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# Scottish Sanitary Survey Project



## Restricted Sanitary Survey Report Orasaigh West UB 489 April 2010



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## Report Distribution – Orasaigh West

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\* Distribution of both draft and final reports to relevant agency personnel is undertaken by FSAS.

\*\* Distribution of draft and final reports to harvesters is undertaken by the relevant local authority.

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# 1. Area Overview

The cockle bed at Orasaigh West is in an intertidal zone on the west side of the Isle of Orasaigh in North Uist, which is located in the Outer Hebrides (see Figure 1.1). There are two fisheries located in this area, Orasaigh East and Orasaigh West, this report specifically addresses the western side. A restricted sanitary survey at Orasaigh West was conducted in response to receipt of an application to classify the area for commercial harvest of common cockles (*Cerostoderma edule*).

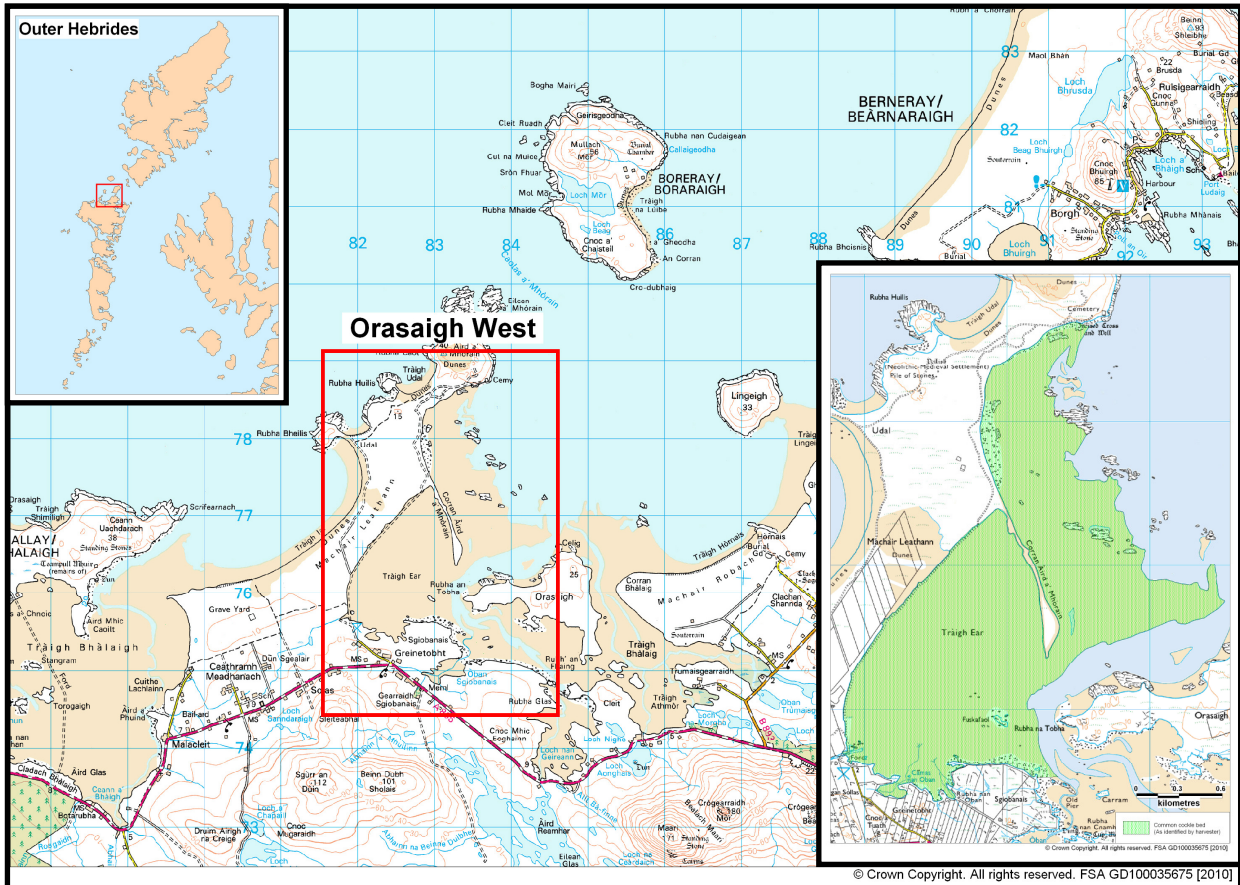


Figure 1.1 Location of Orasaigh West

## 1.1 Land Use

This area was not included in the Land Cover 2000 data. Observations made during the shoreline survey indicated that the land surrounding Orasaigh West was mainly croft land primarily used for grazing sheep and some cattle. The Ordnance Survey map which shows significant areas of croft land with areas of grass land, sand and coniferous plantations.

## 1.2 Human Population

Population data relating to the 2001 census was obtained from the General Records Office for Scotland for the area around Orasaigh West. Figure 1.2 shows the human population figures by census output area. The populations within each output area are not evenly distributed, so care must be exercised in interpreting the numbers presented. On the northern shoreline of North Uist there are several small settlements located along the main road and on the shore east of Orasaigh, these

have been labelled in Figure 1.2. Discharge consents received from the Scottish Environment Protection Agency (SEPA) indicate that these smaller settlements could be a significant source of contamination to the shellfish bed (see Section 3). There is a range of tourist accommodation throughout North Uist, suggesting there is likely to be a seasonal increase in human population during the summer months.

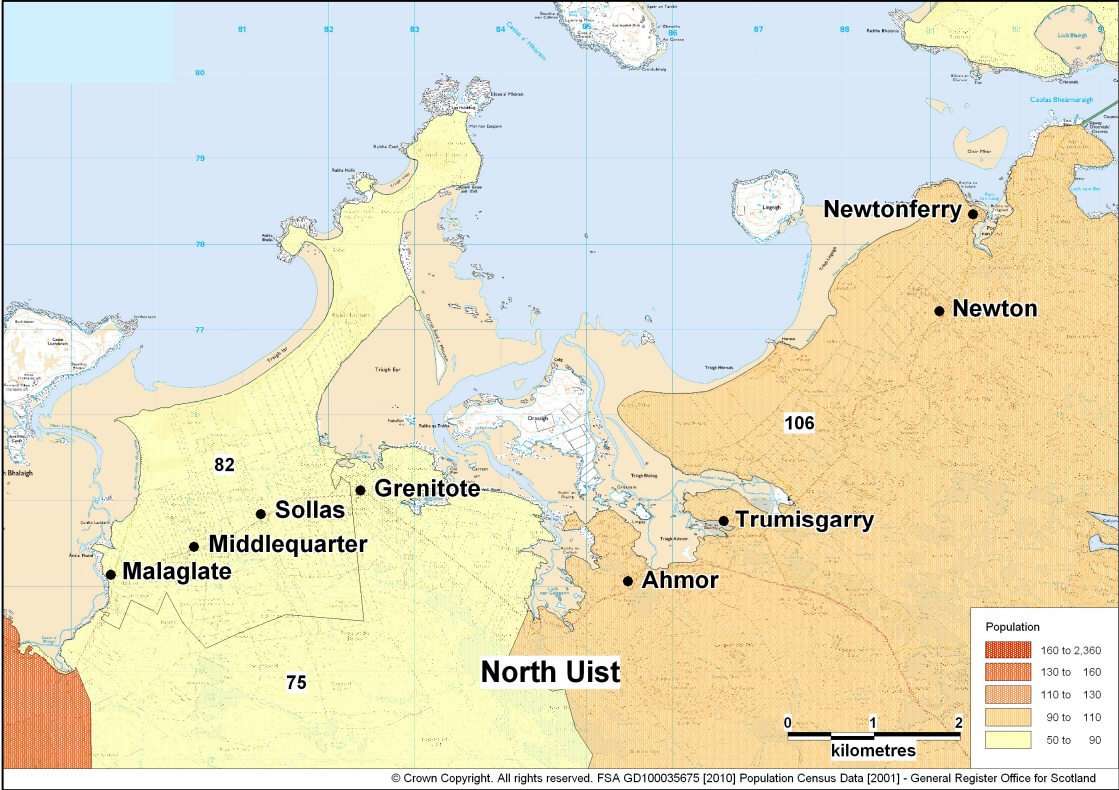


Figure 1.2 Human population surrounding the Isle of Orasaigh

## 2. Fishery

The fishery at Orasaigh West (UB 489 845 04) is comprised of a wild common cockle (*Cerostoderma edule*) bed. The site within Orasaigh West is called Tràigh Ear.

The cockle bed was identified by the harvester on the classification application form as the beach at Tràigh Ear, west of Rubha an Tobha, centred around NF 825 763 extending from west side of Grenitote to Cemy (the Cemetery) in the north peninsula.

There is currently no representative monitoring point (RMP) assigned to this area. The cockle bed at Orasaigh West does not lie within a designated shellfish growing water.

The boundaries of the common cockle bed, as identified by the harvester, are mapped in Figure 2.1. The cockles will be hand raked and harvesting is planned to take place throughout the year.

On the 25<sup>th</sup> January 2010 a regulation (OPSI online, 2010) was put in place by the Scottish Government called The Inshore Fishing (Prohibition of Fishing for Cockles) (Western Isles) (Scotland) Order No.444. This order prohibits fishing for cockles less than 30mm in size within inshore areas throughout the Western Isles, which includes North Uist.

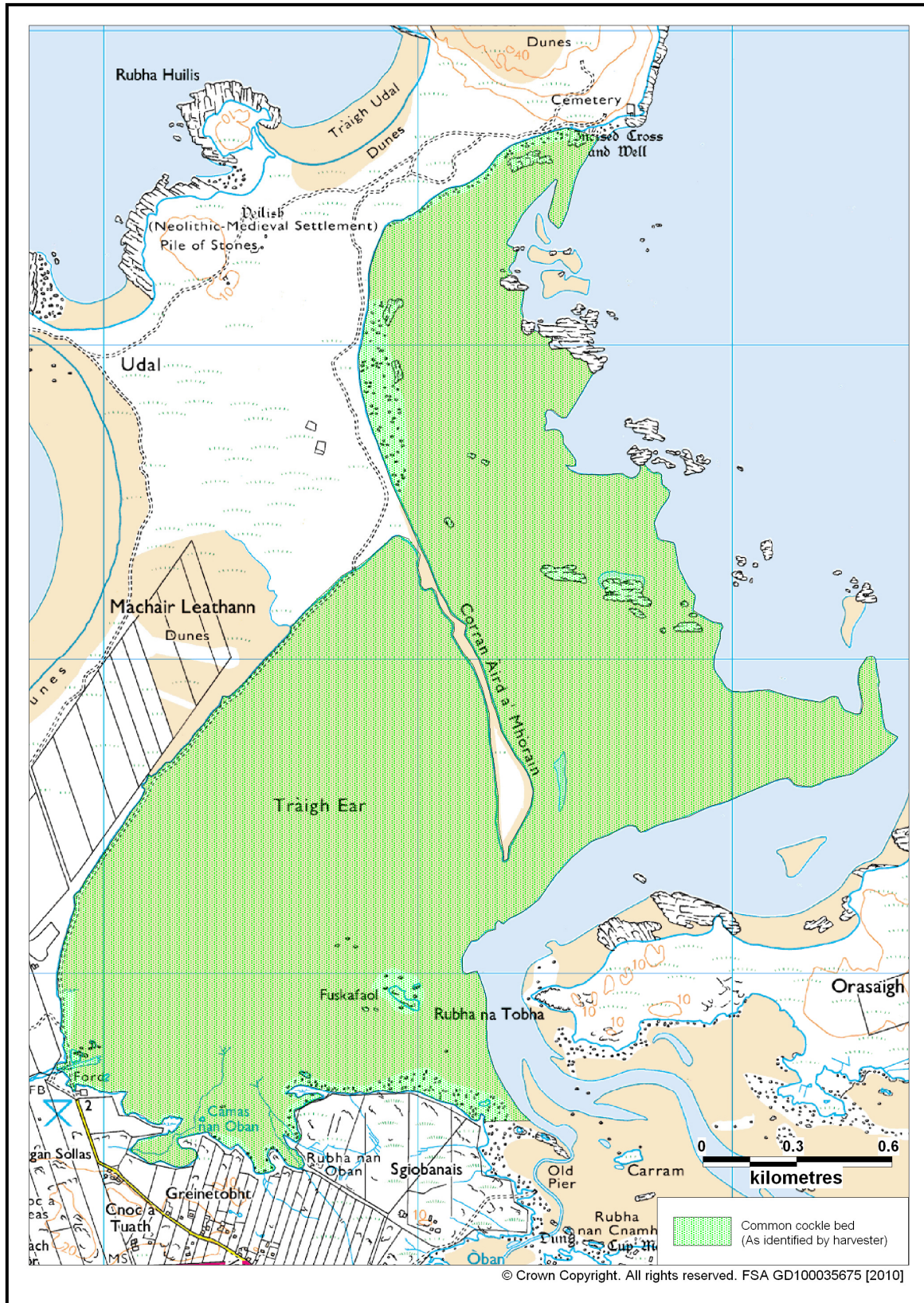


Figure 2.1 Orasaigh West fishery

### 3. Sewage Discharges

A large number of discharge consents were provided by SEPA for the area surrounding the Orasaigh West cockle bed. The majority of these discharge consents were identified as sewage (private) primary or sewage (public) primary discharges (i.e. septic tanks) discharging to soakaway. In Figure 3.1 the discharge consents have been thematically mapped to identify those discharging to watercourses or the sea, soakaways within 400 m of MHWS and soakaways >400 m from MHWS. Details of those not discharging to soakaway are listed in Table 3.1. Details of those discharging to soakaway are listed in Appendix 4. Only details of septic tanks discharging to watercourses or the sea have been provided below as these are considered of greater significance to the pollution of shellfish than those discharging to soakaways. At the time of writing this report, SEPA had not provided data concerning the consented/design population equivalent (PE) or the consented flow m<sup>3</sup>/day for any of the discharge consents. However, in data provided for other areas, most private septic tanks were typically assigned a PE of 5.

Table 3.1 SEPA discharge consents – septic tank discharges

Consent No.	NGR of discharge	Discharge Type	Discharges to
CAR/L/1002336	NF 81358 74999	Sewage (Public) Primary	Unnamed watercourse, Solas
CAR/R/1057583	NF 85679 74207	Sewage (Private) Primary	Coastal waters, Ahmore
CAR/R/1057589	NF 85649 74142	Sewage (Private) Primary	Unnamed watercourse, Loch Maddy
CAR/R/1057036	NF 85513 74048	Sewage (Private) Primary	Loch Aonghais, Ahmore
CAR/R/1056991	NF 85630 74087	Sewage (Private) Primary	Unnamed burn, Ahmore
CAR/R/1049868	NF 86760 75390	Sewage (Private) Primary	Faoghail Vallaquie, Clachan Sands
CAR/R/1059779	NF 87170 75190	Sewage (Private) Primary	Traigh Bhalaigh
CAR/R/1055933	NF 80351 74622	Sewage (Private) Primary	Unnamed tributary of Sound of Harris
CAR/R/1059504	NF 79487 74120	Sewage (Private) Primary	Unnamed watercourse, Malagate
CAR/R/1059792	NF 79495 73735	Sewage (Private) Primary	Unnamed watercourse, Sollas

No community septic tank discharges were identified by Scottish Water for the area.

No septic tanks or sewage outfall pipes were observed during the shoreline survey in the area.

Despite the relatively low population density as a whole, there are quite a large number of sewage discharges in the area, although most serve individual dwellings. A number of those that discharge into, or near, the coastline, may cause localised deterioration in water quality. There are no sewage discharges north of Grenitote. There is a cluster of soakaways at the



south end of the cockle bed and there is a concentration of private septic tanks outside the Orasaigh West site, 2 km south of the Isle of Orasaigh. Due to the location of the sewage discharges, any contamination to the shellfish is likely to be higher at the southern end of the cockle bed.

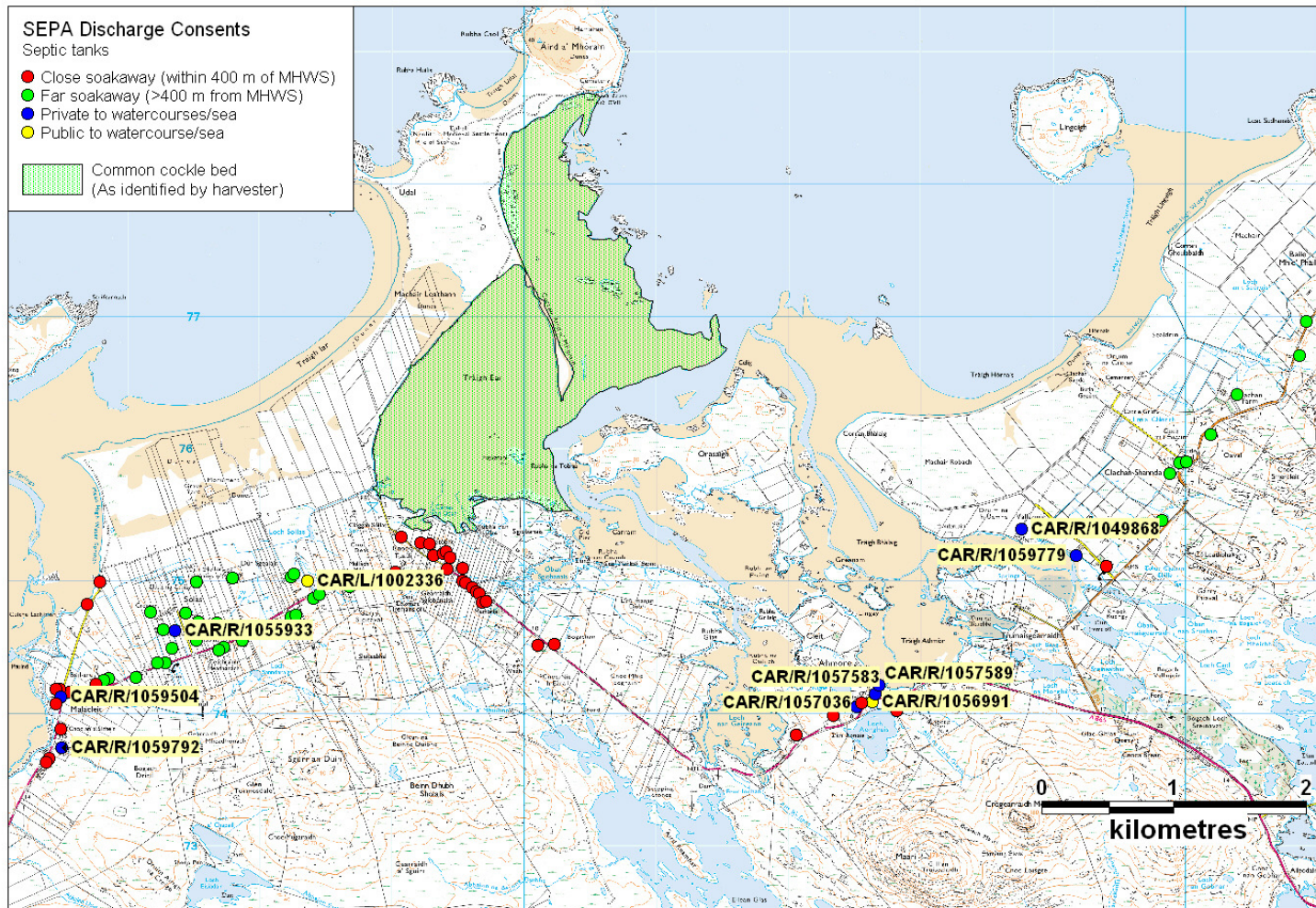


Figure 3.1 Sewage discharges at Orsaigh West

## **4. Animals**

### **4.1 Livestock**

Both sheep and cattle are raised through crofting on North Uist (Encyclopaedia Britannica online, 2010). Livestock are raised on communal grazing areas, including on Machair Robach (sandy grassland to the east of Orasaigh). An agricultural show, including livestock, is held in Hosta, (approximately 6 km south west of the shellfish bed) on the island in late July/early August each year.

The only significant source of information concerning livestock numbers in the vicinity of the fishery was available from the shoreline survey. The shoreline survey relates to the time of the site visits on the 14<sup>th</sup> April 2010. The counts may not represent all livestock in the area as they depend on the point of view of the observer and some animals may have been obscured by the terrain. The area surveyed was a selected stretch of the south west coastline. This was to concentrate on the area with the majority of any relevant discharges and fresh water inputs. It is therefore possible that livestock were present in areas that were not surveyed. As a result the observations made on the day of the shoreline survey will not represent the total number of livestock in the area.

On the southern shoreline of the Tràigh Ear shellfish bed approximately 110 sheep, 19 lambs, 28 cattle and 3 calves were observed grazing in total. No other livestock was observed at the time of the shoreline survey.

On the basis of these observations, the risk of contamination of the shellfishery from livestock sources will be greatest at the southern end of the cockle bed.

Livestock numbers in the area as a whole are likely to be at their highest during the summer months when lambs are present. During the warmer months livestock may access streams to drink and cool off more frequently, leading to higher levels of faecal contamination in freshwater streams and the shellfish bed itself.

### **4.2 Wildlife**

During the shoreline survey approximately 10 gulls, 30 oyster catchers, 62 waders, 2 geese and a single duck were observed on and around the Orasaigh West production area (see Figure 4.1). These seabirds were all observed towards the southern end of the cockle bed. No other wildlife was observed at the time of the shoreline survey. However, it is likely that other seabirds may be present in the area. The distribution and numbers of additional species was not investigated. On the basis of the shoreline survey observations, the risk of contamination of the shellfishery from wild birds will be greatest around the southern end of the cockle bed.

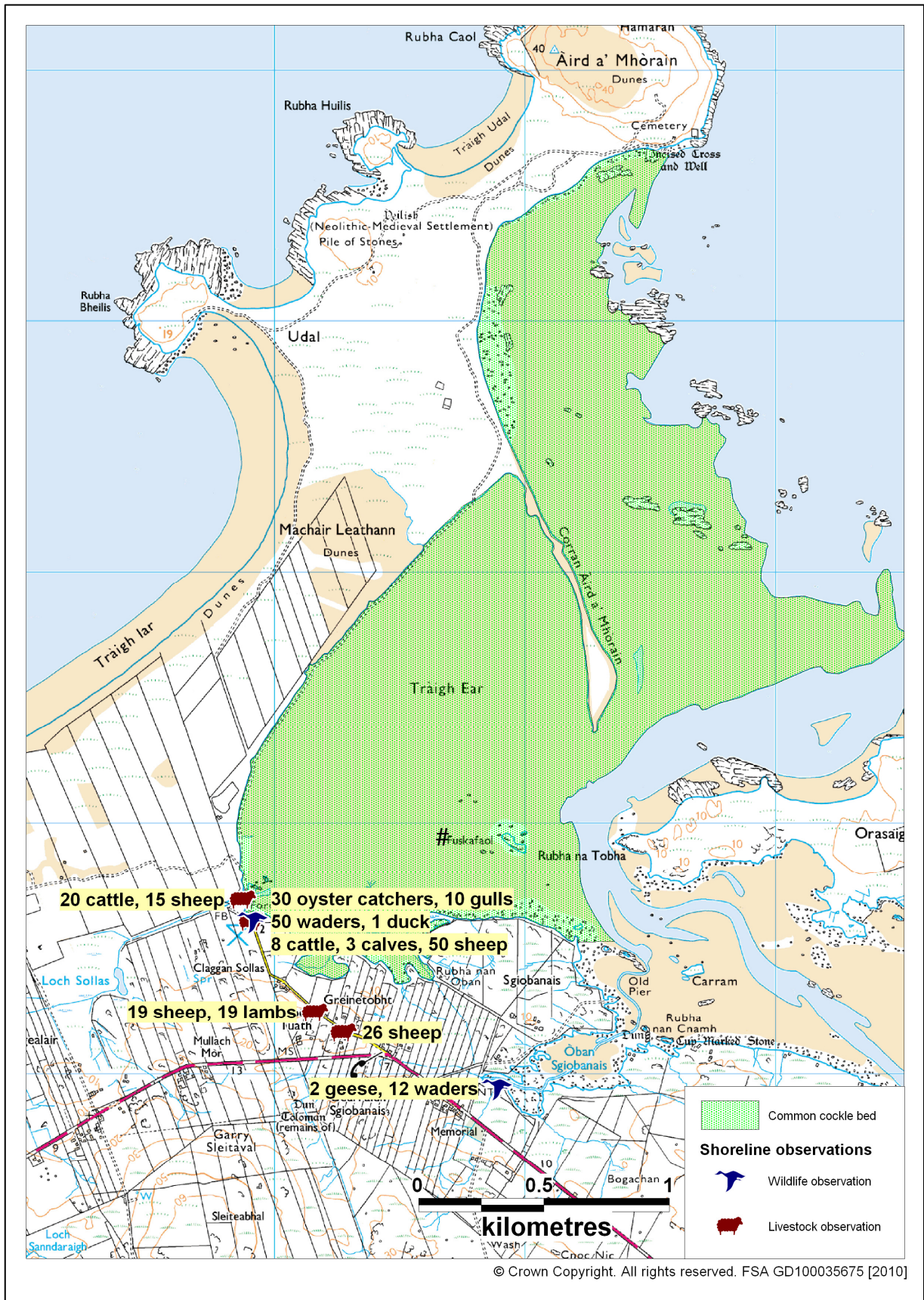


Figure 4.1 Livestock and wildlife present at Orasaigh West during the shoreline survey

## 5. Rainfall

The nearest weather station is located at North Uist: Clachan na Luib which is approximately 10 km south west of Orasaigh West. Daily rainfall values were purchased from the Meteorological Office for the period 01/01/2003 to 30/09/2007 inclusive for the North Uist: Clachan na Luib weather station. For this period of 1664 days, total daily rainfall was not recorded for 260 days, including the entire months of July 2003, June 2004, October and December 2005, March and April 2006, and February 2007.

Rainfall data were supplied to Cefas/FSAS by the Meteorological Office under licence. Unless otherwise identified, the content of this section (e.g. graphs) is based on further analysis of this data undertaken by Cefas.

High rainfall and storm events are commonly associated with increased faecal contamination of coastal waters through surface water run-off from land where livestock or other animals are present, and through sewer and wastewater treatment plant overflows (Mallin et al. 2001, Lee and Morgan 2003).

The influence of rainfall on microbiological quality will depend on factors such as local geology, topography, land use and sewerage infrastructure.

### 5.1 Rainfall at North Uist

Due to the missing data it is not appropriate to present total rainfall at North Uist by year or month. Instead, Figures 5.1 and 5.2 summarise the pattern of rainfall recorded at North Uist. The box and whisker plots present the distribution of individual daily rainfall values (observations) by year (Figure 5.1) or by month (Figure 5.2). The grey box represents the middle 50% of the observations, with the median noted by a line within the box. The whiskers extend to the largest or smallest observations up to 1.5 times the box height above or below the box. Individual observations falling outside the box and whiskers are represented by the symbol ‘\*’.

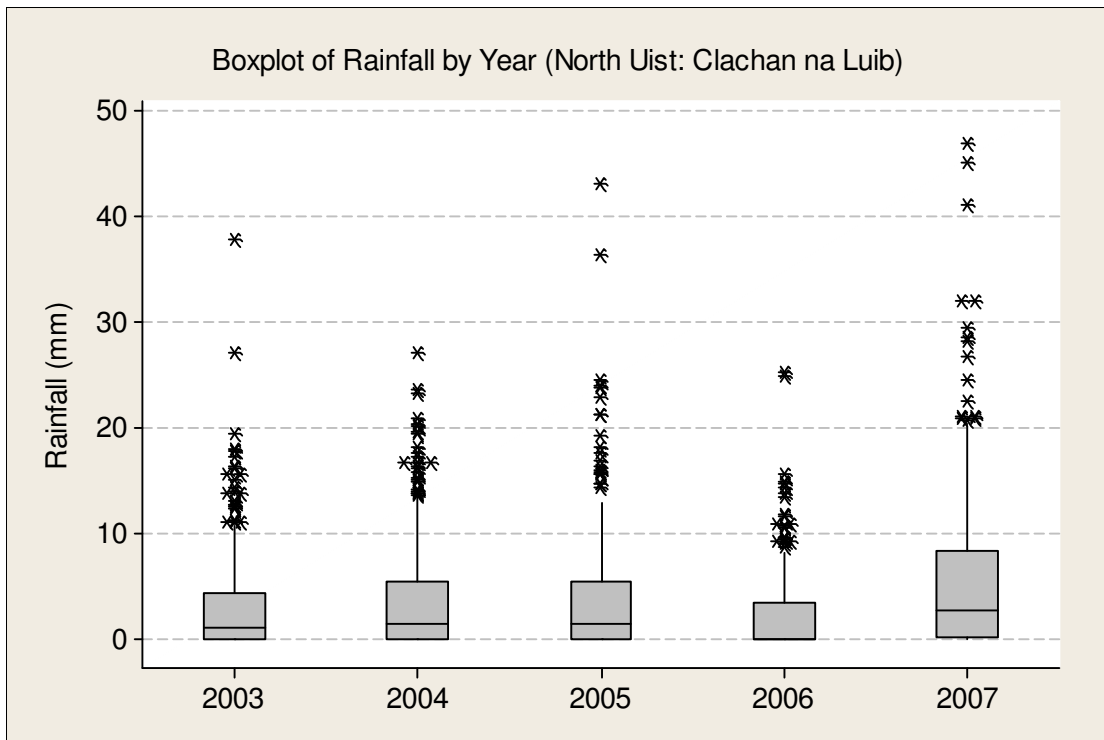


Figure 5.1 Boxplot of daily rainfall at North Uist by year

Figure 5.1 shows that there was considerable variation in the median daily rainfall from year to year. Overall, 2006 saw the lowest median rainfall, of 0mm. The highest individual rainfall events occurred in 2005 and 2007, with 2007 being wetter overall.

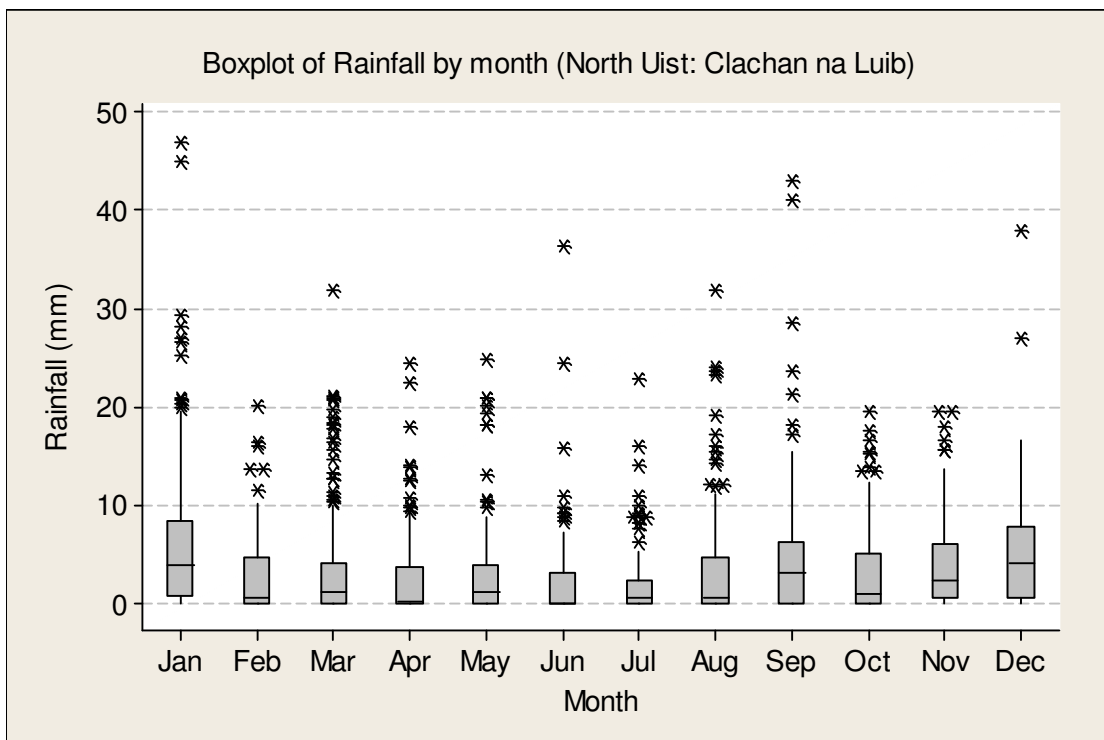


Figure 5.2 Boxplot of daily rainfall values at North Uist by month

The wettest months were September to January inclusive. High individual rainfall events occurred throughout the year, although not in all individual months. For the period considered here (2003 – 2007), 36% of days for which records were available experienced no rainfall while 47% of days experienced rainfall of 1mm or less. Although the mean rainfall was 4 mm per day, there were 8 occasions where daily rainfall exceeded 30mm. The highest daily rainfall recorded (47mm) fell in January 2007.

Periods of increased rainfall are generally associated with higher levels of contaminated surface water runoff. Marked changes in the level of rainfall may also cause significant wash off of accumulated material, especially after preceding dry periods.

## 6. River Flow

During the shoreline survey, two fresh water streams were observed discharging into the selected area of shoreline surveyed. The Ordnance Survey map indicates that there are potentially 7-8 fresh water streams in total discharging into the area in which the fishery is located. The two streams sampled were of measurable size but did not have measurable flow. These streams are listed in Table 6.1 and mapped in Figure 6.1. There was no rain on the day of the shoreline survey or in the previous week.

Table 6.1 Stream flow and *E. coli* concentrations – Orasaigh West

No	Grid Ref	Description	Width (m)	Depth (m)	Measured Flow (m/s)	Flow in m <sup>3</sup> /day	<i>E. coli</i> (CFU/100 ml)
1	NF 82888 74941	Stream	0.85	0.0 – 0.03	NA	NA	<100
2	NF 81876 75694	Stream	5.1	0.0 – 0.4	NA	NA	600

The stream discharging outside of the fishery had a low result of <100 *E. coli* cfu/100 ml. The stream that discharged directly into the fishery at the south west corner of the shellfish bed had a higher result of 600 *E. coli* cfu/100 ml. These results indicate that *E. coli* contamination of the two sampled watercourses differed significantly on the day of the survey, with low contamination in the stream located outside the fishery and moderate contamination in the stream located at the southern end of the fishery. It would be expected that levels of faecal contamination in the streams would increase significantly after periods of rainfall. However, these samples represented conditions at one point in time only and contamination levels present in the identified watercourses could vary considerably from these values.



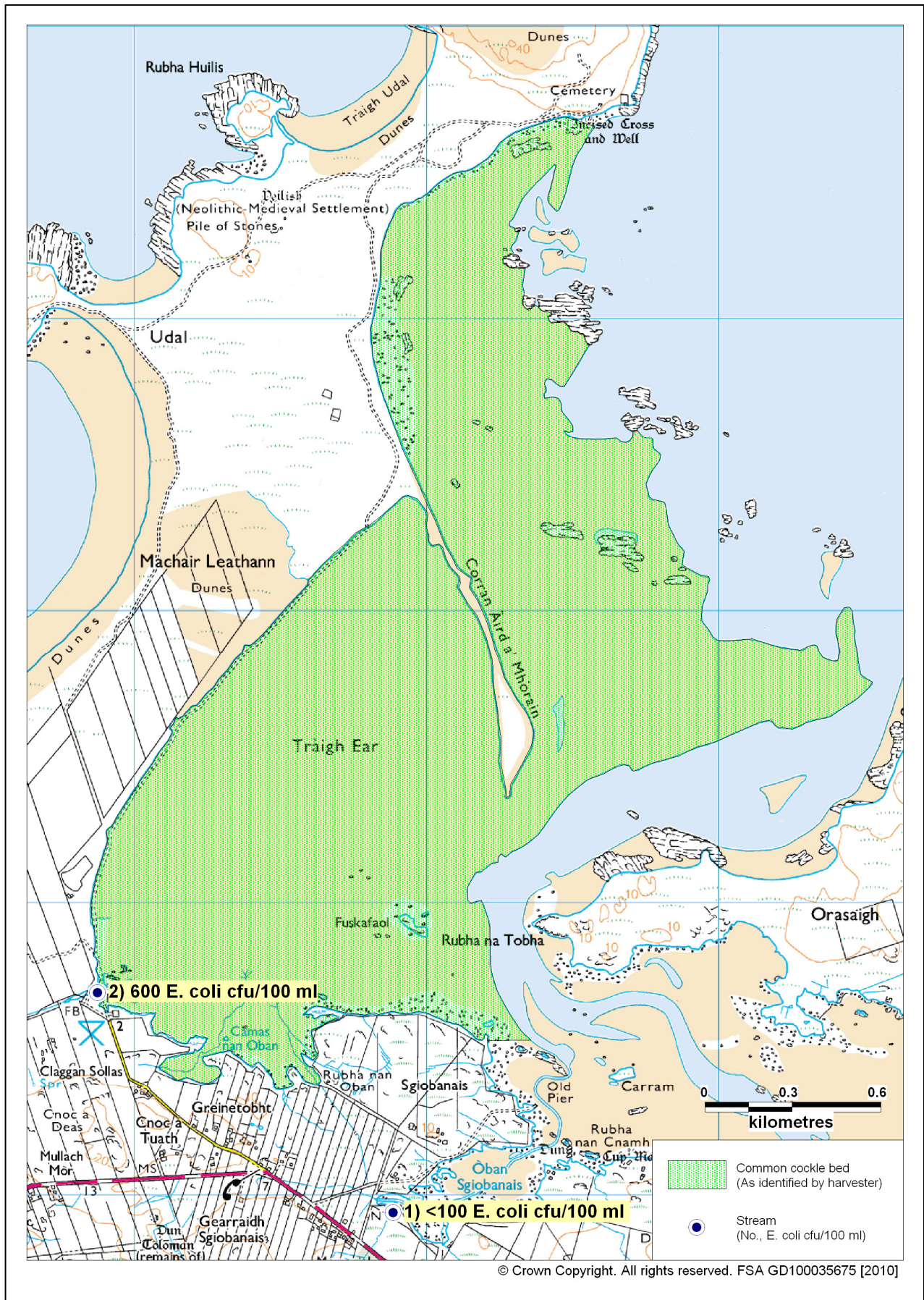


Figure 6.1. Location of streams at Orsaigh West

## **7. Historical *E. coli* Monitoring Data**

There is no historical *E. coli* monitoring data available for Orasaigh West.

## 8. Bathymetry and Hydrodynamics

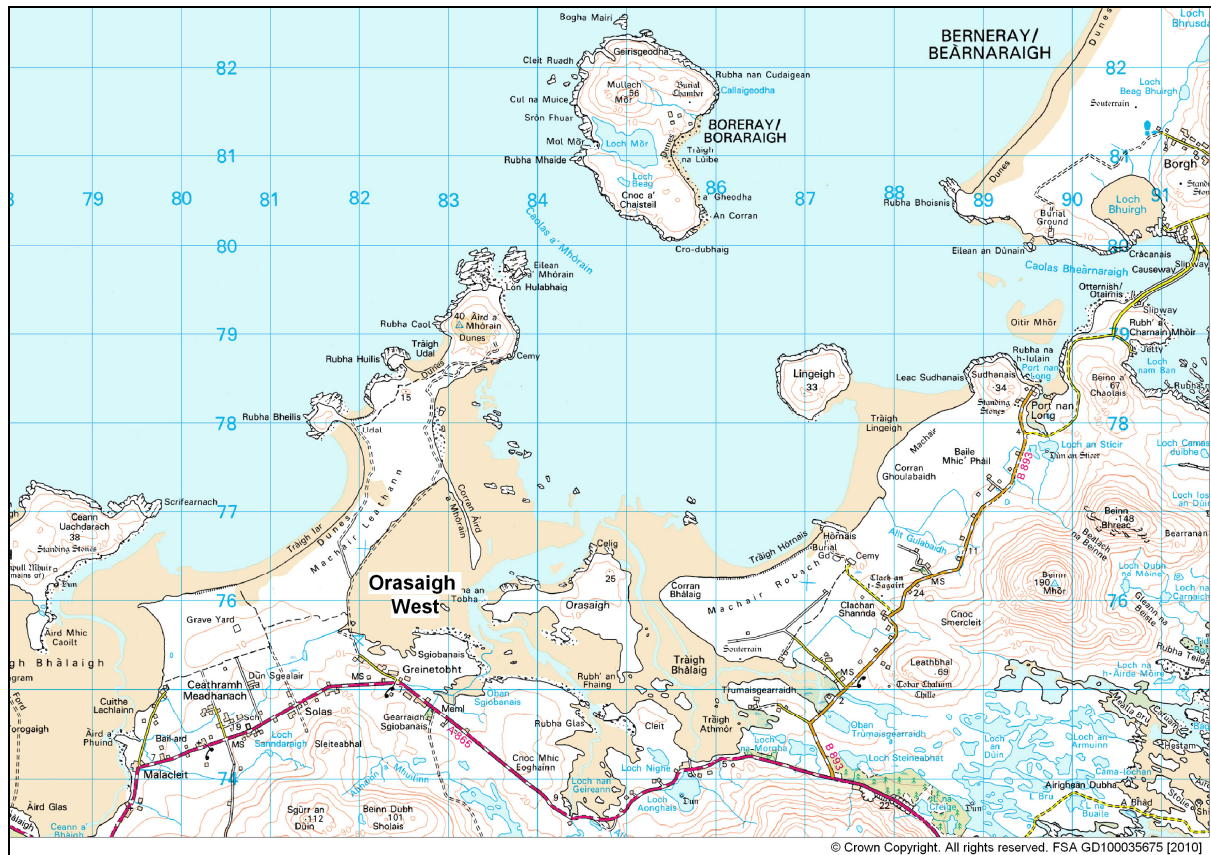


Figure 8.1 Isle of Orasaigh and the surrounding area

The Ordnance Survey map shows that much of the area is intertidal with shallow subtidal channels that interweave around the Isle of Orasaigh (see Figure 8.1). This area is shown as a drying area on Admiralty charts. Depths do not exceed 2 m in the intertidal area. Between the headland at the northern end of the shellfish bed and the island of Lingeigh, depths increase to 10 m. In the channel between Boreray and North Uist depths increase to 20 m and beyond here is the Atlantic Ocean. Orasaigh West is partially sheltered by the sand dunes to the west but is open to the North. Due to the bay being open to the north, strong winds from this direction would tend to drive tides higher than normal, resulting in resuspension and shifting of sediments.

### 8.1 Tidal curve and description

The two tidal curves below are for the port of Scolpaig, the nearest secondary port. This is located approximately 11 km west along the coastline of the fishery at Scolpaig. The tidal curves were output from UKHO TotalTide. The first is for seven days beginning 00.00 GMT on 7<sup>th</sup> April 2010. The second is for seven days beginning 00.00 GMT on 14<sup>th</sup> April 2010. Together they show the predicted tidal heights over high/low water for a full neap/spring tidal cycle.

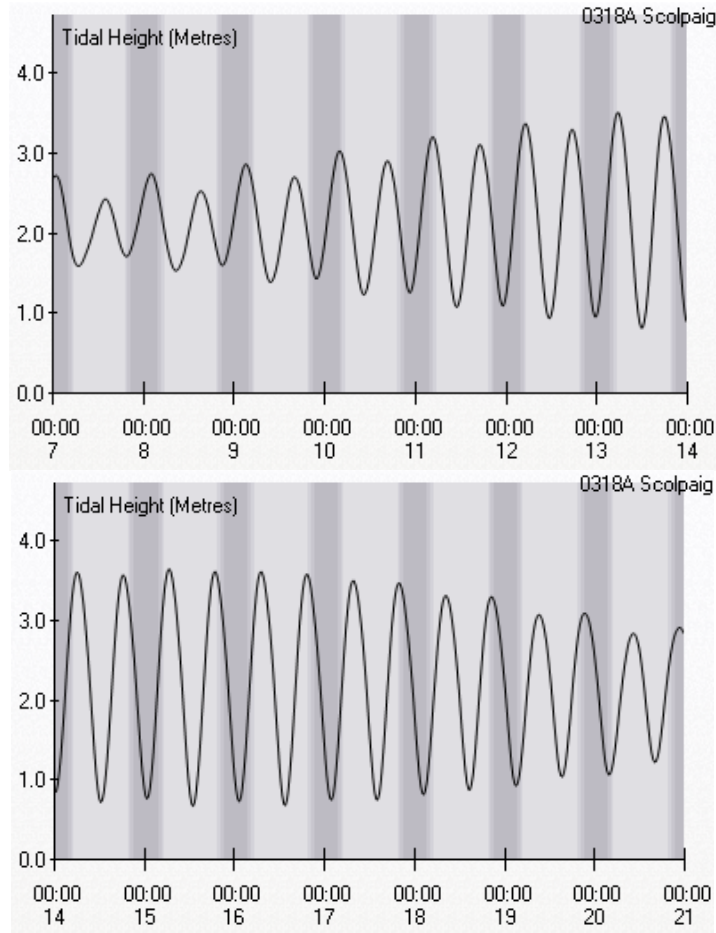


Figure 8.2 Tidal curves for Scolpaig

The following is the UKHO summary description for Scolpaig:

The tide type is Semi-Diurnal.

MHWS	3.8 m
MHWN	2.8 m
MLWN	1.5 m
MLWS	0.7 m

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Predicted heights are in metres above chart datum. The tidal range at spring tide is therefore approximately 2.3 m and at neap tide 2.1 m.

## 8.2 Currents

On the flood tide, water will enter through the main channels located on either side of Orasaigh and flood over the intertidal areas from the shallow channels. The reverse will occur on the ebb tide. The incoming tide will flow around Orasaigh, with a larger proportion of flow curving round the west side of the island via the Rubha na Tobha channel. Flows in the Tràigh Ear area will also be contained by the spit of land at Corran Aird à Mhòrain.

### **8.3 Conclusions**

Contamination arising to the south of Tràigh Ear will impact on the local area at high tide and will flow across the southern half of the cockle bed on the ebb tide and into the deeper water of Rhubha na Tobha. There will therefore be less impact from these sources on the northern part of Tràigh Ear and even less on the part of fishery north of the spit. Any contamination arising to the south of Orasaigh will principally impact on the south-eastern edge of the fishery on the ebb tide.

## 9. Shoreline Survey Overview

A restricted shoreline survey of the southwestern part of the shoreline was undertaken by staff from Comhairle nan Eilean Siar Council on the 14<sup>th</sup> April 2010.

No septic tanks or sewage outfall pipes were observed during the shoreline survey.

A single sub-surface sea water sample was taken from the southern end of the shellfish bed. The sample returned a result of 20 *E. coli* cfu/100 ml.

Fresh water samples were taken at the two streams flowing at the time of the shoreline survey. One of the two streams discharged outside of the cockle bed to the south and returned a result of <100 *E. coli* cfu/100 ml. The second stream located at the southern end of the shellfish bed returned a higher result of 600 *E. coli* cfu/100 ml.

During the shoreline survey one common cockle sample was collected from the southern end of the cockle bed. The cockle sample returned a result of 140 *E. coli* MPN/100 g.

During the shoreline survey approximately 110 sheep, 19 lambs, 28 cattle and 3 calves were observed grazing on the southern shoreline of the cockle bed. In addition to livestock certain wildlife including gulls, oyster catchers, waders, geese and a duck were also observed.

A map is provided in Figure 9.1 that shows the relative locations of the most significant findings of the shoreline survey. These findings only represent the selected area of shoreline surveyed on the day and not the entire shoreline surrounding the area in which the fishery is located.

In summary, identified sources of potentially significant contamination were:

- Freshwater stream flowing into the southern end of the shellfish bed
- Livestock grazing on and near the shoreline at the southern end of the shellfish bed



## **10. Overall Assessment**

### **Fishery**

The cockle bed was identified by the harvester on the classification application form as the beach at Traigh Ear, west of Rubha an Tobha, centred around NF 825 763 extending from west side of Grenitote to Cemy (the Cemetery) in the north peninsula. The cockles will be hand raked and harvesting is expected to take place throughout the year.

### **Human sewage inputs**

A large number of consented discharges are present in the area surrounding Orasaigh West. The majority of these discharge consents are private septic tanks to soakaways. Half of the soakaways are within 400 m of the shoreline and could therefore have the potential to impact the fishery if the soakaway is not working properly. There are also 10 private septic tank discharges to watercourses or the sea. There is a large number of private septic tank soakaways at the south end of the cockle bed and a concentration of private septic tanks outside the Orasaigh West site, 2 km south of the Isle of Orasaigh. None of these were confirmed during the shoreline survey. There are no sewage discharges north of Grenitote.

Any impact from sewage inputs will be likely to be greatest at the southern end of the cockle bed, as this is where a significant number of the private septic tanks are located. The cluster of private septic tanks 2 km south of the Orasaigh West site may also be a significant source of contamination.

### **Agricultural inputs**

During the shoreline survey a number of sheep and lambs (approximately 110 sheep and 19 lambs in total) and cattle (approximately 28 cattle and 3 calves in total) were observed grazing along the shoreline at the south end of the shellfish bed. Often the sheep and cattle were either close to or had access to the shoreline and were close to fresh watercourses. Therefore, agricultural sources may be a significant source of contamination to the area. Any contamination arising from the observed animals would potentially impact, most heavily on the southern end of the fishery.

### **Wildlife inputs**

During the shoreline survey approximately 10 gulls, 30 oyster catchers, 62 waders, 2 geese and a single duck were observed on and around the Orasaigh West site. The birds were mainly located at the south end of the fishery.



## **Rivers and streams**

During the shoreline survey, two fresh water streams were observed discharging into the selected area of shoreline surveyed. The Ordnance Survey map indicates that there are potentially 7-8 fresh water streams in total discharging into the area in which the fishery is located. One of the sampled streams discharged outside of the fishery south of the cockle bed and the other discharged into the south end of Traigh Ear. The stream discharging outside of the fishery had a low result of <100 *E. coli* cfu/100 ml. The stream that discharged directly into the fishery at the south west corner of the shellfish bed had a higher result of 600 *E. coli* cfu/100 ml. These results indicate that *E. coli* contamination of these watercourses differed significantly on the day of the survey, with low contamination in the stream located outside the fishery and moderate contamination in the stream located at the southern end of the fishery. It would be expected that levels of faecal contamination in the streams would increase significantly after periods of rainfall. However, these samples represented conditions at one point in time only and contamination levels at other times could vary considerably from these values.

## **Rainfall**

Rainfall patterns at North Uist: Clachan na Luib (the nearest rainfall station) show seasonal variation in rainfall levels and the wettest months were August to January inclusive. An increase in rainfall following a dry period may be expected to wash a flush of bacteria from the surrounding land into the production area. The highest risk of this type of event is during July and August, when lower average daily rainfall and extreme daily rainfall events are most likely to occur. The impact of rainfall events is likely to be most acute nearest where the streams enter the shellfish bed.

## **Analysis of results**

There are no historical *E. coli* monitoring results for Orasaigh West.

During the shoreline survey one common cockle sample was collected from the southern end of the cockle bed. The cockle sample returned a Class A result of 140 *E. coli* MPN/100 g.

A single sub-surface sea water sample was taken from the southern end of the shellfish bed. The sample returned a relatively low result of 20 *E. coli* cfu/100 ml.

## **Movement of contaminants**

Contamination arising to the south of Tràigh Ear will be taken across the southern half of the the fishery during the ebb tide but will also have more local impacts at other states of the tide.

## **Overall conclusions**

The main identified potential sources of human and animal contamination lay on the southern shore of the area and are likely to have their greatest impact on the fishery in the near vicinity.

# 11. Recommendations

## Production Area

The recommended production area boundaries are: the area bounded by lines drawn between NF 8372 7874 and NF 8465 7654 and between NF 8350 7578 and NF 8331 7533 and extending to MHWS.

## RMP

It is recommended that the RMP be set at NF 8225 7575. This is situated towards the southern end of the fishery where most of the potential sources of contamination are located.

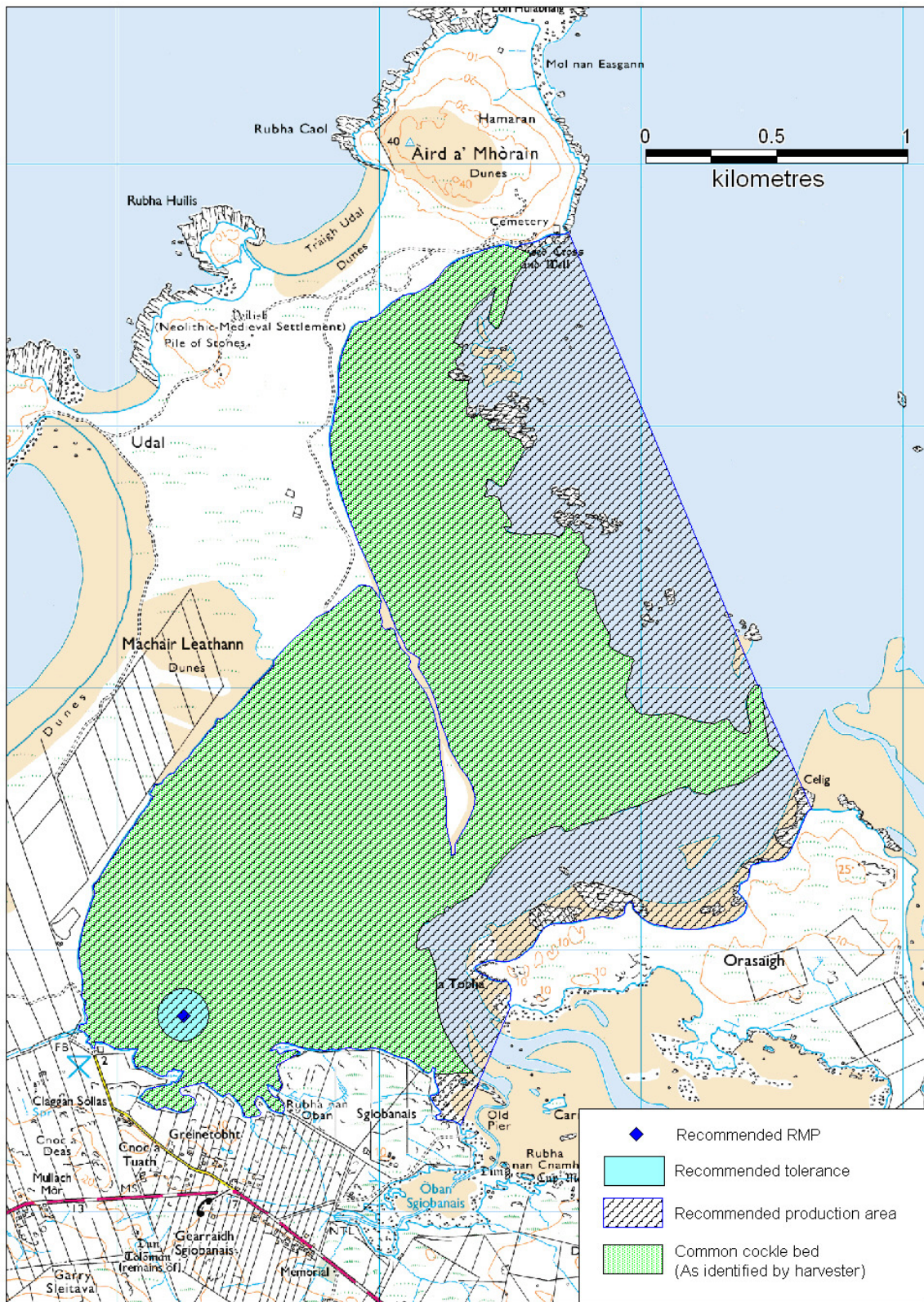
## Tolerance

As there is likely to be variation in cockle density across the Orasaigh West area, it is recommended that a 100 m tolerance be allowed for sampling. This will allow for some variability in density while still ensuring that monitoring is undertaken reasonably close to the assigned RMP.

## Frequency

As there is no historical monitoring data for the area and some seasonal variation in sources of contamination is expected, it is recommended that monthly monitoring be undertaken until sufficient data has been accumulated to permit a review.

The locations of the recommended production area boundaries, RMP and tolerance zone are illustrated in Figure 11.1.



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Figure 11.1 Recommendations for Orasaigh West

## 12. References

[www.britannica.co.uk](http://www.britannica.co.uk) (2010). Encyclopaedia Britannica Online. Accessed 11/06/2010.

Lee, R.J., Morgan, O.C. (2003). Environmental factors influencing the microbial contamination of commercially harvested shellfish. *Water Science and Technology* 47, 65-70.

Mallin, M.A., Ensign, S.H., Mclver, M.R., Shank, G.C., Fowler, P.K. (2001). Demographic, landscape, and meteorological factors controlling the microbial pollution of coastal waters. *Hydrobiologia* 460, 185-193.

OPSI (Office of Public Sector Information)  
[http://www.opsi.gov.uk/legislation/scotland/ssi2009/ssi\\_20090444\\_en\\_1](http://www.opsi.gov.uk/legislation/scotland/ssi2009/ssi_20090444_en_1) *The Inshore Fishing (Prohibition of Fishing for Cockles) (Western Isles) (Scotland) Order 2009* Accessed online 12/05/10

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4. **SEPA Discharge consents - Soakaways**

## Sampling Plan for Orasaigh West

PRODUCTION AREA	SITE NAME	SIN	SPECIES	TYPE OF FISH-ERY	NGR OF RMP	EAST	NORTH	TOLE R-ANCE (M)	DEPTH (M)	METHOD OF SAMPLING	FREQ OF SAMPLING	LOCAL AUTHORITY	AUTHORISED SAMPLER(S)	LOCAL AUTHORITY LIAISON OFFICER
Orasaigh West	Traigh Ear	UB 489 845 04	Common cockles	Wild	NF 8225 7575	82250	875750	100	N/A	Hand raked	Monthly	CnES	Samantha Muir	Samantha Muir



## Comparative Table of Boundaries and RMPs – Orasaigh West

Production Area	Species	SIN	Existing Boundary	Existing RMP	New Boundary	New RMP	Comments
Orasaigh West	Common cockles	UB 489 845 04	N/A	N/A	The area bounded by lines drawn between NF 8372 7874 and NF 8465 7654 and between NF 8350 7578 and NF 8331 7533 and extending to MHWS.	NF 8225 7575	New production area and RMP

# Shoreline Survey Report



## Orasaigh West UB 489

### Restricted Scottish Sanitary Survey Project



## Shoreline Survey Report

Production area: Orasaigh West  
 Site name: Traigh Ear  
 Species: Common Cockles (*Cerostoderma edule*).  
 Harvester: Duncan MacInnes  
 Local Authority: CnES  
 Status: New site

Date Surveyed: Wednesday 14<sup>th</sup> April 2010  
 Surveyed by: Samantha Muir  
 Existing RMP: NA  
 Area Surveyed: See Figure 1.

### Weather observations

Wednesday 14<sup>th</sup> April: Sunny and dry with no rain in the previous week.

### Site Observations

#### **Fishery**

The Orasaigh West production area is harvested for common cockles (*Cerostoderma edule*). The common cockles are hand raked within the sands of Traigh Ear, shown in Figure 1. The harvesters plan to harvest the razors all year round.

#### **Sewage/Faecal Sources**

There are no large settlements surrounding Orasaigh West, however there are several small settlements at the south end of the fishery near Greinetobht. The majority of human population is spread through scattered dwellings around the production area. No sewage outfall pipes or septic tanks were observed during the shoreline survey.

#### **Seasonal Population**

There are no caravan parks or campsites in the area surrounding Orasaigh West. No hotels or B&BS were observed during the shoreline survey.

#### **Boats/Shipping**

At the time of the shoreline survey no boats were observed near Orasaigh West.

#### **Land Use**

The land surrounding Orasaigh West is mainly croft land primarily used for grazing sheep and some cattle.

#### **Livestock**

On the southern shoreline of the Traigh Ear shellfish bed approximately 110 sheep, 19 lambs, 28 cattle and 3 calves were observed grazing in total.

**Wildlife/Birds**

During the shoreline survey approximately 10 gulls, 30 oyster catchers, 62 waders, 2 geese and a single duck were observed towards the southern end of the shellfish bed.

Observations can be found in Table 1.

Figure 1. Shoreline Observations

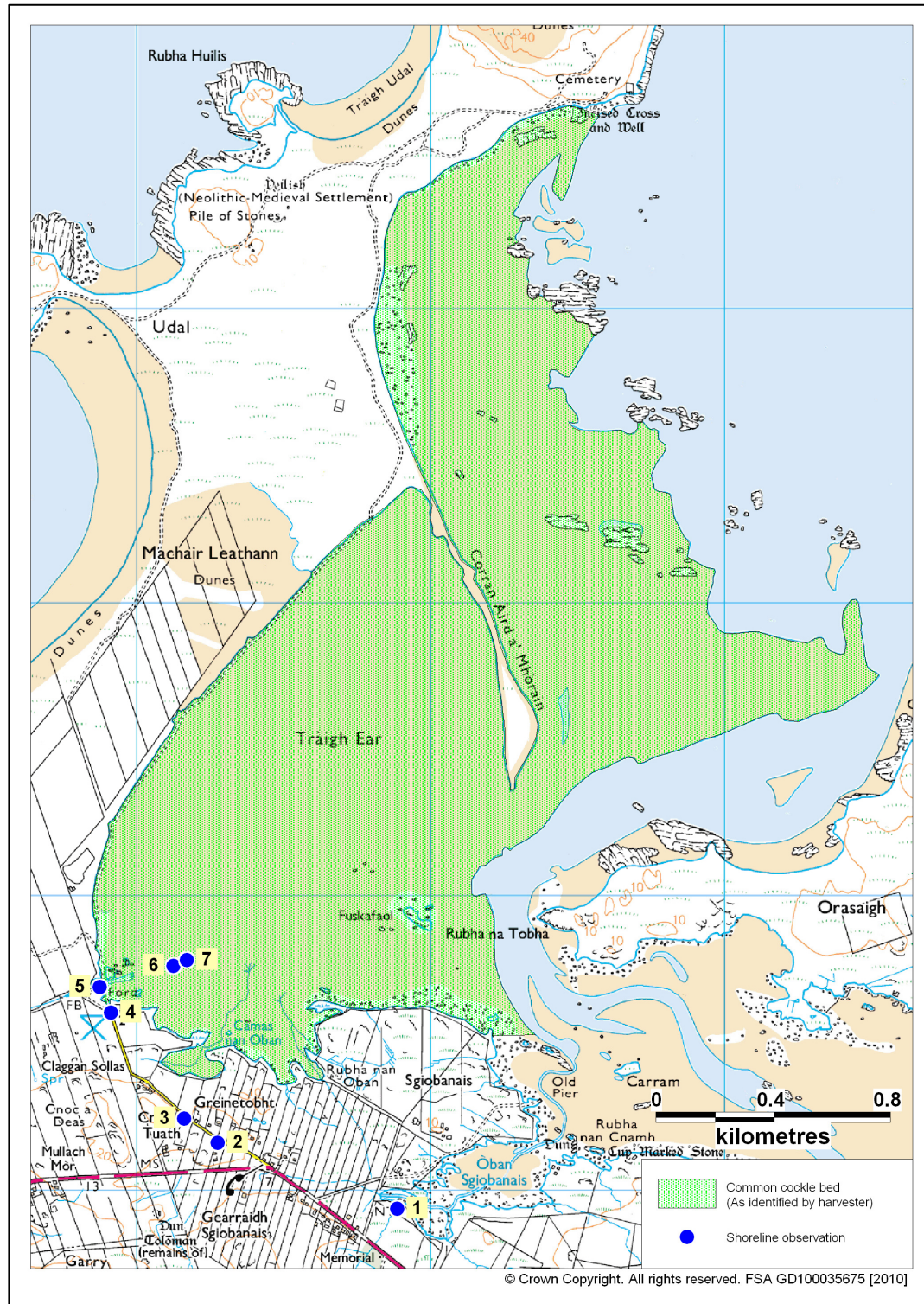


Table 1. Shoreline Observations

No.	Date	Time	NGR	East	North	Associated photograph	Description
1	14/04/2010	08:45	NF 82888 74941	82888	874941	Figure 4	Fresh water stream, W 0.85, D 0.0 – 0.03. Fresh water sample OFWW1. 2 geese, 12 waders, 16 houses overlooking the shoreline.
2	14/04/2010	08:50	NF 82278 75164	82278	875164	-	Croft land, 25 sheep grazing
3	14/04/2010	08:55	NF 82164 75246	82164	875246	-	Croft land, 18 sheep, 19 lambs grazing
4	14/04/2010	09:00	NF 81914 75607	81914	875607	-	7 cattle, 3 calves, 50 sheep, 30 oyster catchers, 10 gulls, 50 waders, 1 duck
5	14/04/2010	09:05	NF 81876 75694	81876	875694	Figure 5 – 7	Fresh water stream, W 5.1, D 0.0 – 0.4, not able to measure flow, boulder strewn. Fresh water sample, OFWW2. 20 cattle, 15 sheep. Cattle grazing along shoreline.
6	14/04/2010		NF 82127 75765	82127	875765	-	Sea water sample, OWSW1
7	14/04/2010		NF 82173 75785	82173	875785	-	Common cockle sample, OWC1

Photographs referenced in the table can be found attached as Figures 4 – 7.

## Sampling

Water and shellfish samples were collected at sites marked on the map. Bacteriology results follow in Tables 2 and 3.

Seawater samples were tested for salinity using a hand held refractometer. These readings are recorded in Table 1 as salinity in parts per thousand (ppt).

Samples were also tested for salinity by the laboratory using a salinity meter under more controlled conditions. These results are shown in Table 2, given in units of grams salt per litre of water. This is the same as ppt.

Table 2. Water Sample Results

No.	Date	Sample	Grid Ref	Type	E. coli (cfu/100ml)	Salinity (g/L)
1	14/04/2010	OWFW1	NF 82888 74941	Fresh water	<100	-
2	14/04/2010	OWFW2	NF 81876 75694	Fresh water	600	-
3	14/04/2010	OWSW1	NF 82127 75765	Sea water	20	34.5

Table 3. Shellfish Sample Results

No.	Date	Sample	Grid Ref	Type	E. coli (MPN/100g)
1	14/04/2010	OWC1	NF 82173 75785	Common cockle	140

Figure 2. Water sample results

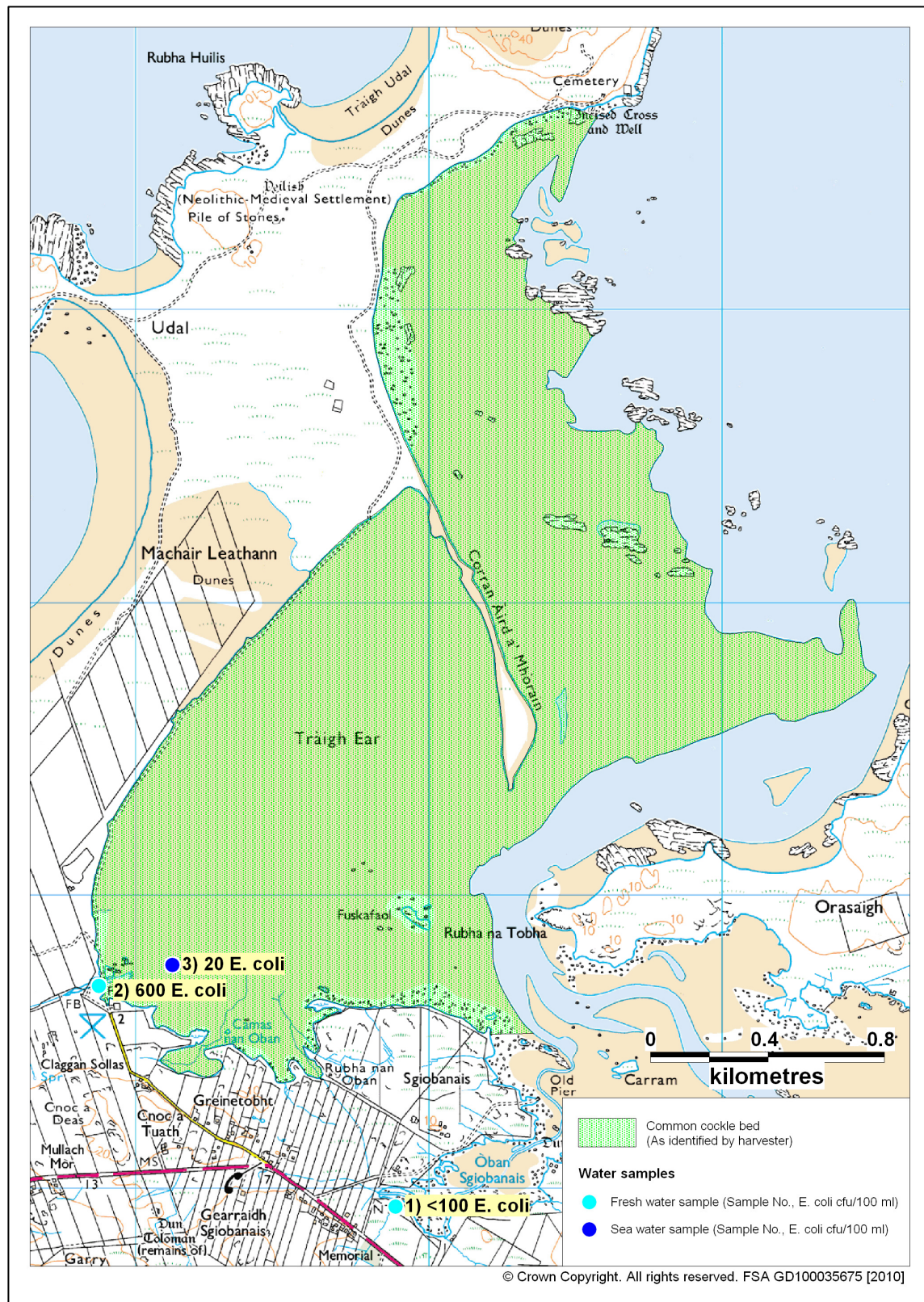
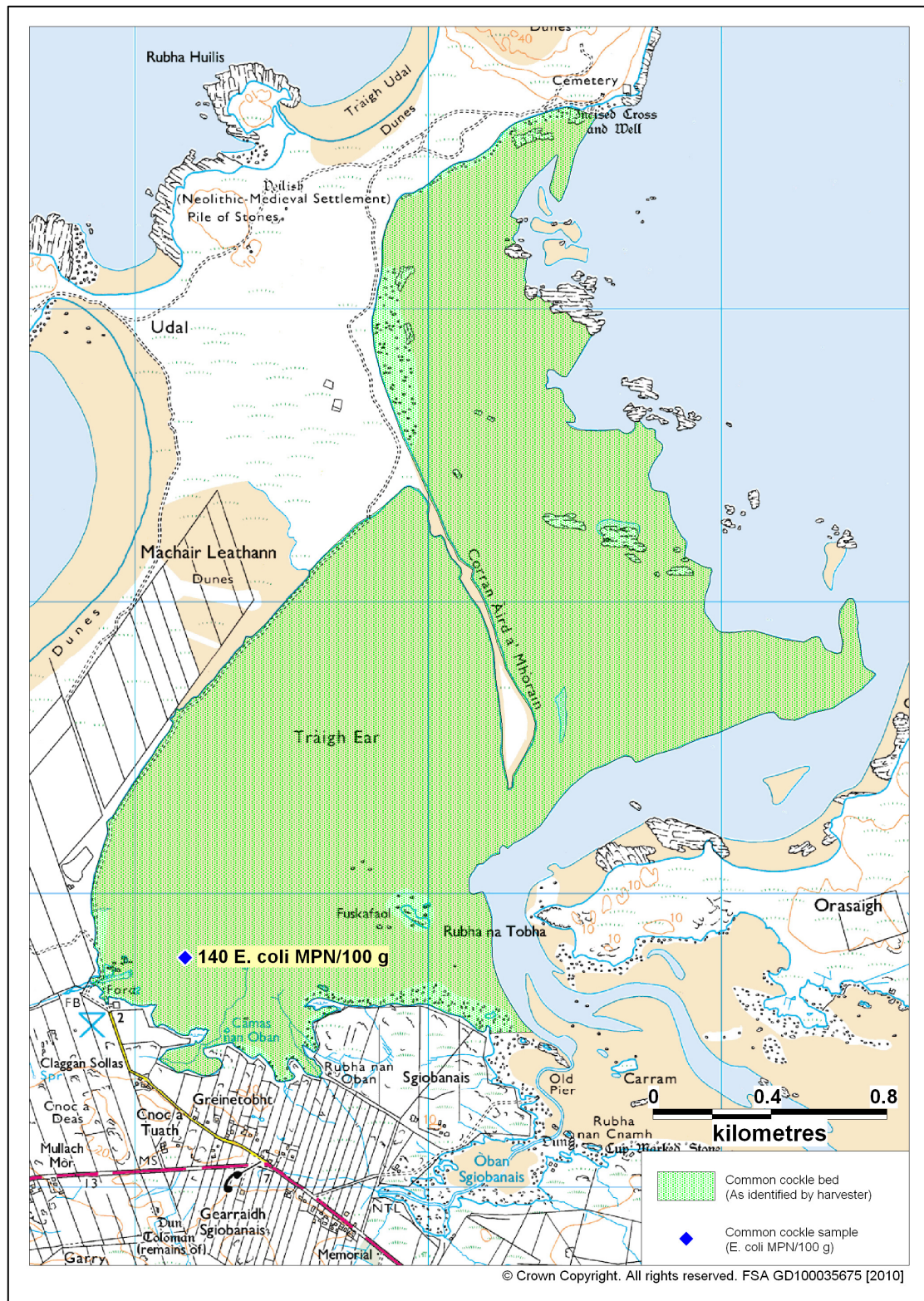


Figure 3. Shellfish sample results





## Photographs



Figure 4. Location of fresh water sample 1, OWWF1



Figure 5. Fresh water stream looking seaward



Figure 6. Cattle grazing on the shoreline in the distance



Figure 7. Location of fresh water sample 2, OWW2

## SEPA Discharge Consents - Soakaways

Consent No.	NGR of discharge	Discharge Type	Discharges to	Near or Far Soakaway
CAR/R/1064907	NF 80530 74693	Sewage (Private) Primary	4 Middlequarter, STE to soakaway, Isle Of North Uist	Far soakaway
CAR/R/1059903	NF 80430 74760	Sewage (Private) Primary	6 Middlequarter, STE to soakaway, Isle of North Uist	Far soakaway
CAR/R/1059879	NF 80672 74685	Sewage (Private) Primary	Garadh Mor, STE to soakaway, 1 Middlequarter, North Uist	Far soakaway
CAR/R/1057018	NF 80512 74992	Sewage (Private) Primary	Clach na Croise, STE to Land, Sollas, Isle of North Uist	Far soakaway
CAR/R/1059606	NF 80729 74624	Sewage (Private) Primary	Dunskellar Schoolhouse, STE to soakaway, Isle of North	Far soakaway
CAR/R/1056276	NF 80510 74550	Sewage (Private) Primary	Daisy Bank, STE to soakaway, 5 Middlequarter, Isle of North Uist	Far soakaway
CAR/R/1075770	NF 80790 75020	Sewage (Private) Primary	Dunskellar School, STE to soakaway, Sollas, Isle Of North Uis	Far soakaway
CAR/R/1061918	NF 80717 74497	Sewage (Private) Primary	Cnoc Nan Uan, STE to soakaway, 1 Middlequarter, Isle of North Uist	Far soakaway
CAR/R/1049918	NF 80260 74630	Sewage (Private) Primary	10 Middlequarter, STE to soakaway, Isle of North Uist	Far soakaway
CAR/R/1057709	NF 80683 74476	Sewage (Private) Primary	Cnoc an Locha, STE to soakaway, Sollas, Isle of North Uist	Far soakaway
CAR/R/1049465	NF 80169 74764	Sewage (Private) Primary	Tigh A Bhruaich, STE to soakaway, 11 Middlequarter, Isle Of North Ui	Far soakaway
CAR/R/1068549	NF 80860 74550	Sewage (Private) Primary	3 Sollas, STE to Land, Isle of North Uist	Far soakaway
CAR/R/1067508	NF 80330 74490	Sewage (Private) Primary	Quirang, 10 Middlequater, STE To soakaway, Isle Of North Vist	Far soakaway
CAR/R/1059900	NF 81070 74660	Sewage (Private) Primary	Park Cottage, STE to soakaway, Isle of North Uist	Far soakaway
CAR/R/1056618	NF 80279 74381	Sewage (Private) Primary	12 Middlequarter, STE to soakaway, Isle of North Uist	Far soakaway
CAR/R/1079130	NF 80217 74380	Sewage (Private) Primary	1 Malaclate, STE to soakaway, Isle Of North Uist	Far soakaway
CAR/R/1076172	NF 81229 74730	Sewage (Private) Primary	Sheillaidh, STE to soakaway, 8 Sollas, Isle of North Uist	Far soakaway
CAR/R/1032229	NF 81230 75030	Sewage (Private) Primary	Havisgarry, STE to soakaway, Sollas, Isle of North Uist	Far soakaway
CAR/R/1020153	NF 81265 74745	Sewage (Private) Primary	8 Sollas, STE to land, Isle of North Uist	Far soakaway
CAR/R/1075900	NF 81250 75050	Sewage (Private) Primary	Arvillas Rock, STE to Soakaway, Sollas	Far soakaway
CAR/R/1060027	NF 80055 74267	Sewage (Private) Primary	7 Malaglate, STE to Soakaway, Sollas, Isle of	Far soakaway

Consent No.	NGR of discharge	Discharge Type	Discharges to	Near or Far Soakaway
			North Uist	
CAR/R/1049468	NF 79785 74992	Sewage (Private) Primary	Machair House, STE to soakaway, 4 Malaclete, Isle Of North Uist	Close soakaway
CAR/R/1075685	NF 81400 74870	Sewage (Private) Primary	Oceanview, STE to soakaway, Sollas	Far soakaway
CAR/R/1066699	NF 81440 74899	Sewage (Private) Primary	Primrose Cottage, STE to Soakaway, Sollas, Isle of North Uist	Far soakaway
CAR/R/1051294	NF 79690 74820	Sewage (Private) Primary	Oir Na Mara, STE to Soakaway, Isle of North Uist	Close soakaway
CAR/R/1059891	NF 79850 74260	Sewage (Private) Primary	8 Malaglate, STE to soakaway, Isle of North Uist	Far soakaway
CAR/R/1059895	NF 79811 74246	Sewage (Private) Primary	9 Malaglate, STE to soakaway, Isle of North Uist	Far soakaway
CAR/R/1059898	NF 79750 74220	Sewage (Private) Primary	Balard, STE to soakaway, Malaglate, Isle of North Uist	Close soakaway
CAR/R/1066568	NF 81613 74983	Sewage (Private) Primary	10 Sollas, STE to Soakaway, Isle of North Uist	Far soakaway
CAR/R/1049922	NF 81673 74953	Sewage (Private) Primary	11 Sollas, STE to soakaway, North Uist	Far soakaway
CAR/R/1046768	NF 79551 74162	Sewage (Private) Primary	10 Malaglate, STE to soakaway, Isle of North Uist	Close soakaway
CAR/R/1048209	NF 79479 74183	Sewage (Private) Primary	Aird A Phunid, STE to soakaway, Isle of North Uist	Close soakaway
CAR/R/1059923	NF 79452 74178	Sewage (Private) Primary	11 Malaglate, STE to soakaway, Sollas, Isle of North Uist	Close soakaway
CAR/R/1059677	NF 79450 74070	Sewage (Private) Primary	Cnoc Sitheil, STE to Soakaway, Isle of North Uist	Close soakaway
CAR/R/1059845	NF 79490 73880	Sewage (Private) Primary	12 Malaglate, STE to soakaway, Isle of North Uist	Close soakaway
CAR/R/1073814	NF 82020 75070	Sewage (Private) Primary	Toloman View, STE to soakaway, Isle of North Uist	Close soakaway
CAR/R/1066828	NF 82060 75330	Sewage (Private) Primary	1 Grenitote, STE to soakaway, Isle of North Uist	Close soakaway
CAR/R/1056616	NF 79401 73656	Sewage (Private) Primary	Free Church Mission House, STE to Soakaway, Sollas	Close soakaway
CAR/R/1060173	NF 79380 73630	Sewage (Private) Primary	Strvan, STE to Soakaway, Sollas	Close soakaway
CAR/R/1056535	NF 82210 75290	Sewage (Private) Primary	3 Greintote, STE to soakaway, Isle Of Noth Uist	Close soakaway
CAR/R/1056410	NF 82280 75280	Sewage (Private) Primary	4 Grenitote, STE to soakaway, Lochmaddy, Isle Of North Uist	Close soakaway
CAR/R/1075836	NF 82310 75190	Sewage (Private) Primary	6 Grenitote, STE to soakaway, Isle Of North Uist	Close soakaway
CAR/R/1043308	NF 82378 75207	Sewage (Private) Primary	7 Grenitote, STE to soakaway, Lochmaddy, Isle Of North Uist	Close soakaway
CAR/R/1018412	NF 82410 75092	Sewage (Private) Primary	10 Grenitote, STE to land, Sollas, North Uist	Close soakaway
CAR/R/1045361	NF 82402 75224	Sewage (Private)	8 Grenitote, STE to	Close soakaway

Consent No.	NGR of discharge	Discharge Type	Discharges to	Near or Far Soakaway
		Primary	soakaway, North Uist	
CAR/R/1060028	NF 82430 75180	Sewage (Private) Primary	9 Grenitote, STE to Land, Isle of North Uist	Close soakaway
CAR/R/1056986	NF 82530 75000	Sewage (Private) Primary	14 Grenitote, STE to soakaway, Isle of North Uist	Close soakaway
CAR/R/1064898	NF 82530 75094	Sewage (Private) Primary	13 Grenitote, STE to soakaway, Isle of North Uist	Close soakaway
CAR/R/1055778	NF 82553 74982	Sewage (Private) Primary	15 Grenitote, STE to soakaway, Isle of North Uist	Close soakaway
CAR/R/1047652	NF 82600 74950	Sewage (Private) Primary	17 Grenitote, STE to soakaway, Isle Of North Uist	Close soakaway
CAR/R/1046973	NF 82630 74920	Sewage (Private) Primary	18 Grenitote, STE to soakaway, Sollas, Isle Of North Uist	Close soakaway
CAR/R/1067559	NF 82654 74902	Sewage (Private) Primary	Shandon, STE to soakaway, Isle Of Lewis	Close soakaway
CAR/R/1043309	NF 82678 74835	Sewage (Private) Primary	20 Grenitote, STE to soakaway, Isle Of North Uist	Close soakaway
CAR/R/1043371	NF 82705 74849	Sewage (Private) Primary	21 Grenitote, STE to soakaway, Sollas, Isle Of North Uist	Close soakaway
CAR/R/1010069	NF 83100 74510	Sewage (Private) Primary	Stonefield, 11 Genitote, Isle of North Uist, STE to soakaway	Close soakaway
CAR/R/1061452	NF 83220 74520	Sewage (Private) Primary	Tynecastle, STE to soakaway, Grenitote, Isle of North Uist	Close soakaway
CAR/R/1044533	NF 85051 73836	Sewage (Private) Primary	4A Ahmor, STE to soakaway, Isle of North Uist	Close soakaway
CAR/R/1020136	NF 85332 73981	Sewage (Private) Primary	4 Ahmore, STE to Soakaway, Lochmaddy, Isle of North Uist	Close soakaway
CAR/R/1057574	NF 85550 74080	Sewage (Private) Primary	Newhouse, STE to soakaway, Lochmaddy, Isle of North Uist	Close soakaway
CAR/R/1017597	NF 85810 74020	Sewage (Private) Primary	2 Ahmor, STE to Land, Lochmaddy, Isle of North Uist	Close soakaway
CAR/R/1015995	NF 85910 74100	Sewage (Private) Primary	Orisaigh, 2 Ahmor, Isle of North Uist - STE to Land	Close soakaway
CAR/R/1049524	NF 87400 75110	Sewage (Private) Primary	8 Clachan Sands, STE to soakaway, Isle of North Uist	Close soakaway
CAR/R/1056584	NF 87820 75460	Sewage (Private) Primary	7 Clachan Sands, STE to Soakaway, Isle of North Uist	Far soakaway
CAR/R/1059542	NF 87880 75810	Sewage (Private) Primary	2 Clachan Sands, STE to Soakaway, Isle of North Uist	Far soakaway
CAR/R/1018968	NF 87950 75890	Sewage (Private) Primary	New dwelling, 2/3 Clachan Sands, STE to land, Isle of North Uist	Far soakaway
CAR/R/1059583	NF 88003 75903	Sewage (Private) Primary	Cnoc An Duin, STE to soakaway, Clachan Sands, Isle Of North Uist	Far soakaway
CAR/R/1015348	NF 88189 76108	Sewage (Private) Primary	Goulaby, Clachan Farm, Isle of North Uist, STE to land	Far soakaway
CAR/R/1050639	NF 88390 76410	Sewage (Private) Primary	Clachan Farm, STE to soakaway, Clachan Sands, Isle of North Uist	Far soakaway

<b>Consent No.</b>	<b>NGR of discharge</b>	<b>Discharge Type</b>	<b>Discharges to</b>	<b>Near or Far Soakaway</b>
CAR/R/1061450	NF 88864 76704	Sewage (Private) Primary	2A Newton, STE to soakaway, Lochmaddy, Isle of North Uist	Far soakaway
CAR/R/1060094	NF 88910 76960	Sewage (Private) Primary	2 Newton, STE to land, Isle of North Uist	Far soakaway