Hampshire Water Transfer and Water Recycling Project

Environmental Statement – Appendix 9.3 Intertidal seagrass survey

VOLUME NUMBER: 6

PLANNING INSPECTORATE NUMBER: WA010002

VOLUME DOCUMENT REFERENCE: 6.2

APFP REGULATION: 5(2)(a)

May 2026

Version 0

from Southern Water

Contents

Graphics

Tables

1 Introduction

1.1 Overview

1.1.1 This technical report has been prepared in relation to the Hampshire Water Transfer and Water Recycling Project (hereafter referred to as the 'Proposed Development') and supports the marine ecological assessment which is presented within Environmental Statement (ES) Chapter 9 Marine biodiversity, Volume I (Document reference 6.1, DCO Volume 6). Details of the Proposed Development are described in ES Chapter 3 Description of the Proposed Development, Volume I (Document reference 6.1, DCO Volume 6) and have informed the scope of this study.

1.1.2 This report details the baseline data for seagrass collected between 28 and 29 September 2022 and is produced to inform the marine ecological assessment presented within ES Chapter 9 Marine biodiversity, Volume I (Document reference 6.1, DCO Volume 6). The survey scoping and methodology used for establishing the ecological baseline for seagrass are provided in section 2 of this report.

1.2 Objectives

1.2.1 The Environmental Impact Assessment (EIA) Scoping Report for the Proposed Development identified potential effects on seagrass and to assess whether additional study is recommended.

1.2.2 To inform the assessment of likely significant effects on seagrass the following objectives were set:

1. Undertake a desk study to identify any records of seagrass within Langstone Harbour or around the Eastney Long Sea Outfall (LSO).
2. Undertake surveys to confirm presence or absence of seagrass habitat in the field survey area (the whole of Langstone Harbour) through identification of *Zostera marina* (eelgrass) or *Zostera noltei* (dwarf eelgrass).
3. Highlight and map areas of key importance to seagrass within the field study area.

1.3 Seagrass ecology

1.3.1 Seagrass beds are made up of grass-like flowering plants that occur around the UK. Whilst there are four species of seagrass which can occur in sheltered, shallow waters on sandy substrate in the UK, only *Z. marina* (eelgrass) and *Z. noltei* (dwarf eelgrass) were the focus of this survey as there are no records of *Ruppia* around the Solent.

1.3.2 Seagrass beds form important coastal habitats as they provide nurseries, refuge areas and foraging areas for a variety of species including commercially and recreationally important species [1]. Seagrass beds are also beneficial in reducing coastal erosion and improving water quality [2] [3], as seagrass is able to stabilise the substrate and cycle nutrients, making the area more habitable [4].

1.3.3 Seagrass beds have declined by at least 44% since 1936, but losses over a longer time span may be as high as 92% [5]. They are at risk from human activities including pollution, scour and overfishing [3]. Restoration projects are being carried out around the UK, with one restoration project occurring within the Solent by the Hampshire and Isle of Wight Wildlife Trust in partnership with Boskalis Westminster, University of Portsmouth, the Royal Society of the Protection of Birds (RSBP), Project Seagrass, Coastal Partners, Isle of Wight Estuaries Project, Chichester Harbour Protection and Recovery of Nature, Environment Agency (EA) and Blue Marine Foundation [6] [7].

1.3.4 Langstone Harbour is a tidal basin where at low water, large areas of mud flats are exposed. These mud flats are drained by three main channels which unite to make a common and narrow exit to the sea. At the time of Site of Special Scientific Interest (SSSI) notification, the harbour contained one of the largest areas of mixed saltmarsh on the South coast, as well as extensive beds of seagrass [8].

1.4 Legal context

1.4.1 The European Union's 'Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora' (the Habitats Directive) requires the maintenance and/or restoration of natural habitats and species of European interest.

1.4.2 To help implement this, the UK Marine special areas of conservation (SAC) the Financial Instrument for the Environment (LIFE) Project identified a series of sub-features of the Annex I marine habitats, including *Zostera* habitats [9]. Furthermore, seagrasses are protected by the Bern Convention, the Barcelona Convention (indirect protection of Mediterranean seagrass habitats), the Ramsar Convention (indirect protection of seagrass habitats). The International Union for Conservation of Nature (IUCN) Red List consider European seagrass species as "*Least Concern*", although some species are locally threatened [10].

1.4.3 At this time, after the UK left the European Union, the European legislation tools remain in place and current; however, changes in environmental legislation, could result in differing levels of protection and will impact the efficacy of efforts for ecosystem protection and restoration [11].

1.4.4 In the United Kingdom, national action plans with targets specifically for seagrass conservation relate to the Marine Strategy Framework Directive (MSFD). The MSFD is a European Directive which was developed to protect, preserve, and restore the quality of the marine environment across Europe [10], and provides protection for benthic habitats. Although not specifically targeted at seagrass, member states are required to take the necessary measures to achieve or maintain Good Environmental status (GES), based on 11 qualitative descriptors of the marine environment by the year 2020 [12]. The Marine Strategy Regulations 2010 were made under Section 2(2) of the European Communities Act 1972 and transpose the requirements of the MSFD into UK law. The references to MSFD and other EU legislation, will continue to work after the EU exit.

1.4.5 Additional legislation is in place supporting an ecosystem-based management approach, including the Commercial Fisheries Policy and the Marine and Coastal Access Act 2009 [13].

1.4.6 Within England, seagrass is listed as a habitat of principle importance within the Section 41 of the Natural Environment and Rural Communities (NERC) Act 2006: habitats and species of principal importance in England. Section 41 is the requirement for the Secretary of State (SoS) to publish and maintain a lists of species and habitats that are considered to be of principal importance. They are also mentioned in the Hampshire Biodiversity Action Plan (BAP) [14] and Isle of Wight BAP [15].

1.4.7 Langstone Harbour is located towards the eastern extremity of the Solent, South England. It is a designated as a SSSI under Section 28 of the Wildlife and Countryside Act 1981 (as amended). Langstone Harbour is also classified as a Special Protection Area (SPA) under Article 4.2 of the EU Directive (79/409/EEC), Ramsar sites under the Convention on Wetlands of International Importance (Ramsar Convention) and forms part of the Solent Maritime SAC designated under the Habitats Directive (92/43/EEC).

2 Methodology

2.1 Background

2.1.1 This technical report has been prepared in relation to the Hampshire Water Transfer and Water Recycling Project (hereafter referred to as the 'Proposed Development'). A desk study and a field study were commissioned for the Proposed Development after consultation with the EA to assess the intertidal seagrass within Langstone Harbour. The desk study was completed by Southern Water Services Limited (the Applicant), and the field survey was completed by APEM Ltd.

2.1.2 The field survey was undertaken to assess the density, extent and condition of intertidal seagrass beds using a hovercraft. The results of this survey will inform the consents and licensing requirements for the Proposed Development.

2.1.3 This technical note outlines the methodology and results of the survey. A comparison has been provided with historical seagrass extent records collated by the Hampshire and Isle of Wight Wildlife Trust for Langstone Harbour from 2006 to 2014 [16].

2.2 Survey guidance

2.2.1 The survey guidance was written by APEM Ltd., who also carried out the survey in line with this guidance.

2.2.2 This document outlines the programme of the survey, survey methodologies and how the data should be collected and the required geographic information system (GIS) outputs to inform the assessment.

2.3 Zone of Influence

2.3.1 The geographical scope of the assessment has been informed by:

1. The Order Limits which include temporary land take for construction compounds, access routes and lay down areas.
2. The likely effects of the Proposed Development on ecological features within the 'Zone of influence' (ZoI).

2.3.2 The ZoI is the area over which ecological features may receive impacts from a development. It covers the Order Limits, and the wider landscape where pathways of connectivity (ecological or hydrological links) exist for the transfer of impacts away from the works area.

2.3.3 Each ZoI has been determined by:

1. Consideration of the activities during construction and operation associated with the Proposed Development.
2. The scale, duration and timing of the works.
3. Ecological data, including aerial photography and Ordnance Survey (OS) mapping, biological records of each species of and baseline data collected from the field survey.

2.3.4 Based on the scale and duration of the Proposed Development it is considered that construction activities within the Order Limits will typically produce temporary and localised impacts.

2.3.5 The ZoI, desk study area and field survey area for seagrass, are detailed below within Table 2-1.

Table 2-1 Intertidal seagrass Zone of Influence, desk study area and field survey area

Ecological Receptor	ZoI	Desk study area	Field survey area
Seagrass	Within Langstone Harbour	Within Langstone Harbour Within Eastney LSO	Within Langstone Harbour

2.3.6 The EA identified Langstone Harbour as an area that has the potential to support seagrass beds due to the wave and current energy, elevation and salinity criteria. For this reason, the entire Harbour area has been set as the extent of the field survey area. The Solent Seagrass Restoration Project is currently active in the Harbour.

2.3.7 The ZoI has been set as within Langstone Harbour as the whole site is the likely dispersion area of any harmful impacts from the Proposed Development.

2.4 Desk study

2.4.1 A desk study was carried out to identify areas of potential seagrass. This desk study used MAGIC [17] to assess the location of seagrass and the size of each bed within the study area.

Desk-based study area

2.4.2 The desk study consists of two study areas (refer to ES Figure 9.1 Marine ecology study areas 1 and 2, Volume III (Document reference 6.3, DCO Volume 6)). Study area 1 consists of Langstone Harbour. This has been chosen as it is likely to be impacted by the following components of the Proposed Development:

1. Water Recycling Plant (WRP) site
2. Pipelines between Budds Farm Wastewater Treatment Works (WTW) and the WRP site

2.4.3 All of these components involve undertaking construction activities either adjacent to the marine environment, within Flood Zones 2 and 3[1] which connect to the marine environment under flood conditions, or underneath a waterbody which connects to the marine environment [18, 19]. Therefore, there is a risk to have construction effects on the marine environment.

2.4.4 The Chichester Harbour has been excluded from the study area as there is only limited sediment transport and exchange between Langstone Harbour and

[1] Flood zones are defined by the Environment Agency, with each zone being based on the likelihood of the area flooding. Flood zone 1 areas least likely to flood (<0.1% annual probability of river flooding), flood zone 2 is medium probability (0.1%-1% annual probability) and flood zone 3 areas more likely to flood (>1% annual probability). Department for Levelling Up, Housing and Communities and Ministry of Housing, Communities & Local Government, 25 August 2022. Available at: Flood risk and coastal change - GOV.UK (www.gov.uk) [Accessed 31/1/24].

Chichester Harbour given the narrow harbour entrances and very low wave energy conditions [20].

2.4.5 Study area 2 is around the Eastney LSO (see ES Figure 9.1 Marine ecology study areas 1 and 2, Volume III (Document reference 6.3, DCO Volume 6)). As this area is subtidal, it has been scoped out of the field survey. Any subtidal areas in close proximity to the study area were surveyed and reported to have no seagrasses present (refer to ES Appendix 9.10 Eastney Long Sea Outfall benthic ecology survey, Volume II (Document reference 6.2, DCO Volume 6)).

2.5 Field survey

Objectives

2.5.1 The aim of this survey was to assess the extent of seagrass beds within Langstone Harbour to acquire adequate information for the EIA process and to provide up-to-date mapping. Specific aims of the survey were to:

1. Map the seagrass beds with 100% coverage of Langstone Harbour.
2. Undertake density and condition assessments of the seagrass beds.

Survey methods

2.5.2 Due to the soft sediments at Langstone Harbour, all the survey work was undertaken using a hovercraft. Although efforts were made to fully scope the area, there were a few small areas that could not be reached as access was restricted. In these areas the presence or absence of seagrass was determined from a distance. When a seagrass habitat was identified it was photographed and the species present noted.

2.5.3 The boundary of the seagrass was assessed using the Global Positioning System (GPS) track function on a handheld GPS and driving the hovercraft along the border of the bed. The edge of the bed was defined as the area where seagrass cover was reduced to less than 5% [21] [22].

2.5.4 At each bed surveyed, a series of stations were selected for sampling using a $1m^2$ quadrat. Quadrat locations were determined in the field, based on bed size, ease of access and spatial variability of seagrass density or condition. The locations were selected to obtain representative information for the bed with the number of stations limited by the time constraints for the survey. The following information was collected from each quadrat:

1. Position using handheld GPS
2. Density – recorded as percentage cover and allocated to one of the following categories: none present, 1-5% cover, 6-10% cover, 11-20%, 21-30%, 31-40%, 41- 50%, 51-60%, 61-70%, 71-80%, 81-90%, and 91-100%
3. Condition of seagrass – evidence of browning or wasting disease
4. Macroalgae presence – description and percentage cover
5. Sediment type – description consistent with Folk (1954) but noting that it was based on visual assessment, not Particle Size Analysis
6. Top view photograph of each quadrat

Mapping

2.5.5 The extent of the seagrass recorded during the survey was mapped in a GIS. The seagrass beds recorded between 2006 and 2014 was plotted using shapefiles of the Marsden and Scott [16] data which were available from Natural England [23], to enable a comparison of seagrass extent over time.

2.6 Programme of surveys

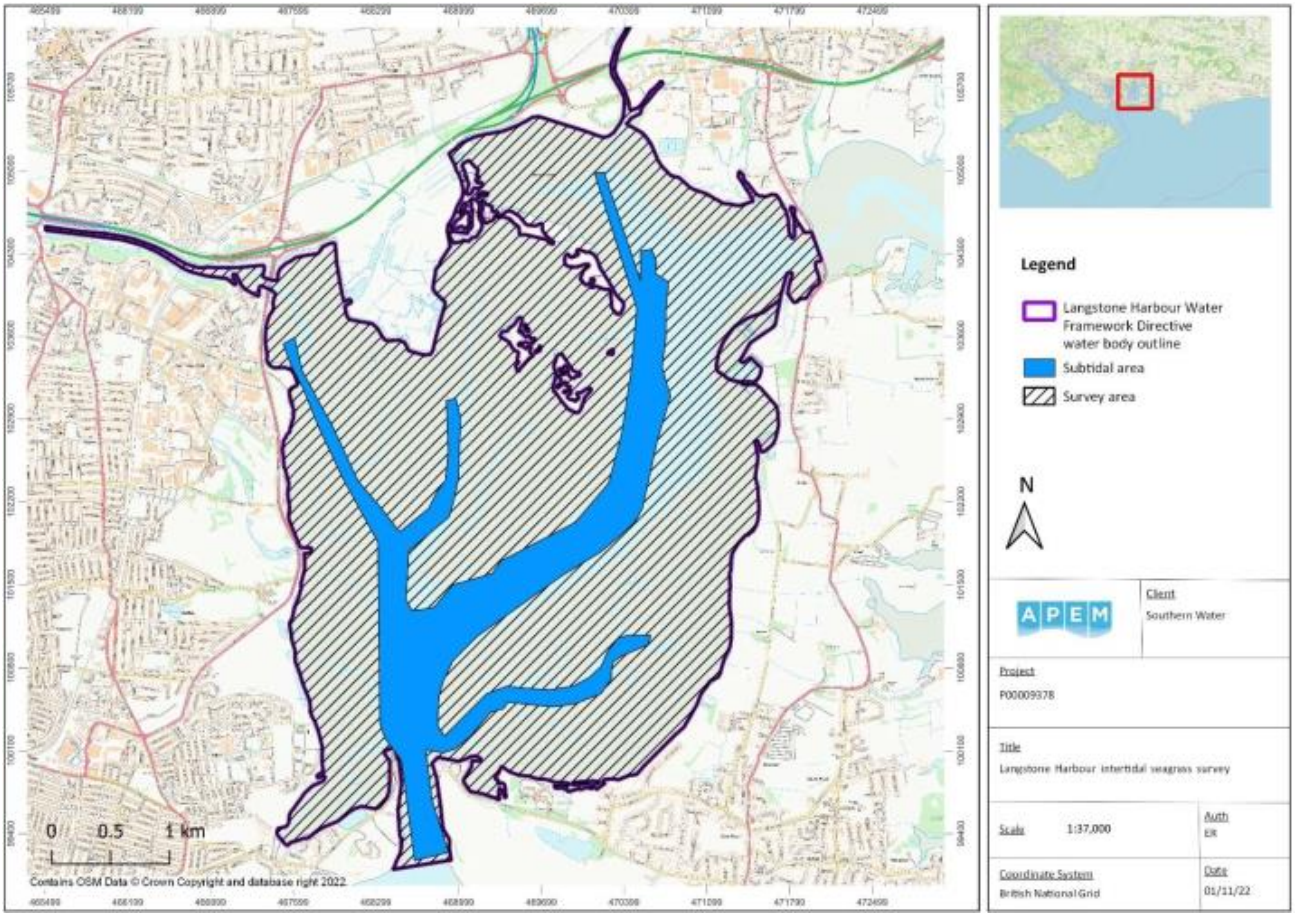
2.6.1 A desk study was started in 2022. For this report the desk study was undertaken in 2022 to identify areas of potential seagrass and prepare for the field study.

2.6.2 The field study was completed on the 28 and 29 September 2022, during spring low tide (Table 2-2). On the first day (28 September) the survey concentrated on mapping the east side of the harbour and on the 29 September, the survey concentrated on mapping the west side. The survey area is indicated in Graphic 2-1.

Table 2-2 Tide times for the survey

Date	Low tide		High tide	
	Time (BST)	Height (m)	Time (BST)	Height (m)
28th September 2022	06:50	0.21	13:54	4.83
28th September 2022	07:26	0.27	14:30	4.77

Graphic 2-1 Langstone Harbour survey area



3 Results

3.1 Overview

3.1.1 The results of the desk study and survey identified the areas of seagrass in Langstone Harbour. The desk study was used to provide map data and potential condition of seagrass beds.

3.1.2 Ground-truthing was used to confirm these areas of seagrass beds, in the form of boat surveys in Langstone Harbour.

3.2 Desk study

3.2.1 Twenty-two seagrass beds were identified using MAGIC [17] and these locations are provided in Table 3-1. These seagrass habitats are known to support commercially and recreationally important species [24] and species that are considered to be of conservation importance.

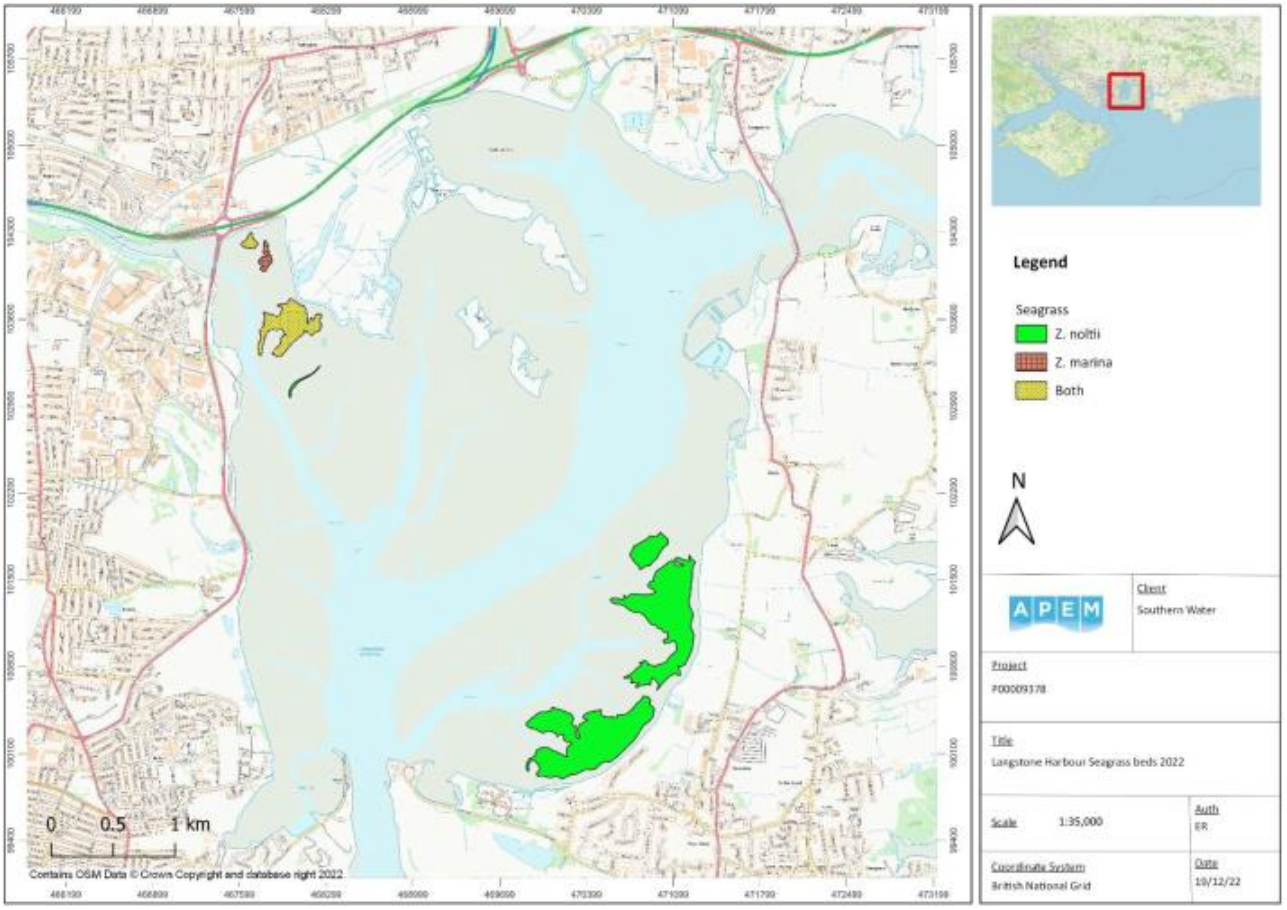
Table 3-1 Locations of seagrass in Langstone Harbour

Site	Unique identifier	Size	Co-ordinates
North near Anchorage Park	NE_0444_26	92 ha	SU68300299
8 spots between Baker's Island and South Binness Island	NE_04NE_0444_18 NE_0444_19 NE_0444_20 NE_0444_21 NE_0444_22 NE_0444_23 NE_0444_24 NE_0444_2544_17	0.1ha 0.1ha 0.1ha 0.1ha 0.1ha 0.8ha 0.1ha 0.1ha 0.1ha 0.2ha	SU69560373 SU69600366 SU69630361 SU69660351 SU69760344 SU69720333 SU69700328 SU69580326 SU69600334
3 spots west of Langstone Harbour along the Hayling Billy Trail on Hayling Island	D_00091___4 D_00091___3 NE_0449_308	0.1ha 0.3ha 26.7ha	SU70970189 SU71180174 SU71110137
2 spots south-west of Langstone Harbour near Sinah Warren Village and Leisure Club	D_00091___7 NE_0449__304	0.2ha 5.3ha	SU70250046 SU70240001

3.3 Field surveys

3.3.1 Seagrass beds in Langstone Harbour were observed in the south-east and north-west regions of the bay (Graphic 3-1). These were found on mud substrate. A total of seven seagrass beds were identified and mapped, these consisted of *Z. noltei, Z. marina* or a mixture of both species covering a total area of 0.83km^2.

Graphic 3-1 Seagrass beds mapped in Langstone Harbour during survey



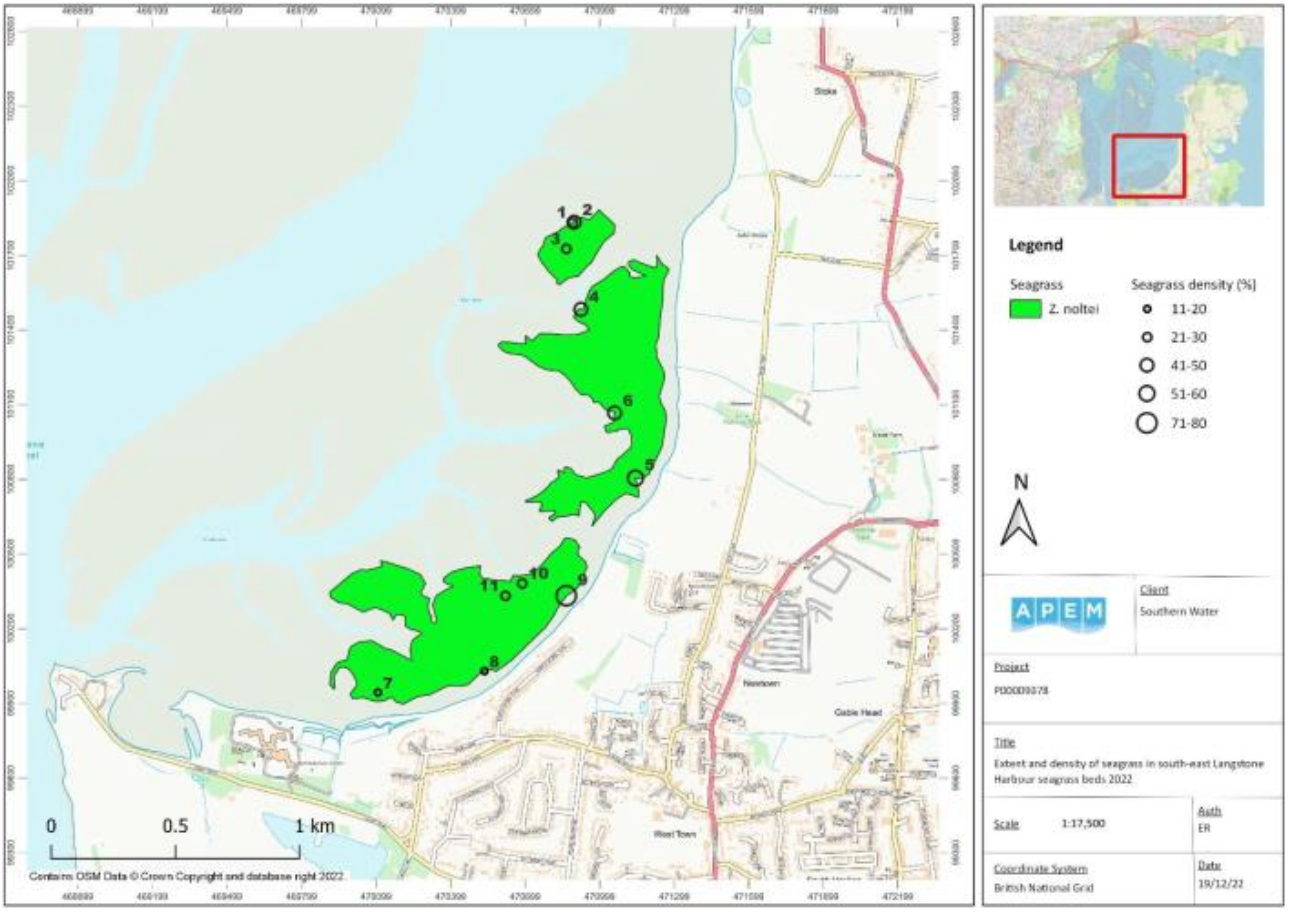
South-east region

3.3.2 The south-east region consisted of mud substrate with small patches of abundant green algal mats and saltmarsh.

Seagrass extent

3.3.3 Three seagrass beds containing *Z. noltei* were identified and mapped within the south-east region of Langstone Harbour, covering a total area of 0.70km^2 (Graphic 3-2). Each bed had a distinct boundary and was separated by large creeks and/or areas of mud with a total absence of seagrass. The sizes of these beds were 0.05km^2, 0.31km^2 and 0.34km^2.

Graphic 3-2 Seagrass beds and seagrass density mapped in the south-east region of Langstone Harbour during survey



Seagrass density

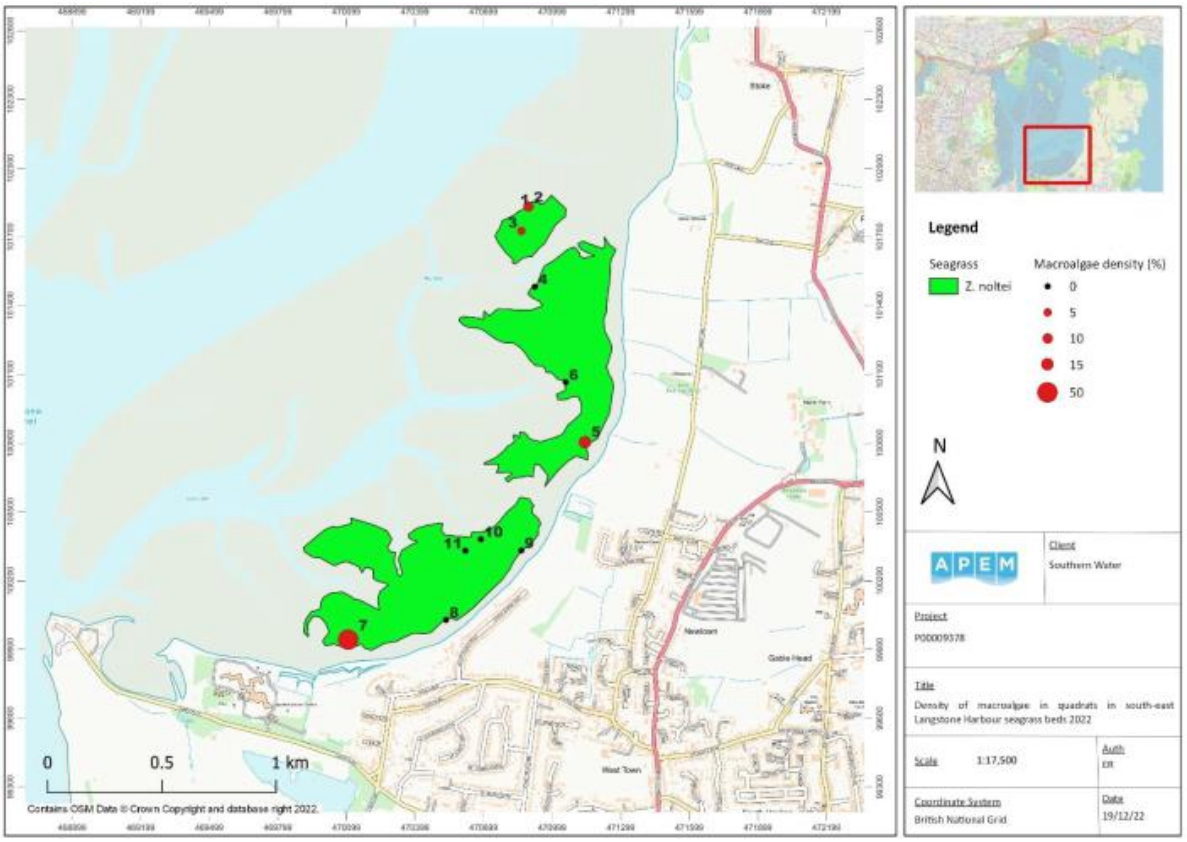
3.3.4 The seagrass beds in the south-east region were relatively homogenous (Graphic 3-2). While the percentage cover in quadrats ranged between the 11-20% and 71-80% categories, the majority of quadrats had seagrass coverage between 21% and 50% (refer to Table 3-2). Example seagrass densities observed during the survey are presented in Table 3-3.

Condition assessment

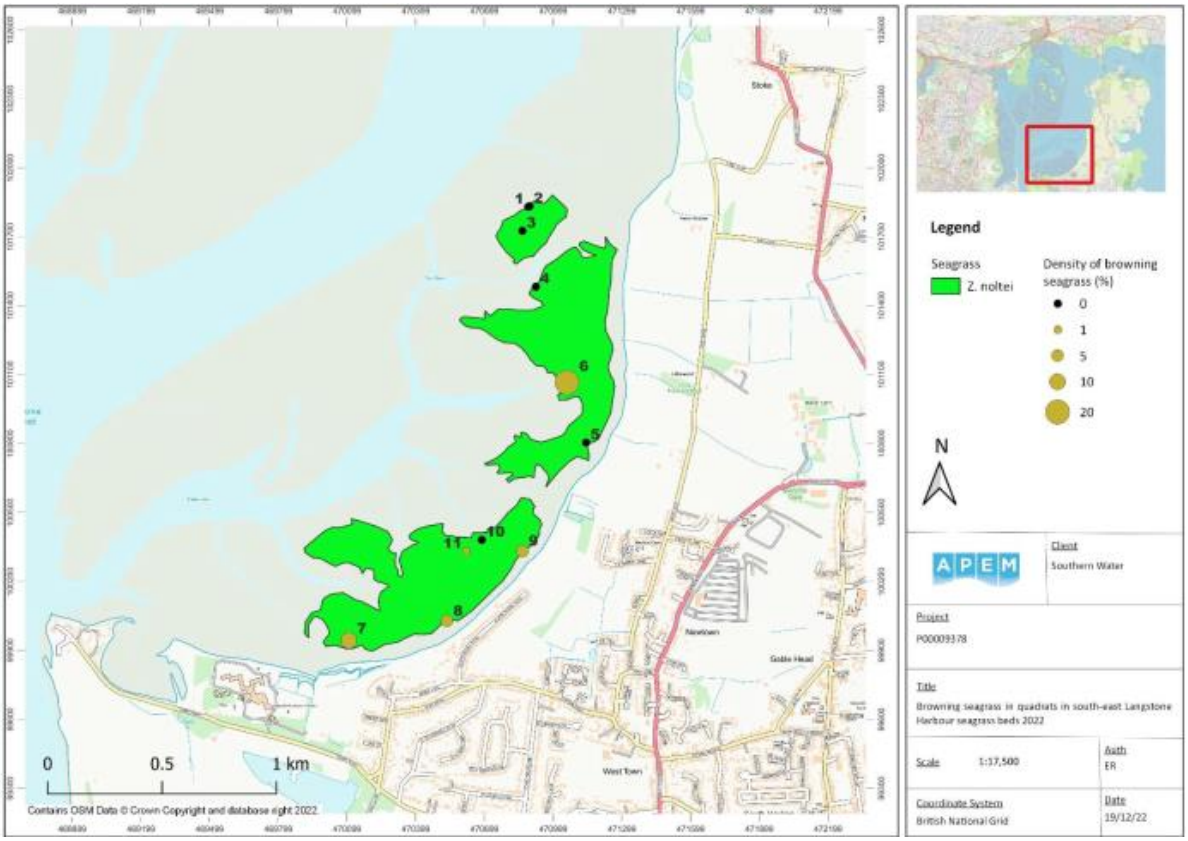
3.3.5 Two macroalgal taxa were identified within the south-east region seagrass beds (green algal mats and the brown seaweed bladder wrack *Fucus vesiculosus*). Both taxa were colonising the underlying mud sediment or empty shells on the sediment surface and were not epiphytes of the seagrass plants. Despite one quadrat containing 50% green algae coverage, the seagrass beds as a whole had very sparse levels of macroalgae colonisation, with macroalgae being absent in 64% of the quadrats and having low abundance (i.e. 5-15%) in 27% of quadrats (Graphic 3-3).

3.3.6 Browning of *Z. noltei* was observed in two of the seagrass beds in this region, with almost half of the quadrats (45%) containing at least some browning. However, the browning was at relatively low levels (1 to 10% of the eelgrass present) apart from one quadrat in which 20% of the coverage had evidence of browning. No signs of wasting disease were observed (Graphic 3-4).

Graphic 3-3 Seagrass beds and macroalgae mapped in the south-east region of Langstone Harbour during survey



Graphic 3-4 Seagrass beds and browning mapped in the south-east region of Langstone Harbour during survey



North-west region

Seagrass extent

3.3.7 Four seagrass beds were identified and mapped in the north-west region of Langstone Harbour, covering a total area of 0.13km^2 (Graphic 3-5). Unlike the beds in the south-east region, these beds did not have a distinct boundary. The beds were mostly separated by areas of mud with less than 5% coverage of seagrass or of areas too small to be classified as seagrass beds. Occasionally some beds were separated by areas of mud, with a high coverage of green algae, large creeks, or areas of saltmarsh.

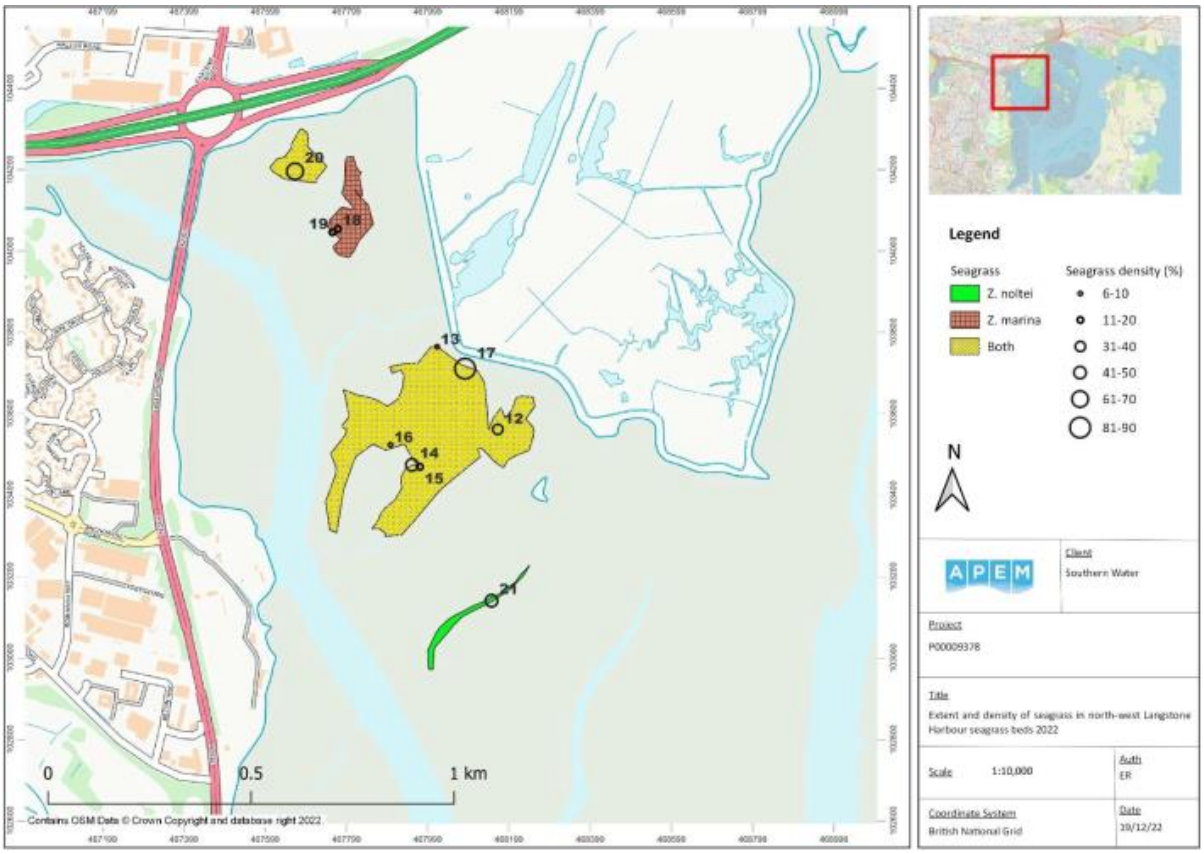
3.3.8 One of the seagrass beds comprised solely of *Z. noltei*, covering a total area of 0.004km^2 in the south of this region. This bed was isolated by extensive saltmarsh to the south-east and a shallow sloping creek with a high coverage of *F. vesiculosus* to the north-west.

3.3.9 Another monospecific bed was also mapped in the northern section of this region, which consisted of *Z. marina* and covered an area of 0.013km^2. A small layer of surface water was noted across this bed.

3.3.10 Two beds consisted of both *Z. noltei* and *Z. marina*. One of these was mapped at the northern most section of the region and had an area of 0.01km^2, and the other was the largest bed in the region (0.12km^2), which bordered Farlington marshes. Although both species were present in these beds, they were mainly dominated by *Z. noltei*.

3.3.11 A few seagrass shoots were noted in the easternmost area of the north-west region; however, they did not cover enough area or have high enough percentage cover (less than 5% cover) to be mapped as seagrass beds.

Graphic 3-5 Seagrass beds and seagrass density mapped in the north-west region of Langstone Harbour during survey



Seagrass density

3.3.12 The three smaller seagrass beds in the north-west region each had relatively homogenous densities of seagrass within beds, although densities varied between beds. Densities of 11-20% were recorded in the *Z. marina* seagrass bed; 41-50% in the isolated *Z. noltei* seagrass bed; and 61-70% in the mixed seagrass bed. Where only one or two quadrats were deployed, the percentage cover values are considered to be representative of the wider bed based on observations in the field (refer to Graphic 3-5 and Table 3-2).

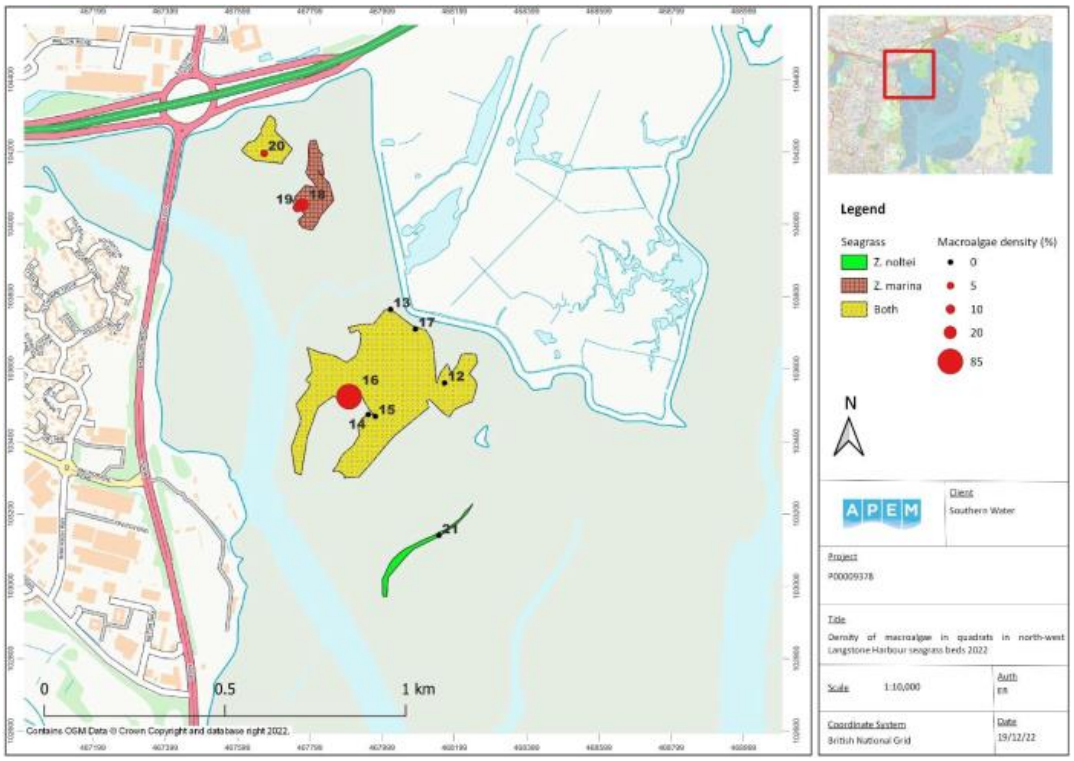
3.3.13 Unlike the other seagrass beds in Langstone Harbour, the largest seagrass bed in the north-west region had a high level of small-scale spatial variability in seagrass density, with values in quadrats ranging from 6-10% to 81-90% cover (Graphic 3-5).

Condition assessment

3.3.14 Macroalgae coverage in the seagrass beds of the north-west region, notably green algal mats, was generally low, with most quadrats (60%) having no macroalgae and others (30% of quadrats) having very little macroalgae (5-20% cover). However, some areas of the largest bed did have high macroalgae coverage, with 85% cover recorded in one of the quadrats (refer to Table 3-2). Areas of high macroalgae coverage were observed adjacent to, and in close proximity to, most of the north-west seagrass beds (Graphic 3-6).

3.3.15 Browning of seagrass was observed at low levels (5-15% brown seagrass coverage), with the seagrass in the majority of quadrats for this region (80%) indicating no signs of browning. No signs of wasting disease were noted for all the beds in this region (Graphic 3-7).

Graphic 3-6 Seagrass beds and macroalgae mapped in the north-west region of Langstone Harbour during survey



Graphic 3-7 Seagrass beds and browning mapped in the north-west region of Langstone Harbour during survey

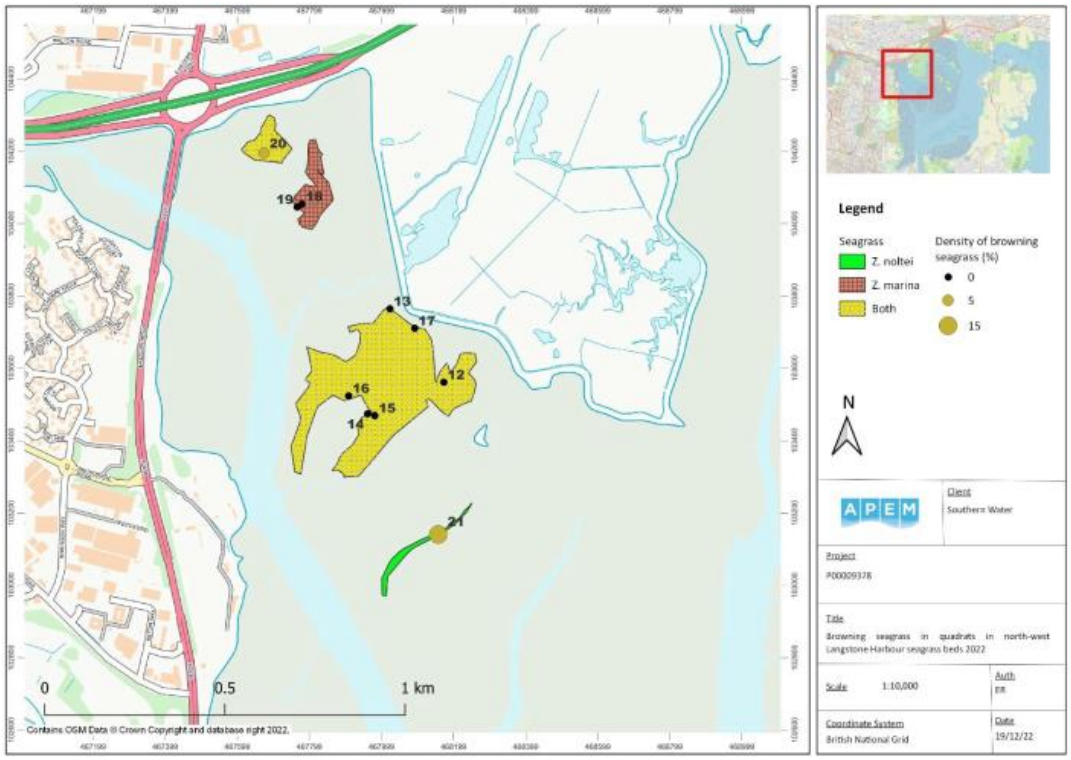
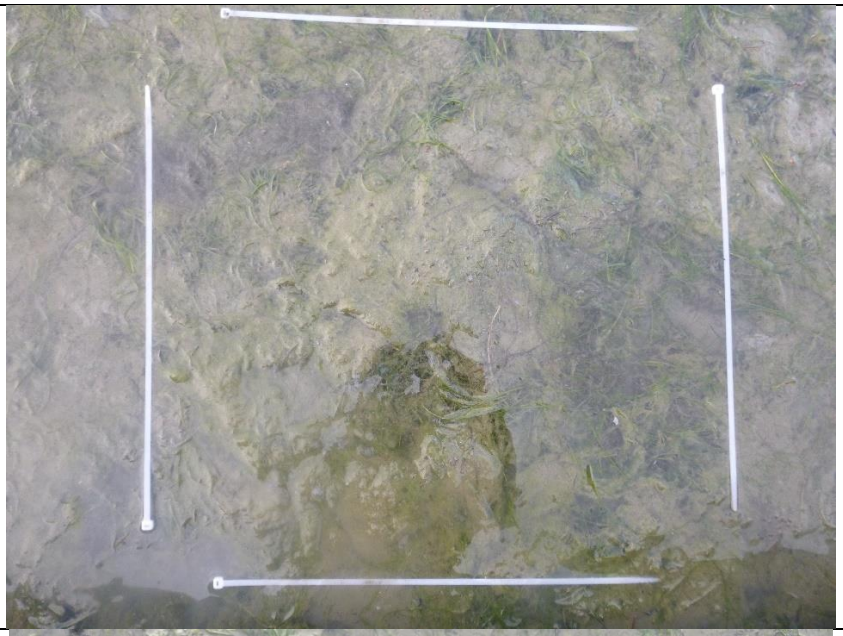


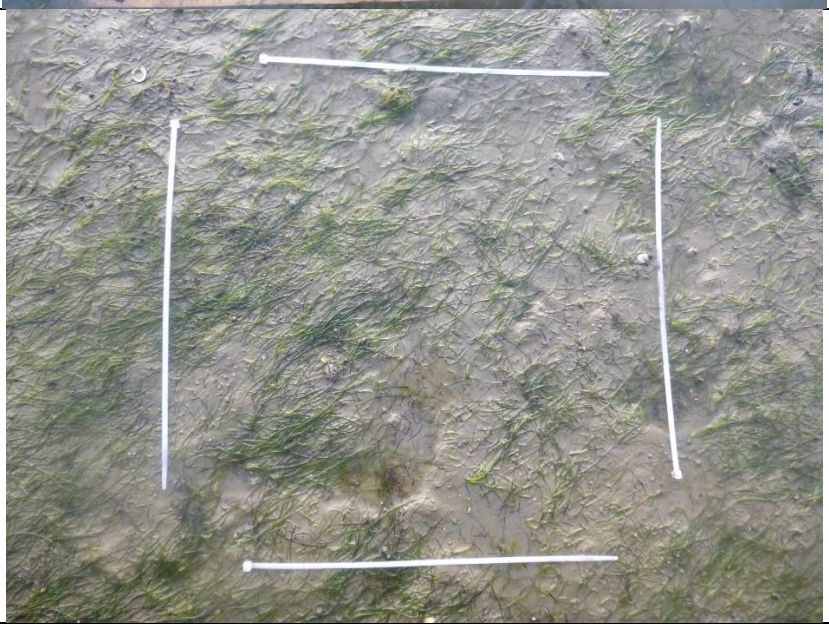
Table 3-2 Data collected from the quadrats during the seagrass survey

Quadrat No.	Latitude	Longitude	Density of seagrass (%)	Seagrass species	Browning/wasting	Macroalgae (%)	Macroalgae description	Sediment classification (Folk 1954)
1	50.811692	-0.995166	21-30	*Z. noltei*	No	0	None	Mud
2	50.81171	-0.995088	41-50	*Z. noltei*	No	10	Green mat	Mud
3	50.810753	-0.995549	21-30	*Z. noltei*	No	5	Green mat	Mud
4	50.808558	-0.994764	41-50	*Z. noltei*	No	0	None	Mud
5	50.80243	-0.991783	51-60	*Z. noltei*	No	15	Green mat, *F. vesiculosus*	Mud
6	50.804798	-0.992919	41-50	*Z. noltei*	20% browning	0	None	Mud
7	50.794809	-1.006648	11-20	*Z. noltei*	10% browning	50	Green mat	Mud
8	50.79553	-1.000551	11-20	*Z. noltei*	5% browning	0	None	Mud
9	50.798215	-0.995824	71-80	*Z. noltei*	5% browning	0	None	Mud
10	50.798678	-0.998327	21-30	*Z. noltei*	No	0	None	Mud
11	50.798239	-0.999293	21-30	*Z. noltei*	1% browning	0	None	Mud
12	50.827577	-1.033425	31-40	*Z. noltei*	No	0	None	Mud
13	50.829422	-1.035509	6-10	*Z. noltei* & *Z. marina*	No	0	None	Mud
14	50.826817	-1.03644	41-50	*Z. marina*	No	0	None	Mud
15	50.826771	-1.03616	11-20	*Z. noltei*	No	0	None	Mud
16	50.827269	-1.037183	6-10	*Z. noltei*	No	85	Green mat	Mud
17	50.828928	-1.034543	81-90	*Z. noltei* & *Z. marina*	No	0	None	Mud
18	50.832054	-1.038926	11-20	*Z. marina*	No	20	Green mat	Mud
19	50.831981	-1.039113	11-20	*Z. marina*	No	10	Green mat	Mud
20	50.833339	-1.040393	61-70	*Z. noltei*	5% browning	5	Green mat	Mud

Table 3-3 Exampled seagrass densities observed during the survey

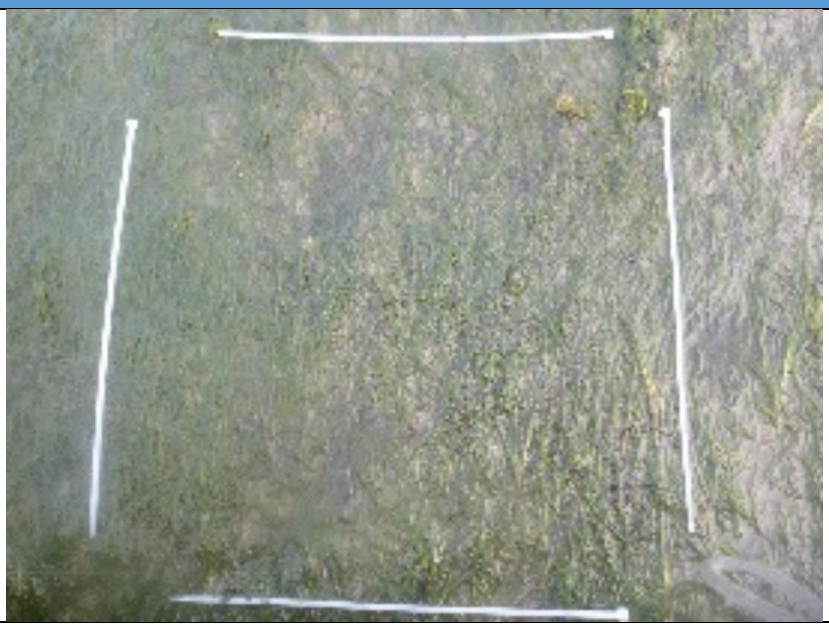
* NB: where white markers were used to for scale in the images below, these delineated a 1m^2 area to be consistent with the 1m^2 quadrat.

Seagrass density (%)	Image
1 - 5%	Density not observed
6 – 10%*	
11 – 20%	

Seagrass density (%)	Image
21 – 30%	
31 – 40%*	

Seagrass density (%)	Image
41 – 50%	
51 – 60%	

Seagrass density (%)	Image
61 – 70%*	
71 – 80%	

Seagrass density (%)	Image
81 – 90%*	
91 – 100%	Density not observed

Comparison to historical datasets

3.3.16 Historical seagrass records were used by Marsden and Scott [16] from 2006 to 2014 to produce seagrass extent maps along the Hampshire and Isle of Wight coasts, including Langstone Harbour. Data was collected from a variety of sources including published papers, survey reports and records submitted to local recording groups each of which used a range of different methodologies including quadrat sampling (e.g. [25]) and on foot GPS surveys (e.g. [26] [27] [28] [29] [30] [31] [32]). Due to the disparity between methodology from historic datasets in Marsden and Scott [16] datasets aren't directly comparable with the data collected in 2022. Therefore, only a very high-level visual comparison has been made.

3.3.17 In the south-east region, the extent of the seagrass mapped in 2022 largely covered the main areas where seagrass had previously been recorded across 2006 to 2014 [16] (Graphic 3-8). This suggests the seagrass bed in this region may be relatively stable in terms of its location, although extent and density may vary across years.

3.3.18 In contrast, the extent of seagrass mapped in 2022 in the north-west region only covered a proportion of the areas in which seagrass had been recorded across 2006 to 2014, although extent in the two northernmost patches appeared to be greater than that recorded previously (Graphic 3-9). It is important to note that the historic data set is a collated data set across years, so it is not clear from the data if there has been a reduction in extent of seagrass in 2022 in relation to a given previous year.

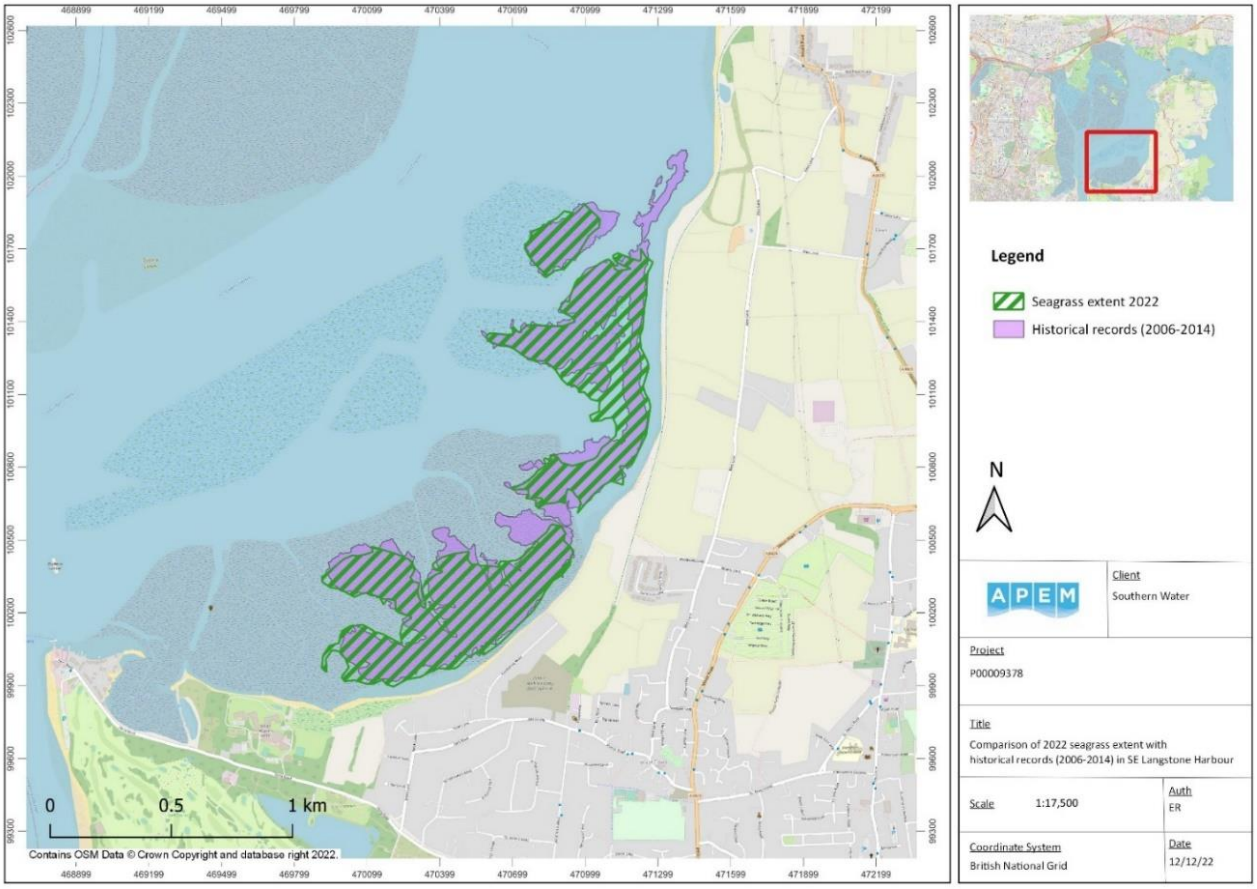
3.3.19 The data indicates that the north-west region beds are more variable in terms of distribution and extent that the south-east region beds. This is consistent with the seagrass beds being clearly defined in the south-west region and in the north-west region, the beds were mostly separated by areas of mud with less than 5%

seagrass coverage or areas of seagrass too small to be classified as a seagrass bed.

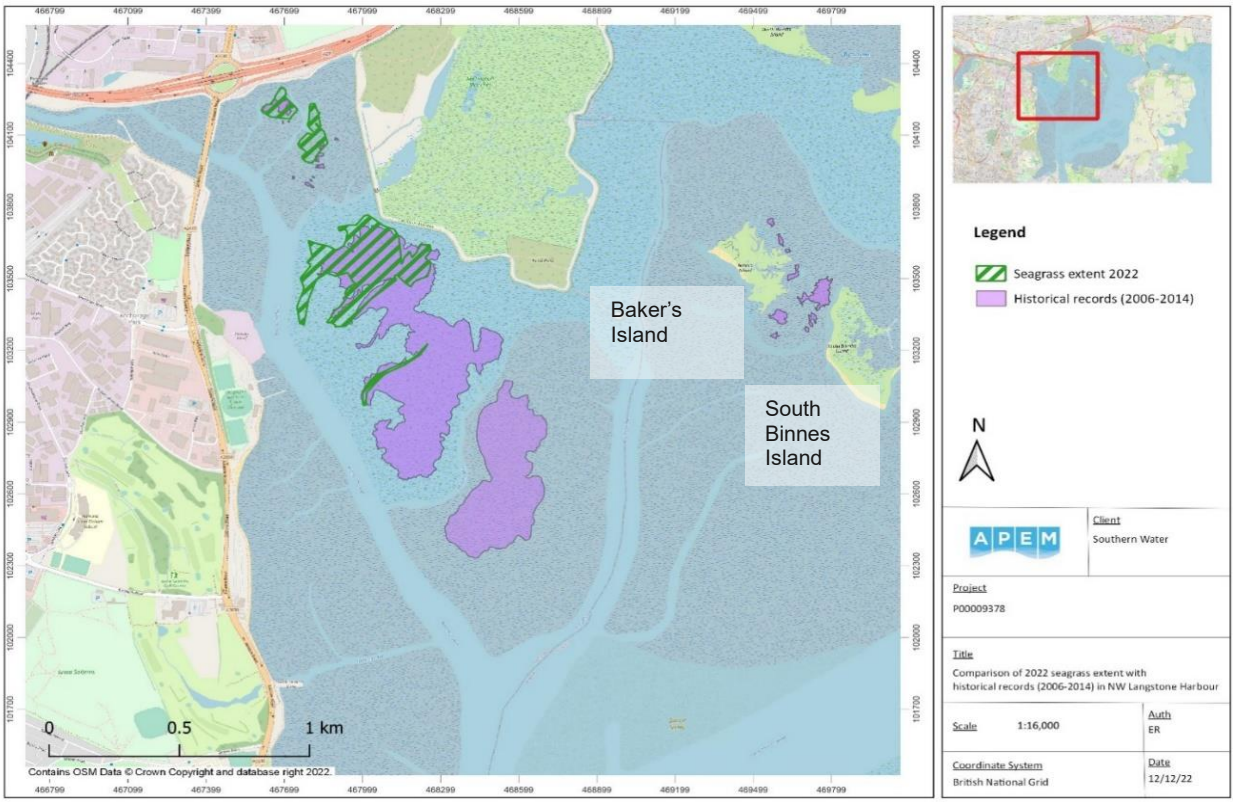
3.3.20 The post survey comparison of data indicated historic records of seagrass in the areas between Baker's Island and South Binness Island (Graphic 3-9). It was not possible to reach these areas by hovercraft due to the presence of a network of channels and tidal restrictions. In relation to a 2010 survey when mapping was conducted in this area, Marsden and Scott [16] refer to mapping by foot and the use of small craft. Additional consideration for how to access this area is recommended for any future seagrass surveys in Langstone Harbour.

3.3.21 The species composition of the seagrass beds in the 2022 survey aligned well with the EUNIS codes assigned to the Langstone Harbour seagrass beds in the Marine Habitats and Species Open Data set [23]. Furthermore, other studies have also noted the presence of both *Z. marina* and *Z. noltei* in the survey area [33, 34, 35].

Graphic 3-8 Comparison of 2022 seagrass bed extent in the south-east region of Langstone Harbour with historical records (2006-2014 from Marsden and Scott 2015)



Graphic 3-9 Comparison of 2022 seagrass bed extent in the north-west region of Langstone Harbour with historical records (2006-2014 from Marsden and Scott 2015)



4 Summary

4.1.1 The seagrass beds in Langstone Harbour have been assessed by desk and field study to determine their extent and condition.

4.1.2 Less seagrass beds were found in the field survey than the desk study, but they appeared to be in good conditions.

4.1.3 Two species of seagrass, *Z. marina* and *Z. noltei,* were found in Langstone Harbour.

5 References

[1] M. A. Hemminga and C. M. Duarte, *Seagrass Ecology,* Cambridge: Cambridge University Press, 2000.

[2] A. W. D. Larkum, R. J. Orth and C. M. Duarte , *Seagrasses: Biology, Ecology and Conservation,* Dordrecht, Netherlands: Springer, 2006.

[3] R. K. F. Unsworth, L. J. McKenzie, C. J. Collier, L. C. Cullen-Unsworth, C. M. Duarte , J. S. Eklöf, J. C. Jarvis, B. L. Jones and L. M. Nordlund, *Global challenges for seagrass conservation,* vol. 48, 2019, pp. 801-815.

[4] J. Widdows, N. D. Pope, M. D. Brinsley, H. Asmus and R. M. Asmus, *Effects of seagrass beds (Zostera noltii and Z.marina) on near-bed hydrodynamics and sedimen resuspension,* vol. 358, 2008, pp. 125-136.

[5] A. E. Green, R. K. F. Unsworth, M. A. Chadwick and P. J. S. Jones, *Historical Analysis Exposes Catastrophic Seagrass Loss for the United Kingdom,* vol. 12, 2021.

[6] Hampshire and Isle of Wight Wildlife Trust, "Solent Seagrass Restoration Project," 2023. [Online]. Available: https://www.hiwwt.org.uk/seagrass-restoration. [Accessed 16 May 2025].

[7] University of Portsmouth, "$5m project to restore life to the Solent's seascape," 10 December 2022. [Online]. Available: https://www.port.ac.uk/news-events-and-blogs/news/5m-project-to-restore-life-to-the-solents-seascape. [Accessed 12 May 2025].

[8] Natural England, "Langstone Harbour SSSI Citation," 1985. [Online]. Available: http://www.sssi.naturalengland.org.uk/citation/citation_photo/1001182.pdf. [Accessed 12 May 2025].

[9] D. M. Davison and D. J. Hughes, *Zostera biotopes: An overview of dynamics and sensitivity characteristics for conservation management of marine SACs,* Scottish Association for Marine Science, (UK Marine SACs Project), 1998.

[10] European Commission, "Marine Strategy Framework Directive," 2023. [Online]. Available: https://environment.ec.europa.eu/topics/marine-environment_en. [Accessed 12 May 2025].

[11] Scottish Government, *MPA network-Parlimentary Report,* 2016.

[12] European Commission, "EU Marine Strategy Framework Directive," 2023. [Online]. Available: https://research-and-innovation.ec.europa.eu/research-area/environment/oceans-and-seas/eu-marine-strategy-framework-directive_en. [Accessed 12 May 2025].

[13] The National Archives, "Marine and Coastal Access Act 2009," [Online]. Available: https://www.legislation.gov.uk/ukpga/2009/23/contents. [Accessed 12 May 2025].

[14] J. Johnston and H. B. P. , *Biodiversity Action Plan for Hampshire Volume 1 and 2,* Hampshire County Council, 1998.

[15] Isle of Wight BAP partnership, *Solent Coastal Habitat Action Plan,* Isle of Wight BAP partnership, 2004.

[16] A. L. Marsden and A. L. Scott, *Inventory of eelgrassbeds in Hampshire and the Isle of Wight. Section 2: Data. Ver. 7,* 2015.

[17] Department for Environment, Food and Rural Affairs, "Multi-Agency Geographic Information for the Countryside (MAGIC)," [Online]. Available: https://magic.defra.gov.uk/MagicMap.html. [Accessed 12 May 2025].

[18] Environment Agency, "Flood Map for Planning (Rivers and Sea) - Flood Zone 2," 2022. [Online]. Available: https://www.data.gov.uk/dataset/cf494c44-05cd-4060-a029-35937970c9c6/flood-map-for-planning-rivers-and-sea-flood-zone-2. [Accessed 12 May 2025].

[19] Environment Agency, "Flood Map for Planning (Rivers and Sea) - Flood Zone 3," 2022. [Online]. Available: https://www.data.gov.uk/dataset/bed63fc1-dd26-4685-b143-2941088923b3/flood-map-for-planning-rivers-and-sea-flood-zone-3. [Accessed 12 May 2025].

[20] SCOPAC, "Portsmouth, Langstone and Chichester Harbours," 2004. [Online]. Available: https://www.scopac.org.uk/scopac_sedimentdb/hbrs/hbrs.htm. [Accessed 16 May 2025].

[21] OSPAR, "Background Document for Zostera beds, seagrass beds," 2009. [Online]. Available: Microsoft Word - P00426_Zostera_beds.doc (ospar.org). [Accessed 12 May 2025].

[22] Natural Resources Wales, "Benthic habitat assessment guidance for marine developments and activities," 2021. [Online]. Available: https://cdn.cyfoethnaturiol.cymru/693125/gn030-guidance-note_accessible.pdf. [Accessed 12 May 2025].

[23] Natural England, "Marine Habitats and Species Open Data (England)," 2016. [Online]. Available: https://www.data.gov.uk/dataset/bfc23a6d-8879-4072-95ed-125b091f908a/marine-habitats-and-species-open-data-england. [Accessed 12 May 2025].

[24] R. Unsworth and C. Bertelli, "Protecting the hand that feeds us: Seagrass (Zostera marina) serves as commercial juvenile fish habitat," 2013. [Online]. Available: http://dx.doi.org/10.1016/j.marpolbul.2013.08.011. [Accessed 20 November 2023].

[25] Environment Agency, *Langstone Harbour intertidal seagrass survey,* Unpublished data, 2009.

[26] I. Ralphs, *Estimated distribution of Zostera species off the west Hayling Island Coast,Langstone Harbour,* Hampshire: Hampshire Biodiversity Information Centre, 2009.

[27] Hampshire and Isle of Wight Wildlife Trust, *Solent Seagrass Project Langstone Harbour Seagrass survey.,* Hampshire: Hampshire and Isle of Wight Wildlife Trust, 2010.

[28] Hampshire and Isle of Wight Wildlife Trust, *Solent Seagrass Project Langstone Harbour Seagrass survey,* Hampshire: Hampshire and Isle of Wight Wildlife Trust, 2011.

[29] Hampshire and Isle of Wight Wildlife Trust, *Solent Seagrass Project Langstone Harbour Seagrass survey,* Hampshire: Hampshire and Isle of Wight Wildlife Trust, 2012.

[30] Hampshire and Isle of Wight Wildlife Trust, *Solent Seagrass Project Langstone Harbour Seagrass survey,* Hampshire: Hampshire and Isle of Wight Wildlife Trust, 2013.

[31] Hampshire and Isle of Wight Wildlife Trust, *Solent Seagrass Project Langstone Harbour Seagrass survey,* Hampshire: Hampshire and Isle of Wight Wildlife Trust, 2014.

[32] Langstone Harbour Board and Southern IFCA, *Dredge scar monitoring to assess recovery of seagrass habitat,* Unpublished data: Langstone Harbour Board, 2012.

[33] P. Thomas, S. Pears, M. Hubble and R. Pérez-Dominguez, *Intertidal sediment surveys of Langstone Harbour SSSI, Ryde Sands and Wootton Creek SSSI and Newtown Harbour SSSI,* Winchester: Natural England & APEM, 2016.

[34] M. do Amaral Camara Lima, R. D. Ward, C. B. Joyce, K. Kauer and K. Sepp, *Carbon stocks in southern England's intertidal seagrass meadows,* vol. 275, 2022, p. 107947.

[35] M. do Amaral Camara Lima, *Assessing the carbon sink potential and impacts of global change on intertidal seagrass meadows in central southern England,* Brighton: University of Brighton, 2020.


WATER
for LIFE®
from
Southern
Water®