



	<p>Kaikorai Stream channel. As part of the S92 response a plan titled Constructed waterbodies and landfill boundaries (Boffa Miskell 29/8/23) was provided with Areas of Significant Biodiversity Value (DCC) and Regionally Significant Wetlands (ORC) which indicate the wetland extent at a very coarse scale. No onsite wetland delineation was undertaken to clearly define the wetland edges. This would ideally have been provided to get a more accurate picture of the site, however as the works do not extend into the wetland and tributary channels the assessment was able to be made without this level of desired detail.</p>
<b>Q:</b>	<b><i>If granted, are there any specific conditions that you recommend should be included in the consent?</i></b>
<b>R:</b>	<p>I support the ecological conditions proposed related to the revegetation plan and updated bird management plan. In the case of the Vegetation Management and Restoration Plan the condition should be worded to require a Vegetation Management and Restoration Plan to be provided, in accordance with the draft Vegetation Restoration Management Plan Framework.</p> <p>No additional ecological conditions, in addition to those already proposed, are recommended. However, a condition for ecotoxicity monitoring is recommended, with ecotoxicological monitoring undertaken every 5 years, unless there is evidence of significant contamination, or downward trends in groundwater quality or surface water quality. Monitoring should be undertaken in accordance with the method outlined in the Cawthron report.</p> <p>Silt and sediment control requirements, surface water monitoring and ecotoxicity monitoring should be conditioned as outlined in other technical specialists' review memos.</p>
<b>Ecology</b>	
<b>Q:</b>	<b><i>Does the application appropriately identify sensitive areas including values within the Kaikorai Stream, upstream and downstream of the proposed activities, wetlands and any other affected water bodies (surface, ground and coastal water)? Yes/no</i></b>
<b>R:</b>	<p>The Kaikorai Stream and estuary which extend along the site's north and west margins are located within an area identified as a Regionally Significant Wetland in the Otago Regional Plan and an Area of Significant Biodiversity in the Dunedin City Council Plan. These areas are both discussed at a broad level in the reports alongside the fauna found in these areas as part of survey data.</p> <p>Freshwater ecology and monitoring includes sites both up and downstream of the site.</p> <p>Any potential impacts related to the historic estuary reclamation which could adversely impact groundwater quality (see groundwater quality technical memo) have not been addressed in the ecological report.</p>
<b>Q:</b>	<b><i>Is the description of the sensitive areas attributes potentially affected by the activity accurate?</i></b>
<b>R:</b>	<p>The attributes of the sensitive areas are only discussed very broadly and the report does not clearly describe other potentially sensitive areas such as the drainage channels in the wetland areas and small tributary channels alongside it.</p> <p>Water quality, sediment quality, macroinvertebrate community and fish community data were provided and discussed.</p> <p>Overall, the description of the sensitive receiving environments is considered appropriate and identifies key features.</p>
<b>Q:</b>	<b><i>Has the instream ecology of both the wetland and the Kaikorai Stream been appropriately assessed including both native and sport fish values? Please include details on the appropriateness of the method of assessment</i></b>



<b>R:</b>	<p>Aquatic ecology was assessed as part of field assessments and instream sampling, in addition to a desktop assessment. This provided an appropriate assessment of the macroinvertebrate community, instream habitat and native fish communities in the vicinity of the landfill.</p> <p>Brown trout were identified as having been recorded from the Kaikorai Stream catchment, however no specific assessment of potential effects of the landfill on these fish was provided. It is anticipated that the Kaikorai Stream in proximity of the landfill is unlikely to be an important habitat for sport fish such as brown trout.</p>
<b>Q:</b>	<p><b><i>Has the natural character of the watercourse and the wetland been appropriately assessed? Please include details on the appropriateness of the method of assessment</i></b></p>
<b>R:</b>	<p>The ecological assessment only describes the natural character of the watercourse and wetland at a very broad scale. Further detail was sought on the actual extent of wetland habitats including updating the plan to show tributaries and channels associated with it, but this was not provided, with just the overlay extent marked on the plans. A correctly delineated plan would have provided more rigour to the application's ecological assessment particularly in regard to identifying the setback areas of the landfill activities. It is noted however that the wetland itself is not directly impacted by the proposed continuation of the landfill operation (having already been partially reclaimed by historic landfill activities), being located just beyond the operational landfill extent and designation area. In addition, leachate is not directly discharged to this area with the leachate trenches being treated via the wastewater treatment plant located adjacent to the site. As such the information provided is considered sufficient to describe the natural character of this area.</p> <p>While the ecological impact assessment provided did not consider any residual ecological effects remained that necessitated offset or compensation measures, I do not concur as the continued operation and closure of the landfill should take into account impacts from the operation of the landfill thus far. Historically, part of the landfill extended into the estuary itself thus reclaiming part of this area and watercourses within the site and associated terrestrial vegetation have been modified or reclaimed as part of ongoing landfill operations. As such the restoration of the site as part of landfill closure is considered important to compensate for the overall impacts of the operation of the landfill. The Cultural Impact Assessment also sought the restoration of ecological values of the Kaikorai Estuary.</p> <p>A draft Vegetation Restoration Management Plan Framework (Boffa Miskell, 30/9/23) has been provided as part of the S92 response to the ecological and landscape queries however their response noted that it is being proposed only as a requirement related to the Landscape and Visual assessment of effects and is not considered a requirement of the ecological effects assessment. This seeks to ensure the successful restoration of the site following closure of the landfill.</p> <p>Revegetation and restoration at the site alongside closure will provide a significant ecological benefit to the receiving environment by creating a large, vegetated area that will aid in buffering the Kaikorai Stream, in addition to increasing terrestrial ecological values and fauna habitat.</p>
<b>Q:</b>	<p><b>Has the Applicant proposed appropriate monitoring for the duration of the consent? I note that ecotoxicology monitoring is mentioned as being ongoing.</b></p>
<b>R:</b>	<p>The method and analysis of monitoring ecotoxicity is considered appropriate however the frequency of monitoring is recommended to be every 5 years, unless there is evidence of significant contamination, or upward trends in groundwater quality or surface water quality. The consent conditions should be worded to reflect this.</p>
<b>Q:</b>	<p><b><i>Have the cumulative effects of the activity been appropriately assessed? Yes/no</i></b></p>
<b>R:</b>	<p>No. Cumulative effects have not been discussed in the ecological assessment.</p>
<b>Q:</b>	<p><b><i>Do you agree with the Applicant's conclusions as to the level of adverse ecological effects within the aquatic environment?</i></b></p>



<b>R:</b>	<p>Overall, the ecological assessment accompanying the application indicates the level of effect to the aquatic environment and fauna is very low due to a negligible magnitude of effect on moderate-high ecological values.</p> <p>I agree that the groundwater drawdown will have a negligible effect on the aquatic environment and that no discernible effects have been found in surface and groundwater quality monitoring.</p> <p>There are however indicators of some unaccounted-for leachate loss to the receiving environment. Ecotoxicity tests recorded increased toxicity downstream of the landfill. The ecological assessment assigned the cause of this to other ecological stressors not associated with the landfill. This conclusion is likely to be incorrect as old stream channels beneath the landfill, in conjunction with the leachate trench location, may provide pathways for unrecognised leachate loss. This is discussed further in the groundwater technical review. The results indicate there may be effects that have been identified as being associated with the landfill leachate, that would otherwise not have been detected or been identified if only the surface or groundwater water chemistry results themselves were assessed in isolation. Further analysis and/or modification to the leachate trench in some places is required to be able to quantify and/or minimise potential effects of leachate loss.</p> <p>I also agree that appropriate sediment erosion and sediment control measures are required related to the earthworks activities associated with the landfill.</p>
<b>Bird Management</b>	
<b>Q:</b>	<b><i>Do you agree with the applicant's assessment of effects on birds, including threatened species, resulting from the proposed activities?</i></b>
<b>R:</b>	<p>Yes, a comprehensive assessment has been undertaken on potential effects to birds as it relates to the landfill and the airport. I agree that risks to birds will reduce as the population decreases with the reduction in putrescible waste and eventual closure of the landfill but also that without mitigation the increased bird strike risk from dispersal due to habitat loss in the landfill will increase.</p> <p>International guidance generally looks at activities within 13 km of an airport in regard to potential impacts on airports. The Green Island landfill is 16 km away from the airport. There is the risk however that as landfill operations reduce the large bird population may search for food further afield as the landfill operations change as part of closure, hence why bird strike risk at the airport is being considered as part of this application.</p> <p>The report indicates that the airport's bird strike is already considered to be high.</p>
<b>Q:</b>	<b>Does the Applicant propose appropriate mitigations to reduce the risks posed by birdlife, for example on the Dunedin Airport?</b>
<b>R:</b>	A draft Southern Black-backed Gull (BBG) Management Plan has been developed as part of the new Smooth Island landfill (which is located further south of Dunedin) consent conditions – noting that the Smooth Hill consents are currently under appeal. A final plan is proposed as a condition of consent.
<b>Q:</b>	<b>Do you agree with the Applicant's conclusions as to the level of adverse ecological effects on birds?</b>
<b>R:</b>	The bird risk assessment focuses on the risk of bird strike at the airport as a result of disbursement from the landfill as it is progressively capped. It included a survey of birds present at the airport and within the landfill, taking note of those most likely to be at increased risk of bird strike. I agree with the conclusions based on the observed abundance of different species at each site, specific species behaviour and records or bird strikes to date at the airport.



	I agree with the level of adverse effects to birds as a result of the ongoing use of the landfill followed by closure as summarised in the ecological assessment that the operation of the landfill has negligible impacts on birds with a positive impact in the short term for food supply reducing to low as the food supply sources decrease. The closure of the landfill in the long-term will have a positive effect on avifauna as sedimentation and contaminants entering the receiving environment are reduced.
<b>Q:</b>	<b>Do you agree with the Applicant’s conclusions as to the level of risk to the airport posed by birds?</b>
<b>R:</b>	I agree that without the application of measures to reduce ongoing bird establishment at the site the closure of the landfill may increase the risk of bird strike as active areas of the landfill are closed and they disperse further from the landfill in search of food resources.  A draft Black Billed Gull Bird Management Plan has been provided which suitably outlines methods to manage the risk of dispersal from the site.

### 3.0 Closure

In conclusion, while there are aspects of the proposal where further detail of the existing site would have been desirable, the information provided is generally sufficient to describe terrestrial and aquatic ecological values of the site and the impacts of the landfill operations on these.

No new native vegetation areas or watercourses will be impacted in comparison to those already impacted by the historic and current landfill operations as the landfill will continue within the current active landfill area.

Freshwater ecological values have been described through comparing to upstream monitoring sites. Ecotoxicology approaches and analysis are appropriate for the site.



Ecological impacts related to the increased risk of bird strike at the airport appear to have been appropriately considered and actions proposed to reduce this risk.


However, cumulative impacts have not been addressed in the ecological report.

Regards,

**SLR Consulting NZ**



**Elizabeth Morrison**  
Principal Ecologist



**Keren Bennett**  
Technical Director - Freshwater

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