

**To**

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**From**

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Reviewer: Brian Flood

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## Memorandum

### Arataki Project Fast-Track Substantive Application: High Level Engineering Assessment of Alternate Boundary Scheme for Shaggy Range Driveway

Wood & Partners Consultants Ltd's (Woods) Civil Engineering Department has undertaken a high-level engineering assessment of the alternate boundary scheme for relocating the Shaggy Range driveway (Driveway) to the south side of the site.

This memorandum outlines the finding of this high-level engineering assessment for both the proposed location of the Driveway and the resulting alterations to the scheme plan.

#### 1. Summary

The findings of this high-level Engineering assessment are that the proposed location of the Driveway is a suitable location for the Driveway. A workable driveway cross section has been tested successfully over this area. The Driveway location can accommodate a four-vehicle parking area, passing bays as required, the vehicle tracking paths, and a compliant vehicle crossing at Arataki Road.

Additionally, the resulting alterations to the scheme plan can be accommodated within the existing Civil Engineering design with minor alterations to the surface and roading design, relatively minor alteration / improvements to the drainage design, and will comply with the Stormwater Management Plan with no change to the areas of the stormwater or wastewater catchments, and no changes to the dry stormwater basin require to accommodate the boundary changes.

#### 2. Introduction

Currently the Shaggy Range driveway is positioned between properties #86 and #108 Arataki Road, Havelock North. The alternate boundary scheme would see the relocation of the Driveway to the south of the development site which runs adjacent to the northern boundary of #19 Albany Lane (Olive Grove) for approximately 173 m. At the eastern most extents of the site the Driveway turns north and continues for another approximately 88 m to a location where it turns east into the existing Shaggy Range property.



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### 3. Assessment of the Shaggy Range Driveway Proposed Location

#### 3.1. Driveway Cross Section

The proposed 6.5 m wide Driveway allotment can accommodate:

- A carriageway with a single crossfall width of 3 % with kerb and channel on one side,
- Typical berm grades of 3 % on the rural side of the Driveway, and
- Berm grades of between 3 % and 15 % on the development side of the Driveway.

The above noted cross section was trialled along the length of the Driveway and found to be workable at all locations. We have noted that alterations to this cross section can be accommodated within the Driveway allotment allowing for flexibility in design.

#### 3.2. Driveway Longitudinal Section

The Driveway is proposed to be at a similar level and grade as the existing ground. This would result in a maximum longitudinal grade of 4.0 % which occurs from the boundary with Arataki Road and extends over an approximate distance of 20 m. The remaining length of the Driveway has longitudinal grades matching closely to the existing ground and being between 0.7 % and 3.0 %. These longitudinal grades are considered well within the suitable range for driveways. Compliant crests and sags in the vertical geometry can be easily accommodated for during any further detailed design.

#### 3.3. Driveway Vehicle Crossing on Arataki Road

##### 3.3.1. Vehicle Crossing Location

The proposed vehicle crossing location on Arataki Road is in a position that allows for it to meet HDC driveway standards and is well away from neighbouring vehicle crossings. It is noted that an existing power / telephone pole servicing the dwelling at #86 Arataki Road is located at this position, however this is planned to be removed as part of the original civil design.

##### 3.3.2. Vehicle Crossing Sight Lines

The Driveway's vehicle crossing is located on a straight section of Arataki Road and provides for sight lines in excess of what is required.

#### 3.4. Ancillary Features

##### 3.4.1. Passing Bays

There are several suitable locations with ample room along the Driveway alignment to allow for passing bays as needed.

##### 3.4.2. Parking Allowance

The Arataki Fast Track – Alternative Masterplan shows an area on the existing Shaggy Range property adjacent to the Driveway with four carparks. The topography of this immediate area is relatively flat however it is surrounded by slopes, at 20+ % grades, that fall into the Shaggy Range property. There is enough flat space in this area to allow for the four shown carparks at 2.6 m wide each and safe pedestrian access to and from these carparks. There is not enough flat space to allow for more than the four shown carparks.

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#### 3.4.3. Livestock Truck Vehicle Tracking

There are suitable widths and grades available to allow for isolated widening of the Driveway's carriageway in the locations identified on UD003 for the livestock truck vehicle tracking. It is noted that this initial tracking can be further refined as part of any future detailed design to better identify these areas of widening.

### 3.5. Landscape Buffer

As part of the Driveway proposed relocation, the landscape buffer will be altered to a 5.0 m wide buffer. This 5.0 m wide buffer will allow for the level transition between the Driveway and the lower proposed residential lots along the southern edge of the development. The maximum grade of this 5.0 m buffer would be 24 % (slightly less than 1V : 4H). This is well below the long-term self-supporting cut / fill slope of 1V : 2.5H identified in the Geotechnical Investigation Report Version 0 by CMW Geosciences.

### 3.6. Utilities and Water Supply

New property connections for telecommunications, power, and water supply will need to be extended down the new Driveway location. This can be accommodated within the Driveway allotment and extending the networks to this location is expected to be minor and easily included into the utilities and water supply design.

## 4. Assessment of the Alterations to the Scheme Boundaries

### 4.1. Surface Shape

#### 4.1.1. Design Surface

Due to the overall shape of the existing ground across the development, alterations to the design surface will be limited. Some minor shaping improvements will be required to account for the new Accessway and JOAL, and the lots that straddle the existing Shaggy Range driveway location and all locations where road boundaries have been shifted. These changes create an opportunity for further minor refinements to the surface to better accommodate overland flow paths and drainage alignments which are all anticipated to slightly improve upon the civil design.

#### 4.1.2. Overland Flow Paths

Overland flow paths (OLFP) have been considered and without having a better understanding of the potential surface improvements there are two situations that could occur:

1. Worst case: The overland flow paths remains unchanged.
2. Best case: A small portion of flows can be directed down the new Accessway reducing the flows on a short section of Arataki Road and two short sections on the proposed local roads.

Either scenario can be easily accommodated within the overall civil detailed design.

### 4.2. Roothing

The required alterations to the roading network to align with the altered scheme boundaries are considered minor. All roading features are able to be shifted to accommodate the altered scheme. Changes to the roading network will be neutral with no notable improvements and no notable worsening.

### 4.3. Drainage

Alterations to the scheme boundaries comply with the Stormwater Management Plan.

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With the ability to cross drainage over the existing location of the Shaggy Range driveway both the stormwater and wastewater civil designs will see improvements with less drainage materials being required overall. This will be gained by running both drainage networks under the new Accessway. The upper part of the stormwater network will also see hydraulic improvements as there will be a reduction in the number of bends within this section of the main pipeline.

## 4.4. Catchments

### 4.4.1. Stormwater Catchments

The altered scheme boundaries will have no impact on the area of the stormwater catchments. Improvements in the upper portion of the stormwater network will lower the time of concentration by shortening the length of the overall piped network however these are expected to be minor at most.

### 4.4.2. Wastewater Catchments

The altered scheme boundaries will have no impact on the areas of the wastewater catchments.

## 4.5. Dry Stormwater Basin

The altered scheme will have no impact on the dry stormwater basin design. Small changes to the time of concentration are expected to be negligible on the overall design of the dry stormwater basin.

## 5. Conclusion

Woods have undertaken a high-level Engineering assessment of the proposed location of the Driveway and found it to be a suitable location for the Driveway. A workable driveway cross section was tested successfully over this area. The Driveway location can accommodate a four-vehicle parking area, passing bays as required, the vehicle tracking paths, and a compliant vehicle crossing at Arataki Road.

The resulting alterations to the scheme plan can be accommodated within the existing Civil Engineering design with minor alterations to the surface and roading design, relatively minor alteration / improvements to the drainage design, and will comply with the Stormwater Management Plan with no change to the areas of the stormwater or wastewater catchments, and no changes to the dry stormwater basin require to accommodate the boundary changes.