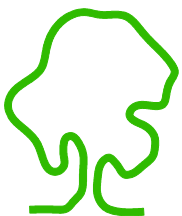


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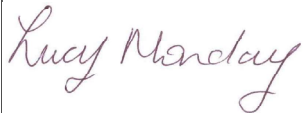
October 2020



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Environmental Assessment Services Ltd

REPORT DATA SHEET

Requirement	Data
Report Reference	AlpineHomes/Yachthaven/EcIA2020
Date	Issued - October 2020
Client	Alpine Homes
Report type	Ecological Impact Assessment
Purpose	MMO Licence Application
Revisions	August 2020 – Botanical and Eel Grass survey results incorporated October 2020 – Marine Invertebrate survey results incorporated
Prepared by	Emily Cooper BSc (Hons) PGCert  Signed
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NON-TECHNICAL SUMMARY

Environmental Assessment Services Ltd has been appointed to prepare an Ecological Impact Assessment in relation to the proposed redevelopment of the slipway and sea wall, and construction of a floating pontoon and moorings at Yachthaven development, Hayling Island.

The site (as existing) comprises a slipway, currently in an unserviceable condition, and dilapidated sea walls. The wider site is a former boat yard which is in the process of being redeveloped for residential use. It is proposed to remove and remediate sections of the sea wall, re-instate the slipway and construct a floating pontoon with 12 moorings.

The aim of this report is to collate preliminary, baseline information on the conservation and ecological status of the site in terms of habitats and species, within the framework of current environmental legislation, and provide recommendations in relation to the proposed redevelopment of the site, where appropriate.

This report is to form part of an Environmental Statement (ES) for submission to the Marine Management Organisation (MMO) pursuant of a licence relating to the coastal aspects of the development approved by Havant District Council under planning application number APP/13/00317.

The assessment comprised a desk-based study, including a review of ecological assessments completed to date in relation to the development of the whole site (terrestrial and marine), together with consultation with statutory and non-statutory bodies and a preliminary ecological appraisal (walkover survey) undertaken in July 2020 to identify features of ecological value and the site's likely potential to support protected and other notable species.

The site is located within the Solent Maritime and Chichester and Langstone Harbour European Marine Site, the Solent Maritime Special Area of Conservation, the Chichester and Langstone Special Protection Area, the Chichester and Langstone Harbours Ramsar site, Chichester Harbour Site of Special Scientific Interest, Chichester Harbour Area of Outstanding Natural Beauty and is within 100 m of Marine Conservation Zone Seagrass Beds and 500 m of Gutner Point Local Nature Reserve. There are also six Local Sites of Important Nature Conservation and six Priority Habitats within 1 km of the site, including

good quality, semi-improved grassland, intertidal mudflats and seagrass beds on site. In addition to these sites and habitats, and the species for which many of them are notable, the site also supports (or has the potential to support) notable and protected species including coastal and aquatic plants, invertebrates, reptiles, birds, pinnipeds, fish and seven trees protected by Tree Preservation Orders, which may be affected by the proposed development.

The current study (including consideration of recent eelgrass mapping and marine invertebrate analysis) has not identified any new habitats or species in addition to those identified during earlier assessment undertaken for planning submission to Havant Borough Council. In addition, no new impacts of the planning application as approved by Havant Borough Council have been identified as part of this assessment. In this case it is considered that the recommended mitigation and enhancement measures contained within the Ecological Management Plan prepared by EcoSupport Ltd in November 2017 remain valid and should be implemented as appropriate.

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Ecological Impact Assessment

October 2020

1. INTRODUCTION

1.1 Background

The following report, prepared by Environmental Assessment Services Limited, is a preliminary assessment of the baseline status of the ecology of land at Yachthaven, Hayling Island in Hampshire. Herein referred to as 'the site'. The Ordnance Survey map reference for the centre of the site is SU 72903 01873. See Appendix A: Site Location Plan.

The site comprises the following key features to be redeveloped:

- i. Slipway
- ii. Sea Defences
- iii. Floating Pontoon and moorings

The wider site is in the process of being developed for residential use, this report relates to plans for the renovation of the slipway and sea defences, and the construction of a floating pontoon and moorings for twelve boats. Six of the available moorings will be for the residents of the properties being developed, the other six would be available for non-residents. This report includes reference to all associated construction infrastructure and storage needs.

1.2 Aim of the Report

The aim of the report is to collate preliminary, baseline information on the conservation and ecological status of the site in terms of habitats and species, within the framework of current environmental legislation.

The report also evaluates the potential of the site to support protected species, in particular for:

- Animals and plants listed under Schedules 1 and 5, and Schedule 8, respectively, of the Wildlife and Countryside Act 1981 (WCA) as amended, and those European protected species listed under Schedules 2 and 5 of The Conservation of Habitats and Species Regulations 2017.
- Plants and animals with Red Data Book¹ or Notable² status.

¹ The World Conservation Union Red List of threatened species provides taxonomic, conservation status and distribution information on taxa (species or group of related species) evaluated to determine their relative risk of extinction.

² Notable (or Nationally Scarce) species occur in 16 – 100 10 km squares in Britain.

- Plants, animals and habitats identified as Priority Species / Habitats or Species / Habitats of Principal Importance for Conservation in England (formerly UK Biodiversity Action Plan)³.

Where the site includes features of ecological value and/or has potential for protected species, an assessment of the likely impacts of the proposal is made, together with recommendations for any further surveying, mitigation and enhancement as considered appropriate.

1.3 Legislation

The legislation relevant to this study is:

- i. Wildlife and Countryside Act 1981 (as amended), which transposes into UK law the Convention on the Conservation of European Wildlife and Natural Habitats (known as the “Bern Convention”) and the Birds Directive 2009.
- ii. The Countryside and Rights of Way Act (CROW) 2000, which strengthens the legal protection for threatened species.
- iii. The Natural Environment and Rural Communities Act (NERC) 2006, which through Section 41 provides a list of habitats and species of principal importance for biodiversity conservation (Priority Habitats and Species) in England.
- iv. The Conservation of Habitats and Species Regulations 2017. These consolidate all the various amendments made to the Conservation (Natural Habitats, &c.) Regulations 1994, which transposed the Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (EC Habitats Directive) into national law.
- v. Protection of Badgers Act 1992, which safeguards both the animals and their setts.
- vi. The Hedgerow Regulations 1997 (made under section 97 of The Environment Act 1995), which make provisions for the protection of important hedgerows.
- vii. National Planning Policy Framework (NPPF) which makes requirements for the protection and enhancement of biodiversity through the planning system.
- viii. The Marine and Coastal Access Act 2009 which established the Marine Management Organisation (MMO) and in turn developed Marine Conservation Zones (MCZs) for the protection of the Marine environment.

1.4 Assessment Method

This assessment has been prepared generally in accordance with the CIEEM EcIA guidelines, as applicable, as recognised by the British Standard on Biodiversity BS42020:2013.

³ Species derived from Section 41 list of the Natural Environmental and Rural Communities (NERC) Act 2006 + the hen harrier.

The assessment was undertaken in three stages:

- a) Review of existing ecological reports and development plans prepared in relation to the current proposal.
- b) Updated consultation: comprising data searches by Hampshire Biodiversity Records Centre (HBRC), Havant Borough Council, NBN Atlas, Magic Mapping, Chichester Harbour Conservancy, Hampshire and Isle of Wight Wildlife Trust.
- c) Preliminary ecological appraisal (walkover survey) carried out on 2 July 2020 to:
 - Assess the baseline status of the site.
 - Identify its use by species of flora and fauna protected or controlled under the Wildlife and Countryside Act, 1981 and associated European legislation.
 - Identify notable features of interest that should or could be retained and/or enhanced as part of the proposals.

2. CONSULTATION AND BASELINE DATA SEARCH

2.1 Hampshire Biodiversity Record Centre

- 2.1.1 Data obtained from Hampshire Biodiversity Record Centre (HBRC) provided information on statutory and non-statutory designated sites and records of protected and notable species within a 1 km radius surrounding the Ordnance Survey grid reference SU 72903 01873.
- 2.1.2 The statutory and non-statutory designated sites identified by HBRC are set out in section 3 below together with an assessment of the potential impact/s of the proposed development.
- 2.1.3 Records of protected and rare species within 1 km of the site have been provided by HBRC. These records are discussed under the protected species headings in Section 5 below, together with an assessment of the potential impact of the proposed development on these species.

2.2 British Trust for Ornithology

- 2.2.1 The British Trust for Ornithology (BTO) were consulted in April 2020 regarding their records for birds recorded within Chichester Harbour (West-Mid Hayling). A summary of the records provided (together with information from other providers and site surveys completed in relation to the proposed development) and an assessment of the likely impacts of the proposed development on birds is given in section 5 below.

2.3 Havant Borough Council

- 2.3.1 Havant Borough Council's online database was accessed for information on Tree Preservation Orders (TPOs) and conservation areas within and adjacent to the site. Searches of the online database show that there are seven trees/groups of trees protected by TPOs within the Yachthaven residential development area. See section 5 below.

2.4 Chichester Harbour Conservancy

Chichester Harbour Conservancy were emailed and given the opportunity to provide feedback on the plans and how they would primarily affect the Chichester Harbour Area of Outstanding Natural Beauty. The Chichester Harbour Conservancy Ecologist comments have been incorporated into the ecological impact assessment, with further surveying and mitigation recommendations as appropriate (see sections 5 and 6).

2.5 Hampshire and Isle of Wight Wildlife Trust

The Hampshire and Isle of Wight Wildlife trust conduct mapping of the seagrass beds and are instrumental in the production and management of the Solent Waders and Brent Goose Strategy. The latest available data from both projects was reviewed as part of this report.

2.6 Magic Mapping

Defra's 'MAGIC' GIS mapping system was used to obtain additional information on existing and potential habitat types which may be present at the site.

2.7 Ocean Biogeographic Information System

Marine species of interest were checked in the Ocean Biogeographic Information System for details on their distribution and abundance in the site area. These records are discussed under the protected species headings in Section 5 below together with an assessment of the potential impact of the proposed development on these species.

2.8 NBN Atlas

Marine species of interest were checked in the NBN Atlas for more specific details on their distribution and abundance in the site area. These records are discussed under the protected species headings in Section 5 below, together with an assessment of the potential impact of the proposed development on these species.

3. DESIGNATED SITES AND PRIORITY HABITATS

The following statutory and non-statutory sites have been identified (by HBRC) within 1 km of the site:

Site	Qualifying feature/s	Distance from the site
Solent Maritime and Chichester and Langstone Harbour EMS	See 3.2.2	On site
Solent Maritime SAC	See 3.2.3	On site
Chichester and Langstone Harbours SPA	See 3.2.4	On site
Chichester and Langstone Harbours Ramsar site	See 3.2.5	On site
Chichester Harbour SSSI	See 3.2.6	On site
Gutner Point (LNR)	See 3.2.7	~ 500 m
Chichester Harbour AONB	See 3.2.8	On site
MCZ Seagrass Beds	See 3.2.9	>100 m
SINCs x 6	See 3.2.10	On site

EMS – European Marine Site, SAC – Special Area of Conservation, SPA – Special Protection Area, Ramsar Site - Wetland of International Importance under the Ramsar Convention, SSSI - Site of Special Scientific Interest, LNR - Local Nature Reserve, AONB - Area of Outstanding Natural Beauty, MCZ - Marine Conservation Zone, SINCI - Local Sites of Important Nature Conservation.

3.1 Solent Maritime and Chichester Harbour European Marine Site (EMS)

The Slipway, Sea Defences, Pontoon and Moorings are in the EMS.

EMS collectively describes the SAC and SPA that are covered by tidal waters. These are not a statutory site designation but a management unit for SACs and SPAs. The requirements for EMS sites are to contribute to the favourable conservation status of designated species, avoid deterioration and disturbance of species, thorough assessment of any plans which have the capacity to impact species and habitats, and monitoring of habitats, species and activities. The EMS should also take into account the social, economic, cultural and recreational needs of the local community. More detail on the SAC and SPA designations is given below.

3.2 Solent Maritime Special Area of Conservation (SAC)

The Slipway, Sea Defences, Pontoon and Moorings are in the SAC.

The Solent Maritime SAC has been designated under the Habitats Directive for its complex marine and estuarine habitats. Ten qualifying habitats are listed within the citation, including salt meadows and mudflats, and sandflats not covered by seawater at low tide.

Key features and species within the SAC include smooth cordgrass *Spartina alterniflora*, small cordgrass *S. maritima*, and the Desmoulin's whorl snail *Vertigo moulinsiana*.

The management approaches to the SAC are to ensure the integrity of the site is maintained or restored, and to achieve favourable conservation status by maintaining or restoring the extent and distribution of habitats, and the structure and function of habitats. Additionally, to maintain or restore the structure and function of qualifying species, supporting the processes by which qualifying species rely, and to support the populations and distribution of these species.

3.3 Chichester and Langstone Harbour Special Protection Area (SPA)

The Slipway, Sea Defences, Pontoon and Moorings are in the SPA. The SPA does not cover land above the high tide mark.

The Chichester and Langstone Harbour SPA has been designated under the Birds Directive due to the high populations of wintering wildfowl (average 25000) and waders (average 75000), as well as breeding birds within the harbour using the extensive wetland areas. Annex I species present include little tern *Sterna albifrons*, little egret *Egretta garzetta* and dark-bellied brent goose *Branta bernicla bernicla*.

Management approaches to SPA are to ensure that the integrity of the site is maintained or restored as appropriate and to ensure that the site contributes to achieving the aims of the Wild Birds Directive by maintaining or restoring the extent and distribution, structure and function, and supporting processes of the habitats of the qualifying features, and those processes on which they rely. Additional management approaches are maintaining or restoring populations and distribution of each of the species these habitats support.

3.4 Chichester and Langstone Harbours Ramsar

The Slipway, Sea Defences, Pontoon and Moorings are in the Ramsar site.

Chichester and Langstone Harbour is declared a Wetland of International Importance under the Ramsar Convention. The Ramsar designation cites the extensive intertidal mudflats, saltmarsh, sand and shingle spits as part of its principle features. The mudflats being key in the support of eelgrass *Zostera spp* and gutweed *Enteromorpha*, providing feeding grounds for wintering birds, and the saltmarshes providing roosting sites.

Management principles for Ramsar sites are the preventing, stopping and reversing the global decline of wetlands.

3.5 Chichester Harbour Site of Special Scientific Interest (SSSI)

The Slipway, Sea Defences, Pontoon and Moorings are in the SSSI.

Chichester Harbour SSSI is designated due to its expansive estuarine basin exposing mud and sandflats, this providing habitat for significant numbers of wintering wildfowl and waders. The saltmarsh habitats fringing the mudflats are rich in cordgrass and other saltmarsh species. Unimproved pastures behind sea walls also host species which provide alternative feeding grounds to overwintering birds.

English Nature's management views of Chichester Harbour SSSI, with regards to littoral sediments, include maintaining good quality water and sediment, maintaining sediment budget, minimising disturbance to overwintering birds and maintaining a dynamic coastline which includes the provision of land for roll back to take place in the event of sea level rise. Wider management includes the control of recreational activities.

3.6 Chichester Harbour Area of Outstanding Natural Beauty (AONB)

The site lies on the border of the AONB, with the landward not being within the AONB and the seaward being in the AONB. The Slipway, Sea Defences, Pontoon and Moorings are in the AONB.

Chichester Harbour is designated an AONB with the primary purpose of conserving and enhancing natural beauty. The AONB management plan states that the needs of agriculture, forestry and rural industries, as well as the social and economic needs of the local communities, should be taken into account when planning and that regard should be paid to those developments that conserve and enhance the environment.

Management of the AONB is overseen by the Chichester Harbour Conservancy, who provide detailed management plans and approaches to development within the harbour area with the aims of conserving the natural beauty of the Harbour. Chichester Harbour Conservancy have been consulted as part of this assessment and their views and concerns considered.

3.7 Gutner Point Local Nature Reserve (LNR)

Gutner Point is located >500 m east of the site.

Gutner Point is designated by Havant Borough Council as an LNR. Gutner Point is the largest roosting site of the Dark Bellied Brent Goose in the Solent. Gutner Point is classed as a core site under the Solent Waders and Brent Goose Strategy. Adjacent to Gutner Point in the Emsworth Channel is one of the largest seagrass meadows in Chichester Harbour, making it an important habitat and feeding ground for overwintering birds.

Management of the reserve includes being closed to the public to ensure that birds are not disturbed.

3.8 Marine Conservation Zone (MCZ) Features - Seagrass

The site is not within a MCZ, however seagrass beds (which have been recorded in the Mill Rithe) are an MCZ feature.

MCZ features form part of the MMO's scoping requirements to consider. Seagrass beds border the proposed pontoon and moorings area.

3.9 Sites of Importance for Nature Conservation (SINCs)

Sites which are considered to be of particular importance for nature conservation within Hampshire, in addition to the statutory designated sites, are referred to as Sites of Importance for Nature Conservation (SINCs).

There are six SINCs within 1 km of the site, ranging from 0.7 < 7.6 ha in area. Their selection criteria include ancient and semi-natural woodlands, agriculturally

unimproved grasslands, semi-natural coastal and estuarine habitats and sites which support one or more notable species.

The closest, and largest of the SINC's is HV0096, which is described as fields and saltmarsh south of Copse Lane and includes the Yachthaven Coastal Meadow area.

3.10 Priority Habitats

The site has been assessed for its potential to include or be part of (BAP) Priority Habitat as listed on Section 41 of the Natural Environment and Rural Communities Act 2006 (NERC Act). Priority Habitats, and National Habitat Network Classifications within a 1 km radius of the site include the following:

Terrestrial Habitats

- Deciduous woodland, >100 m east
- Good quality, semi-improved grassland (habitat restoration/creation site) ~ 500 m east

Coastal Habitats

- Coastal Saltmarsh, ~ 125 m south
- Coastal Flood Plain and Grazing Marsh, ~ 630 m east
- Intertidal Mudflats (on site)
- Seagrass Beds (on site)

These habitats and an assessment of the likely impacts on these habitats is given below, with relevant mitigation given in Section 6.

3.10.1 *Deciduous Woodland*

There is a small area of deciduous woodland located > 100 m east of the site and a second adjacent to the site entrance on Copse Lane. Due to their proximity from the site, it is not considered that either woodland habitat would be impacted by the proposal.

The eastern boundary of the site, and the adjacent plot to the east are classified under the National Forest Inventory as being a mainly mixed broadleaved habitat. However, the site walkover showed there to be a small number of trees located on south east corner of the site and no trees on the adjacent site.

3.10.2 *Good Quality Semi-Improved Grassland*

An area of potential Good Quality Semi – Improved Grassland is located at Gutner Point, ~ 500 m east of the site. This area is not presently identified as a priority habitat, however under the National Habitat Network mapping it is classified as a site for habitat restoration/creation, thus it has potential to be. Due to its proximity from the site, it is not considered it would be impacted by the proposal.

3.10.3 *Coastal Saltmarsh*

The closest area of Coastal Saltmarsh is ~125 m to the south on the Verner Common coastline (across the Mill Rithe). Due to its proximity from the site, it is

not considered that the Coastal Saltmarsh habitat will be directly impacted by the proposed works. General disturbance and pollution protection measures will apply.

3.10.4 *Coastal Flood Plain and Grazing Marsh*

The closest area of Coastal Flood Plain and Grazing Marsh is ~ 630 m to the east, located on the eastern side of Gutner Point on the Emsworth Channel. Due to its proximity from the site, it is not considered that the Coastal Flood Plain and Grazing Marsh habitat will be directly impacted by the proposal.

3.10.5 *Intertidal Mudflats*

HBRC, and DEFRA's 'magic' GIS system, show all tidal areas within 1 km of the site as 'Intertidal Mudflats'. Intertidal mudflats are a priority habitat and develop where large quantities of silt derived from rivers are deposited in estuaries. The sediment is stable and hosts species such as polychaete worms and bivalve molluscs. The high biomass of invertebrates in mudflats provide an important food source for waders and wildfowl. Intertidal mudflats are a habitat of principal importance for the conservation of biodiversity in England, having high productivity for communities and species and providing linkage between marine and intertidal habitat for prey species, nutrients and nutrient cycling (e.g. see Blanchard *et al.*, 2001).

Under the current proposal, development of the site will directly impact an area of intertidal mudflats. It is proposed that the slipway be cast in-situ using land-based plant at low tide. The plant will be working on hardstanding/area of disturbed ground, minimising any potential impacts of degradation on surrounding terrestrial communities. The 'new' slipway will be cast onto the existing concrete slipway.

Further impacts associated with the use of land-based plant include noise, vibration and emissions.

The pontoon will be constructed off site and then manoeuvred and secured into position. On site construction works will involve the driving of 8-10 tubular steel piles along the edge of the natural creek line. Once in position, the piles will be driven through pile guides. The pontoon will be launched at high tide and towed into position.

The driving of piles will cause disturbance to the mudflats, impacts from vibration having potential to cause disturbance to the species who use the habitat. The pontoon will have a surface area of ~550 m². This will not be a direct loss of habitat, but the habitat will be compromised due to the non-physical impact of shading and physical degradation at low tide.

Mitigation measures will be required in this case, see section 6 below.

3.10.6 *Seagrass Beds*

Seagrass beds are of significant ecological value for the habitat they provide and their importance as a food source. They additionally help to support the structure of

the mudflats and are important carbon sinks. HBRC mapping shows presence of seagrass beds bordering the pontoon area and additional meadows along the Mill Rithe.

Globally the cover of seagrasses has reduced between 1993 and 2003 by 15% as they are sensitive to light, nutrients and mechanical disturbance. (Kaiser et al 2001)

In the English Channel, seagrass beds have been expanding since the 1990s partly because of a more favourable climate. *Zostera marina* is protected by the Bern Convention and is recognized as a threatened habitat by the OSPAR Convention. In the United Kingdom, seagrass beds are one of the focal biotopes for Marine Habitat Action Plans (part of the UK Biodiversity Action Plan) and are a named component of 'Lagoons and Shallow Sandbanks' within the European Union Habitats directive (92/43/EEC) (The English Channel: La Manche Jean-Claude Dauvin, in World Seas: an Environmental Evaluation (Second Edition), 2019).

Growth in seagrasses is generally limited by light and affected by temperature (Philliparts, 1995a & b; Marta *et al.*, 1996). *Zostera noltii* is more tolerant of high light intensities, available at low tide, than *Zostera marina*, presumably an adaptation to life higher on the shore and the more turbid environment of intertidal flats (Vermaat *et al.*, 1996; Davison & Hughes, 1998). New leaves appear in spring and eelgrass meadows develop over intertidal flats in summer, due to vegetative growth. Leaf growth stops in September/October and leaves are shed although *Zostera noltii* keeps its leaves longer than *Zostera marina* in winter. In the intertidal, the combined action of grazing and wave action causes leaves to be lost over winter and the plant reduced to its rhizomes within the sediment.

The rhizome of *Zostera noltii* is thinner than that of the longer lived *Zostera marina* and its growth is rapid and ephemeral in nature, taking advantage of seasonal increases in light and nutrients rather than metabolites stored in the rhizome (Marta *et al.*, 1996; Dawes & Guiry, 1992). Marta *et al.* (1996) reported shoot growth rates of ca.0.2 cm/day (winter minimum) to ca. 0.8-0.9 cm/day (summer maximum) in the Mediterranean (with winter temperature of 12 °C and summer maximum temperature of 23.2 °C). They also stated that the rhizomes were short lived, <1 year, presumably from one growing season to the next, however given the 'life-span' of vegetative clones of *Zostera marina*, the plants and seagrass bed of *Zostera noltii* may be much older. Root-rhizome systems help to maintain sediment stabilisation.

Success in estuaries and similar coastal conditions may be limited by high levels of plant nutrients in the water, which are becoming an increasing problem through agricultural run-off. Such high levels of, for example, nitrate and ammonium can directly affect the growth of seagrass (Short et al 1995). The Havant area is currently under pressure from high nitrate levels and policies are being put in place to encourage reduction and offsetting schemes. It is possible that seagrass beds can help to mitigate the effects of eutrophication if the nutrient levels are as such they can be taken up by the seagrass. Excessive levels however will lead to the growth of invasive and algal species which would be detrimental to / suppress the growth of seagrass species.

The proposed development works include the driving of piles into the Mill Rithe bed for the construction of the pontoon, within proximity of the seagrass beds. The seagrass beds were last mapped by HBRC in 2013, this mapping shows that they border the location of the proposed pontoon. Recent mapping, conducted by John Norton Ecology in 2020 in relation to the proposed development, shows the seagrass beds closest to the proposed pontoon to be fragmented but more significant growth along the northern stretch of the creek (See Appendix . An increase in vessels in the creek during works could have the potential to cause physical damage to seagrass beds, especially while anchoring and mooring and during periods of low tide. However, due to the shallow nature of the creek, vessels can only move within Mill Rithe 2.5 hr either side of high tide, and thus the impacts will be lessened.

Mitigation will be required in this case, see Section 6.

3.11 Network Enhancement Zones 1 and 2

The site has been identified to form part of Network Enhancement Zones 1 and 2 under the National Habitat Network Classification system.

Network Enhancement Zones have been designated as a response to ‘Making Space for Nature, A review of England’s Wildlife Sites and Ecological Network’ published by DEFRA in 2010. This called for the establishment of resilient and coherent ecological networks.

The west of the site, the foreshore, and a small corner of the southeast of the site are classified as being within Network Enhancement Zone 1. ‘Network Enhancement Zone 1’ comprises land within close proximity to existing habitat components that are more likely to be suitable for habitat re-creation for the particular habitat. The selection of these areas is primarily based on soil types, but in many cases has been refined by using other data such as hydrology, altitude and proximity to the coast.

The north section of the site (the residential plot) is classified as being within Network Enhancement Zone 2. ‘Network Enhancement Zone 2’ comprises land within close proximity to the existing habitat components that are more likely to be suitable for habitat re-creation, but where other types of habitat can be created or land management may be enhanced including delivery of suitable Green Infrastructure.

4. HABITAT ASSESSMENT

- 4.1 The Preliminary Ecological Appraisal (walkover survey) was carried out on 2 July 2020. Photographs taken during the site survey are provided in Appendix B.
- 4.2 The site is located on Hayling Island, approx. 7 km east from the city of Portsmouth. The site is located towards the western end of the Mill Rithe, which discharges into the Emsworth Channel to the east.

- 4.3 The development site, as approved by Havant Borough Council, comprises both coastal habitat, which is the key subject of the current study, and terrestrial habitat. The terrestrial area includes a former boat yard that has been cleared for the construction of six dwellings (which were under construction during the site walkover assessment), together with an area of proposed Coastal Meadow to the west of the site (under establishment) and an area of proposed Conservation Grassland within the southeast corner of the site (currently used as a materials and equipment storage area), to be developed at a later stage in the site's redevelopment programme.
- 4.4 Access to the site is via Copse Lane, to the north, heading south through the construction site, which will form the driveway to the new development. There is a tree line which runs down the western boundary of the site entrance, and then follows the wider development site boundary to the east and west. Within the boundary tree line there are seven trees which are protected by TPOs.
- 4.5 The wider site (including the housing development area) has historically been used as a boatyard, however the site had been derelict for many years before the current development. The east section of the site had been completely cleared of debris and vegetation before building works commenced, the west section has been fenced off and forms the Yachthaven Nature Reserve/Coastal Meadow, an area of land which forms part of the Ecological Mitigation Plan for the development. There is a small dwelling and mud berth on the shoreline, located towards the centre of the site. This land is not owned by the developer and does not form part of the development site.
- 4.6 The coastal section of the site has been divided into four key areas for the purpose of this study, the habitats within these areas, and a brief description of the proposed works in each of these areas, is as follows:

4.6.1 *Access and Storage*

Access to site will be via the public highway and the site entrance off Copse Lane.

The site is in the process of being redeveloped for residential use. It has historically had berthing and maritime infrastructure on it since the 1930s. The site has had a slipway, and landing stages dating back to the 1940s, but has been largely derelict since the 1980s. Redevelopment of the site began in 2019 following permission granted by HBC for the redevelopment of the site to include six dwellings, two boat sheds/stores, pontoon and moorings, and improvements to the slipway and sea walls. At the time of the latest site walkover assessment the site was a live construction site with storage compounds in excess of 2500 m².

The housing development area and proposed area of conservation grassland has been cleared of vegetation. The proposed area of conservation grassland is currently being used for material and equipment storage.

4.6.2 *Slipway*

The slipway is an existing area of made ground which extends into intertidal mud which supports a variety of saltmarsh and marine plant species. The existing slipway is in unserviceable condition. Repairs will be made on the landward side,

and a new 200 mm slab will be cast in situ and will sit in the water at high tide. This work will be carried out at low water using land-based plant and is anticipated to take 3-4 weeks.

The area of the slipway on land (above MHW) will be 87.25 m², the area of the slipway into the sea is yet to be defined. The width will be 10 m, the length is to be determined based on the gradient needed for the slipway, and surveys of the sea level.

4.6.3 *Sea Defences*

The current sea defences are in three defined sections, to the west and east of the proposed pontoon area, and the central area including both sides of the slipway. The landward side of the sea defences is currently the coastal meadow to the west, and the construction site's storage yard to the east. On the seaward side are intertidal mudflats.

The current defences are in a state of disrepair, on the west section of the site the existing foreshore will be cleaned to remove all waste material. The wall will be removed and the shoreline left to restore to a more natural state, with the exception of 20 m of rock revetment extending from the existing mud berth which is not under the ownership of the developer.

In the central area, which includes either side of the slipway, there will be rock revetment.

The east section will be similarly cleaned up with the footpath re-instated. In addition, the existing concrete structure will be removed and a softer engineered rock revetment will be put in place. This work will be carried out at low water using land-based plant and is anticipated to take 6-8 weeks.

4.6.4 *Floating Pontoon and Moorings*

The floating pontoon will be located within the intertidal mudflats, vegetation in the area of the pontoon is predominantly marine algae. Moorings will be within the wider footprint of the pontoon, vessels will be restricted to a size of 10 m length, 4 m berm. The area of the consented pontoon and mooring is 551 m².

Pontoons will be delivered to site by road and launched from the slipway at high water. They will then be towed into position and the piles driven through the pile guides. Each pile will be driven using vibro-piling as standard, and if percussion piling is necessary to attain design level then 'soft-start' procedures will be employed. All metals will be coated in a marine friendly paint.

The works will be undertaken from a spud-legged crane barge and multicat working over the high-water periods to minimise any impact on feeding wildfowl. The total duration of the works will be dependent upon plant availability but typically 2-3 weeks.

Moored vessels (upon completion) from Yachthaven, would need to travel through Mill Rithe Creek into the Emsworth Channel to get to Chichester Harbour/ the Solent.

5. PROTECTED AND CONTROLLED SPECIES

The following is based on the findings of the site walkover assessment completed July 2020, together with a review of protected species survey reporting completed to date, and up to date (2020) record data provided by Hampshire Biodiversity Records Centre (SBRC), British Trust for Ornithology (BTO), Havant Borough Council (HBC) and other consultees and data providers (as listed above in section 2).

5.1 Trees and Hedgerows

The site includes seven trees which are subject to Tree Preservation Orders located around the perimeter of the site. It is prohibited to cut down, uproot, top, lop, or wilfully undertake damage or destruction of any tree covered by a Tree Protection Order (TPO) under Part VIII of the Town and Country Planning Act 1990 and the Town and Country Planning (Trees) Regulations 1999 (to be read in conjunction with Planning and Compensation Act 1991).

Under the Hedgerows Regulations 1997, it is against the law to remove or destroy certain hedgerows without permission from the local planning authority.

A tree survey and protection plan has been prepared in relation to the proposed redevelopment of the site (Eco Urban, 2017). The plans for development do not include the removal of any trees or hedgerows at the site. Standard protection measures are to be undertaken when working with machinery within proximity of trees and hedgerows.

5.2 Plants

5.2.1 Terrestrial

Terrestrial plant communities can be found at the following areas of the site: access and storage, slipway, and sea defences. All within Network Enhancement Zones 1 and 2.

There are records of 43 higher plant species which are considered protected and/or notable within 1 km of the site. Of these there are three plant species which are covered by Section 41 of the NERC Act 2006. These species are Slender Hare's-ear *Bupleurum tenuissimum*, Divided Sedge *Carex divisa* and Small Cordgrass *Spartina maritima*.

Nationally scarce species recorded within 1 km of the site include golden samphire *Inula crithmoides*, lax flowered sea lavender *Limonium humile*, curved hard grass *Parapholis incurva*, early meadow grass *Poa infirma*, stiff saltmarsh grass *Puccinellia rupestris*, yellow glasswort *Salicornia fragilis*, shining glasswort *Salicornia nitens*, one flowered glasswort *Salicornia pusilla*, and perennial

glasswort *Saracocornia perennis*. These species are salt tolerant and are typical of Coastal Saltmarshes and Grazing Meadows.

During the site walkover conducted by EAS in July 2020, species observed include sea lavender, samphire, sea purslane, seaboot, many seeded goosefoot, sea couch grass and glasswort on the shoreline of the site.

The 2020 Eelgrass and Botanical survey, completed by John Norton Ecology, identified areas of golden samphire across the shoreline of the site, and spartina on the shoreline of adjacent properties, see Appendix C.

Works associated with the remediation of the sea wall have the potential to impact terrestrial plant communities, as a result, protection measures should be put in place. See section 4.

5.2.2 Marine

Marine plant communities can be found within the following areas of the site, intertidal area of the slipway, sea defences, floating pontoon and the moorings. All sites areas are within the priority habitat Intertidal Mudflats. Mudflats and sandflats not covered by seawater at low tide are one of the qualifying features for the SAC designation.

Under the Habitats Directive, Annex I, seagrass beds are listed as a habitat to be conserved to protect its biodiversity. The intertidal mudflats are host to Seagrass beds, both are found within 1 km of the site. Key species within these seagrass beds include Eelgrass *Zostera Marina* and Dwarf Eelgrass *Zostera Noltei*. Seagrasses are unique as they are the only flowering plant able to live underwater and are considered important for a variety of ecological reasons. Seagrass beds provide shelter and habitat for fish and crustaceans, allowing juvenile species to mature in a safe environment. Seagrass helps to stabilise mudflats through their roots and rhizomes, thus reducing erosion. They also provide an important carbon sink. Eelgrass species are a vital feeding ground for bird species such as Dark Bellied Brent Goose, and other wading birds on the Solent.

The principle features of the site's Ramsar designation include mudflats which support beds of eelgrass *Zostera spp* and green algae *Enteromorpha spp*, both important in the diet of Dark Bellied Brent Geese.

Records of marine plants held by HBRC show that there is presence of Eelgrass *Zostera Marina* and Dwarf Eelgrass *Zostera Noltei* at the site. A SeaSearch Survey conducted on behalf of Natural England in 2004 recorded presence of Eelgrass at various locations in the Chichester Harbour.

Seagrass mapping in the Solent has been historically conducted by Hampshire and Isle of Wight Wildlife Trust to assess the extent of seagrass beds. Mapping conducted in 2013 showed that the seagrass beds would border the proposed pontoon. However more recent mapping conducted by John Norton Ecology in 2020, has shown that eelgrass beds at the upper reach of the creek are fragmented, and at their closest point are ~80 m from the proposed pontoon. Other species observed during the site walkover include *Ulva* and *Fucus* algal species, in high

abundance. These (other) species hold a comparatively low ecological value to Eelgrass.

Conclusions from the Eelgrass survey state that during construction and operation of the pontoon, the Eelgrass within Mill Rithe creek would not be impacted. Precautionary protection measures should still be put in place, see Section 6 below.

5.3 Invertebrates

5.3.1 Terrestrial

Large blue butterfly, fisher's estuarine moth and lesser whirlpool ramshorn snail are protected under Schedule 2 of the Conservation of Habitats and Species Regulations 2017. Other protected invertebrates are protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended).

Records from HBRC show the presence of 26 protected and notable invertebrate species within 1 km of the site. Of these, three species are listed under Section 41 of the NERC Act, the moth species Cinnabar *Tyria jacobaeae*, and Large Gold Case Bearer *Coleophora vibicella*, and the butterfly species Small Heath *Coenonympha pamphilus*.

Habitats within close proximity which are of value to invertebrate species include the Yachthaven Coastal Meadow, situated to the west of the proposed pontoon. This will stay under the ownership of the developer and has been designed to promote ecological diversity. The proposal will see the retention of the habitats that support terrestrial invertebrate, therefore considered unlikely to have an impact on notable terrestrial invertebrate species.

5.3.2 Marine

The marine invertebrates species: Starlet Sea Anemone *Nematostella vectensis*, Tentacled Lagoon Worm *Alkmaria romijni* and Lagoon Sand Shrimp *Gammarus insensibilis* are protected species under the Wildlife and Conservation Act 1981 (as amended). All three species have been recorded within the wider Solent area.

Species listed as *Species of Principle Importance* under Section 41 of the NERC Act 2006, recorded in the wider Solent area include the Native Oyster *Ostrea edulis* and Peacocks Tail *Padina pavonica*.

The site is host to seagrass beds which are a prime habitat for a number of marine invertebrate species. A SeaSearch survey of the Chichester Harbour, conducted by Natural England in 2004 identified approximately 30 different marine invertebrate species. It is known that prosobranch molluscs use seagrass beds as grazing sites, the sea anemones (*Cereus pedunculatus*, *Cerianthus lloydii*) and the neogastropod *Hinia reticulatus* are also known to assemble in the seagrass beds. The Section 41 species Fan Mussel has been recorded as living in seagrass beds historically.

Mudflats are less diverse in terms of the invertebrate species they can host; the physical structure of mudflats offers less opportunity for colonisation. Species

which can utilise mudflats as a suitable habitat include invertebrate such as Polychaetes and Bivalves, and in some instances the mud-snail *Hydrobia ulvae*.

A benthic survey conducted on site during August 2020 analysed nine core samples from the intertidal mudflats for presence and abundance of invertebrate. This analysis showed across all samples that there was high biomass but low species diversity, with between four and 13 taxa present. The dominant taxa across samples included the laver spire shell, sludge worm, ragworm and nematoda. No protected or controlled species were identified during the survey. For full report see Appendix D.

Limitations for identification of marine invertebrate include extremely limited data as marine surveys are carried out infrequently. Many species may be missed due to their size and limitations in visibility.

Marine invertebrates have the potential to be impacted by the proposal. They will face physical loss of habitat as a result of the construction of the slipway and pontoon, and non-physical degradation of habitat due to the increased shading from the floating pontoon. Reduction and degradation of habitat will in turn lead to a localised reduction in invertebrates. Impacts will also occur on the seagrass beds which border the proposed pontoon; there is potential for degradation from shading, increased vessel traffic and construction to this habitat which hosts a range of invertebrates.

In the absence of mitigation, the works and associated activities could potentially have a significant impact on marine invertebrates. Further surveying has been completed, see 'A Benthic Biological Survey of Yachthaven, Mill Rithe, Hayling Island' prepared by Fathom Ecology October 2020 (Appendix D).

5.4 Amphibians

Great crested newts (GCN) and natterjack toads are fully protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and Schedule 2 of The Conservation of Habitats and Species Regulations 2017, making them a European Protected Species. Both the individual and its place of shelter or protection are protected.

HBRC hold no records of amphibian species recorded within 1 km of the site.

The site does not include any water features or terrestrial habitat considered likely to support protected amphibians. There are 2 ponds within 500 m of the site, one at Creek Cottage, ~200 m to the east, the second ~250 m south as the crow flies, at Verner Common.

It is not considered that amphibians will be impacted by the proposal as the site does not contain habitats suitable to support amphibian species, or have suitable ecological corridors in which species from neighbouring habitats would be able to access the site. It is generally regarded that amphibians have a low tolerance to saline conditions.

5.5 Reptiles

The more widespread reptiles; grass snake, slow-worm, viviparous lizard and adder, are protected under Schedule 5 of the Wildlife and Countryside Act, 1981 (as amended). It is an offence, amongst other things, to intentionally kill or injure any individual. The more restricted species; sand lizard and smooth snake, are fully protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and Schedule 2 of The Conservation of Habitats and Species Regulations 2017, making them European Protected Species.

Common Lizard, *Zootoca vivipara*, has been recorded within 1 km of the site, this species is protected under the WCA and Section 41 of the NERC Act 2006, making it a Priority Species.

Reptile surveying and mitigation was implemented prior to the commencement of site clearance and construction, as overseen by EcoSupport Ltd.

5.6 Birds

All wild birds, their nests and eggs are protected by UK law. It is an offence to take, kill or injure any wild bird, or to take, damage or destroy any nest (whilst being built or in use) or egg of any wild bird under Part 1 of the Wildlife and Countryside Act 1981. In addition to this protection, those birds and their young listed on Schedule 1 of the Wildlife and Countryside Act 1981 (as amended) must not be disturbed at or near the nest. Part I birds are protected at all times and Part II during the closed season only.

The site is situated within a larger network of water courses which make up the Solent. The Solent is covered by a number of International and National designations due to its populations of overwintering birds. The Solent qualifies for these designations because it is used regularly by 1% or more of the biogeographic population of key species, including dark-bellied brent goose *Branta bernicla bernicla*, common teal *Anas crecca*, ringed plover *Charadrius hiaticula* and black-tailed godwit *Limosa limosa*, and an outstanding assemblage of wintering and passage birds that are reliant on the wetland habitats within the Solent. (Wader and Brent Goose Strategy)

HRBC have records of 117 bird species within 1 km of the site, 49 of these species are covered under Schedule 1 of the Wildlife and Countryside Act. Listed under Section 41 of the NERC Act 2006 are the following species: Skylark *Alauda arvensis*, Tree pipit *Anthus trivialis*, Scaup *Aythya marila*, Dark Bellied Brent Goose *Branta bernicla bernicla*, Stone Curlew *Burhinus Oedicnemus*, Hen Harrier *Circus Cyaneus*, Cuckoo *Cuculus Canorus*, Yellow Hammer *Emberiza citrinella*, Reed Bunting *Emberiza schoeniclus*, Grasshopper Warbler *Locustella Naevia*, Woodlark *Lullula Arborea*, Common Scoter *Melanitta nigra*, Spotted Flycatcher *Muscicapa striata*, Curlew *Numenius arquata*, Whimbrel *Numenius phaeopus*, House Sparrow *Passer domesticus*, Tree Sparrow *Passer montanus*, Roseate Tern *Sterna dougallii*, Turtle Dove *Streptopelia turtur*, Ring Ouzel *Turdus torquatus* and Lapwing *Vanellus vanellus*.

Data obtained from the BTO regarding the Wetland Bird Survey (WeBS) provided details of five year average (2014 – 2019) core count data, and low tide data for 43 species of bird which are recorded in the Chichester Harbour (West) – Hayling Island locality. Core count data is coordinated monthly counts of species, whereas the low tide data counts show period data counts of bird distribution in major UK estuaries.

The core count data shows average of <1000 Dark Bellied Brent Geese, <500 Curlew, <400 Dunlin, <400 Grey Plover, <200 Golden Plover, < 200 Widgeon and <100 Teal use the locality for roosting and feeding during the winter months. The number of curlew on average peak in late summer/early autumn, and are present throughout most of the year, whereas the other above mentioned species peak in early winter (Nov) , before continuing with their migration in the spring (Mar/Apr). WeBS low tide data for the winter 2017/2018 recorded nearly 10,000 Dark Bellied Brent Geese and 1500 Widgeon, 1000 Oystercatcher and >10,000 Dunlin using Chichester Harbour.

The Chichester Harbour Conservancy has confirmed that the *‘Mill Rithe is an important feeding area for wintering and passage waders and wildfowl, with Gutner Point and Verner Common (forming the mouth of the creek) being critical hide tide roosts for those birds. Increased activity on the proposed pontoon, and increased boat traffic in the creek will impact the feeding and roosting areas. Typically, this area of the harbour supports significant numbers of, amongst others, curlew (5 year mean peak of 506), redshank (5 year mean peak 95), grey plover (5 year mean peak 387) and dunlin (5 year mean peak 477). Dark-bellied brent geese also feed in the creek at all states of the tide.*

Gutner Point Local Nature Reserve is a reserve which is closed to the public to protect the roosting birds. It is home to one of the largest roosts in the Solent and is considered a core area under the Solent Waders and Brent Goose Strategy.

The Solent Waders and Brent Goose (SWBG) Strategy is a conservation partnership project coordinated by HIWWT, which maps and records roosting sites. The gathered data categorises sites in accordance with their importance to the bird populations they support. Immediately to the west of the site is a Primary Support area, and to the south, Verner Common is a SPA and primary support area. In addition to the roosting sites, the seagrass beds are the primary diet of the Brent Goose. Seagrass beds are mapped by HIWWT to assess their ongoing condition and capacity to support the Brent Goose population

The SWBG Strategy states that there is potential for any development on land adjacent to, or in close proximity to Solent Wader and Brent Goose sites to have an impact on the ecological function of the network of sites that are available for feeding and roosting. It is considered by the strategy that indirect effects may include recreational pressures and access to sites, overshadowing and lighting from buildings, noise and visual disturbance from construction work. The strategy advises that indirect impacts have the potential to reduce the functional area of the sites available for roosting and foraging.

Birds have the potential to be impacted by development at the site, during construction and operation.

Construction works will include the laying of a concrete slab as part of the new slipway, removal of concrete remnants of the sea wall and the construction of a floating pontoon. All of which will have the potential to affect birds due to the increased vehicles and their associated noise, vibration and emissions.

The construction of the pontoon will include using pile drivers and a spur crane barge. Piles will be driven into the mudflats and underlying strata to provide the supporting structure to the floating pontoon. Noise and vibration from the operation of the pile driver has the potential to impact birds. Protection measures will be required to avoid disturbance to birds during the construction period, see Section 6.

During the operational stage of the proposal, increased vessels as a result of the additional moorings may have the potential to disturb important bird species (as listed above) as there will be additional noise, emissions and wave movement. A disturbance investigation conducted during 2012 examined the potential effects vessels could have on the overwintering bird population using Mill Rithe Creek. The investigation involved making a number of passes through the mouth of the creek, between Verner Common and Gutner Point which would assess alertness and disturbance to resting, feeding and roosting birds. Of the four passes made, three were at 8 knots, the Chichester Harbour speed limit, and a further pass at a higher speed of 20 knots was made for the purpose of the investigation. Each pass of the sites found there was little increase in the alertness of the birds, and minimal disturbance.

The shallow nature of the creek means that navigation in and out of Yachthaven is limited to 2.5 hrs either side of high tide. During this time, the seagrass beds will be immersed and will not be used for feeding as a result. There are navigation channel markers in and out of the creek to allow vessels a safe passage, these follow the deepest part of the creek which is also a distance of approx. 60 m from the roosting sites.

The disturbance survey concluded that the increase in vessels is unlikely to impact the bird populations. However, precautionary protection measures will be required in this case, see Section 6 below for recommendations.

5.7 Bats

All species of bat are protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and Schedule 2 of The Conservation of Habitats and Species Regulations 2017 (meaning all species of bat are both UK and European Protected Species).

It is illegal to:

- Kill, injure or capture (take) bats
- Deliberately disturb bats (whether in a roost or not)
- Damage, destroy or obstruct access to a bat roost

Disturbance is unlawful where bats ability to survive, breed, reproduce, rear/nurture their young, hibernate or migrate is impaired or where local distribution or

abundance is significantly impacted. This may occur where actions impact their roosts, flight lines or foraging areas.

Records available from HBRC show the presence of bats within 1 km of the site, species include *Chiroptera*, Pipistrelle *Pipistrellus*, Soprano Pipistrelle *Pipistrellus pygmaeus* and Long Eared Bat *Plecotus*.

Over recent years, the site has been cleared to allow for building works (nearing completion). Earlier walkovers of the site completed in relation to the original planning application concluded that there was no suitable habitat for bats within the site. No further bat surveying has been completed at the site. However a bat survey was conducted at the adjacent residential property in 2017; it was concluded that there were no suitable habitats for bats on the adjacent land.

The site has minimal habitats suitable for supporting bats, however as the coastal meadow to the west of wider site increases in diversity, its use as a potential foraging ground increases. Standard protection measures should be put in place. See section 6.

5.8 Badgers

Badgers are protected in the UK under the Protection of Badgers Act, 1992 (as amended). It is an offence, amongst other things, to take, injure or kill a badger, or interfere with a badger sett (this includes intentionally or recklessly disturbing a badger when it is occupying a badger sett). To avoid committing an offence a permit must be obtained to damage, destroy, obstruct or disturb a badger when it is occupying a badger sett.

There are no records of badgers present within 1 km of the site.

The site does not include suitable habitat for badgers. Within 1 km of the site there is a small area of deciduous woodland, however it has limited connectivity to other potential habitat. It is not considered likely that badgers would be impacted by the proposal.

5.9 Dormice

The common (or hazel) dormouse is protected under Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and Schedule 2 of The Conservation of Habitats and Species Regulations 2017, making common dormice a European Protected Species.

There are no records of dormice within 1 km of the site.

The site does not include suitable habitat for dormice. Within 1 km of the site there is a small area of deciduous woodland, however it has limited connectivity to other potential habitat. It is not considered likely that dormice would be impacted by the proposal.

5.10 Pinnipeds

The Common Seal *Phoca vitulina* is designated as a Species of Principle Importance under Section 41 of the NERC Act 2006. It has additional protection under the Wildlife and Conservation Act 1981 (as amended) which prevents the killing, injuring or taking of the Common Seal from 1st June to 31st Aug. The Common Seal is also listed under the Conservation of Species and Habitats Regulations 2010 making it a European Protected Species.

There are no records of the Common Seal *Phoca vitulina* within 1 km of the site (as held by HBRC). The Chichester Harbour Conservancy holds details on the seal population of the area. Chichester Harbour is the only known rookery in the Eastern English Channel, an estimated 40 seals live in the harbour. The preferred habitat of the seal is shorelines and estuaries where they rest on sandbanks, of which there are potential locations within 1 km of the site where seals may reside. For the protection of the seal, their preferred rookery location with Chichester Harbour is not disclosed by the Chichester Harbour Conservancy.

The location of the site means it is unlikely that the seals would choose it for resting, the site is shallow and accessible by water only 2.5 hr either side of high tide.

Activities during the construction period on site which may impact on seals include the use of pile drivers and land-based machinery which will contribute to an increase in noise, vibration and emissions. Standard protection measures should be in place, see section 6.

5.11 Fish

The Atlantic Sturgeon, Allis Shad, Twaite Shad, Common Whitefish/Houting, Giant Goby, Couch's Goby, Long snouted Seahorse and Short snouted Seahorse are all protected under the Wildlife and Conservation Act 1981 (as amended). It is an offence under the act to kill, injure or possess the species. The Atlantic Sturgeon, Allis Shad and Twaite Shad are also listed in under the Conservation of Species and Habitats Regulations 2010 making a European Protected Species.

Under Section 41 of the NERC Act 2006, there are 35 species of fish listed as species of principle importance, including the Atlantic Sturgeon, Allis Shad, Twaite Shad and Long snouted Seahorse and Short snouted seahorse.

Records of all fish listed under the Wildlife and Countryside Act 1981 (as amended) and Section 41 of the NERC Act 2006 have been analysed from distribution data available from the Ocean Biogeographic Information System and NBN Atlas. The Allis Shad is the only species recorded within proximity of the site, with distribution polygons to the south for the Twaite Shad. It should be noted that distribution polygons cover a large geographical area which limits defining exact locations. There have been no recorded sightings of the Long snouted Seahorse, however the species uses seagrass beds as one of its preferred habitats.

It is known that seagrass beds provide suitable habitats for many species of juvenile fish and allows them to safely reach maturity. The Allis Shad, which has been

recorded within the Solent, migrate through the estuarine environment to freshwater to spawn. However, its preference is deeper channels meaning it is not likely to be within close proximity of the site due to the shallow channels and it not being directly on its migratory path.

Langstone Harbour, which includes the site, is a designated Bass nursery under the Bass Order 1999. As such, fishing for bass or any other fish, using Sand Eels as bait by any fishing boat in any part of the harbour, is prohibited between 30th April and 1st November. Further restrictions are also applicable to all anglers on landing sizes, and bait collection.

There are no specific records held of protected and notable species within 1 km of the site. Limitations include very limited records of fish recorded. Data which is available is spread over a wide geographical area and refining the location of a species as a result is limited.

Construction of the floating pontoon is the most likely activity to have an impact on fish. The driving of piles into the mudflats and adjacent to the seagrass beds will result in immediate disturbance and degradation to habitat, and possible destabilisation of the mudflats as a result. The impacts will be short term and normal water movements will redistribute displaced silts and sediment.

5.12 Other Protected and Notable Species

West European Hedgehog *Erinaceus europaeus* (listed under Section 41 of the NERC Act) has been recorded within 1 km of the site. Due to the lack of suitable habitat on site it is not considered that the proposal would have an impact on this species.

Record databases have been searched for Cetaceans and Marine Turtles, covered under Section 41 of the NERC act, to establish presence of these species within proximity of the site. No records have been identified.

Relatively few records suggest a potential lack of recording/reporting within the area.

5.13 Non-native Invasive Species

Schedule 9 of the Wildlife and Countryside Act, 1981 (as amended) lists those non-native species that are established in the wild but which pose a conservation threat to native biodiversity and habitats. Schedule 9 aims to regulate further release of these species by making it a criminal offence to release them into the wild.

Hampshire Biodiversity Records Centre has records of eight flora and five fauna species which are non-native invasives, of which one flora species is listed under Schedule 9 of the Wildlife and Countryside Act 1981 (as amended), and four of the fauna species are listed.

Flora species include:

- Japanese knotweed *Fallopia japonica*

- Butterfly bush *Buddleja davidii*
- Pampas Grass *Cortaderia selloana*
- Russian Vine *Fallopia baldschuanica*
- Bluebell *Hyacinthoides hispanica x non-scripta*
- Bay *Laurus nobilis*
- Cherry Laurel *Prunus laurocerasus*
- Turkey Oak *Quercus cerris*

Fauna Species include:

- Mandarin Duck *Aix galericulata*
- Canada Goose *Branta canadensis*
- Ruddy Duck *Oxyura jamaicensis*
- Ruddy Shelduck *Tadorna ferruginea*
- Horse Chestnut Leaf Miner *Cameraria ohridella*

Under the Ramsar site designation conservation notes, the presence of the invasive seaweed species Japanese seaweed *Sargassum muticum* was cited. *Sargassum muticum* has small air sacs, allowing it to float and to create large mats on the surface of the sea, causing overshadowing and potentially impeding the growth of species such as eelgrass. This species is also listed under Schedule 9 of the Wildlife and Conservation Act 1981 (as amended).

6. MITIGATION

This study is an update following ecological surveying completed as part of the planning application approved by Havant Borough Council. No new habitats, protected or notable species have been identified as a result of this study, or further protected species surveying completed as part of the Environmental Statement for submission to the MMO. In this case, the recommendations contained within the Ecological Management Plan (prepared by EcoSupport Ltd November 2017) remain valid. A summary of the ecological guidance given within this report is as follows. Please refer to the full document for further guidance.

6.1 Intertidal Mudflats

The proposal will result in direct habitat loss and degradation of intertidal mudflats, the most significant area this will happen in is the location of the proposed pontoon and moorings. This area is dominated by the algal species *Fucus Sp*, and *Ulva Sp*, both of which are highly abundant and common across the coastline of the UK. The ecological value as a result is relatively low.

Protection measures include clear working corridors for all vessels working in the creek, works should only be carried out where the tide allows to avoid grounding.

6.2 Seagrass (Eelgrass) Beds

An Eelgrass survey was conducted during June 2020. It concluded that there will be no impact to the seagrass beds as a result of the proposal. This is due to the

location and fragmented nature of the Eelgrass beds which are located closest to the proposed pontoon, see Appendix C.

As a standard protection measure, an Eelgrass code of conduct is to be put in place and owners of boats using the development are to be made aware of this. The code of conduct is to include the following guidelines:

- Do not throw litter into the creek,
- Use fixed moorings and avoid anchoring
- Do not anchor outside of navigation channels
- If you do have to anchor, do so on bare mud and avoid eelgrass beds
- Avoid using the boat (sea) toilets within the creek
- Keep to the speed limit (8 knots) while in the creek
- Avoid grounding on Eelgrass, if this does happen do not try and move the vessel, allow the tide to lift the vessel back out.

During 2012, 26 swinging moorings were available in the creek. Swinging moorings can cause direct impact to seagrass beds, and increase the probability of fragmentation. It is understood that no new licences for swinging moorings will be made available as there will be mooring available from the Yachthaven development. Although none of the swinging moorings are licenced to the applicant there will be moorings made available to members of the public as an alternative to a swinging mooring.

6.3 Trees and Hedgerows

Standard protection measures are to be implemented in accordance with BS 5837.

6.4 Plants (Excluding Eelgrass Beds)

A botanical survey was conducted in conjunction with the Eelgrass survey, by John Norton Ecology in June 2020 (Appendix C). This has shown the presence of the Section 41 species *Spartina* on the foreshore of adjacent properties, and the presence of the nationally scarce species, Golden Samphire along the shoreline of the site.

Land based machinery will be used along the shoreline during the remedial works to remove the sea wall. There should be a defined working corridor for the machinery to operate in to minimise potential disturbance to the adjacent plant communities.

See section 6.2 above for details on seagrass.

6.5 Invertebrates

A benthic analysis survey has been conducted for marine invertebrates, see 'A Benthic Biological Survey of Yachthaven, Mill Rithe, Hayling Island' in Appendix D, for further guidance and recommendations.

6.6 Reptiles

Whilst there will be no significant loss of reptile habitat as a result of the proposed redevelopment, there was a potential risk of harm to any reptiles which may use the site from the use of construction (excavators etc) and delivery vehicles during site clearance and redevelopment.

Such works have commenced, and reptile protection measures were put in place and overseen by EcoSupport Ltd.

6.7 Birds

Due to the presence of internationally important overwintering bird populations that use the Solent, construction work along the foreshore and within the creek (including the removal of the sea wall, and piling for the pontoon) is to be undertaken between April and September (inclusive). Non-vibration equipment is to be used to minimise disturbance to birds.

Whilst the site is operational, there will be an increase in the number of vessels that use the channel. While it has been shown that the birds remain largely undisturbed by the passing of vessels, an environmental code of conduct is to be put in place to ensure ongoing protection. The environmental code of conduct will include the following:

- Gutner Peninsula and Verner Common are private land holdings and internationally important winter-roost sites and thus boats should not be moored here at any time.
- During the autumn and winter periods (September to April) boats should use the centre of the navigation in order to ensure disturbance to birds on high tide roosts at Gutner Peninsula and Verner Common is kept to a minimum.
- ‘No Landing Areas’ will be clearly shown within the Code of Conduct.
- Information will be provided detailing the importance of the wintering birds using Chichester Harbour SPA as a whole, as well as the importance of lessening disturbance to these bird populations. Locations of other important bird high tide and feeding areas within the harbour will be detailed.
- General information on littering and location of rubbish disposal areas.

In addition, signs should be displayed at Gutner Peninsula and Verner Common with wording to the effect of it being a protected area where landing is prohibited.

Additional protection measures on site include the installation of stock netting with top rail fencing on the landward side of the coastal path, adjacent to the coastal meadow (SINC), for the protection of birds using the SINC. This fencing has been completed.

6.8 Bats

Whilst there will be no loss of potential habitat for bats as a result of the proposed development, consideration should be given to minimising the use of artificial light and implementing a sensitive light strategy while the pontoon is operational. Artificial light can deter bats from using the site and may disrupt dispersal and navigational routes.

Consideration should be given to the type of lamp (sodium and LED should be used over mercury or metal halide lamps), avoiding light spillage into key habitat areas (boundary vegetation etc), levels of lighting and the operational times of lighting. More information on lighting strategies is available from the Bat Conservation Trust's guidance 'Bats and artificial lighting in the UK 2018'

6.9 Other Protected and Notable Species

If any new evidence of protected species is discovered whilst site clearance and construction work is in progress, Natural England should be informed immediately and appropriate advice on how to deal with the situation should be sought from a qualified ecologist.

It is advised by the Chichester Harbour Conservancy that on seeing seals, vessels should travel at a low speed and not stay within the vicinity of the seals for any more than 10 minutes.

6.10 Non-native Invasive Species

All non-native invasive species should be appropriately dealt with to restrict their spread into the wild. For example, the disposal of any non-native invasive species should be carefully considered to avoid causing an offence.

7. ENHANCEMENT

Some ecological enhancement should be included within the wider development site to secure biodiversity improvement beyond that of the existing (pre-developed) site.

The planning permission (granted) includes the following feature for ecological enhancement:

- The sea defences are to be removed to allow for natural realignment and the creation of coastal grassland, this will reduce coastal squeeze pressure at the development location.

The below listed enhancement measures relate to the wider site, including the coastal meadow, coastal grassland and residential area. In this case, the enhancement contained within the Ecological Management Strategy (prepared by EcoSupport Ltd November 2017) remains valid. A summary of the ecological

guidance given within this report is as follows. Please refer to the full document for further guidance.

7.1 Grassland and Scrub Management

Planting should be used to increase diversity within the site and enhance the site for wildlife by improving foraging habitat and providing shelter, hibernation, roosting and nesting opportunities.

Improved foraging habitat may be achieved by providing areas of grassland with differing sward length (i.e. area of both long and short grass) ideally incorporating wildflowers suited to the grass height and management.

Scrubland levels should be managed to enhance the use of the coastal meadow and grasslands for foraging by wetland birds.

Specific details pertaining to the creation of a diverse grassland can be found in the Ecological Management Strategy.

7.2 Hibernacula and nesting features

As per the existing Ecological Management Plan for the site, hibernacula and nesting features should be incorporated into the design for the Yachthaven coastal meadow and coastal grassland to encourage ecological diversity. Management of bird boxes should be undertaken as per the Ecological Management Strategy.

7.3 Bats

Bat boxes and roosting features should be incorporated into plans where possible to encourage their presence and provide safe nesting sites. Annual inspection of the bat boxes and their use should be undertaken by a suitably licenced and qualified ecologist.

7.4 Seagrass (Eelgrass) Beds

Annual monitoring of the health of eelgrass beds will be required between May and August, as per the methodology for surveying mudflats as outlined in the Joint Nature Conservation Committee (JNCC) marine monitoring handbook. The mapping will then inform future recommendations and, if necessary, any advisory mitigation put in place with the cooperation of resident and visiting watercraft users. Any advisory information would be distributed to all users of the pontoon at Yachthaven.

8. CONCLUSIONS

This Ecological Impact Assessment has detailed key ecological considerations to be made in relation to the proposal to construct a pontoon and to remediate the existing slipway and sea wall at Yachthaven. The pontoon will provide berthing for 12 vessels.

This report is based on a desktop study of records available and a site walkover conducted during July 2020. The desktop study has shown that there are a range of flora and fauna, both terrestrial and marine, which have the potential to be impacted by the proposals.

No significant impacts relating to the proposed access and storage have been identified. There is potential to impact habitats during the construction and operational phase of the slipway, sea wall and pontoon. Where mitigation measures are applied, the impacts can be reduced.

An Ecological Management Plan (Ecosupport Nov 2017) has been prepared in relation to the proposal, in which further surveying/monitoring of the ecology is recommended prior to and during the redevelopment of the site in order that considerations can be made to minimising the ongoing impact of the proposal on the ecology of the site.

Once construction has taken place, parts of site will have the opportunity to recover. The landward side of the site will be allowed to take on a more natural state where the sea wall has been removed and the seaward part of the site will see disturbance from the pile driving settle, allowing recovery of the intertidal mudflats.

Surveying has taken place in relation to Seagrass (Eelgrass), Botany and Marine Invertebrates at the site; key information pertaining to this has been included within this report and will feed into the mitigation measures.

Where the recommendations given in this and subsequent ecological reporting are implemented, the proposed redevelopment of the site is not considered likely to have any significant negative impact on conservation interests. Where ecological enhancement measures are included within the design there is opportunity for biodiversity net gain.

★ ★ ★ ★ ★ ★ ★

APPENDIX A

Figure 1: Site Location Plan

Figure 2: Proposed Site Plan



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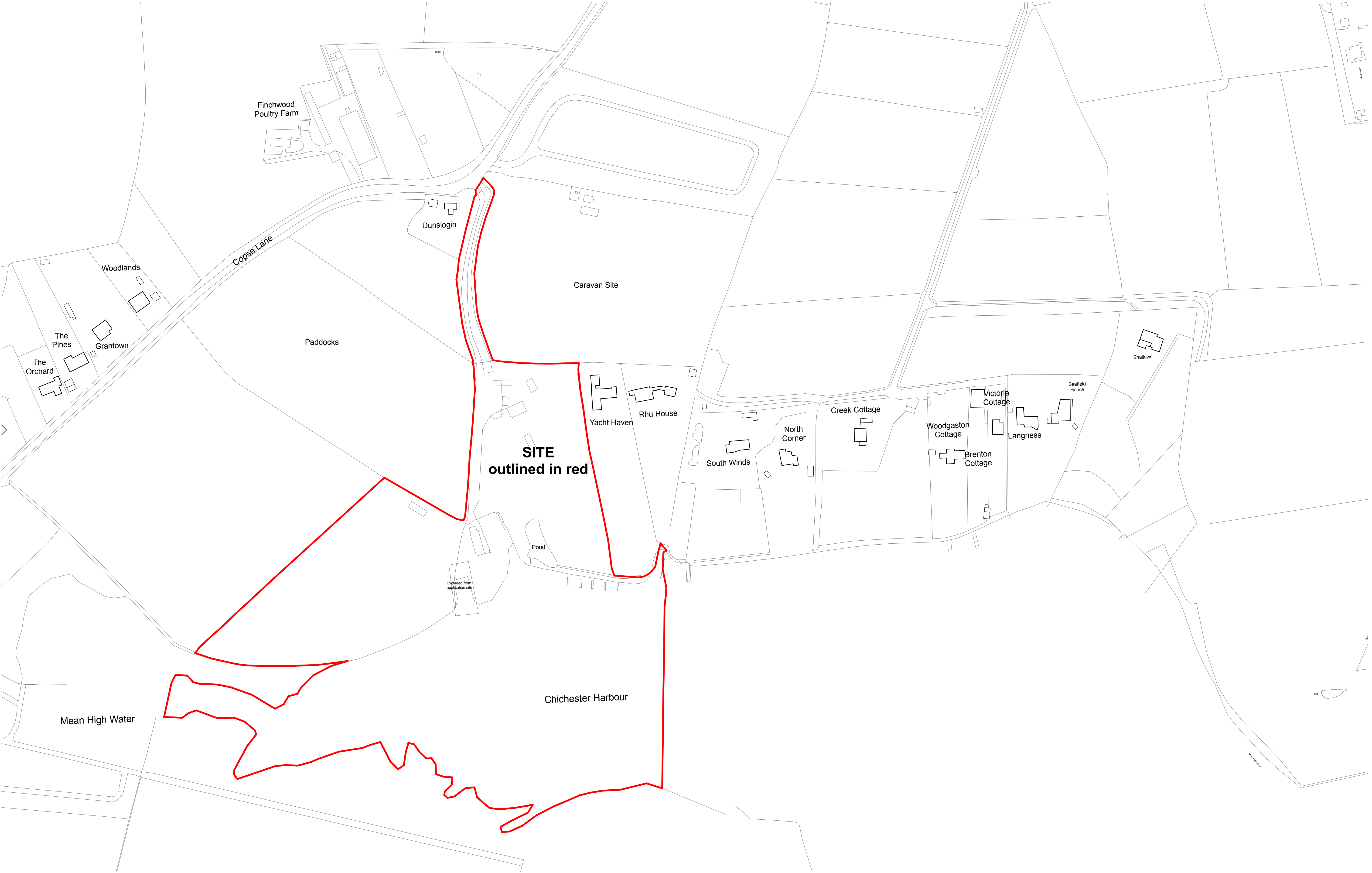
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Alpine Homes

Yacht Haven

Proposed Site Layout

Project number	Project Number
Date	Issue Date
Drawn by	Author
Checked by	Checker
A108	
Scale	1 : 500



Note: All dimensions to be checked on site by the contractor before fabrication and erection. Figured dimensions to be taken in preference to scaled dimensions. This drawing is the copyright of the architects and must not be reproduced or used without their express consent, except for the purposes of a planning application. Electronic issue of this drawing to be confirmed by paper hard copy only.

APPENDIX B

Site Photographs



Looking west towards the site – area of sea wall to be cleaned up in the foreground, slipway to the middle.



Looking east towards the site, coastal meadow on the left of the photo, Mill Rithe on the right



Yacht Haven Coastal Meadow



View towards site from the adjacent caravan park, proposed pontoon area to the right of the photo



View of the proposed site, slipway in centre, proposed pontoon area foreground.

APPENDIX C

Eelgrass and Botanical Survey

Yachthaven Harbour, Hayling Island

Eelgrass Survey 2020

For:

Alpine Homes Ltd

Author:

John Norton MCIEEM

Date issued:

7 August 2020

John Norton Ecology 

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SUMMARY

A survey of eelgrass (*Zostera*) in Yachthaven Creek was carried out to update information from a previous survey carried out in 2011. The results (based mostly on recent Google Earth satellite photography) show a decrease in extent of the beds in the creek and that dense areas of eelgrass lie at their closest point c.80 metres from eastern side of the site of the new pontoon. There are also one or two small patches of more fragmented beds in close proximity to the pontoon site. It is considered that it should be possible to avoid all direct impacts to the eelgrass beds in Yachthaven Creek during construction and use of the new pontoon.

1.0 INTRODUCTION

- 1.1 A survey of eelgrass (*Zostera*) was undertaken in 2020 to provide updated information in relation to a proposed pontoon in Yachthaven Harbour, Hayling Island, as part of the Alpine Homes development on the site. Previous survey information on eelgrass in the harbour was presented in the 2011 ecology report (repeated here at **Appendix 2**). The survey data will feed into ecological mitigation strategies for the development, in particular to ensure that any impacts to the important eelgrass beds in the creek will be avoided or minimised.

2.0 METHODS

- 2.1 The survey was carried out by John Norton, assisted by Dean Swensson, on 15 June 2020. The harbour and creek area were examined visually with the aid of binoculars and by checking accessible areas of eelgrass growth. The survey focused on areas close to the proposed pontoon site but the whole of the creek sea wall was walked to gain a wider picture of the extent of eelgrass over the whole of the creek. Photographs were taken of the pontoon area and at intervals along the shore. Areas of eelgrass were provisionally marked onto printed copies of Google Earth satellite images and later mapped using QGIS software.
- 2.2 The survey was undertaken in fine, sunny weather during low tide; however the bright conditions made it difficult to see more distant areas of eelgrass. It was not possible to view or accurately map any seagrass beyond the middle of the main channel.

3.0 RESULTS

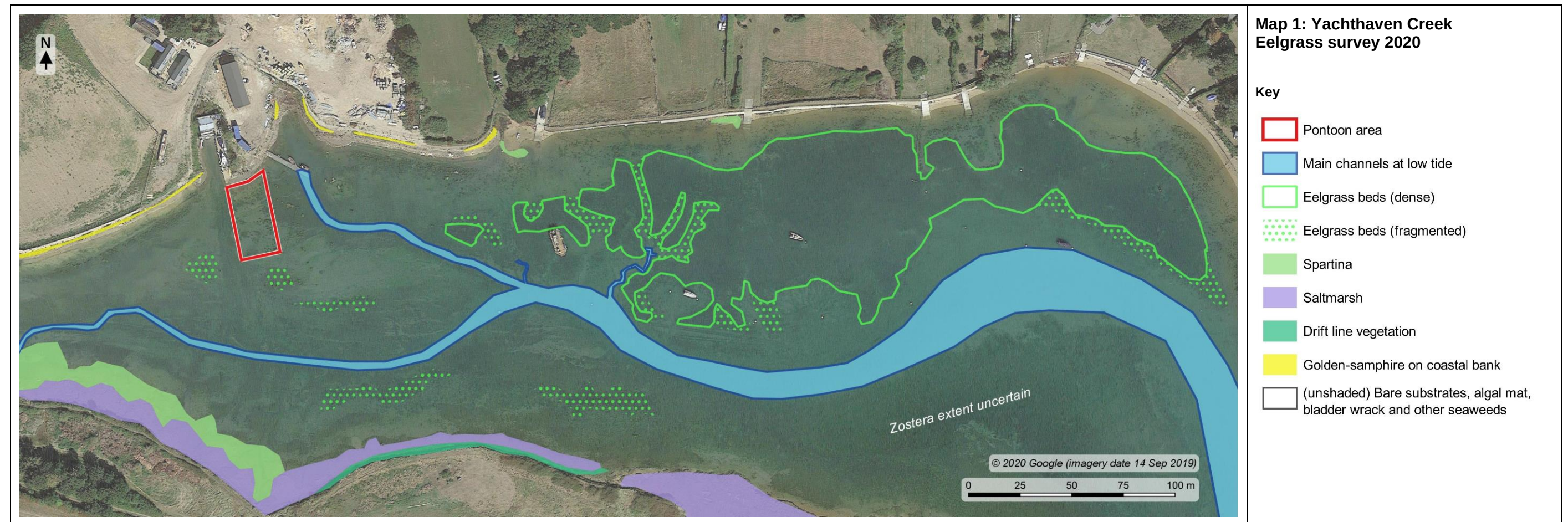
- 3.1 The results of the survey are illustrated on **Map 1**. Photographs are presented in **Appendix 1**. Map 1 also shows other vegetation present in the harbour, including cord-grass *Spartina* beds and saltmarsh, though these are mapped approximately along the southern shore.
- 3.2 A small specimen of eelgrass collected from the site was confirmed as being Eelgrass *Zostera marina*, based on leaf and shoot morphology (**Photo 8**).
- 3.3 It was evident that the areas of eelgrass mapped during the field survey correlated well with areas of dark blue-green colouration shown on the most recent Google Earth satellite

photograph, dated September 2019. Consequently the Google imagery was used as the main basis for the mapping. It was also possible to distinguish between areas of dense cover of eelgrass and areas where it was more fragmented (as had been done during previous surveys).

- 3.4 The proposed pontoon site consists entirely of an elevated section of muddy substrate which is strongly dominated by bladder wrack seaweeds (**Photos 1-2**), as is the adjacent area to the east, including the area under the existing jetty/pontoon and either side of the small channel which runs from here to the main channel (**Photo 3**). Similar vegetation was observed in 2011 and there has been no change in vegetation on the new pontoon site. The main areas of dense eelgrass in the creek are shown in **Photos 5-7**. The nearest of these lies 81m from the edge of the pontoon site (as mapped in Figure 1) at its closest point.
- 3.5 There are one or possibly two small areas of eelgrass in close proximity to the proposed pontoon site. The first of these was visible from the shore and is shown in **Photo 4**, measuring 160m². The second mapped to the south of the pontoon (c.110m²) was not visible from the shore and is difficult to say for certain whether it definitely supports eelgrass or not. However, previous surveys do show eelgrass in this general area.
- 3.6 The Google imagery did not appear to show any dense eelgrass beds on the south side of the main channel. However, two areas of fragmented eelgrass appear to be present towards the west end of the creek on the south side. The remainder of the area to the south has been marked as 'uncertain' on Map 1, but the eelgrass here appears to be at best fragmented, or possibly absent altogether. The total area of dense eelgrass mapped in 2020 is therefore 1.54 ha, with fragmented eelgrass 0.32 ha, giving a total of 1.86 ha.
- 3.7 The more detailed survey in 2011, which also covered the area to the south of the channel, produced a total area of 3.74 ha. Even allowing for the different survey methods and coverage, this indicates at least a small decline, which based on Google Earth satellite imagery appears mainly due to a contraction in the beds in the western part of the creek, including those areas in closer proximity to the proposed pontoon site.
- 3.8 It is interesting to note that the most recent of the two Hampshire and Isle of Wight Wildlife Trust (HWT) surveys (conducted between 2006 and 2008; marked in red on the map in Appendix 2) mapped the distribution of eelgrass in the creek mainly to the south of the channel. This did not correlate with the 2011 survey, nor the present survey, and it seems possible that the HWT data was mapped incorrectly. It is unlikely that such a large change in spatial distribution would occur in the space of three years or so, compared to relatively little change between 2011 and 2020.

4.0 CONCLUSIONS

The current extent of Eelgrass *Zostera marina* in Yachthaven Creek has possibly reduced slightly from that recorded in 2011. The main areas occur to the east of the proposed pontoon site, which itself supports dense bladder wrack seaweed of lower ecological value than the eelgrass beds. It is considered that it should be possible to avoid all direct impacts to the nearby eelgrass beds during construction and use of the new pontoon.



APPENDIX 1: PHOTOGRAPHS

Photographs taken on 13 June 2018.



Photo 1. View of proposed pontoon site, showing dominance of bladder wrack seaweed on muddy substrate.



Photo 2. Northern part of proposed pontoon site in foreground, viewing east; existing jetty visible on left side.



Photo 3. Channel leading into harbour from existing jetty, showing absence of eelgrass in this area.



Photo 4. Patch of eelgrass (yellow line) adjacent to the south-west corner of the proposed pontoon area (see Map 1).



Photo 5. View across creek from first slipway, 130m east of the proposed pontoon. Here, some dense areas of eelgrass are clearly visible as dark green patches on the mud, but form a narrow zone.



Photo 6. View from first slipway looking south-east. The eelgrass beds widen out here and almost reach the shingle areas on the upper part of the shore.



Photo 7. View south-east into the creek from the third slipway, 320m east of the proposed pontoon. Most of the greenish colouration is probably eelgrass beds.



Photo 8. Eelgrass (*Zostera marina*) in typical muddy substrate.

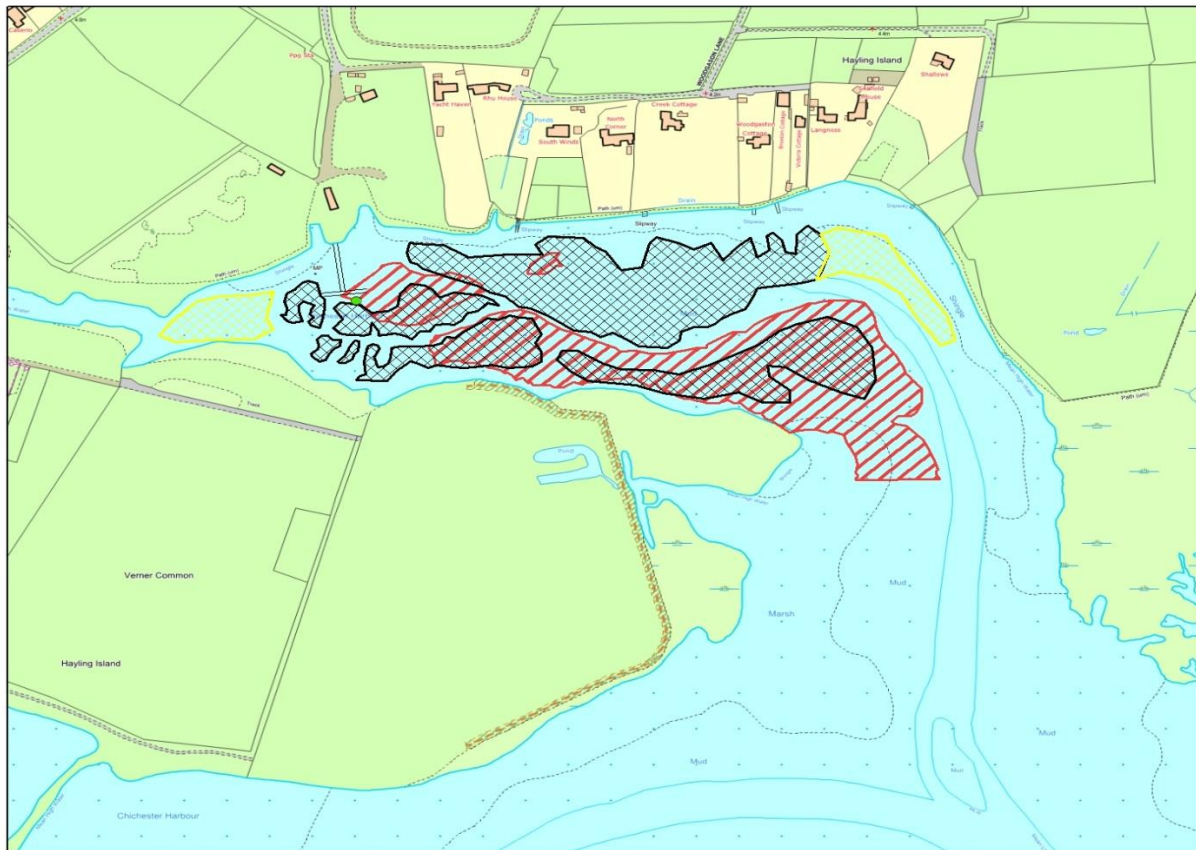
APPENDIX 2: EXTRACT FROM 2011 ECOLOGY REPORT

Eelgrass beds

HWT compiled maps of eelgrass *Zostera* beds of Chichester Harbour (20) which show the results of surveys in Chichester Harbour from 1995-2005 and 2006-2008. The exact years of survey are not known but the distribution appears to have contracted when the more recent survey was carried out. The map indicates that *Zostera* grows in parts of the creek mostly to the east of the proposed pontoon area (in lower parts of the creek) and not at higher levels which are densely vegetated by larger seaweeds, as would be expected from the known habitat preferences and ecology of the species. Further smaller and fragmented beds are also distributed to the west of the proposed pontoon area.

A survey of the extent of the eelgrass within the zone of influence was undertaken in September and October 2011. The beds' extent and positions were determined on an aerial image through a combination of on shore observations using optical aids and wading out through the channels at low tide. Bed extents were recorded with a hand held GPS device, mapped in the field and later quantified using Geographic Information Systems (GIS). The qualitative on shore visual observations were then drawn as polygons over the aerial image using the GPS points to define bed positions and extents. The survey methodology followed the JNCCs marine monitoring handbook (21) as far as was possible. However, in some instances this was not possible, such as the timing of the survey falling outside the optimum period (May – August) and the most recent remote sensing data available being three years old. Using the polygons created by the site visit, the eelgrass beds are estimated to be 3.74ha (**Figure 9**) in area and therefore currently represent approximately 3.74% of the total area of eel grass in the harbour (22).

The HWT survey (20, see **Figure 9**) recorded the extent of the eelgrass beds within the zone of influence as 3.27ha. There was a marked difference between the two surveys in the spatial distributions of the beds and in particular the northern bed adjacent to the row of shoreline houses. However, when comparing the approximated areas for the two surveys the 2011 data indicate an increase of 12.6%. During the 2011 it was noted that the beds appearing fragmented in nature (i.e. density falling below 50% coverage, qualitatively assessed on site using a 0.5m² quadrat). In these instances (plotted as yellow polygons in the map) the egg wrack *Ascophyllum nodosum* which dominates the near shore eulittoral zone, is encroaching into the normally dense monospecific *Zostera* spp. stands, which may be indicative of some form of disturbance already occurring. For the remaining beds density largely exceeded 85% by coverage. The channels present were also covered by *Ulva* for approximately 2m on both sides and thus causes a further degree of fragmentation between beds although likely to be a naturally occurring fragmentation.



↑ OS map replicated under licence. Licence number 100048821

Figure 9: Extent of eelgrass beds within the zone of influence. Red hatched areas show the extent of the eelgrass as mapped in 2008 by HWT (20), black and yellow crosshatched areas show the extent of eelgrass in 2011 based on field survey data with the yellow crosshatching indicating areas where the eelgrass is fragmented (Scale 1:4,000).

During the late summer/autumn 2011 period up to four boats were moored on swinging moorings within the creek (see **Figure 10** for an example). Within the vicinity of these moorings, damage to the habitat was apparent due to the ridge of the hull of the moored boats creating substantial ridges and scars within the eelgrass bed, effectively reducing the extent of the beds (**Figures 11** and **12**). With relevant permission and licences, it is understood that presently 26 swinging berths are available in the Yachthaven Creek from Chichester Harbour Conservancy. The latest eelgrass survey carried out during Autumn 2011 has shown that eelgrass beds are widespread although increasingly fragmented over Yachthaven and that there would be very few areas where swinging berths would not have at least some adverse impact upon the eelgrass beds, potentially causing a significant reduction in the overall quantity and distribution. This may have long term negative influences such as encroachment and colonisation from other less ecologically important species such as sea lettuce *Ulva lactuca* and *Fucus spp.*, or erosion of soft sediments with the continuous scaring and scraping of the sediments from long term use and likely reducing the likelihood of re-colonisation by eelgrass. This may be an explanation for the apparent fragmentation of the eelgrass beds when the recent extent is compared to that from 2008 (20).

The eelgrass beds within Chichester Harbour as a whole are an important feature of the Solent Maritime SAC and are vital for the bird populations which are features of the Chichester and Langstone Harbours

SPA/Ramsar Site/SPA. They are an Annex I habitat under the Habitats Regulations and are a priority within the UKBAP, HBAP and HvBAP. Therefore, the eelgrass beds within the zone of influence are considered to be of **national value**, although they may be declining in quality as a result of swing moorings.

APPENDIX D
Benthic Analysis Report

A Benthic Biological Survey of the Yacht Haven, Mill Rythe, Hayling Island.

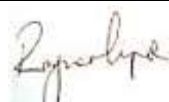
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1. Company Background

Fathom Ecology Limited www.fathom-ecology.com is a small consultancy advising on fit for purpose environmental data for marine infrastructure projects. The company provides advice on the assessment of the effects of disturbance on the marine environment and on mitigation and compensation measures required in the reduction of risk to both the developer and the environment.

2. Introduction

Alpine Group Ltd is seeking permission for a planning application referred to as the Yacht Haven which can be summarised as:

- Repair sea defences around the slipway and to secure the footpath in a manner compatible with Chichester Harbour Conservancy policy;
- Undertake tree surveys around the periphery of the site and remedial work as necessary;
- Erect six houses on the former boatyard site;
- Replace the existing pontoon and slipway and move 12 berths (licensed to the site) from swinging moorings to the new pontoon – carefully avoiding an area of eel grass *Zostera* in accordance with the ecological report; and
- Complete landscape works in accordance with the ecological report and landscape plan to provide a western area of coastal meadow and an eastern area of conservation grassland.

Fathom Ecology Limited was commissioned by Alpine Homes to undertake a survey investigating the intertidal benthic biological resources of the area around the existing pontoon, slipway and sea defences.

The aim of the survey was to identify the presence of any rare species or protected habitats in the intertidal area and to provide baseline information on the marine benthos for the area adjacent to the Yacht Haven development site. The scope of works included securing 9 core samples and carrying out taxonomic analysis.

2.1. Site Location

The Yacht Haven is located in Hayling Island, Hampshire, PO11 0BF within Chichester Harbour, Grid Reference SU728017. The location of the Yacht Haven survey area and sample points are shown in Figure 1.



Figure 1. The location of the Yacht Haven survey area with sampling stations.

2.1.1 Site Description

The Yacht Haven and the survey area are located on the northern bank of Mill Rithe, a saltwater creek on the east coast of Hayling Island, Hampshire. Mill Rythe creek is situated approximately halfway down Hayling island some 2.5 km from the entrance to Chichester Harbour.

The intertidal area of the site shows some evidence of the area's past as a boatyard, with mooring structures and anthropogenic debris, typical within Chichester Harbour. The exposed sediments consist of flint pebbles and cobbles, plus brick rip rap towards the upper shore, descending to mixed mud over gravelly sediments towards the mid shore and soft muds towards the lower shore.

The proposed development at the Yacht Haven is located within Chichester Harbour which has a range of local, national and international designations demonstrating that the area is sensitive to changes in landscape and land use, particularly with regard to natural resources, habitats and biodiversity. The Site lies within the following sites designated for nature conservation:

- [Chichester Harbour Ramsar](#) site (Wetland of International Importance);
- [Solent and Dorset Coast potential Special Protection Area](#);
- [Chichester and Langstone Harbours Special Protection Area](#);
- [Chichester Harbour Site of Special Scientific Interest \(SSSI\)](#)
- The area also falls within a Nitrate Vulnerable Zone classified as Eutrophic Waters (Estuaries and Coastal waters).

3. Methods

3.1. The Survey

- The survey was carried out on a single high tide on Thursday 13th August, 2020.
- A total of 9 samples were secured using a 0.01m² intertidal corer.
- The samples were carefully washed through a 0.5mm sieve to remove the substrate.
- The remaining sample was transferred to a labelled container, fixed in buffered formaldehyde and sealed for transport to the laboratory.
- The benthic faunal analysis was carried out according to the National Marine Analytical Quality Control Scheme (NMBAQC). Taxonomic analysis includes faunal identification and enumeration to identify biological communities and characterise taxa for each community type.

Table 3.1: Co-ordinates of Sampling Stations

TRANSECT	SITE	GRID REF (OSGB)	LATITUDE	LONGITUDE
A	1	SU 7291901784	50.81103	-0.966406
	2	SU 7292901769	50.810893	-0.966258
	3	SU 7291301771	50.810915	-0.966487
B	1	SU 7289601757	50.810786	-0.966731
	2	SU 7294901751	50.810727	-0.965981
	3	SU 7296701770	50.810891	-0.965718
C	1	SU 7301501769	50.810878	-0.965037
	2	SU 7299601754	50.810751	-0.965322
	3	SU 7283601730	50.810549	-0.967589

3.2. Laboratory Analysis

3.2.1 Macro-faunal Analysis

Buckets with preserved benthic samples were sorted by carefully tipping them over a 0.5 mm sieve and gently rinsing them with tap water to remove any traces of formaldehyde. The samples were then carefully washed into a white plastic sorting tray, illuminated and the fauna removed using fine forceps. The fauna were split into four groups; Polychaetes, Molluscs, Crustaceans, and Others. Each group was placed into a separate container with a waterproof label and stored in a 70% alcohol solution prior to identification by MIES highly experienced benthic taxonomist using a high powered stereo microscope. All individuals were identified to species level, where possible, apart from members of the Nematoda and Nemertea.

3.3. Data Analysis

Macro-invertebrate community structure was investigated using the multivariate statistical package PRIMER v6 (Plymouth Routines in Multivariate Ecological Research) (Clarke & Gorley, 2006). Data were subjected to a square root transformation to downplay the importance of the most abundant species and to increase the influence of the rarer species.

4. Results

The intertidal area comprises a very sheltered intertidal mudflat habitat. This is a UK BAP Priority Habitat (BAP habitats are now [Habitats of Principal Importance/Priority Habitats](#)) and is on the OSPAR List of Threatened and/or declining Species and Habitats (Region II – Greater North Sea). It is also listed as a Habitat of Principal Importance for the purpose of conserving biodiversity under the Natural Environment and Rural Communities (NERC) Act 2006.

The following habitat description has been paraphrased from UK Biodiversity Action Plan; Priority Habitat Descriptions. BRIG (ed. Ant Maddock) 2008. <https://jncc.gov.uk/our-work/uk-bap-priority-habitats/>

- Mudflats are sedimentary tidal habitats created by deposition in low energy coastal environments, particularly estuaries and other sheltered areas.
 - Their sediment consists mostly of silts and clays with high organic matter content.
 - They commonly appear in the natural sequence of habitats between subtidal channels and vegetated saltmarshes.
 - In large estuaries they may be several kilometres wide and commonly for the largest part of the intertidal area of estuaries.
 - The mudflat surface plays an important role in nutrient chemistry.
 - In areas receiving pollution, organic sediments sequester contaminants and may contain high concentrations of heavy metals.
 - Mudflats are characterised by high biological productivity and abundance of organisms, but low diversity with few rare species.
 - Mudflats are highly productive areas that, together with other intertidal habitats, support large numbers of predatory birds and fish.
 - They provide feeding and resting areas for internationally important populations of migrant and wintering waterfowl and waders, and are also important nursery areas for flatfish.
 - They are widespread in the UK.
- In many areas they have been much reduced by land claim.

4.1. Fauna

The following results include data from 9 benthic stations in and around the proposed slipway and wider intertidal area adjacent to the Yacht Haven development. The detailed faunal abundance data are shown in table 3.2. This upper estuary intertidal mud habitat exhibited a low species diversity of between 4 and 13 taxa. The number of individuals ranged between 682 and 25,256 per m².

The following paragraphs provide some insight into the key organisms identified within the samples.

- The gastropod mollusc *Peringia ulvae* was recorded at all stations and dominated the abundance in most. The abundance ranged between 308 and 6,710 organisms per m². From the Joint Nature Conservation Committee (JNCC) Marine Habitat Classification, <https://mhc.jncc.gov.uk/biotopes/jncmncr00002190>, together with *Tubificoides benedii* and *Hediste diversicolor*, *Peringia ulvae* is characteristic of upper estuarine sandy mud and mud shores, in areas with significant freshwater influence. This accords with the location of these survey stations in Mill Rythe.

- The Tubificids *Tubificoides benedii* (all stations) and *T. pseudogaster* (stations A1-3, B1, B3 and C3) together account for abundances ranging from 22 to 2002 individuals per m². These tubificids are characteristic of upper estuary muddy sediments with low fluctuating salinity.
- Nematoda spp. were the only taxon other than the mud snail *P. ulvae* to be found at all sites. This was unsurprising considering that nematodes are the most abundant taxonomic group on the planet comprising four out of every five multicellular animals (Bongers and Ferris, 1999).

In terms of distribution, the number of individuals were found to be relatively high SEE MUFFY. Stations A3 and C1 returned the highest number of individuals, accounted for in the main by the Oligochaetes *T. benedii* and *T. pseudogaster* and the Hydrobid *P. ulvae*. Stations C2 & C3 returned relatively low biomass values for intertidal mudflats .

A total of 26 invertebrate taxa comprising 1148 individuals were recorded from the 9 core samples. Individuals spanned six different phyla, including Annelida (Classes Polychaeta and Clitellata); Arthropoda [i.e. crustaceans] (Class Malacostraca); Mollusca (Classes Gastropoda and Bivalvia) Actinopterygii {i.e. ray finned fish} (Class Gobidae); as well macrofaunal Nematoda. However, after data reconciliation, which involved the removal from the data set of juvenile individuals recorded to genus level only the following taxa were removed: (21 Nereididae spp., 2 Actinaria, 3 Platyhelminthes, 19 *Capitalla* spp. Enchytraeidae spp. 2, HARPACTICOIDA spp. 10, *Hyalidae* spp. 1, Chironomidae spp. 13, *Dolichopodidae* spp. 7, *Paranais* spp.1 and 1 Gobiidae), the number of taxa were reduced to 13 and the number of individuals reduced to 1069. Data rationalisation is commonly undertaken to address taxonomic inconsistencies and current issues with nomenclature and taxonomic reassignments, reducing the chance of spurious results. Data presented hereafter are in accordance with the rationalised data set.

A breakdown of the numbers of individuals by phyla is provided in Table 4.1. The dominant taxon was Mollusca, comprising 65.7% of all individuals, of which 97.8% were from Class Gastropoda and 2.2% from Class Bivalvia. The number of individuals in the other taxa were extremely reduced compared to the Mollusca with annelids being the next most abundant.

Table 4.1: Number and percentage of individuals from the different phyla

TAXON	TOTAL NUMBER OF INDIVIDUALS	% OF TOTAL INDIVIDUALS
Mollusca	703	65.7
Annelida	324	30.3
Nematoda	38	3.5
Crustacea	4	0.4

This is fairly typical of intertidal mudflats which are generally highly productive (see above), supporting a high biomass but with relatively low species diversity and few rare species. The species diversity at the site was lower than expected and this is likely to be due to biotic factors (e.g. predation by the large numbers of juvenile shore crab *Carcinus maenas* present (**Error! Reference source not found.** and **Error! Reference source not found.**)). *Carcinus maenas* is an opportunistic predator and has been shown to significantly reduce the numbers of invertebrates on mudflats (McLusky, 1989). Overall, the fauna

observed during the course of the survey were considered common for UK coastal waters, and no invertebrate species of conservation importance were recorded.

The top 10 most numerous taxa are presented in Table 4.2. The most numerous species were the mud snail, *Peringia ulvae* and the tubificid annelids, *Tubificoides benedii* and *T. pseudogaster*, and Nematodes. Collectively, these four taxa accounted for almost 95% of all individuals. The only taxon found at all sites other than the abundant gastropod mollusc *Peringia ulvae* was the Nematoda, which is unsurprising considering that nematodes are the most abundant taxonomic group on the planet comprising four out of every five multicellular animals (Bongers and Ferris, 1999).

Table 4.2: Abundance, percentage of total abundance and distribution of top 10 most abundant taxa

TAXON	ABUNDANCE	% OF TOTAL ABUNDANCE	NUMBER OF SITES
<i>Peringia ulvae</i>	688	61.2	9
<i>Tubificoides benedii</i>	189	16.8	9
<i>Tubificoides pseudogaster</i>	93	8.3	6
NEMATODA spp.	38	3.4	9
<i>Nereididae</i> spp.	21	1.9	8
<i>Streblospio benedicti</i>	20	1.8	4
<i>Capitella</i> spp.	19	1.7	7
<i>Hediste diversicolor</i>	19	1.7	7
<i>Abra tenuis</i>	14	1.2	5
<i>Chironimidae</i> spp.	13	1.1	4
HARPACTICOIDA spp.	10	0.9	3

Hierarchical cluster analysis with SIMPROF (Clarke *et al.*, 2008) testing on square root transformed Bray Curtis similarity data revealed a single main cluster group containing seven sites (A1, A2, A3, B1, B2, B3 and C1) and two dissimilar sites (C2 and C3). The communities at the sites in the main cluster were more similar to one another (>62% similarity) than they were to the communities recorded at sites C2 and C3 (Figure 4.1). The main cluster group was characterised by *Peringia ulvae*, *T. benedii*, *T. pseudogaster*, Nematoda, *Nereididae* spp, *Streblospio shrubsolii*, *Capitella* spp., and *Hediste diversicolor*, the first five species of which contributed to over 74% of the similarity between samples within the cluster group. Based on these species and the others that occurred in the main group, this group can be best described as a mix of the biotope complexes, **LS.LMu.MEst** (polychaete/bivalve-dominated mid estuarine mud shores) and **LS.LMu.UEst** (polychaete/oligochaete-dominated upper estuarine mud shores).

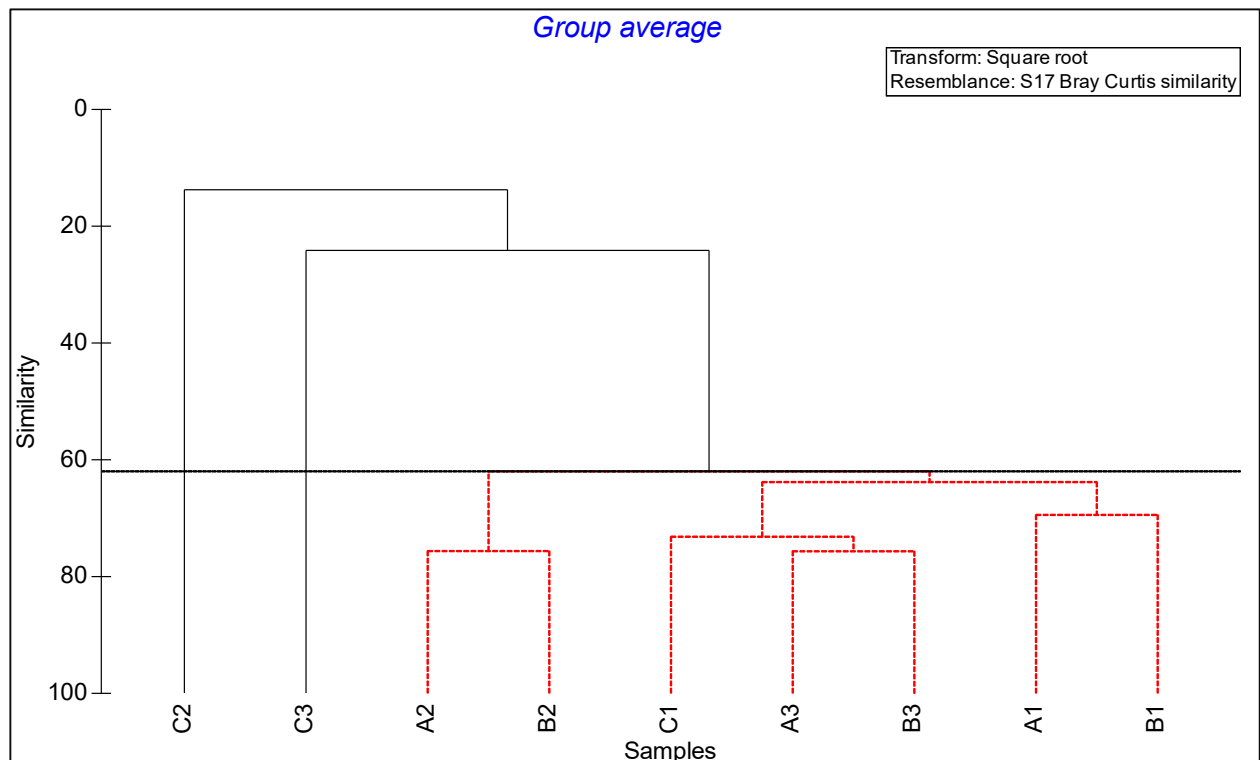


Figure 4.1: Hierarchical cluster analysis of benthic infaunal data. The horizontal black line is located at a 62% similarity level

Sites located at the different shore levels of the A and B transects grouped together, i.e. A1 with B1, A2 with B2, and A3 with B3, indicating a large amount of similarity (approximately >70%) in community structure between sites located at the same distance from the shore along these two transects. Notably, the community structure at C1 was more similar to the community structure at A3 and B3 than to any other site. Only a limited number of individuals and species were recorded at sites C2 (N=31 and S=4) and C3 (N=51 and S=6), respectively, whereas the number of individuals and species at the other sites was much greater, ranging from 88 to 326 individuals, and from 9 to 13 taxa, in part explaining why the communities at sites C2 and C3 were found to be different to the main cluster group. Due to the paucity of taxa at sites C2 and C3, these sites were not able to be classified beyond a main habitat level, and were assigned to the **LS.LMu** littoral mud habitat.

Intertidal mudflat*

The estuarine intertidal mudflat (H1.1) associated with the site is a habitat of high ecological value. Intertidal mudflats are a habitat of principal importance for the conservation of biodiversity in England having high productivity for communities and species and providing linkage between marine and intertidal habitat for prey species, nutrients and nutrient cycling (e.g. see Blanchard *et al.*, 2001). Accordingly, these habitats have previously been identified under the UK Biodiversity Action Plan as under threat from sea level rise, human disturbance, industrial and domestic housing development and pollution, amongst other factors. Notably, estuarine mudflats are listed as Priority Habitat under UKBAP goals. The intertidal mudflats at the site are of international significance for the wading birds and wildfowl which they support.

The high shore was dominated by littoral coarse sediment and biotopes ranged from **LR.LLR.F** Fucoids on sheltered marine shores which covered the upper shore, through mixed sediments in the narrow midshore with *Fucus vesiculosus* **LR.LLR.F.FvesX** and large sheltered areas of *Ascophyllum nodosum* **LR.SLR.FX.AscX**.

The sediments here supported similar animal species to those found on other mixed sediment shores along the Solent shoreline and included *Peringia ulvae*, cockles *Cardium edule* and the winkle *Littorina littorea* which were frequent amongst the coarse mixed sediments and under the fucoid alga, the limpet *Patella vulgata* was occasional and the Beadlet anemone *Actinia equine* were rare. Mobile epifauna included frequent juvenile shore crabs *Carcinus maenas*.

The majority of the intertidal area within the intertidal area comprised littoral mud **LS.LMu**. In most places this had a gravelly muddy sand component with occasional rip rap, cobbles and pebbles.

Saltmarsh – scattered plants*

Scattered saltmarsh plants (H2.4) dominated by the nationally rare golden samphire *Limbarda crithmoides* above the EHWS mark and *Sueada maritima* and cord grass *Spartina* spp. on the upper intertidal. The scattered saltmarsh community is found along the upper shore landward of existing slipway throughout the coastal area of the site. Coastal saltmarsh is an important resource for wading birds and wildfowl and acts as a refuge for birds feeding on adjacent intertidal mudflat. It can also act as a breeding site for breeding gulls and terns and as a food source for passerines particularly in the autumn and winter. It is listed as Priority Habitat under UKBAP goals. The saltmarsh consists of scattered plants

Strandline vegetation*

The strandline(H5) marks the upper tidal limit and lies within both the international and national designated sites. Strandline vegetation is not listed as a UK priority habitat and at site consisted primarily of brown fucoid algae. It provides shelter to invertebrates and food to birds and is considered to be of value within the context of the site. The talitrid family of amphipod-dominated strandline biotope **LS. LSa.St.Tal** was recorded with the amphipods sheltering amongst the loose fucoids decomposing at the high water mark and beneath the man-made fibre at the base of the rock armour.

SACFOR

A standardised MNCR SACFOR abundance scale (Table 1) was used to analyse the surface community.

Table 3: SACFOR abundance scale used for littoral taxa (NB: table adapted from the 1990 Marine Nature Conservation Recording (MNCR) SACFOR abundance scale referenced within JNCC, 2017).

Abundance		Encrusting & turf species e.g. sponges, barnacles, mussels, seaweeds etc.	Small plant & animals (1-5cm) e.g. worms, anemones, limpets, dogwhelks etc.	Large plants & animals (>5cm) e.g. crabs, starfish, fish etc.
Abbreviation	Definition			
S	Superabundant	80 – 100% cover	>750 per m ²	>100 per m ²
A	Abundant	40 – 80% cover	500 per m ²	75 per m ²
C	Common	20 – 40% cover	100 per m ²	50 per m ²
F	Frequent	10 – 20% cover	50 per m ²	10 per m ²
O	Occasional	5 – 10% cover	10 per m ²	5 per m ²

Abundance		Encrusting & turf species e.g. sponges, barnacles, mussels, seaweeds etc.	Small plant & animals (1-5cm) e.g. worms, anemones, limpets, dogwhelks etc.	Large plants & animals (>5cm) e.g. crabs, starfish, fish etc.
Abbreviation	Definition			
R	Rare	<5% cover	<5 per m ²	1 per m ²

Table 4: Surface sediment observations of fauna and algae at each of the quadrat locations along the GCC foreshore during the August 2020 survey.

Species	Abundance SACFOR scale	Notes
<i>Actinia equine</i>	Rare	
<i>Ascophylum nodosum</i>	Abundant	no <i>A.nodosum mackaii</i> observed
<i>Austrominius modestus</i>	Frequent	
<i>Blindingia minima</i>	Occasional	Associated with freshwater spring
<i>Carcinus maenus</i>	Frequent	Only juveniles encountered
<i>Cardium edule</i>	Occasional	
<i>Fucus vesiculosus</i>	Abundant	Most abundant to east of club house
<i>Littorina littorea</i>	Frequent	On hard substrates from upper to lower intertidal
<i>Littorina saxatilis</i>	Rare	Single specimen on upper eulittoral
<i>Patella vulgata</i>	Occasional	On boulders and large cobbles
<i>Peringia ulvae</i>	Superabundant	High densities on muddy substrates
<i>Semibalanus balanoides</i>	Frequent	
<i>Gammarus</i> species	Occasional	Probably <i>G.locusta</i>

5. Discussion and Recommendations

5.1. Designated Sites

The site of the proposed development lies within the designated site of Chichester Harbour AONB, SSSI, SPA and Ramsar wetland of international importance (MAGIC, 2020). There is the potential for direct and indirect impacts.

5.2. UK and Local BAP Habitats

The Site encompasses small areas of the UK BAP priority habitats; Intertidal Mudflats and Coastal Saltmarsh. Direct and indirect impacts may occur as a result of construction and operational activities at the site. These areas are also a designated site and methods will need to be undertaken to protect and restore them.

5.2.1 Intertidal Habitats/Species

The habitats within the intertidal survey area directly contribute to the value and status of the Chichester Harbour SPA, Ramsar site and SSSI.

In project specific terms, the main risk to the intertidal mudflats and saltmarsh communities is damage during the construction phase of the development, including the installation of the new slipway, pontoon and moorings. Activities including use of heavy equipment on the marshes and mudflats (pressure from heavy equipment can compromise marsh drainage leading to loss and very poor, or no, recovery (Laegdsgaard, 2002), plus extensive periods of smothering from runoff can block light and cause compaction thus further impacting the sites integrity (Kelleway, 2006; Trave and Sheaves, 2014). The intertidal mudflat and saltmarsh habitats are interdependent and any impact on one habitat could indirectly impact the wider ecosystem.

The main taxa identified throughout the intertidal included polychaete burrows, likely to be the lugworm *Arenicola marina*, the mud snail *Peringia ulvae*, the bladder wrack *Fucus vesiculosus* and fucoid *Ascophyllum nodatum* and the green algae *Ulva lactuca* and *Blindingia minima*. In addition, mobile epifaunal taxa such as shore crabs *Carcinus maenas* (mostly juvenile) and the winkle *Littorina littorea* also occurred frequently. May of these taxa ranged over the full width of the intertidal, or at least over the mid to lower shore area. The less frequently recorded taxa were only recored at the upper shore in the case of the rough periwinkle *Littorina saxatilis* or the lower shore as was the beadlet anemone *Actinia equina*.

Given the importance of the Mill Rythe and the wider Chichester Harbour to wildfowl, waders, fish communities, interstitial and epibenthic fauna, protection and enhancement of the intertidal mudflats and saltmarsh should be built in to the design of any activities in the intertidal area. In particular terracing for saltmarsh vegetation is recommended to be installed at the EHW mark throughout the site. This will not only look attractive to prospective owners of properties on the development site, but will help safeguard the existing vegetation as well as provide new habitat for colonisation by invertebrates, fish and birdlife that utilise the area.

Construction activities including access to and from the intertidal mudflats and saltmarsh should be located sensitively to minimise impacts on these important habitats. Protecting the intertidal mudflat and saltmarsh habitats would benefit:

- Wildfowl, waders and passerine birds;
- Fish stocks by protecting their nursery habitat;
- Support the Ramsar, SPA and SSSI designated features;
- Protect a locally and nationally depleting saltmarsh and mudflat habitats; and
- Wider environmental benefits of protecting saltmarsh and mudflat to maintain a healthy ecosystem and ecosystem services.

6. Conclusion

Government guidance on biodiversity now requires developers **to protect and enhance biodiversity, particularly with regard to priority habitats such as mudflats and saltmarsh**. Given the International designations of features at the proposed development site, the opportunity exists to turn environmental challenges into opportunities by creating net gains for biodiversity at the site. This will help build a positive brand for Alpine Group Ltd and demonstrate the sustainable credentials of the organisation.

To achieve a net gain for biodiversity at the site any work within the Site must improve the environment for birds, fish and other wildlife, as well as meet international, national, regional and local Biodiversity

Action Plan targets. The EU Water Framework Directive 2000/60/EC highlight the need for maintaining and improving the ecological value of estuaries. Every effort should be made to help ensure that these protected habitats retain their favourable status. This could be done by investigating estuary edge design. It is highly recommended that the Environment Agency's publication Estuary Edges – design advice (EA, 2011) is used to understand and implement the most suitable soft engineering option at the site.

Overall, it is considered that any potential adverse impacts from the proposed development upon specific protected species/habitats/designated sites will be able to be mitigated for, in line with existing wildlife legislation and planning policy. As has been outlined above, the opportunity is available for the proposed development to make a positive contribution to the biodiversity of the Site and local area. Using both on site mitigation and targeted enhancements, a positive change is considered to be likely to occur.

In the event that it is not possible to retain the habitats of value on the Site, these should be replaced through habitat creation and if this is not possible then efforts should be made to enhance existing habitat nearby. Emphasis should be placed on providing ecological networks through the development to ensure that there are no barriers to dispersal or migration of species through the Site. All compensation and ecological enhancement works should ideally focus on the protected, rare and vulnerable species present on the Site and in the local area, i.e. Wintering wildfowl and waders, terns, saltmarsh, intertidal mudflats, aquatic invertebrates and fish.

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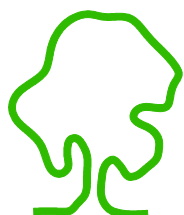
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