

SUMMARY OF EVIDENCE

Michael George Chapman

1. My evidence provides a stormwater assessment to support a conservation and development project in the Taiwawe catchment at Hot Water Beach
2. The evidence presents conceptual stormwater solutions to manage runoff from 25 proposed house sites and access roads.
3. The stormwater management approach at Taiwawe focusses on the multiple benefits achieved through catchment scale revegetation.
4. Revegetation will reduce site runoff at Taiwawe by providing leaf canopy interception, evapotranspiration, and soakage into the organic ground cover, through:
 - a. Evapotranspiration
 - b. Increased Soakage
 - c. Flow retardance
5. An estimated 10% reduction in runoff volume and peak flow is achieved by re-vegetation at Taiwawe. This reduction is based on runoff from the current agricultural + existing bush land use compared to future pasture+ existing bush + revegetation land use + impervious areas during a frequent (2 year) rainfall event. A reduction in volume and peak flow is a hydrological enhancement and an improvement of the status quo. The re-vegetation measures go beyond simply adopting a drainage neutral approach which seeks only to match existing and future peak flows but not reduce those flows or indeed overall runoff volume.
6. In addition to revegetation, key aspects of the stormwater approach relate to the use of rainwater tanks for domestic water supply (re-use for house lots), as well as options such as swales and filter strips to manage runoff from accessways and parking areas. The aim is to disperse flow diffusely across moderately sloping ground.
7. The approach for Taiwawe is to pass forward storm peak flows. A major consideration regarding the requirement for peak flow control is catchment location. The Taiwawe Structure Plan area is at the lower end of the wider catchment (see Figure 1 in Taiwawe Catchment Surface Water Runoff Management Report v4). So peak flows should be released before flows arrive from elsewhere within the upper catchment.

8. The Waikato regional hazards portal shows a portion of the lower site (Lot 25) is located within the 100yr floodplain. Flood risk mitigation measures such as setting the ground floor above the 100yr level (including freeboard) and ensuring occupants have safe egress and access to the property during times of flood are two basic safety requirements.
9. A portion of Lot 25 is also within a low risk Tsunami hazard zone, but the building site is expected to be outside the low hazard zone (ref Figure 8 in Taiwawe Catchment Surface Water Runoff Management Report v4)

In summary

10. Extensive revegetation is proposed under the structure plan to not only improve biodiversity, ecology, and mana whenua values, but also to offset the increase in imperviousness in accordance with Waikato Regional Council guidance for device sizing.
11. Volume control and treatment from residential impervious areas will be managed using rain tanks for domestic water supply (re-use) as well as swale/filter strips or other small scale planted gardens for private hardstand areas. Each lot has adequate space to implement a range of measures to be decided at resource consent/building consent stage.
12. Roadside swales are proposed under the structure plan to treat and convey runoff from accessways which will convey to the nearest appropriate gully outlet incorporating best practice erosion control measures such as diffuse pipe outlet and rock rip rap or bank planting set back from the stream bank and angled in the direction of flow.
13. Road culverts should be sized to convey the 100yr peak flow and provide for fish passage. The location of these culverts and sizing will be provided at subdivision consent stage.
14. I have read the supplementary s42a report tabled at the hearing on 15 March 2021 and comments from Mr E Varley. I respond to the issues in my supplementary statement of evidence dated 31 March 2021. The key matters raised in the s42A report relate to the proposed approach to pass 'post development flows forward' and the potential impacts this has on the bottleneck at the beach outlet, and potential conflicts with using swales to manage runoff from accessway roads and hardstand area within each lot.
15. I have addressed these matters in my supplementary evidence. This is a net positive outcome for the catchment due to the revegetation programme which will reduce stormwater volume and peak flow compared to the current land use. In my experience this is a unique and fortunate situation for new

development to go beyond a 'drainage neutral' approach, to reinstating native vegetation at scale with significant hydrology benefits.

16. Typically, extensive native vegetation no longer exists and cannot be replicated as part of a new development due to space constraints, cost, and yield. By reintroducing native planting, we enhance the water cycle – along with soakage to ground. Re-vegetation is by far the best way to replicate a natural hydrological system if space allows and most importantly if there is willingness.
17. As also noted above, an estimated 10% reduction in peak flow is achieved by revegetation at Taiwawe for the 2-year and 100-year events. Total runoff volume also decreases compared to existing runoff volume, this is highly unusual for new development and is typically achieved only by large-scale soakage or re-vegetation.
18. The validity of the proposed 'pass it forward' approach is therefore a moot point, e.g., in terms of stormwater adding to flows downstream, or coinciding with flows from other parts of the catchment. Whatever combination of flows results, will be less than under the existing situation, not more or worse.
19. I conclude by acknowledging the concerns raised in the s42A report with respect to the potential effects within the wider catchment. I consider the net positive hydrology outcomes by revegetation at scale will be a marked improvement on the current pastoral land use.
20. Notwithstanding, controls are still required to manage potential erosion impacts from impervious surfaces (accessway ways, roof, and parking). These controls ensure diffuse discharge of flows (no direct outlets to waterways) for rain tank overflows, and swales (planted or rock lined with check dams if necessary) to manage runoff from accessways.
21. Accepting the generally limited infiltration capacity of the site soils, there is sufficient land area both for on-site flow management, and for swale sizing and planting/detailed design to achieve the water quality function for the more frequent smaller 'first flush' rain events, which the road side swales are intended for.