



Soay Sound, West Loch Tarbert

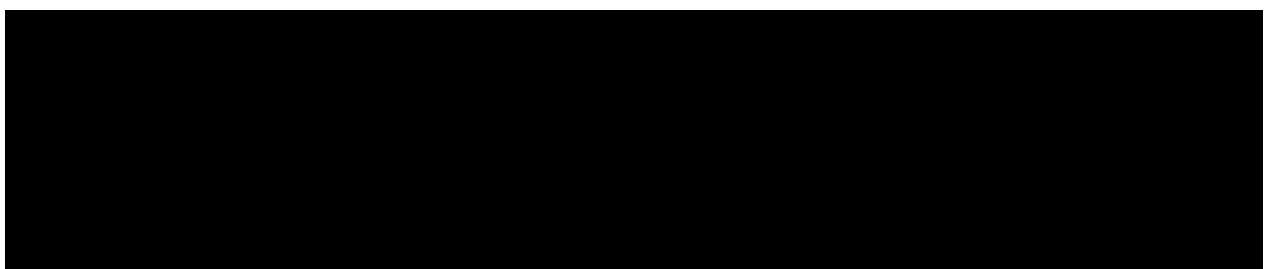
SEPA CAR Application for variation

Additional Information

CAR/L/1004053

Mowi Scotland Limited

December 2021



Soay Sound SEPA CAR Variation December 2021

Additional Information

This application is being submitted as a proposal to vary the biomass at the Soay Sound Salmon Farm from 2012.5t to 2300t. No changes to licensed pen type or configuration are proposed. No changes to existing licence conditions relating to medicines are requested.

Background

A previous SEPA initiated variation in 2016 (VN-11) reduced the licenced maximum biomass of the site from 2300t to 1725t, together with a separate pro rata reduction in licenced medicines. This action was taken by SEPA in response to previous unsatisfactory seabed surveys at the site. Since then, Mowi has taken measures to ameliorate the causes of this non-compliance, and successive seabed surveys in 2017 and 2018 have been classified as meeting environmental quality standards. Recognising the improved benthic conditions, a staged recovery in fish production levels was previously authorised (VN-13) by SEPA in 2018 taking the licensed maximum biomass to 2012.5 tonnes.

Supporting Information

The results of a further survey undertaken in July 2020 has been submitted to SEPA and is presently awaiting classification. Additional stations across a multi transect design were sampled in accordance with SEPA's new framework requirements. Mowi analysis of the 2020 survey results in terms of SEPA's new environmental standards is presented in this document. New model simulations (NewDepomod) have been performed to assess the likely deposition of waste solids at the Soay salmon farm site at current licensed biomass and proposed biomass. The application of the NewDepomod model to describe the deposition of waste solids beneath the pens and in the surrounding environment is provided in this document.

1. Location of the Soay Sound salmon farm site and pens

The existing 100m circumference pen coordinates are:

Western Group

1 (NW):	57° 56.775'N 006° 58.044'W	106193.007E 906028.152N
2:	57° 56.757'N 006° 57.975'W	106258.012E 905990.104N
3:	57° 56.740'N 006° 57.907'W	106322.993E 905952.919N
4:	57° 56.722'N 006° 57.839'W	106388.001E 905914.885N
5 (W):	57° 56.739'N 006° 58.077'W	106155.011E 905963.160N
6:	57° 56.721'N 006° 58.009'W	106220.012E 905925.123N
7:	57° 56.704'N 006° 57.941'W	106284.999E 905887.937N
8:	57° 56.684'N 006° 57.918'W	106305.001E 905849.891N

Eastern Group

1 (NW):	57° 56.687'N 006° 57.702'W	106517.994E 905840.083N
2:	57° 56.669'N 006° 57.634'W	106582.019E 905802.124N
3:	57° 56.652'N 006° 57.566'W	106647.005E 905764.945N
4:	57° 56.634'N 006° 57.498'W	106711.989E 905726.907N
5 (W):	57° 56.651'N 006° 57.735'W	106480.003E 905775.099N
6:	57° 56.633'N 006° 57.667'W	106544.989E 905737.919N
7:	57° 56.616'N 006° 57.598'W	106610.002E 905699.877N
8:	57° 56.598'N 006° 57.530'W	106675.021E 905663.120N

No change to the existing permitted site layout shown in Figure 1 is requested.

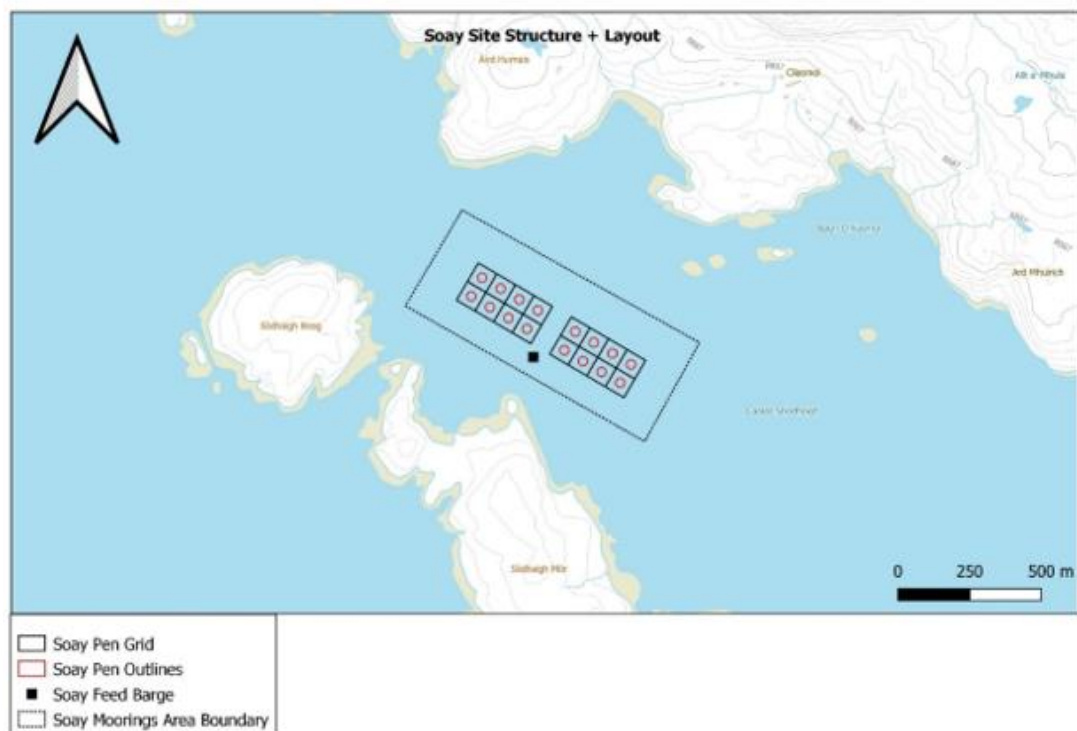


Figure 1. Soay Sound site plan showing the existing site infrastructure

2. Depositional Modelling

NewDepomod is bespoke modelling software designed to simulate the dispersion of particulate wastes from salmon farms. The model (SAMS, 2021) has been developed by the Scottish Association for Marine Science (SAMS) and is supplied under licence. The version used for the modelling described here was:

runTimeFrameWork version: Final 1.20211021113845.1634811708
library version:
numerics version: Final 1.20211021113834.1634811708
datatypes version: Final 1.20211021113826.1634811708
util version: v1.4.0-rc02-(SEPA)

The model was configured exactly as specified by SEPA in the modelling guidance published in July 2019 (SEPA, 2019). The site was modelled for a maximum biomass of 2300 tonnes with a feed load of 7 kg/tonne/day. This configuration of the model produces a conservative estimate of the benthic footprint, with a deposition rate of 250 g m⁻² equating approximately to an Infaunal Quality Index (IQI) of 0.64 (the boundary between moderate and good status). Work by SEPA has shown that footprints predicted by this “standard default” configuration broadly match the footprint area derived from seabed samples, although there is a great deal of variability from site to site. The model is capable of making more accurate predictions of seabed impact when it is calibrated against seabed IQI data from previous production cycles. However, in the absence of multiple multi-transect historical datasets, the standard default method was used (SEPA, 2019).

A regular model grid was prepared. The grid covered a 2km x 2km area, with a 25m grid spacing in both directions. The grid size was 80 x 80 cells. The water depth was 29.2 m, the weighted average of the depths at the two current meter deployments (ID233 and ID81, Figure 2, Table 1). The flowmetry file combined the data from ID233 and ID81; after merging the length of the combined record was 91.94 days in total (see next section).

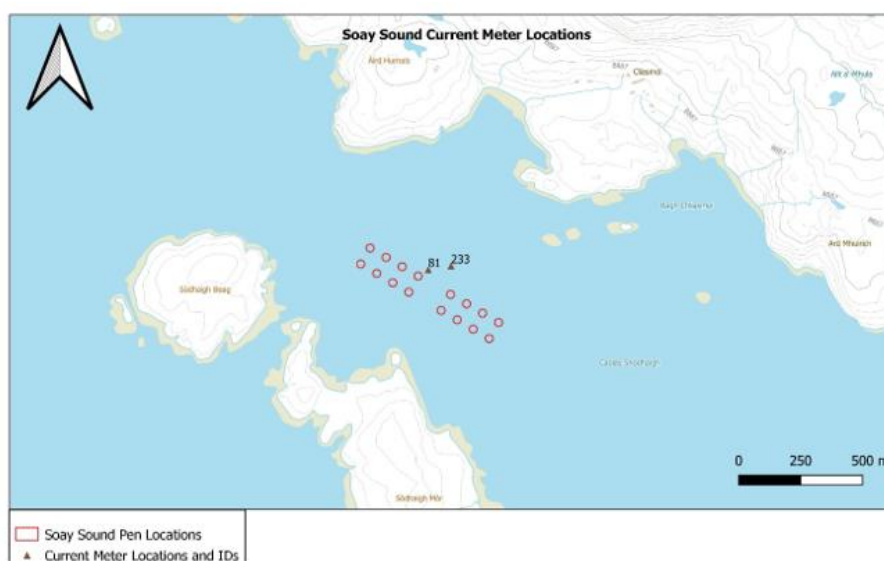


Figure 2. Locations and ID numbers of current meters (▲) deployed at Soay Sound relative to the pen locations (□).

2.1 Current meter data

ADCP current data collected in 2016 and 2018 was validated. This data was used for modelling the existing consent of 2012.5 tonne and the proposed (previously licensed) 2300 tonnes to support the application. Two deployments were made, the details of which are summarised in Table 1 and 2.

Table 1. Details of current data validated for modelling.

ID	Data collection periods	Duration (days)	Period used in flowmetry
ID233	2018-07-11 to 2018-10-18	85.93	2018-07-11 11:20 to 2018-10-05 09:40
ID81	2016-05-10 to 2016-06-15	35.82	2016-06-01 22:00 to 2016-06-07 22:00

Table 2: Hydrographic Summary Soay Sound

HYDROGRAPHIC SUMMARY SOAY SOUND		ID233	ID81
	Soay Sound	Jul-Oct 2018	May-June 2016
Near-surface Currents	Mean Speed (m/s)	0.075	0.055
	Residual Speed (m/s)	0.015	0.015
	Residual Direction (°G)	340.34	33.22
	Tidal Amplitude Parallel (m/s)	0.122	0.084
	Tidal Amplitude Normal (m/s)	0.031	0.028
	Major Axis (°G)	305	85

HG sheets showing the analysis of the data have been submitted with this application.

Due to differences in the setup of the two ADCP deployments (distance to first cell), a log-law factor was applied to the near bed velocities of the measurements from ID81 to match the 3.7 m (2.7 m for ID81) height of the ID233 recordings. Effectively, a factor of 1.0411 was applied to the near-bed current data from ID81. A subset of 6 days of data was used from ID81 to supplement the approximately 86 days of data from ID233 and stitched to the end of the ID233 data at similar points in the tidal cycle.

Following the standard default approach, NewDepomod was used to simulate one year of deposition at the maximum farm biomass. Results were analysed over the final 90 days of the simulation, with the mean deposition rate across the model domain being calculated and the footprint area being delimited by the 250 g m⁻² contour (SEPA, 2019). The results are summarised below.

2.2 Current Biomass

The modelled footprint for the current consented biomass at the farm using the SEPA standard default method is shown in Figure 3. The area of the footprint, as defined by the deposition rate of 250 g m⁻², was 66,875 m². The maximum (90-day mean) deposition was 2413.5 g m⁻². The intensity of deposition within the footprint was 392.6 g m⁻².

Table 3. The modelled footprint area and mean footprint deposition for Soay Sound for the current biomass of 2012.5tonnes and proposed biomass of 2300 tonnes, using the SEPA standard default method.

Metric	Value	
Maximum Biomass (T)	2012.5	2300
Feed load (T/yr)	5141.9	5876.5
Solid Waste release rate (kg/day)	3374.8	4192.3
Allowable Mixing Zone (m ²)	238,962	238,962
Modelled Footprint Area (m ²)	66,875	86,875
Maximum Deposition (g m ⁻²)	2413.5	2548.3
Mean Footprint Deposition (g m ⁻²)	392.6	415.0

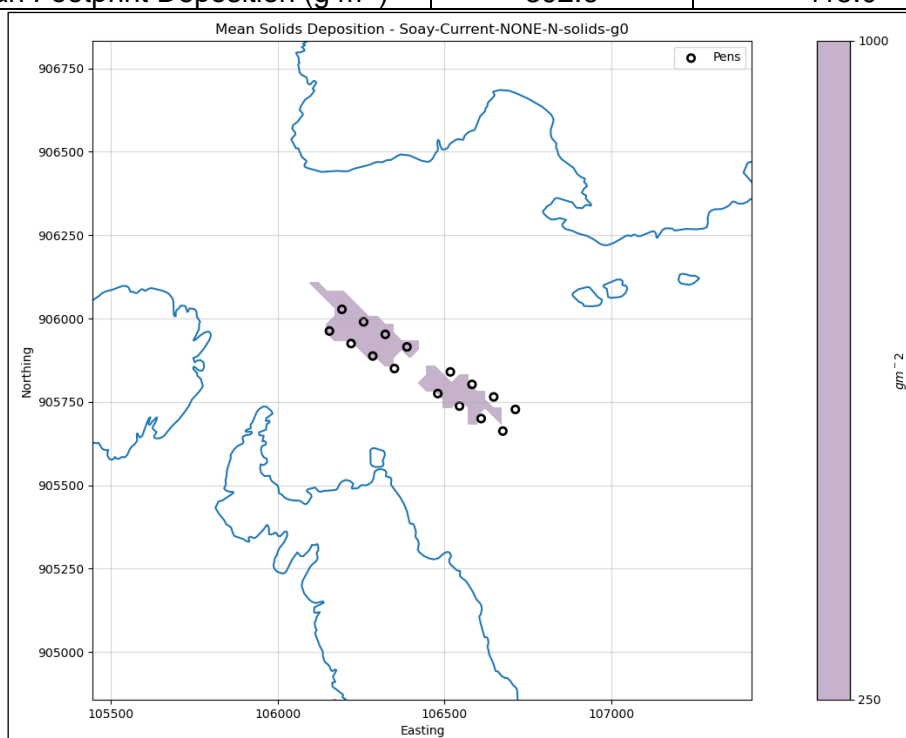


Figure 3. The modelled footprint for Soay Sound for the consented biomass of 2012.5 tonnes, using the SEPA standard default method.

2.3 Proposed Biomass

The modelled footprint for the proposed biomass at the farm using the SEPA standard default method is shown in Figure 4. The area of the footprint, as defined by the deposition rate of 250 g m^{-2} , was $86,875 \text{ m}^2$. The maximum (90-day mean) deposition was 2548.3 g m^{-2} . The intensity of deposition across the footprint was 415.0 g m^{-2} , below the allowed threshold of 4000 g m^{-2} for Soay Sound which has a wave exposure index of 2.98 (2.8 being the threshold value for 4000 g m^{-2}).

These results for both model runs are presented in Table 3 indicating that the proposed site and biomass will comfortably meet pertinent Environmental Quality Standards for salmon farm waste solids.

The proposed increase in biomass meets screening criteria for assessing increases in biomass at existing fish farms (SEPA Paper 4 – Draft Framework for increases in biomass at established site).

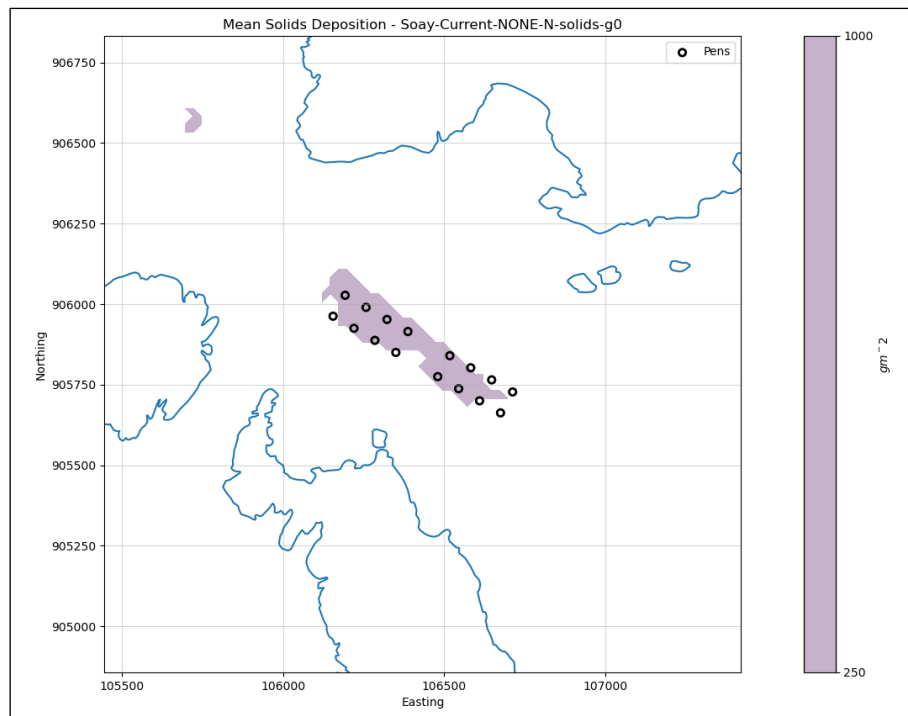


Figure 4. The modelled footprint for Soay Sound for the proposed biomass of 2300 tonnes, using the SEPA standard default method.

An increase in the size of predicted footprint can be seen between the two model runs. Due to the conservative nature of SEPA's standard default method in NewDepomod, an increase in the 0.64 IQI ellipse area is unlikely to be proportional to the increase in the modelled footprint.

3. 2020 Benthic Sampling

Survey work was carried out between the 19th and 22nd July 2020 and subsequent sample analysis was completed by Benthic Solutions Ltd. Sediment quality parameters were assessed during this time in order to fulfill SEPA's monitoring requirements under current consent guidelines.

To satisfy the Monitoring Survey Protocol associated with CAR licence, sediment samples were collected at four stations, located at 0m, 47m, 57m (this being the predicted ITI 30 contour AZE) and 67m east southeast of the cage group, as well as at two reference stations located 985m and 2,149m east southeast of the cage group centre. Two replicate grab samples were taken at each station for fauna, and separate samples for particle size and carbon analysis. Redox measurements were not taken during this survey.

The site was operated for a period of sixteen months this cycle prior to the seabed survey. Peak biomass during this period was achieved on the 14th April 2020 where the site reached a biomass of 1,798 tons. Following this, regular harvests took place where the biomass on site began to drop for the final time during this production cycle around June 2020 with 75% of peak biomass occurring on the 16th of the same month. Due to the Coronavirus pandemic and various states of lockdown the survey scheduling was impacted by need to follow enhanced health and safety protocols and commenced thirty-four days later. Rapid harvesting also occurred during this period emptying the site of all stock by the time the survey began. In line with the Benthic Monitoring Protocol MPS/CAR/L/1004053 the Soay salmon farm was sampled within license conditions, commencing 20th July 2020.

The results of the licensed AZE survey have been presented to SEPA for classification, Mowi's internal assessment indicates compliance with pen edge and AZE environmental standards.

In addition to the Monitoring Survey described above a 4 transect survey was completed during the same period to assess the footprint of the site in accordance with SEPA's new framework design. IQI results indicate compliance with pen edge and mixing zone environmental standards.

Summary results:

- Number of transects – 4
- Pen edge results – all pass
- 0.64 IQI ellipse area – 177,213.59 m²
- Allowable Mixing Zone – 238,962.44 m²
- IQI <0.64 area (% of AMZ) – 74.15

Figures 5 and 6 detail the sample stations, the allowable mixing zone for the site, and the ellipse generated from the 0.64 IQI value as a percentage area of the mixing zone.

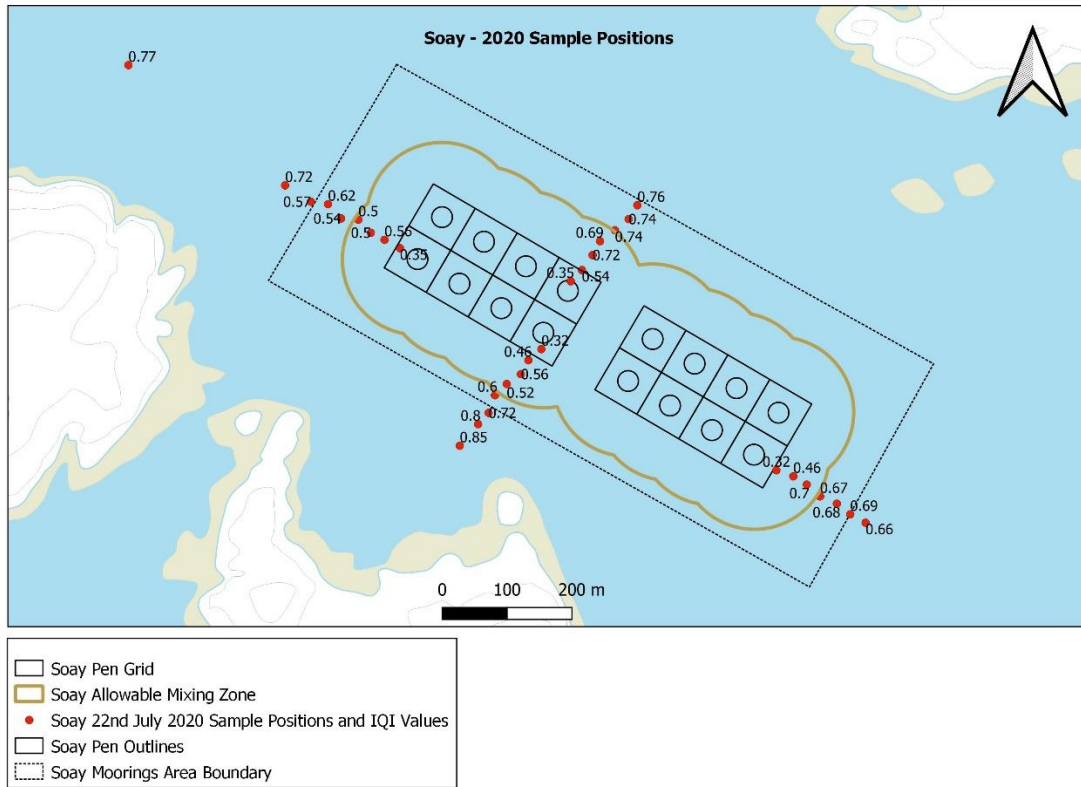


Figure 5. Sample positions and IQI values from the seabed survey undertaken on 22nd July 2020.

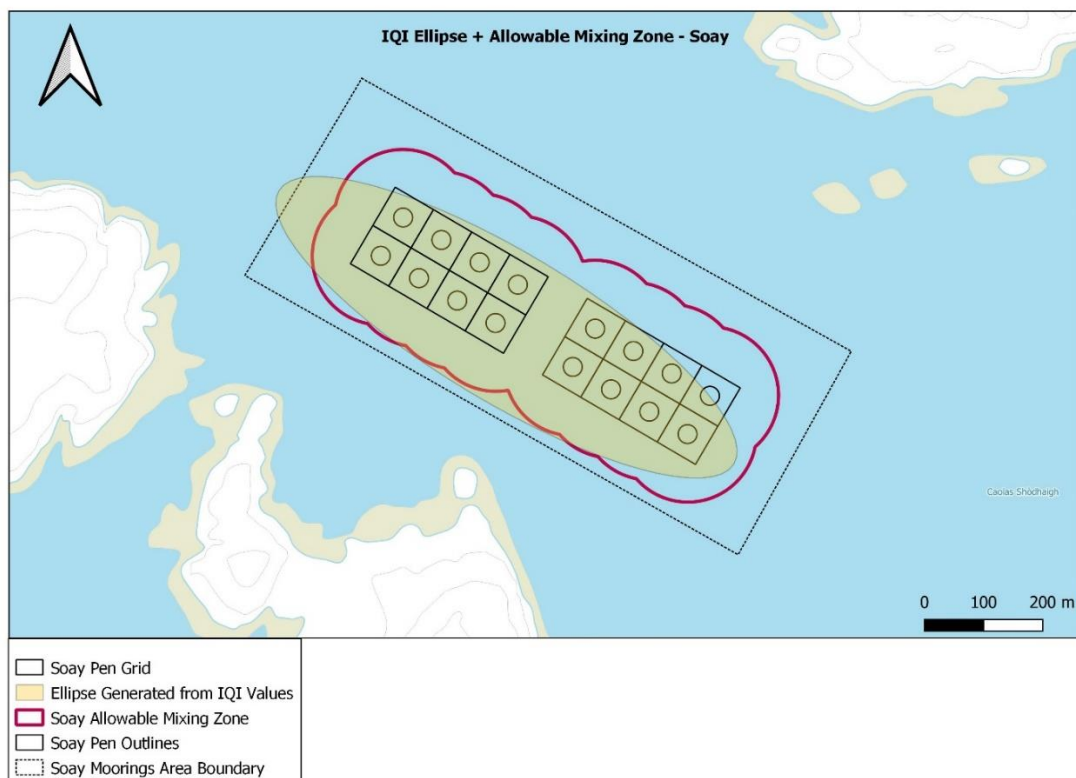


Figure 6. The Allowable Mixing Zone (—) and the fitted ellipse (shaded) where IQI < 0.64.

Environmental Monitoring Plan

A new Environmental Monitoring Plan is also presented with this application (Appendix 2), detailing both future biological sampling, and future medicinal residue sampling. Figure 7 below shows both proposed biological sampling transects, and medicinal residue sampling stations.

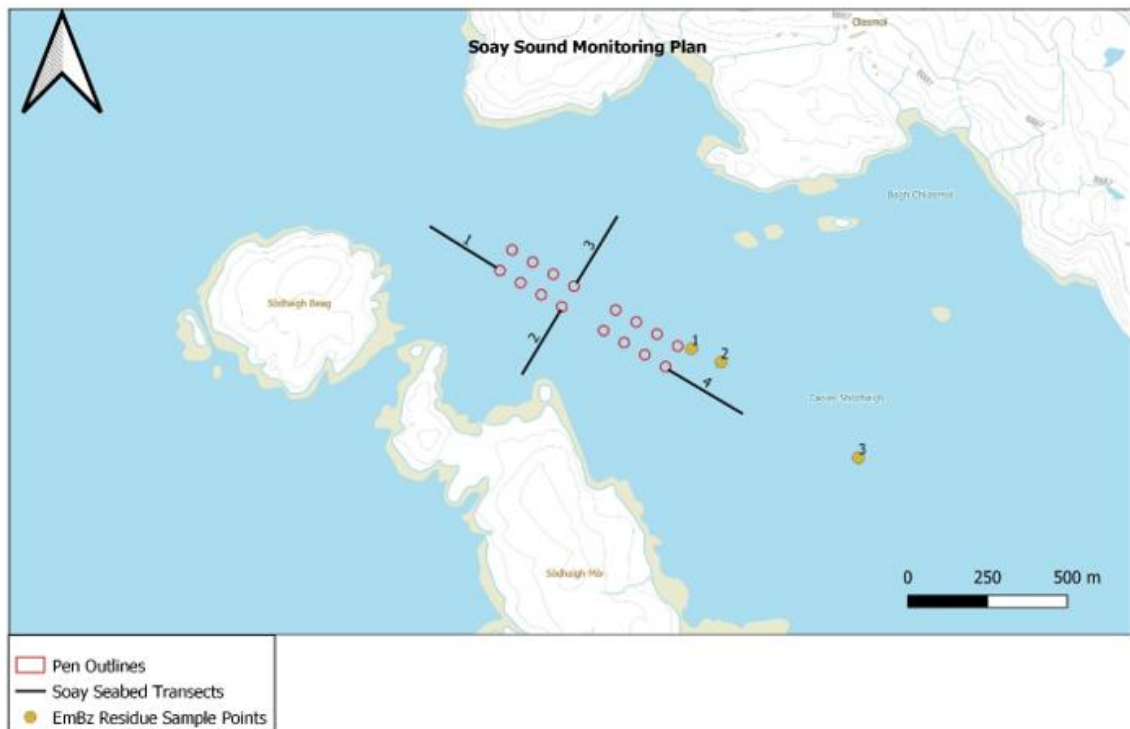


Figure 7. Biological Monitoring - Direction of Primary (T1, T4) and Secondary (T2, T3) Transects, plus Emamectin Benzoate Residue Sampling Stations