

<b>Subject:</b>	<b>Engineering, Flooding &amp; Infrastructure 73 Trig Road and 155 – 157 Brigham Creek Road, Whenuapai, Auckland</b>	<b>Date:</b>	<b>7/12/2022</b>
		<b>Memo No:</b>	<b>TM-01</b>
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## Memo

### 1. Introduction

Cato Bolam has been engaged by Neil Construction Limited (NCL) to provide a combined engineering infrastructure and flooding technical memo in support of a fast-track consent application for a future development at 73 Trig Road and 155 – 157 Brigham Creek Road in Whenuapai, Auckland. NCL intends to subdivide 73 Trig Road to accommodate three industrial lots and a road connection to Trig Road (plans attached). 155 – 157 Brigham Creek Road is currently included within the Whenuapai Business Park fast-track consent application (Schedule 52) as balance lots 200 and 300. The proposal seeks consent for Lots 1-3 (73 Trig Road) and Lots 200 and 300 (155-157 Brigham Creek Road) to be used for any permitted activities listed in the Auckland Unitary Plan ('AUP') Light Industry Zone Activity Table H17.4.1, and for any buildings to be constructed on the industrial lots that meet the identified bulk and location standards of the Auckland Unitary Plan's Light Industry Zone. No residential development is proposed. 73 Trig Road is legally described as Lot 1 DP 117365 and 155 – 157 Brigham Creek Road is legally described as Lot 2 DP 334953.

The purpose of this memo is to provide a brief design and assessment of the earthworks, the flood hazard risk, the infrastructure network connections, and the proposed methods of mitigating the stormwater runoff from the development in compliance with Auckland Council Requirements.

### 2. Site Description

73 Trig Road is in an irregular shape with an area of 2.61ha. 155-157 Brigham Creek Road is also an irregular shape with an area of 3.6224ha. The subject site is zoned as Future Urban within the Auckland Unitary Plan (Operative in Part). 73 Trig Road is located on the eastern side of Trig Road and 155-157 Brigham Creek Road is located on the southern side of Brigham Creek Road. 73 Trig Road is currently covered by pasture and vegetation with an existing dwelling and shed at the north-western corner. The access is off Trig Road, which leads to an existing metal driveway. Bulk earthworks are currently being undertaken on 155-157 Brigham Creek Road as consented by LUC 60350837.

An overland flow path enters 73 Trig Road through an existing vehicle crossing and exits to the north towards Brigham Creek Road. Furthermore, there are minor overland flow paths that originate at the subject site and discharge northward as shown in Figure 1.

Overland flow is conveyed through 155-157 Brigham Creek Road within the existing watercourses. Secondary flow paths are proposed along proposed road 1 which is covered by the consent for the Whenuapai Business Park. Based on modelling in HEC-Ras, the flood paths do not impact on proposed floor levels within proposed Lots 200 and 300 or affect entry to these lots.

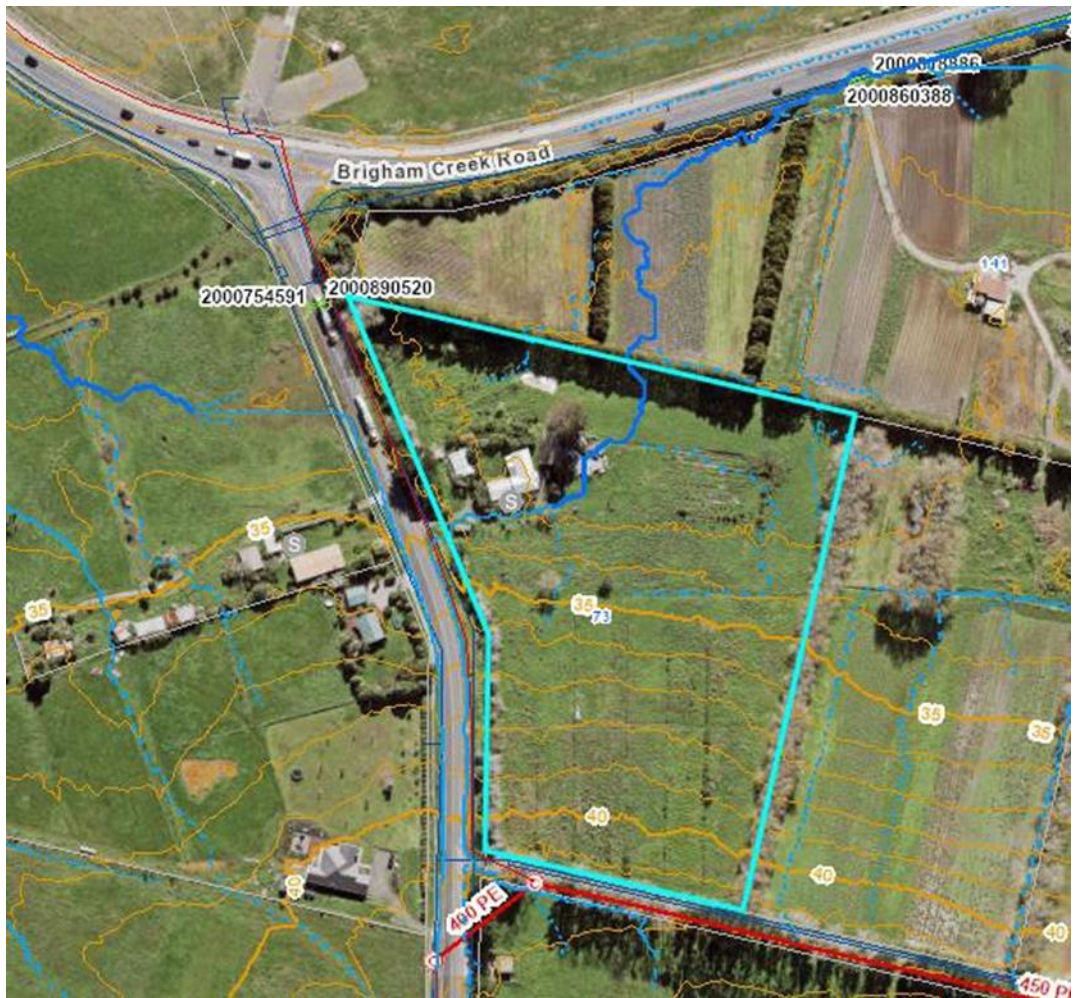


Figure 1: 73 Trig Road Site Map





**Figure 2: 155-157 Brigham Creek Site Map**

### **3. Proposed Development**

#### **3.1 Development at 73 Trig Road**

The proposal is to subdivide the existing site at 73 Trig Road into 3 industrial lots and extend the proposed Road 2 (of Whenuapai Business Park) at 71 Trig Road to intersect with Trig Road.

It is proposed to upgrade Trig Road on the eastern side for the length fronting the proposed development. Drainage infrastructure is also proposed to service the development.



**Figure 3: Proposed Development at 73 Trig Road**

### 3.2 Development at 155-157 Brigham Creek Road

As part of the fast-track resource consent application process, 155-157 Brigham Creek Road, Whenuapai is also included in this application. The proposal to subdivide 155-157 Brigham Creek Road into two industrial lots: lots 200 and 300 is contained within the previously submitted Whenuapai Business Park application. The boundaries of 155-157 Brigham Creek Road (Balance Lot 200 and 300 Whenuapai Business Park Stage 1) are not changing. Both the lots will have access from proposed Road 1; as shown in Figure 3. The proposed Road 1 will connect to Brigham Creek Road at a proposed intersection. The access to lot 200 is proposed via a proposed driveway including a small bridge over an existing watercourse. Lot 300 is accessible from the main road ("Road 1").

The wastewater and stormwater drainage infrastructure and water supply are proposed to service lot 200 and 300 as shown in Figure 3 and 4, and on drawings 44315-DR-C-3000 to 6000.

Power and telecommunication services will be available from proposed Road 1. The drainage connections (stormwater, wastewater and water) for these Lots have been sized to service Light Industry zoning. Power and telecommunication services will be available from proposed Road 1.



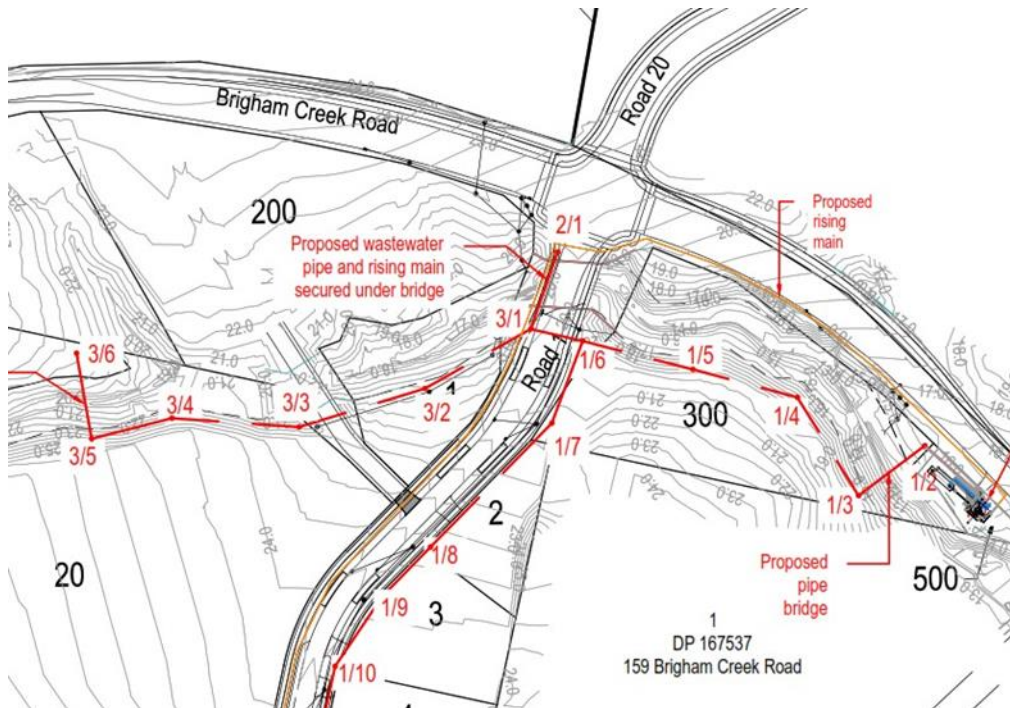


Figure 4: Lot 200 and 300 Proposed Wastewater

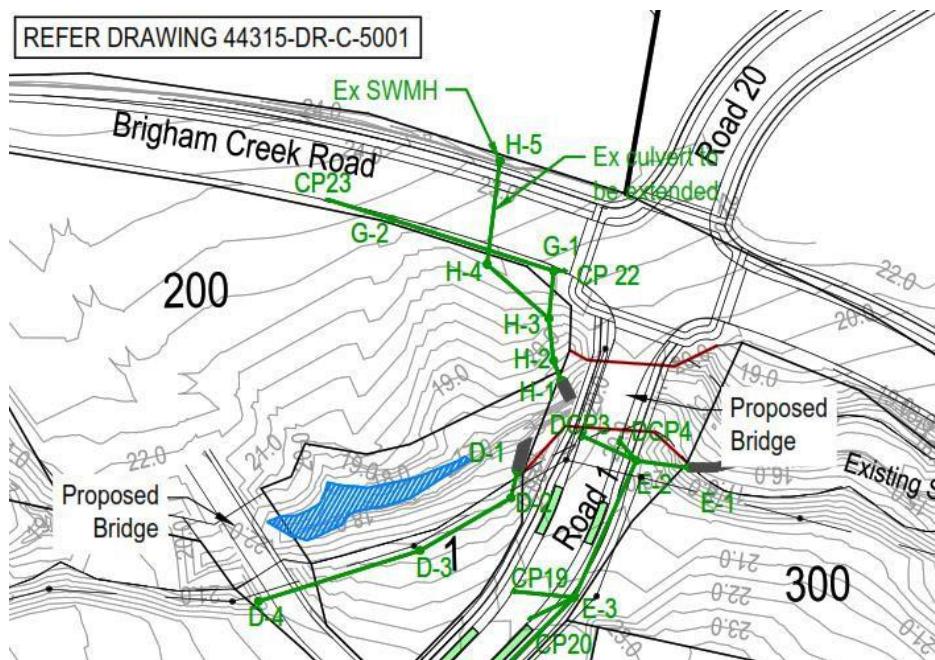


Figure 5: Proposed Lots 200 and 300

## 4. Earthworks

### 4.1 Proposed Earthworks

Earthworks are proposed to form the proposed roads and to reshape the lots to the final level as part of this resource consent application. The construction of the earthworks will be carried out in accordance with Auckland Council standards. The proposed earthworks consist of an area of 3.2ha with volumes of approximately 10,958m<sup>3</sup> and 24,204m<sup>3</sup> for cut and fill respectively at 73 Trig Road site. The proposed earthwork will be completed under a bulk earthworks consent which has been submitted to Council (BUN60410316). The earthworks at Lot 200 and 300 are consented under LUC60350837, with additional earthworks and services proposed under the Whenuapai Business Park as drawings 46528-DR-C-2000 to 2100.

### 4.2 Sediment and Erosion Control

Erosion and sediment controls will be provided and constructed in accordance with GD05, to minimise effects to downstream environment. These controls shall be reviewed, adjusted, and maintained as the work progresses.

The completed surface will be progressively stabilised to reduce the exposed areas. Detailed sediments and erosion control plans will be included in the engineering report.

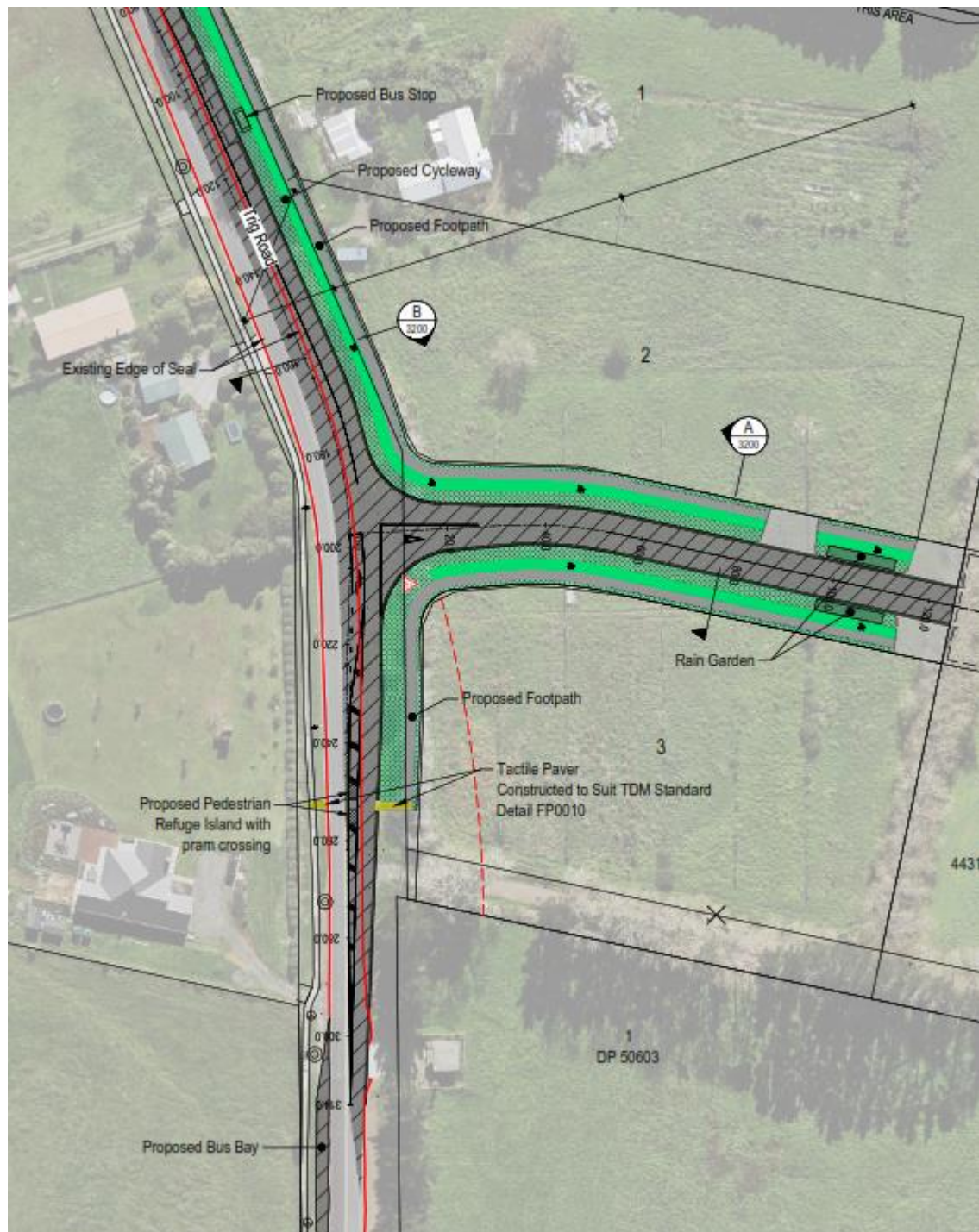
## 5. Roothing

A collector road is proposed under the 69 and 71 Trig Rd development application for Whenuapai Business Park. The proposed road runs in an east-west direction and terminates in front of 73 Trig Road. The collector road is proposed to be extended to connect with Trig Road to form a new intersection.

The existing Trig Road will be upgraded along the frontage starting from the southern boundary of 73 Trig Road to Brigham Creek Road intersection. As part of the upgrade, a new flush median is proposed on Trig Road with a kerb and channel, cycle lane and footpath on the eastern side of Trig Road. Two bus stops are also proposed on either side of Trig Road as shown in Figure 5 and on drawings 46528-DR-C-3000 to 3200.

An indicative “No Build” line is proposed across the southwestern corner of the site in recognition of a proposed designation for future road geometry as per consultation with Auckland Transport and Supporting Growth Alliance (SGA).

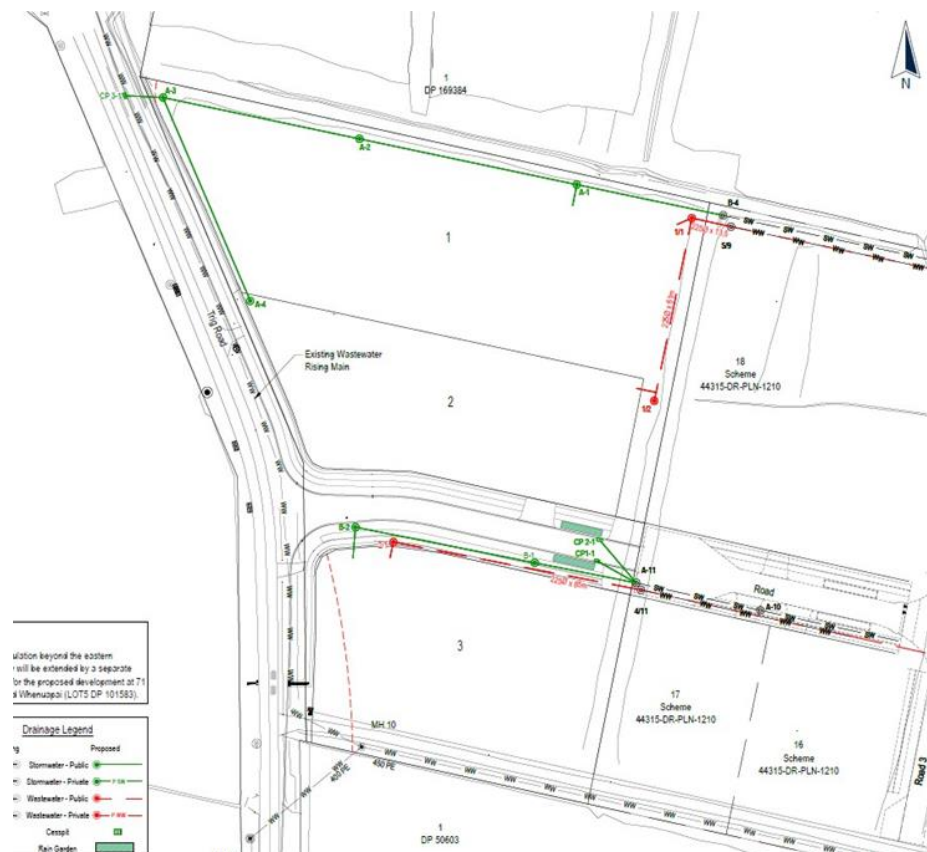




**Figure 6: Proposed Roading**

## 6. Wastewater Network

The Whenuapai Business Park wastewater reticulation is proposed to be extended to service 73 Trig Road. A wastewater line will be extended along the eastern boundary to service lot 1 and lot 2. A separate wastewater line will be extended along the proposed Road 1 as shown in Figure 6 to service lot 3. The reticulation proposed by the Whenuapai Business Park development also proposed suitably sized wastewater connections for lot 200 and 300 in 155-157 Brigham Creek Road as shown on drawing 46528-DR-C-4000.



## 7. Flood Assessment

## 7.1 73 Trig Road

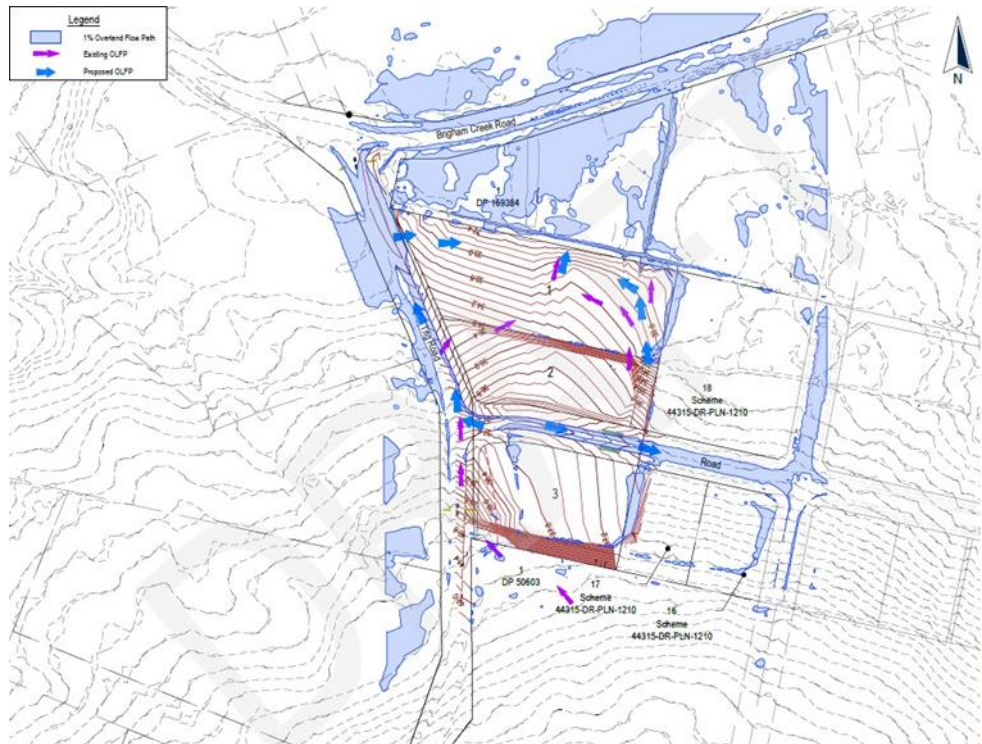
Auckland Council's Geomaps shows existing overland flow paths from Trig Road within the northern section before crossing the northern boundary and discharging to the neighbouring property as shown in Figure 1.

The earthworks design follows a similar flow pattern as in the existing situation. The proposed earthworks are designed to direct the flow from the subject site to the same exit points as in existing situation at the northern boundary. The Levels along the northern boundary will remain as they currently are to ensure that the post-development flow direction will remain unchanged, and the flood risks are not exacerbated.

The post development situation flood assessment has been carried out using the HEC RAS software. The 24 hours rainfall depth for the 1% AEP storm event is obtained from TP108 rainfall graph and applied over the total catchment. HEC HMS was used to determine the precipitation hydrograph for HEC RAS model as per Auckland Region 24-hour design, storm time interval and intensity. Post-development flood model is shown below in Figure 7. The 1% AEP overland flow that originates from the upstream section of the subject property at 73 Trig Road will be diverted to the east through the proposed Road 2. This is to reduce the flooding affecting the property at 141 Brigham Creek Road. A stormwater pipe with scruffy dome along the northern boundary is also proposed to divert a portion of the 1% AEP flow as shown in Figure 9.

The post development flood results demonstrate that the overland flow will enter from the lowest point of Trig Road from the north-western corner and exit at the same points as in the existing situation. The proposed flood mitigation will reduce flood risk to downstream property at 141 Brigham Creek Road. No effects to the upstream properties will be created as shown on drawing 46528-DR-C-5300.





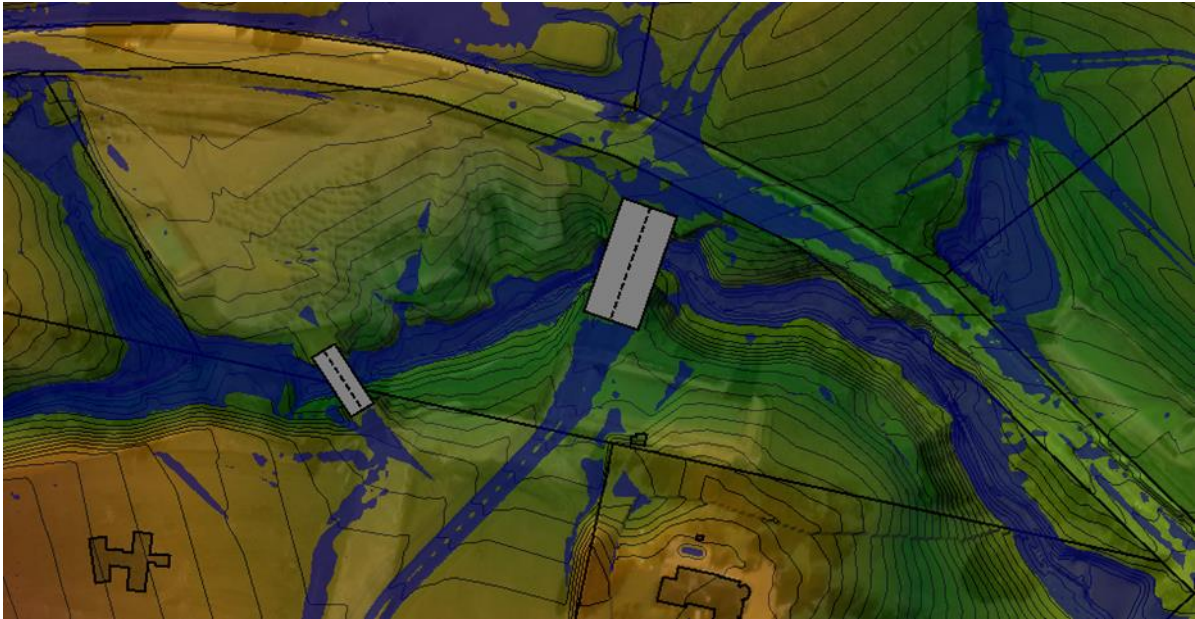
**Figure 7: Post-development Overland Flow at 73 Trig Road**

## 7.2 155-157 Brigham Creek Road

One of Waiarohia Stream' tributaries (unnamed Stream), conveys the 1% AEP overland flow from the upstream properties and discharges it to Waiarohia Stream, through several properties including the property at 155-157 Brigham Creek Road. A portion of the overland flow from Brigham Creek Road discharges to the unnamed Stream through 155-157 Brigham Creek Road where Road 1 to Brigham Creek Road is proposed as shown in Figure 8.

The post development overland flow will maintain similar overland flow path as in existing situation. The overland flow from Brigham Creek Road future intersection with Road 1, will flow over the proposed Road 1 carriageway to the unnamed Stream.

Based on flood assessment results, the proposed Lots 200 and 300 will not be affected by flooding from the unnamed stream. However, minor overland flow paths in each lot may be required during full development of the two lots.



**Figure 8: Post-development Overland Flow at lot 200 and 300**

## **8. Stormwater Management**

### **8.1 Existing Stormwater**

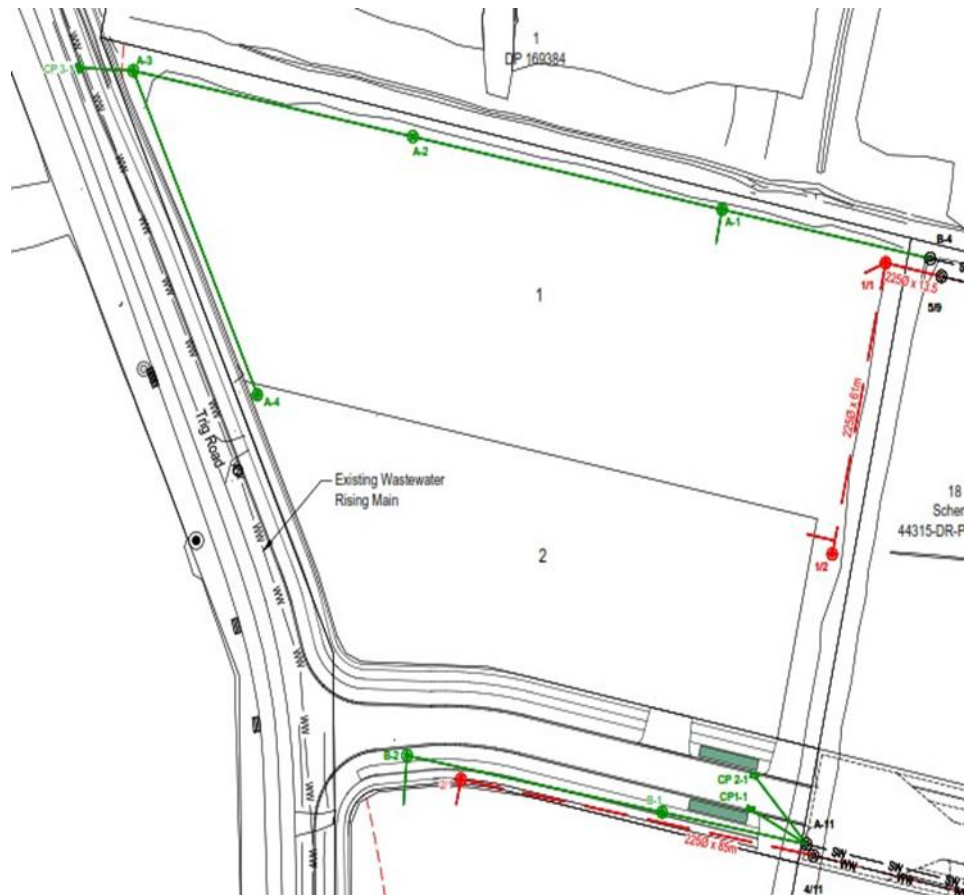
There is no existing public stormwater reticulation within the site or neighbouring properties. The site is naturally draining to the existing gully and discharge to the Waiarohia Stream or its tributaries via Brigham Creek Road.

### **8.2 Proposed Stormwater Network**

As with proposed wastewater, the neighbouring subdivision – Whenuapai Business Park (managed by NCL) stormwater reticulation is proposed to be extended adjacent to the eastern boundary of 73 Trig Road. A stormwater line will be extended along the northern boundary, and a separate stormwater line will be extended along the proposed road extension for collecting the stormwater runoff via catchpits. The reticulation proposed by the Whenuapai Business Park development also proposed suitably sized stormwater connections for lot 200 and 300 in 155-157 Brigham Creek Road as shown on drawings 46528-DR-C-5000 to 5210.

New public stormwater reticulation is proposed to convey the 10% AEP flow from the proposed development and the upstream catchments. The runoff from the site will be discharged to the unnamed stream in 71 Trig Road through the proposed development's outlet structure.

The reticulation has been sized to allow for upstream catchments/neighbouring sites to connect as shown in Figure 9 below.



**Figure 9: Proposed Stormwater Layout**

### 8.3 Stormwater Mitigation

#### 8.3.1 Stormwater Mitigation - Auckland Council Network Discharge Consent

Given the Future Urban zoning of the site, private stormwater discharge consent is required. The stormwater management strategy follows the approach outlined within the Auckland Council Network Discharge Consent to ensure that it is consistent with the desired Council outcomes. The stormwater management is proposed in accordance with the requirement of Schedule 4 of the Network Discharge Consent. A detailed specific stormwater management plan for the subject sites will be provided separately in the future, when building development occurs.

The stormwater mitigation requires provision of retention for 5mm runoff from the impervious areas and provide detention for the difference between the pre-development and post-development runoff volumes from the 95th percentile 24 hours rainfall event minus the retention volume.

Treatment systems shall be provided to treat the runoff from the impervious areas. The existing and proposed overland flow paths shall be managed to avoid any detrimental effects to the neighbouring properties and to the downstream environment.

The proposed public stormwater reticulation shall be designed to accommodate the 10% AEP storm event for the Maximum Probable Development (MPD). The MPD allows for the maximum impervious surface limits of the current zone or the proposed zoning. It is noted that the impervious area is not limited in the light industrial zone.

#### 8.3.2 Proposed Mitigation

The stormwater reticulation is designed for the 10% AEP storm events. However, the proposed stormwater line along the northern boundary is designed to cater for overland flow originating from the 10% AEP storm event via a high flow inlet (scruffy dome) on a 1350mm diameter manhole. The downstream reticulation has been sized



to accommodate the additional flow, even assuming 10% blockage. This has the effect of reducing the 1% AEP storm runoff to predevelopment levels.

Bioretention (battered raingardens) are proposed in the front berm of the road to provide the required detention for the difference between the pre-development and post-development runoff volumes from the 95th percentile 24 hours rainfall. Due to limited infiltration, the required retention for the impervious area in the road reserve will be compensated within the detention volume according to AUP Table E10.6.3.1.1 Hydrology mitigation requirements.

### 8.3.3 Stormwater Treatment

Raingardens are proposed in the road reserves to provide the required treatment for the proposed road extension only inside the subdivision.

Wherever the impervious areas are over 1,000m<sup>2</sup> or the proposed carparks are over 30 carparks for each future lot, treatment shall be provided within the individual lots.

## 9. Water Supply

There is an existing 225mm diameter watermain available at the western berm of Trig Road. The proposal is to extend the watermain from neighbouring subdivision along the proposed road extension and tie in with the existing watermain within Trig Road. Three new water connections are proposed from the proposed water extension to service proposed lots as shown in Figure 10. The reticulation proposed by the Whenuapai Business Park development also proposed suitably sized water connections for lot 200 and 300 in 155-157 Brigham Creek Road.

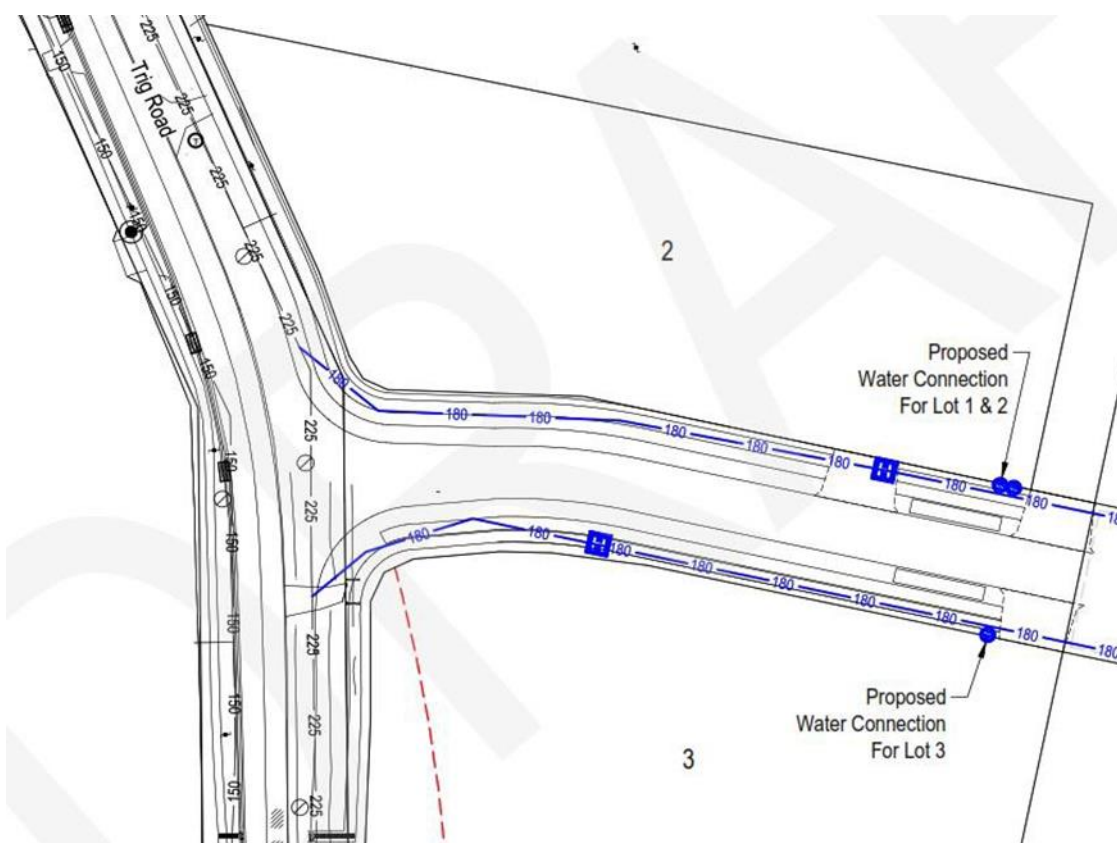


Figure 10: Proposed Water Reticulation

## 10. Utilities & Services

Power and telephone services are currently located within the road reserve of Trig Road in front of the subject site. The power and telephone services will be extended throughout the proposed development to serve the individual Lot. The existing overhead lines crossing the site will be undergrounded and re-routed.

The utility services proposed by the Whenuapai Business Park development also proposed suitably sized utility connections for lot 200 and 300 in 155-157 Brigham Creek Road.

Lighting including street lighting to the proposed intersection with Trig Road will be provided.

## 11. Summary

Public wastewater reticulations will be extended from the wastewater manholes of the extended wastewater reticulation at 71 Trig Road to service the development of 73 Trig Road. The reticulation proposed by the Whenuapai Business Park development also proposed suitably sized connections (for stormwater, wastewater, water, and utilities) for lot 200 and 300 in 155-157 Brigham Creek Road.

Stormwater networks are proposed to convey the 10% AEP stormwater runoff from the proposed development. Stormwater mitigation shall be provided as discussed in section 8.3. The runoff from the impervious area will be treated on site before discharging to the stormwater network.

The overland flow paths are assessed and managed to minimise detrimental effects to the neighbouring properties, Whenuapai Business Park (which is in progress), and downstream environment. The existing flood hazard risks are not exacerbated.

Utility services are available within the road reserve and shall be extended to service the proposed development.

## 12.0 Limitations

This Memo is prepared for the applicant, Neil Construction Limited, in relation to an application under the Covid-19 Recovery (Fast-track Consenting) Act 2020 for 73 Trig Road and 155 – 157 Brigham Creek Road, Whenuapai, Auckland. The comments within this Memo are limited to the purpose stated. Cato Bolam accept no liability for the use of this memo by any other person that that stated above, or use for any other purpose, and any such person who relies upon any matter contained in this Memo does so entirely at their own risk.