**DANIEL CURTIS – STORMWATER**

Intro

1. My name is Daniel Lee Curtis, and I am a Technical Director for stormwater at Harrison Grierson consultants.
2. I have 28 years of experience working as an engineer, predominantly on Stormwater Management projects.

Summary of my evidence

1. The stormwater management that has been proposed for the development of the TPIL site at 297 Te Puna Station Road has been designed in accordance with the requirements of the Te Puna Business Park Structure Plan as presented the Western Bay of Plenty District Plan (Appendix 7).
2. The stormwater management designed by WSP considered the comprehensive development of the TPIL site. Subsequent flood modelling undertaken through the application process has identified that a smaller component of the TPIL site could be filled without significant impacts on the flood hazard elsewhere in the catchment.
3. The current application provides stormwater management for this reduced development area of the TPIL site with recommended conditions related to the potential development of the remaining area in the future.
4. The stormwater management for the development applies a treatment train approach to reduce the risk of contaminants being discharged from the operational site.

Stormwater Infrastructure

1. The proposed stormwater infrastructure created as part of the TPIL development includes:
	1. The reformation of the existing Te Puna Station Road open drain from its current location to within the TPIL site boundary. This will be constructed to match existing falls and connect to the flowpath on the eastern boundary of the TPIL site.
	2. The existing 900DN culvert discharging beneath Te Puna Station Road from the northern roadside drain, including runoff from the neighbouring OPL site to the north will be extended to retain the connection to the flowpath on the eastern side of the TPIL site.
	3. A new swale will be constructed along the Te Puna Station Road frontage of the TPIL development area to treat and convey runoff from the site to the forebay of the wetland in the northeastern corner of the TPIL site.
	4. A new swale will be constructed to either side of the internal road serving the TPIL development to treat and convey site runoff to the forebay of the pond located in the northeastern corner of the TPIL site.
	5. A new stormwater wetland will be constructed in the northeastern corner of the TPIL site to provide treatment and attenuation of site runoff prior to discharge. This wetland will be bunded to a height above the 1% AEP flood level to further reduce the risk of resuspension of contaminants during extreme rainfall events in the Hakao Stream catchment.
	6. Reinstatement of natural wetland feature and formation of a vegetated overland flowpath downstream of the TPIL site in line with the Te Puna Business Park Structure Plan.
		1. The flowpath has been increased from the 20m width as set out in the Structure Plan to the proposed 45m width to assist with conveyance of flows through the area whilst minimising potential flood hazards.
	7. The construction of a third 1600DN culvert beneath Teihana Road to provide improved drainage ability between the Hakao Stream and Te Puna Business Park drainage to the Wairoa River.
	8. The workshop located on the site is to be retained and a proprietary treatment device will be provided to provide a form of pretreatment prior to discharging to the swale on the southern side of the internal TPIUL road.

Design Parameters

1. The swales and wetland have been designed to treat and safely convey site runoff from the developed site up to the 100-year; 10-minute storm event representing the critical storm duration and the first flush from the development.
2. The WSP design allows for attenuation of the 100-year; 10-minute flows to no more than 80% of pre-development rates. It is considered that attenuation may not be required due to the demonstration that there are no significant impacts on flood hazard elsewhere in the catchment in response to the proposed filling of the TPIL site. The attenuation component has been retained but may be able to be removed through the detailed design process with agreement with Western Bay of Plenty and Bay Of Plenty territorial authorities.
3. New swales draining the TPIL land will be constructed only within filled areas of the site to reduce the risk of interaction with groundwater.
4. The wetland will be constructed with a minimum base 0.5m below the existing ground level to allow groundwater to maintain a permanent water level and healthy environment for plants.
5. Runoff from the area of land above the TPIL land on the western and southern boundary naturally drain through the TPIL site. This runoff does not require mitigation; however, must be safely conveyed through the TPIL site. Currently design options are being considered on how to best manage these flows.

Response to Mr Kernot’s Submission dated 4th July 2024

1. In sections 12, 13 and 14 in his evidence, Mr Kernot describes the local operation and concerns associated with the northern roadside drain, the culvert connection beneath Te Puna Station Road and the onwards conveyance. In particular, the presence of standing water within the existing southern roadside drain even during the summer months (observations provided from February 2024).
2. I agree with Mr Kernot that the roadside drain system on Te Puna Station Road is critical in safely conveying flows through the local area. The formation of a new southern side roadside drain and the cleaning of the drain on the eastern side of the TPIL land will provide an opportunity to create a positive grade which may currently not be present in the present arrangement due to partial blockage of flows through vegetation and local side instabilities.
3. In Section 17 Mr Kernot requests that consistency is applied to the design rainfall approach, in particular to consider RCP to 2130.
4. With recent severe weather events recorded around the country in the past few years, the topic of climate change is a necessary consideration in the design of stormwater networks. Section 5.8.3 Climate Change Guidelines of the Bay of Plenty Regional Council’s Hydrological and Hydraulic Guidelines document (Guideline 2012/02) considers 2.1 degrees climate change to 2090. Section 5.1.4 of the Stormwater chapter of the Western Bay of Plenty 2009 Development Code indicates that climate change considerations should be to the year 2040.
5. The Harrison Grierson analysis has considered the RCP 8.5 scenario to the year 2100 being the maximum period currently available from HiRDS. I agree that there should be a consistent approach to the application of climate change for the design of infrastructure and this will be accounted for in the detailed design stage.

Daniel Curtis

05/07/2024