

Comments on Seil Final Options Report and Easdale Survey Report Addendum

Chris Chubb

Independent Expert, Clachan Seil Wastewater Stakeholder Group. 21 September 2017

1. General

- 1.1. I have been asked by Scottish Water to review the Options Report (Island of Seil Wastewater Treatment Options Review, FINAL REPORT, May 2017) and supplementary material provided by Scottish Water regarding Easdale Bay. (AMSL Report No.16/10.1 – rev 2, 13 June 2017 – Easdale tracer, hydrographic and dispersion report - Easdale Dispersion studies June 2017 ADDENDUM).
- 1.2. The prime objective of sewage treatment is the protection of public health whilst minimising adverse impacts on the environment. Constructing and operating sewerage systems, sewage treatment works and disposing of effluent and sludge all involve change in land and water use. These activities rely on assimilative and restorative capacity of the receiving environment for safe functioning in relation to human health and wellbeing.

It's a fundamental principle of environmental management that sewage conveyance, effluent treatment and effluent disposal all need to avoid, and where that is not practicable, minimise impacts on the environment; and where impact is caused it shall be mitigated or remediated or compensated.

In my advice to Scottish Water, the Community Stakeholders, and the Clachan Seil Stakeholder Group I have sought to adhere to these principles.
- 1.3. There has been much detailed discussion within the Clachan Seil Stakeholder Group and I think it may be helpful to briefly consider some of the key uses made of the environment which either explicitly or implicitly influence the broad picture and the choices made in selecting a preferred option.

Key uses of the Seil environment impacted or potentially impacted by Options 1A and/or 3A/B

Sewage Conveyance Treatment and Disposal – Access, construction, operation, maintenance will include consideration of the environmental impacts of :-

- temporary and permanent changes in land use,
- mineral extraction and import,
- vehicle movements,
- energy used,
- noise,
- ecological impact,
- surface water drainage,
- receiving water quality,

Public Health Protection. Residents, shellfish consumers, and recreational water users will benefit from a lower disease / infection risk from untreated sewage. Potential smell and noise nuisances will need to be minimised. Local residents at Seaview have concerns about Option 3 causing smell nuisance, and also about construction and operation activities, having had a very bad experience of previous SCOTTISH WATER projects that used the site.

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Landscape The existing Balvicar site is a “blot on the landscape” spoiling a formerly attractive open view of Seil Sound, and causing noise nuisance to local residents. The Option 1A Hillside site is as remote from habitation as practicable, minimising the public health, noise and smell risks to the Seil population, and with careful landscaping and planting of access road and treatment site can provide a wildlife corridor and enhanced biodiversity. The Option 1A Seaview Septic tank site will need to be landscaped and protected from storm damage to enhance the current fairly derelict-appearing upper foreshore. The Option 3 Septic tank site is hidden from public view but quite close to properties.

Recreation – The water-based and land-based tourism industry is important to the island economy and is generally on an upwards trend. Boating, sailing, kayaking, swimming, diving, snorkelling and other water sports, pleasure trips, camping, walking, bird watching, fishing, rock pooling and the general Seil ambience are all enjoyed and highly valued by visitors and residents. Island community stakeholders have particular concerns that the proposed Option 3 outfall locations are too close inshore for adequate effluent dispersion.

Wild life appreciation – There are many indigenous and migratory species to be seen on the island including rare mammals and birds and unusual habitats.

Ecology value – The island sits within the Loch Sunart to sound of Jura Marine Protected Area (for Common Skate and marine mammals), and the Firth of Lorn Special Area for Conservation (reefs). On land the Ballachuan Nature Reserve, is renowned for an exceptionally large number of lichens, mosses and fungal species. The generally undeveloped and rugged interior of the island contributes to ecological diversity. The waters surrounding Seil are particularly rich in diverse marine life, and the clear water is very attractive to recreational divers and for scientific research. Not necessarily “pristine” but close to it.

- 1.4. Residents of Seil occupy homes and therefore contribute to the sewage load arising on the island, the treatment and disposal of which currently causes public health and environment related challenges.
- 1.5. The poor compliance of Seil Sound waters with Shellfish Waters Regulations was identified by SEPA early in the Millennium as being largely due to the proliferation of untreated sewage discharges and poorly maintained septic tanks on the Eastern side of the island fronting Seil Sound. The initial scheme installed in 2008/9 by Scottish Water was intended to intercept the majority of these discharges with a public sewer which would convey the sewage to a new treatment plant. The responsibility for managing the sewage now draining to the public sewer rests firmly with Scottish Water. The design underestimated the amount of surface water, (predominantly from properties), entering the system and consequently the treatment plant was hydraulically overloaded resulting in poor operational performance of the system as a whole, with the CSO operating far more frequently than intended.
- 1.6. Following Scottish Water’s decision to replace the underperforming treatment works, and the subsequent establishment of the Clachan Seil Wastewater Stakeholder Group, I was invited to become the Independent Expert advising on technical, policy and legal issues within my competence.

2. Final Options Report

- 2.1. I have been impressed by the thorough and comprehensive nature of the Final Options Report and have very little to say that is additional to the comments I have made previously to the Stakeholder Group. (Clachan Seil Wastewater Treatment - Public Meeting 15 June 2017, Comments from Chris Chubb.)
- 2.2. A minor criticism is that the discussion of Options 3A and 3B in sections 8.11 and 8.12 is a little muddled, mixing references to the draft Options Report's Options 3A and 3B, with revised Options 3A and 3B.
- 2.3. For clarity, my understanding is that Scottish Water's Options 3A and 3B are now for either Option to discharge via a proposed Southern outfall to Easdale Bay. Option 3A would discharge at 4 metres depth, and Option 3B at 5 metres depth. Option 3A is for a septic tank, secondary filter and UV disinfection. It would be for SEPA to decide whether disinfection should be seasonal or year-round. Option 3B is for a septic tank discharge alone. My references to Options 3A and 3B throughout this document are based on this understanding unless explicitly referenced to another document.
- 2.4. I have also challenged an assumption in section 8.10 that surface water runoff into the sewer has negligible bacterial load. These issues are also referred to in Sections 3.3.2 to 3.3.4 below.
- 2.5. Overall, I believe the Final Options Report to be a fair and accurate statement of the Options considered and the Conclusions now drawn by Scottish Water.
- 2.6. The Community Stakeholders came up with a different set of Option Appraisal Scores, firmly placing Option1A ahead of Option3B.
- 2.7. I agree that there are now only two viable options from those initially considered, both conditional on receiving environmental permits and any relevant planning permission requirements that are acceptable to Scottish Water. These are Option 1A (new treatment works discharging via the Balvicar outfall to Seil Sound, and a new septic tank serving Seaview Terrace discharging to Easdale Bay,) and Option 3 (septic tank treating sewage currently arriving at Balvicar WWTW plus Seaview Terrace flows). Option 3 is further subdivided into either of Option 3A (disinfection) or 3B (deeper outfall) discharging via the Final Options Report "Southern" outfall to Easdale Bay.
- 2.8. **Option 1A -New Hillside treatment plant**

I support the Stakeholder view that Option 1A provides the best overall "deal" for the community and environment, and hope it can proceed to completion. In my view it will deliver

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the intentions of the original scheme - minimising the polluting impact of sewage originating on the East side of the island, and providing a high level of water quality in Seil Sound. This should be sufficient to ensure that the effluent does not threaten year-round and year-by-year compliance with Shellfish Waters Directive standards, thereby helping to assure good quality shellfisheries and year-round recreational use. By locating the treatment works as far as is reasonably practicable from homes, and thus minimising risk of visual, noise and smell nuisance associated with operations, Option 1A offers a long-term, local solution for sewage originating on the East side of the island.

2.9. Other concerns

There is a risk that SEPA may require the existing final effluent / CSO outfall soffit to be located at actual Mean Low Water Mark of Spring Tides, rather than via the elevated terminal valve which also does not meet SEPA's 50x Initial Dilution policy. There may be third party legal challenges regarding compliance with the Shellfish Waters Regulations.

Whilst there will inevitably be some short-term disturbance to the community and site ecology during construction, sensitive landscaping and planting of the treatment site and access road verges could effectively hide the treatment plant from view and provide increased biodiversity and a "wildlife corridor".

2.10. Option 1A – Seaview Septic tank

I have some reservations about installing a small septic tank discharging via the current outfall at Seaview, given the clear evidence of complex nearshore circulation, potentially affecting the water's edge, particularly at low tide. However, I consider the small number of properties involved, and the likely 90+% reduction in existing polluting load mitigates most environmental and public health concerns, and will be a considerable improvement over the existing untreated discharge.

2.11. Other concerns

There is a risk that SEPA's cost/ benefit assessment will require that the present outfall be extended so that the soffit is below Mean Low Water of Spring tides (MLWS).

There is a risk of odour nuisance to Seaview properties from normal tank ventilation and during desludging operations, and counter measures such as carbon filters should be considered.

2.12. Conclusion

I think that both elements of Option1A can most probably, subject to the granting of environmental permits from SEPA and any relevant planning permission from Argyll and Bute Council, conform with regulatory policy and deliver legal compliance with environmental and water quality requirements.

3. Option 3 transfer sewage from Balvicar to New Septic tank at Seaview quarry site

- 3.1. If insuperable obstacles to delivering Option 1A materialise, (it is recognised that obtaining Planning Permission might be a problem) then one of the Option 3 variants will need to be developed to deliver a successful solution.
- 3.2. There are two Option 3 variants both discharging via an Outfall South of the original Option 3: either 3A, Septic Tank, secondary filter and UV disinfection at about 4m depth, or 3B, Septic tank discharging via longer outfall at about 5m depth.

3.3. Addendum Report

- 3.3.1. Informing the Final Options Report there has been further refinement of thinking and modelling within Scottish Water regarding the Easdale Bay options, to address concerns raised by community stakeholders and myself. The net result appears to be that there is recognition of limited circulation and dispersion within Easdale Bay and that outfalls for either 3A or 3B will need to be longer and deeper than initially thought, reducing the risk of entrainment of treated sewage effluent within inner Easdale Bay. Much is contained in the Addendum report from Anderson Marine (AMSL Report No.16/10.1 – rev 2, 13 June 2017 – Easdale tracer, hydrographic and dispersion report - Easdale Dispersion studies June 2017 Addendum). This modifies the conclusions of the first Easdale tracer hydrographic dispersion report, using improved design data on sewage flows, concentrations and loads to model outfall lengths and dispersion of bacteria in relation to Bathing Waters standards. Although not directly quoted in the Options Report this Addendum formed the basis of many of the changes to the Option 3 considerations in the Final Report. Note that the Addendum report has Option 3A discharging via the original proposed Northern Outfall, so the data is not directly comparable with the current Option 3A which discharges via the “Southern” outfall.
- 3.3.2. It is clear and to be commended that the Scottish Water design team has done much in ensuring that “conservative” design approaches have been adopted in sewer modelling, treatment design and dispersion modelling. They have aimed at ensuring that operational performance will be at least as good as predicted. For Option 3A there is a manufacturer’s disinfection process guarantee of not more than 10,000 FC/ 100ml at end of pipe and maximum flow, so with a minimum of 50x initial dilution at mean flows, surface concentrations would not be expected to frequently exceed 200 FC/100ml while disinfection is operating. However, for Option 3B, (septic tank only) Scottish Water have yet to provide a clear, comprehensive “cradle to grave” or more accurately “foul sewer to recreational-water-point-of-use” statistical analysis of sewage microbial strengths, flows and loads through the treatment and effluent dispersion systems.
- 3.3.3. I have had valuable discussions with Scottish Water design engineers and their marine consultants regarding bacterial loadings and interpretation of the modelling results of effluent

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dispersion and Bathing Waters compliance. As a result various bacterial loadings of effluent following treatment have been modelled to assess Bathing Waters standards compliance distances from the proposed outfalls for Options 3A and 3B. These results, and ensuing verbal and email dialogue have enhanced mutual understanding of the importance of assessment of bacterial loading, and I hope that this additional work will also be summarised in a short report from Scottish Water.

- 3.3.4. The Mathematical Model used for this work, Visual Plumes, is a relatively simple model assuming a constant-flowing "ribbon" plume of effluent with dilution resulting from vertical mixing as the buoyant sewage (freshwater) plume moves upwards through the water column from the outfall pipe, and transverse horizontal spreading at the sea surface, described numerically by the dispersion coefficient. (The dispersion coefficient is a simple area/time parameter, which does not account well for real world turbulence and topographic effects.) At Easdale Bay and the Sound beyond, high wave and tidal energy, and topographic effects of the rocky coastline and seabed, generate turbulence, shear and eddies which will increase the rate of dispersion beyond those predicted by the model. In my view the net result is that the model provides a conservative, i.e. pessimistic view of likely dispersion of the effluent in the receiving waters. This is supported by the tracer studies undertaken for Option 3, which indicated rapid dilution and dispersion. However, there is firm evidence of a tidal eddy in Easdale Bay and it is not clear whether the 4 or 5 metres depth outfalls proposed in Options 3A and 3B would sit outside that eddy for all or part of the tidal cycle. There is therefore potential for some or all of the surface effluent plume resulting from a minimum 50x initial dilution between outfall and sea surface to be entrained in the eddy, despite the high tidal turbulence and strong currents further offshore. It seems unlikely that a disinfected effluent discharged from the Option 3A outfall would result in a breach of Bathing Waters standards in the eddy or at the shoreline. (Note that unless Scottish Water were to voluntarily adopt year-round disinfection, disinfection would likely only be required during the Bathing Season). The position is less clear for an undisinfected effluent from 3B, or from 3A if only seasonal disinfection were adopted.
- 3.3.5. Using the Scottish Water provided criteria the Addendum Report indicates that a slightly longer and deeper outfall (than that identified in the Final Report) would be required in order to achieve EC Bathing waters "Sufficient" standard within a small radius of the 3A outfall, (in the Addendum Report this Option 3A is discharged via the Northern outfall) . For Option 3A (disinfection, Northern outfall) the requisite depth was modelled at 4metres below Chart Datum to achieve "Excellent", "Good" and "Sufficient" standard within 50metres of the outfall, and for Option 3B (septic tank only, Southern Outfall) at 5metres below Chart Datum to achieve "Sufficient" standard within 100 metres of the outfall. The Final Options Report (p59) contains a plan showing the location of the 3B outfall, and a 100 m radius for achievement of "Good" status which impacts on the shoreline. As a result of this discrepancy between the two reports it is not completely clear whether any shoreline would be impacted by water of less than "Sufficient" standard. It is also not clear whether any impacted shoreline would be considered by SEPA to be "point of use" in the context of their policy for protection of recreational waters.
- 3.3.6. Overall I am satisfied that the Addendum report is competent, reflecting sound science in further analysing the survey data, (in relation to the 2016 report, AMSL Report No. 16/10.1 – rev1, October 2016, Easdale tracer, hydrographic and dispersion report,) and in drawing conclusions based on updated design criteria provided by Scottish Water. However, as

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mentioned in 3.3.3 further information on bacterial loadings and dispersion is now available, which should further refine confidence in estimates of likely compliance with Bathing Waters standards. I hope that Scottish Water will put this information in the public domain.

3.4. Other concerns

Storm tanks at Balvicar will be enlarged to ensure that the Balvicar CSO discharge will operate less frequently than 10 times per year on average. There is a risk that SEPA may require the Balvicar (CSO) outfall soffit to be located at actual Mean Low Water Mark of Spring Tides, rather than via the current elevated terminal valve.

I consider that the close proximity of the Option 3 septic tank to Seaview properties will pose a risk of odour nuisance from normal tank ventilation processes and during desludging operations unless counter measures such as carbon filters are provided.

Although Options 3A & 3B both provide for the amalgamation and re-location of two existing discharges, either Option would constitute a “new” discharge into the Firth of Lorne. There may be third party legal challenges as to the making of a new discharge into a Marine Protected Area and Special Area of Conservation.

3.5. Conclusion

I think that in the event of Option 1A meeting insuperable obstacles, either of Option 3A (septic tank ,secondary filter and UV disinfection, discharging at about 4m depth via Southern Outfall,) or Option 3B, (septic tank discharging via a longer deeper (5m) Southern outfall without disinfection) can, subject to the granting of environmental permits from SEPA and any relevant planning permission from Argyll and Bute Council, conform with regulatory policy and deliver legal compliance with environmental and water quality requirements, albeit transferring most of the sewage pollution load originating on the East side of the island to the West for treatment and discharge.

4. Overall Conclusion

I am firmly of the opinion that Option 1A offers the best environmental outcome for the residents of Seil, managing the sewage originating on the East side of the island close to point of origin and delivering high water quality in Seil Sound, and providing a significant reduction in the polluting effects of the small Seaview discharge. Delivering Option 1A is likely to cause some disruption to residents during construction, and to the island’s ecology during and post-construction. I believe that such impacts can be readily mitigated and or remediated by Scottish Water, and with a bit of community engagement the access road and treatment site can become an ecological asset for the island.

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If Option 1A proves to be impossible to deliver Option 3A or 3B can probably conform with regulatory policy and legal compliance, with limited or negligible impact on the water quality of Easdale Bay, particularly if the secondary filter and disinfection option (3A) is adopted.

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