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cc Michael Russell MSP

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**Dounie Marine Cage Fish Farm, Sound of Jura, licence application  
CAR/L/1152438**

Dear Ms Anderson

I am writing on behalf of the Friends of the Sound of Jura, a community group concerned about a proposal by Kames Fish Farming Ltd, to site a 2,500 tonne salmon or rainbow trout farm at Dounie on the Sound of Jura. The CAR application (CAR/L/1152438) is being considered in SEPA's Lochgilphead office at present.

We would welcome a chance to meet you to discuss this proposal and the issues it raises, detailed below.

You will be aware of the widespread and growing concern that aquaculture has become a polluting industry, damaging a common resource with impunity. This feeling is reflected by the 3400+ people who have signed two petitions against the plans for Dounie, more than a third of whom live in Argyll and Bute. They include a majority of those on the electoral roll in the closest Community Council wards.

While supportive of aquaculture in general, Argyll and Bute's MSP, Michael Russell, has voiced his concerns about Dounie, saying: 'I have raised some serious concerns about this application with the relevant Minister and, in particular, about the issue of establishing fish farms in MPAs. I am not convinced that it is sited in a place that should be licensed for aquaculture'.

It is clear that sea lice have developed resistance to the licensed pesticides and, in response, that these chemicals are being over-used by fish farms, in ways that are harmful to other marine life. This is just one of a number of environmental reasons not to issue a CAR licence for this farm.

Here are some more:

Dounie is inside the Loch Sunart to Sound of Jura Marine Protected Area, recently created to protect critically endangered flapper skate. These long-lived fish are highly site faithful. Tagging studies show that they live just offshore from Dounie and their egg cases, which often wash ashore, show that they breed locally.

The proposed fish farm would be sited on the lip of a steep underwater slope, where gravity flows would carry waste and the bound-in pesticide, emamectin benzoate, from the fish farm into a 200m deep trench, the skate's primary habitat. SNH have expressed their concern to SEPA that the skates' eggs could be affected by this discharge, as might their crustacean prey.

This was confirmed by Dr James Thorburn (University of St Andrews, recently allocated Scottish Government funding to study the skate) who said: 'if a fish farm was in an area with lots of egg cases, chemical and sediment would be of concern.'

We are struggling to understand why the decision on the CAR licence application for Dounie has not been refused on nature conservation grounds alone: because of its impact on the flapper skate inside an MPA created for them, because of its impact on wild salmonids, and, as SNH have also pointed out, because it would destroy a rare community of northern seafans and sponges. A second benthic survey for these has just been completed on behalf of Kames.

Regarding the use of emamectin benzoate, in May 2017, SEPA wrote: 'SEPA proposes that the EQS for emamectin benzoate residues in sediments should be tightened considerably, to the extent that practically useable quantities are unlikely to be able to be authorised, unless effective mitigation measures are put in place to collect fish faeces and ensure the metabolites from the administration of the medicated feed are contained.'

These mitigation measures were not included in the plans submitted by Kames.

Additionally, SEPA's current guidance on the use of emamectin states that inside a 'relevant protected area' (defined as 'an area designated as either a Natura site, a Marine Protected Area or where a Priority Marine Feature has been identified and in which the conservation interest may be susceptible to the effects on the area of Emamectin Benzoate'), the far-field levels of emamectin 'within or otherwise liable to result in deposition within a relevant protected area' are 12 ngkg<sup>-1</sup> (dry weight).'

This is not a practically useable quantity, so it should be impossible to grant a licence for the use of emamectin within the MPA.

Is it not time to rule out a CAR licence for this site?

Without emamectin there would be little hope of controlling sea lice at Dounie. It is vital that sea lice larvae are not released there because it lies directly on the route of wild salmon migrating up the Sound of Jura, to their breeding areas in the River Add, around 5km away. The Add is one of the few remaining west coast rivers without an active salmon farm close to its

mouth. The river also supports breeding sea trout that frequently use the bay at Dounie. Both fish species are Priority Marine Features and can be killed by sea lice released by fish farms. The Scottish Government acknowledges this fact and that even the best run fish farms can release them, as Marine Scotland recently pointed out in their submission to a planning application for a fish farm in Loch Duich, saying: 'It should be noted that adherence to the suggested criteria for treatment of sea lice stipulated in the industry CoGP may not necessarily prevent release of substantial numbers of lice from aquaculture installations.'

Earlier this month a tidal drogue experiment demonstrated that the rising tide takes less than three hours to move water (and sea lice larvae) from Dounie directly to the mouth of the loch at Crinan, where the River Add meets the sea.

Against this background SEPA is consulting on DZR, with a view to allowing even larger fish farms in high flow areas, presuming that all of these will be offshore. The Friends of the Sound of Jura have already responded to the consultation, saying that despite it's high tidal flow, the Sound is not offshore and that its coastal communities do not want industrial fish farms to pollute their inshore waters, upon which many jobs depend.

As you know, aquaculture is anomalous with regard to the dumping of waste into the sea. Not only is it uniquely allowed to discharge a range of toxic chemicals, but it is also the only industry to discharge so much particulate waste, yet its waste discharges are not modeled to the same standard as other industries. In order to bring aquaculture's pollution licensing up to standard, we understand that the proposed DZR approach would use the new DEPOMOD hydrodynamic software to model where all this organic waste and emamectin will go.

SEPA has acknowledged that new DEPOMOD's precursor, the autoDEPOMOD software, which is still in use, is unable to model this dispersal in high flow sites, or when the seabed is not flat.

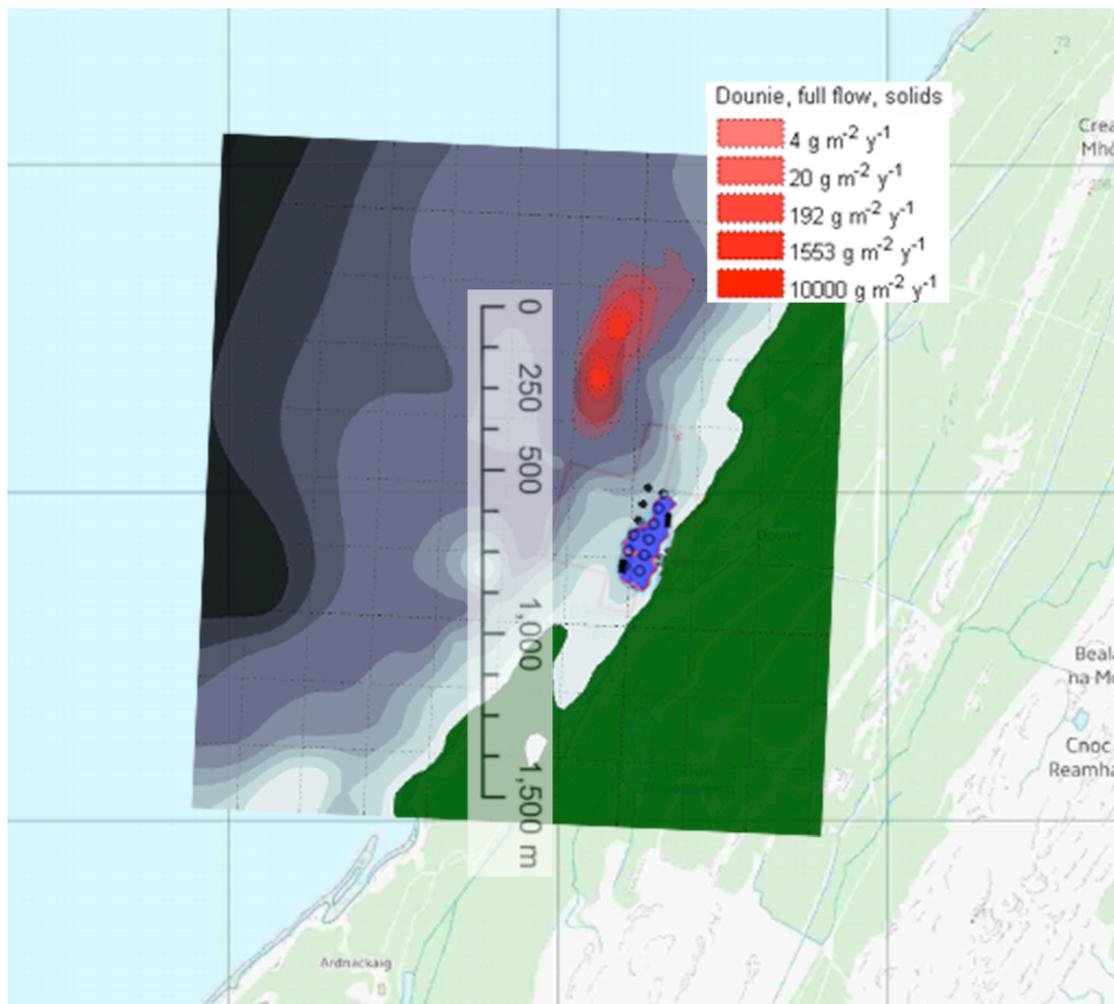
SEPA computer modeler, Dr Andrew Berkeley, who has been very helpful, also confirmed that the present autoDEPOMOD cannot be used to model impacts over large scales. There are cases where it is suitable, for instance in and around a farm, but as soon as you are 100m away from a fish farm the flows will be different from where they were measured, at the farm. He said, 'if the sensitive receptor is 500-1000m away you cannot use autoDEPOMOD to assess the impact on it.'

In addition, research done on SEPA's behalf into the deposition of organic waste and emamectin from several fish farms around Shuna, showed that autoDEPOMOD failed to predict where the waste actually accumulated, confirming the widely-acknowledged fact that computer models struggle to simulate turbulent flow in complex environments.

Like Shuna, Dounie has complex seabed topography, with steep slopes and high current flow. In order to direct Kames' second seabed survey, for the rare northern seafans that escaped their notice the first time, the SEPA office in Lochgilphead asked Dr Berkeley to use the new DEPOMOD to predict where the waste would accumulate.

The composite map below shows the results produced by both models, with the autoDEPOMOD predicted deposition shown in purple and the new DEPOMOD deposition in red.

In contrast to the autoDEPOMOD prediction that waste would only be deposited close to the cages, new DEPOMOD shows that substantial quantities of waste would flow downhill to accumulate up to 500 metres from the cages, in the deep trench where the endangered flapper skate live.



In two patches, 10 kg of waste is predicted to be deposited per square meter per year. Dr Berkeley said this plot should not be considered to be an accurate prediction of magnitudes and locations of deposition because the model is not calibrated and validated at this site. However he added, 'we have confidence that it can be used as a risk-screening tool'.

This is, in part, because Dr Berkeley was obliged to use the 15 day tidal data provided by Kames in their CAR submission. He said that a full prediction would require 90 days of flow data to be collected.

These figures are just for organic waste, but emamectin benzoate binds to fish faeces, so it is deposited wherever they fall. It has an extremely long half-life, being excreted by the fish for months, then remaining actively toxic, especially to crustaceans, on the seabed for many months more.

Please would SEPA calculate how much emamectin benzoate would be deposited in this way, in the deep trench offshore from Dounie, and explain how the figures are reached.

Given a possible annual waste deposition as high as 10 kg/m sq in some areas, it seems very unlikely that emamectin levels in the far-field would not exceed the 12 ng/kg dry weight EQS that SEPA has set for MPAs.

Apart from the deposition to the north-west of the cages, Dr Berkeley pointed out that the other main difference is that the new DEPOMOD simulation predicts that 18% of the waste would be deposited inside the modeled area, while the present model, autoDEPOMOD, shows just 1% deposited inside.

This means that with autoDEPOMOD, 99% of the waste leaves the model's 1x1 square km grid to an 'unknown fate' and its polluting effect is therefore ignored. Likewise, the fate of 82% of the pollution modeled by new DEPOMOD is unknown. The Shuna study shows what a mistake it is to assume that not knowing its fate means that pollution has vanished forever.

This difference is partly because the new model uses a 2x2 square km grid but it still ignores everything that reaches its larger boundary, only 1 km from the farm if it is sited in the centre.

There is no allowance in either model for any of this waste to be readmitted on the next tide, or re-entrained and deposited elsewhere, or reworked by burrowing animals, which often happens and is a serious omission.

Dr Berkeley explained that the new DEPOMOD cannot predict where this large majority of the waste will end up:

'This model cannot inform on the wider impact of the 'exported' material. For that a wider scale, hydrodynamic model would be required.

Based on viewing flow patterns from the Scottish Shelf Model (hydrodynamic) in this area, the indication is that much of the discharged material will move north and be dispersed over a large area. In that sense I would expect any impacts to be very low in magnitude. But that is only based on flow patterns, and the sediment dynamics (erosion, transport, deposition) in reality are a complicating factor that it is much more difficult to anticipate without an appropriate model.'

He added that particulate modeling is much more complicated than modeling dissolved chemicals, as there are settling rates to consider. He also said he cannot model how the waste would move once it's on the seabed or whether it would damage sensitive areas. These are all significant short-comings.

One reason why the 82% of pollution of 'unknown fate' cannot be modeled is that there is a trade off between increasing the size of the grid, in order to try

to track all the particles until they settle, and the model's increasing inability to represent the flow accurately throughout that larger grid.

This is partly because the validation measurements would only be made at the source of the waste, but also because the computer power required grows rapidly as the grid size increases, and soon becomes unaffordable.

Complex turbulent flow is notoriously difficult to model, let alone on a budget.

In other words even the latest computer models are unable to predict where most of the waste and the long-lived toxic chemical emamectin benzoate would go.

In the long term 'dilution to oblivion' rarely works and it is certainly not safe to assume that it will work in inshore areas, or where the deposits would overlap with those from other fish farms.

It is clear that the new DEPOMOD has a limited ability to predict waste deposition, and that the existing version, autoDEPOMOD, is not fit for the purpose of assessing a CAR licence at high flow sites with irregular seabeds.

However, Barbara Gritten (SEPA Lochgilphead, 18<sup>th</sup> September email, copied to Jim Frame) has confirmed that: 'The original application we received used the current Autodepomod model. We will assess the application based on this submission. As you know we have also run the new depomod model and we may use information from this to inform our determination decision.'

Please could you explain how the use of autoDEPOMOD can be justified in making this decision, given its shortcomings?

There are other problems with issuing a CAR licence at Dounie:

The Regulatory Reform Act of 2014 gave SEPA the new duty of ensuring sustainable economic growth, but the same Act states that this must be consistent with the agency's other functions, which include furthering nature conservation. This is because all UK public bodies have an obligation to promote and enhance biodiversity and to apply the precautionary principle in doing so. This cannot be dodged by saying that some specific duties are someone else's responsibility. For instance, it is not sufficient to pass the duty to conserve wild fish to Marine Scotland, given that the FHI claim their responsibility is only for the health of *caged* fish, particularly when SEPA has the following mechanism for protecting wild fish:

In SEPA's (2005) Regulation and Monitoring of Marine Cage Fish Farming in Scotland – a Manual of Procedures (page 24) it says:

'SEPA may, in determining biomass limits for sites where proximity to important wild stocks is considered as a significant issue, impose a biomass limit equivalent to that biomass which can be effectively treated for sea lice infestations using an authorised sea lice medicine'

The same manual also says:

'in certain instances, to protect important wild salmonid stocks, SEPA will limit

the biomass to that which can be treated at the site using an authorised sea lice medicine.'

Sea lice numbers in the closest fish health areas to Dounie have been dangerously high in recent years and Argyll's figures are among the worst in the country. Kames admit that they already have problems with sea lice on their farmed salmon. Rainbow trout are not much better, judging by SEPA's sea lice treatment data from Loch Etive as well as the FHI reports.

The use of cleaner fish is still in its infancy and experiencing mixed results. The wrasse used in this way do not do well in high current sites such as Dounie. Physical treatments, such as the thermolicer, raise serious welfare issues, killing 175,000 fish in one incident alone.

Pesticides are no longer able to control these damaging parasites, even when used at levels in breach of CAR licences, and, from Dounie, sea lice larvae would be transported directly to the wild salmon and sea trout in the River Add estuary, potentially in numbers many orders of magnitude above natural background levels.

Is SEPA satisfied that the 2,500 tonne biomass proposed at Dounie can be effectively treated for sea lice in such a way that the impact on wild fish in the River Add and along the coast of the Sound of Jura will be insignificant?

Please let us know if you would be able to meet to discuss this.

Thank you for your time.

Yours Sincerely

Friends of the Sound of Jura  
Tayvallich  
Argyll