	8 Appendix 11 - Ecology Impact Assessment Report	**Where / how this has been addressed in the EcIA**	**Report reference**
	8.1 Freshwater ecology		
8.1.1	**Sections 1-4**		
	We did not identify critical gaps in the scope of the ecological assessments that were undertaken. However, we note that field assessments were significantly constrained by restrictions imposed by the COVID-19 pandemic response and limitations to access until May 2020. The authors of the ecological report have acknowledged that further ecological field assessments are required to confirm the ecological values that are present and to complete the ecological impact assessment.	**Herpetofauna:** the project's herpetologist revisited the designation site and walked the alignment of the proposed upgrade of McLaren Gully and Big Stone roads on 7 May 2021. During this time, Samantha gathered general information on habitat condition within the designation site and adjacent to the road and carried out limited hand searching for lizards within road-side vegetation. **Freshwater:** the project's freshwater ecologist revisited the downstream tributary on 12 & 13 April 2021, to conduct a further survey of the fish community within the season recommended by national protocol of Joy et al. (2013).	Section 2.6 of the ecological impact assessment (EcIA) has been updated. Sections 2.7, 3.5, and 5-7 of the EcIA have been updated to account for the additional freshwater surveys.
	We support the ecological report recommendation to undertake additional fish surveys during a more appropriate time of the year. We would further suggest that those surveys incorporate additional methods to electrofishing where they are more appropriate to the environment (e.g. trapping or eDNA). We also support the ecology report recommendations to undertake further fieldwork to establish hydrological, water quality, stream habitat and wetland habitat baseline condition before any potential changes that may occur to surface and groundwater flows as a result of the proposed works. Establishing a robust baseline is pivotal to the proposed approach to identify any required offsets after the actual impacts have occurred. Additional surveys will also add to the accuracy of impact assessments.	**Additional surveys:** additional freshwater survey techniques were employed in April 2021 to respond to this comment from the technical reviewers. eDNA was not able to be collected due to environmental and site constraints; baited traps (fyke nets) were set in an area with sufficient surface water. **Additional monitoring and baseline information:** GHD updated its groundwater and surface water technical assessments to address this matter. These updated technical reports have been used to inform the EcIA.	Sections 2.7, 3.5, and 5-7 of the EcIA have been updated to account for the additional freshwater surveys.
	Further information sought		
a	The results of field surveys to assess freshwater fish communities, fish passage barriers, water quality, hydrology, wetland and stream habitat that may be impacted by the proposal.	As above, additional field surveys, as well as additional desktop research, mapping and interrogation of aerial imagery was undertaken to respond to this comment. The EcIA has been updated, throughout, to reflect these updates.	
	The groundwater report considers the potential impact of effects on Open Stream5 but goes on to exclude any assessment of effects on that watercourse after concluding that the proposed activities would have very low potential effects on the Open Stream catchment. However, the Open Stream catchment has not been considered in the ecological report. The applicant team response to our initial query on this issue is that Open Stream is outside the zone of influence. This presents a contradiction between the groundwater and ecological reports that should be clarified.	Open Stream has not been considered in the EcIA and it has been confirmed that this subcatchment will not be affected by the landfill proposal.	
	Further information sought:		
b	Provide clarification on whether the Open Stream catchment is within the zone of influence or not. If earthworks and discharges are taking place within the Open Stream catchment then an assessment of the potential effects should be provided.	Open Stream has not been considered in the EcIA and it has been confirmed that this subcatchment will not be affected by the landfill proposal.	
	The ecological report does not appear to have considered the newly released National Environmental Standards for Freshwater and National Policy Statement for Freshwater Management, possibly because they were only released very recently. Those documents are likely to have implications for how values and impacts are assessed and should be included in the ecological assessment. Of particular importance will be how habitats may meet the definition of a "natural wetland".	Section 3.2.1 of the ecological impact assessment has been updated to include explicit reference to National Policy Statement for Freshwater Management 2020 (NPS-FM 2020) and that all wetlands described in the EcIA are 'natural inland wetlands'.	Section 3.2.1 of the ecological impact assessment has been updated
	Further information sought:		
c	Please provide an assessment of the application against the recently released National Environmental Standards for Freshwater and National Policy Statement for Freshwater Management.	This is a planning and design matter, which is best addressed within the Assessment of Environmental Effects (AEE) and design report. However, the updated EcIA provides context and pertinent information to inform the AEE with respect to the NPS-FM 2020 and National Environmental Standards for Freshwater 2020.	
	An important objective for ecological surveys should be delineating the length of perennial, intermittent and ephemeral stream length. While perennial and ephemeral watercourses are identified and discussed, we could find no mention of intermittent watercourses being present. It may be that this is because they are not present, however, we believe this should be clarified. We are also unsure how perennial and ephemeral watercourses were differentiated as part of the ecological report and appreciate that it may have been difficult due to having limited access to the site. Robust classification of stream type is likely to be important for assessing the level of effects and appropriate mitigation, offsets or compensation. We have found methods for classifying small streams developed by Auckland Council to be useful in this regard6.	There are no intermittent or perennial waterways within the designation site, despite streamlines being shown on the topographic map. These topographic streamlines are often found to extend further upstream in headwater areas, including ephemeral or intermittent reaches. Within the designation site, the streamlines indicate gully head flow paths that only carry surface water for a limited period and after rainfall events. This has been confirmed after numerous site visits across multiple seasons and throughout varied weather conditions. Section 3.5 of the EcIA has been updated to respond to this.	Section 3.5 of the EcIA has been updated to respond to this.
	Further information sought:		

d	Develop and apply a method for classifying and differentiating between ephemeral, intermittent and perennial watercourses that will be impacted by the proposal.	Perennial or intermittent reaches are not present within the designation site as discussed within the EcIA.	
8.1.2	**Sections 5-7** See Section 8.2.1 below for a high-level review of assessment of effects contained in the ecological report.	Refer below	
	With respect to potential hydrological effects on downstream wetland and freshwater values, we acknowledge that the proposed approach to determining the appropriate scale of mitigation, offset or compensation using empirical data is preferable to attempting to predict losses in advance using modelling. However, this approach also means that it is unlikely that much confidence can be placed in the magnitude and level of effects assessments provided without mitigation as summarised in Table 19 of the ecology report. It is therefore important that any proposed management and monitoring plans (e.g. as described in Section 6.6 of the EcIA) be provided upfront to allow detailed technical reviews to ensure effects are adequately managed.	Draft management plans have been developed including a Vegetation Restoration Management Plan, which addresses the mitigation required to address wetland loss. It is also important to note that the uncertainty regarding and magnitude of effects to downstream wetlands, as detailed in our originally submitted EcIA, has substantially reduced by the revised landfill proposal and additional information provided in GHD's updated technical assessments.	
	Further information sought:		
a	Proposed management plans that include a detailed methodology of how any potential loss of downstream wetland and stream habitat will be measured and managed to achieve a no net loss (ideally net-gain) outcome.	As above, a draft Vegetation Restoration Management Plan has been developed. Further, no net loss calculations now included in EcIA for wetland offset (Appendix 7).	
	The EcIA has highlighted the potential for changes to access roading to impact on wetland habitat. The maps also show that the Otokia Creek flows alongside McLaren Gully Road into the site. Based on this information, it would seem possible that road upgrades could potentially result in disturbance of the current stream alignment.	The proposed widening of McLaren Gully and Big Stone Roads has been substantially revised, largely in order to address avoiding ecological effects on wetland habitats, where possible. The proposed road upgrades are not anticipated to affect any waterways, including Otokia Creek where it flows alongside McLaren Gully Road. The EcIA has not been updated to respond to this as this section of Otokia Creek is outside of the footprint.	
	Further information sought:		
b	Clarification on whether there is any potential for road upgrades to impact on stream habitats including fish passage. If potential effects exist then these should be assessed.	We have assumed that the proposed upgrades to McLaren Gully and Big Stone Roads will not require installation of any new culverts. However, upgrades or extensions to existing culverts may be required. Section 5.4.1 of the EcIA has been included to address this.	
8.2	**Terrestrial ecology** Additional information is required in some sections to be able to undertake a thorough assessment of whether a no net-loss/net-gain outcome can be confidently achieved if the ecological impact management measures proposed are implemented. Recommendations for additional information are provided below.	As above, a draft Vegetation Restoration Management Plan has been developed. Further, no net loss calculations now included in EcIA for wetland offset (Appendix 7).	
8.2.1	**Sections 5-7** Although the assessment of effects section (section 5) follows best practice methodology (Roper- Lindsay et al 2018), in the assessment process, for some ecological features (i.e. herpetofauna and avifauna that may be subject to strike risk) the magnitude of effect is assessed with the implementation of best practice management (i.e. measures to manage/mitigate effects) taken into account. However, for the terrestrial and wetland vegetation or other avifauna components, the effects assessment does not take mitigation measures into account. At the start of Section 5, the reports states "we determined the magnitude of effects of the proposed activities and likely level of effect without mitigation" (section 5.0, page 54). As such, this approach has not been consistently applied.	Section 5.5 of the EcIA has been updated to correct this. We have more clearly stated that while the "Overall Summary of Ecological Effects" provides the Level of Effect without mitigation, our assessment also assumes implementation of a Falcon Management Plan, Bird Strike Management Plan and a Lizard Management Plan.	Section 5.5 of the EcIA
	Further information sought:		
a	Provide an updated overall effects assessment that considers the effects before and after mitigation for all ecological features/ecosystem component. This will enable more transparency on the extent and level of ecological effects of the landfill before any management/mitigation is applied, which will indicate the level and nature of impact management measures required to sufficiently address the effects and achieve a no-net loss (ideally net-gain) outcome. In this regard, we recommend using a consistent assessment approach for all ecological features. For each ecological attribute, please amend Table 19 to include a column for level of effect (before any effects management measures are applied), a summary of relevant effects management measures that will be applied and level of effect (after effects management measures are applied).	The tables within Sections 5.5 and 7 of the EcIA have been updated to address this. Also see above.	Sections 5.5 and 7 of the EcIA

	As mitigation is required for significant vegetation (due to Otago RPS and proposed Dunedin 2GP provisions) irrespective of the ecological value, magnitude of impact and overall level of ecological effects, we suggest clarifying which vegetation types are considered "significant" in Section 6.	Section 6 of the EcIA has been updated to refers to the significance assessment already provided in Section 3.2.2. We do not consider it necessary to add to Section 6 as suggested by the technical peer reviewers.	
	Further information sought:		
b	Provide clarification of which vegetation types are considered "significant" in Section 6 taking into account the requirements of the Otago RPS and proposed Dunedin 2GP. Please provide a table (or update Table 17) specifying significance for each vegetation type and quantum of vegetation to be removed.		Table 17 in Section 5.1.1 of the EcIA has been updated.
c	Specify the mitigation measures to be applied for each significant vegetation type and quantum of mitigation proposed.	We have updated our EcIA and provided draft management plans to address this query. For example, impact to significant wetland habitat is addressed in the draft Vegetation Restoration Management Plan; impact on lizard habitat and lizards is addressed in the draft Lizard Management Plan and the draft Vegetation Restoration Management Plan. The draft Falcon Management Plan details management requirements for the effects management approach relevant to the eastern falcon. The draft Landfill Management Plan outlines objectives and procedures for plant and animal pest control, which is relevant for all of the above.	
	Section 6 provides an overview of recommendations for impact management measures in accordance with the mitigation hierarchy (avoid, remedy, mitigate, offset, compensate). While the recommendations have been well thought out, clarification is needed as to whether any of the proposed measures will actually be undertaken. This will have an important bearing on whether the ecological impacts of the landfill laid out in section 4 will be effectively managed and a no net-loss (ideally net-gain) outcome is achieved.	Draft management plans have been developed. This includes a draft Vegetation Restoration Management Plan, which addresses the mitigation required to address wetland loss.	
	Further information required:		
d	Clarify which of the recommendations for impact management measures in accordance with the mitigation hierarchy set out in Section 6 will be undertaken. If this information is to be provided in ecological management plans, these plans need to be provided upfront in order to determine whether ecological effects associated with the project will be appropriately avoided, minimised, mitigated or offset/compensated.	As above, draft management plans have been developed.	
	In Section 6.3 (Mitigation), clarification, calculation (and methodology) and rationale is needed on how much replacement treeland and wetland habitat will be created and how much will be enhanced to mitigate for the loss of these vegetation types as assurance that no-net-loss (ideally net-gain) will be achieved.	As above, a draft Vegetation Restoration Management Plan has been developed. Further, no net loss calculations now included in EcIA for wetland offset (Appendix 7).	
	Further information required:		
e	Clarify how much replacement treeland and wetland habitat will be created and how much will be enhanced to mitigate for the loss of these vegetation types. Provide calculations (including methodology) and rationale for quantum proposed.	No net loss calculations have been included in EcIA for wetland offset using best practice Biodiversity Offsets Accounting Model for New Zealand. These calculations have been included in Appendix 7 of the EcIA.	
f	Please also provide a table detailing how much vegetation will be lost (for all vegetation types) and the quantum of revegetation and/or enhancement proposed to mitigate/offset/compensate for the loss of each type. If the location of the revegetation or enhancement is known, this should also be provided (ideally in map format to demonstrate proximity to the impact site).	Given the updated design, which has reduced effects on indigenous / ecological values, addition of a new table was deemed unnecessary. We have updated Table 20 to incorporate / provide this information - using bold font, for example.	
	In section 6.4 (Offsetting), information on the method/rationale/calculations behind the proposed offsetting amounts is required to provide robustness and assurance that a no-net loss (ideally net- gain) outcome is achieved. It is presumed that the ecological management plans listed in the report (Wetland Restoration, Terrestrial Vegetation Restoration, Pest Control, Falcon and Lizard Management Plans) will be developed and will contain more details regarding the impact management measures required to address the ecological effects of the project. The information provided in these management plans will be relevant to assessing whether the project will result in no net-loss (ideally net-gain).	As above, draft management plans have been provided up front. No net loss calculations have also been included in the EcIA for wetland offset using best practice Biodiversity Offsets Accounting Model for New Zealand.	
	Further information required:		
g	Provide the method and calculations used to determine the proposed mitigation and offsetting quantum for terrestrial and wetland vegetation creation and enhancement. Please demonstrate how a no-net-loss (ideally net gain) can be achieved by the proposed actions. Please also clarify how time lags associated with mitigation and offset planting will be addressed by the proposal.	No net loss calculations have been included in the EcIA for wetland offset using best practice Biodiversity Offsets Accounting Model for New Zealand. This is provided in Appendix 7 of the EcIA.	

h	If the further information requested above is to be laid out in detail in the series of ecological management plans proposed, these plans need to be provided upfront in order to assess whether the ecological impacts of the project will be adequately addressed and whether appropriate effects management measures will be applied.	As above, draft management plans have been developed to be lodged with the resource consent application.