Scottish Sanitary Survey Project

Restricted Sanitary Survey Report

Baleshare

UB 492

March 2010

Report Distribution – Baleshare

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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 in undertaken by the relevant local authority.

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1. Area Overview

Baleshare is located in North Uist in the Western Isles, Scotland (see Figure 1.1). The Baleshare production area is an inter tidal zone between the Isle of Baleshare on the west and North Uist and the Carinish peninsula on the east. It stretches down to the Beul au Toim inlet. The area is approximately 2.5 km by 1.6 km at its widest points. Baleshare is an inter tidal zone with depths of up to 2 m depending on tidal state and location. A restricted sanitary survey at Baleshare was conducted in response to receipt of a full application to classify the area for commercial harvest of common cockles (*Cerostoderma edule*.).

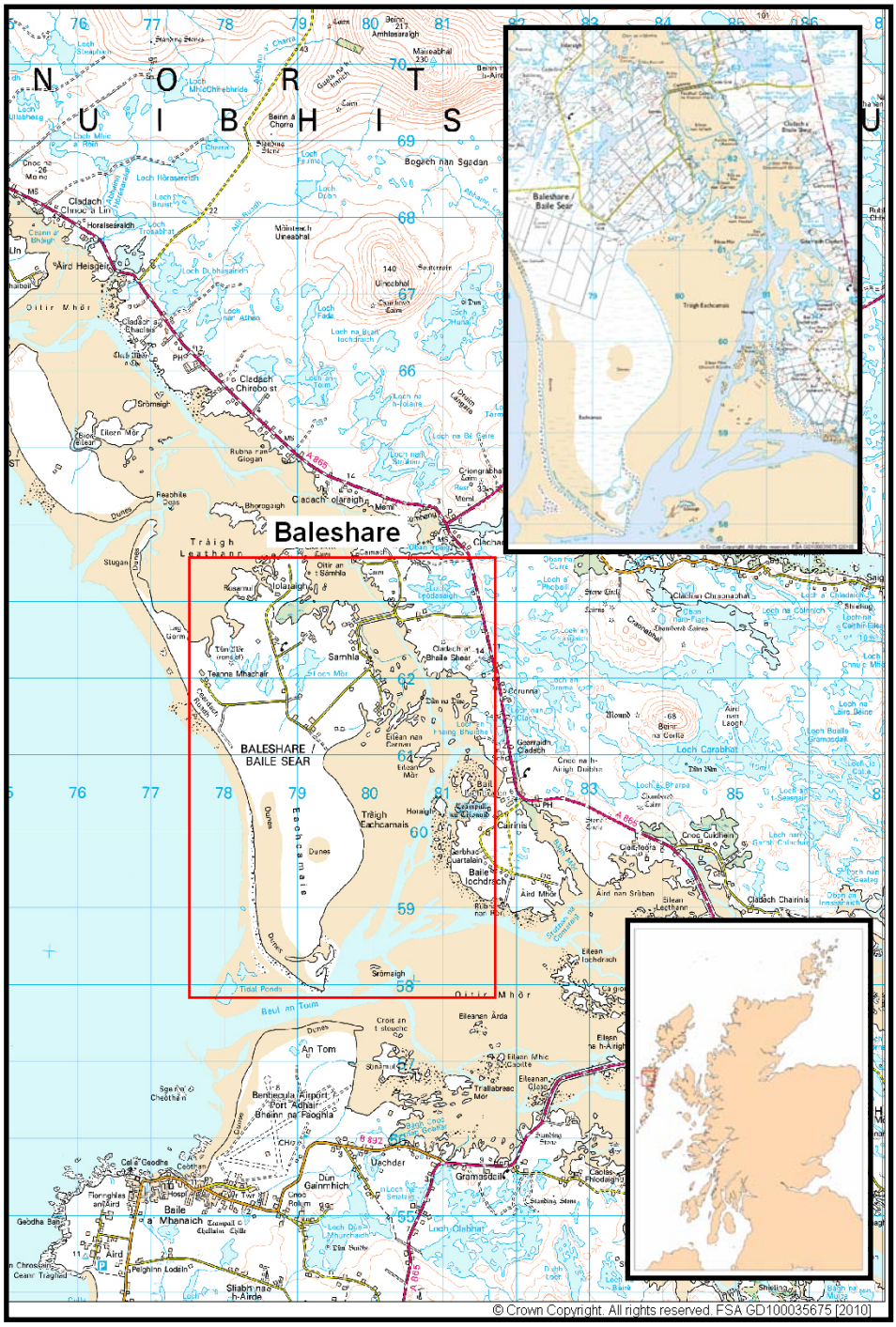

Figure 1.1 Location of Baleshare

1.1 Land Use

No Land Cover 2000 data was available for the Western Isles at the time of writing this report. Observations made during the shoreline survey indicated that the land surrounding Baleshare was mainly croft land that is used for grazing sheep and some cattle.

1.2 Human Population

Figure 1.2 shows the census output areas that are directly adjacent to Baleshare, from the 2001 census data obtained from the General Records Office. The majority of the surrounding human population is located in scattered dwellings. The largest settlement in the area is the village of Carinish (Cairinis), located towards the southeast corner of the site. This will be the largest potential source of human faecal contamination of the shellfishery. Benbecula Airport is located at the far southern end of the site and serves the islands of Benbecula, North and South Uist in the Western Isles of Scotland. The amount of traffic is relatively large considering the small population of the islands (32,692 passengers in 2009; source: Civil Aviation Authority). Several other smaller settlements have been labelled on the map in Figure 1.2.

This area of the Western Isles is a popular destination for outdoor pursuits and country sports and is visited by tourists daily. There is likely to be an increase in human presence during the summer months.

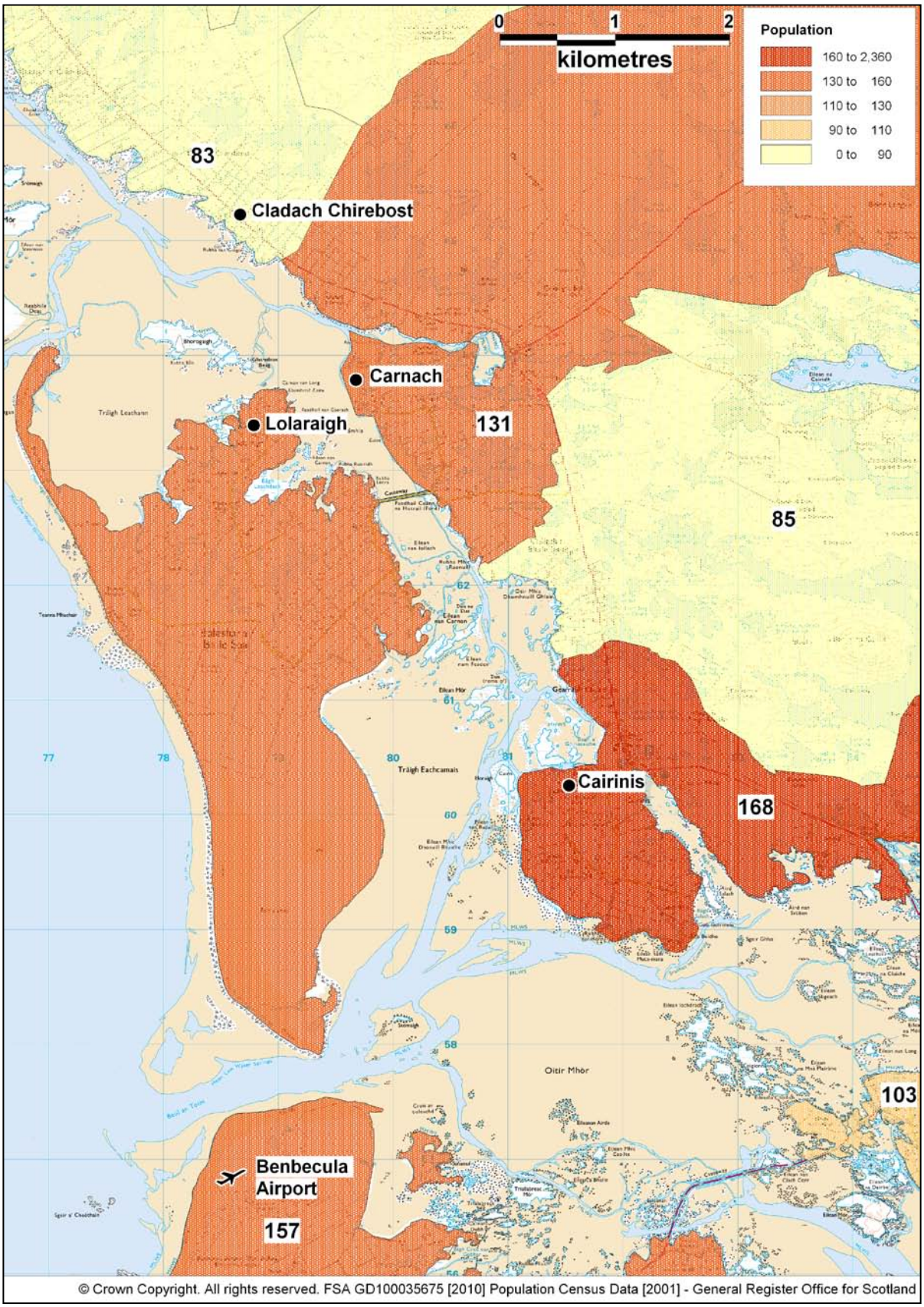

Figure 1.2 Human population surrounding Baleshare

2. Fishery

The fishery at Baleshare (UB 492 851 04) is comprised of a wild common cockle (*Cerostoderma edule*) bed.

The cockle bed was identified by the harvester on the classification application form as the sands at Traich Eachcamais, north of Beul an Toim (NF 800 580) and West of Eilean nan Carnan, Eilean Mor and Shoraidh (NF 810 600) (Figure 2.1).

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

The cockles will be hand raked and harvesting is planned to take place throughout the year.

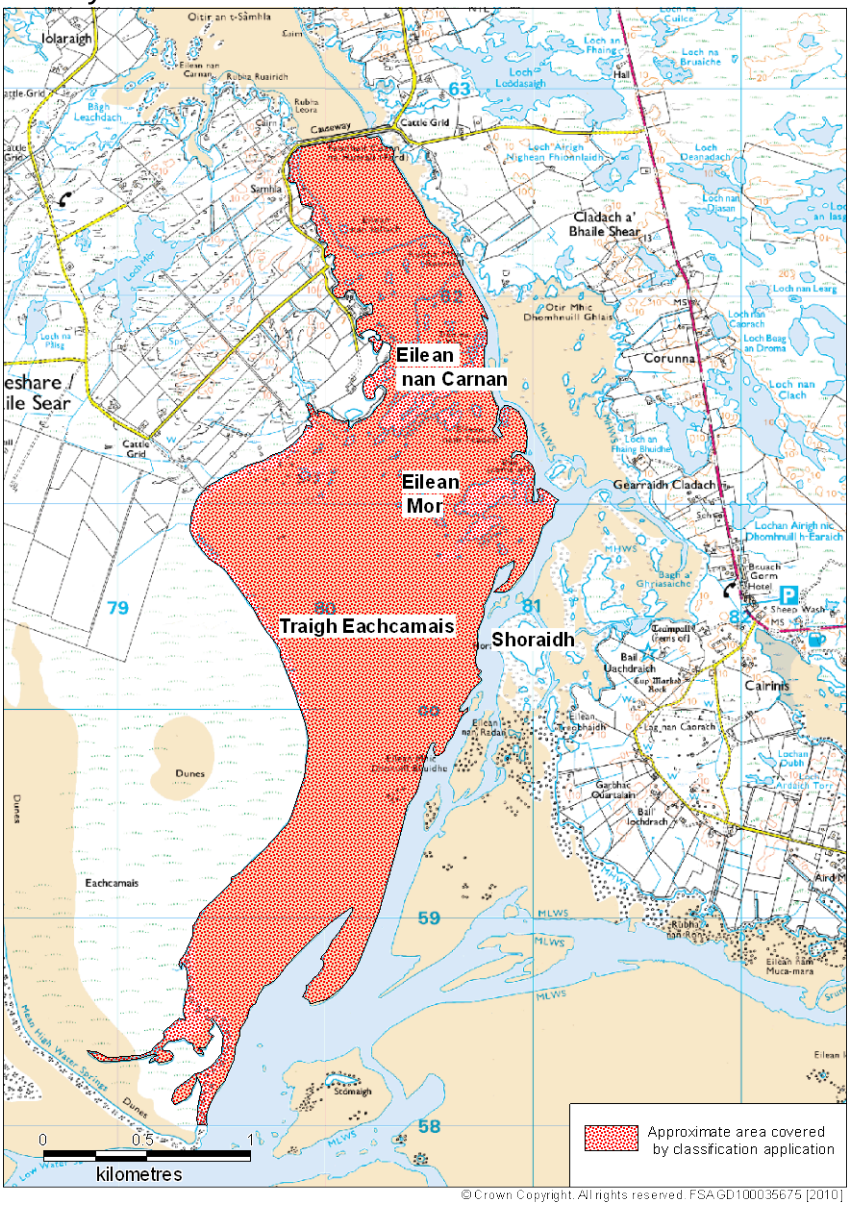

Figure 2.1 Baleshare fishery

3. Sewage Discharges

A large number of discharge consents were provided by SEPA for the area surrounding Baleshare. The majority of these discharge consents were identified as sewage (private) primary (i.e. septic tanks) going to soakaway. In Figure 3.1 the discharge consents have been thematically mapped to identify those not going to soakaway, soakaways within 400 m of MHWS and soakaways >400 m from MHWS. Details of those not going to soakaway are listed in Table 3.1. Those going to soakaway are listed in Appendix 4. At the time of writing this report, SEPA had not provided data concerning the consented/design PE or the consented flow m^3/day for any of the discharge consents.

Table 3.1 SEPA discharge consents – sewage (private) primary

Consent No.	NGR of discharge	Discharge Type	Discharges to
CAR/R/1060005	NF 81669 59513	Continuous	Beul an Toim, Isle of North Uist
CAR/R/1045267	NF 82140 60270	Continuous	Bagh Mor, Carinish,
CAR/R/1040334	NF 78581 62666	Continuous	Unknown watercourse
CAR/R/1045853	NF 79620 62660	Continuous	Sound of Monach, Isle of North Uist
CAR/R/1057691	NF 79990 62140	Continuous	Unknown coastal Waters, Isle of North Uist
CAR/R/1059619	NF 79959 62320	Continuous	Sound of Monach, Isle of North Uist
CAR/R/1059912	NF 79750 62890	Continuous	Sound of Monach, Baleshare, Isle of North Uist
CAR/R/1055686	NF 80750 62900	Continuous	Loch Leodasaigh, Isle of North Uist
CAR/R/1066345	NF 80139 63837	Continuous	Sound of Monach, Isle of North Uist
CAR/R/1076951	NF 81421 61987	Continuous	Otir Mhic Dhomhnuill Ghlais, Baleshare
CAR/R/1041229	NF 81703 61880	Continuous	Unknown watercourse, Claddach Baleshare, Isle Of North Uist
CAR/R/1061837	NF 81740 61480	Continuous	Loch Fhaing Bhuidhe, Isle of North Uist
CAR/L/1080277	NF 8181 6075	Continuous	Not provided
CAR/L/1080262	NF 8176 6068	Continuous	Not provided
CAR/L/1080275	NF 8196 6054	Continuous	Not provided

Three community septic tank discharges were identified by Scottish Water for the area adjacent to Baleshare. These are detailed in Table 3.2 and mapped in Figure 3.1.

Table 3.2 Discharges identified by Scottish Water

Consent No.	Discharge Name	NGR of discharge	Discharge Type	Level of Treatment	Consented/ design PE	Consented flow m^3/day
CAR/L/1080277	Cairinish A Primary School Thoraigdh	NF 8184 6077	Continuous	Septic tank	180	13.5
CAR/L/1080262	Cairinish B Trianiadh Bruach Gor	NF 8180 6070	Continuous	Septic tank	100	7.5
CAR/L/1080275	Cairinish C Carabhat	NF 8180 6070	Continuous	Septic tank	88	6.6

No sanitary or microbiological data were available for these discharges. SEPA did not provide information on the discharge consents for these septic tanks. Two of the septic tanks, Cairinish B and Cairinish C relate to the same grid reference; however SEPA has identified that they do not share an outfall pipe.

A septic tank associated with a hotel was also observed during the shoreline survey and this is listed in Table 3.3. The location has been included in the mapped discharges in Figure 3.1. Further details can be found in the shoreline survey report in the appendix.

Table 3.3 Observation of potential sewage discharge

No	Date	NGR	Description of potential sewage discharge
1	16/03/2010	NF 81970 60710	Septic tank

Despite the relatively low population density in the area as a whole, there are a large number of sewage discharges in the area, although most serve individual dwellings and many run to soakaway. A number of those that discharge into, or near, the coastline, may cause localised deterioration in water quality. Three relatively large discharges (considering the population density in the area) are located in the vicinity of Carinish (see Table 3.2) and these would provide a significant potential source of contamination of the shellfishery.

Due to the physical barrier imposed by the causeway, discharges located to the north of it should not have any effect on the water quality in the vicinity of the Baleshare fishery.

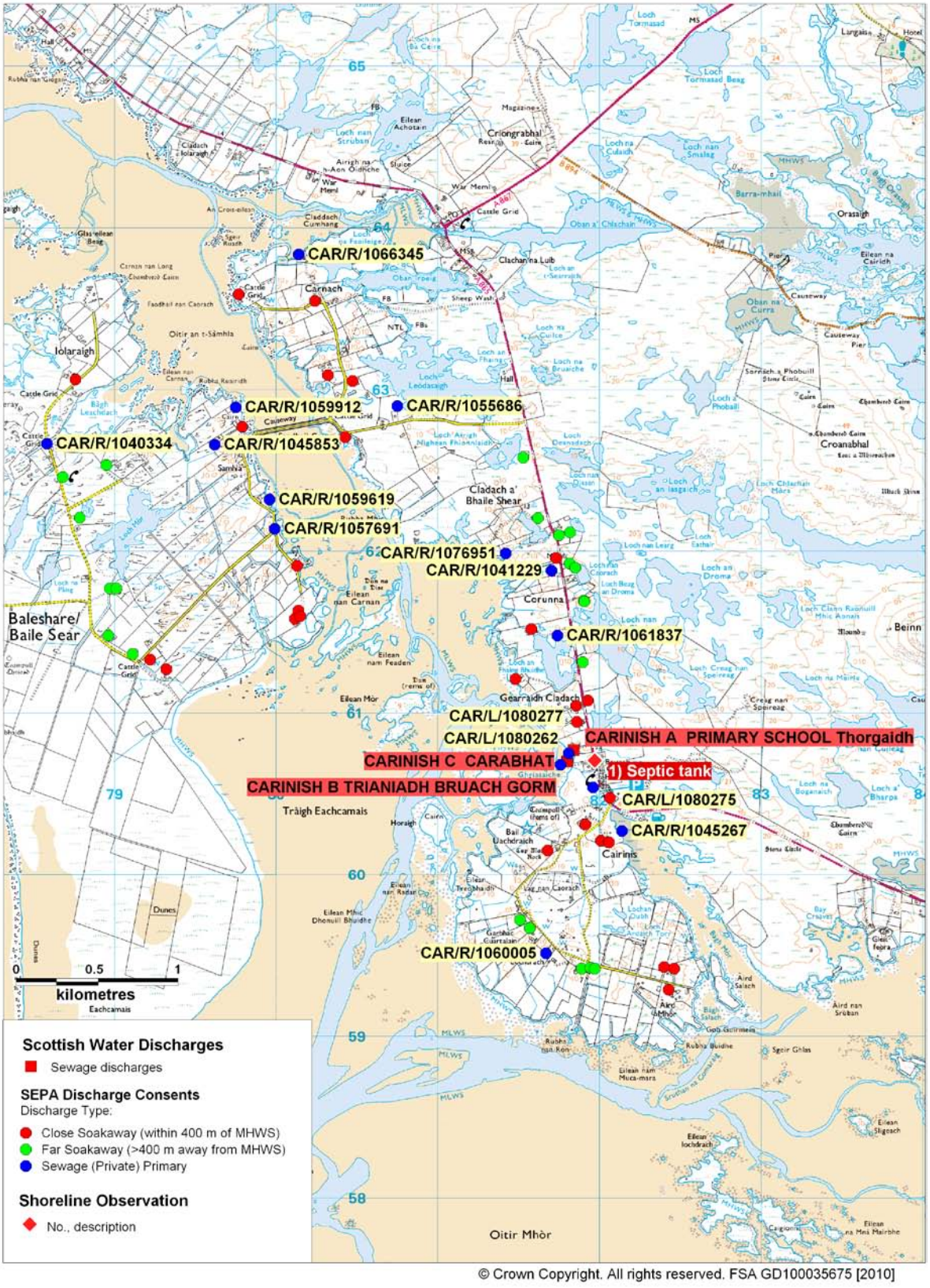

Figure 3.1 Sewage discharges at Baleshare

4. Animals

4.1 Livestock

Both sheep and cattle are raised through crofting on North Uist (Encyclopaedia Britannica online). Livestock are raised on communal grazing areas, including on machair (sandy grassland). An agricultural show, including livestock, is held on the island in late July/early August each year.

However, the only significant source of information concerning livestock numbers in the area surrounding Baleshare was the shoreline survey. The shoreline survey relates to the time of the site visits on the 16th March 2010 so caution should be used in interpreting these data as animals are likely to move about the area ofer time and some animals may have been obscured by the terrain.

On the western shoreline, approximately 170 sheep were observed grazing on land close to the shore, and sheep droppings were observed along the shoreline. There was one farm observed on the western shore nearby the sheep grazing fields.

On the eastern shore, more sheep droppings were observed along the shoreline. In addition, two pigs were observed near a farm close to Carinish, and three horses further south.

On the basis of these observations, the risk of contamination of the shellfishery from livestock sources will be greatest around the north-western shore of the Tràigh Eachcamais area.

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 also 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 gulls, oyster catchers, ducks, and geese were observed on and around the Baleshare production area (see Figure 4.1). 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 during other times of the year. 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 north-western shore of the Tràigh Eachcamais area. However, this does not provide information as to whether this difference in bird density applies more generally than just at the time of the survey.

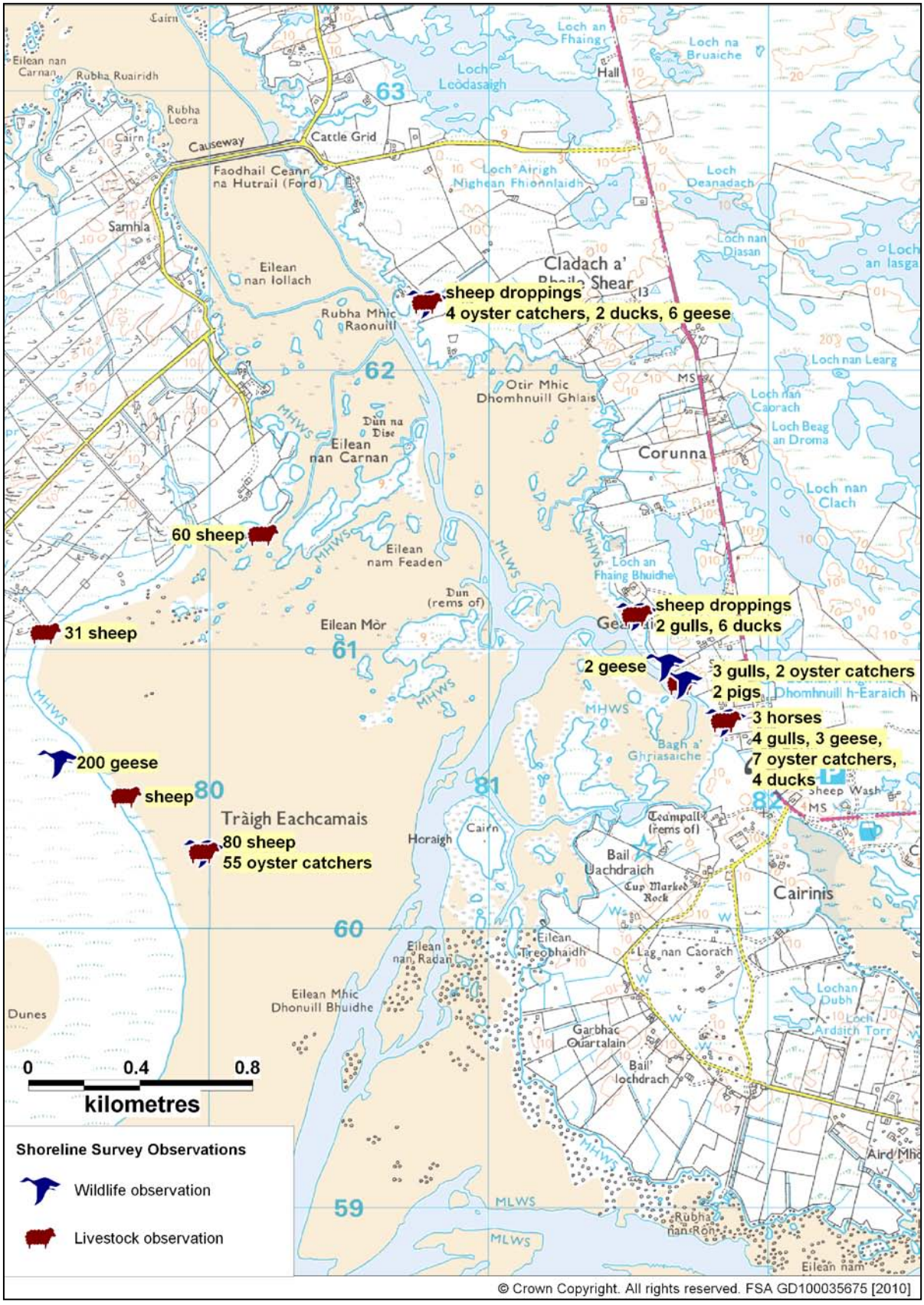

Figure 4.1 Livestock and wildlife present at Baleshare during the shoreline survey

5. Rainfall

The nearest weather station is located at North Uist: Cllachan na Luib which is approximately 3.6 km north of Baleshare. 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. Due to the close proximity of the weather station to Baleshare, rainfall recorded here is likely to be very similar to that experienced in the bay and the surrounding land.

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 marked as 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 '*'.

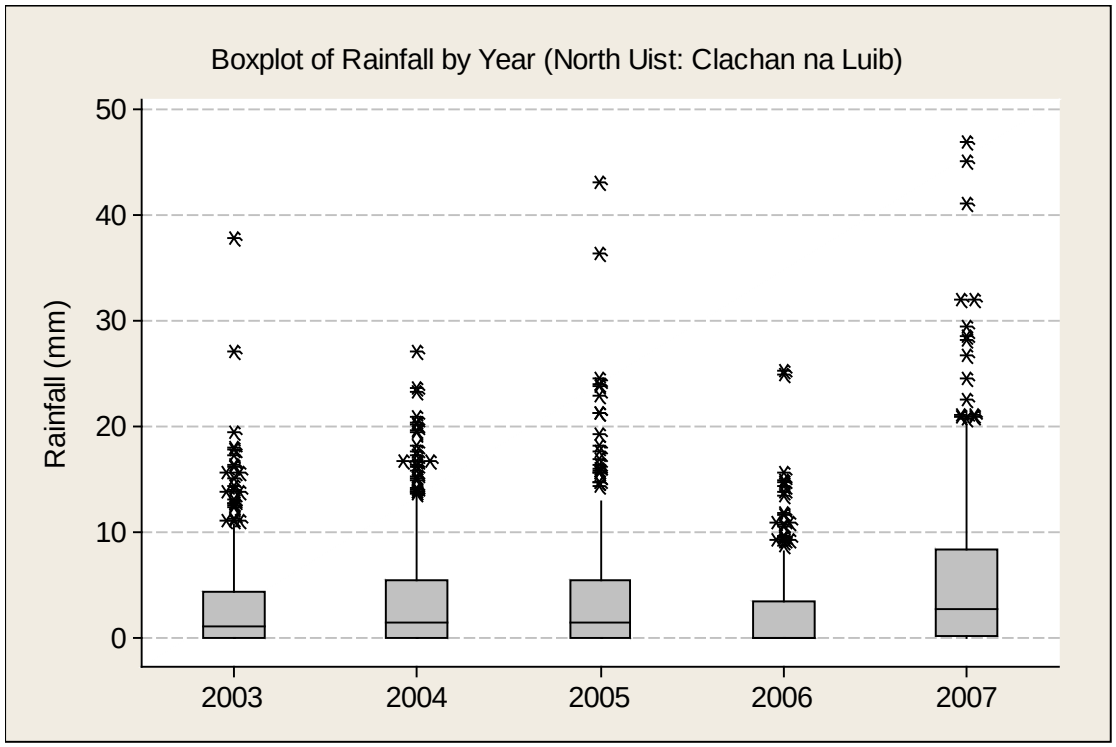

Figure 5.1 Boxplot of daily rainfall at North Uist by year

Figure 5.1 shows that there was significant variation in the median daily rainfall from year to year. Overall, 2006 was a dry year in this area and saw the lowest median rainfall. The highest individual rainfall events occurred in 2005 and 2007.

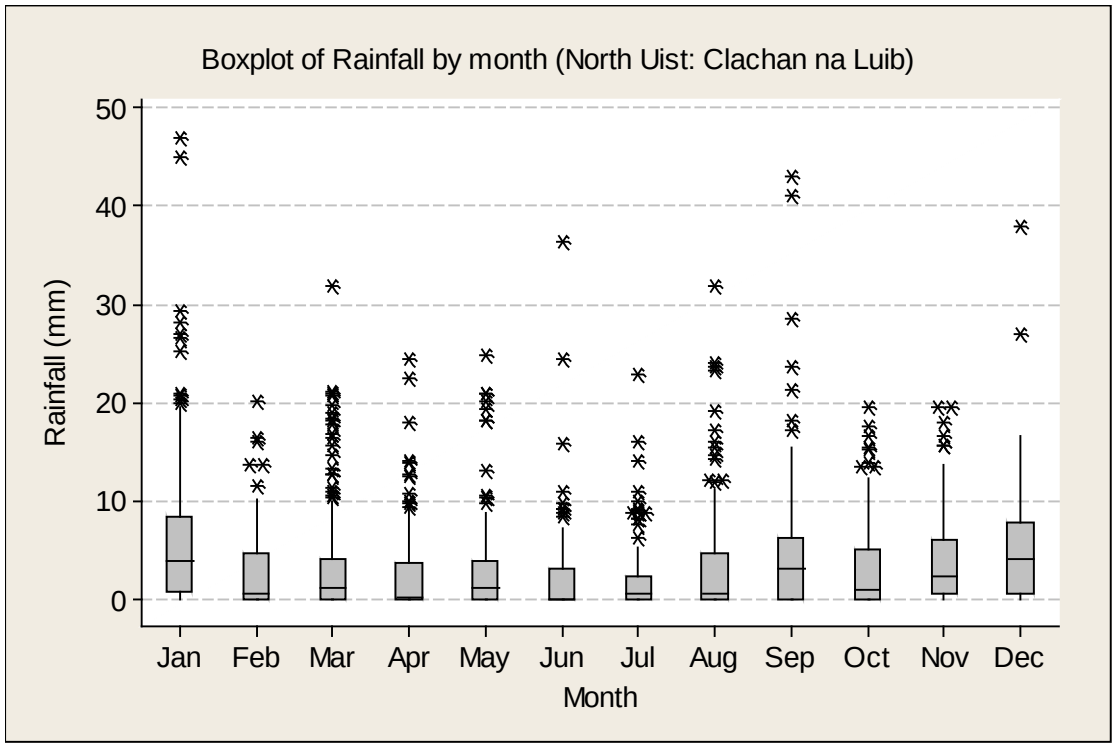

Figure 5.2 Boxplot of daily rainfall values at North Uist by month

The wettest months were December and January, but the 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

There are no river gauging stations in the vicinity of Baleshare. A total of six watercourses were observed discharging into the area. These represented the largest freshwater inputs to the area and are listed in Table 6.1 and mapped in Figure 6.1. There was some light rain on the day of the survey but none in the previous week.

Table 6.1 Stream flow and *E. coli* concentrations – Baleshare

No	Grid Ref	Description	*E. coli* (cfu/ 100 ml)
1	NF81965 60753	Stream	NA
2	NF 81851 60742	Stream	<100
3	NF 81423 61582	Stream	<100
4	NF 80780 62240	Stream	<100
5	NF 79457 60593	Stream	<100
6	NF79952 61395	Stream	200

At the time of the shoreline survey, there were six streams flowing. Water samples were taken from all but one of these streams. The four streams located on the southwest side of the site each gave a result of <100 *E. coli* cfu/100ml. The stream located on the north-west side of Tràigh Eachcamais yielded a result of 200 *E. coli*/100 ml. *E. coli* contamination of these watercourses was therefore low on the day of the survey. It would be expected that levels of faecal contamination in the streams would increase significantly after more extensive rainfall.

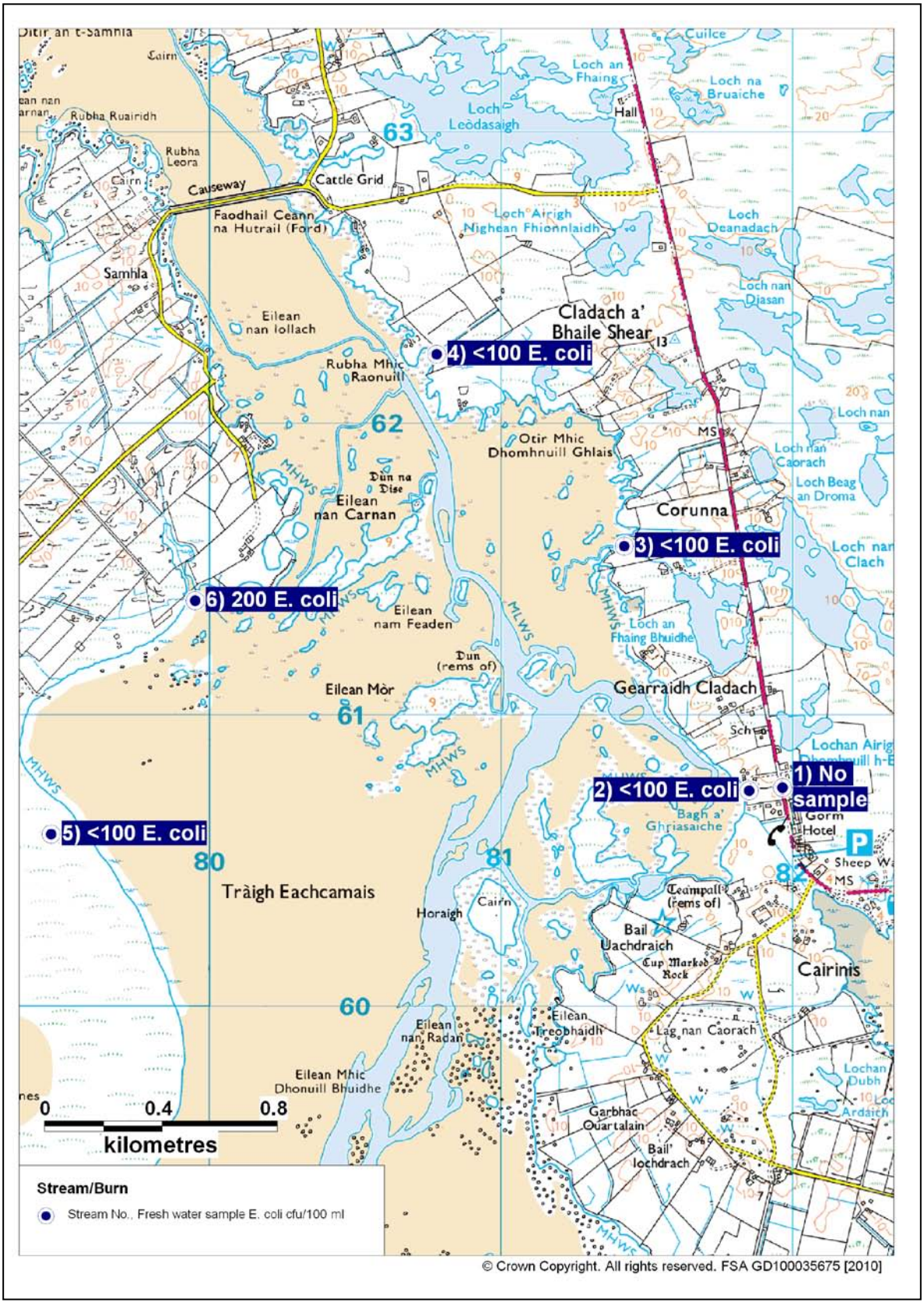

Figure 6.1. Location of streams and fresh water sample results at Baleshare

7. Historical *E. coli* Monitoring Data

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

8. Bathymetry and Hydrodynamics

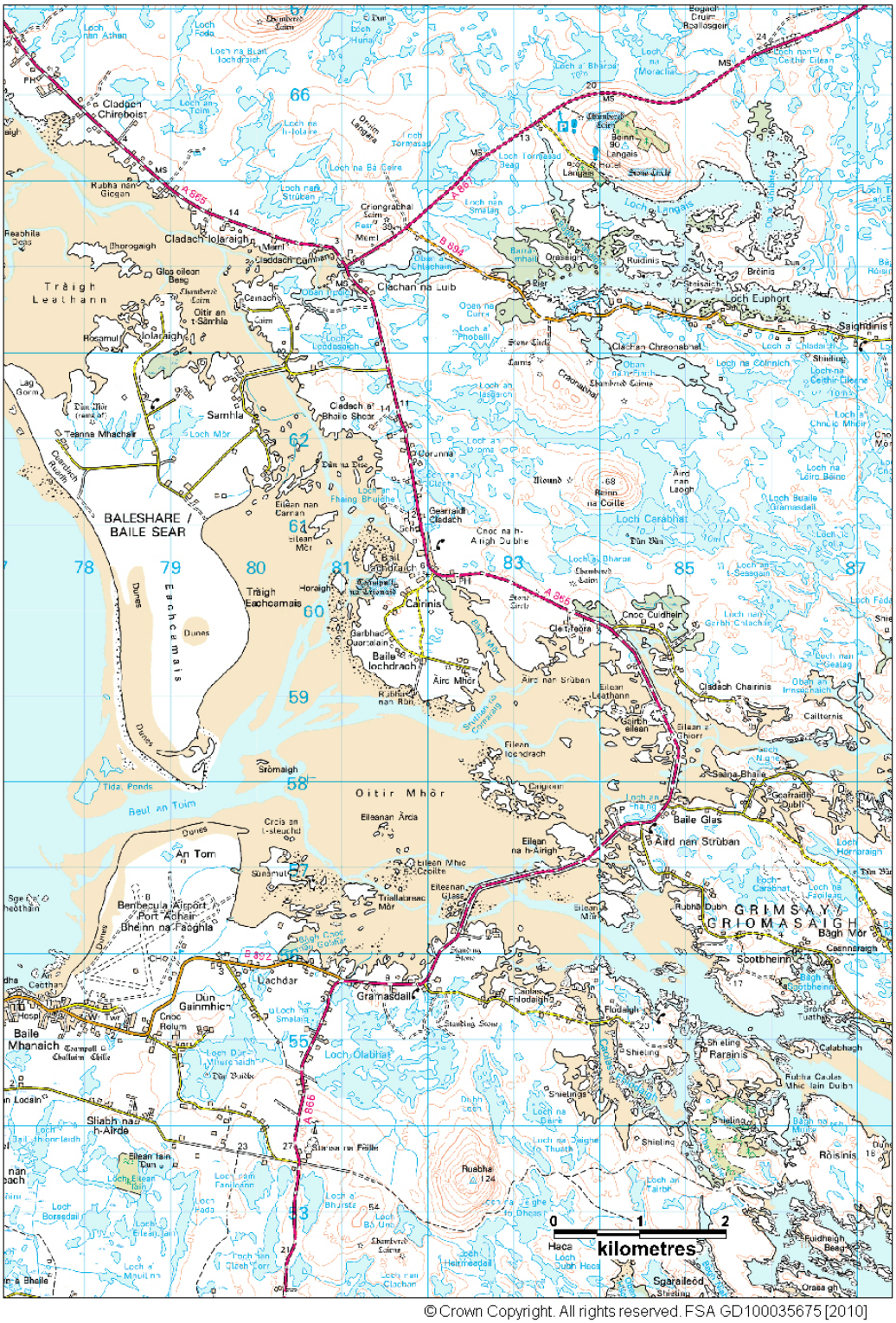

Figure 8.1 Baleshare bathymetry chart and OS map

Electronic hydrographic data was not available for the North Baleshare area. The Ordnance Survey map shows that much of the area is intertidal with shallow subtidal channels that connect to the sea via Beul au Toim to the south of Baleshare (see Figure 8.1) and it is shown as a drying area on Admiralty charts.

There is also a connections to the sea on the east side of North Uist, via the channels between there and Grimsay, and between Grimsay and Benbecula. Charts also show that, with distance from the coastline of Baleshare island, the depth increases from a drying area to depths of up to 50 m.

The causeway between Baleshare and North Uist does not contain a bridge or pipe and so there is no seawater connection between the channels north and south of the causeway.

8.1 Tidal curve and description

The two tidal curves below are for the port of the Balivanich, the nearest secondary port. This is located approximately 1 km south-west of the western end of Beul au Toim and is thus relatively close to the fishery. The tidal curves were output from UKHO TotalTide. The first is for seven days beginning 00.00 GMT on 9th March 2010. The second is for seven days beginning 00.00 GMT on 16th March 2010. Together they show the predicted tidal heights over high/low water for a full neap/spring tidal cycle.

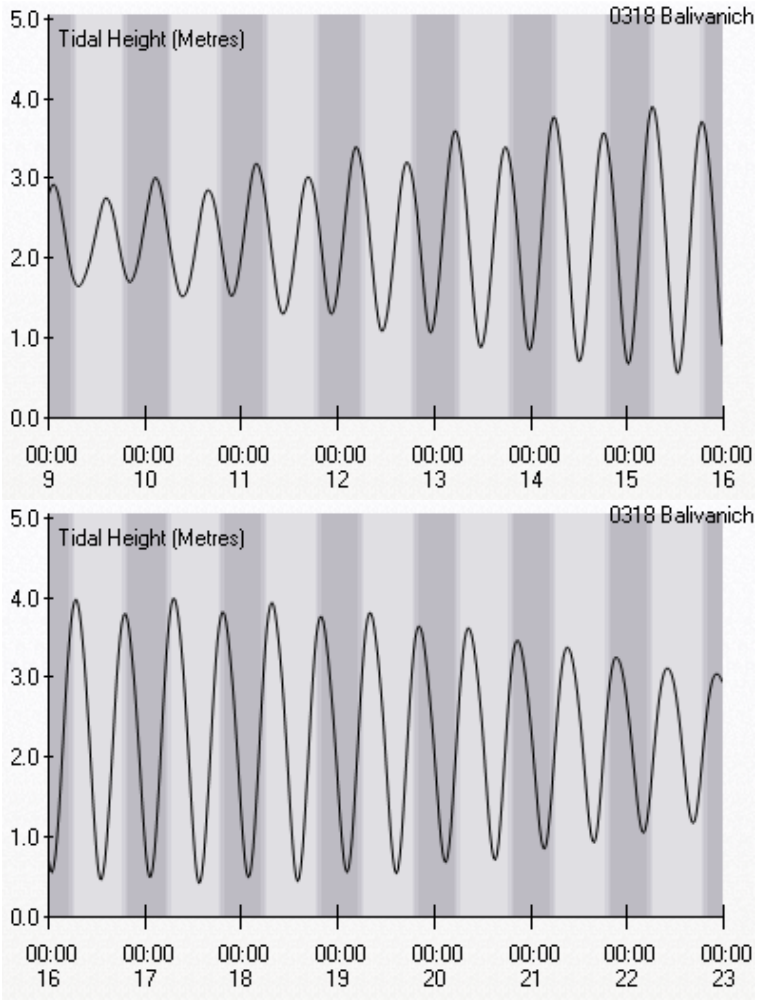

Figure 8.2 Tidal curves for Balivanich

The following is the UKHO summary description for Balivanich:

The tide type is Semi-Diurnal.

MHWS	4.1 m
MHWN	3.1 m
MLWN	1.5 m
MLWS	0.5 m

Predicted heights are in metres above chart datum. The tidal range at spring tide is therefore approximately 3.6 m and at neap tide 1.6 m.

8.2 Currents

There is no Admiralty tidal flow information for points close to Baleshare. Scottish Sea Kayaking (Cooper and Reid, 2005) indicates that the average spring flows to the west of Baleshare are of the order of 2 knots (approximately 1 m/s) with the northerly flood occurring approximately 4 h 30 m before HW Ullapool and the southerly ebb tide occurring approximately 1 h 55 m after HW Ullapool. Average neap flows will be approximately half of this.

Flows in the area of the fishery will differ from this due to the constriction at Beul au Toim with the large intertidal area behind. No information was available on this. However, on the flood tide, water will enter through Beul au Toim and flood over the intertidal areas from the shallow channels. The reverse will occur on the ebb tide. Any contamination arising from sources at the lower end of the area will tend to be taken over the respective side of the fishery on the incoming tide and then, combined with any arising from sources towards the causeway, back out over the fishery on the outgoing tide. In general, contamination impacting on the area of the fishery shown in Figure 2.1 would be expected to principally arise from sources on Baleshare itself, or possibly from sources outside of Beul au Toim on the flooding tide. The eastern side of the fishery may be impacted by contamination arising from sources on North Uist and Cairinish on the ebbing tide. This would include the community discharges at Cairinish. Sources to the north of the Baleshare causeway will not affect the microbiological quality of the fishery at Traich Eachcamais due to the physical barrier of the causeway itself.

Tidal flows moving in via Beul au Toim towards the Benbecula - Grimsay and Grimsay - North Uist causeways will meet the incoming tide from the other direction near those causeways. However, where this meeting point occurs will depend upon tidal state and prevailing weather conditions at the time.

8.3 Conclusions

Dilution of contamination within the area will tend to be low due to the shallow depths. The currents over Traich Eachcamais will generally mean that sources along on the western shore will be of most immediate local importance although the Cairinish community discharges may impact on the eastern edge of the fishery on the ebb tide. It is unlikely that significant contamination will arise from the restricted flows through the Benbecula - Grimsay and Grimsay - North Uist causeways.

9. Shoreline Survey Overview

A restricted shoreline survey of the Baleshare shoreline was undertaken by staff from Comhairle nan Eilean Siar Council on the 16th March 2010.

Only one septic tank was seen during the shoreline survey. The community discharges were not located. Approximately 170 sheep were observed grazing on land close to the shore on the western shoreline. There is also a farm located on the western shore close to the grazing sheep. Near Cairinis, two pigs and three horses were observed.

Sub surface sea water samples were taken from four points within the shellfish bed area. One sample was taken from the northern end of the bed, next to the causeway and returned a result of 0 *E. coli* cfu/100 ml. The other three samples taken from the eastern and southern coastline all had results of 2 *E. coli* cfu/100 ml.

Fresh water samples were taken all along the coastline of Baleshare at any streams or burns flowing at the time of the shoreline survey. From the five fresh water samples taken from streams or burns, four had results of <100 *E. coli* cfu/100 ml and one sample, taken from the western shoreline of the site had a result of 200 *E. coli* cfu/100 ml.

A single common cockle sample was collected from the eastern side of the Baleshare shellfish bed. The cockle sample had a result of 20 *E. coli* MPN/100 g. This sample was taken outwith the bed identified by the harvester.

A map is provided in Figure 9.1 that shows the relative locations of the most significant findings of the shoreline survey.

In summary, identified sources of potentially significant contamination were:

- Contaminated freshwater streams flowing into both sides of the Baleshare site
- Livestock grazing on the shoreline

However, only one of the many potential sources of sewage contamination in the area was located during the survey.

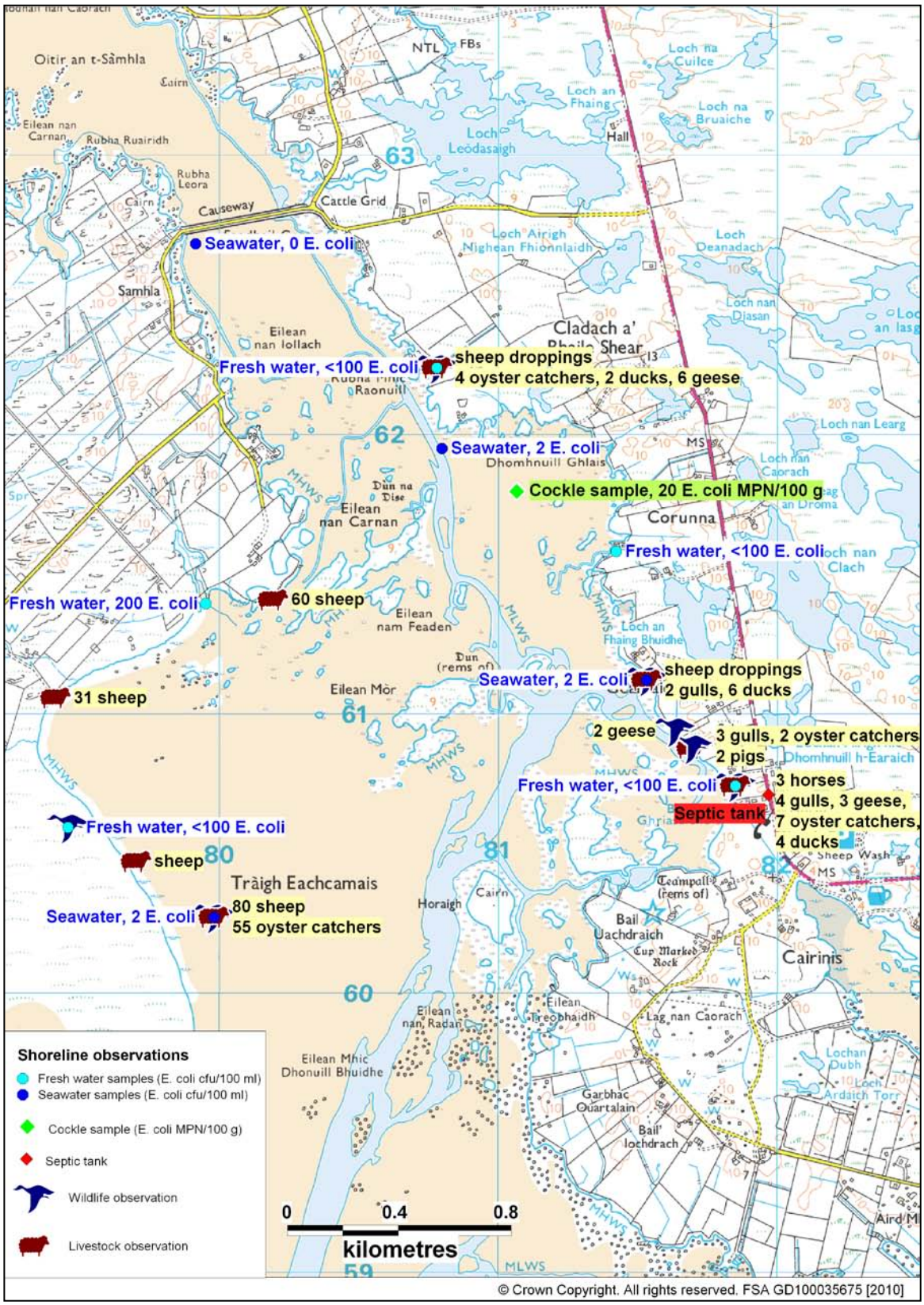

Figure 9.1 Summary of shoreline observations

10. Overall Assessment

Fishery

The cockle bed was identified by the harvester on the classification application form as the sands at Traich Eachcamais, north of Beul an Toim (NF 800 580) and West of Eilean nan Carnan, Eilean Mor and Shoraidh (NF 810 600). The common cockle bed was found to extend beyond the area identified by the harvester, to include the sands east of Eilean nan Carnan, which is where the shoreline survey sample was collected. 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 Baleshare. The majority of these discharge consents are soakways, 27 out of 49 soakaways are within 400 m of the shoreline and could therefore have the potential to impact the fishery. There are also 12 private septic tank discharges to the sea. The majority (10 out of 12) of the private primary sewage (septic tank) discharges are located north of Eilean Mor.

Scottish Water identified three large community sewage discharges on the Isle of Carinish, located at the southeastern end of the Baleshare site. During the shoreline survey, a septic tank was also observed in the same area.

Any impact from sewage inputs will be likely to be greatest on the northern shoreline up to the causeway and the eastern shoreline down to Cairinis, as this is where the majority of the private septic tank discharges and Scottish Water discharges are located. Discharges located to the north of the Baleshare causeway will not impact on the fishery due to the physical barrier that it provides.

Agricultural inputs

During the shoreline survey a large number of sheep (approximately 170 in total) were seen grazing along the western shoreline. Sheep droppings were also observed all along this shore. There was little livestock on the eastern shoreline and only two pigs and three horses were observed, although sheep droppings were present. Often the sheep were close and/or had access to the shoreline and were close to fresh water inputs. Due to the close proximity of the livestock to the shoreline and fresh water inputs, agricultural sources may be a significant source of contamination to the area. The western shoreline of the shellfish bed had the largest concentration of livestock, so this side of the shellfish bed is likely to experience the largest amount of contamination.

Wildlife inputs

During the shoreline survey approximately 9 gulls, 68 oyster catchers, 209 geese and 12 ducks were observed on and around the Baleshare site. The birds were mainly located on the western side of the fishery.

Rivers and streams

A total of six watercourses were discharging into Baleshare at the time of the shoreline survey. Out of the five streams sampled four had results of <100 *E. coli* cfu/100 ml and one sample, taken from the western shoreline of the site had a result of 200 *E. coli* cfu/100 ml.

Rainfall

Rainfall patterns at North Uist: Cllachan na Luib (the nearest rainfall station) show that seasonal variation in rainfall levels occurs and the wettest months were December and January. 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 Baleshare.

During the shoreline survey a single common cockle sample was collected from the sands east of the identified Baleshare shellfish bed. The cockle sample had a low result of 20 *E. coli* MPN/100 g.

Seawater samples were taken from four points within the shellfish bed, all of which returned low results of <2 *E. coli* cfu/100 ml.

Movement of contaminants

Dilution of contamination within the area will be low due to the shallow depths. Sources along on the western shore will be of most immediate local importance on the flooding tide although the Cairinish community discharges may impact on the eastern edge of the fishery on the ebb tide.

Overall conclusions

Despite the significant number of sewage discharges in the area, the main source of contamination of the fishery is likely to be farm animals and wild birds on the western side of the fishery.

11. Recommendations

Production area

The recommended production area is as follows: Area bounded by lines drawn between NF 7937 5793 and NF 8000 5822 and between NF 8000 5822 and NF 8137 6148 and extending to MHWS.

This covers the entire area included in the classification application but excludes areas of potentially greater contamination to the east of this.

RMP

The recommended location is at NF 8000 6085. This is in the area expected to experience the most consistently high levels of contamination in the area potentially impacted by animal contamination and streams.

Tolerance

The recommended tolerance is 100 m. This should allow sufficient stock to be collected for testing, given the potential for variability in occurrence and density of wild stocks, while ensuring that sampling takes place sufficiently close to the intended location.

Frequency

Given that there is no historical data for the area, it is recommended that sampling be undertaken monthly until sufficient data has been obtained for review.

The recommendations are summarised in Figure 11.1 and also presented in Appendices 1 and 2.

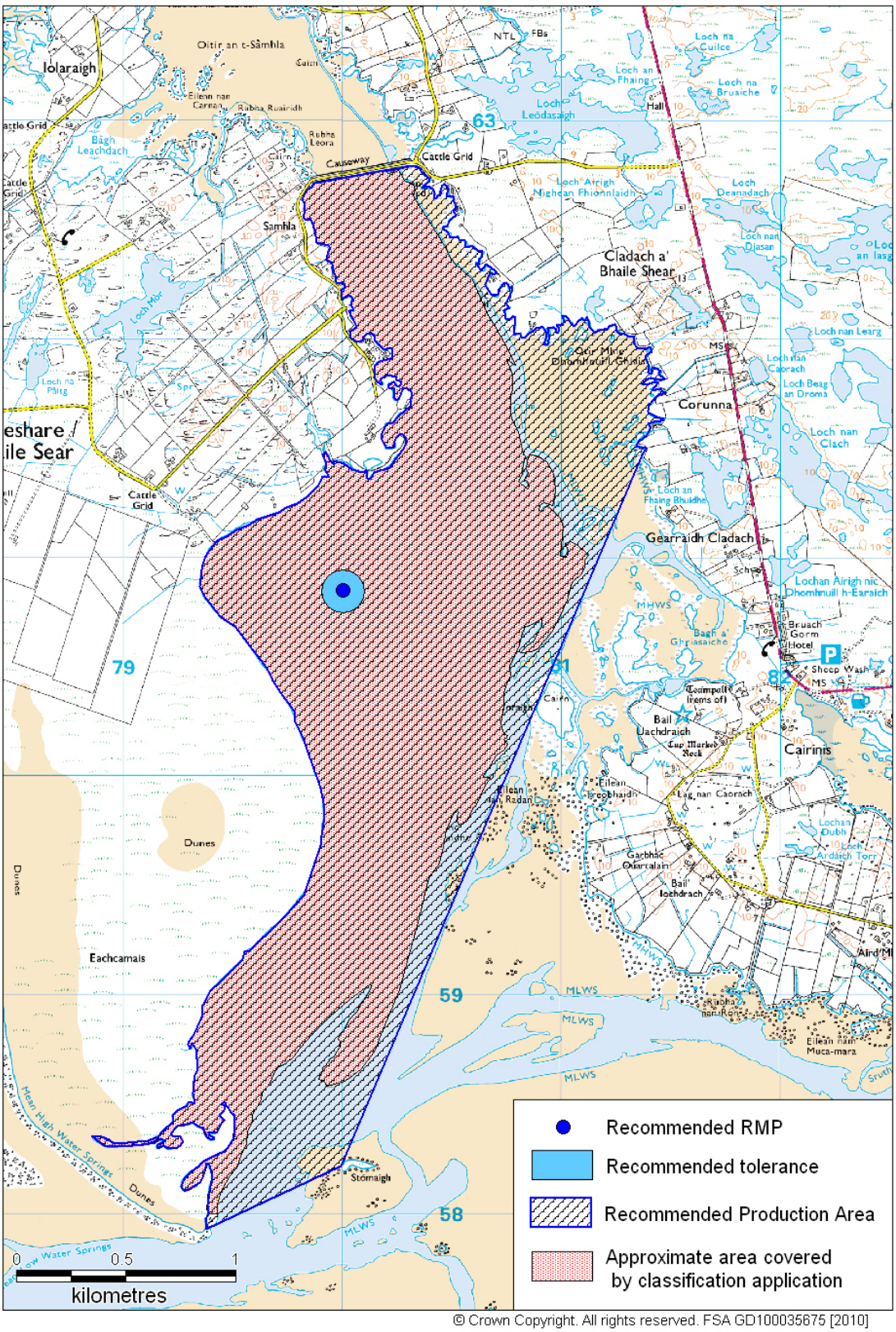

Figure 11.1 Baleshare recommendations

12. References

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Mallin, M.A., Ensign, S.H., McIver, 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.

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4. **SEPA Discharge consents - Soakaways**

Sampling Plan for Baleshare

PRODUC-TION 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
Baleshare	Traigh Eachcamais	UB 492 851 04	Common cockles	Wild	NF 8000 6085	80000	860850	100	N/A	Hand raked	Monthly	CnES	Samantha Muir	Samantha Muir

Comparative Table of Boundaries and RMPs – Baleshare

Production Area	Species	SIN	Existing Boundary	Existing RMP	New Boundary	New RMP	Comments
Baleshare	Common cockles	UB 492 851 04	N/A	N/A	Area bounded by lines drawn between NF 7937 5793 and NF 8000 5822 and between NF 8000 5822 and NF 8137 6148 and extending to MHWS.	NF 8000 6085	New production area and RMP

Shoreline Survey Report

Baleshare
UB 492

Restricted Sanitary Survey

Scottish Sanitary Survey Project

Shoreline Survey Report

Production area:	Baleshare
Site name:	Traigh Eachcamais
Species:	Cockles (*Cerastoderma edule*.)
Harvester:	Duncan MacInnes
Local Authority:	CNES
Status:	New Site
Date Surveyed:	Tuesday 16th March 2010
Surveyed by:	Samantha Muir Matt MacDonald
Existing RMP:	NA
Area Surveyed:	See Figure 1.

Weather Observations

Tuesday 16th March:	Bright day with some sunshine, breezy ~ 20mph Little rain in early morning but none in the previous week.

Site Observations

Fishery

The Baleshare production area is harvested for common cockles (*Cerostoderma edule*). Cockles are hand raked within the Traigh Eachcamais site. The harvesters plan to harvest the cockles all year round, although harvesting will be weather dependent.

Sewage/Faecal Sources

The largest settlement around the production area is the village Cairinis. There is a hotel here, with a septic tank nearby. Around the rest of the shoreline, human population is minimal, with only scattered dwellings around the production area. No other sources of sewage contamination were observed. There were several freshwater inputs from small streams, however all showed to have low *E. coli* counts.

Seasonal Population

The only hotel near to the shoreline is the Temple View Hotel, which is likely to have a higher occupancy during the summer months of June-September. There are no caravan parks or B&B's in the area.

Boats/Shipping

No boats were seen on the sea during the shoreline survey, one small boat was observed on the shore.

Land Use

The area surrounding the fisheries is mainly croft land, primarily used for grazing sheep and some cattle.

Livestock
During the shoreline survey approximately 171 sheep were observed on the western shore of the production area. 3 horses, 2 pigs and evidence of sheep grazing were observed on the eastern shore.

Wildlife/Birds
During the shoreline survey, gulls, oystercatchers, ducks, geese, and waterfowl droppings were observed on and around the shoreline.

Observations can be found in Table 1.

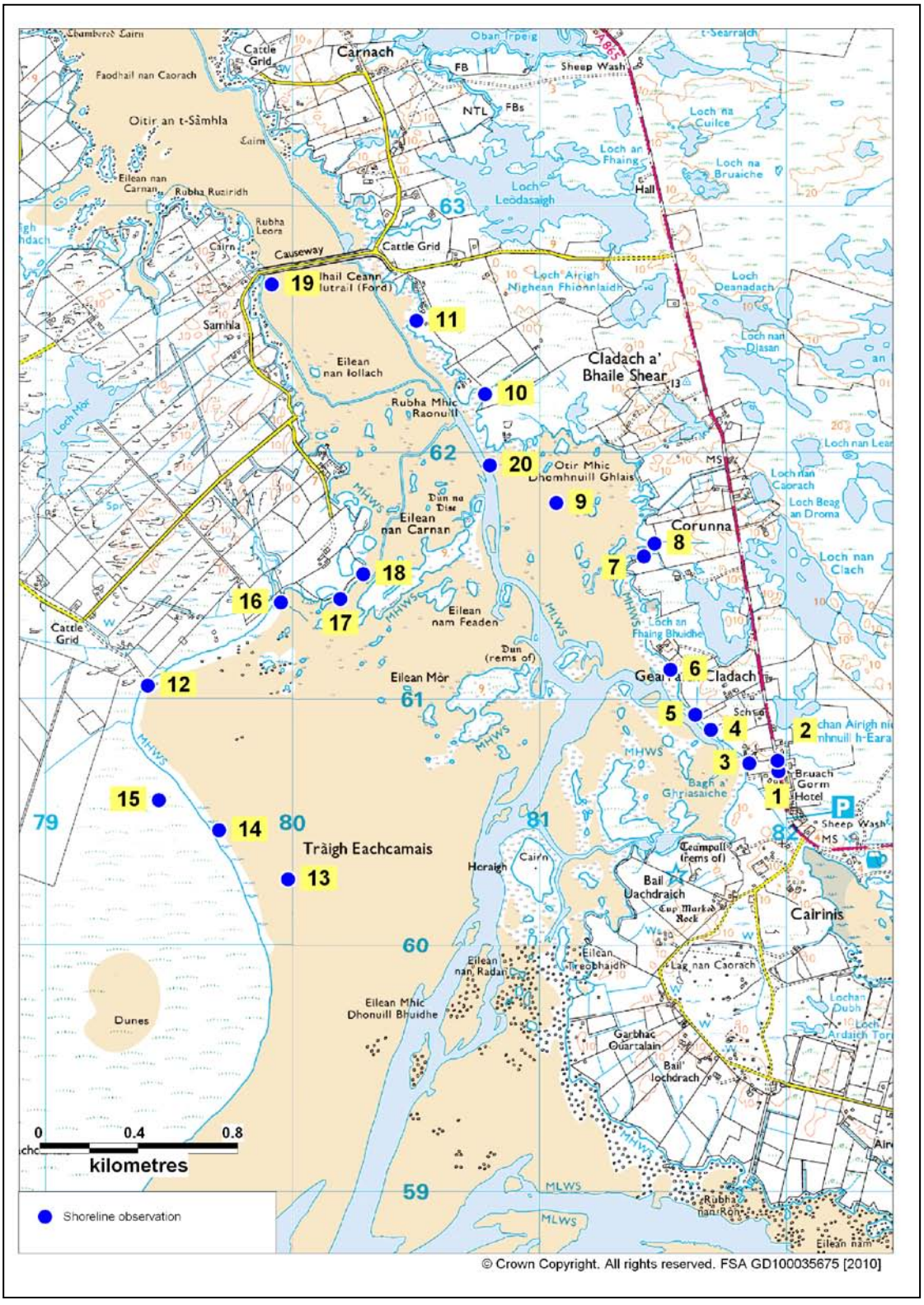

Figure 1. Shoreline observations

Table 1 Shoreline observations

No.	Date	Time	NGR	East	North	Associated photograph	Description
1	16/03/2010	09:00	NF 81970 60710	81970	860710	Figure 4	Start walk at Temple View hotel. Small township. Septic tank at road.
2	16/03/2010		NF81965 60753	81965	860753	-	Minor fresh water input. Negligible flow. Width: 80cm.
3	16/03/2010	09:15	NF 81851 60742	81851	860742	-	Fresh water sample BFW1. 4 ducks, 7 oyster catchers, 3 geese, 4 gulls, 3 horses.
4	16/03/2010	09:20	NF 81694 60877	81694	860877	Figure 5	Minor field run off, 2 pigs, small farm, 2 oyster catchers, 3 gulls
5	16/03/2010	09:25	NF 81632 60938	81632	860938	-	Minor field run-off, 2 geese.
6	16/03/2010	09:30	NF 81532 61121	81532	861121	-	House on shore, 1 small boat, 6 ducks, 2 gulls, evidence of sheep droppings along track. Seawater sample BSW1, salinity 36.2 ppt.
7	16/03/2010	09:37	NF 81423 61582	81423	861582	Figure 6	Fresh water field run-off, width 85cm-1.6m, 25cm depth. Fresh water sample BFW2.
8	16/03/2010	09:45	NF81467 61633	81467	861633	-	Minor fresh water run-off
9	16/03/2010	10:10	NF81068 61799	81068	861799	Figure 7	Cockle sample BC1
10	16/03/2010	10:20	NF 80780 62240	80780	862240	-	Fresh water input, 5cm-55cm width, 8cm deep, minimal flow. Fresh water sample BFW3. 6 geese, 2 ducks, 4 oyster catchers, sheep droppings all along shore.
11	16/03/2010	10:30	NF 80501 62537	80501	862537	Figure 8	House on shore at causeway
12	16/03/2010	11:40	NF 79413 61057	79413	861057	Figure 9	31 sheep
13	16/03/2010	11:42	NF 79981 60272	79981	860272	-	Seawater sample BSW2, salinity 35.8 ppt. 55 oyster catchers, 80 sheep visible on land to west.
14	16/03/2010	11:45	NF 79702 60471	79702	860471	Figure 10	Sheep on shore.
15	16/03/2010	11:46	NF 79457 60593	79457	860593	-	Fresh water sample BFW4, 200 geese.
16	16/03/2010	12:25	NF79952 61395	79952	861395	Figure 11	Fresh water input, traced up land, photo. Fresh water sample BFW5.
17	16/03/2010	12:30	NF80193 61409	80193	861409	-	Farm, 60 sheep. Very smelly of sheep all along shore, sheep droppings all along shore.
18	16/03/2010	12:40	NF 80287 61509	80287	861509	-	Photo
19	16/03/2010		NF 79915 62684	79915	862684	-	Seawater sample at causeway BSW3, salinity 35.8 ppt.
20	17/03/2010	10:15	NF 80799 61951	80799	861951	-	Sea water sample BSW4

Photographs referenced in the table can be found attached as Figures 4 – 11.

Sampling

Water and shellfish samples were collected at sites marked on the map in Figures 2 and 3 respectively. 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 chloride by the laboratory. The results were reported as milligrams of chloride per litre. These were then converted to salinity expressed in parts per thousand (ppt) and are shown as such in Table 2.

Table 2 Water sample results

No.	Date	Sample	Grid Ref	Type	*E. coli* (cfu/100 ml)	Salinity (ppt)
1	17/03/2010	BFW1	NF 81851 60742	Fresh water	<100	-
2	17/03/2010	BFW2	NF 81423 61582	Fresh water	<100	-
3	17/03/2010	BFW3	NF 80780 62240	Fresh water	<100	-
4	17/03/2010	BFW4	NF 79457 60593	Fresh water	<100	-
5	17/03/2010	BFW5	NF79952 61395	Fresh water	200	-
6	17/03/2010	BSW1	NF 81532 61121	Sea water	2	36.2
7	17/03/2010	BSW2	NF 79981 60272	Sea water	2	35.8
8	17/03/2010	BSW3	NF 79915 62684	Sea water	0	35.8
9	18/03/2010	BSW4	NF 80799 61951	Sea water	2	36.0

Table 3 Shellfish sample results

No.	Date	Sample	Grid Ref	Type	*E. coli* (MPN/100 g)
1	16/03/2010	BC1	NF81068 61799	Common cockles	20

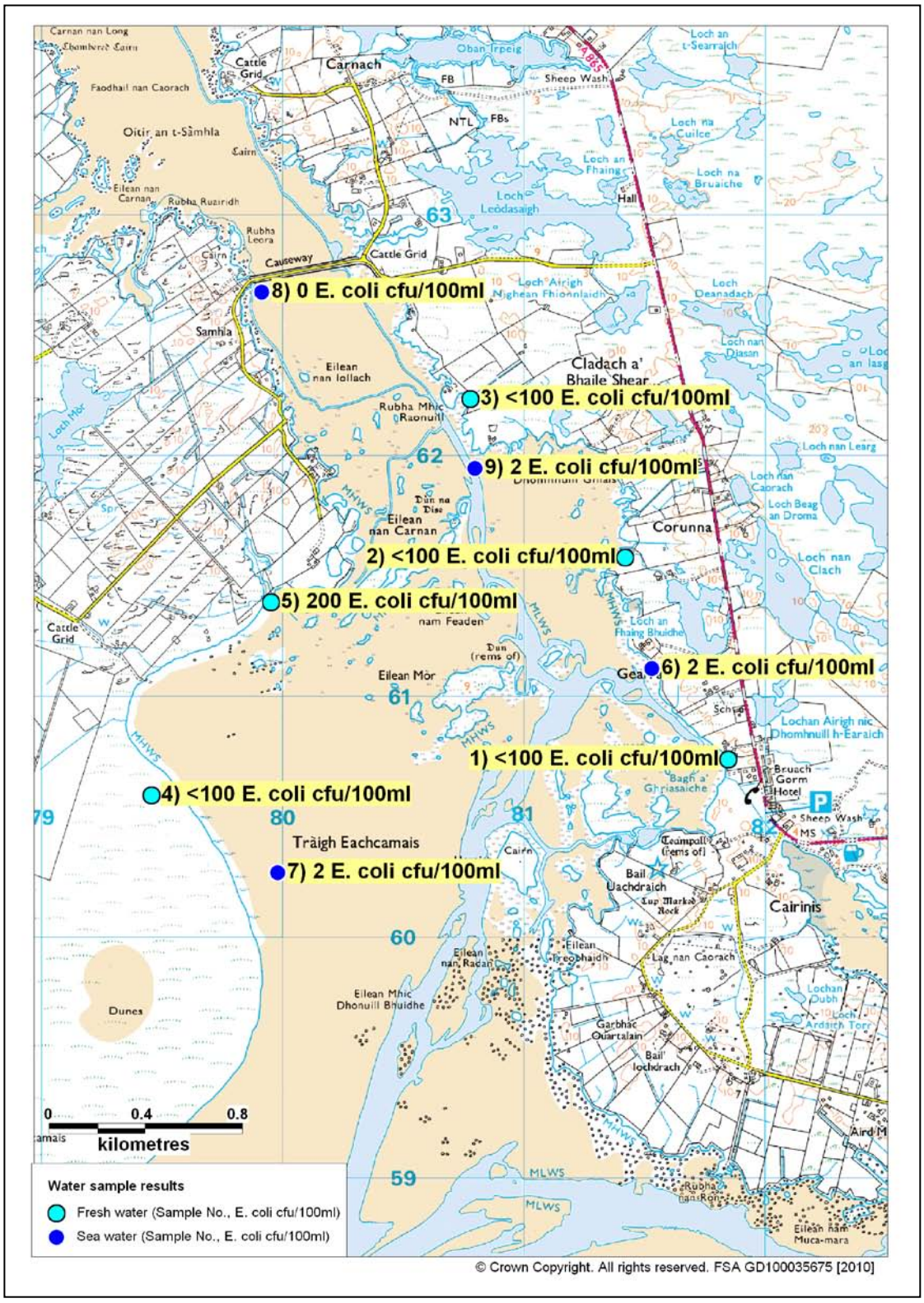

Figure 2. Water sample results

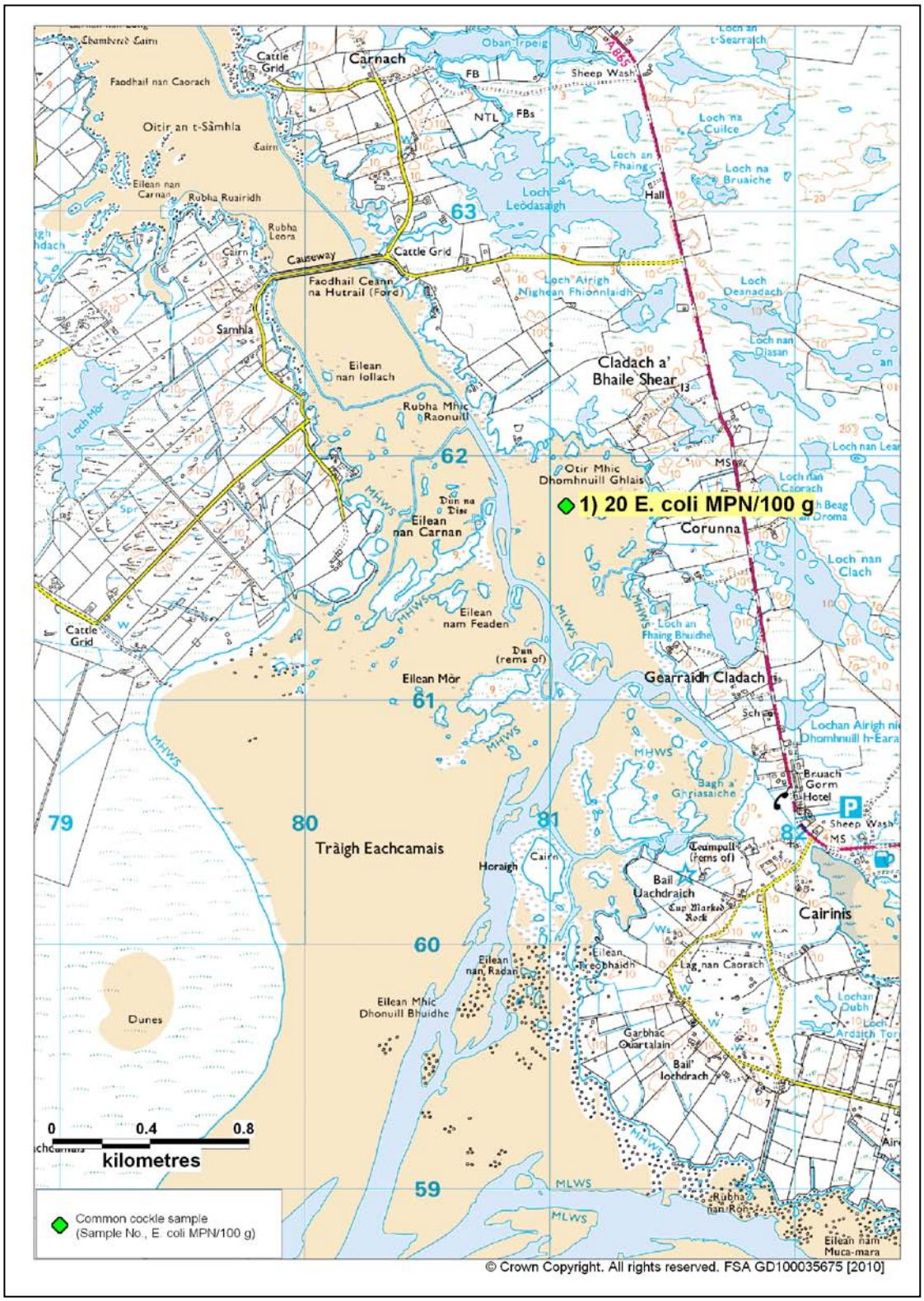

Figure 3. Shellfish sample result

Photographs

Figure 4. Septic tank at road.

Figure 5. Pig in field close to shoreline

Figure 6. Fresh water field run-off, Fresh water sample BFW2

Figure 7. Cockle sample BC1

Figure 8. House on shore at causeway

Figure 9. Thirty-one sheep at shoreline

Figure 10. Sheep tracks on shoreline

Figure 11. Fresh water input, traced up land. Fresh water sample BFW5

SEPA Discharge Consents – Soakaways

Consent No.	NGR of discharge	Discharge Type	Discharges to
CAR/R/1045897	NF 81680 60150	Continuous	STE to soakaway, Isle of North Uist
CAR/R/1055988	NF 81912 60310	Continuous	STE to soakaway, Isle Of North Uist
CAR/R/1015248	NF 82065 60476	Continuous	STE to land
CAR/R/1060008	NF 82010 60210	Continuous	STE to soakaway, Carnish, Isle of North Uist
CAR/R/1060002	NF 82060 60200	Continuous	STE to soakaway, Carnish, Isle of North Uist
CAR/R/1050065	NF 82400 59430	Continuous	STE to soakaway, Carinish, Isle of North Uist
CAR/R/1066522	NF 82462 59419	Continuous	STE to soakaway, Isle of North Uist
CAR/R/1061473	NF 82429 59289	Continuous	STE to soakaway, 15 Carinish, Isle of North Uist
CAR/R/1045973	NF 79220 61330	Continuous	STE to soakaway, Isle of North Uist
CAR/R/1046260	NF 79320 61270	Continuous	STE to soakaway, Isle of North Uist
CAR/R/1059908	NF 80116 61583	Continuous	STE to soakaway, Isle of North Uist
CAR/R/1057710	NF 80129 61911	Continuous	STE to soakaway, Isle of North Uist
CAR/R/1059499	NF 80138 61633	Continuous	STE to soakaway, Baleshare, Isle of North Uist
CAR/R/1061958	NF 78758 63063	Continuous	STE to soakaway, Isle of North Uist
CAR/R/1059475	NF 80150 61600	Continuous	STE to Land, Isle of North Uist
CAR/R/1015772	NF 79790 62770	Continuous	STE to land
CAR/R/1059869	NF 80427 62707	Continuous	STE to Soakaway, Baleshare, Isle of North Uist
CAR/R/1051345	NF 80320 63090	Continuous	STE to Land, Isle of North Uist
CAR/R/1075670	NF 79769 63590	Continuous	STE to soakaway, North Uist
CAR/R/1060987	NF 80472 63054	Continuous	STE to Soakaway, Baleshare
CAR/R/1056396	NF 80240 63550	Continuous	STE to soakaway, Balshore
CAR/R/1061916	NF 81480 61210	Continuous	STE to soakaway, Lochmaddy, Isle of North Uist
CAR/R/1050434	NF 81580 61520	Continuous	STE to Soakaway, Isle of North Uist
CAR/R/1059028	NF 81732 61960	Continuous	STE to Land, Isle of North Uist
CAR/R/1077368	NF 81857 61045	Continuous	STE to soakaway, North Uist
CAR/R/1033355	NF 81861 60945	Continuous	STE to soakaway, Isle of North Uist
CAR/R/1060990	NF 81929 61078	Continuous	STE to soakaway, Claddach Baleshare, Isle of North Uist
CAR/R/1047485	NF 81510 59720	Continuous	STE to soakaway, Isle Of North Uist
CAR/R/1059693	NF 81570 59670	Continuous	STE to land, Isle of North Uist
CAR/R/1057224	NF 81890 59420	Continuous	STE to Land, Isle of North Uist
CAR/R/1055618	NF 81944 59426	Continuous	STE to soakaway, Isle of North Uist
CAR/R/1021834	NF 81970 59420	Continuous	STE to land, North Uist
CAR/R/1060114	NF 78970 61770	Continuous	STE to land, Isle of North Uist
CAR/R/1060117	NF 79010 61770	Continuous	STE to Land, Isle of North Uist

Consent No.	NGR of discharge	Discharge Type	Discharges to
CAR/R/1051023	NF 78960 61480	Continuous	STE to Soakaway, Isle Of North Uist
CAR/R/1048901	NF 79112 61365	Continuous	STE to soakaway, Isle of North Uist
CAR/R/1048489	NF 78785 62208	Continuous	STE to soakaway, Baleshare
CAR/R/1056221	NF 78680 62460	Continuous	STE to soakaway, Isle of North Uist
CAR/R/1068609	NF 78949 62533	Continuous	STE to soakaway, Illeray, Isle of North Uist
CAR/R/1061479	NF 81619 62206	Continuous	STE to Soakaway, Claddach Baleshare
CAR/R/1052984	NF 81530 62580	Continuous	STE to soakaway, Claddach, Baleshare, Isle of North Uist
CAR/R/1059902	NF 81750 62100	Continuous	STE to soakaway, Bacesaale, North Uist
CAR/R/1056417	NF 81816 61926	Continuous	STE to soakaway, Isle Of North Uist
CAR/R/1064773	NF 81819 62118	Continuous	STE to Soakaway, Baleshare, Isle of North Uist
CAR/R/1049545	NF 81850 61900	Continuous	STE to soakaway, North Uist
CAR/R/1048628	NF 81888 61479	Continuous	STE to soakaway, Isle of North Uist
CAR/R/1059907	NF 81904 61694	Continuous	STE to soakaway, Baceshare, North Uist
CAR/R/1042880	NF 81906 61690	Continuous	STE to soakaway, Claddach Baleshare, Isle Of North Uist
CAR/R/1056111	NF 81897 61315	Continuous	STE to soakaway, Carinish, North Uist