BEFORE THE AUCKLAND COUNCIL

In the matter of	the Resource Management Act 1991 ("the Act")
And	*WATERCARE SERVICES LTD* *First Respondent*
In the matter of	An application for regional resource consents for the Huia Replacement Water Treatment Plant Project Woodlands Park Road, Waima.

Statement of Evidence in Chief of Brett Stansfield
for The Tree Council, Titirangi Residents & Ratepayers Association, Forest & Bird, Waitakere Ranges Protection Society, Titirangi Protection Group and Save Our Kauri Trust

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Dated: 13 April 2021

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1. INTRODUCTION

1.1. My full name is Brett Thomas Stansfield and I represent The Tree Council, Titirangi Residents & Ratepayers Association, Forest & Bird, Waitakere Ranges Protection Society, Titirangi Protection Group and Save Our Kauri Trust.

1.2. My evidence relates to the risk the proposed Huia Water Treatment Plant replacement will have on the aquatic receiving environment and associated risk of contaminant transfer to the broader Armstrong and Yorke stream catchments.

~~1.2.~~1.3. I am generally in agreement with the AEE submitted by Boffa Miskell in terms of ecological effects of the development, however I am concerned that the potential spread of kauri die back from the development site to the downstream environment is not well addressed.

~~1.3.~~1.4. I have worked with kauri dieback technical experts on the proposed conditions attached to my evidence.

2. QUALIFICATIONS AND EXPERIENCE

1.1.I hold a BSc in Biology, a postgraduate diploma in Zoology (Massey University) and an MSc (Hons) in freshwater ecology obtained from Auckland University in 1994.

1.2. My additional tertiary education since this time has included the following courses:

- New Zealand's Natural Heritage (Massey University 2002)
- Data Analysis (Massey 2003).

- Multivariate Statistical Methods (Massey 2005).

- Forecasting and Time Series Regression (Massey 2006)

1.3. In 2001 I published a paper in the New Zealand Journal of Marine and Freshwater Research entitled "Effects of sampling frequency and laboratory detection limits on the determination of time series water quality trends".

1.4. I am presently the Director and Principal Scientist of Environmental Impact Assessments Limited, a consultancy based in Auckland specialising in freshwater quality, taxonomy (aquatic macroinvertebrates, macrophytes and periphyton) and ecology of rivers, lakes and wetlands of New Zealand.

1.5. I have previously served as a freshwater scientist for two regional councils (Wellington Regional Council 1995 – 2000 and Hawke's Bay Regional Council 2000 – 2010). In these roles I provided expert advice to council in freshwater plan development, state of the environment monitoring for rivers, lakes and wetlands and setting of resource consent conditions pertaining to point source discharges.

1.6. In 2008, I began a part time consultancy in Napier and in 2010 resigned from council to pursue the business further.

1.7. My company is an accredited provider of freshwater macroinvertebrate taxonomy and I have been teaching freshwater ecology to undergraduate students at Auckland University of Technology as a guest lecturer for the Freshwater Ecology and Environmental Monitoring and Risk Assessment papers since 2014.

1.8. Since 2009 I have been hosting one day training workshops for council scientific officers and consultants on aspects of water quality, ecology and statistical analysis of data.

1.9. I am a professional member of the New Zealand Freshwater Sciences Society.

1.10. In preparing this evidence I have read and in some cases reviewed all literature cited at the end of this document.

ABBREVIATIONS USED

Resource Management Act 1991 and amendments (RMA)

Assessment of Ecological Effects (AEE)

3. SCOPE OF EVIDENCE

3.1. My statement of evidence covers:

- Land clearance effects on stream networks.

- Stream channel movement and sediment deposition during storm events.

- Envisioned risk of kauri die back (*Phytophthora agathidicida*) transmission from the development site to the downstream receiving environment.

4. EXECUTIVE SUMMARY

3.2. In my view there is a high risk that the microscopic Kauri die back pathogen *Phytophthora agathidicida* will be transported from the development site to the downstream environment which currently contains Kauri trees that are disease free.

3.3. The pathogen is likely to be transported either directly from the overland flow paths or via the sediment detention outflows of the development area during rainfall.

3.4. Fluvial processes of streams create meanders. Meanders are produced when water in the stream channel erodes the sediments of an outer bend of a streambank and deposits this and other sediment on subsequent inner bends downstream. This process reinforces the riffle-pool structure of a stream.

3.5. The sediment deposition area on the inner bend of a stream is where any stormwater sediment and associated Kauri die back pathogen *Phytophthora agathidicida* will settle.

3.6. Fluvial processes may also give rise to stream islands. This occurs when the water path of the stream divides owing to the large amount of debris in its path making the stream go around the debris. This island can sometimes form due to streambank failure which drops a large amount of debris into the stream channel and the easiest course for the stream is to go around the deposited material.

3.7. This island creation also contributes to further stream bank scour on the outer edges of the island that can lead to sediment deposition further downstream.

3.8. The sediment deposition areas previously discussed are where any stormwater sediment and associated kauri dieback pathogen *Phytophthora agathidicida* will also settle and from there invade any tree roots. As the water level recedes these sediment deposits allow for plant roots to colonise this newly created habitat.

3.9. The root zone of Kauri trees, usually calculated as three times the drip line (caonpy area), crosses tributaries downstream of the development area. This means that there is a risk that any Kauri die back pathogen could infect roots of what are currently healthy trees downstream of the development area.

5. EVIDENCE

Land clearance effects on stream ecosystems

3.10. Clearance of land gives rise to major changes in the hydrological characteristics of a catchment. Rainfall runoff events increase dramatically owing to a lack of vegetation to intercept, absorb and evapotranspiration of water. This means water levels in streams rise dramatically owing to the increased water runoff received from the cleared catchment. Overland flow paths become wider and flooding potential increases as the natural wetland or seepage areas contained in a forest environment have been removed, filled and compacted.

3.11. Increased runoff gives rise to increased sedimentation of the stream channels as cleared land has a clay surface that is easily mobilised and delivered to the stream channel via overland flow. The stream channels also suffer increased sedimentation owing to streambank failures that can occur owing to the increased water runoff that they receive.

3.12. The natural processes of stream channel movement and sediment deposition increase during storm events in a cleared sub catchment owing to a greater amount of hydraulic forces delivering water to the stream channel.

Stream Channel Movement and Sediment deposition during storm events.

3.13. Fluvial processes of streams create meanders. Meanders are produced when water in the stream channel erodes the sediments of an outer bend of a streambank and deposits this and other sediment on subsequent inner bends downstream. This process reinforces the riffle-pool structure of a stream.

3.14. Fluvial processes may also give rise to stream islands. This occurs when the water path of the stream divides owing to the large amount of debris

in its path making the stream go around the debris. This island can sometimes form due to streambank failure dropping a large amount of debris into the stream channel and the easiest course for the stream is to go around the deposited material.

3.15. This island creation also contributes to further stream bank scour on the outer edges of the island that can lead to sediment deposition further downstream.

3.16. Both stream meandering and island formation increases if the upper reaches of the stream or overland flow paths of the stream have been cleared. This is because more water and sediment than usual is being delivered to the stream channel. This creates large amounts of sediment to be deposited on the flanks of the stream channel.

3.17. The increased sediment deposition of a stream due to meandering and island formation represent areas where the Kauri die back pathogen *Phytophthora agathidicida* will settle and potentially invade tree roots.

Envisioned risk of Kauri Die Back transmission from the development site to the downstream receiving environment.

3.18. The Huia Water Treatment Plant replacement development will result in 3.5 Ha of vegetation clearance. While this represents a small proportion of the greater Muddy Creek Catchment (720 Ha), it is the upper reaches of the streams that will be most affected because the proportion of each sub catchment cleared is very high in these areas.

3.19. The proposed land clearance is to be undertaken in a staged process (JWS 2.1) and 10m riparian buffers are proposed to minimise the effects of land clearance on the stream ecosystems for tributaries in the development area however this will not be sufficient to buffer the effects of high rainfall runoff events that are frequent in the Waitakere Ranges as overland flow paths identified in Auckland Council Geomaps are more numerous than just the tributaries identified in the Boffa Miskell

AEE p31 (Flynn and Boothroyd 2019). The following schematics show the difference between the AEE and what is evident in Auckland Council Geomaps.

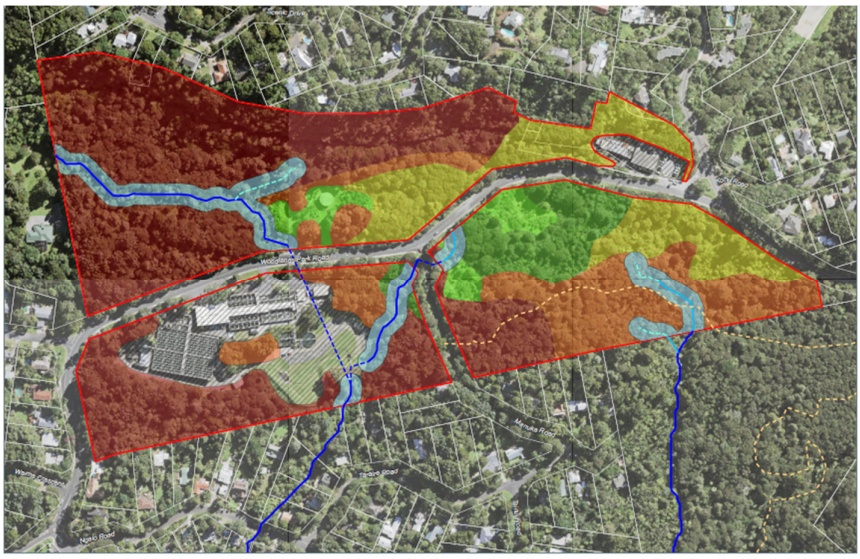

Figure1: 10m width riparian corridors identified in Boffa and Miskell AEE

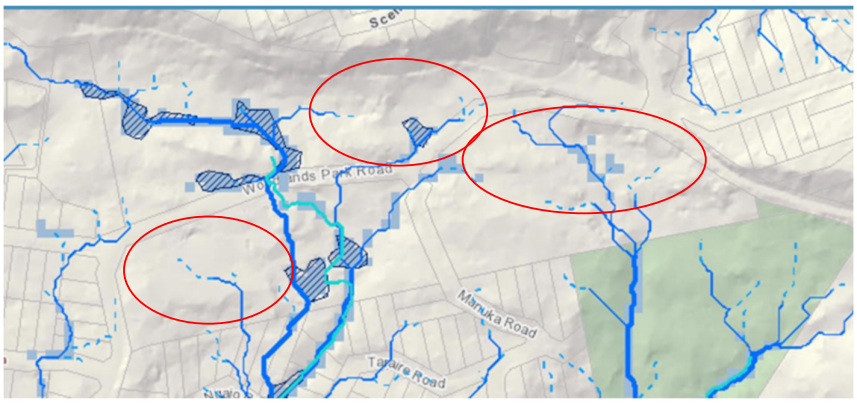

Figure 2: Overland flow paths and tributaries in Auckland Council Geomaps.

Key: Diagonal shading = flood prone areas

Blue shading without diagonal stripes = flood plains

Turquoise line = open watercourse

Dark blue line = overland flow paths

3.20. The blue lines identified in the red ellipses represent overland flow paths that will deliver sediment laden water to the downstream environment during high rainfall runoff periods. These areas represent source areas of Kauri dieback that will escape the proposed development area. The AEE states that the development will include reclaiming 53m of the Yorke Gully headwater stream to ensure the entire tributary avoids the impacts of the development and it diverts 'clean water' to the downstream environment (p83, AEE). However this assumes that all land above the proposed stream diversion area is kauri dieback free. Given that Kauri dieback exists in this parcel of land it would be unwise to assume that any works within this area will not transfer sediment and *Phytophthora agathidicida* spores to this diversion.

3.21. Page 83 of the AEE also states that the created diversion will also collect treated stormwater from the site to discharge downstream. I am not confident that the 'treated stormwater' will be Kauri dieback free as this pathogen is highly resilient to water treatment (Waipara pers comm.)

3.22. On Tuesday 6th April I undertook a site visit with Mr Paul Jones of Watercare. We were surprised to see the headwater intermittent stream reaches of Yorke Creek flowing. The presence of flow was very close to Scenic Drive which was also a surprise. Whether this was due to a water main or fire hydrant failure is under investigaton but it does demonstrate that these intermittent streams do flow at times. I would expect that the flow will increase in these headwaters when vegetation is cleared which poses risks of Kauri dieback transmission downstream.

3.23. The following aerial view is taken using Auckland Council Geomaps and it identifies areas where healthy Kauri are known to be located near the proposed development site.

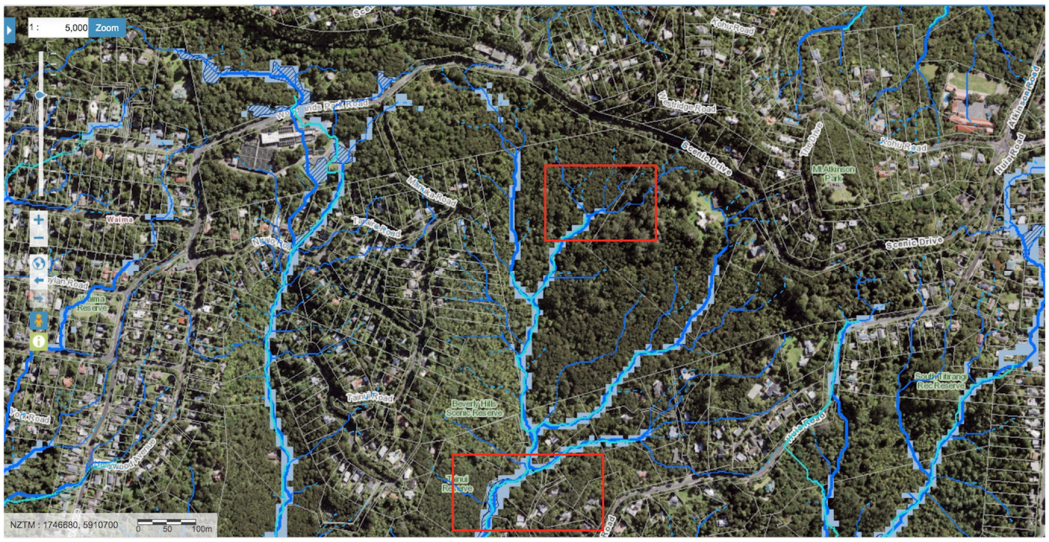

Figure 3: Known areas where healthy kauri are currently growing.

3.24. Figure 3 shows two areas in the red rectangles where healthy kauri are known to be growing. While the upper rectangle is not directly connected to the development area, there is potential for vehicle traffic from the development site to transfer sediment and Kauri die back pathogen to this area via the stormwater drainage from Scenic Drive. The following schematic shows the approximate Kauri drip line which is an estimate of the lateral root coverage each tree has in the upper red rectangle.

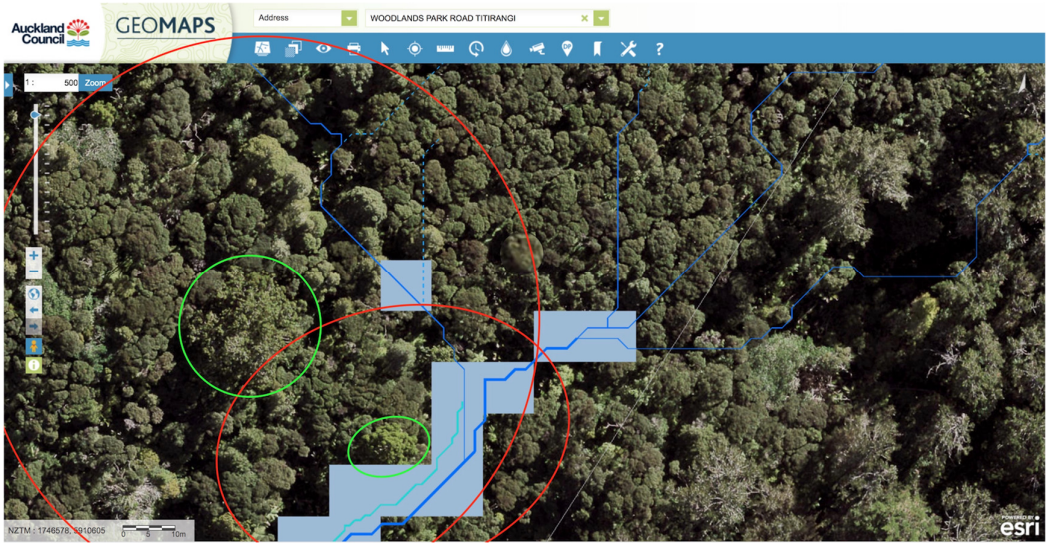

Figure 4: Kauri (green circle/ellipse) and drip lines (red circle ellipses) of two kauri located from the upper red triangle of figure 3.

3.25. Figure 4 shows both kauri trees (green circle/ellipse) have root zones (red circle/ ellipse) that extend well into the floodplain and path of the stream and overland flow paths. The following schematic shows the kauri trees of the lower red rectangle as well as their drip line boundaries.

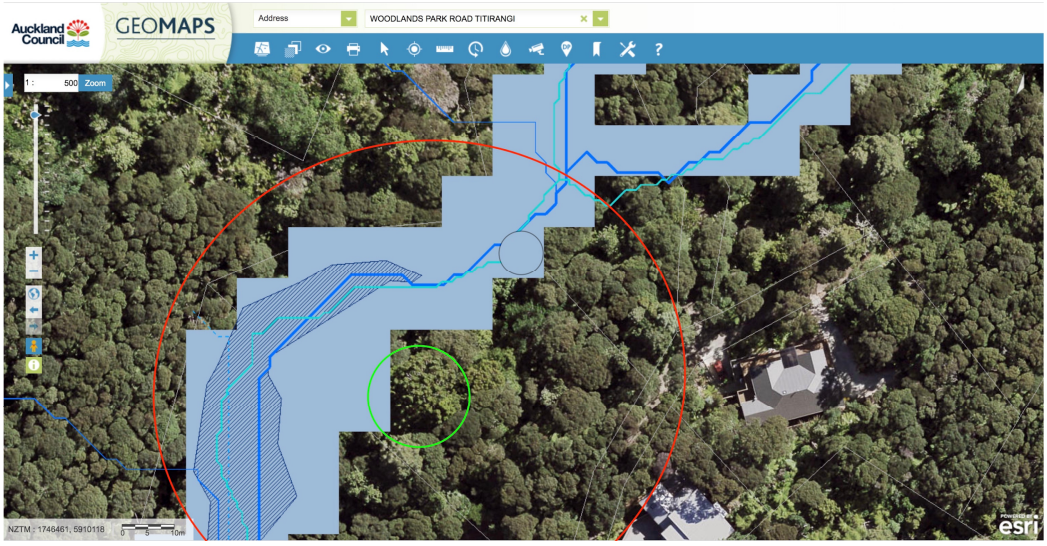

Figure 5: Kauri (green circle) and drip line (red circle) located from the lower red rectangle of figure 2.

3.26. Figure 5 shows that the kauri tree identified in this picture has a drip line that encompasses the flood plain, stream channel and overland flow pathway identified in Auckland Council Geo Maps.

Conclusion

3.27. In my view this development cannot proceed as the risk of Kauri dieback transmission to the downstream environment is too high. There will be a large number of vehicle movements from the development sites that pose risks of vehicle transfer of the pathogen to Scenic Drive via

infected soil material which could then drain to the downstream environment.

3.28. This evidence has shown that the overland flow paths and flood plains fall within the kauri drip zone of what are currently healthy Kauri trees. Alluvial processes of the streams will ensure that any sediment and water from the development site will be deposited in deposition areas adjacent to these streams which then allows the kauri die back pathogen to invade tree roots nearby.

LITERATURE CITED

Flynn, S. & Boothroyd, I.K.G., (2019) Huia Water Treatment Plant Replacement Assessment of Ecological Effects Prepared for Water Care Services Limited.

Joint Witness Statement Att 2.1 Kauri Die Back Management Plan – Staging Plans