To

Fast Track Consenting Panel

Cc: Fulton Hogan Land Development

From

Woods
Kendall Reid – General Manager, Survey

W-REF: P24-128
24 March 2025

Milldale P21 Stream Investigations

Milldale Development, Pine Valley

This report examines watercourse P21 within the Milldale Development to determine the need for drainage reserves and/or esplanade reserves in accordance with Auckland Council requirements and Section 230 of the Resource Management Act.

Statement of Qualifications and Experience

Kendall Reid

I am a Licensed Cadastral Surveyor and General Manager of Surveying at Wood and Partners Consultants Ltd (Woods). Woods is a multi-disciplinary consultancy specialising in planning, urban design, engineering, water infrastructure, and surveying. I have been employed at Woods since October 2016.

I hold the qualifications of a Bachelor of Surveying, from University of Otago, which I completed in 2010. I am a Licensed Cadastral Surveyor with the Cadastral Survey Licensing Board of New Zealand, a Registered Professional Surveyor and a Full member of Survey + Spatial New Zealand.

I have 14 years of professional experience in the Surveying field. This primarily includes the land development aspects of surveying. It includes both the capture of physical features and cadastral marks, as well as navigating the regulatory and legal processes associated with land development. I have substantial experience working with water boundaries and have previously collaborated with Survey + Spatial New Zealand (S+SNZ) and Land Information New Zealand (LINZ) to provide advice to Auckland Council on esplanade requirements. My expertise also led to the collaboration and publication of an article in the December 2019 Surveying + Spatial magazine titled "Where is a river and who decides?"

I confirm that, in my capacity as co-author and approver of this report, I have read and abide by the Environment Court of New Zealand's Code of Conduct for Expert Witnesses Practice Note 2023.

Yours faithfully

Kendall Reid

General Manager, Survey

Regan Lafferty

I am a Graduate Surveyor at Wood and Partners Consultants Ltd (Woods), a multi-disciplinary consultancy. I have been employed at Woods since February 2023.

I hold a Bachelor of Surveying from University of Otago, completed in 2022. I am a Graduate Level member of Survey + Spatial New Zealand. I have two years of post-graduate experience in surveying, including field capture and plan preparation, predominantly on the Milldale site.

I confirm that, in my capacity as the originator of this report, I have read and abide by the Environment Court of New Zealand's Code of Conduct for Expert Witnesses Practice Note 2023.

Yours faithfully

Regan Lafferty

Graduate Surveyor

Samantha Muirhead

I am a Licensed Cadastral Surveyor at Wood and Partners Consultants Ltd (Woods). Woods is a multi-disciplinary consultancy specialising in planning, urban design, engineering, water infrastructure, and surveying. I have been employed at Woods since December 2013.

I hold a Bachelor of Surveying from University of Otago, completed in 2013. I am a Licensed Cadastral Surveyor with the Cadastral Survey Licensing Board of New Zealand and a Full member of Survey + Spatial New Zealand.

I have 11 years of post-graduate experience in the Surveying field. This primarily includes the land development aspects of surveying, including both greenfield and brownfield development. My experience includes capture of physical features and cadastral marks, as well as navigating the regulatory and legal processes associated with land development.

I confirm that, in my capacity as reviewer of this report, I have read and abide by the Environment Court of New Zealand's Code of Conduct for Expert Witnesses Practice Note 2023.

Yours faithfully

Samantha Muirhead

Associate – Survey Manager

MILLDALE P21 STREAM INVESTIGATIONS

MILLDALE
STAGE 10-13
FULTON HOGAN LAND DEVELOPMENT LIMITED
4/02/2025
For information

Document Control

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Table of Contents

1. Introduction

This report provides a summary of the investigation conducted on the watercourse within Stages 10-13 of the Milldale development in Wainui East, Auckland, specifically referred to as P21 (Shown in Appendix A) to the east of Argent Lane. The primary objective of this investigation was to accurately determine the location of the stream bed and measure its width. These measurements are required for assessing the necessity of drainage reserves and/or esplanade reserves, as required by Auckland Council and by Section 230 of the Resource Management Act 1991 (RMA).

The investigation involved field surveys and data analysis to ensure precise and reliable results. The findings of this investigation will inform the planning and development processes, ensuring compliance with relevant legislative and planning requirements. This report should be read in conjunction with the appendices.

2. Stream Legislative Requirements

This investigation has been undertaken employing the following enactments:

2.1. Cadastral Survey Rules 2021

The Rules for Cadastral Survey 2021 (Rules) are issued by the Surveyor-General under s49 of the Cadastral Survey Act 2002.

Part 2.6 - Duty of a surveyor

(a) gather all evidence relevant to the definition of the boundary and its boundary points,

(b) interpret that evidence in accordance with all relevant enactments and rules of law, and

(c) use that evidence to determine the correct position of the boundary and boundary points in relation to other boundaries and boundary points.

2.2. Resource Management Act 1991

As per s230 of the RMA, esplanade reserves are required when allotments of less than 4 hectares are created upon subdivision and are adjacent to rivers that are 3 metres or greater in width. Section 2 of the RMA defines a river as:

"River means a continually or intermittently flowing body of fresh water; and includes a stream and modified watercourse; but does not include any artificial watercourse (including an irrigation canal, water supply race, canal for the supply of water for electricity power generation, and farm drainage canal)."

In addition, Section 2 defines the riverbed as:

*"**Bed** means,-*

(a) In relation to any river-

(i) For the purposes of esplanade reserves, esplanade strips, and subdivisions, the space of land which the waters of the river cover at its annual fullest flow without overtopping its banks

Therefore, the field investigations were used to determine whether the average width exceeds 3 meters at any location and require an esplanade reserve to be vested.

2.3. Auckland Unitary Plan

Where an esplanade reserve is not required under the RMA, the Auckland Unitary Plan, Wainui Precinct specifies requirements for riparian margins. These requirements state the location and width of the open space shall be minimum width of 25m for the Waterloo Creek ecological corridor and 15m for secondary ecological corridors. Milldale stream P21 has since been identified as a secondary ecological corridor by Viridis, Environmental Consultants.

3. Methodology

3.1. Field Investigations

In 2016, a field survey was conducted utilising conventional GNSS and total station methodologies. The majority of the stream was characterised by clearly defined banks and delineated onsite using top and bottom bank strings, supplemented by a centreline string where possible through the channel.

At the time of the survey, the downstream area of the stream had been dammed to create an artificial pond for farming purposes. The dam was removed in early 2023 as part of the Milldale Stage 5B earthworks consent, and the area was naturalised to match the adjacent upstream and downstream profiles. This area was surveyed again using the same conventional methods following the naturalisation works and has been incorporated into the existing survey data. The survey data shown in Appendix A is clearly labelled 'MODIFIED WATERCOURSE, MEASURED 2023'.

3.2. Data Analysis

The survey data was processed using 12d, ensuring precise handling and accuracy of field measurements. After processing, the data was exported to BricsCAD as 2D strings for further analysis. Cross-sectional measurements were initially taken perpendicular to each top of bank at approximately 20-meter intervals to assess stream widths.

Natural obstructions, such as felled trees or vegetation build-up near blocked culverts, caused localized channel widening. These anomalies were carefully documented and incorporated into the analysis to ensure the calculated average widths accurately represented the stream's physical characteristics.

The average stream width was calculated using the following formula:

$$Average\ width\ (m)\ =\ \frac{Sum\ of\ widths\ (m) at\ cross\ sections}{Number\ of\ cross\ sections}$$

3.3. Waterloo Stream Typical Cross Section

The Milldale Stream P21 has a well-defined channel within a valley. During the survey, the waterline was clearly below the observable banks. The stream varies in width and course, with the upstream section being relatively straight and narrow, while the middle section was more variable due to high vegetation. The modified watercourse section is consistent in width and has a very curvy path. The downstream section, also through vegetation, shares similar characteristics with the middle section. Despite these variations, the average stream width remains under 3 meters.

An overall plan showing sections can be found in Appendix A.

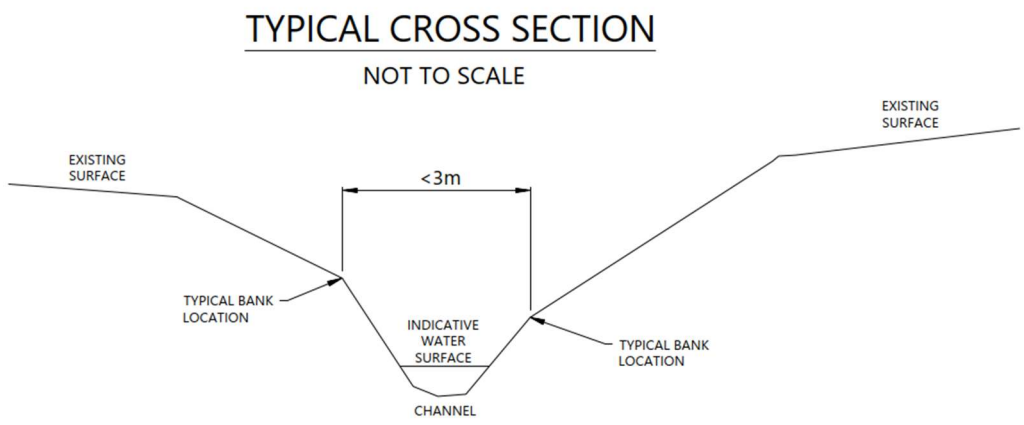

Figure 1: Standard Stream Cross-section

Figure 2: Photograph of P21

4. Conclusion

The methodology employed in this investigation ensured accurate determination of the stream's banks and widths, meeting the statutory and planning requirements for the Milldale development.

Due to the varying nature of the stream, widths were measured at approximately 20-meter intervals and averaged to obtain an overall stream width of 2.66 meters.

The Milldale Stream P21 will fall under the classification of secondary ecological corridor as per the Auckland Unitary Plan, Wainui Precinct.

5. APPENDIX A – STREAM WIDTH INVESTIGATION PLAN