Sanitary Survey - classification zone

Portland Harbour – 2021

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This report was produced by Carcinus Ltd (Carcinus) (Carcinus) on behalf of the Food Standards Agency (FSA) for the purposes of providing a sanitary survey for the specific Bivalve Mollusc classification zone (BMCZ) application as detailed in this report. Every effort has been made to ensure the information contained within is as complete and valid as possible at the time of writing. It should be noted that additional information may have existed at the time of publication of this report that was not available, not identified or has subsequently been published after the date of this report. Carcinus accepts no liability for any costs, losses or liabilities arising from the reliance upon or use of the contents of this report other than by its client.

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1 Introduction

This report was produced by Carcinus Ltd (Carcinus) on behalf of the Food Standards Agency (FSA) for the purposes of providing a sanitary survey of a proposed classification zone, desktop assessment and recommendation on the need to conduct a shoreline assessment and/or bacteriological survey for the proposed Production area within Portland Harbour, Dorset, for the harvesting of farmed mussels (*Mytilus edulis*), Pacific Oysters (*Crassostrea gigas*) and King Scallops (*Pecten maximus*).

1.1 Legislative Requirement

Bivalve molluscs, such as mussels, clams and oysters, are filter feeding organisms that filter the water in which they live to feed on microorganisms. This feeding behaviour increases their ability to accumulate and retain microorganisms, including those that are pathogenic to humans, and other chemical contaminants in the water column. The safety of bivalves harvested for human consumption is, therefore, strongly influenced by the quality of water in which they have grown. Sources of microbiological contamination from a variety of sources, including human and/or animal origin, can affect Bivalve Mollusc Production Areas (BMPAs), the suitability of shellfish harvested from such areas for human consumption and the post-harvesting processes necessary to make Live Bivalve Molluscs (LBMs) safe.

EU Regulation 2019/627 sets out specific requirements for the classification of new Bivalve Mollusc Classification Zones (BMCZs), including the requirements for a sanitary survey to be conducted. The primary element of a sanitary survey for new areas is a desktop assessment, which will determine a sampling plan to be initiated at a new specific LBM bed with a view to classification. The proposed sampling programme and the sampling locations arising from the desktop assessment are based on the examination of publicly available information on the geographical and hydrological characteristics of the area and potential sources of pollution, as well as any existing sanitary surveys and/or *E. coli* data relating to the area (if available) from Official Control monitoring, or any neighbouring classified production areas (where relevant). Sample numbers, sampling points and sampling frequency ensure the results of the analysis are as representative as possible for the area considered. Thus, the sanitary survey determines a Representative Monitoring Point (RMP) to inform a provisional sampling plan to facilitate the classification of a new production area/bed (Note, the RMP must represent the worst-case scenario of contamination within the production area to be classified); it also confirms the provisional boundary of the area/bed requested to be classified. Although the boundary of the production area or bed is suggested in the harvester's application, it is necessary to define the boundary co-ordinates of the water body based on the available evidence to ensure any identified sources of pollution are considered. The sanitary survey also considers whether there is a need for a shoreline and/or bacteriological survey to be conducted before the sampling plan is finalised.

In England and Wales the Central Competent Authority (CCA) under Regulation (EU) 2019/627 is the FSA. Carcinus is contracted to undertake sanitary surveys for new BMCZs in England and Wales on behalf of the FSA. These assessments are to demonstrate compliance with the requirements stated in Article 56 of EU Regulation 2019/627.

1.2 Scope of assessments

A desktop assessment is the first stage in the sanitary survey process relating to (EC) 2019/627, and is used to provide a basic assessment of contamination risks to the shellfishery as well as a

provisional sampling plan that identifies a Representative Monitoring Point (RMP), sampling frequency, sampling depth, tolerance, species to be sampled and the provisional production area boundaries. The desktop survey focusses on bacterial contamination sources (primarily from faecal origins) and the associated loads of the faecal indicator organism *E. coli* and does not assess chemical contamination, or the risks associated with biotoxins. The assessment also determines whether the area requires a shoreline and/or a bacteriological survey before the sanitary survey can be finalised. The procedure followed is not appropriate to consideration of applications within marinas and docks.

2 Application and Fishery

An application for the classification of a single production area in the waters within Portland Harbour, Dorset was received from Dorset Council – Local Authority (LA). The application was validated by the FSA and passed to Carcinus for undertaking a sanitary survey desktop assessment on November 2020. The requested application zone is bounded by the coordinates in Table 2.1. The location of the application zone within Portland Harbour can be seen in Figure 2.1. The application zone is relatively small, approximately 200 m by 100 m.

Table 2.1 Coordinates delineating the application zone

Point reference	NGR (OSGB 1936, EPSG:27000)	WGS 1984, EPSG:4326 Latitude	WGS 1984, EPSG:4326 Longitude
A	SY 68659 77590	50.597183°	-2.4441667°
B	SY 68747 77769	50.5988°	-2.44295°
C	SY 68837 77726	50.598417°	-2.4416667°
D	SY 68750 77546	50.5968°	-2.4428833°

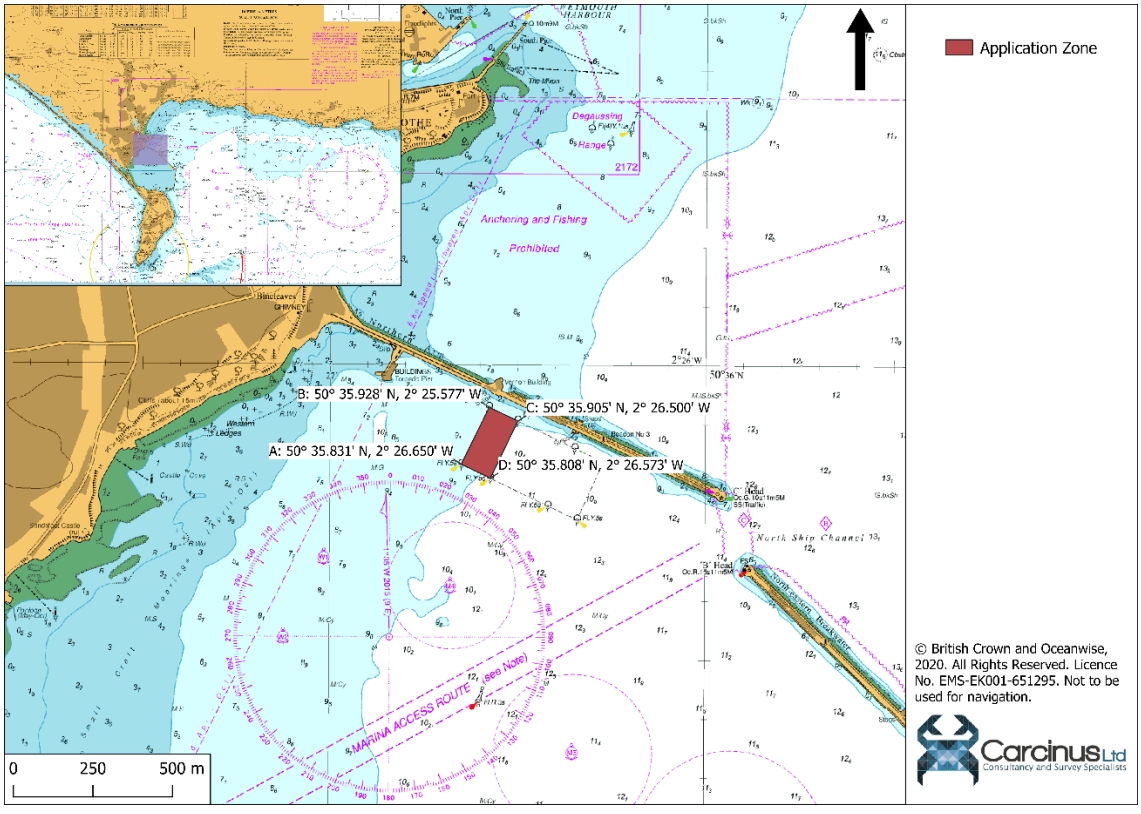

Figure 2.1 Application zone Boundary.

There is one further classification zone within the vicinity of the application zone. *Fleet Oyster Farm* is located approximately 2.6 km south-west of the application zone. This CZ is currently classified for Pacific oyster harvesting, based on samples from Fleet Oysters (B25AI) RMP.

The application specifies harvesting of farmed mussels, Pacific oysters and King scallops. The mussels will be grown on ropes and harvested via boat in May and June, the pacific oysters will be harvested year-round from their floating bag culture site, and the scallops will be grown using a multiplat system, and planned for harvesting from December 2021. The expected annual production from the shellfishery would be 10 tonnes, though it is not clear what proportion of this value is attributed to each cultured species.

3 Sources of Faecal Contamination

A sanitary survey desktop assessment has been conducted to identify potential sources of faecal contamination to the application area. Figure 3.1 presents the location of potentially significant sources of contamination identified as part of this study.

Active consented discharges have been identified through the interrogation of the Environment Agency (EA) permit database[1] (December 2020).

In addition the sanitary surveys of Portland Harbour (Cefas, 2009) (including the addendum (Cefas, 2011) and The Fleet (Cefas, 2013) have been reviewed and relevant information gathered as part of those studies is used herein to support this assessment. Whilst the application zone is located within an area classified in the 2009 sanitary survey, those reports do not specifically assess the application zone but do characterise the wider region within which the application is situated.

[1] EA permit data have not been validated and as such the accuracy of such information cannot be guaranteed.

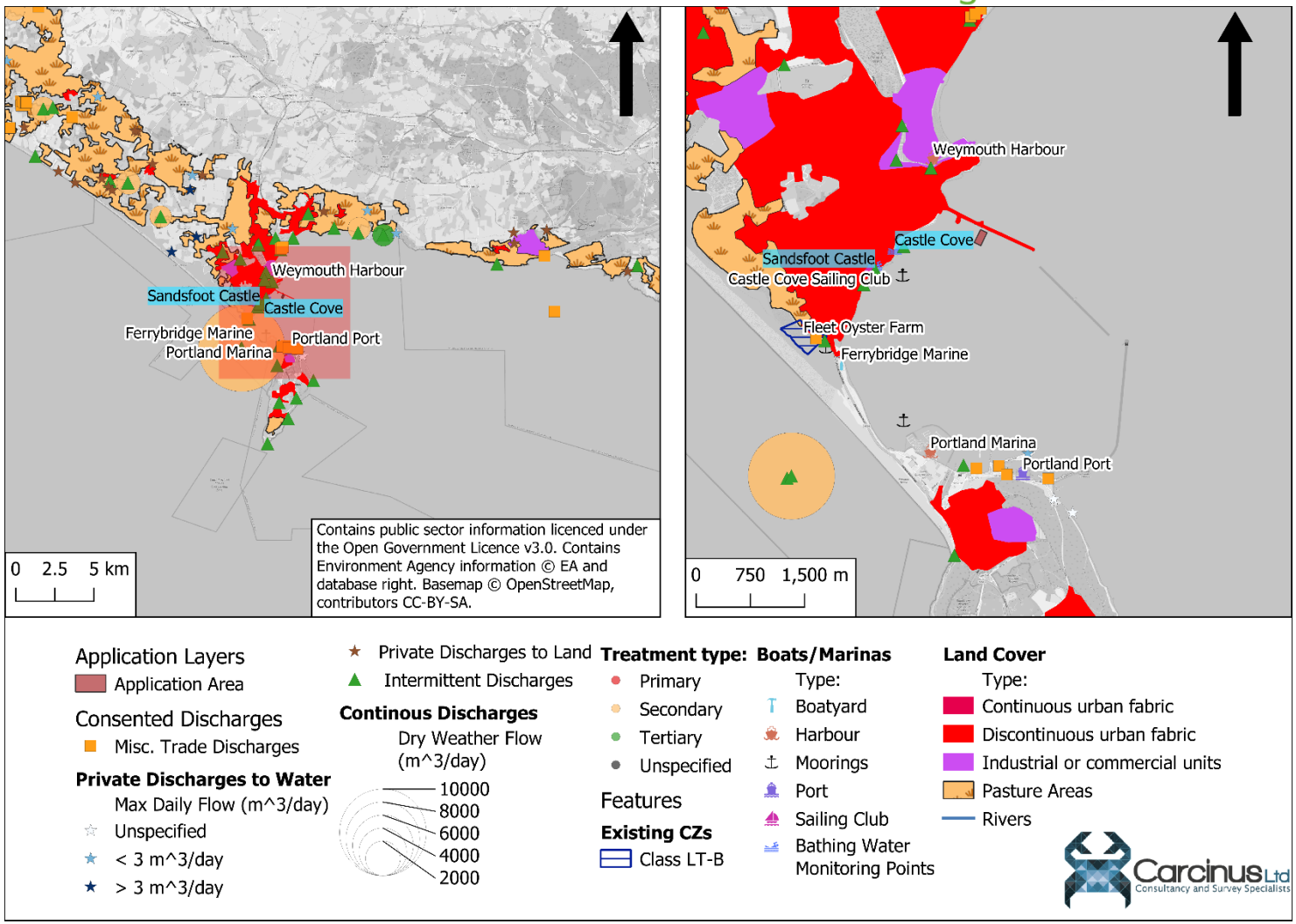

Figure 3.1 Potential sources of faecal and chemical contamination to the application zone.

3.1 Freshwater inputs

Freshwater inputs require consideration as part of the assessment, as they act to carry contamination resulting from runoff, urban diffuse and point source pollution and other rural diffuse sources. During the winter, increased rainfall is likely to result in increased levels of runoff and a subsequent increase in bacterial loading carried into coastal waters. Bacterial loading is typically highest during periods of heavy rain occurring following a dry period.

The application zone is located entirely within Portland Harbour, and receives no direct freshwater inputs. However, the River Wey discharges into Weymouth Bay, and contamination may be carried over the application zone via the North Shipping Channel on a flooding tide. Additionally, The Fleet is situated to the south west of the application zone, and contamination from within this lagoon will be carried over the application zone via the New Channel, at the western edge of Portland Harbour. The position of the RMP should be located to capture these influences.

3.2 Sewage Discharges

3.2.1 Continuous Discharges

There are 16 continuous discharges contained within the catchment of the Dorset coastal strip, in which the application zone is located. Details of all discharges are presented in Table 3.1 and the locations of those discharges near to the application zone are shown in Figure 3.1.

Table 3.1 Details of continuous discharges within the vicinity of the application zone.

Name	Dry Weather Flow (m^3/day)	Treatment	NGR (OSGB 1936, ESPG: 27000)	Receiving Environment
ABBOTSBURY WWTW	300	CHEMICAL - PHOSPHATE STRIPPING	SY5890684921	ABBOTSBURY BROOK
BRIDPORT SEWAGE TREATMENT WORKS	8050	ACTIVATED SLUDGE	SY4555089120	LYME BAY(C)
CHARMOUTH SEWAGE DISPOSAL WORKS	1270	BIOLOGICAL FILTRATION	SY3678091710	LYME BAY(C) & RIVER CHAR(S)
CHIDEOCK STW	290	UV DISINFECTION	SY4253092140	RIVER WINNIFORD(S)
LANGTON HERRING	40	BIOLOGICAL FILTRATION	SY6095082760	*Unspecified*
MELPLASH SEWAGE TREATMENT WORKS	3	PACKAGE TREATMENT PLANT	SY4850098006	TRIBUTARY OF THE RIVER BRIT
OSMINGTON MILLS	142	BIOLOGICAL FILTRATION	SY7363082000	OSMINGTON STREAM (S)
POWERSTOCK	34	BIOLOGICAL FILTRATION	SY5159095960	*Unspecified*

Name	Dry Weather Flow (m^3/day)	Treatment	NGR (OSGB 1936, ESPG: 27000)	Receiving Environment
PUNCKNOWLE WRC	435	BIOLOGICAL FILTRATION	SY5345989626	RIVER BRIDE
RINGSTEAD STW	33	UV DISINFECTION	SY7516781575	UNNAMED STREAM(S)
STOKE ABBOTT STW	32	BIOLOGICAL FILTRATION	ST4549000500	TRIBUTARY OF RIVER BRIT
SWANAGE SEWAGE TREATMENT WORKS	4910	MEMBRANE FILTRATION	SZ0424278664	SWANAGE BAY (C)
WEST MILTON WATER RECYCLING CENTRE	36	BIOLOGICAL FILTRATION	SY4996996244	TRIB OF MANGERTON RIVER
WEYMOUTH SEWAGE TREATMENT WORKS	32141	BIOLOGICAL FILTRATION	SY6613074360	(C) ENGLISH CHANNEL
WORTH MATRAVERS WWTW	64	BIOLOGICAL FILTRATION	SY9741576826	STREAM AT WINSPIT BOTTTOM

Most of the continuous discharges throughout the catchment are located a significant distance from the application zone. The closest continuous discharge, Weymouth STW, is located 4.3 km south-west of the application zone on the other side of Chesil Beach. This discharge only employs biological filtration and has a high volume of discharge (32141 m^3), and so represents a high risk of bacterial loading to the waters around it. However, despite its proximity to the application zone (relative to other continuous discharges in the catchment) there is little pathway for direct connectivity and so will only contribute to the background level of faecal loading. No continuous discharge has been identified as being of direct relevance to the placement of the RMP for this application zone.

3.2.2 Intermittent Discharges

Intermittent discharges, comprising Combined Storm Overflows (CSOs), storm tank overflows and pumping station emergency overflows have the potential to significantly affect local water quality and subsequently the management of shellfish hygiene within BMCZs. Spill events either occur during periods of wet weather when the sewers are inundated with surface water and infiltration of groundwater, or in the event of an emergency failure of a plant/equipment. Monthly classification sampling cannot normally reliably characterise the impacts from these spills as they occur sporadically and/or infrequently. Whilst some discharges are screened to remove sewage debris prior to discharge, such screening is unlikely to significantly reduce faecal bacterial loading. These discharges therefore often spill raw/untreated effluent with high faecal coliform concentrations (7.2 $x10^6$ CFU/100 ml, Kay *et al.*, 2008).

There are a total of 91 intermittent discharges contained within the Dorset coastal strip. Details of these discharges, including any treatment in place, are presented in Table 3.2 and the positions of those discharges closest to the application zone are presented in Figure 3.1.

Table 3.2 Details of intermittent discharges within the application zone.

Name	Treatment (if applicable)	NGR (OSGB 1936, EPSG 27000)	Receiving Environment
ABBOTSBURY WWTW	SCREENING	SY5885584921	ABBOTSBURY BROOK
ADMIRAL HARDY CSO	NONE	SY6758078730	WEYMOUTH HARBOUR(E)
ANNING'S LANE PUMPING STATION	SCREENING	SY4935689773	THE RIVER BRIDE
BRIDPORT EAST BRIDGE CSO	SCREENING	SY4705292852	RIVER ASKER(S)
BRIDPORT SEWAGE TREATMENT WORKS PS	SCREENING	SY4555089120	LYME BAY (C)
BRIDPORT WEST STREET CSO	NONE	SY4632093020	RIVER BRIT
BURTON BRADSTOCK	NONE	SY4894089630	RIVER BRIDE(S)
BURTON SOUTHOVER PS	SCREENING	SY4849089360	RIVER BRIDE (S)
CASTLE COVE PUMPING STATION	SCREENING	SY6768477538	PORTLAND HARBOUR
CHAFEY'S LAKE CSO	SCREENING	SY6603080050	TRIBUTARY OF THE RIVER WEY
CHARMOUTH SEWAGE DISPOSAL WORKS	SCREENING	SY3678091710	LYME BAY(C) & RIVER CHAR(S)
CHARMOUTH SEWAGE DISPOSAL WORKS	SCREENING	SY3717093740	LYME BAY(C) & RIVER CHAR(S)
CHICKERELL BOYS CLUB CSO	NONE	SY6758078730	WEYMOUTH HARBOUR(E)
CHICKERELL ROAD CSO	SCREENING	SY6758078730	WEYMOUTH HARBOUR
CHICKSBRIDGE PS	SCREENING	SY5407089720	RIVER BRIDE(S)
CHIDEOCK STW	SCREENING	SY4254092240	RIVER WINNIFORD(S)
CHURCH STREET PUMPING STATION	SCREENING	SY5771085025	MILL STREAM
COOMBE PUMPING STATION	SCREENING	SZ0346082780	STUDLAND BAY(C)
CORONATION CRESCENT CSO	SCREENING	SY6721080970	RADIPOLE LAKE VIA SWS
CRANFORD AVENUE CSO	SCREENING	SY6859780667	TRIB OF WEYMOUTH BAY (VIA SWS)
DURLSTON ROAD PS	SCREENING	SZ0337077980	UNNAMED STREAM TO DURLSTON BAY
EYPE PUMPING STATION	SCREENING	SY4481091270	RIVER EYPE
FAIRFIELD SEWAGE PUMPING STATION	NONE	SY6491080495	TRIB OF THE RIVER WEY
FERRYBRIDGE PS	NONE	SY6659076230	THE FLEET
FISHERBRIDGE PUMPING STATION	SCREENING	SY7037082960	RIVER JORDAN (S)
FISHWEIR FIELDS PS	SCREENING	SY4789193755	RIVER ASKER VIA SWS
GRASMERE ROAD CSO	SCREENING	SY6713480939	RADIPOLE LAKE
HAMS PLOT CSO	SCREENING	ST4799001080	RIVER BRIT(S)
HARMAN'S CROSS PUMPING STATION	SCREENING	SY9911079940	UNNAMED STREAM (S)

Name	Treatment (if applicable)	NGR (OSGB 1936, EPSG 27000)	Receiving Environment
HERSTON CROSS ATTENUATION TANK CSO	SCREENING	SZ0173079090	TRIB OF RIVER SWAN(S)
HIGH ST/SEYMOUR ROAD	SAND FILTRATION	SZ0334078712	ENGLISH CHANNEL
HIGH STREET CSO	NONE	SY6838473264	WEST BAY (COASTAL)
HILLCREST ROAD PUMPIMG STATION	SCREENING	SY6729077210	PORTLAND HARBOUR
KIMMERIDGE PUMPING STATION	SCREENING	SY9137079650	KIMMERIDGE STREAM(S)
LANGTON HERRING	MACERATION	SY6095082760	
LEE LANE PUMPING STATION	SCREENING	SY4808993847	RIVER ASKER
LODMOOR PUMPING STATION	SCREENING	SY6828081390	TRIBUTARY OF LODMOOR (S)
LONGCROFT ROAD CSO	SCREENING	SY6758078730	WEYMOUTH HARBOUR(E)
LULWORTH BEACH PUMPING STATION	SCREENING	SY8242079730	ENGLISH CHANNEL(C)
MARLOW ROAD COMBINED SEWER OVERFLOW	SCREENING	SY6805978622	WEYMOUTH HARBOUR VIA SWS (E)
MELCOMBE AVENUE CSO	SCREENING	SY6859780667	TRIB OF WEYMOUTH BAY (VIA SWS)
NETHERBURY PS	SCREENING	SY4722099210	RIVER BRIT(S)
NEW SWANAGE ATTENUATION TANK	SCREENING	SZ0309079640	ULWELL STREAM
NEWLANDS BRIDGE PUMPING STATION	MACERATION	SY3700093560	RIVER CHAR
NEWSTEAD ROAD PUMPING STATION	SCREENING	SY6758078730	WEYMOUTH HARBOUR(E)
OSMINGTON BAY HOLIDAY CENTRE PS	SAND FILTRATION	SY7202082030	ENGLISH CHANNEL
OSMINGTON MILLS S P STN	MACERATION	SY7355081730	
OVERCOMBE PUMPING STATION	NONE	SY6940081400	OVERCOMBE BEACH (C)
PENNSYLVANIA ROAD PS	NONE	SY6961071170	GROUND
PORTLAND BILL STORM OVERFLOW	NONE	SY6777068280	ENGLISH CHANNEL(C)
PORTLAND RAILWAY GRAVITY SEWER	NONE	SY7070072300	LYME BAY (C)
PUNCKNOWLE WRC	SCREENING	SY5345989626	RIVER BRIDE
PYMORE VILLAGE PUMPING STATION	NONE	SY4698094480	RIVER BRIT
RADIPOLE LAKE PUMPING STATION	SCREENING	SY6766079210	WEYMOUTH HARBOUR (E)
REAR DONCASTER ROAD	NONE	SY6713077010	PORTLAND HARBOUR (C)
RINGSTEAD STW	SCREENING	SY7516781575	UNNAMED STREAM(S)

Name	Treatment (if applicable)	NGR (OSGB 1936, EPSG 27000)	Receiving Environment
RODWELL AVENUE CSO	SCREENING	SY6806078620	WEYMOUTH HARBOUR VIA SWS (E)
ROMAN ROAD	SCREENING	SY6721080970	RADIPOLE LAKE (S)
SALWAY ASH PUMPING STATION	SCREENING	SY4581095570	TRIBUTARY OF RIVER BRIT (S)
SEATOWN PUMPING STATION	NONE	SY4208091780	WINNIFORD (S)
SHIPTON GORGE PUMPING STATION	SCREENING	SY4985591135	TRIBUTARY OF THE RIVER BRIDE
SOUTH BRIDGE COMB. STORM OVERFLOW	*Unspecified*	SY4660092240	RIVER ASKER(S)
SOUTH STREET CSO	NONE	SY4645092280	RIVER BRIT
SOUTHGATE PUMPING STATION	SCREENING	ST4791700952	RIVER BRIT
SOUTHWELL PS	MACERATION	SY6908069880	FRESHWATER BAY
SPA ROAD COMBINED SEWER OVERFLOW	NONE	SY6721080970	RADIPOLE LAKE VIA SWS
SPRING LANE CSO	SCREENING	SY6805978622	WEYMOUTH HARBOUR VIA SWS (E)
SPRING ROAD COMBINED SEWER OVERFLOW	SCREENING	SY6806078620	WEYMOUTH HARBOUR(E) - COVE ROW
SWANAGE TUNNEL	SCREENING	SZ0321678753	SWANAGE BAY
SWANAGE TUNNEL	SCREENING	SZ0323578743	SWANAGE BAY
SWANAGE TUNNEL	SCREENING	SZ0424378665	SWANAGE BAY
THE MARSH COMBINED SEWER OVERFLOW	SCREENING	SY6758078730	WEYMOUTH HARBOUR(E)
THE STREET CSO, CHARMOUTH	SCREENING	SY3679093690	RIVER CHAR(S)
ULLSWATER CRESCENT CSO	SCREENING	SY6721080970	RADIPOLE LAKE VIA SWS
VICTORIA SQUARE PORTLAND	MACERATION	SY6851074510	PORTLAND HARBOUR
WADMORE LANE PUMPING STATION	NONE	SZ0298083190	TRIBUTARY OF LITTLE SEA
WARDCLIFFE ROAD CSO	NONE	SY6758078730	WEYMOUTH HARBOUR(E)
WATERY LANE PUMPING STATION	NONE	SZ0387182448	TRIBUTARY OF STUDLAND BAY
WEST BAY ROAD CSO	NONE	SY4635191351	RIVER BRIT
WEST BAY SLUICES	SCREENING	SY4621090490	BRIDPORT HARBOUR(WEST BAY)(C)
WEST BEXINGTON PUMPING STATION	NONE	SY5295086620	CHESIL BEACH
WEST BRIDGE CSO	SCREENING	SY4627093030	RIVER BRIT
WEST LULWORTH PUMPING STATION	SCREENING	SY8242079730	ENGLISH CHANNEL(C)

Name	Treatment (if applicable)	NGR (OSGB 1936, EPSG 27000)	Receiving Environment
WEST MILTON WATER RECYCLING CENTRE	SCREENING	SY4989696271	TRIB OF MANGERTON RIVER
WEST ROAD FOUNDRY PUMPING STATION	SCREENING	SY4546993064	RIVER SIMENE
WESTON ROAD CSO	SCREENING	SY6758078730	WEYMOUTH HARBOUR(E)
WESTON STREET	SCREENING	SY6851570884	GROUNDWATER VIA INFILT SYSTEM
WEYMOUTH SEWAGE TREATMENT WORKS	*Unspecified*	SY6607074330	(C) ENGLISH CHANNEL
WEYMOUTH SEWAGE TREATMENT WORKS	SCREENING	SY6613074360	(C) ENGLISH CHANNEL
WORTH MATRAVERS WWTW	NONE	SY9736276843	STREAM AT WINSPIT BOTTTOM

There are several intermittent discharges within the boundary of Portland Harbour itself. These are Castle Cove PS, Hillcrest Road PS and Rear Doncaster Road CSO. The two former discharges only employ screening, and the latter employs no treatment. When these discharges are actively spilling, they pose a significant risk of contamination to the application zone. The application zone will receive diffuse contamination from waters circulated on tidal flows. The RMP should take these sources of potential contamination into account.

3.2.3 Private Discharges

In addition to the water company owned discharges, there are a number of private and trade discharges throughout the catchment, including several on the southern side of Portland Harbour near the marina (Figure 3.1). The closest of these is located approximately 3 km from the application zone, and permitted discharges are < 3 m^3/day. Nevertheless, the choice of RMP location should take these into account.

3.3 Boats and Marinas

Portland port sits at the southern end of Portland Harbour (Figure 3.1). This port has 12 berths for vessels up to 300 m length, and receives a traffic carrying a variety of freight, from hazardous materials to agribulks (UK Ports, 2020). As of 1 December 2020, 11 fishing vessels <10 m list Portland Harbour as their home port, though no vessels >10 m (UK Government, 2020) are listed. A further 25 fishing vessels (22 <10 m and 3 >10 m) list Weymouth Harbour, approximately 1.3 km north-west of the application zone, as their home port. In addition to the commercial shipping traffic, there is a significant volume of recreational boating activity near the application zone. Portland Marina and Boatyard, 1.3 km west of the commercial port, has space for more than 400 vessels (Boatshed, 2018). A number of visitor moorings are also present. Additionally, Weymouth Harbour has space for a further 400 vessels, and can accommodate craft up to 20 m length (Weymouth Harbour, 2020).

Merchant shipping vessels are prohibited from making overboard discharges within three nautical miles of land[2], meaning that no impact on the application zone is expected from vessels transiting past Portland Harbour. Recreational vessels of sufficient size to contain on-board toilets are liable to make overboard discharges from time to time, particularly when moored overnight or when

[2] The Merchant Shipping (Prevention of Pollution by Sewage and Garbage from Ships) Regulations 2008.

navigating through an area. However, as pump-out facilities are available at both marinas (The Green Blue, 2020), overboard discharges from moored vessels are less likely. Contamination from recreational vessels represents significant source of contamination at certain times of the year (May to September). Therefore, inputs from boats may contribute to the overall faecal loading within the area and contribute to faecal loadings to the Application Area, however, this contribution is considered to be minimal and also cannot be reliably captured by an RMP.

3.4 Agricultural Sources

The main route through which diffuse sources of agricultural faecal contamination enters waterways (and subsequently BMCZs) is runoff during periods of wet weather. Faecal loading through this source is typically highest during winter months when rainfall and river flows are at their highest levels. However, high loadings are possible at any time of year during significant rainfall events, particularly following a period of prolonged dry weather.

Whilst the wider catchment of The Fleet and the River Wey have agricultural catchments and will receive diffuse faecal inputs from farm animals, no land immediately adjacent to Portland Harbour is reserved for pasture. It is, therefore, considered unlikely that contamination from this source presents a significant risk to the application zone, and as thus the placement of the RMP does not need to take this into account.

3.5 Wildlife

The 2009 sanitary survey of Portland Harbour reported the presence of several waterbird species, including cormorants and various gulls. The average count of overwintering birds in The Fleet and River Wey in the five years to 2018-2019 was 14,748 (Frost *et al.*, 2020). Species included Brent Goose, Mute Swan, Pintail and Pochard. Some faecal material from birds passing over Portland Harbour may reach the application zone, though it is unlikely that this is a significant source of contamination. Diffuse contamination from wading birds in the wider area may also reach the application zone, but given the spatial and temporal variability, cannot be reliably captured by an RMP.

Sightings of grey seals are common across the south coast of England (NBN, 2020), though no major colony is present around Weymouth Bay or Chesil Beach. These animals show a wide foraging range and whilst they may well enter the harbour, do not represent a significant source of contamination to the shellfishery and, therefore, does not need to be taken into account when determining RMP locations.

3.6 Other Sources of Contamination

Urban fabric is found to both the north and south of Portland Harbour in the form of the towns of Weymouth and Portland respectively. Settlements near to waterbodies represent a potential source of diffuse pollution via utility misconnections and dog fouling. Dog walking takes place along the shore of Portland Harbour and dog fouling may represent a potential diffuse source of pollution to the near shore coastal zone, though the application zone is located adjacent to a breakwater rather than the shoreline. As such, the choice of RMP location does not need to take these sources into consideration.

4 Existing Classifications and Monitoring History

The application zone is in the vicinity of the following existing classification zone (CZ):

- *Fleet Oyster Farm*, classified for Pacific oyster (*Crassostrea gigas*) (Class LT-B). This CZ is currently classified based on samples from Fleet Oysters (B25AI) RMP (Figure 4.1). This RMP has been sampled since March 2014, and since then only 1 sample has exceeded the threshold of 4,600 *E. coli* MPN/100 g required for Class B. Nearly 20% of samples have exceeded the lower threshold of 230 *E. coli* MPN/100 g required for Class A. A long-term classification is awarded when a CZ shows stable compliance for a period of 5 years or more. This RMP replaced an old RMP at Fleet (B025A), at which sampling stopped in June 2015 (though only 4 samples had been collected in the 18 months previous). The RMP was changed based on recommendations of the 2013 sanitary survey, to better capture the few sources of pollution to this CZ.

The 2009 sanitary survey of Portland Harbour recommended sampling from several points around the Harbour. The closest of these, Bincleaves Groyne (B25AA), was located approximately 200 m north-west of the application zone, within the Lyme Bay Shellfish Farm along the north-eastern breakwater and was proposed to be used to classify that zone. Monitoring data is only available from one of the RMPs recommended in the original sanitary survey, the Scallop Bed Several Order (Sc) RMP (B025T). However, as this RMP is located approximately 1.5 km from the application zone, and no monitoring data are available from May 2016, it is not considered further.

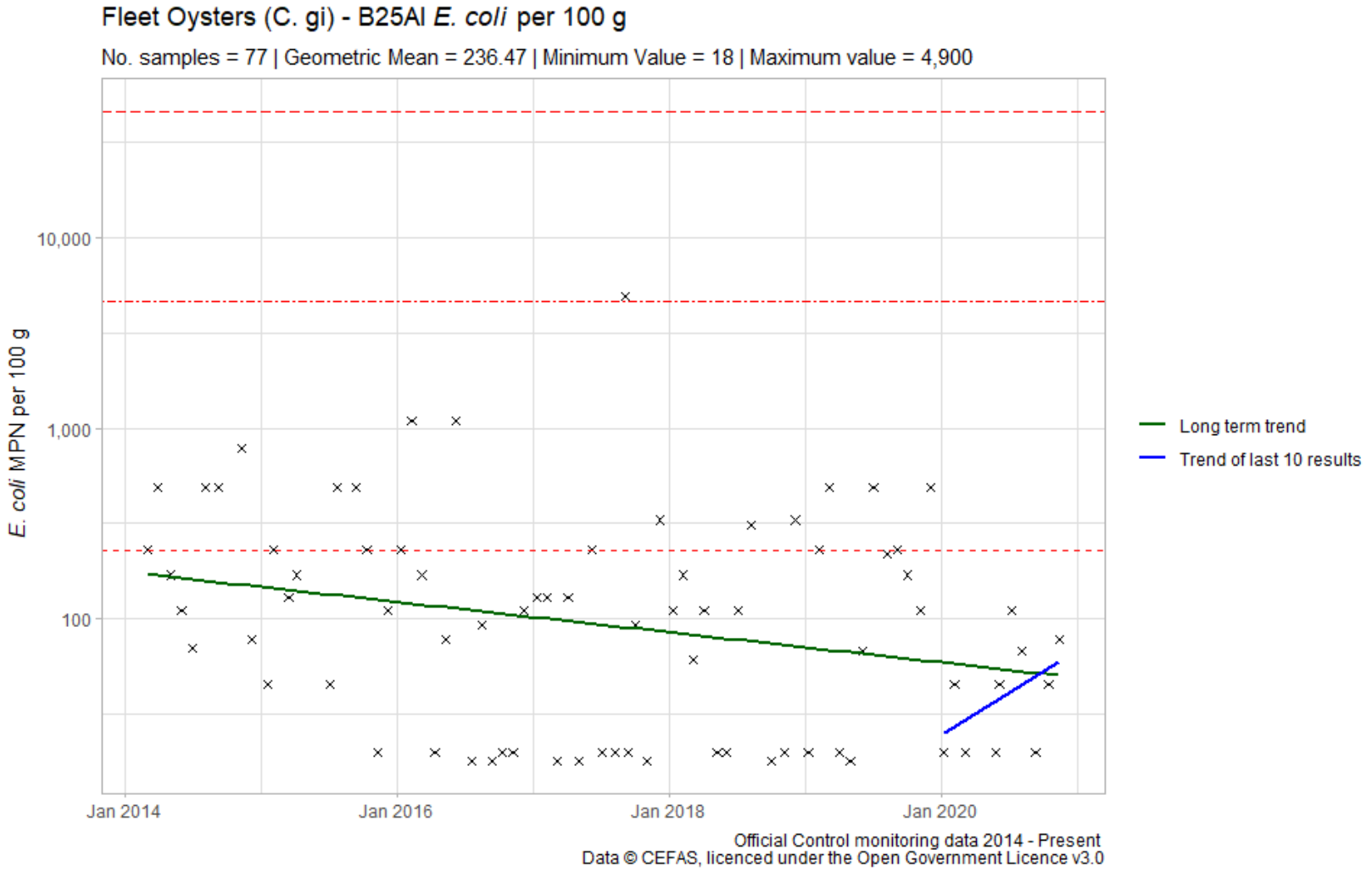

Figure 4.1 Monitoring history for Fleet Oysters (C. gi) – B25AI. Horizontal lines indicate classification thresholds (<230 CFU/100 ml = A, <4600 CFU/100 ml = B & <46000 CFU / 100 ml = C).

The status of EC bathing waters near the application zone are also of relevance to this assessment. There are two EC Bathing Water Quality Monitoring Points within Portland Harbour (Figure 3.1). Castle Cove has only been monitored since 2019, and was awarded an 'Excellent' classification, reflecting low levels of faecal coliforms, including *E. coli*. Sandsfoot Castle has varied between 'Excellent' and 'Good' classifications over the past three years, which reflect *E. coli* concentrations of ≤250 - ≤500 cfu/100 ml. It should be noted that bathing water sampling only occurs during the summer period (May to September inclusive) and, therefore, may not represent the potential for increased faecal loading during periods of elevated rainfall during winter months. However, bathing water results do provide an indication of water quality in the area during the bathing water season.

5 Hydrodynamics/Water Circulation

The application zone is located adjacent to the northern breakwater of Portland Harbour, a semi-enclosed man-made harbour. Given the lack of significant freshwater input, tidal streams are likely to be the dominating force of water circulation under most conditions. Tidal streams within the vicinity of the application zone are best characterised by the following data:

- The most relevant tidal prediction location for the application zone is located at Portland (50° 34' N, 2° 26' W, UKHO Total Tide (0033 – Portland). Tidal ranges for this location are as follows (all referenced to Chart Datum):
    - Mean Spring Range, 2.0 m; and
    - Mean Neaps Range, 0.6 m.

Tidal currents within the harbour predominately flow in an anticlockwise direction[3] and on flooding tides the application zone receives a significant flow from the North Shipping Channel.

6 Other Considerations

The application falls within the boundaries of the Notice of Conformed Designation for Dorset and Hampshire for *Bonamia ostreae* under the Aquatic Animal Health (England and Wales) Regulations, 2009 (Cefas, 2016). Under this notice, the movement of bivalve mollusc species into, out of or within this area is prohibited, except for the purposes as defined under the notice, including that "the species… may be taken from the area for direct human consumption, and must not be re-immersed". The EA consented discharge databased indicated that there is consented discharge associated with oyster depuration at the Fleet Oyster CZ, approximately 2.5 km south-west of the application zone.

7 Recommendations for a RMP and Classification Zone

7.1 Provisional Classification Zone

The application zone to be used as a production area for mussels, oysters and scallops is delineated by coordinates as outlined in Table 2.1. Those coordinates define an area within Portland Harbour, Dorset (see Figure 2.1 and Figure 3.1). It is recommended that the boundary of the classification zone remains the same as defined within the application.

[3] The 2009 sanitary survey of Portland Harbour includes tidal modelling figures (Figures 5.1-5.3, p15 - 20), but these cannot be reproduced in this report due to copyright.

7.2 Representative Monitoring Point (RMP)

The location of the RMP has been informed based on the identified contamination sources described within this assessment, likely connectivity with the provisional classification zone outlined above, seasonality of inputs and faecal contamination loadings.

The main sources of contamination to the application zone will be through land runoff and intermittent discharges from urban fabric on the western side of the harbour and diffuse sources of pollution from outside the harbour carried through the connecting channel to The Fleet on ebbing tides and the North Shipping Channel on flooding tides. Given the small size of the application zone, the choices for RMP location are limited. It is our recommendation therefore that the RMP be located at the mid-point of the line connecting Points A and D in Table 2.1.

7.3 Classification Species

A report commissioned by the FSA (Cefas, 2014) to examine the suitability of other shellfish species as indicator species has been reviewed to determine the suitability of indicators for classification purposes. The recommendations for indicator species in relation to *E. coli* accumulation are generally limited by data availability and recommendations can only be made where sufficient data are available to compare *E. coli* accumulation and clearance in two or more species.

The application is for the harvesting of farmed mussels (*Mytilus edulis*), Pacific oyster (*Crassostrea gigas*) and King scallops (*Pecten maximus*). The acquisition of individuals from each species is not anticipated to be problematic as the RMP location is situated within the boundary of the application zone. The Cefas (2014) states that *Mytilus* spp. can be used to represent *C. gigas*, though only when the two species are co-located both geographically and with respect to their position within the water column. The report states that indicator species are not appropriate for *P. maximus* CZs. As such, we recommend that samples are initially collected from each species, though if after a period of time (~ 10 samples), results from *Mytilus* spp. and *C. gigas* individuals are not statistically different, only samples from *Mytilus* spp. and *P. maximus* individuals should be taken, to prevent unnecessary costs.

7.3.1 Criteria for Sampling

The following criteria should be applied to sampling at the designated RMP:

- Each sample should comprise only those individuals of harvestable / marketable size; and
- Sample collection of each species to be undertaken by boat within a tolerance of 25 m from the RMP.

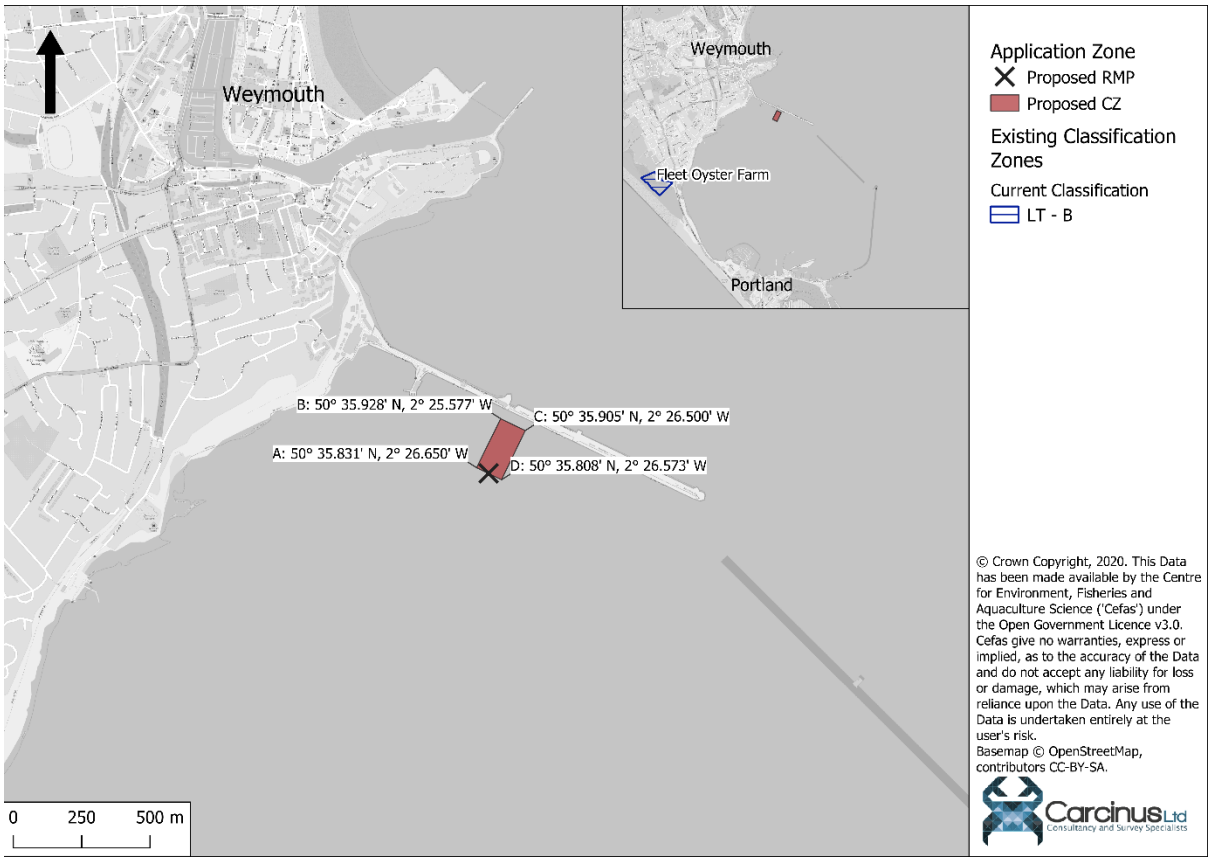

Figure 7.1 Location of RMP within application zone.

The RMP, sampling plan and provisional Classification Zone boundary are presented in Table 7.1.

Note - All coordinates in WGS1984, EPSG: 4326 are in dd.dddddd° format and those presented in OSGB 1936, EPSG:27700: are presented as Eastings and Northings (m).

Table 7.1 Provisional Sampling Plan

Production area	Portland Harbour
Provisional Classification Zone	Portland Harbour: Site A
RMP name(s)	Site A (M. sp); Site A (C. gi); and Site A (P. ma)
RMP	Latitude / Longitude (WGS 1984, EPSG:4326): 50.597000° N, -2.4435479° E Ordnance Survey National Grid (OSGB 1936, EPSG:27000) 368703 E, 077569 N
Classification species	*M. edulis*; *C. gigas*; and *P. maximus*
Sampling species	Initially *M. edulis*; *C. gigas*; and *P. maximus* (see note)
Sampling depth	At least 1 m below surface for all species
Collection method	Via boat
Sampling tolerance	25 m (around RMP)
Sampling frequency	Monthly, year-round

Provisional Classification Zone Boundaries	Delineated by lines between these points (WGS 1984, EPSG 4326): 50.597183° N, -2.4441667° E 50.5988° N, -2.44295° E 50.598417° N, -2.4416667° E 50.5968° N, -2.4428833° E Delineated by lines between these points (OSGB 1936 EPSG:27000): 368659 E, 077590 N 368747 E, 077769 N 368837 E, 077726 N 368750 E, 077546 N
Notes	Initial sampling of both *M. edulis* and *C. gigas*. If initial results are not statistically different, recommend only sampling *M. edulis*.

8 Recommendations for a Shoreline Survey

The proposed classification is zone is of a relatively small size (200 m x 100 m), which limits the placement of the RMP. The zone is situated inside a semi-enclosed man-made harbour, to which no major freshwater sources drain. Contamination will be carried to the zone through several sources: via diffuse urban runoff, though the shoreline is 600 m west of the zone; via tidal circulation and to a lesser extent from freshwater influx via The Fleet, although an existing classification zone is present at the mouth of the Fleet, and has a stable LT-B classification.

It is, therefore, our recommendation that, in this case, further physical assessment of the zone to confirm existing sources of contamination or identify any unknown sources, in the form of an updated shoreline survey, is not considered of significant value. Physical assessment would provide limited additional information as no significant changes in bathymetry, land use or population via urban development were identified since the previous shoreline surveys covering the application zone and surrounding areas were conducted in 2009, 2011 and 2013 (Cefas, 2009; 2011 & 2013). In the view of long term monitoring data available for the existing nearby classification zone, it is unlikely there are unknown additional potential sources of contamination that will influence the boundary of the zone or the placement of the RMP. The assessment has identified sufficient information to enable the placement of the RMP in a location representative of faecal contamination sources within the area. The assessment is further strengthened by classification monitoring data from the other classified zone nearby. The placement of the RMP is also limited due to the very small size of the classification zone within which the RMP can be located.

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About Carcinus Ltd

Carcinus Ltd is a leading provider of aquatic environmental consultancy and survey services in the UK.

Carcinus was established in 2016 by its directors after over 30 years combined experience of working within the marine and freshwater environment sector. From our base in Southampton, we provide environmental consultancy advice and support as well as ecological, topographic and hydrographic survey services to clients throughout the UK and overseas.

Our clients operate in a range of industry sectors including civil engineering and construction, ports and harbours, new and existing nuclear power, renewable energy (including offshore wind, tidal energy and wave energy), public sector, government, NGOs, transport and water.

Our aim is to offer professional, high quality and robust solutions to our clients, using the latest techniques, innovation and recognised best practice.

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Carcinus provides environmental consultancy services for both freshwater and marine environments. Our freshwater and marine environmental consultants provide services that include scoping studies, Environmental Impact Assessment (EIA) for ecological and human receptors, Habitats Regulations Appraisal (HRA), Water Framework Directive (WFD) assessments, project management, licensing and consent support, pre-dredge sediment assessments and options appraisal, stakeholder and regulator engagement, survey design and management and site selection and feasibility studies.

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"*To be a dependable partner to our clients, providing robust and reliable environmental advice, services and support, enabling them to achieve project aims whilst taking due care of the sensitivity of the environment*"