

**BEFORE THE INDEPENDENT HEARINGS PANEL**

**UNDER** the Resource Management Act 1991 (RMA)

**AND**

**IN THE MATTER** of an application by Onoke Heights Limited for resource consents for a 93 lot residential subdivision on Dip Road, Whangarei

---

**STATEMENT OF EVIDENCE OF AARON HOLLAND  
THREE WATERS AND GEOTECHNICAL  
31 OCTOBER 2023**

---

## **MAY IT PLEASE THE INDEPENDENT HEARING PANEL**

### **INTRODUCTION**

1. My full name is Aaron Holland.
2. I am the Civil Engineering National Technical Manager at Land Development & Engineering Ltd and have been with the company since 2014. A statement of my qualifications and experience are included in **Attachment 1**.

### **OVERVIEW OF THE PROPOSAL**

3. This evidence is in respect of an application by Onoke Heights Limited ("**the Applicant**") for subdivision and land use resource consent at Dip Road, Kamo ("**the Site**"), to:
  - (a) create 93 residential allotments, drainage and recreational reserves to vest and other associated works; and
  - (b) establish retaining walls up to a maximum height of 5m within the setback of road and side boundaries.(together "**the Proposal**")

### **CODE OF CONDUCT**

4. While this is a Council level hearing, I have read the Code of Conduct for Expert Witnesses in the Environment Court Practice Note 2023. I have complied with the Code of Conduct in preparing this statement of evidence. Unless I state otherwise, this evidence is within my sphere of expertise and I have not omitted to consider material facts known to me that might alter or detract from the opinions I express.

### **SUMMARY OF EVIDENCE**

5. My evidence considers the potential effects of the Proposal on three waters and geotechnical matters and how those effects will be managed. I also respond to the various concerns raised by submitters in respect of the Proposal, including stormwater and flooding effects, water capacity for firefighting purposes, and potential effects arising from earthworks. Finally, I address section 1A-XX of the conditions proposed by the s 42A Officer for Whangarei District Council ("**Council**") and summarise why I

do not consider that the requirements are necessary. For the reasons set out below, my opinion is that the Site is suitable for the Proposal.

### **PURPOSE AND SCOPE OF EVIDENCE**

6. As noted above, my evidence will focus on the three waters and geotechnical aspects of the Proposal. My evidence should be read in conjunction with the Geotechnical Investigation Report dated 2<sup>nd</sup> July 2021, and Three Waters Report, dated 28<sup>th</sup> January 2022. Specifically, my evidence will address:
- (a) my involvement with the Proposal;
  - (b) summary of the three waters report;
  - (c) summary of the geotechnical investigation;
  - (d) potential effects on three waters and geotechnical matters;
  - (e) matters raised by submitters; and
  - (f) the Council's s 42A Report.

### **INVOLVEMENT WITH THE PROPOSAL**

7. I am a CPEng engineer, working for Land Development & Engineering Ltd, a medium sized engineering company. My role is LDE National Engineering Technical Manager Civil and Infrastructure. Land Development & Engineering Ltd have undertaken the geotechnical investigation and reporting, designed the stormwater pond, and provided professional design advice for the wastewater and water system for the proposal at Dip Road, Kamo.

### **SUMMARY OF THE THREE WATERS REPORT**

8. In respect of the three waters aspects of the proposed development, being stormwater, wastewater and water supply for the development:
- (a) The existing public reticulated water system has sufficient capacity for both water supply and firefighting supply for the proposed development.

- (b) Council have agreed that the existing public wastewater system for that area of Kamo, has sufficient capacity for the proposed development.
- (c) The proposed stormwater reticulated system and stormwater pond will mitigate the additional effects caused by the development of the roads and impervious areas within the proposed development.

### **SUMMARY OF THE GEOTECHNICAL INVESTIGATION**

- 9. In respect of the geotechnical investigation, the site is suitable for the proposed development shown in the Blue Wallace earthworks plan, numbered 220253-01-PL-200 Rev 6 Earthworks, subject to the recommendations contained in the geotechnical report being implemented.

### **POTENTIAL EFFECTS**

- 10. In respect of Civil and Geotechnical Engineering, the effects of the Proposal will be managed as follows:
  - (a) Stormwater effects are to be mitigated by a single large stormwater pond. This includes mitigating downstream effects and improving storm water runoff quality for the discharge into the stream that runs through the Site. It also incorporates an additional 20% of rainfall to manage climate change effects. The design allows for up to 60% impervious area to be developed on each lot before additional mitigation measures would be required.
  - (b) Wastewater will be managed via gravity for all the development, connecting into council reticulated system in Tuatara drive, Kamo.
  - (c) The Council's reticulated water supply will service the development for potable water and firefighting requirements. Council have confirmed that they have sufficient capacity to service this development, and hydrant flow testing undertaken confirms that sufficient pressure is available for the potable water supply and the firefighting requirements for the development.
  - (d) The geotechnical investigation and testing undertaken shows the Site is suitable for residential development. A minimum of 5m

setback from the slopes surrounding the stream are required and the deeper earthwork fill areas are expected to undergo some initial settlement during construction due to the sites volcanic soils where fills exceed 4m in depth. The settlement will be managed and monitored as part of the Site's initial development to mitigate any future effects. Otherwise, the Site is suitable for residential development.

## **RESPONSE TO SUBMISSIONS**

11. A review of the stormwater related submissions indicates concerns with the development causing additional downstream flooding effects mainly due to the flooding around the stream culvert in Tuatara drive. There are also concerns about water quality effects on the stream itself from stormwater runoff. The pond and stormwater management for the site will address these concerns via the following:
- (a) The pond is designed to provide water quality treatment for the proposed development treating all stormwater runoff up to 1/3<sup>rd</sup> of a 5% AEP storm, including treatment of the proposed road runoff. As such, water entering the stream will be treated by the proposed pond which is designed in accordance with best practice and TP10/GD01 (pond design guidelines published by Auckland Council), before discharging into the stream.
  - (b) The pond provides for 24 hr extended detention to mitigate potential stream health/erosion issues that could be caused by the development for the smaller regular storms.
  - (c) The pond limits peak flows for the 2, 10 and 100yr storm events from the development into the stream to below the Site's current discharge rates, so there is not expected to be any additional effects from the development that would exacerbate the existing flooding issues downstream. The downstream flooding issues are the reason for mitigating peak flows up to the 1%AEP (100yr storm event).
  - (d) The pond has been designed to address future effects caused by climate change. This has been achieved by incorporating an additional 20% of rainfall over the next 100yrs as required by WDC

engineering standards. The 20% climate change adjusted value is slightly above the NIWA RCP8.5 average value.

- (e) After reviewing the submissions around the existing flooding issues in Tuatara drive, the pond design was updated to reduce peak flows from the proposed development to 80% of current levels. The additional mitigation is suggested in WDC engineering standards to provide a reduction in runoff from sites being developed to help address the existing capacity problems in Council's stormwater network. In this instance the increased pond size provides an additional 20% reduction in peak flows from the site. The effect of this will be to lower the peak flow rates into the stream to 20% less than the current discharge rates of the undeveloped site providing an overall improvement in the downstream effects.
12. The fire service submission expressed concerns that the water capacity for firefighting may be inadequate as a firefighting supply for the proposed development. In my opinion:
- (a) Hydrant flow testing in Dip Road shows that there is sufficient pressure and flow for the proposed development for both water reticulation and for firefighting purposes.
  - (b) In regard to the fire hydrants location and coverage, there are 4 existing additional fire hydrants located on Dip Road which run adjacent to the rear boundaries of lots 42-72 which provide additional coverage to the subdivision. These are shown in Council GIS system.
13. Earthworks submissions reviewed relate to queries around volume of earthworks, the stability of the land, and the potential effects of the earthworks on the stream. In response:
- (a) Extensive site testing and investigation has been undertaken to ensure that any risks associated with the sites stability or underlying soils are identified and managed through design and construction methods. The proposed earthworks will be managed and tested in accordance with NZS 4431 (engineering fill standard for residential development) and best practice, and the proposed

retaining walls will be designed for the Site's ground conditions and consider global stability as part of any design. A review of the information provided for the consent has also been undertaken by Council's geotechnical engineers Tonkin and Taylor as part of the consenting process to confirm that information provided shows that the land is suitable for development.

- (b) Other than the stream outlets and the at grade gravel walking track that is proposed alongside the stream, all earthworks is separated by 10m or more from the stream, so there are not expected to be any effects on the stream beyond the outlet installations, and these will be carefully managed and undertaken during low flow times to ensure the stream is not affected.
- (c) Earthworks across the site is to be managed in accordance with GD05 (new version of TP58) and will be managed in accordance with the erosion and sediment control plans that are required as part of the regional consent. This plan will be implemented and managed by the construction contractor and is also monitored by NRC as part of the regional earthworks consent for the site to ensure the site is appropriately managed.

#### **SECTION 42A REPORT**

- 14. A review of the Council's s 42A report indicates that the section 42A Officer agrees that any potential effects of the Three Waters and Geotechnical aspects of the proposed subdivision will be less than minor with the mitigation measures proposed. The Officer also noted that the matter raised by submitters in regard to The Three Waters and Geotechnical aspects of the proposed subdivision have also been addressed as part of the submitted information.
- 15. The only matter that was raised in the s 42A information which requires a response from me as an engineer is one of the suggested consent conditions. The condition is shown in Figure 1, and is section 1A-XX of the proposed conditions suggested by Council:

development (this applies to the Council's Water Reservoir site).

- xx Design details for a stormwater attenuation and treatment pond located within Lot 200 in accordance with Section 4 of Council's Engineering Standards 2022 Edition including the following detail:

09/112741

30



- A minimum of 5 metre setback distance from the pond edge to the boundary
- A minimum of 3.5 metres of unrestricted permanent maintenance access
- Space for sediment drying area
- Layout to accommodate internal slopes of:
  - Below Permanent Water Level – 1:4 or gentler slope except on the south-eastern side of the pond which shall be 1:2 gradient
  - Above Permanent Water Level – 1:3 or gentler slope except on the south-eastern side of the pond which shall be 1:2 gradient and fully planted
  - Mowable areas, sediment drying area and access – 1:4.5 or gentler slope. Areas proposed to be fully planted may be steeper
- Riprap and gabion mattress details and sizing calculations to accommodate in excess of 200-year ARI storm event.
- Maintenance manual for ongoing maintenance of the pond

**Figure 1 – Suggested consent conditions**

16. The proposed condition has not been suggested or discussed prior to the s 42A report being issued, and none of the requirements have been included in the ponds design or report as submitted for the consent. The pond was also designed and submitted before the 2022 engineering standards were released, which I believe contain some of these recommendations.
17. Including these requirements into a consent as a condition would make them mandatory, despite whether they can be achieved or not, and despite whether they are necessary for the particular site. For this reason, and for the reasons below, I do not consider that they should be included.
18. In relation to the specific detail of the suggested conditions, I consider that:
  - (a) The maintenance access formed around the top of the pond embankment is currently only 3m wide (not the 3.5m suggested in the above condition). Widening it uses up more space, and given the proximity to the road, the additional width (whilst nice to have) would not in my opinion provide better access. Accordingly, I do not consider that the additional width is necessary. As a comparison, shared accessways (even long ones for multiple dwellings) are only 3m wide. While the accessway could, if



necessary, be widened immediately off the road onto the embankment to 3.5m, it seems unnecessary to create additional width and impervious area given the easy access, and the infrequent use it would have.

- (b) I assume that the 5m setback from the pond edge to the boundary is the setback required of the water surface/top of embankment to the boundary. I can confirm that this is what is shown and achieved in the current design. However, it is important to note that the outer most toe of the embankment extends out to the boundaries in places, and there is little scope to move the pond further up the hill into the road corridor. This is due to nearly all the space available within the reserve area being used with the additional capacity that Council requested to meet the 80% predevelopment requirement. I do not foresee any potential problems associated with this given how conservatively the pond has been designed, including having a primary overflow and a secondary emergency one included in the design.
- (c) The layout of the pond as designed for consent approval and as shown in the submitted drawings and stated in the stormwater report has 1:3 slopes internally everywhere. There is a 3m wide bench at the crest of the pond for maintenance purposes and there is a 1m wide bench at the permanent water level, which provides a safe egress platform from the 1:3 internal slope, should anyone enter the pond's permanent water level intentionally or otherwise. Whilst it may be possible to change the design slopes as suggested, with the 1m safety bench located at the permanent water level, there should not be any problems or safety concerns with people exiting the pond, so in my opinion there is no need to change the pond's internal gradients from what is proposed which are easier to maintain, and more stable than a steeper 1:2 slope.
- (d) There is no flat area for sediment drying however there is a 1:3 slope back up to the road above the pond crest. This is intended to create a flattish platform where the upper pond slope currently changes from cut to fill, which would serve as both the access point and a storage area immediately adjacent to the pond and

road, with the added benefit that it would drain back into the pond. This could be used to stockpile wet sediment as part of future maintenance should it ever be necessary. This would ensure that the wet material was placed in a position where it drained back into the pond, rather than placing it in the remaining reserve areas where it could potentially cause a nuisance to others.

- (e) In regards to the riprap and gabion mattress condition, the 100yr outlets are via the smaller outlets cut into the side of the scruffy dome manhole. Any flows in excess of this like the 200yr storm exit via the primary overflow, being the scruffy dome. Then as an added precaution the pond has an additional secondary spillway, solely for emergency purposes which enables the pond to control any flows in excess of the ponds capacity. This ensures that flows are always controlled and directed towards the stream. The secondary emergency spillway is not intended to be a hard riprapped structure and would be formed of grass with a suitable geotextile lining like 'Enkamat' or 'Landlock'. This allows plants and grass to grow through them, whilst managing erosion in the extremely unlikely event that it had water flowing over it. Additionally, it is worth noting that the current 200yr storm event is less than the designed 100yr plus climate change storm event that the pond is designed for. Finally, as the additional emergency spillway is solely there as a secondary backup to the primary scruffy dome overflow, the additional cost and environmental damage of forming a rock lined channel into the stream that may never be used is in my opinion unnecessary.

## CONCLUSION

19. For the reasons above, in my opinion, the Site is suitable for the proposed subdivision.

**DATED** this 31<sup>st</sup> day of October 2023



.....  
**Aaron Holland**

**ATTACHMENT 1 - AARON HOLLAND CV**



# Aaron Holland (CPEng)

National Engineering Manager – Civil and Infrastructure

[www.lde.co.nz](http://www.lde.co.nz)

## QUALIFICATIONS

BEng (Tech, Civil), NZCE (Mechanical)  
CPEng – Geotechnical, Civil, Structural

## MEMBERSHIPS

CMEngNZ  
MEngNZ  
SESOC  
Geotechnical Society, EGP, NZ Coastal Society, NZ River Group, NZ Transportation Group.

## PRACTICE FIELDS

Coastal, Civil, Geotechnical, Structural and Mechanical Engineering

## EXPERIENCE

25+ years of professional experience

## TRAINING AND ACCREDITATIONS

- SiteSafe
- Rapid Building Assessor Tier 2 – Team Leader

## SKILLS

- Geometric road design, urban design, intersection design and pavement design
- Water, wastewater, and stormwater engineering
- Flood level analysis, erosion, and sediment control planning
- Emergency assessment and evaluation of coastal damage including, slips, structural damage, coastal erosion
- Environmental engineering including climate change and coastal inundation, wastewater treatment and disposal, hydrological modelling and dam design
- Structural design and assessments
- Infrastructure design and development
- Asset condition assessment
- RMA experience with reports, consent, concept development, and compliance
- Geotechnical engineering, including site and soil investigations and slip repairs
- Contract, project, budget, and dispute management
- Project governance and leadership

## AREAS OF PRACTICE

Aaron is a chartered engineer with extensive experience across multiple engineering fields. He specialises in infrastructure development, subdivision design, project management, geotechnical, structural, and environmental engineering.

His extensive engineering portfolio includes terrain modelling, stormwater and flood modelling, geotechnical engineering including piling and slip repair. Aaron has also completed significant coastal projects, often developing unique coastal protection strategies and coastal road-supporting structures.

In addition to his technical contributions, Aaron serves as a National Engineering Manager – Civil and Infrastructure, overseeing personnel and resource management. He excels in providing supervision, teaching, and mentoring to team members, ensuring their professional growth and development.

## PROJECT EXPERIENCE

### Emergency Slip Repairs, Northland

Severe storms in Northland have resulted in extensive slip damage to the road network. LDE swiftly conducted assessments, identified risks, and recommended necessary remedial actions, including road and lane closures. We also offered specialised geotechnical guidance for any emergency repairs needed to ensure safe road functionality.

As the team leader at LDE, Aaron has led the investigation and management of the Far North District Council (FNDC) slip repairs in Northland for several years, collaborating closely with FNDC engineers. His responsibilities have included preliminary design advice, cost-effective repair designs for Northland's road network, and comprehensive management of geotechnical investigations and interpretations, as well as civil and structural designs within the LDE team.

LDE submitted contract documents and cost estimates for tendering purposes. Aaron has been actively involved in managing engineering supervision, design review, and liaising with contractors and council staff throughout the process. Aaron's expertise has also extended to supervising contracts for some of the repair projects, including MSQA services.

### The Sands Development, Papamoa

Aaron has played a significant role in the Sands project, actively collaborating with key project partners and the wider LDE team. His role responsibilities span a range of activities, including conducting reviews, design input, Digital Terrain Model (DTM) modelling, addressing connectivity issues and analysis of catchments and flow paths, and technical oversight and guidance to the civil team, and client liaison. Additionally, Aaron has been responsible for reporting and updating drawings and assumed the role of project director for approx. 6 months to assist with resourcing and overall project governance.

### Lady Ruby Drive, East Tamaki Auckland

This project was a proposed commercial development. As part of this, LDE were engaged to undertake a geotechnical investigation and engineering design of a significant retaining wall to extend the yard at the rear of the property. Services design was also included as part of the scope. Aaron was the project lead and reviewer. He designed and drafted the plans for the retaining wall area and the services design of the project's pipelines, stormwater, and pavement. Comprehensive reports were provided, suitable for consent applications.

### Mansion House – On-site Wastewater, Kawau Island

The Department of Conservation engaged LDE to undertake a review of the existing on-site wastewater ponds and spray irrigation system to support their application for a new Discharge Consent. Aaron's role included design input and technical review of our proposed solutions.

### Takutai Square Development, Auckland Central

This project was for the redevelopment of Takutai Square and surrounding roads into a shared space. Aaron worked in partnership with JFC to redevelop the old oriental markets area in downtown Auckland. Aaron investigated the engineering impacts, such as drainage problems, and geotechnical issues of the proposal (based on the complexities of existing infrastructure), including the train station running beneath the area 1m underground and a nearly completed new high-rise building.

### PROJECT EXPERIENCE

#### 67 Dip Road Subdivision, Whangārei

A geotechnical investigation was undertaken for a proposed 50-60 lot subdivision in Whangārei. Initial testing indicated highly sensitive soils immediately below a shallow crust. The soils exhibited no strength in the CPTs, penetrometers and machine borehole testing, with pilcon shear readings indicating higher strengths than any of the others would suggest available. Further site investigations were undertaken, including shear wave velocity testing, and DCPT testing, and triaxial testing of the soils to try and identify what could be expected as part of the development and how the risks could be managed.

The preliminary testing raised far more questions than it answered about what to expect and what soil properties were present, allowing the subdivision to proceed. Following this testing, it was decided that the material was behaving like allophonic soil, which Aaron had dealt with years previously as part of another development in Warkworth. Testing showed that this was indeed the case and that this would need to be considered as part of the development and is now planned to proceed with careful management of the soils and earthworks cuts and fills.

#### Lunn Ave Development, Auckland

Aaron has provided guidance and direction for the LDE project team for this large-scale commercial project that involved replacement investigation and replacement of most of the site areas, which were un-engineered fill. The works required categorising the material into unsuitable material, material that could be reused, and contaminated material to be disposed of with the previous waste management site. He also provided the geotechnical and civil team design management within LDE, including all the civil infrastructure design, pavement design, temp construction methodology to protect the neighbouring buildings and existing, remedial works for ground conditions for car parking and building areas for the new commercial buildings for the site.

#### Edgewater 240 Lot Subdivision, Karikari Peninsula

Aaron completed the design of the site's infrastructure, roads, sewers, and stormwater services along with a stormwater catchment analysis. He prepared, submitted, and liaised with councils for approval. Aaron also provided engineering supervision, project management, and contract management. As the engineer's rep, he oversaw all necessary certifications and resolved all construction and consenting issues.

#### Neilson Street Bus Depot, Onehunga, Auckland

Aaron successfully oversaw the comprehensive engineering design of a new civil bus servicing depot on Neilson Street, Onehunga. The project entailed a broad scope, including stormwater drainage, pavement design, ground modelling, wastewater management, and coordination of multiple stakeholders. Specialised systems were designed, such as a trade waste system with consent and a complex stormwater drainage system. Challenges during construction, including soft ground conditions and contamination issues, were adeptly managed. Despite these obstacles, the project was completed on time, showcasing the effectiveness of Aaron's governance model.

#### Totara Park Development, Whangārei

Aaron was the developers engineer for the project through the consenting stages to construction. This project comprised the engineering design of a 420 Lot urban subdivision with greenfield infrastructure design, including extensive geotechnical work with the entire 60-hectare site being reshaped with cuts and fills, mse and timber pole walls. Geometric design, ground modelling of the road network, pavement investigation and design, remediation of swampy areas, reticulated sewerage and water, roundabout design, stormwater design, catchment analysis, and flooding assessments. It also involved designing a significant stormwater system, including a 3-hectare dam with a road over the crest, to control the development's runoff and protect the downstream areas from additional flooding issues.

#### Refuse Transfer Station, Silverdale

Undertook site investigations to enable the redevelopment of the main waste transfer station in the area. Provided investigation and included geotechnical, civil and structural design and design management to increase site capacity. Included was the construction of tilt slab concrete buildings and large, tied retaining walls. Obtained resource consents and building consents and worked with various stakeholders to ensure value engineering and the design and management of the site protected the sensitive coastal receiving environment.