**M21a**) with extensive stands of White Beak-sedge *Rhynchospora alba*. Only the valley mire habitat is considered in this report.

The more open areas of valley mires comprise varying amounts of Cross-leaved Heath *Erica tetralix*, Cottongrass *Eriophorum angustifolium*, Purple Moor-grass *Molinia caerulea* and Bog Asphodel *Narthecium ossifragum*, with Oblong-leaved Sundew *Drosera intermedia*, Round-leaved Sundew *D. rotundifolia*, Multi-stemmed Spike-rush *Eleocharis multicaulis* and White Beak-sedge *Rhynchospora alba* all locally prominent. At the richest sites bog mosses are abundant and can form extensive lawns in the wettest areas. *Sphagnum papillosum* is the dominant hummock-forming species often accompanied by scattered *S. rubellum* and *S.*

subnitens, with the local *S. medium* found in the least disturbed sites. Wetter hollows have the lawn-forming *Sphagnum auriculatum*, *S. fallax* and S. *cuspidatum* plus in Purbeck an abundance of the orange-brown *S. pulchrum*, a rare species in Britain. The *Sphagnum* carpets provide a habitat for a number of specialist liverworts including *Calypogeia sphagnicola*, *Cephalozia connivens*, *C. macrostachya*, *Kurzia pauciflora*, *Mylia anomala*, *Odontoschisma fluitans*, *O. sphagni* and *Riccardia latifrons*. In more basic flushes *Aneura pinguis* and *Riccardia multifida* are present among mosses such as *Campylium stellatum*, *Dicranum bonjeanii* and *Sarmentypnum exannulatum*.

4.1.4 H9190 Old acidophilous oak woods with *Quercus robur* on sandy plains

Heathland in Dorset is an open landscape and historically was largely free of woodland with only very small areas of wood-pasture or bog woodland present. Since the cessation of traditional heathland management at the end of the 19th Century secondary woodland has developed on many heathland sites usually from the edges or on slightly richer soils along watercourses. There are small stands of ancient or long-established woodland found within heathland sites as at Arne, Morden Bog, Povington Heath and Remsptone Heath. The largest stand is at Holt Forest with former wood-pasture found to the west of Holt Heath, but previously intimately connected to it by a series of droves. The forest was formerly much more open with heath vegetation between the trees, but over the last 100 years it has become dense woodland with infill of younger Birch and Holly between the veteran Oak and Beech. These woodland areas can support important epiphytic lichen communities including a number of old woodland indicators.

Epiphytic lichens within the Dorset Heaths SAC

Mature oaks support a wide range of lichen communities (James *et al*, 1977) on well-lit trunks usually dominated by leafy lichens of the Parmeliaceae including *Flavoparmelia caperata*, *Hypotrachyna afrorevoluta*, *Melanelixia glabratula*, *Parmelia saxatilis*, *P. sulcata*, *Parmotrema perlatum* and *P. reticulatum*. There is a wide range of associated crust-forming lichens such as *Lecanora chlarotera*, *Pertusaria amara*, *P. albescens*, *P. hymenea*, *P. pertusa*, *Pyrrhospora quernea* and locally *Rinodina roboris*. Further up the trunk there may be quantities of *Evernia prunastri* and *Usnea* species, both of which are sensitive to Nitrogen and Ammonia compounds.

The drier side of the trunks have *Chrysothrix candelaris*, *Cliostomum griffithii*, *Dendrographa decolorans*, *Lecanactis abietina*, *Lepraria incana* and *Snippocia nivea**. Veteran oaks can support a number of specialist lichens associated with dry bark including *Alyxoria xerica*, *Cresponea premnea**, *Inoderma subabietinum**, *Lecanographa lyncea**, *Sporodophoron cretaceum** and *Thelopsis corticola** plus, in the deep bark crevices,

Chaenotheca hispidula, *C. trichialis* and *C. stemonea*. Several of these species are globally rare* with southern England the stronghold and they are generally sensitive to Nitrogen and Ammonia compounds.

4.2 INDICATOR SPECIES

Indicator species (bio-indicators) are widely used to monitor and assess the ecological diversity and health of habitats and as a method of comparing sites. Many lists of indices have been compiled and some are included in the criteria for the selection of biological SSSIs (Boseanquet *et al*, 2018 & Sanderson *et al*, 2018).

4.2.1 *Bryophytes*

The Dorset Heaths SAC is important for bryophytes in a regional context. The valley mires and wet heaths in particular hold important assemblages of bog-mosses (*Sphagnum* spp.) and associated liverworts. *Sphagnum pulchrum* is a Nationally Species with the mires of the Dorset Heaths a national stronghold, it is mentioned on the citations of several heathland SSSIs. The drier heath has less diversity but can include a number of local species including the Section 41 moss *Dicranum spurium* a heathland specialist. Table 1 lists those bryophytes most strongly associated with heaths and mires in Dorset. The ecological traits (Ellenberg Values) for bryophytes (Hill *et al*, 2007) shows that many species have a Nitrogen Value (N) of 1 or 2 meaning they are associated with extremely infertile or infertile sites The majority have pH values (R) of between 1 and 3, meaning they are indicators of extreme acidity or found on acid substrata or in acid flushes (Hill *et al*, 2007). These species will be sensitive to Nitrogen and Ammonia compounds and nationally several have declined significant in lowland Britain due to enrichment (Blockeel *et al*, 2014).

TABLE 1. Key bryophyte species within the Dorset Heaths SAC

			Ellenberg Values			
Group	**Species**	**English Name**	**L**	**F**	**R**	**N**
Liverworts	***Aneura pinguis***[1]	**Greasewort**	**8**	**9**	**6**	**2**
Liverworts	***Calypogeia sphagnicola***	**Bog Pouchwort**	**8**	**9**	**1**	**1**
Liverworts	*Cephalozia connivens*	Forcipated Pincerwort	6	8	1	1
Liverworts	***Cephalozia macrostachya***	**Bog Pincerwort**	**7**	**8**	**1**	**1**
Liverworts	***Cephaloziella divaricata***	**Common Threadwort**	**7**	**5**	**2**	**2**
Liverworts	***Gymnocolea inflata***	**Inflated Notchwort**	**7**	**7**	**1**	**1**
Liverworts	***Kurzia pauciflora***	**Bristly Fingerwort**	**7**	**9**	**1**	**1**
Liverworts	***Mylia anomala***	**Anomalous Flapwort**	**7**	**9**	**1**	**1**
Liverworts	***Odontoschisma denudatum***	**Matchstick Flapwort**	**7**	**6**	**1**	**1**
Liverworts	***Odontoschisma fluitans***	**Bog Notchwort**	**8**	**9**	**1**	**1**
Liverworts	***Odontoschisma francisci***	**Holt Notchwort**	**6**	**7**	**2**	**2**
Liverworts	*Odontoschisma sphagni*	Bog-moss Flapwort	8	8	1	1
Liverworts	***Riccardia latifrons***	**Bog Germanderwort**	**7**	**8**	**1**	**1**
Liverworts	***Riccardia multifida***	**Delicate Germanderwort**	**7**	**9**	**5**	**2**
Mosses	***Campylium stellatum***	**Yellow Starry Feather-moss**	**8**	**8**	**6**	**2**
Mosses	***Campylopus brevipilus***	**Compact Swan-neck Moss**	**8**	**8**	**1**	**1**
Mosses	*Dicranum scoparium*	Broom Fork-moss	6	5	3	2
Mosses	***Dicranum spurium***	**Rusty Fork-moss**	**6**	**5**	**2**	**2**
Mosses	*Hypnum jutlandicum*	Heath Plait-moss	6	5	2	2
Mosses	***Leucobryum glaucum***	**Large White-moss**	**5**	**6**	**2**	**2**
Mosses	***Pleurozium schreberi***	**Red-stemmed Feather-moss**	**6**	**5**	**2**	**2**
Mosses	*Polytrichum juniperinum*	Juniper Haircap	8	5	3	2

			Ellenberg Values			
Group	**Species**	**English Name**	**L**	**F**	**R**	**N**
Mosses	*Polytrichum piliferum*	Bristly Haircap	9	3	3	1
Mosses	***Racomitrium lanuginosum***	**Woolly Fringe-moss**	**7**	**4**	**2**	**1**
Mosses	***Sarmentypnum exannulatum***	**Ringless Hook-moss**	**6**	**5**	**2**	**2**
Mosses	***Scorpidium revolvens***	**Rusty Hook-moss**	**8**	**9**	**6**	**2**
Mosses	***Scorpidium scorpioides***	**Hooked Scorpion-moss**	**8**	**10**	**6**	**2**
Mosses	*Sphagnum auriculatam*	Cow-horn Bog-moss	7	9	2	2
Mosses	***Sphagnum beothuk***	**Tawny Bog-moss**	**8**	**7**	**1**	**1**
Mosses	***Sphagnum capillifolium***	**Acute-leaved Bog-moss**	**7**	**7**	**2**	**2**
Mosses	*Sphagnum compactum*	Compact Bog-moss	8	8	1	1
Mosses	*Sphagnum cuspidatum*	*Feathery Bog-moss*	8	10	1	2
Mosses	*Sphagnum fallax*	Flat-topped Bog-moss	7	9	2	3
Mosses	***Sphagnum medium***	**Magellanic Bog-moss**	**8**	**8**	**1**	**1**
Mosses	***Sphagnum molle***	**Blushing Bog-moss**	**8**	**8**	**2**	**1**
Mosses	***Sphagnum papillosum***	**Papillose Bog-moss**	**8**	**8**	**1**	**1**
Mosses	***Sphagnum pulchrum***	**Golden Bog-moss**	**8**	**10**	**1**	**1**
Mosses	***Sphagnum rubellum***	**Red Bog-moss**	**7**	**7**	**2**	**1**
Mosses	*Sphagnum subnitens*	Lustrous Bog-moss	7	8	3	2
Mosses	*Sphagnum tenellum*	Soft Bog-moss	8	8	1	1
Mosses	***Straminergon stramineum***	**Straw Spear-moss**	**7**	**9**	**3**	**2**

[1] species in bold are Dorset Notable species

4.2.2 Lichens

A. *Terricolous lichens*

Heathland supports a limited but important range of terricolous lichens, particularly *Cladonia* species, many of which are confined to acidic peaty soils and have declined significantly across lowland regions of northwest Europe. In Southern England the extensive heaths of the New Forest are now perhaps the only ones that support this lichen assemblage in a favourable condition with the full complement of species present (Sanderson, 2017). The Dorset Heaths are still very important for lichens but many species are now rare or scarce because of habitat loss and cessation of traditional management practices. The richest sites tend to be larger blocks such as Godlingston Heath, Hartland Moor, Holt Heath, Morden Bog and Winfrith Heath, with the acid dune-heath at Studland supporting particularly important examples.

Table 2 lists those terricolous lichens most strongly associated with heathland in Dorset and some are indicator of high quality heathland habitat. Unlike vascular plants and bryophytes there are no Ellenberg Values for lichens but equivalent ecological traits for many species have been developed on the Continent (e.g. Nimis, 2016) and can be applied to the British species. Heathland lichens generally have a pH value of 1-3 and a eutrophication value of 1-2. These species are very sensitive to Ammonia and Nitrogen compounds and have declined significantly in other heathland areas such as Northern Germany, Denmark and The Netherlands, as well of parts much of lowland England outside of the New Forest (Sanderson, 2017).

TABLE 2. Key terricolous lichens within Dorset Heaths SAC

	Ecological Indicator Values	
Species	**pH**	**Eutrophication**
Baeomyces rufus	2-3	1
Cetraria aculeata[1]	1-3	1
Cetraria muricata	1-4	1
Cladonia arbuscula	1-3	1
Cladonia callosa		
Cladonia cervicornis	1-2	1
Cladonia chlorophaea	1-3	1-2
Cladonia ciliata	2-3	1
Cladonia coccifera sens.str.	1-2	1-3
Cladonia crispata var. ***cetrariiformis***	1-2	1
Cladonia diversa	1-2	1-2
Cladonia fimbriata	1-3	1-3
Cladonia floerkeana	1-2	1
Cladonia foliacea	2-3	1-2
Cladonia furcata	2-4	1-2
Cladonia glauca	1-2	1
Cladonia gracilis	1-2	1
Cladonia grayi	1-2	1
Cladonia incrassata	1	1
Cladonia macilenta	1-2	1-2
Cladonia portentosa	1-2	1
Cladonia ramulosa	1-2	1
Cladonia rei	2-3	1
Cladonia scabriuscula	2-3	1
Cladonia squamosa 'heathland ecotype'	1-2	1-2
Cladonia strepsilis	1-2	1
Cladonia subcervicornis	1-2	1
Cladonia subulata	2-3	1
Cladonia uncialis subsp. ***biuncialis***	1-3	1
Cladonia verticillata	1-2	1
Cladonia zopfii		
Dibaeis baeomyces	3-4	1
Icmadophila ericetorum	1-2	1
Lichenomphalia umbellifera	1-2	1
Peltigera canina	2-4	1
Peltigera didactyla	2-3	3
Peltigera hymenina	3	1
Peltigera neckeri	2-3	1
Pycnothelia papillaria	1-2	1-2

[1] species in bold are Dorset Notable species

B. *Epiphytic lichens*

Epiphytes are widely used as bio-indicators to monitor the effects of agricultural and industrial pollution (Wolseley and James, 2002a & 2002b). Fifty years ago Sulphur Dioxide (SO_2) was the main pollutant causing acidification of bark and rock surfaces in particular (Hawksworth & Rose, 1970). Today the major pollutants are Nitrogen (N), Nitrogen Dioxide (NO_x) and Ammonia (NH_3) compounds from agricultural, traffic and industrial sources and are impacting human health as well as semi-natural vegetation and lichen communities in particular (Herk, 1999). A methodology for monitoring atmospheric pollutants has been developing using lichen found on Oak twigs (Wolseley, 2002) which has a neutral type of bark. Recording species from both twigs and trunks is perhaps more useful as twigs respond quickly to changes in the present conditions whereas trunks can pick up changes over years and decades (Sutton *et al*, 2004). Several of the lichens that have recently expanded their range have warm-temperate distributions within Europe and have spread north and east due to a combination of rising pollution levels and to the warming climate (Herk & Dobben, 2002).

Different lichens show a variety of responses to different pollutants and can be grouped into indicators based on differing traits. For the present survey species can be grouped into the following:

Nitrophytes – species tolerant of high levels of Nitrogen and Ammonia compounds and therefore usually absent from nutrient-poor habitats such as lowland heathland. These species will have Eutrophication values of 3-5 within the Ecological Indicator Values. Nitrophytes used for this survey are as follows:

	Ecological Indicator Values[1]	
Species	**pH**	**Eutrophication**
Candelaria concolor	3-4	3-5
Candelariella reflexa	3-4	4-5
Diploicia canescens	3-5	2-4
Hyperphyscia adglutinata	3-5	3-5
Phaeophyscia orbicularis	2-5	4-5
Physcia tenella	2-4	3-4
Xanthoria parietina	2-4	3-4

Acidophytes – species highly intolerant of even low levels of Nitrogen and Ammonia compounds and typically found on bark of Oak, Birch and Willow within and around the edges of lowland heathland in sites that are unpolluted or with very low levels of pollution. These species will have pH values of 1-2 and Eutrophication values of 1-2 within the Ecological Indicator Values. Acidophytes used for this survey are as follows:

	Ecological Indicator Values	
Species	**pH**	**Eutrophication**
Evernia prunastri	1-3	1-3
Hypogymnia physodes	1-3	1-2
Parmelia saxatilis	1-2	1-3
Platismatia glauca	1-2	1-2
Tuckermannopsis chlorophylla	1-2	1-2
Usnea cornuta	1-2	1

Usnea subfloridana	1-3	1-2

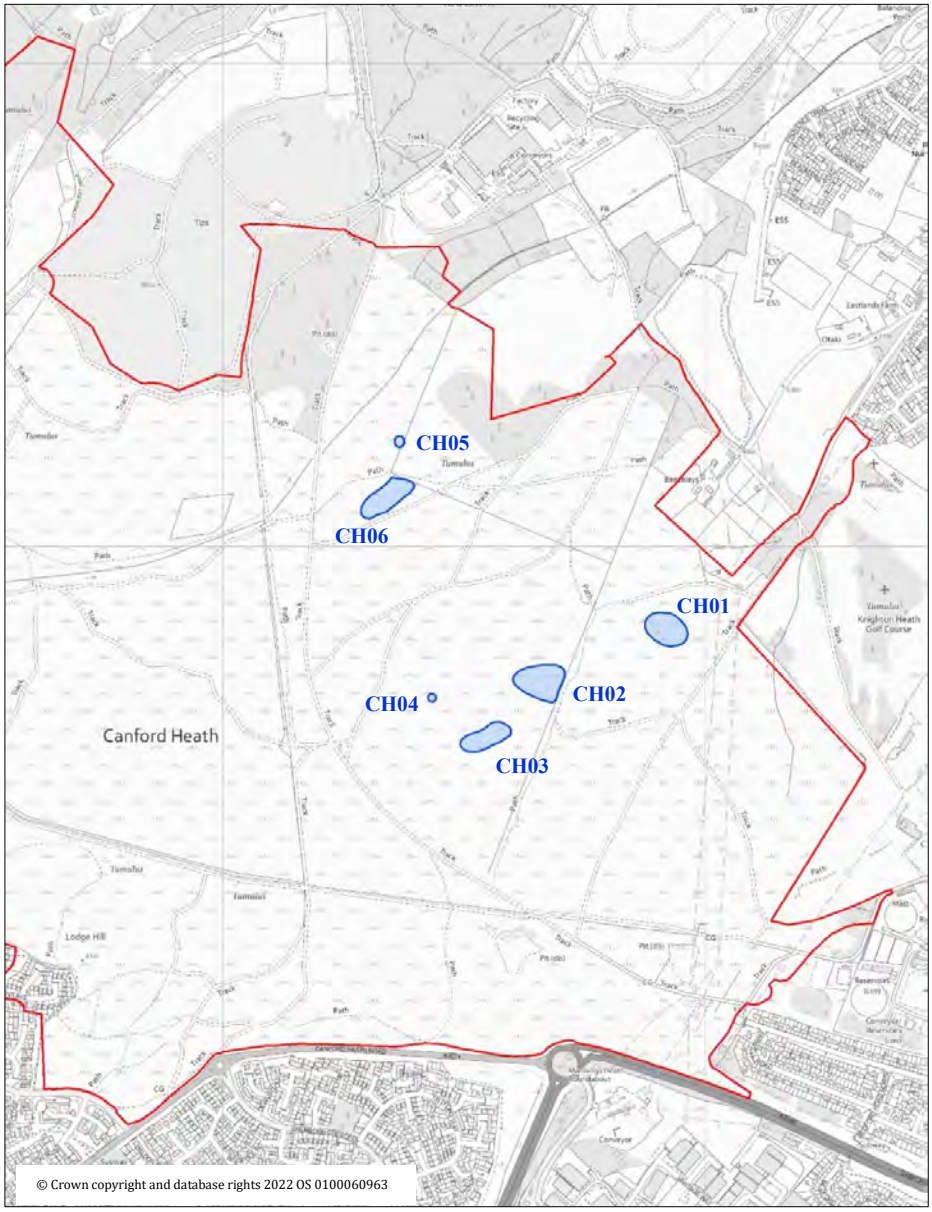
Mesophytes – species characteristic of neutral barked trees and shrubs (e.g. Oak, Beech, Hawthorn, Hazel and Willow) in areas with little or no pollution in lowland Britain.

5. RESULTS

5.1 CANFORD HEATH SSSI

Monitoring was set up in 2009 at six sites, three are terricolous lichens in heathland, two are for epiphytic lichens on small Oak trees and one is an area of wet heath and mire with a good range or bryophytes typical of the habitat. The six sites were revisited during the present survey. The three terricolous lichen plots are now becoming less useful for monitoring as the heath is now in a mature to senescent stage with little bare ground and lichens have declined significantly and mosses have increased. This is a natural part of the heather cycle.

MAP 3. Canford Heath monitoring sites



Monitoring site: CH01

Distance from biofilters: 970m

Grid Reference: SZ0390 9582

Species group: Heathland lichens **SAC feature**: European Dry Heaths

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Brief description:

Stand of dry to humid heath (**H8 – H4**) on a gentle north – north-west facing slope. Vegetation dominated by Ling *Calluna vulgaris* with occasional Bell Heather *Erica cinerea*, Cross-leaved Heath *Erica tetralix*, Purple Moor-grass *Molinia caerulea* and rare Western Gorse *Ulex gallii*. When set up in 2009 there was around 10% bare ground in patches between the heather clumps which had a local abundance of *Cladonia* species.

Species recorded	Frequency 2009	Frequency 2012	Frequency 2022
Cladonia chlorophaea / *grayi*	O[1]	O	R-O
Cladonia crispata var. *cetrariiformis*	F-LA	O-LF	-
Cladonia diversa	O	R	-
Cladonia floerkeana	O	O	R
Cladonia portentosa	O	O	O
Campylopus introflexus	O-LF	O	O
Dicranum scoparium	-	-	O
Hypnum jutlandicum	R-O	O-LF	F-LA

[1] DAFOR Scale: D = Dominant; A = Abundant; F = Frequent; O = Occasional; R = Rare
L= Locally, e.g. LF = Locally frequent

2022 comments

Since the 2012 survey the heath has become taller and more closed and is now in a mature to senescent stage. There is very little (<1%) bare ground and the open patches where heather clumps have died are dominated by bryophytes, particularly *Hypnum jutlandicum*. *Cladonia* species are now much reduced with even the robust *C. portentosa* only occasional.

Monitoring site: CH02

Grid Reference: SZ0365 9572

Species group: Heathland lichens **SAC feature**: European Dry Heaths

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Brief description:

Flat to gently sloping plateau of humid heath (**H4**) with abundant Ling *Calluna vulgaris* and Cross-leaved Heath *Erica tetralix*, plus frequent Bell Heather *Erica cinerea* and rare to occasional Purple Moor-grass *Molinia caerulea* and Western Gorse *Ulex gallii*. When set up in 2009 there was 10-15% bare soil as gaps between the heather stems with abundant *Cladonia* species.

Species recorded	Frequency 2009	Frequency 2012	Frequency 2022
Cladonia chlorophaea / *grayi*	-	R	O
Cladonia crispata var. *cetrariiformis*	A	O-LA	O
Cladonia diversa	O	O	-
Cladonia floerkeana	-	R	R
Cladonia portentosa	O	O	O-LF
Cladonia squamosa	-	O	R
Cladonia strepsilis	R-O	R	R
Cladonia verticillata	O	R	-
Campylopus introflexus	O	O	O
Dicranum scoparium	-	-	R
Hypnum jutlandicum	-	-	O-LF

[1] DAFOR Scale: D = Dominant; A = Abundant; F = Frequent; O = Occasional; R = Rare
L= Locally, e.g. LF = Locally frequent

2022 comments

The heath is now in a mature phase with very little bare ground (<1%) and lichens have decreased significantly whereas mosses have increased. Most of the lichens present were along and either side of an old track.The local *Cladonia strepsilis* is still present in very small quantity.

Monitoring site: CH03

Grid Reference: SZ0354 9562

Species group: Heathland lichens **SAC feature**: European Dry Heaths

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Brief description:

Flat to gently sloping north – north-east facing slope of mainly humid heath (**H4**). Ling *Calluna vulgaris* and Cross-leaved Heath *Erica tetralix* are abundant with occasional Bell Heather *Erica cinerea*, Purple Moor-grass *Molinia caerulea* and Western Gorse *Ulex gallii*, plus rare Bristle Bent *Agrostis curtisii*. When set up in 2009 the stand was quite open with 15-20% soil as open patches between the heather clumps, in which *Cladonia* species are abundant.

Species recorded	Frequency 2009	Frequency 2012	Frequency 2022
Cladonia chlorophaea / *grayi*	-	O	O
Cladonia crispata var. *cetrariiformis*	A	LA	O-LF
Cladonia diversa	F	O-LF	R
Cladonia floerkeana	O	O	O
Cladonia portentosa	F	O-LF	O-LF
Cladonia strepsilis	R	R-LF	R
Cladonia verticillata	O	O-LF	R
Campylopus introflexus	F	O-LF	O

[1] DAFOR Scale: D = Dominant; A = Abundant; F = Frequent; O = Occasional; R = Rare
L= Locally, e.g. LF = Locally frequent

2022 comments

As with the other two heathland lichen plots the heath is now in a mature stage and there are very few gap and bare ground. Lichens are now very sparse except for the robust *Cladonia portentosa*. Just to the south of this plot on flatter an area that has been mown in the past is more open and lichens more frequent.

Monitoring site: CH04

Grid Reference: SZ03432 95686

Species group: Epiphytic lichens

Brief description:

Two small Oak trees, c. 20-30 years old, either side of a ditch and among Bracken in a valley running south-west – north-east. There have been no major changes here since the monitoring was established in 2009.

Species recorded:

	2009	2012	2022
Twig and small branches <15mm			
Amandinea punctata[1]	✓	O	R
Arthonia punctiformis	✓	-	-
Arthonia radiata	✓	O	O
Catillaria nigroclavata[2]	-	-	R
Fuscidea lightfootii	✓	O	O
Hypotrachyna revoluta	-	-	R
Lecanora barkmaniana	-	R	R
Lecanora chlarotera / hybocarpa	✓	O	O
Lecidella elaeochroma	✓	O	O
Melanelixia subaurifera	✓	R	R
Parmelia sulcata	-	R	R
Physcia tenella	✓	LF	F
Punctelia jeckeri	-	R	R
Punctelia subrudecta	✓	R	O
Ramalina farinacea	✓	O	O
Ramalina fastigiata	-	R	R
Xanthoria parietina	✓	O	O
Xanthoria polycarpa	✓	O	R
Branches and main trunk			
Amandinea punctata	✓	R	-
Arthonia radiata	-	R	R
Candelaria concolor	✓	R-O	R
Candelariella reflexa	✓	O	O
Catillaria fungoides	-	-	O-F
Flavoparmelia caperata	✓	R	O
Flavoparmelia soredians	✓	R	R
Fuscidea lightfootii	✓	R	R
Hyperphyscia adglutinata	-	-	R-O
Hypotrachyna afrorevoluta	✓	R	R-O
Lecanora barkmaniana	✓	O-LA	F-LA
Lecanora chlarotera	✓	O	O
Lecanora confusa	-	R	R

	2009	2012	2022
Lecidella elaeochroma	✓	O	O
Melanelixia glabratula	✓	R	R
Normandina pulchella	-	-	O
Parmelia sulcata	✓	R	O
Parmotrema perlatum	✓	O-LA	O
Parmotrema pseudoreticulatum	-	-	R
Phlyctis argena	-	-	R
Physcia tenella	-	O	O
Punctelia subrudecta	✓	R	O
Xanthoria parietina	✓	-	R

[1] species in **bold** are nitrophytes and indicate over enrichment (hypertrophication)
[2] species in **blue** indicate some enrichment (eutrophication) and are typical of trees in parkland or pastures with grazing animals and not expected to be found on heathland sites

2022 comments

A number of new species were recorded and these are mostly species that are associated with neutral (mesic) bark, plus the nitrophyte *Hyperphyscia adglutinata* which is tolerant of higher levels of Ammonia and Nitrogen compounds. Small amounts of filamentous algae are present on the twigs but not on the trunk.

Monitoring site: CH05

Distance from biofilters: 570m

Grid Reference: SZ03366 96215

Species group: Epiphytic lichens

Brief description:

Several small Oak trees (c. 30+ years old) among scattered large Scot's Pine in a sheltered valley. Since the monitoring was set up in 2009 several of the pines have been cut down and the canopy is slightly more open.

Species recorded:

	2009	2012	2022
Twig and small branches <15mm			
Arthonia punctiformis	✓	R	R
Candelariella reflexa[1]	-	O	O
Evernia prunastri[3]	✓	R	R
Fuscidea lightfootii	✓	LF	O-LF
Graphis scripta	✓	-	R
Hypogymnia physodes	✓	R	-
Hypotrachyna revoluta	✓	R	O
Lecanora chlarotera	✓	O	O
Lecanora confusa	✓	O	R
Lecidella elaeochroma	✓	O	O
Melanelixia subaurifera	✓	O	O
Parmelia sulcata	-	R	O
Physcia tenella	✓	F	F
Punctelia subrudecta	-	R	O
Ramalina farinacea	✓	O	O
Xanthoria parietina	✓	O	O
Xanthoria polycarpa	-	R	R
Branches and main trunk			
Arthonia radiata	-	R	R
Caloplaca obscurella[2]	✓	F	LF
Candelaria concolor	✓	R	O
Candelariella reflexa	✓	O-LF	O
Flavoparmelia caperata	✓	R	O
Flavoparmelia soredians	✓	R	R
Hyperphyscia adglutinata	-	-	R-O
Lecanora barkmaniana	✓	O	O-LF
Lecanora chlarotera	✓	O	O
Lecanora confusa	✓	R	R
Lecidella elaeochroma	✓	R	R
Melanelixia glabratula	✓	R	R

	2009	2012	2022
Normandina pulchella	-	-	R-O
Parmelia sulcata	✓	O	O
Parmotrema perlatum	✓	O	O
Parmotrema pseudreticulatum	-	-	R
Physcia tenella	✓	O	O
Phlyctis argena	-	-	R
Punctelia borreri	✓	R	-
Ramalina fastigiata	✓	-	R

[1] species in **bold** are nitrophytes and indicate over enrichment (hypertrophication)
[2] species in **blue** indicate some enrichment (eutrophication) and are typical of trees in parkland or pastures with grazing animals and not expected to be found on heathland sites
[3] species in **red** are acidophytes and expected to be found on nutrient-poor substrates within the heathland landscape

2022 comments

As with the previous site several new lichens have colonised the trees including the nitrophyte *Hyperphyscia adglutinata*. Acidophytes remain very rare and *Hypogymnia physodes* appears to have been lost from the lower branches at least. Small quantities of filamentous algae were noted on the small branches and twigs, but not on the trunks.

Monitoring site CH06

Grid Reference: SZ0334 9614

Species group: Wet heath and mire bryophytes

SAC feature: European Dry Heaths

Brief description:

A small area of wet heath and valley situated towards the bottom of valley. The mire vegetation (**M21**) has abundant Cross-leaved Heath *Erica tetralix* and Purple Moor-grass *Molinia caerulea* with occasional to locally frequent Bog Asphodel *Narthecium ossifragum*, Common Cottongrass *Eriophorum angustifolium*, Ling *Calluna vulgaris* and White Beak-sedge *Rhynchospora alba*. A few scattered plants of Carnation Sedge *Carex panicea*, Round-leaved Sundew *Drosera rotundifolia*, Sharp-flowered Rush *Juncus acutiflorus* and Tormentil *Potentilla erecta* were also noted. Sphagna are well represented with *Sphagnum cuspidatum*, *S. papillosum* and *S. tenellum* most frequent plus small quantities of *S. auriculatum*, *S. rubellum*, *S. subnitens* and, most notably, the Nationally Scarce *S. pulchrum*. The adjoining area of wet heath (**M16**) has scattered plants of Deer-grass with *Sphagnum compactum* and *S. tenellum*, plus the local *Campylopus brevipilus*.

Species recorded	Frequency 2009	Frequency 2012	Frequency 2022
Campylopus brevipilus	R[1]	-	-
Hypnum jutlandicum	O	O	O
Leucobryum glaucum	-	R	R
Sphagnum auriculatum	R-O	R	O
Sphagnum compactum	R	R-O	O
Sphagnum cuspidatum	O-LA	O-LA	O-LA
Sphagnum papillosum	F	F	F-LA
Sphagnum pulchrum	R	R-O	O
Sphagnum rubellum	R	O	R-O
Sphagnum subnitens	O	O	R
Sphagnum tenellum	O-LF	O-LA	O-LA
Calypogeia fissa	-	-	R
Calypogeia sphagnicola	-	R	-
Cephalozia connivens	-	-	R
Cephaloziella cf. *macrostachya*	-	O	O
Kurzia pauciflora	O	O	O-LF
Mylia anomala	-	R-O	O
Odontoschisma sphagni	O-LF	O-LF	O-LF
Riccardia latifrons	-	R	-

[1] DAFOR Scale: D = Dominant; A = Abundant; F = Frequent; O = Occasional; R = Rare; L= Locally, e.g. LF = Locally frequent

2022 comments

The condition of the mire was generally good and *Sphagnum* species remain frequent to locally abundant, particularly at the eastern end. Most are in good health and well-pigmented, some larger hummocks were slightly bleached this may be down the prolonged drought in the summer. All the *Sphagnum* species recorded in previous surveys are still present, most notably the Nationally Scarce *Sphagnum pulchrum*, a speciality of the valley mires in the Poole Basin. The associated liverworts are found throughout, the two recorded in the last survey but not seen during the current one were rare in 2012 and therefore very easy to overlook, two others were recorded new to the site.

5.2 TURBARY & KINSON COMMON SSSI

Two remnants of heath and associated habitats within the Poole – Bournemouth conurbation. Turbary Common is the largest, supporting dry and wet heath plus a small valley mire. Secondary woodland and scrub has developed around the fringes of the site. Like all urban heaths it is subject to summer fires which have had a detrimental effect on the dry heath in particular. Kinson Common is now mainly secondary woodland with a remnant of valley mire but very little heathland.

There are very few records of bryophytes or lichens from the sites, but the mire areas were surveyed by DERC in November 1995 as part of bryophyte survey of mires across the Poole Basin Heaths (Edwards, 1997). These lists with DAFOR frequencies provide a useful baseline for comparing with the current survey.

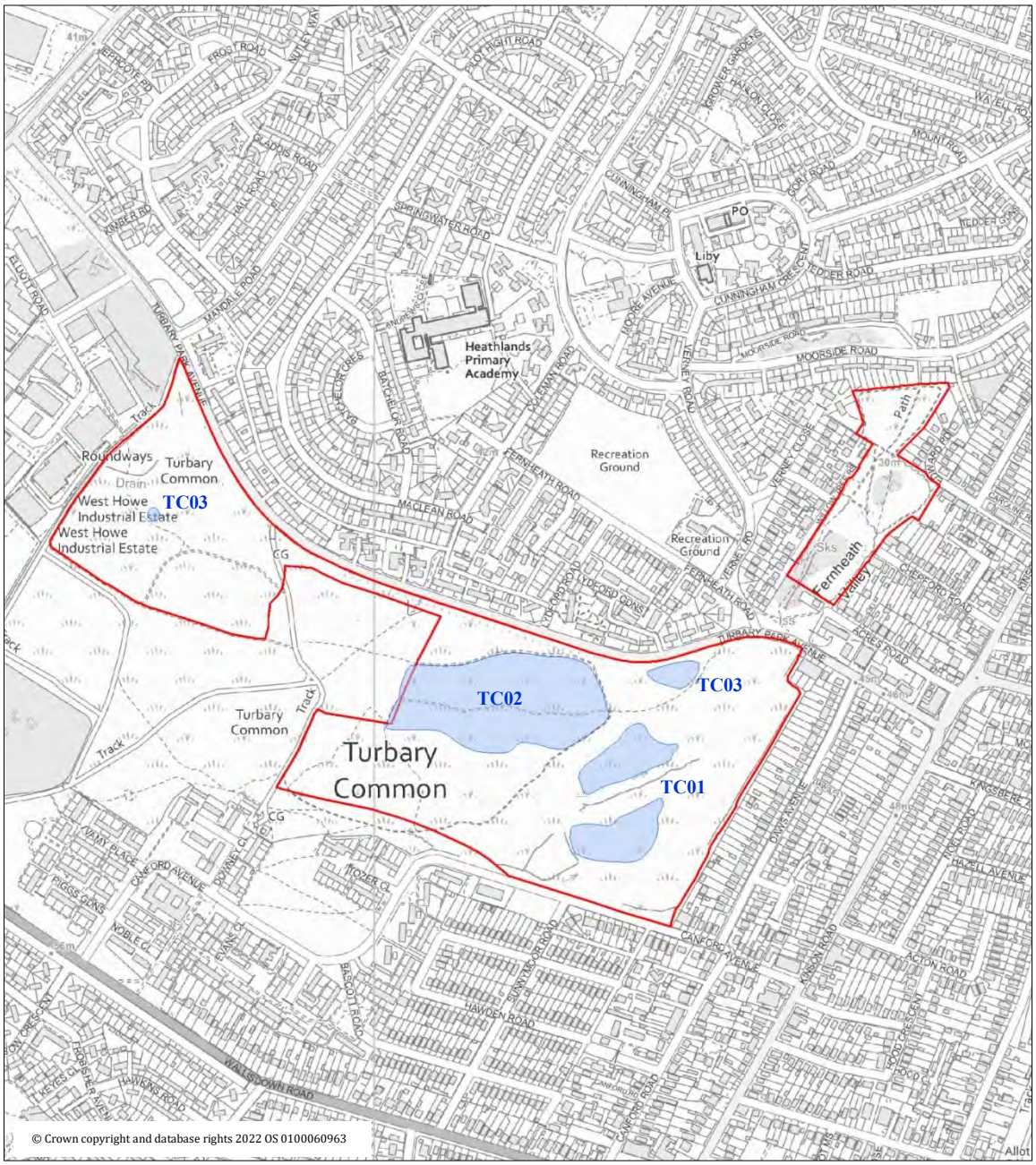
Turbary Common

SAC features: European Dry Heaths
Northern Atlantic wet heaths with *Erica tetralix*
Depressions on peaty substrates / Transition mires

Monitoring sites: **TC01;** the mire, SZ063946
TC02; dry heath, SZ0609 9474
TC03; oak trees, SZ0570 9501 & 0640 9479

Turbary Common has remnants of dry heath (**H8**-type) dominated by Ling *Calluna vulgaris* and Western Gorse *Ulex gallii* with smaller quantities of Bell Heather *Erica cinerea* and Bristle Bent *Agrostis curtisii*. Like other small urban heathland sites the heath is subject to regular fires and, at the present time, the drier areas are either recently burnt and relatively short and open, or un-burnt and quite tall and closed. Lichens are generally very scarce in both types, with only one small area supporting a typical range of species for dry heath. The eastern part of the site is valley with a small watercourse. The lower slopes support valley mire with abundant *Sphagnum* species, there are narrow bands of wet heath above the mire. The site is grazed by small numbers of ponies and cattle.

MAP 3. Turbary Common monitoring locations



Monitoring site: TC01

Grid Reference: SZ063946

Species group: Heathland lichens **SAC feature**: Depressions on peaty substrates / Transition mires

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The mire sits at the eastern end of the site and drains northeast along the bottom shallow valley. The gentle sloping sides have open mire dominated by Cross-leaved Heath *Erica tetralix* and Purple Moor-grass *Molinia caerulea* with frequent to abundant Ling *Calluna vulgaris*, Bog Asphodel *Narthecium ossifragum* and Cottongrass *Eriophorum angustifolium*, with patches of White Beak-sedge *Rhynchospora alba* in the shortest area. Runnels on the southeast side have Pale Butterwort *Pinguicula lusitanica*, Carnation Sedge *Carex panicea* and Bog Pondweed *Potamogeton polygonifolius*. *Sphagnum* species are abundant throughout and locally form lawns around the margins of small bog pools.

Species	Common Name	29/11/1995	9/11/2022
Liverworts			
Aneura pinguis	Greasewort	O-LF	O
Cephalozia connivens	Forcipated Pincerwort	R	O
Gymnocolea inflata subsp. *inflata*	Inflated Notchwort	R	-
Kurzia pauciflora	Bristly Fingerwort	O	O
Mylia anomala	Anomalous Flapwort	-	R-O
Odontoschisma sphagni	Bog-moss Flapwort	-	O
Riccardia multifida	Delicate Germanderwort	R	O-LF
Mosses			
Aulacomnium palustre	Bog Groove-moss	-	R
Bryum pseudotriquetrum	Marsh Bryum	-	R-O
Calliergonella cuspidata	Pointed Spear-moss	O	R
Hypnum jutlandicum	Heath Plait-moss	O	O
Leucobryum glaucum	Large White-moss	R	-
Polytrichum commune	Common Haircap	R	-
Sphagnum auriculatum	Cow-horn Bog-moss	O	O
Sphagnum compactum	Compact Bog-moss	O-LA	O
Sphagnum cuspidatum	Feathery Bog-moss	O-LF	O-LA
Sphagnum fimbriatum	Fringed Bog-moss	R	R
Sphagnum papillosum	Papillose Bog-moss	A-LD	A-LD
Sphagnum pulchrum	Golden Bog-moss	-	O-LF
Sphagnum rubellum	Red Bog-moss	R	R-O
Sphagnum subnitens	Lustrous Bog-moss	R	O-LF
Sphagnum tenellum	Soft Bog-moss	O-LA	O-LA

[1] DAFOR Scale: D = Dominant; A = Abundant; F = Frequent; O = Occasional; R = Rare
L= Locally, e.g. LF = Locally frequent

The site remains generally in good health, the most obvious change is the valley bottom along the watercourse where the reedbed has expanded at the expense of the shorter and more open runnels. *Sphagnum* species remain abundant and in good health. All the species recorded in 1995 were refound, and one notable addition is the Nationally Scarce *Sphagnum pulchrum* which is present locally in the wetter parts of the mire on the northwest side of the watercourse. Associated bog liverworts are found throughout and two new species were added to the site. Shallow runnels on the southeast still support *Aneura pinguis* and *Riccardia multifida*.

Monitoring site: TC02

Grid Reference: SZ0609 9474

Species group: Heathland lichens **SAC feature**: European Dry Heaths

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Small area of relatively short dry heath with abundant Ling *Calluna vulgaris* plus frequent Bell Heather *Erica cinerea* and Western Gorse *Ulex gallii*, and patchy Bristle Bent *Agrostis curtisii*. The area has probably been burnt in the past but not for 10 years or so. It is lightly grazed and there are several cattle paths through the area. The diversity is poor compared with sites outside of the conurbation that are not subject to regular hot summer fires.

Species recorded	Frequency 2022
Lichens	
Cladonia cervicornis	O-LF
Cladonia chlorophaea / *grayi*	O
Cladonia crispata* var. *cetrariiformis	**R**
Cladonia diversa	R
Cladonia furcata	O-LF
Cladonia portentosa	F
Cladonia ramulosa	R
Bryophytes	
Campylopus introflexus	O
Hypnum jutlandicum	O
Polytrichum juniperinum	R-O

Monitoring site: TC03

Grid Reference: SZ0570 9501 & 0640 9479

Species group: Epiphytic lichens

There are a number of small Oak trees along the northern edge of the heath, from aerial photographs these are probably around 40 years old. The trunks have relatively few lichens, but they are abundant on the horizontal branches and twigs.

Species	Frequency
Twig and small branches <15mm	
Arthonia radiata	O
Catillaria nigroclavata[2]	O
Evernia prunastri[3]	R
Flavoparmelia caperata	O-LF
Flavoparmelia soredians	O
Hyperphyscia adglutinata[1]	O
Hypotrachyna afrorevoluta	O
Hypotrachyna revoluta	R
Lecanora carpinea	R
Lecanora chlarotera / hybocarpa	O
Lecidella elaeochroma	F
Melanelia subaurifera	O
Parmelia sulcata	O-LF
Parmotrema perlatum	O-LF
Phaeophyscia orbicularis	O
Physcia tenella	F
Punctelia subrudecta	O
Ramalina farinacea	O
Ramalina fastigiata	R
Xanthoria parietina	O-LF
Main branches and trunks	
Anisomeridium biforme	R
Candelaria concolor	O-LF
Cliostomum griffithii	R
Flavoparmelia caperata	O
Hyperphyscia adglutinata	O-LF
Hypotrachyna afrorevoluta	R
Lecanora barkmaniana	R
Lecanora expallens	R-O
Lepraria finkii	O-LF

Species	Frequency
Normandina pulchella	R
Parmelia sulcata	R
Parmotrema perlatum	O
Phaeophyscia orbicularis	R
Physcia tenella	O-LF
Punctelia subrudecta	O
Xanthoria parietina	O

[1] species in **bold** are nitrophytes and indicate over enrichment (hypertrophication)
[2] species in **blue** indicate some enrichment (eutrophication) and are typical of trees in parkland or pastures with grazing animals and not expected to be found on heathland sites
[3] species in **red** are acidophytes and expected to be found on nutrient-poor substrates within the heathland landscape

The more exposed trunks and the twigs have species tolerant of higher levels of enrichment such as *Candelaria concolor*, *Hyperphyscia adglutinata*, *Phaeophyscia orbicularis*, *Physcia tenella* and *Xanthoria parietina* which are occasional to locally frequent. However, some relatively pollution sensitive species found on neutral bark such as *Flavoparmelia caperata* and *Parmotrema perlatum* are occasional. Acidophytes are very rare or absent with only a small quantity of *Evernia prunastri* present on the twigs.

Kinson Common

A small site a kilometre to the north of Turbary Common and occupying a relatively sheltered valley with two watercourses. Much of the site is secondary woodland and acid grassland with a variety of acid mire, wet tall herb and poor fen habitat either side of the main watercourse. The two small areas of heath in the south of the site have become invaded by bracken and are currently being restored. The acid mire areas were surveyed in 1995 which provides a useful comparison for the current survey.

MAP 4. Kinson Common

Monitoring site: KC01

Grid Reference: SZ067960

Species group: Wet heath & bryophytes

SAC feature: Depressions on peaty substrates / Transition mires

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The mire is found either side of a small stream and drains northeast along the bottom of a shallow valley. Acid mire is confined to two small areas at the eastern end where there is tussocky Purple Moor-grass *Molinia caerulea* with Cross-leaved Heath *Erica tetralix*, Ling *Calluna vulgaris*, Bog Asphodel *Narthecium ossifragum* and Common Cottongrass *Eriophorum angustifolium*. *Sphagnum* species are abundant in these areas particularly *Sphagnum papillosum* and *S. subnitens*, with *S. auriculatum*, *S. fallax*, *S. rubellum* and *S. palustre* also present. Runnels towards the central watercourse have frequent *Calliergonella cuspidata*. Either side of the central stream there is a thick band of more enriched tall-herb fen vegetation and patches of rushes that support few bryophytes. The area is occasionally cattle grazed.

Species	Common Name	29/11/1995	9/11/2022
Liverworts			
Calypogeia muelleriana	Mueller's Pouchwort	R	R
Cephalozia connivens	Forcipated Pincerwort	R	R
Kurzia pauciflora	Bristly Fingerwort	R	R
Odontoschisma sphagni	Bog-moss Flapwort	R	-
Mosses			
Aulacomnium palustre	Bog Groove-moss	LA	O-LF
Bryum pseudotriquetrum	Marsh Bryum	R	-
Calliergonella cuspidata	Pointed Spear-moss	O	O-LF
Dicranum bonjeanii	Crisped Fork-moss	R	-
Hypnum jutlandicum	Heath Plait-moss	O	O
Leucobryum glaucum	Large White-moss	R	-
Sphagnum auriculatum	Cow-horn Bog-moss	O-LF	O-LF
Sphagnum fallax	Flat-topped Bog-moss	R	O-LF
Sphagnum papillosum	Papillose Bog-moss	O-LA	O-LA
Sphagnum palustre	Blunt-leaved Bog-moss	LF	O-LA
Sphagnum rubellum	Red Bog-moss	R	O
Sphagnum subnitens	Lustrous Bog-moss	R	O-LF

There have been few changes since the 1995 survey with all the *Sphagnum* species refound in good condition and with no obvious signs of enrichment. The cattle grazing is key to keeping the Purple Moor-grass in check and provide open patches for smaller species.

Monitoring site: KC02

Grid Reference: SZ066960

Species group: Epiphytic lichens

On a slope north of the mire is an area of acid grassland and Bracken with secondary Oak and Birch woodland. The small open-grown Oaks sampled are around the edge of the grassland and quite well lit. They are around 30 to 40 years old with relatively few lichens on the trunks but more abundant on the numerous horizontal branches.

Species	Frequency
Twig and small branches <15mm	
Arthonia punctiformis	O
Arthonia radiata	O -LF
Evernia prunastri[3]	O
Flavoparmelia caperata	O-LF
Flavoparmelia soredians	O
Hyperphyscia adglutinata[1]	R
Hypotrachyna afrorevoluta	O
Hypotrachyna revoluta	O
Lecania naegelii	R
Lecanora carpinea	R
Lecanora chlarotera / hybocarpa	F
Lecidella elaeochroma	F-LA
Melanelia subaurifera	O
Parmelia sulcata	O-LF
Parmotrema perlatum	O-LF
Pertusaria leioplaca	R
Phaeophyscia orbicularis	R
Physcia aipolia	O
Physcia tenella	O-LF
Punctelia subrudecta	O
Ramalina farinacea	O
Ramalina fastigiata	R
Usnea cornuta	R
Xanthoria parietina	O
Main branches and trunks	
Alyxaria varia	R
Anisomeridium biforme	R
Cliostomum griffithii	R
Flavoparmelia caperata	O

Species	Frequency
Hyperphyscia adglutinata	R
Hypotrachyna afrorevoluta	R
Lecanora argentata	R
Lecanora chlarotera	O
Lecanora expallens	R-O
Lecidella elaeochroma	O-LF
Lepraria finkii	O-LF
Normandina pulchella	R
Parmelia sulcata	R
Parmotrema perlatum	O
Punctelia subrudecta	O
Pyrrhospora quernea	R

[1] species in **bold** are nitrophytes and indicate over enrichment (hypertrophication)
[2] species in **blue** indicate some enrichment (eutrophication) and are typical of trees in parkland or pastures with grazing animals and not expected to be found on heathland sites
[3] species in **red** are acidophytes and expected to be found on nutrient-poor substrates within the heathland landscape

Although only just over a kilometre to the north of Turbary Common the lichens indicating high levels of enrichment are much less frequent with species of neutral bark (mesophytes) most abundant. Nitrophytes such as *Physcia tenella* and *Xanthoria parietina* are present but are mainly confined the most exposed tips of the twigs. Acidophytes are generally rare with only small quantities of *Evernia prunastri* and *Usnea cornuta* present on small branches.

5.3 PARLEY COMMON SSSI

SAC features: European Dry Heaths
Northern Atlantic wet heaths with *Erica tetralix*
Old acidophilous oak woods with *Quercus robur* on sandy plains (Qualifying feature)

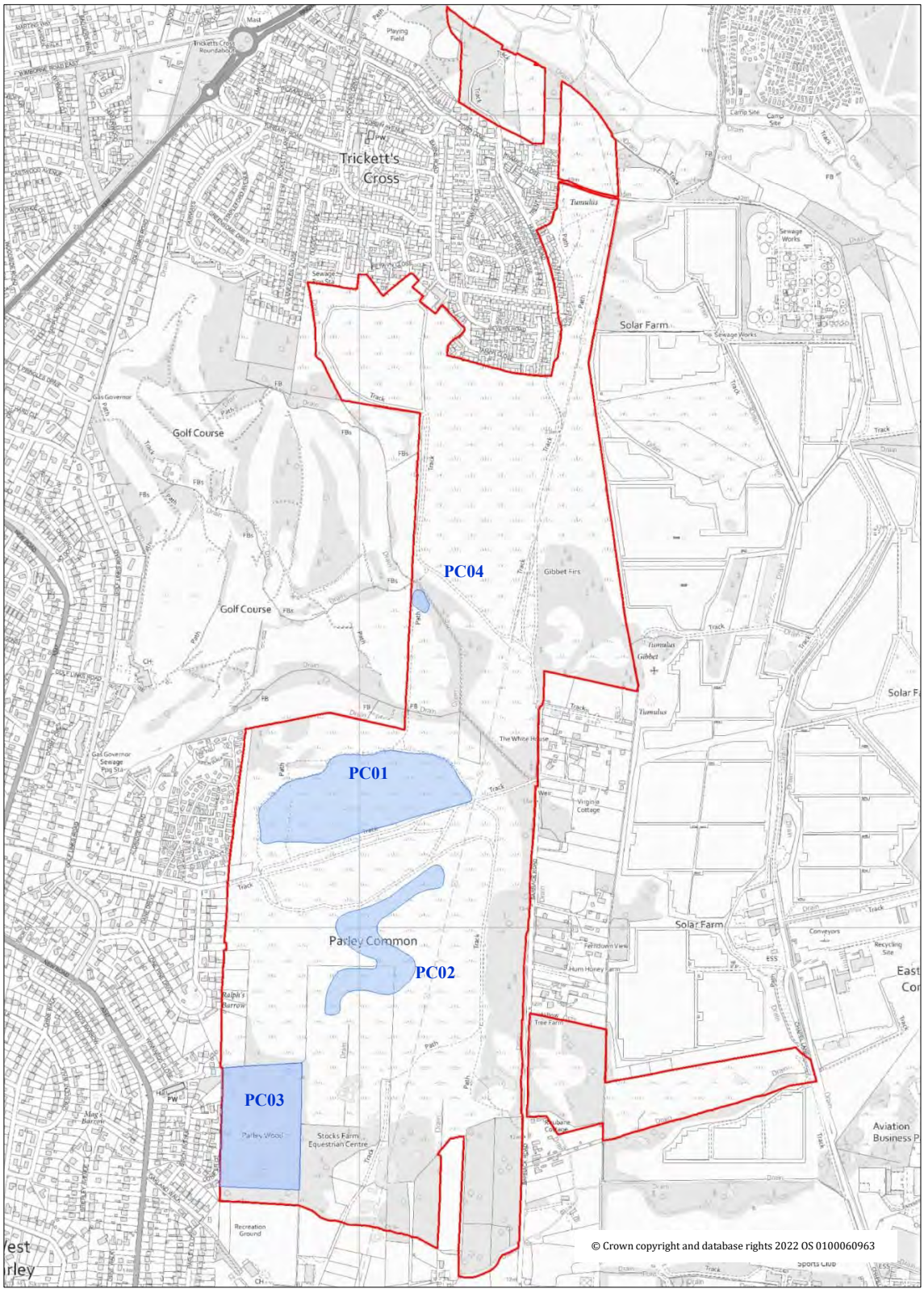
Monitoring sites: **PC01** dry heath, SZ089992
PC02 wet heath, SZ090989
PC03 oak trees in woodland, SZ087985
PC04 oak trees in heath edge, SZ0914 9822

The SSSI is the surviving remnant of a once extensive heath that extended from Wimborne east to the Moors River at Hurn. The land is gently undulating with the higher ground to the west at 25 metres above sea level (a.s.l.), sloping to 12 metres a.s.l. in the southeast corner. Higher ground is free-draining and dominated by Ling *Calluna vulgaris* with varying quantities of Bell Heather *Erica cinerea*, Dwarf Gorse *Ulex minor* and Bristle Bent *Agrostis curtisii*. Much of the heath is in a mature or senescent phase with limited open areas with bare peaty soil for specialist bryophytes and lichens. Some areas are mown and linear scrapes have been dug to provide habitat for Sand Lizard *Lacerta agilis* (an SSSI feature). Lower lying ground supports typical wet heath (**M16a**) dominated by Cross-leaved Heath *Erica tetralix* with frequent Ling *Calluna vulgaris* and Deer-grass *Trichophorum germanicum*, plus occasional to locally frequent Bog Asphodel *Narthecium ossifragum*, Heath Rush *Juncus squarrosus*, White Beak-sedge *Rhynchospora alba* and Cottongrass *Eriophorum angustifolium*.

Parley Wood lies in the southwest corner of the SSSI and is an Oak-Birch-Holly woodland which is not marked on the 1805 OS map, so is doubtfully ancient woodland. However, it is shown as woodland on the 1839 Tithe Map and is therefore probably around 200 years old. Pedunculate Oak *Quercus robur* dominates the canopy with the older trees on the boundary banks. Downy and Silver Birch *Betula pubescens* & *B. pendula* are frequent throughout, with rare Rowan *Sorbus aucuparia*. There is a patchy understorey of Hazel *Corylus avellana*, Alder Buckthorn *Frangula alnus* and Holly *Ilex aquifolium*, the last of these forming dense thickets in places. The acid soils and dense canopy means the ground flora is poorly developed and patchy with frequent Bramble *Rubus fruticosus* agg. and Purple Moor-grass *Molinia caerulea*, plus scattered Broad Buckler-fern *Dryopteris dilatata*, and the mosses *Mnium hornum*, *Polytrichastraum formosum* and *Thuidium tamariscinum*. Within the NVC (Rodwell, 1991) much of the wood is referrable to the **W10** *Quercus robur- Pteridium*

aquilinum-Rubus fruticosus woodland with small stands of **W4** *Betula pubescens-Molinia caerulea* woodland in the wetter areas .

MAP 5. Parley Common monitoring locations.



Monitoring site: PC01

Grid Reference: SZ089992

Species group: Heathland lichens **SAC feature**: European Dry Heaths

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A stand of tall dry heath (**H2**-type) mainly in a mature to senescent stage with very little bare ground and there is a well-developed moss layer beneath the heather. Some strips have been mown and small scrapes made to provide habitat for reptiles. These more open areas have a range of *Cladonia* lichens. At the top of the slope there are some damper areas with frequent Cross-leaved heath *Erica tetralix*, these are more open and have a local abundance of lichens particularly *Cladonia portentosa* and *C. uncialis* subsp. *biuncialis*. *Hypnum jutlandicum* is by far the most abundant moss with small quantities of *Dicranum scoparium* and *Pleurozium schreberi*. The non-native liverwort *Lophocolea semiteres* is present on the sides of the main path on the east side of the area.

Species recorded	**Frequency 2022**
Lichens	
Cladonia chlorophaea / *grayi*	O
Cladonia ciliata	O
Cladonia crispata* var. *cetrariiformis	**O**
Cladonia floerkeana	O
Cladonia portentosa	LA
Cladonia squamosa 'heathland taxon'	O
Cladonia uncialis* subsp. *biuncialis	**O-LF**
Bryophytes	
Lophocolea semiteres	R
Campylopus introflexus	O
Dicranum scoparium	O
Hypnum jutlandicum	A
Pleurozium schreberi	**R**

Monitoring site: PC02

Grid Reference: SZ090989

Species group: Heathland lichens **SAC feature**: Northern Atlantic wet heaths with *Erica tetralix*

Well developed wet heath (**M16a**-type) in the central southern part of the site, short and relatively open over large areas with lichens locally abundant and in places up to 70% of the vegetation. In the wetter areas *Sphagnum* mosses become abundant. *Cladonia portentosa* is by far the most abundant lichen with most other species confined to the open patches of firm wet peaty soil between the heather clumps. *Cladonia crispata* var. *cetrariiformis* and *Cladonia squamosa* are particularly frequent. The wet heath specialist *Cladonia strepsilis* is scattered throughout in small quantity and in one area the very local *Pycnothelia papillaria* and the Nationally Scarce *Cladonia zopfii* are present.

Species recorded	Frequency 2022
Lichens	
Cetraria aculeata	**R**
Cladonia chlorophaea / *grayi*	O
Cladonia ciliata	R
Cladonia crispata* var. *cetrariiformis	**F**
Cladonia diversa	R
Cladonia floerkeana	O-LF
Cladonia portentosa	A
Cladonia squamosa 'heathland taxon'	F
Cladonia strepsilis	**O**
Cladonia uncialis* subsp. *biuncialis	**R**
Cladonia verticillata	**O**
Cladonia zopfii SZ0899 9886	**R**
Pycnothelia papillaria	**R**
Bryophytes	
Campylopus brevipilus	**R-O**
Campylopus introflexus	O-LF
Hypnum jutlandicum	O-LF
Leucobryum glaucum	**R**
Sphagnum compactum	F-LA
Sphagnum cuspidatum	O-LA
Sphagnum tenellum	O-LA

Monitoring site: PC03

Grid Reference: SZ087985

Species group: Epiphytic lichens **SAC feature**: Old acidophilous oak woods with *Quercus robur* on sandy plains

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An area of Oak-Birch-Holly woodland damp in places in the southwest corner of the SSSI. Lichens were only recorded from the trunks of the mature Oaks that were not heavily shaded by Holly.

Species recorded	Frequency 2022	Status
Lichens		
Anisomeridium ranunculosporum	**R-O**	**SOWI; DN**
Cladonia coniocraea	F	
Cliostomum griffithii	O	
Diarthonis spadicea	F	
Enterographa crassa	R	
Flavoparmelia caperata	O	
Graphis elegans	R	
Hypotrachyna afrorevoluta	O	
Lecanactis abietina	**O-LA**	**DN**
Lecanora chlarotera	R	
Lepraria finkii	F	
Parmotrema perlatum	R	
Pertusaria amara	O	
Pertusaria hymenea	O	
Pertusaria pertusa	O	
Phaeographis dendritica	**O**	**SOWI; DN**
Phlyctis argena	O	
Snippocia nivea	**O**	**SOWI; IR; DN**
Varicellaria hemisphaerica	**R**	**DN**
Bryophytes		
Liverworts		
Frullania dilatata	O	
Metzgeria furcata	R	
Microlejeunea ulicina	O	
Mosses		
Hypnum cupressiforme	A	
Isothecium myosuroides	F	

Due to the low light levels crustose lichens and bryophytes are abundant on the lower trunks, with larger leafy lichens generally rare only becoming frequent on the main branches and in the canopy. The lichen assemblage is very typical of neutral to slightly acid bark in old established semi-natural woodland and includes a number of old woodland indicators (SOWI species, Sanderson *et al*, 2018) such as *Anisomeridium ranunculosporum*, *Phaeographis dendritica* and *Snippocia nivea*, and these, along with *Lecanactis abietina* and *Varicellaria hemisphaerica*, are generally very sensitive to enrichment from Ammonia and Nitrogen compounds. The dense canopy of the woodland probably acts as an effective buffer from pollutants.

Monitoring site: PC04

Grid Reference: SZ0914 9822

Species group: Epiphytic lichens

Several small Oak trees on the south side of a small stream near the eastern edge adjoining Ferndown Golf Course and with more open heathland to the north and south.

Species	Frequency
Twig and small branches <15mm	
Arthonia radiata	O
Candelariella reflexa[1]	O
Catillaria nigroclavata[2]	O
Flavoparmelia caperata	O
Flavoparmelia soredians	R
Hyperphyscia adglutinata	O
Hypogymnia physodes[3]	R
Hypotrachyna afrorevoluta	O
Hypotrachyna revoluta	R
Lecanora chlarotera / hybocarpa	O
Lecidella elaeochroma	F-LA
Melanelixia subaurifera	O
Parmelia sulcata	O-LF
Parmotrema perlatum	O-LF
Pertusaria leioplaca	R
Phaeophyscia orbicularis	R
Physcia aipolia	O
Physcia tenella	O-LF
Punctelia jeckeri	R
Punctelia subrudecta	O
Ramalina farinacea	O
Ramalina fastigiata	R
Xanthoria parietina	O
Main branches and trunks	
Anisomeridium biforme	R
Cliostomum griffithii	R
Flavoparmelia caperata	O
Fuscidea lightfootii	R
Hypotrachyna afrorevoluta	R
Lecanora chlarotera	O
Lecanora expallens	R-O

Species	Frequency
Lecidella elaeochroma	O
Lepraria finkii	O
Parmelia sulcata	R
Parmotrema perlatum	O
Punctelia subrudecta	O
Pyrrhospora quernea	R
Xanthoria parietina	R

[1] species in **bold** are nitrophytes and indicate over enrichment (hypertrophication)

[2] species in **blue** indicate some enrichment (eutrophication) and are typical of trees in parkland or pastures with grazing animals and not expected to be found on heathland sites

[3] species in **red** are acidophytes and expected to be found on nutrient-poor substrates within the heathland landscape

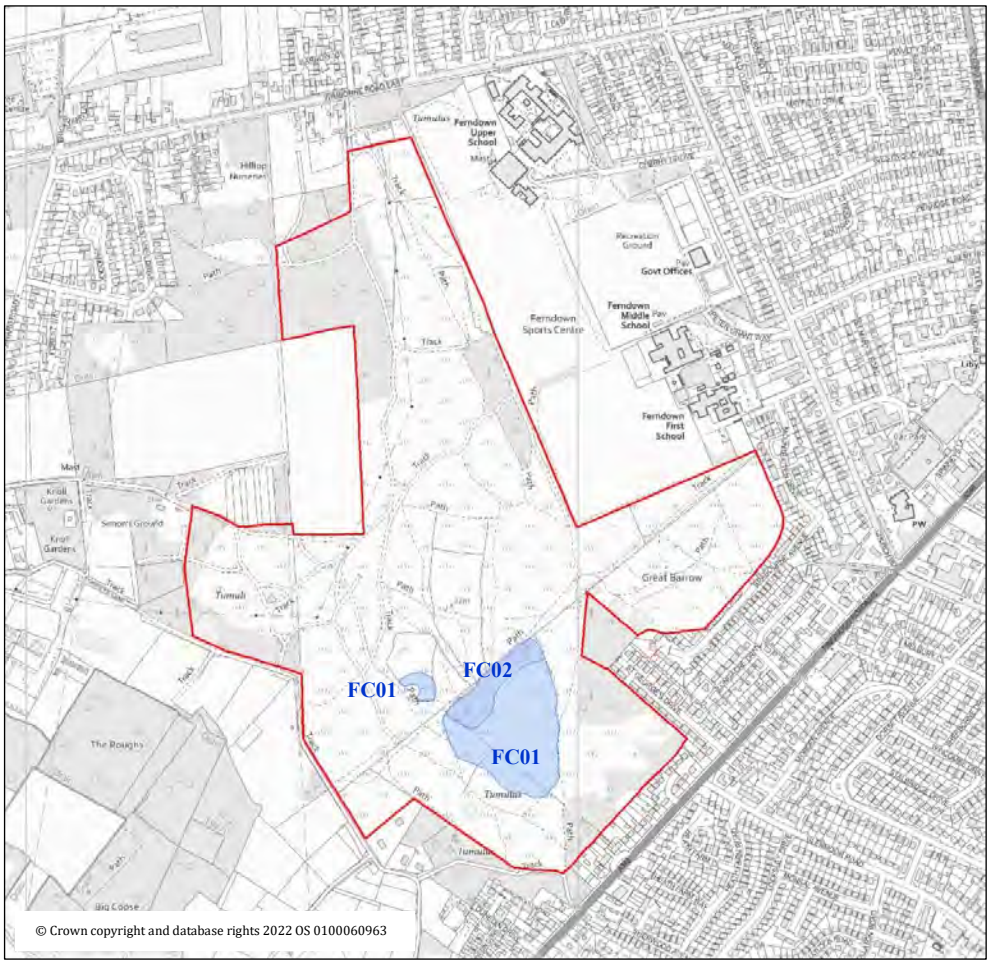
5.4 Ferndown Common SSSI

SAC features: European Dry Heaths

Monitoring sites: **FC01**, dry heath, SZ0673 9970
FC02, oak trees in heath edge, SZ0687 9974

An area of heathland with fringing secondary woodland and scrub, now enclosed within Ferndown it was formerly part of the extensive heathland that spread from Wimborne east to the Moors River. The heath is mainly dry or humid with only small stands of wet heath, there are areas of secondary woodland around the western and southern fringes and gorse scrub is scattered throughout. Much of the centre of the site was burnt in a hot summer fire in July 2018 making it unsuitable for monitoring. The heath has recovered sufficiently now and much of the barer ground has abundance of the non-native moss *Campylopus introflexus*.

MAP 6. Ferndown Common sites



Monitoring site: FC01

Grid Reference: SZ0914 9822

Species group: Heathland lichens **SAC feature**: European Dry Heaths

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Mature heath to the south of the burnt area, much of which is tall Ling *Calluna vulgaris* with scattered Bell Heather *Erica cinerea*, Dwarf Gorse *Ulex minor* and Bristle Bent *Agrostis curtisii*. *Cladonia* lichens are very localised and only frequent is the few shorter and more open areas. One small area in the southwest of the burnt section is damper with abundant Cross-leaved Heath *Erica tetralix*, and have good areas of firm damp peat with a local abundance of *Cladonia* species, although these are at early stage of recovery and cannot be identified with certainty to species level. Of particular note in this area is the very local *Cladonia strepsilis*.

Species recorded	Frequency 2022
Lichens	
Cladonia chlorophaea / *grayi*	O
Cladonia crispata* var. *cetrariiformis	**O-LF**
Cladonia diversa	R
Cladonia floerkeana	O
Cladonia macilenta	R
Cladonia portentosa	O-LA
Cladonia ramulosa	R-O
Cladonia squamosa 'heathland taxon'	R-O
Cladonia strepsilis	**R-O**
Cladonia subulata	R
Bryophytes	
Cephaloziella divaricata	O
Campylopus introflexus	O-LF
Campylopus pyriformis	R
Dicranum scoparium	O
Hypnum jutlandicum	O-LF

Monitoring site: FC02

Grid Reference: SZ0914 9822

Species group: Epiphytic lichens

The fringes of the heath have stands of scrub and mixed woodland especially along the western and southern edges. The site chosen for monitoring is in the central-south of the site and surrounded by heathland and comprises a stand of closed-canopy Turkey and Pedunculate Oak *Quercus cerris* and *Q. robur*, with Birch *Betula* spp. and Rowan *Sorbus aucuparia*. Epiphytes are abundant on the trunks and the branches.

Species	Frequency
Twig and small branches <15mm	
Arthonia radiata	O
Catillaria nigroclavata	O
Flavoparmelia caperata	O-LF
Flavoparmelia soredians	R
Hypogymnia tubulosa	O
Hypotrachyna afrorevoluta	R
Hypotrachyna revoluta	O
Lecanora barkmaniana[2]	R
Lecanora chlarotera / hybocarpa	O
Lecidella elaeochroma	O
Melanelixia subaurifera	O
Parmelia sulcata	O
Parmotrema perlatum	O
Phaeographis smithii	R
Phaeophyscia orbicularis[1]	O
Physcia tenella	F
Punctelia jeckeri	O
Punctelia subrudecta	F
Ramalina farinacea	O
Ramalina fastigiata	R
Xanthoria parietina	O-LA
Main branches and trunks	
Anisomeridium biforme	R
Caloplaca obscurella	R
Cliostomum griffithii	O
Flavoparmelia caperata	A
Evernia prunastri[3]	F
Fuscidea lightfootii	R

Species	Frequency
Graphis scripta	R
Hypogymnia physodes	F
Hypogymnia tubulosa	R
Hypotrachyna afrorevoluta	O-LF
Hypotrachyna revoluta	O
Lecanora barkmaniana	R
Lecanora chlarotera	O
Lecanora confusa	R
Lecanora expallens	O
Lepraria finkii	O
Melanelixia glabratula	O
Parmelia saxatilis	O
Parmelia sulcata	F
Parmotrema perlatum	F
Parmotrema pseudoreticulatum	R
Physcia tenella	R
Physconia grisea	R
Punctelia subrudecta	O
Pyrrhospora quernea	R
Ramalina farinacea	O
Usnea cornuta	R
Xanthoria parietina	R

[1] species in **bold** are nitrophytes and indicate over enrichment (hypertrophication)
[2] species in **blue** indicate some enrichment (eutrophication) and are typical of trees in parkland or pastures with grazing animals and not expected to be found on heathland sites
[3] species in **red** are acidophytes and expected to be found on nutrient-poor substrates within the heathland landscape

The trees in this area have an abundance of lichens on both the trunks and the branches and twigs. Generally leafy lichens of mesic (neutral) bark dominate but of particular note is the local abundance of the acidophytes *Evernia prunastri* and *Hypogymnia physodes* on the trunks of several Turkey Oaks. Species that indicate high levels of enrichment (nitrophytes) are rare on the trunks, and only noted on one Pedunculate Oak on the southern edge, but are more frequent on the smaller branches and twigs.

6. DISCUSSION

6.1 EPIPHYTIC LICHENS

Epiphytic lichens are one of the best ways of monitoring atmospheric pollutants. At all the sites surveyed the twigs of the oak trees show signs of enrichment with nitrophytes such as *Physcia tenella* and *Xanthoria parietina* particularly prominent. Conversely acidophytes that are sensitive to Nitrogen and Ammonia compounds are rare or absent on the twigs. Filamentous algae which indicate over-enrichment were only noted on twigs on Canford Heath.

The situation is slightly different on the tree trunks with the more exposed and isolated trees supporting nitrophytes, but those under a more closed canopy such as in Parley Wood or the stand of oaks on Ferndown Common, appear to be buffered from the highest levels of pollution and are dominated by leafy or crust-forming lichens of neutral bark (mesophytes) and support several species that are very sensitive to pollutants.

6.2 HEATHLAND LICHENS

Lichens were present in the heathland at all sites but it is apparent that much of the dry and humid heath is not in a favourable condition for them. This is mainly due the fact that the vast majority of the heath is now in a mature to senescent stage in the heather cycle and there is now very little open bare ground that can support a diverse assemblage of species. Only the robust *Cladonia portentosa* survives in any quantity and in places a thick layer of the moss *Hypnum jutlandicum* is present. Very locally some areas have been mown and scrapes made for reptiles, these were the best areas for lichens.

The richest area for terricolous lichens is found over quite a large area of short and open wet heath (**M16a**) in the southern part of Parley Common. This area has a lichen assemblage comparable to some of the better lichen sites on the Dorset Heaths at Godlingston Heath, Holt Heath and Morden Heath and includes the firm damp peat specialists *Cladonia strepsilis* and *Pycnothelia papillaria*, plus the Nationally Scarce *Cladonia zopfii* which in Southern England is confined to the New Forest and Dorset heaths.

Where the lichens present in the heathland appear to be in good condition and not discoloured, bleached or covered in algae, this would indicate that enrichment is currently not a major problem. This finding is backed up by the accompanying bryophytes, including *Cephaloziella divaricata*, *Dicranum scoparium*, *Hypnum jutlandicum*, *Pleurozium schreberi* and *Polystichum juniperinum*, which are all typical of the habitat and have low Ellenberg values for Nitrogen (N).

6.3 WET HEATH & MIRE BRYOPHYTES

Three of the sites, Canford Heath, Kinson Common and Turbary Common, all have small acid mires supporting a good range of *Sphagnum* mosses and associated 'bog liverworts' which are typical of the habitat (**M21a**), and most are confined to naturally very nutrient-poor and infertile soils as well as requiring a clean water source. The Canford Heath site was monitored in 2012 and the other two sites were surveyed in November 1995, therefore all sites have data from which change can be measured.

At all sites the *Sphagnum* appeared to be in good condition and well pigmented. Some minor bleaching was noted on larger more exposed hummocks and this may have been down to the drought conditions during the summer. Most of the species recorded in previous surveys were refound and the mires at Canford Heath and Turbary Common support the Nationally Scarce, *Sphagnum pulchrum*, the Dorset valley mire being a national stronghold. The associated bog liverwort species were also mostly refound and in good health.

The findings would indicate that currently that enrichment is not having a direct impact on the mire bryophyte assemblage. It should be noted however that low levels of enrichment can have a fertilising affect on the surrounding vegetation which may encourage species such as Purple Moor-grass to grow more quickly and out-compete the slower growing bryophytes. Maintaining or increasing grazing levels is important to keep the habitat open and in good condition for the bryophytes.

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APPENDIX I: Bryophyte and lichen species recorded 2022

		Status	Canford Heath	Turbary Common	Kinson Common	Parley Common	Ferndown Common
Bryophytes							
Liverworts							
Aneura pinguis	Greasewort	DN		#			
Calypogeia fissa	Common Pouchwort		#	#			
Calypogeia muelleriana	Mueller's Pouchwort				#		
Cephalozia connivens	Forcipated Pincerwort		#	#			
Cephalozia cf. *macrostachya*	Bog Pincerwort	NS	#				
Cephaloziella divaricata	Common Threadwort		#	#		#	#
Kurzia pauciflora	Bristly Fingerwort	DN	#	#			
Lophocolea semeteres	Southern Crestwort					#	
Mylia anomala	Anomalous Flapwort	DN	#	#			
Odontoschisma sphagni	Bog-moss Flapwort		#	#			
Riccardia latifrons	Bog Germanderwort	DN	#				
Riccardia multifida	Delicate Germanderwort	DN		#			
Mosses							
Archidium alternifolium	Clay Earth-moss	DN		#			#
Aulacomnium palustre	Bog Groove-moss			#	#		
Bryum pseudotriquetrum	Marsh Bryum			#			
Calliergonella cuspidata	Pointed Spear-moss			#	#		
Campylopus brevipilus	Compact Swan-neck Moss	DN				#	
Camppylopus introflexus	Heath Starwort		#	#	#	#	#
Campylopus pyriformis	Dwarf Swan-neck Moss			#	#	#	#
Dicranum scoparium	Broom Fork-moss		#			#	#
Hypnum jutlandicum	Heath Plait-moss		#	#	#	#	#
Leucobryum glaucum	Large White-moss	DN	#			#	

		Status	Canford Heath	Turbary Common	Kinson Common	Parley Common	Ferndown Common
Pleurozium schreberi	Red-stemmed Feather-moss	DN				#	
Polytrichum juniperinum	Juniper Haircap		#	#	#	#	#
Pseudoscleropodium purum	Neat Feather-moss			#			
Sphagnum auriculatum	Cow-horn Bog-moss		#	#	#		
Sphagnum compactum	Compact Bog-moss		#	#		#	#
Sphagnum cuspidatum	Feathery Bog-moss	DN	#	#		#	#
Sphagnum fallax	Flat-topped Bog-moss				#		
Sphagnum fimbriatum	Fringed Bog-moss			#			
Sphagnum palustre	Blunt-leaved Bog-moss				#		
Sphagnum papillosum	Papillose Bog-moss	DN	#	#	#		
Sphagnum pulchrum	Golden Bog-moss	NS; DN	#	#			
Sphagnum rubellum	Red Bog-moss	DN	#	#	#		
Sphagnum subnitens	Lustrous Bog-moss		#	#	#		
Sphagnum tenellum	Soft Bog-moss		#	#		#	
Lichens							
Terricolous							
Cetraria aculeata		DN				#	
Cladonia cervicornis				#			
Cladonia chlorophaea / grayi			#	#		#	#
Cladonia ciliata		DN		#		#	#
Cladonia crispata var. *cetrariiformis*		DN	#	#		#	#
Cladonia diversa			#	#		#	
Cladonia floerkeana			#			#	#
Cladonia furcata				#			
Cladonia glauca		DN				#	

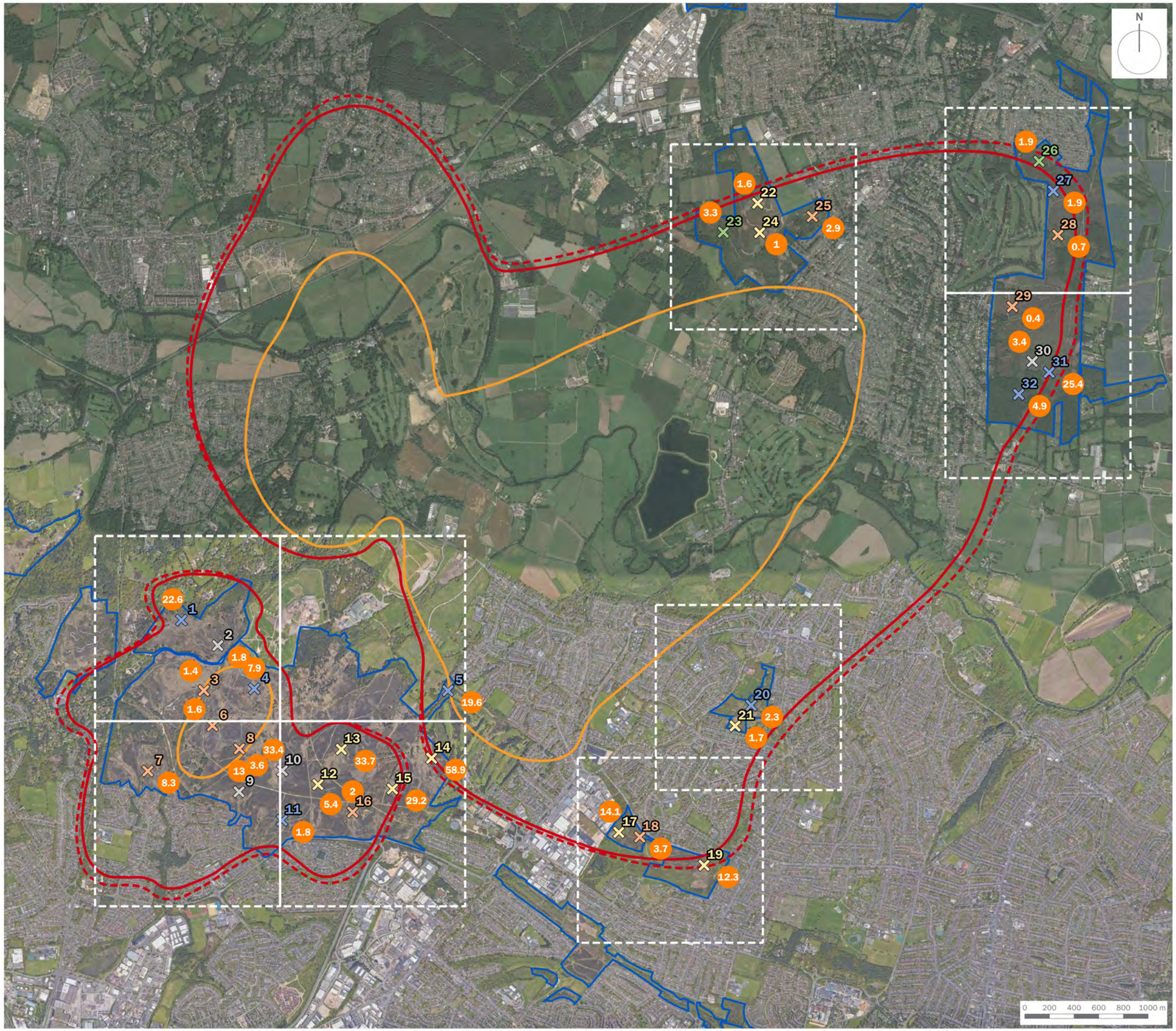
		Status	Canford Heath	Turbary Common	Kinson Common	Parley Common	Ferndown Common
Cladonia macilenta						#	#
Cladonia portentosa			#	#		#	#
Cladonia ramulosa			#	#		#	#
Cladonia rangiformis				#			
Cladonia squamosa 'heathland ecotype'		DN	#			#	#
Cladonia strepsilis		DN	#			#	#
Cladonia subulata							#
Cladonia uncialis subsp. *biuncialis*		DN				#	
Cladonia verticillata		DN	#			#	
Cladonia zopfii		NS; DS				#	
Pycnothelia papillaria		DN				#	
Epiphytes							
Alyxaria varia			#		#		
Anisomeridium biforme				#	#	#	
Anisomeridium ranunculosporum		SOWI; DN				#	
Arthonia punctiformis			#		#		
Arthonia radiata			#	#	#	#	#
Bacidia laurocerasi			#				
Caloplaca obscurella			#				
Candelaria concolor			#	#			
Candelariella reflexa			#	#			#
Catillaria fungoides			#				
Catillaria nigroclavata			#	#		#	#
Cladonia coniocraea						#	
Cliostomum griffithii				#	#	#	

		Status	Canford Heath	Turbary Common	Kinson Common	Parley Common	Ferndown Common
Diarthonis spadicea						#	
Enterographa crassa						#	
Evernia prunastri			#		#		#
Flavoparmelia caperata			#	#	#	#	#
Flavoparmelia soredians			#	#	#	#	#
Fuscidea lightfootii			#			#	#
Graphis elegans						#	
Graphis scripta			#			#	#
Hyperphyscia adglutinata			#	#	#		
Hypogymnia physodes						#	#
Hypogymnia tubulosa							#
Hypotrachyna afrorevoluta			#	#	#	#	#
Hypotrachyna revoluta			#	#	#	#	#
Lecanactis abietina		DN				#	
Lecanora argentata					#		
Lecanora barkmaniana			#				#
Lecanora chlarotera			#	#	#	#	#
Lecanora hybocarpa			#	#	#	#	
Lecanora confusa			#		#		#
Lecidella elaeochroma			#	#	#	#	#
Lepraria finkii				#	#	#	
Melanelia glabratula			#			#	#
Melanelia subaurifera			#	#	#	#	#
Micarea doliformis					#		
Normandina pulchella			#	#	#		
Parmelia saxatilis							#

		Status	Canford Heath	Turbary Common	Kinson Common	Parley Common	Ferndown Common
Parmelia sulcata			#	#	#	#	#
Parmotrema perlatum			#	#	#	#	#
Parmotrema pseudoreticulatum			#				#
Phaeographis dendritica		SOWI; DN				#	
Phaeographis smithii						#	#
Phaeophyscia orbicularis				#			#
Phlyctis argena			#			#	#
Physcia tenella			#	#	#	#	#
Physconia grisea							#
Punctelia borreri			#				
Punctelia jeckeri			#			#	#
Punctelia subrudecta			#	#	#	#	#
Ramalina farinacea			#	#	#	#	#
Ramalina fastigiata			#	#	#	#	#
Snippocea nvea		SOWI; DN				#	
Usnea cornuta					#		#
Xanthoria parietina			#	#	#	#	#
Xanthoria polycarpa			#				

Plans

Plan EDP 1: Soil Sampling Results
(edo7095_d030a 03 May 2023 DJo/GCr)



Special Area of Conservation (SAC)

1.0 Aluminium/Calcium (Al/Ca) Ratio

Habitat Type

- Heath
- Marshy Grass/Bog
- Acid Grass
- Wet Heath
- Mosaic

- 1% of CL - Bog Habitats
- 1% of CL - Acid Grassland Habitats
- 1% of CL - Dwarf Shrub Heath (DSH)

client

MVV Environment Limited

project title

Proposed Energy from Waste Combined Heat and Power Facility at Canford Resource Park

drawing title

Soil Sampling Results (Overview)

date	03 MAY 2023	drawn by	DJo
drawing number	edp7095_d030a	checked	GCr
scale	1:30,000 @ A3	QA	GYo

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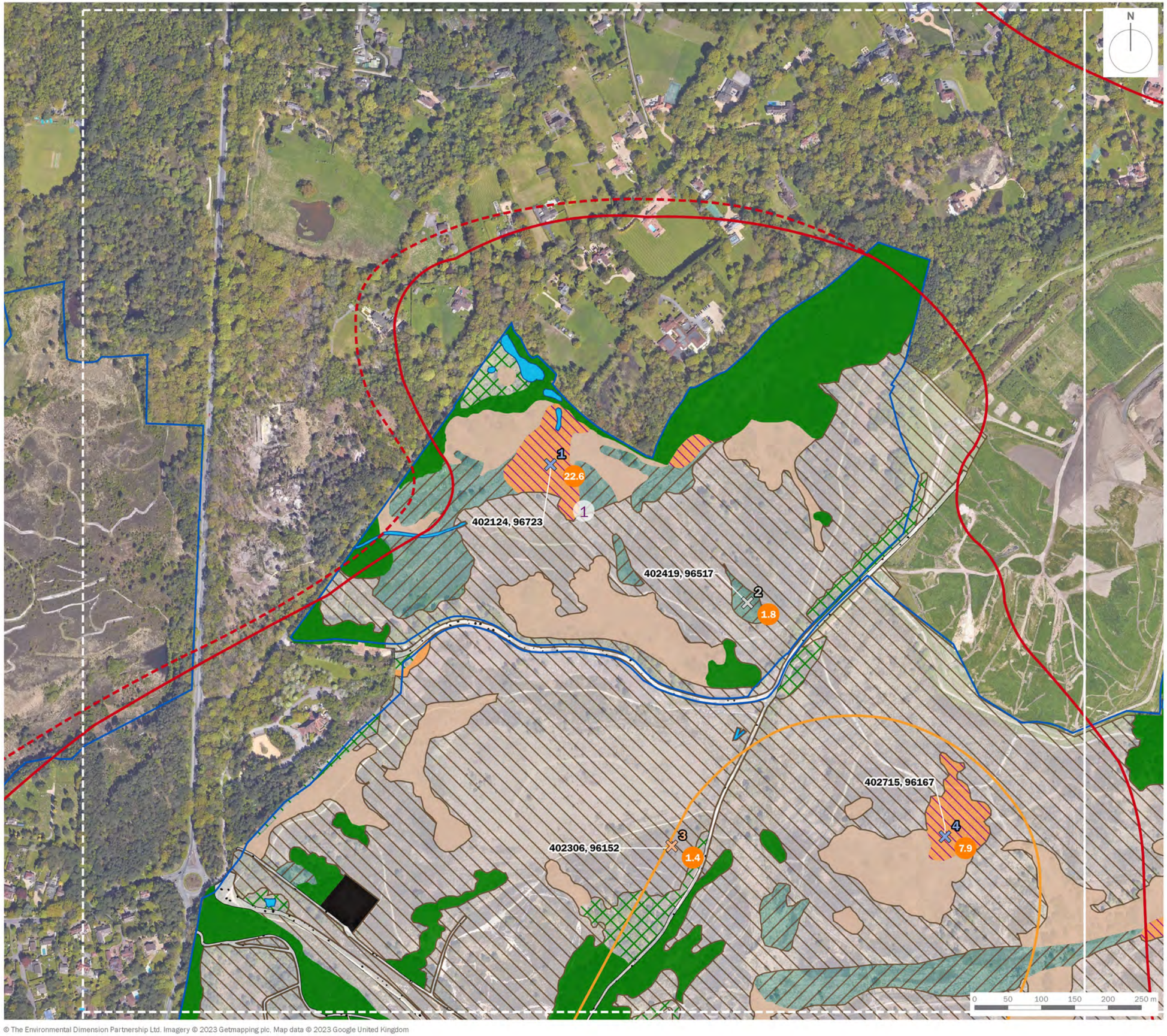

Special Area of Conservation (SAC)

1.0 Aluminium/Calcium (Al/Ca) Ratio

Habitat Type

- Heath
- Marshy Grass/Bog
- Wet Heath
- Woodland
- Tall Ruderal
- Scrub
- Heathland
- Wet Dwarf Shrub Heath
- Bracken
- Unimproved Neutral Grassland
- Marsh/Marshy Grassland/Bog
- Standing Water/Running Water
- Building
- Bare Ground
- 1% of CL - Bog Habitats
- 1% of CL - Acid Grassland Habitats
- 1% of CL - Dwarf Shrub Heath (DSH)

client

MVV Environment Limited

project title

Proposed Energy from Waste Combined Heat and Power Facility at Canford Resource Park

drawing title

Soil Sampling Results (Sheet 1 of 9)

date	03 MAY 2023	drawn by	DJo
drawing number	edp7095_d030a	checked	GCr
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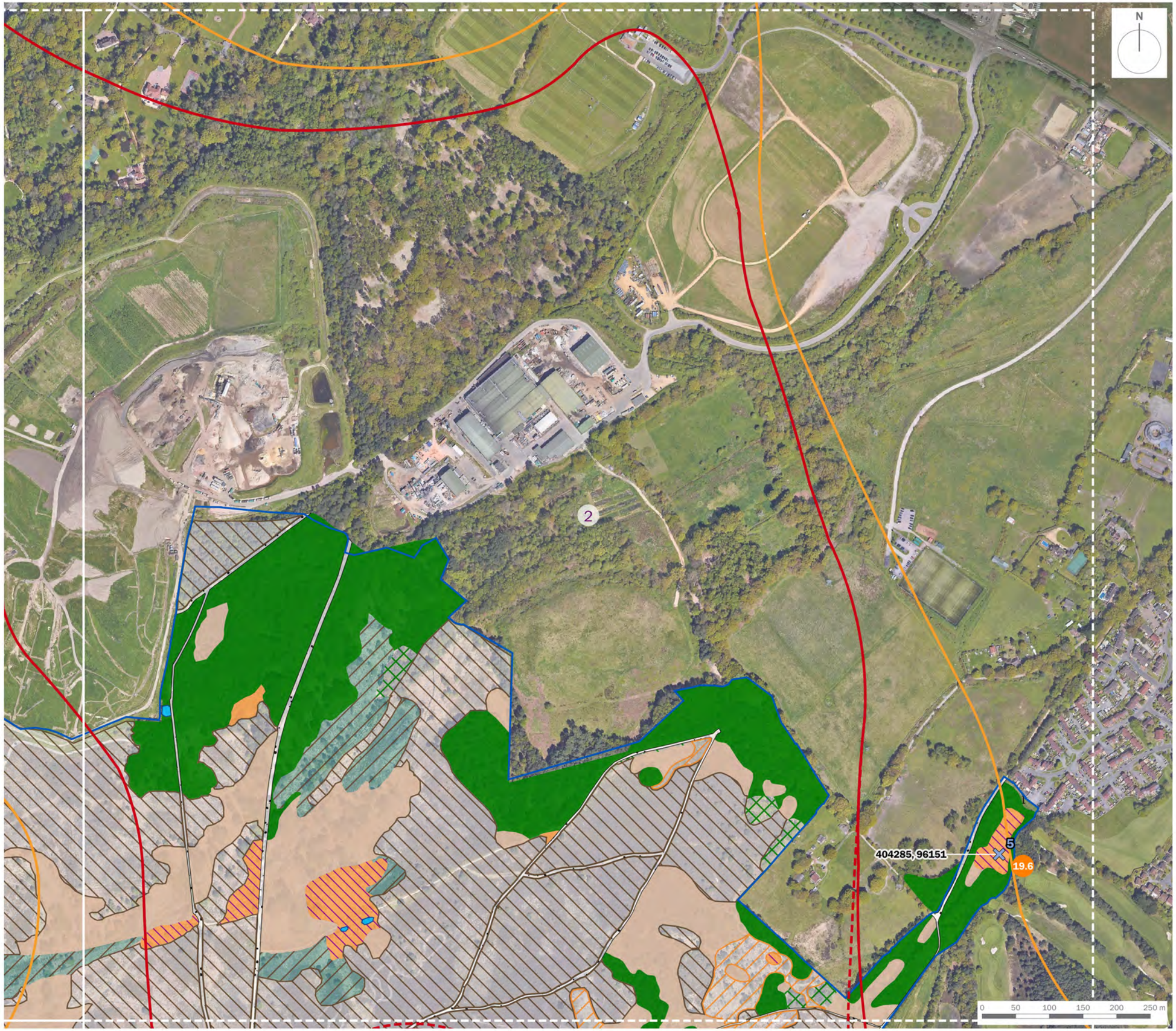

Special Area of Conservation (SAC)

1.0 Aluminium/Calcium (Al/Ca) Ratio

Habitat Type

- Marshy Grass/Bog
- Woodland
- Improved Grassland
- Scrub
- Heathland
- Wet Dwarf Shrub Heath
- Acid Grassland
- Bracken
- Unimproved Neutral Grassland
- Marsh/Marshy Grassland/Bog
- Standing Water/Running Water
- Bare Ground
- 1% of CL - Bog Habitats
- 1% of CL - Acid Grassland Habitats
- 1% of CL - Dwarf Shrub Heath (DSH)

client

MVV Environment Limited

project title

Proposed Energy from Waste Combined Heat and Power Facility at Canford Resource Park

drawing title

Soil Sampling Results (Sheet 2 of 9)

date	**03 MAY 2023**	drawn by	**DJo**
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scale	**1:5,500 @ A3**	QA	**GYo**

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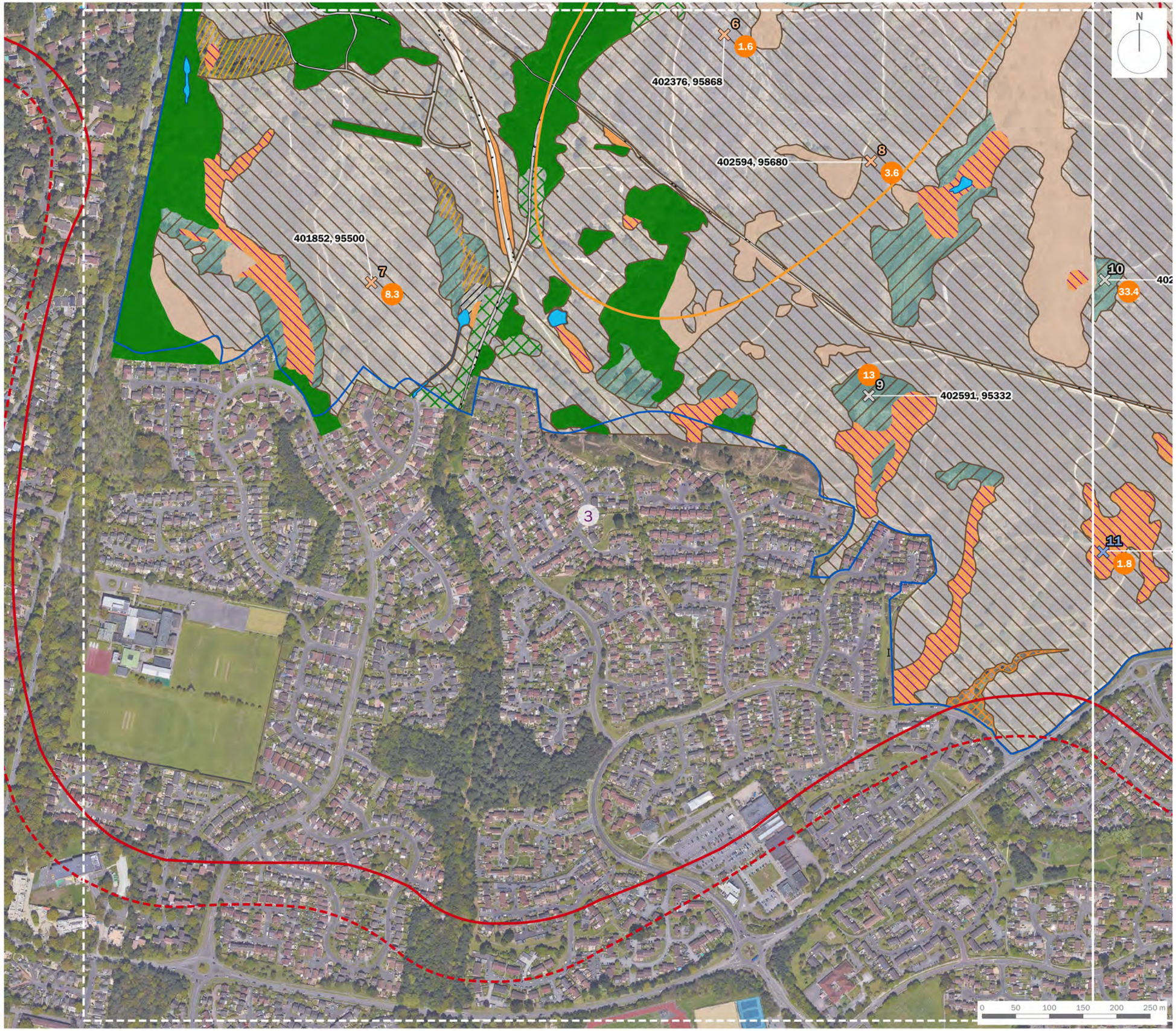

Special Area of Conservation (SAC)

1.0 Aluminium/Calcium (Al/Ca) Ratio

Habitat Type

- Heath
- Marshy Grass/Bog
- Wet Heath
- Woodland
- Tall Ruderal
- Improved Grassland
- Scrub
- Heathland
- Wet Dwarf Shrub Heath
- Bracken
- Unimproved Neutral Grassland
- Unimproved Calcareous Grassland
- Marsh/Marshy Grassland/Bog
- Standing Water/Running Water
- Bare Ground
- Other Habitat
- 1% of CL - Bog Habitats
- 1% of CL - Acid Grassland Habitats
- 1% of CL - Dwarf Shrub Heath (DSH)

client

MVV Environment Limited

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Proposed Energy from Waste Combined Heat and Power Facility at Canford Resource Park

drawing title

Soil Sampling Results (Sheet 3 of 9)

date	03 MAY 2023	drawn by	DJo
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N

13 403421, 95676 33.7

14 404152, 95604 58.9

10 402942, 95503 33.4

12 403231, 95390 5.4

15 403835, 95355 29.2

2 16 403512, 95167

4

11 402939, 95100 1.8

0 50 100 150 200 250 m

Special Area of Conservation (SAC)

1.0 Aluminium/Calcium (Al/Ca) Ratio

Habitat Type

- Heath
- Marshy Grass/Bog
- Wet Heath
- Acid Grass
- Woodland
- Tall Ruderal
- Scrub
- Heathland
- Wet Dwarf Shrub Heath
- Acid Grassland
- Bracken
- Bracken/Acid Grassland Mix
- Unimproved Calcareous Grassland
- Marsh/Marshy Grassland/Bog
- Standing Water/Running Water
- Building
- Bare Ground
- 1% of CL - Bog Habitats
- 1% of CL - Acid Grassland Habitats
- 1% of CL - Dwarf Shrub Heath (DSH)

client

MVV Environment Limited

project title

Proposed Energy from Waste Combined Heat and Power Facility at Canford Resource Park

drawing title

Soil Sampling Results (Sheet 4 of 9)

date	03 MAY 2023	drawn by	DJo
drawing number	edp7095_d030a	checked	GCr
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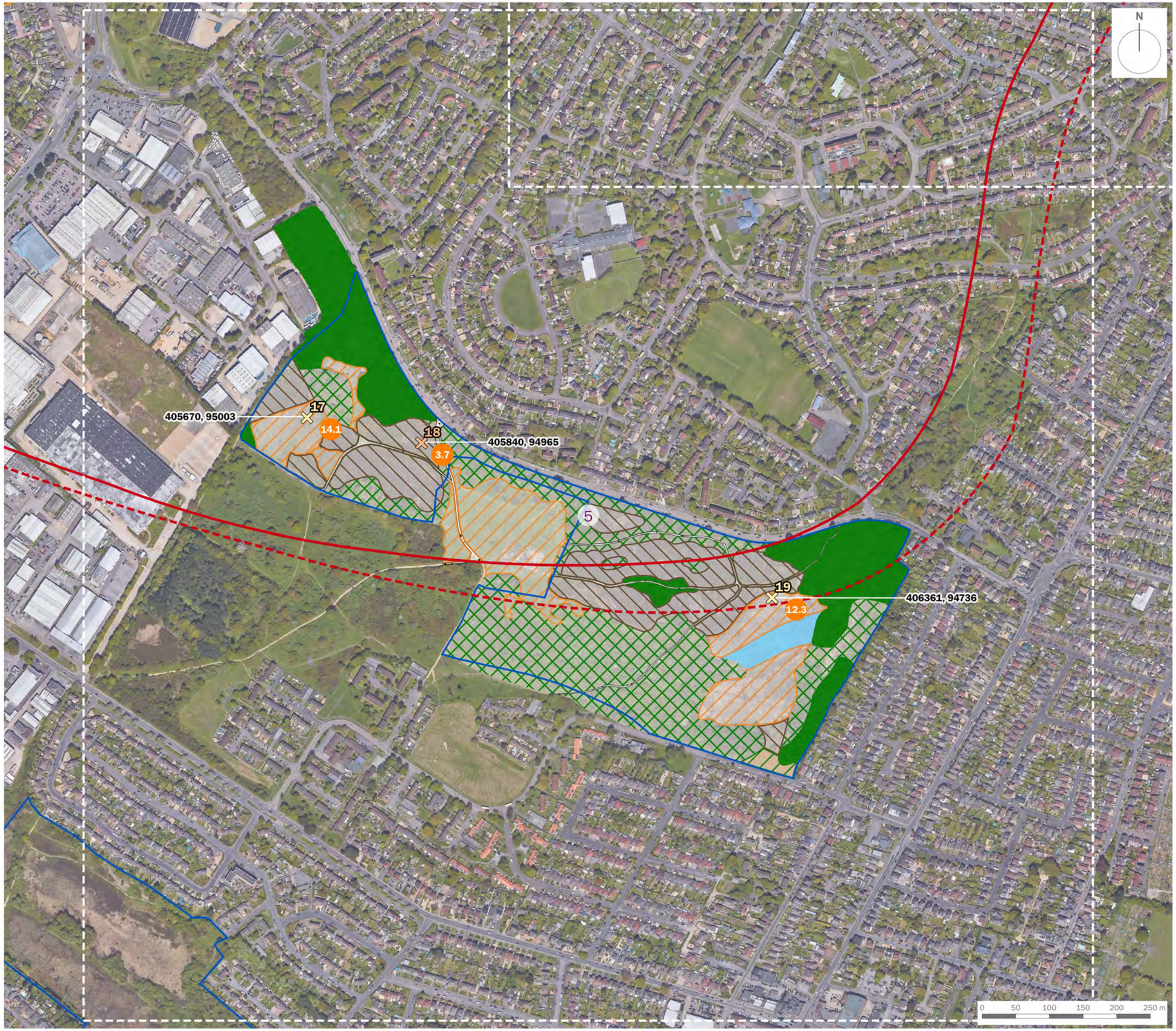

Special Area of Conservation (SAC)

1.0 Aluminium/Calcium (Al/Ca) Ratio

Habitat Type

- Heath
- Acid Grass
- Woodland
- Scrub
- Heathland
- Acid Grassland
- Bracken/Scrub Mix
- Reeds
- Bare Ground
- 1% of CL - Bog Habitats
- 1% of CL - Acid Grassland Habitats
- 1% of CL - Dwarf Shrub Heath (DSH)

client

MVV Environment Limited

project title

Proposed Energy from Waste Combined Heat and Power Facility at Canford Resource Park

drawing title

Soil Sampling Results (Sheet 5 of 9)

date	03 MAY 2023	drawn by	DJo
drawing number	edp7095_d030a	checked	GCr
scale	1:5,500 @ A3	QA	GYo

the environmental dimension partnership

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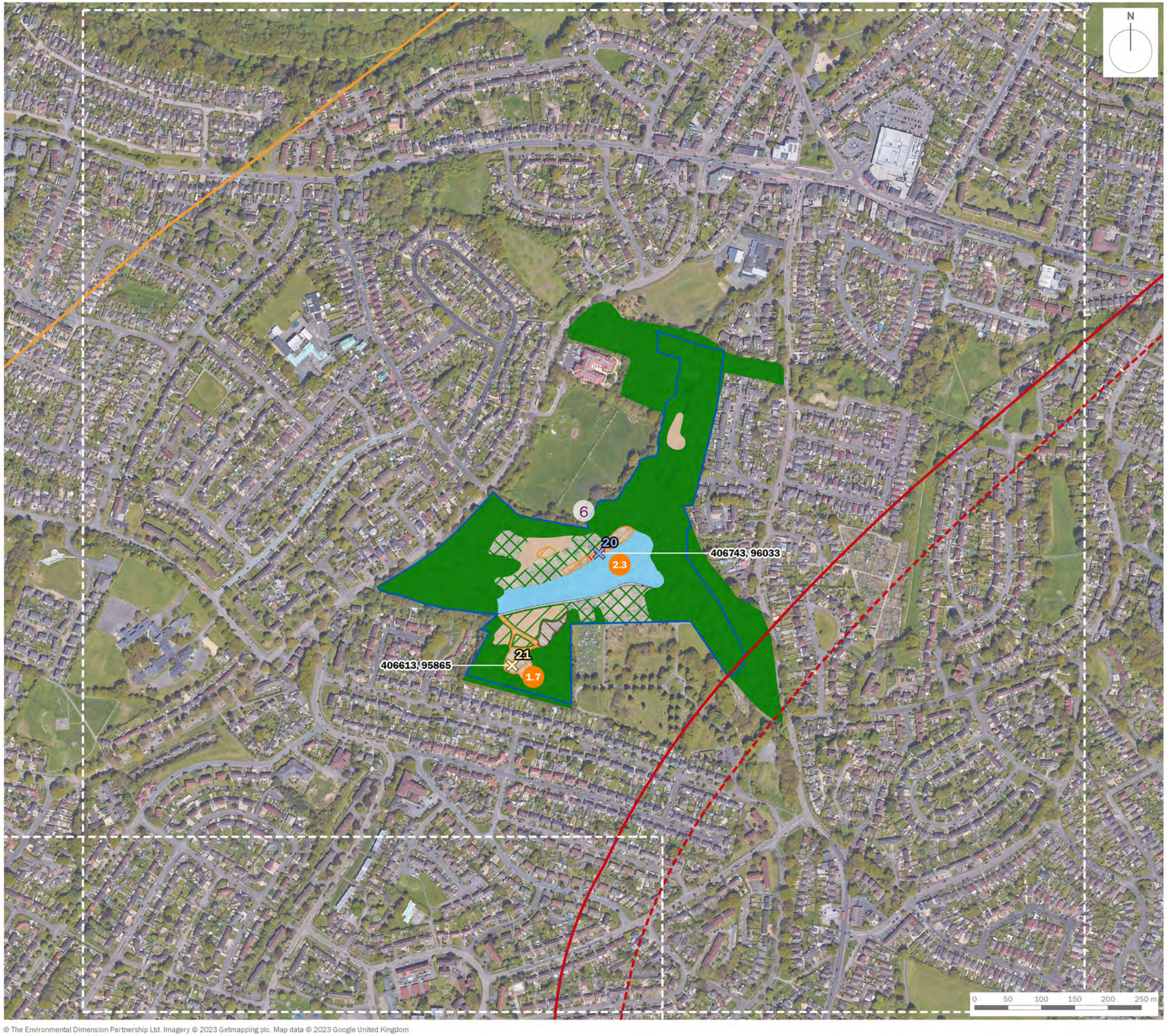

Special Area of Conservation (SAC)

1.0 Aluminium/Calcium (Al/Ca) Ratio

Habitat Type

- Marshy Grass/Bog
- Acid Grass
- Woodland
- Scrub
- Heathland
- Acid Grassland
- Bracken
- Bracken/Scrub Mix
- Marsh/Marshy Grassland/Bog
- Reeds
- Bare Ground
- 1% of CL - Bog Habitats
- 1% of CL - Acid Grassland Habitats
- 1% of CL - Dwarf Shrub Heath (DSH)

client

MVV Environment Limited

project title

Proposed Energy from Waste Combined Heat and Power Facility at Canford Resource Park

drawing title

Soil Sampling Results (Sheet 6 of 9)

date	03 MAY 2023	drawn by	DJo
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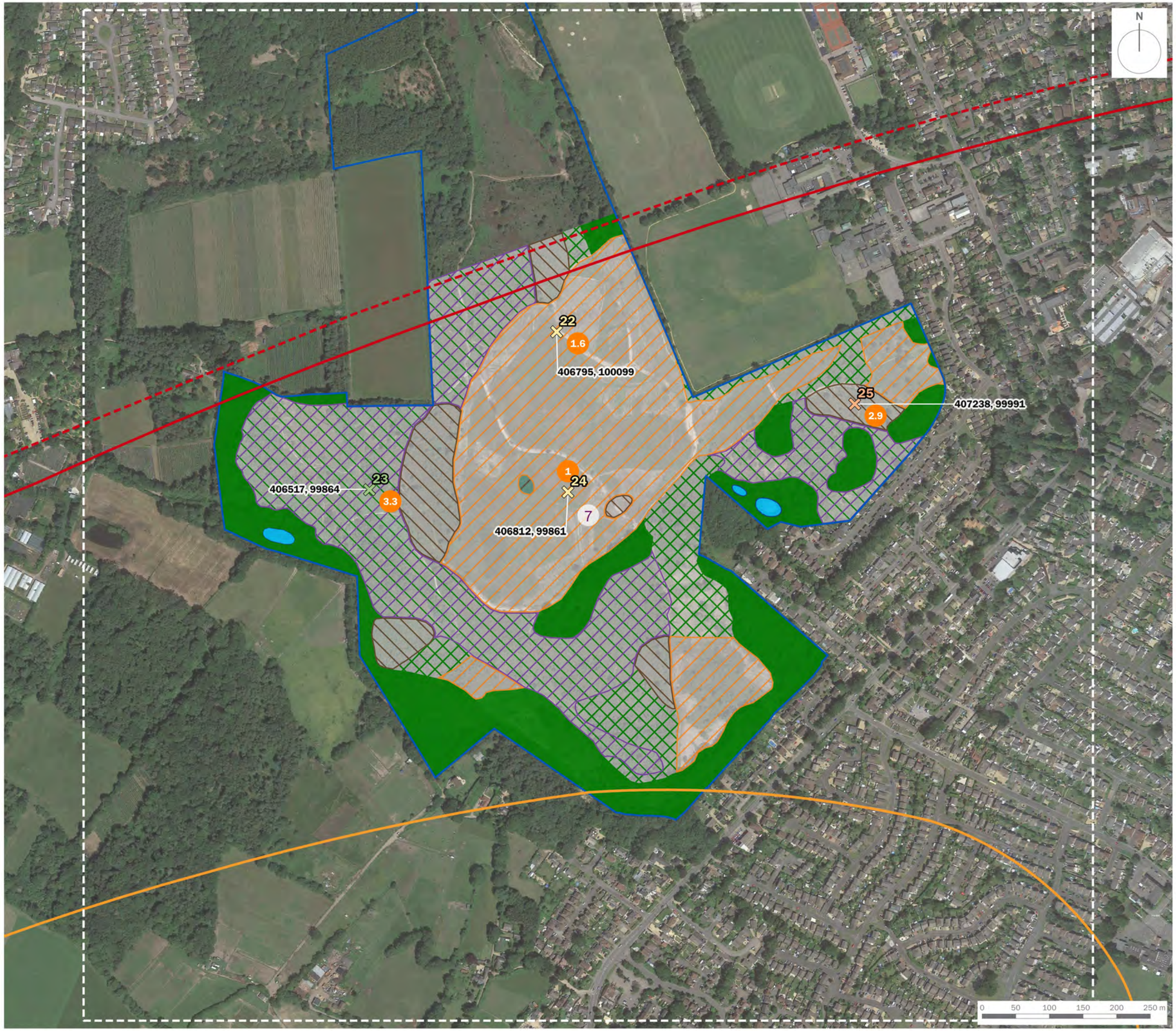

Special Area of Conservation (SAC)

1.0 Aluminium/Calcium (Al/Ca) Ratio

Habitat Type

- Heath
- Acid Grass
- Mosaic
- Woodland
- Scrub
- Heathland
- Wet Dwarf Shrub Heath
- Acid Grassland
- Mosaic of Heather, Common Gorse, Pine, Birch and Bracken
- Standing Water/Running Water
- 1% of CL - Bog Habitats
- 1% of CL - Acid Grassland Habitats
- 1% of CL - Dwarf Shrub Heath (DSH)

client

MVV Environment Limited

project title

Proposed Energy from Waste Combined Heat and Power Facility at Canford Resource Park

drawing title

Soil Sampling Results (Sheet 7 of 9)

date	03 MAY 2023	drawn by	DJo
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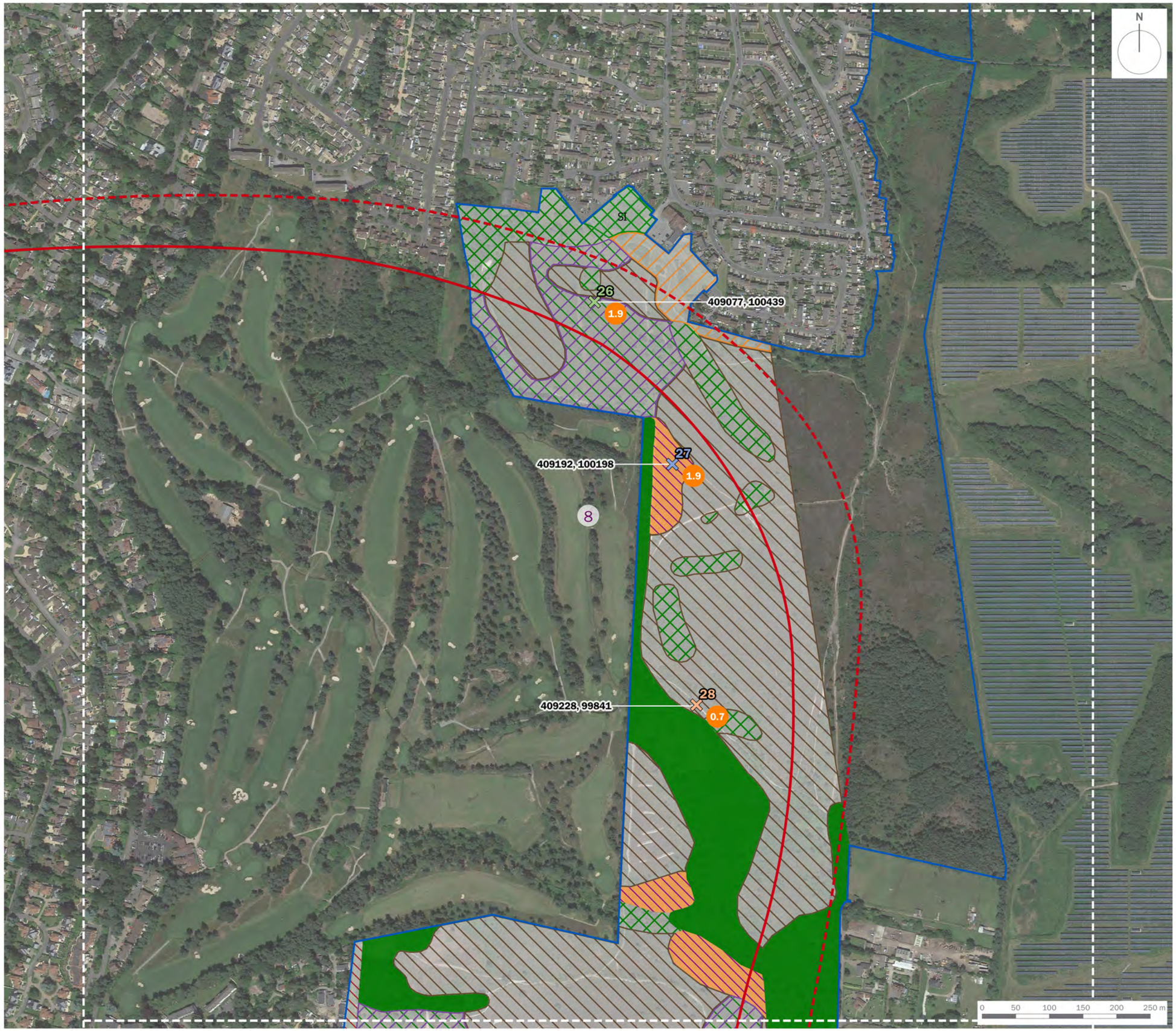

Special Area of Conservation (SAC)

1.0 Aluminium/Calcium (Al/Ca) Ratio

Habitat Type

- Heath
- Marshy Grass/Bog
- Mosaic
- Woodland
- SI Poor Semi-improved Grassland with Dense Scrub
- Scrub
- Heathland
- Acid Grassland
- Mosaic of Heather, Common Gorse, Pine, Birch and Bracken
- Marsh/Marshy Grassland/Bog
- No Survey Access
- 1% of CL - Bog Habitats
- 1% of CL - Acid Grassland Habitats

client

MVV Environment Limited

project title

Proposed Energy from Waste Combined Heat and Power Facility at Canford Resource Park

drawing title

Soil Sampling Results (Sheet 8 of 9)

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Special Area of Conservation (SAC)

1.0 Aluminium/Calcium (Al/Ca) Ratio

Habitat Type

- Heath
- Marshy Grass/Bog
- Wet Heath
- Woodland
- Scrub
- Heathland
- Wet Dwarf Shrub Heath
- Mosaic of Heather, Common Gorse, Pine, Birch and Bracken
- Marsh/Marshy Grassland/Bog
- No Survey Access
- 1% of CL - Bog Habitats
- 1% of CL - Acid Grassland Habitats

client

MVV Environment Limited

project title

Proposed Energy from Waste Combined Heat and Power Facility at Canford Resource Park

drawing title

Soil Sampling Results (Sheet 9 of 9)

date	03 MAY 2023	drawn by	DJo
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