Yachthaven Eelgrass survey

A report for

Alpine Homes

08/11/2023



Fathom Ecology





GUTNER CREEK
INTERTIDAL EELGRASS ASSESSMENT

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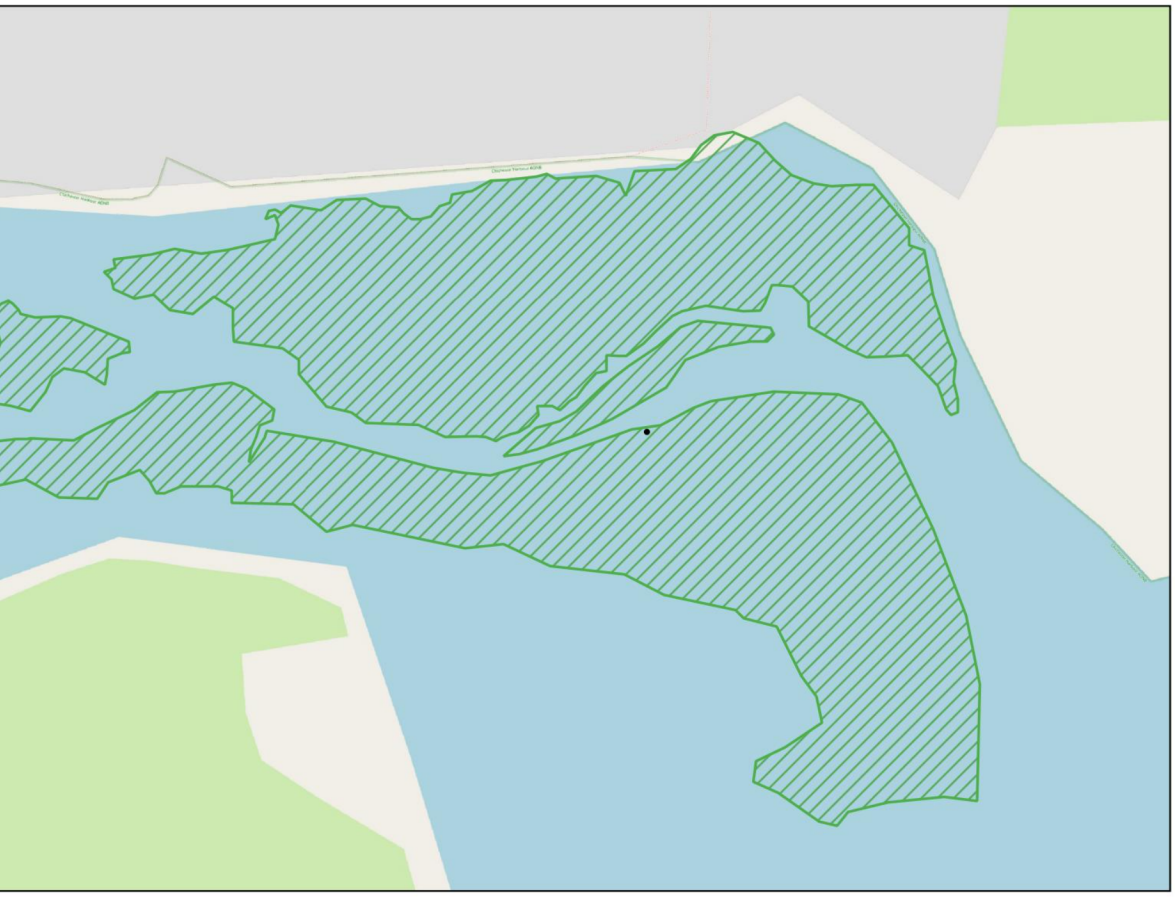
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Map Title	Coordinate System & Source
Mill Rythe Seagrass Survey- Seagrass extent August 2023	EPSG:3857 - WGS 84 / Pseudo-Mercator Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © https://www.openstreetmap.org and contributors.
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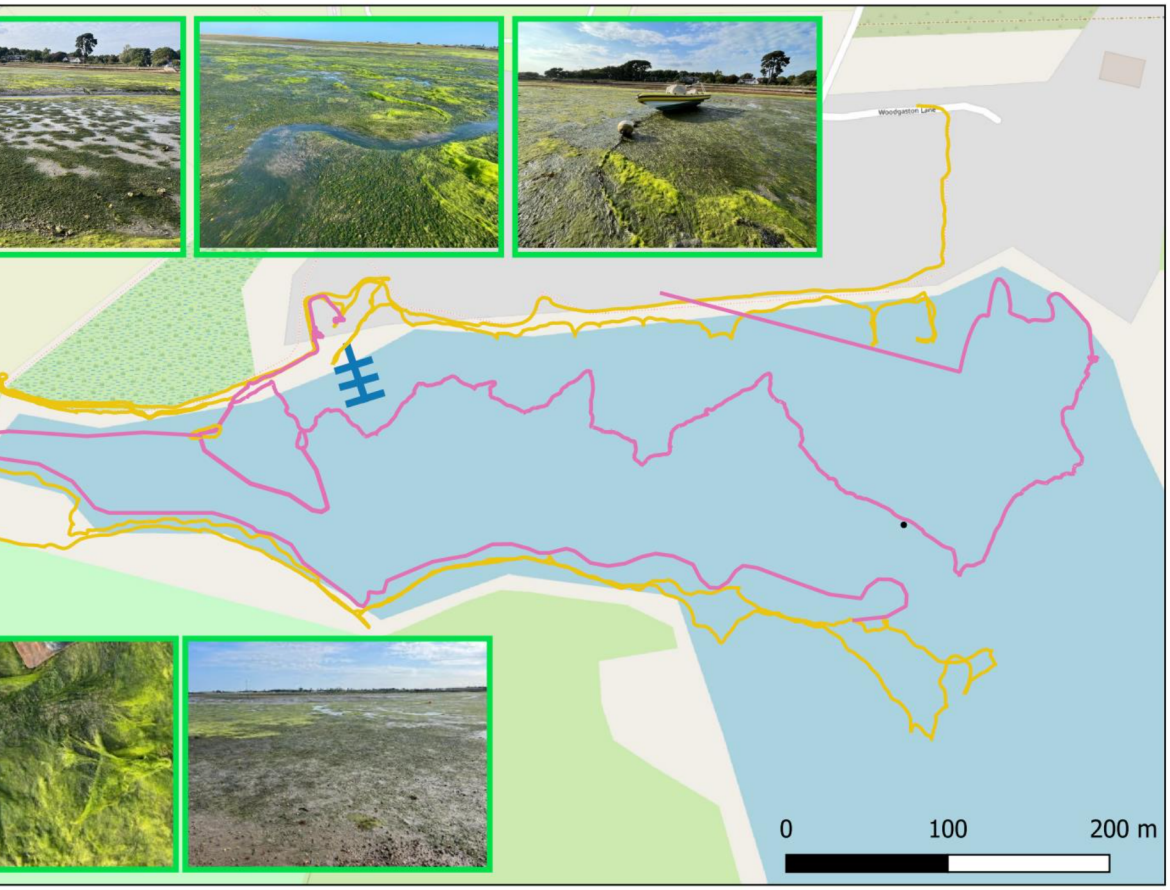
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Figure 1. Eelgrass distribution August 20

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Map Title	Coordinate System & Source
Mill Rythe Seagrass Survey Tracks August 2023	EPSG:3857 - WGS 84 / Pseudo-Mercator Base map and data from OpenStreetMap and OpenStreetMap Foundation (CC-BY-SA). © https://www.openstreetmap.org and contributors.
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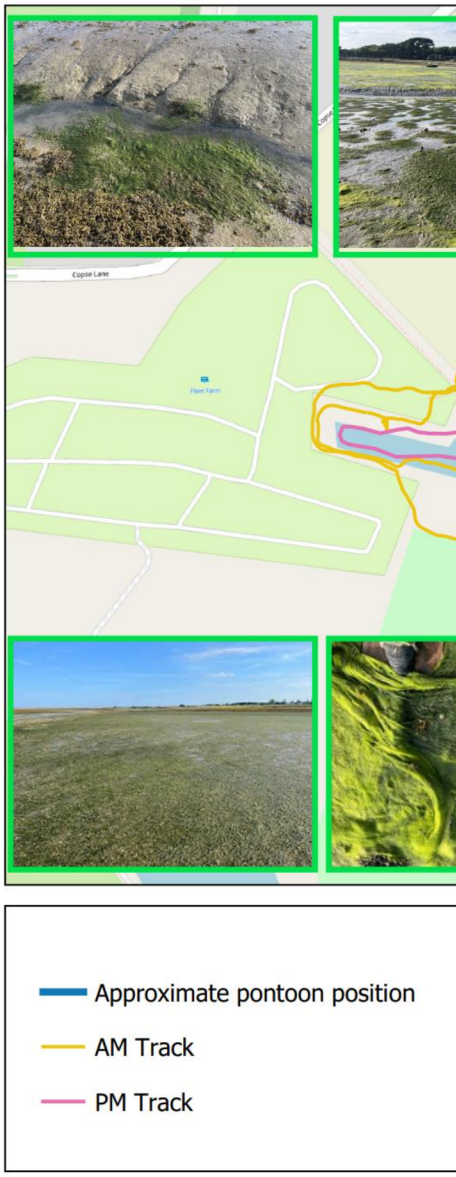


Figure 2. Track at Gutner Creek, Mill Ry

1. Company Background

Fathom Ecology Ltd www.fathom-ecology.com a small consultancy advising on fit for purpose environmental data for infrastructure projects in or adjacent to marine, estuarine and freshwater environments. The company provides specialist advice on the assessment of the effects of disturbance on aquatic environments and on mitigation and compensation measures required in the reduction of risk to both the developer and the environment.

2. Introduction

The Yachthaven development has proposed the installation of a pontoon on the intertidal habitat of Gutner Creek, Mill Rythe, eastern Hayling Island. Approximately 270 m^2 of intertidal habitat will be affected by the pontoon installation and up to a further 380 m^2 of intertidal habitat will be lost or shaded when vessels are moored alongside. The pontoon provides tidal berthing for a total of twelve vessels, with the maximum size of each vessel being 10 m in length and 4m width.

The Hampshire and the Isle of Wight Wildlife Trust (HIWWT) mapped the extent of the eelgrass present in Gutner Creek in 2008 (Figure 1). Eelgrass beds were present to the east of the proposed pontoon location, and in smaller fragmented beds to the west of the site. Havant Borough Council made eelgrass monitoring a condition of the Planning Permission set out in a Section 106 agreement for the Yachthaven development. Five years of eelgrass monitoring were proposed. This survey report provides the findings of the fourth year of monitoring at the site.

The objective of the monitoring work is to detect trends and changes in the distribution, abundance and health of the eelgrass over time with regard to the proposed development and the associated factors which have the potential to influence the eelgrass at the site. The monitoring also allows management intervention should it be required.

Eelgrass Conservation Status & Importance

Eelgrasses are marine flowering plants found in shallow, coastal habitats. Within the UK there are four recognised species of eelgrass: common eelgrass, Zostera marina; dwarf eelgrass, *Z. noltii*; beaked tasselweed *Ruppia maritima*; and spiral tasselweed *R. cirrhosa*. Unusually, the common eelgrass *Z.marina* has two forms, the typical form grows in subtidal water where it remains fully submerged during its life history, however when the seeds of *Z.marina* colonise the intertidal environment where typically plants are exposed for long periods between tides, Z. marina takes on another form known as the narrow leaved eelgrass. For many decades the narrow eelgrass was believed to be a species in its own right and was classed as *Z. anguistifolia*. Recent genetic evidence has shown that *Z. angustifolia* is in fact the intertidal phase of the common eelgrass exhibiting differences in terms of morphology and life history as adaptations to different habitats (D'Avack et al 2019).The dwarf eelgrass, which grows predominantly within the intertidal, and the intertidal phase of common eelgrass both coexist in Gutner Creek and the wider Mill Rythe.

Numerous papers have outlined the importance of eelgrass to marine systems and these are usefully summarised in Marsden and Chesworth (2014) and Cullen-Unsworth et al (2018). Eelgrass is an important food source for grazing bird species (Tubbs and Tubbs, 1982) including Brent Geese which are a feature of Chichester and Langstone Harbours Special Protected Area. Eelgrasses supply decaying nutrient material to associated marine communities and stands are habitat for related epi-benthic species and communities, plus sediments are aerated and consolidated through their roots, which can enhance infaunal invertebrate communities.

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Eelgrasses are subjected to intense levels of anthropogenic disturbance because of the shallow nearshore waters they inhabit (Bertelli et al.,2020). Amongst many factors associated with anthropogenic activities, they have suffered from “wasting disease” (nutrient associated fungal infection on Z. marina), eutrophication causing smothering by green algae, have been impacted by biocides associated with antifoul (Chesworth et al., 2004), and are sensitive to physical removal and/or burial of vegetation and effects of increased turbidity and sedimentation (Erftemeijer & Lewis 2006).

Importantly in the report Inventory of Eelgrass Beds in Hampshire and the Isle of Wight, 2014 (Marsden and Chesworth, 2014) the presence of eelgrass at Mill Rythe was noted, with regard to dwarf eelgrass Z. noltii on the upper and mid intertidal. Since 2014 investigations by Fathom Ecology have determined that both *Z.marina* and *Z. noltii* are present in mixed beds at Mill Rythe. It is well documented that eelgrass in Chichester Harbour is “vastly reduced” and the extent and condition of the eelgrass beds at Mill Rythe are of real value to the harbour (Figure1). With increasing interest in eelgrass, new beds are being recorded throughout the wider Chichester Harbour. Despite this, the dwarf eelgrass at Mill Rythe, represents one of the most significant stands mapped to date.

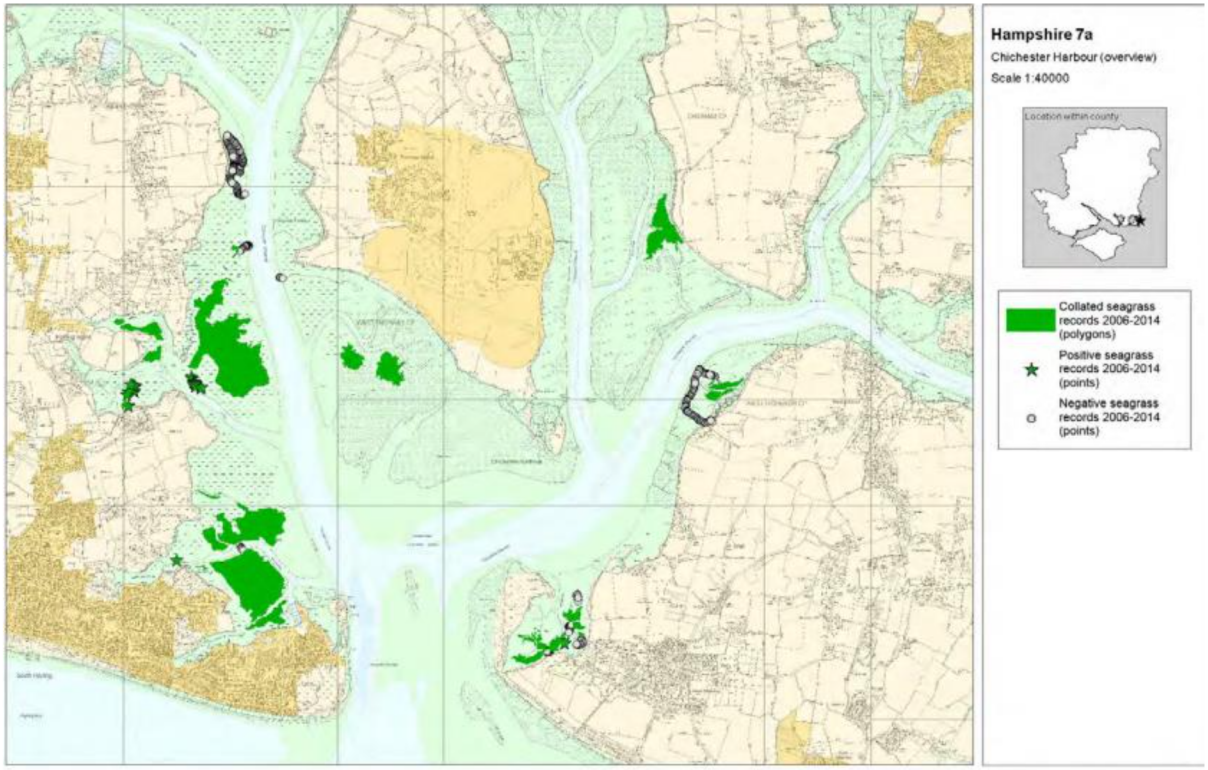


Figure 3. Eelgrass distribution in Gutner Creek, Mill Rythe (from Marsden & Scott 2015)

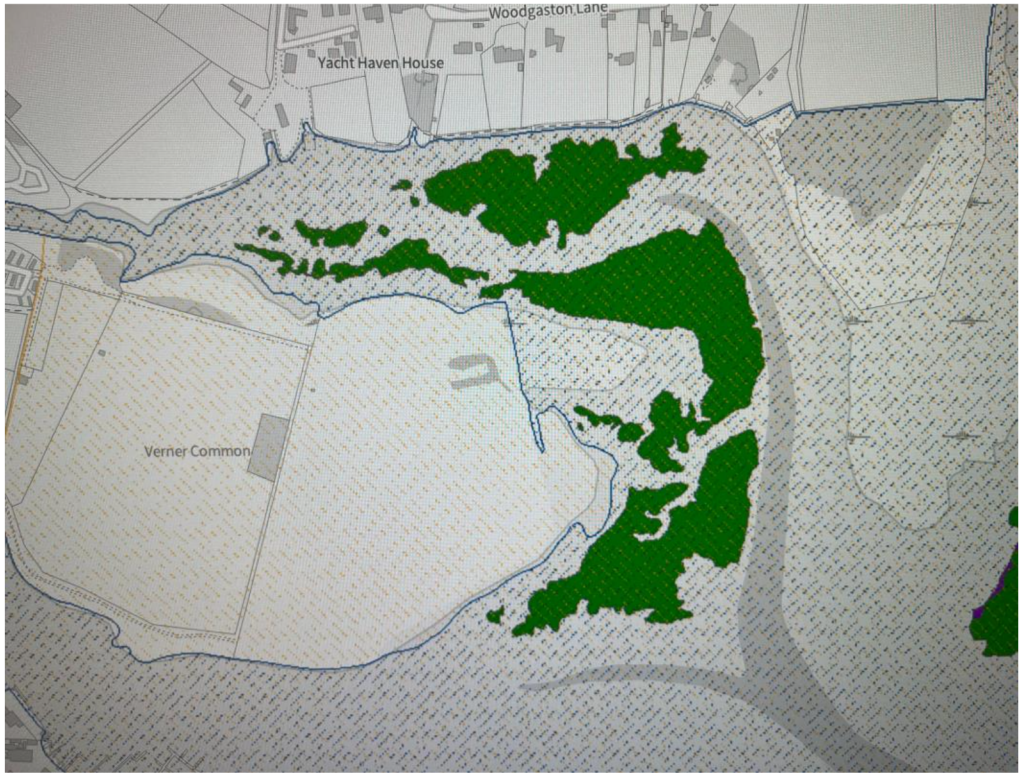


Figure 4. Eelgrass distribution in Gutner Creek, Mill Rythe (Source: www.magic.gov.uk)

Survey Scope & Objectives

The Yacht Haven and the survey area are located on the northern bank of Gutner Creek, Mill Rythe, 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 Maritime Special Area of Conservation;
- 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).

Fathom Ecology Limited (Fathom) was commissioned by Alpine Homes Limited to undertake a survey to assess the eelgrass at Gutner Creek, Mill Rythe (the Site), on the east coast of Hayling Island during August 2023. The purpose of this work was to achieve a broad scale overview of eelgrass presence/absence within Gutner Creek in relation to the pontoon that has been proposed for installation at the site.

The overall purpose of the study was to establish intertidal distribution of eelgrass; to record the position and photograph such locations as may exist. The significance of this survey and report is to place any eelgrass noted at the Site in context to the proposed development works at the Yachthaven,

and the associated possibility of disturbance to, or loss of eelgrass beds.

It is not the intention of this report to reiterate data on the conservation status (i.e., rarity and associated legislation rather than spatial distribution) of eelgrass at the Site, as it is notable that previous work has given this information in suitable detail (Marsden and Chesworth, 2014, Marsden and Scott 2015). Instead, this report provides detail on the outcome of the current survey and a general overview of the spatial extent of eelgrass beds recorded at Mill Rythe, plus aspects related to habitat and sensitivities of these beds.

2.1. Survey Conditions

The survey took place on the 17th of August 2023 during both the morning and evening low tides. The conditions on site are outlined below:

Table 1. Survey Details

Date	17th of August 2023
Morning Tide start and finish times	05.30 – 07:15
Morning Tide height	0.9 m
Morning low tide time	06:15
Evening Tide start and finish	17:00 – 19:45
Evening Tide height	1.1 m
Evening low tide time	18:32
Type of survey	Intertidal eelgrass mapping
Sea conditions (Beaufort)	1
Weather conditions	Good, bright sunshine, south westerly wind <10 knots.

2.2. Limitations

The Eelgrass Survey was conducted during the recommended survey period for monitoring Zostera, the annual period for maximum blade density and coverage in temperate systems is between May and September (see Orth et al., 2012). Hence the survey was conducted during the optimum period and within the dates specified by Havant Borough Council (HBC) in their Section 106 conditions (August).

It is believed that the eelgrass recorded during the survey adequately served the purpose of evaluating the extent of its distribution at the site. The survey was undertaken during an optimal time of year by an experienced marine ecologist with over 20 years' experience. Weather conditions were fair, and the marine vegetation was in good condition. Both low tide windows were available during daylight hours, and the intertidal and associated habitats were comprehensively surveyed. .

3. Methodology

The Site was surveyed on August 17th 2023 by two experienced marine ecologists. Handheld GPS, mud patters, camera and quadrat were used during the survey.

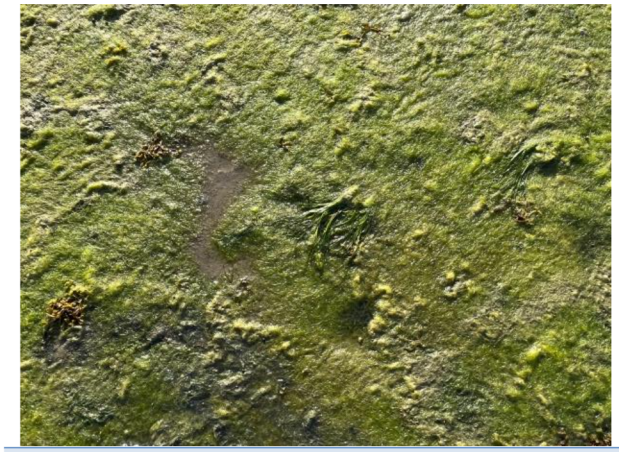
Surveys were undertaken in line with the previous two years monitoring conducted by Fathom Ecology in 2021 and 2022. This followed JNCC Common Standards Monitoring (CSM) guidelines for littoral and sublittoral sediment (JNCC, 2004[a]; JNCC, 2004[b]). All CSM methodological guidelines were followed, although notably the guidelines state that for eelgrass surveys, up to end of July is optimal for survey whilst from August to October is suboptimal. Accordingly, each of the surveys contributing to the findings within this report were collected outside of the recommended period for eelgrass surveys as specified by the JNCC but within the optimal time according to Orth et al., 2012 and HBC. The eelgrass beds at the site appeared to be in good health with no signs of senescence observed during the August survey.

The survey was conducted on foot by cross- and up-shore walking to record the presence of eelgrass stands. An un-delineated approach was used to optimise survey time, incidental encounter with eelgrass in the intertidal was also useful and visual changes in sediment mounding (noted from distance) proved a usable indicator of intertidal eelgrass bed presence. As the work was tidally/temporally limited, the intertidal survey followed the ebb tide out, then as the tidal inundation reduced survey area, the surveyors moved further up the shore until the eelgrass habitat area was no longer visible. Survey was then concluded, and field notes collated.

Where eelgrass was encountered in the intertidal, photographs were used to capture Site detail (Figure 3). Two handheld Garmin GPSMap 66S Global Positioning System (GPS) units were used to capture coordinates for later plotting in a Geographical Information System (GIS). The manufacturer states the accuracy of this unit to be less than 10 m for GPS and between 3-5 m for DGPS. Routine use of this unit has shown accuracy to be within 3 m. GIS imagery was produced in QGIS 2.18.20. Pictures of eelgrass were captured with an Olympus Tough and an iphone 13.

4. Results

Stands of *Zostera* beds were noted through the grid walkover and through incidental noting of changes in bed form (seen from distance) causing mild “humocking” (where fine sediment is trapped or bound by eelgrass fronds and rhizomes). Figure 5 below shows examples of intertidal eelgrass at the time of survey.



IMG2516



IMG2515



IMG2535



IMG2533







IMG2514



IMG2529

Montage of intertidal eelgrass east of Alpine Homes on the north shore of Gutner Creek, Mill Rythe. Higher up the shore at this location were thick stands of ephemeral algae. This frequently smothered Zostera which was patchy and rather forlorn.



IMG2507



IMG2504



IMG2496



IMG2493







IMG2488



IMG2483

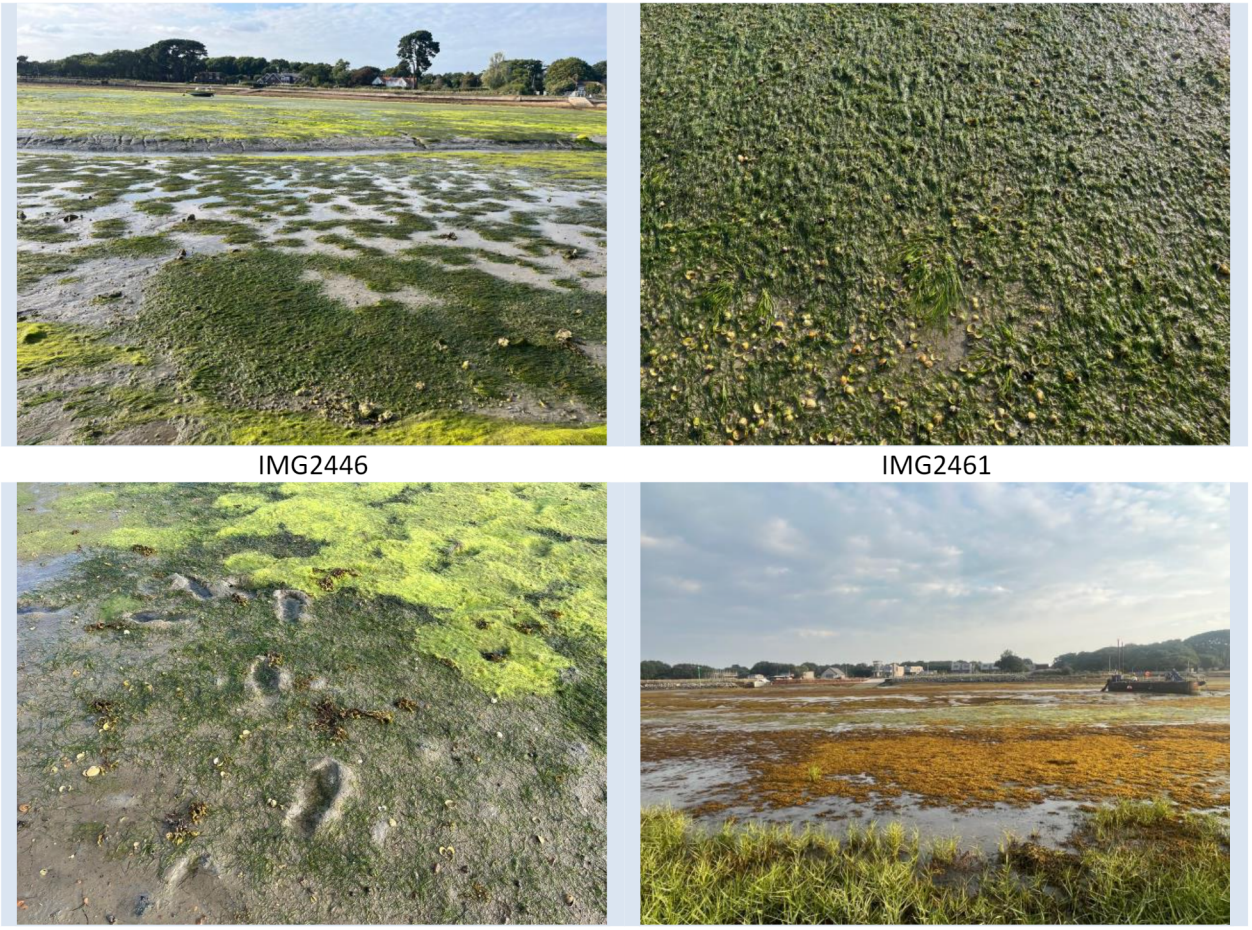


Figure 5. Montage of intertidal eelgrass photos at Gutner Creek, Mill Rythe Shore.

The predominant eelgrass species in all of the above pictures is the dwarf eelgrass *Zostera noltii*, whilst images 2496 & 2493 show examples of *Z.marina* at the site, in its intertidal form, known in the UK as *Z.angustifolia*. *Zostera marina* (var. *angustifolia*) was generally found in the drainage channels, although it also occurred as a mosaic amongst the *Z. noltii* on the mudflats and interspersed with fucoid algae.

The eelgrass beds formed 15 large polygons as shown in Figure 1. These polygons outline areas within which eelgrass was observed and photographed and the details are presented in Table below.

The boundaries were drawn using a combination of GPS Track data and photographic evidence.

Where the recorded track linked ground truth photos showed no evidence of Zostera, or only loose

Where the recorded track linked ground truth photos showed no evidence of Zostera, or only loose decaying leaves, or washed up lumps this area was excluded from the final mapped locations presented here. Note the distribution / density of Zostera within each polygon was by no means continual / uniform across the area outlined. Also, and as might be expected, often there was a patchwork mosaic of Zostera, sediment, Fucus spiralis and Ulva mats.

Table 2: Eelgrass polygon locations* and detail (*latitude and longitude positions are centroids).

Eelgrass Locations (Sites)	Lat*	Long*	Notes
Polygon 1	50.810525°	-0.967845°	*Zostera* spp. Small patch. ~12 m length x 4 m width
Polygon 2	50.810460°	-0.967033°	Large mosaic of Z.noltii, *Fucus spiralis*, *Ulva* spp. and sediment. ~95 m length by 5 m width
Polygon 3	50.810762°	-0.965332°	*Zostera* spp. ~30 length x 10m width
Polygon 4	50.810618°	-0.965087°	*Small patch Z. noltii*. ~10m diameter
Polygon 5	50.810679°	-0.962466°	Zostera noltii ~350m length x 100 m width at widest point. Mosaic of eelgrass, fuciods and ephemeral green alga.
Polygon 6	50.809074°	-0.959338°	*Zostera* noltii extending high up foreshore on shingle with fuciods.
Polygon 7	50.806162°	-0.958465°	*Zostera* noltii. large patchy bed 360 m length x 40 m width. Many brent geese.
Polygon 8	50.807512°	-0.960702°	Zostera noltii. ~230m length x 95 m width. Sparser on lower shore.
Polygon 9	50.807570°	-0.961757°	*Zostera* noltii. Small patch ~20 m diameter
Polygon 10	50.807857°	-0.961548°	*Zostera* noltii. Small patch 9 , #35 m length by 20 m width
Polygon 11	50.808479°	-0.961284°	*Zostera* spp. small patch high up foreshore interspersed with Spartina sp. colonising mudflat.
Polygon 12	50.808606°	-0.961660°	*Zostera* spp. growing in creek bed a previous identification feature for *Z.angustifolia* (see Discussion). L ~10 m x 3 m width.
Polygon 13	50.809700°	-0.960862°	*Zostera* noltii. Large patch ~250 m length x 85 m width
Polygon 14	50.810055°	-0.965067°	*Zostera* noltii mosaic with fucoids and ephemeral greens. ~200 m length x 40 m width
Polygon 15	50.810030°	-0.967033°	*Zostera* noltii. Small patch ~50m length x 15 m width

The furthest extent recorded possibly represented the lowest extent in distribution of intertidal eelgrass

(likely *Z. noltii*, dwarf eelgrass) down the shore, at least as could be reliably assessed on foot in the lowest shore surveyed during the walkover survey. Z. noltii was the dominant seagrass, however, the narrow leaved seagrass Z. marina var angustifolia was also common throughout the site, typically within creeks but also in tidal puddles on the open mudflats where it conincided with dwarf seagrass.

The invasive species *Z. japonica* was not apparent, though as it can bear the same number of rhizomes that UK *Zostera* species can, again this can be problematic for in-field identification. To identify between some *Zostera* species, research has shown that taxonomic in-field differentiation is not recommended with DNA analysis now being the preferred method.

5. Discussion

A survey was undertaken at Gutner Creek, Mill Rythe adjacent to the Yachthaven development on the 17th of August 2023 to map the extent of eelgrass at the site. The Considerable stands of both the dwarf eelgrass *Zostera noltii* and the intertidal variant of the common eelgrass *Z.marina* var *angustifolia* were encountered, during the surveys, predominantly on the mid to upper shore and it is clear that the eelgrass beds at the site have increased in size since being mapped by the Hampshire and Isle of Wight Wildlife Trust in 2013 (Chesworth & Marsden 2014) and by Fathom Ecology in 2021 & 2022. Despite this the beds seem to be suffering from increased smothering by green ephemeral algae. This is particularly evident to the west of the Yachthaven.

Survey of the subtidal eelgrass areas indicated the most prevalent species was the indigenous *Z. noltii* (dwarf eelgrass) which is known to inhabit the eulittoral down to the shallow sublittoral fringe (see MarLIN (2005) for habitat detail) and has been reported at Mill Rythe. However, moderate sized stands of *Z.* angustifolia were also encountered both on the mudflats and in the small tidal creeks. No subtidal habitat was encountered within Mill Rythe and as such the common eelgrass *Z.marina* was not observed.

The survey undertaken for this work indicates that the known habitat preference for *Z. noltii* (upper to mid intertidal) is apparent at Mill Rythe. The very lowest distribution appeared to follow a linear pattern broadly parallel with the shore down to the creek. Within the Creek small patches of Z.marina var angustifolia were observed.

Overall, the presence of the eelgrass beds at Mill Rythe could be described as abundant and widely distributed in the mid to upper intertidal and occasionally in the shallow sublittoral. The known tolerance of the species shows that *Z. noltii* is sensitive to increasing turbidity. This may explain the patchiness and absence east of the Yachthaven. Turbisity may be a limiting factor preventing eelgrass colonisation on the lower shore at Mill Rythe, as suspended sediment can be high (max 100 ppm) inducing shallowing of the high (innermost) creeks (SCOPAC). No further sublittoral patches were found and this may be related to light becoming the limiting factor in eelgrass distribution (see Ochieng *et al.*, 2010).

The Revised Ecological Assessment report for the Yachthaven (Ecosupport 2012) identified a total of 26 swing moorings located within Gutner Creek and concluded that they caused significant damage to the eelgrass beds at the site, potentially leading to their fragmentation. As such Chichester Harbour

Conservancy would no longer grant new license applications for swing moorings at the site, so the Yachthaven proposed the introduction of a pontoon on the intertidal habitat at the site to allow recreational boating whilst minimising the impact on the eelgrass beds. During the August 2023 survey a total of three vessels were present on swinging moorings within Gutner Creek, with some damage to the eelgrass being apparent.

As outlined above, it is widely recognised that eelgrasses are important to marine ecosystems for a variety of facilitating factors. The wide and abundant distribution observed at Mill Rythe suggests a resilient population. Despite this, increased turbidity, amongst others, is one of the key factors affecting eelgrass (Ospar, 2009) thus management of this aspect at Mill Rythe is an imperative should the development of the pontoon proceed.

6. Conclusions

- The eelgrass monitoring survey at Gutner Creek, Mill Rythe in relation to the proposed pontoon installation identified considerable beds, larger than those recorded by Marsden and Cheswell (2015) or by Fathom Ecology in 2021 & 2022 as well as a highly patchy population in the intertidal and shallow sublittoral;

- The dominant species at the site was the dwarf eelgrass *Z. noltii* though patches of Z. angustifolia were found in tidal creeks as well as mosaiced amongst the noltii beds.

- It is reasonable to assume that the maximum eelgrass extent recorded during the August survey may be the limit of *Z. noltii* distribution at Mill Rythe, based on its known preferred habitat and turbidity levels at the site;

- Eelgrass is an Annex 1 habitat under the Habitat Regulations, therefore the eelgrass beds within the zone of influence of the development (i.e. Gutner Creek) are considered to be of national importance being an feature of the Solent Maritime SAC and providing vital supporting habitat for the Brent Geese as well as other species (wigeon and pintail) which are features of the protected wildfowl assemblage for both the SPA and Ramsar sites.

- Eelgrass has declined due to numerous anthropogenic effects. The *Z. noltii* population recorded at Mill Rythe is in good condition for eelgrass within the Solent other than the highly patchy (fragmented) areas affected by the swing moorings and the increasing ephemeral algae which is smothering the eelgrass in some instances.

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