Environmental Protection Agency
- Expert Consenting Panel

Woods
Jamie Whyte – Principal

W-REF: P24-128
25 February 2025
Reviewer: Brandon Olver

Milldale Stages 10 - 13

Functional Design Memorandum

STATEMENT OF QUALIFICATIONS AND EXPERIENCE

Originator: Jamie Whyte – Principal

I am a Principal at Wood & Partners Consultants Ltd. Wood & Partners Consultants Ltd is a multi-disciplinary consultancy specialising in planning, urban design, civil engineering, water infrastructure and surveying. I have been employed at Wood & Partners Consultants Ltd since January 2004.

I hold the qualifications of a Bachelor of Surveying from the University of Otago (BSurv), which I completed in 2003. I hold a professional qualification as a Register Professional Surveyor (RPSurv). I am a Full (voting) Member of Survey and Spatial New Zealand.

I have 20 years of professional experience in Subdivision Engineering and the Land Development industry. I have extensive knowledge in the design, construction and delivery of large-scale land development projects. My experience includes major roles on some of New Zealand's largest subdivision projects including Stonefields, Long Bay, Millwater and Milldale.

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.

Reviewer: Brandon Olver - Senior Associate Engineer

I am a Senior Associate Engineer at Wood & Partners Consultants Ltd. Wood & Partners Consultants Ltd is a multi-disciplinary consultancy specialising in planning, urban design, civil engineering, water infrastructure and surveying. I have been employed at Wood & Partners Consultants Ltd since December, 2014.

I hold the qualifications of Bachelor of Engineering Technology (Civil Engineering) from Open Polytechnic, which I completed in 2016. I am a Chartered Professional Engineer member of the Engineering New Zealand.

I have 19 years of professional experience in the Civil Engineering field, including roles such as Contract Engineer at Downer Group and Engineering Technician at Opus International Consultants Ltd. My experience includes design, construction supervision and contract management of land development projects. Projects I have worked on include Milldale earthworks, Milldale civil works, Wiri North Quarry filling and redevelopment, Equidae Estate development, and 75 Valley Road subdivision

I confirm that, in my capacity as author 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.

1. Introduction

Fulton Hogan Land Development Limited (**FHLD**) is seeking consent for residential development within Milldale Stages 10 - 13. Stages 10 – 13 form the remaining four stages of land yet to be developed by FHLD within the Wainui Precinct.

Milldale is a master planned residential subdivision. Development to date has been structured and designed in accordance with the Wainui Precinct Plan (the **Precinct Plan**). The Precinct Plan and Masterplan for Milldale provide for a well-connected, mixed density urban environment. Walkable communities are enabled with a network of pedestrian and cycle paths linking key spaces and amenities within the development. Stages 10 – 13 have been designed with consideration of a number of site constraints and opportunities.

While the site opportunities are readily achieved with the proposed design, there has been careful consideration and a balancing of achieving good urban outcomes alongside the site constraints. This memorandum will provide rationale for how the subdivision design responds to those site constraints.

2. Site Opportunities

- Continue to deliver a successful and thriving residential community;
- A local housing market that responds well to a mix of housing densities providing a range of housing opportunities to the local community;
- Infrastructure ready development;
- Master planned subdivision with a functional layout and connections to local amenities;
- Continue to deliver key links through the development including green corridors, public transport networks, cycle lanes, active mode links and pedestrian movement networks;
- Implement and deliver the remaining open spaces for the development, thereby providing further amenity to the local community;
- Enhance and protect existing waterways that are planned to be retained;
- Provide opportunities for urban density co-located with open space amenity and public transport networks;
- Higher elevations within Stages 10 – 13 that provide opportunities for outlook and views with vertical separation between lots and dwellings; and
- Utilise an existing unformed road - there is an existing unformed road between the consented Wainui Road / Argent Lane Roundabout and Cemetery Road along the western ridge of Stages 12 and 13. This road reserve can be utilised to connect Argent Lane to Cemetery Road.

3. Site Constraints

- Difficult topography. Stages 10 – 13 present the steepest topography within the development;
- Adjoining property at 147 Argent Lane. 147 Argent Lane is not owned by FHLDL and there are no development plans for this site. Site levels at the boundary of 147 Argent Lane need to be respected and retained. There is no opportunity to raise levels on 147 Argent Lane to ease grades across Stages 12 and 13;
- Cemetery Road. There are multiple rural accesses along the western side of Cemetery Road. The levels of Cemetery Road need to be maintained and there is no opportunity to lower levels along Cemetery Road to ease grades across Stages 12 and 13;
- South facing slopes. In addition to the steep topography, much of Stages 10, 11 and the northern portion of Stage 12 are south facing;

- Geotechnical instability. The steep slopes are prone to instability and underlying soils are highly expansive and sensitive to moisture. Considerable geotechnical improvement works will be required to ensure the ground is well conditioned for residential development;
- Freshwater features. Stream and wetlands have been identified within Stages 10 – 13 and these do not align well with the structure of the Wainui Precinct Plan. A well-considered balancing of urban design and ecological outcomes is required to ensure a viable and functional realisation of residential outcomes in the Wainui Precinct;
- Wainui Stormwater Management Plan (**SMP**) compliance. Compliance with the SMP is challenging with Auckland Council now deterring 'at source' detention such as the previously promoted rain gardens. The latest preference is now for centralised devices which require large amounts of developable land to be set aside for detention basins; and
- Conformance with the Precinct Plan. When considering the above site constraints it is challenging and, in some cases, impractical to adhere to the Precinct Plan.

4. Design Response to Site Constraints

4.1. Difficult topography

The Stage 10 – 13 design responds to the steep topography in a number of ways. There is a general trend to run the majority of roads parallel with the contour and minimise the number of roads running against the contour. This allows for mid-block retaining features, such as retaining walls or reinforced earth slopes (**RE Slopes**), to run parallel with the contour roads. These mid-block retaining features absorb height differential up the slope which allows for on-grade residential frontage onto the contour roads. This is the best method to promote flatter residential sites, which in turn, minimises post development earthworks and enables cheaper construction costs for building new homes.

Roads running against the contour are largely restricted to those key roading connections identified on the Precinct Plan. These roads provide connections between the lower and higher levels within each stage. Consideration of maximum gradients in accordance with Auckland Transport Design Manual is necessary when designing the vertical geometry of these roads. In particular these are maximum gradients of 8% for a collector road (bus route) and 12.5% for a local road.

The use of mid-block retaining features also enables vertical separation between residential sites. This is a positive outcome in higher density residential areas. This promotes more sun exposure, more open outlooks, and potential for views across the development and out to the Hauraki Gulf on the higher elevation sites.

Where mid-block retaining features are less than 3.0m, mid-block retaining walls are adopted. Where these mid-block retaining features increase in height beyond 3.0m, RE Slopes are adopted. These are 1 vertical to 2 horizontal (1V:2H) planted slopes, with protective vegetation covenants proposed on the survey scheme plan. This provides a softer design feature for the larger retaining structures greater than 3.0m in height.

Overall, it is considered the landform design of Stages 10 to 13 responds well to the existing topography of the site while achieving compliant road gradients across the steep terrain. The use of midblock retaining features allows for relatively flat sites that will minimise the amount of secondary earthworks once builders establish on these sites.

4.2. 147 Argent Lane Boundary Levels

The adjoining property at 147 Argent Lane is not owned by FHLD, and there is no current development plans for the site. The western and northern boundary elevations of 147 Argent Lane have been respected and maintained within the proposed landform design.

Retaining walls are proposed and necessary within the new residential lots fronting the western and northern boundary of 147 Argent Lane. This is to assist with absorbing the height difference across the site and to ensure the adjacent collector road has conforming road gradients at a maximum of 8%.

Retaining wall heights along this boundary have been minimised where possible. Typically, these walls will be less than 2m, with short sections extending up to 2.5m.

Connections to infrastructure to 147 Argent Lane have been enabled. This site has road frontage with Argent Lane, and 4 additional road connections are enabled with the Stage 12 and 13 scheme plan to the western and northern boundaries of 147 Argent Lane. Two of these connections include stream edge road links, represented by SER 04 and SER 07 on the Roading drawing set.

4.3. Cemetery Road Levels

Cemetery Road is an existing rural road located on a ridgeline that defines the boundary between the Wainui Precinct and the rural zoned land to the west.

There are multiple rural driveway access points along the western side of Cemetery Road. The levels of Cemetery Road will need to be maintained so those accesses are not compromised. Therefore, there is no opportunity to lower levels along Cemetery Road to ease grades across Stages 12 and 13.

Between a set height on Cemetery Road (high point of 82m RL) and the set height at 147 Argent Lane (low point of 48m RL), there is approximately 30m of fall across the site.

The main outcome of these fixed levels is the east – west collector road identified on the Precinct Plan cannot comply with the maximum gradient of 8%. This road has therefore been adjusted to a local road with a maximum gradient of 12.5%.

The other main design response is vertically detaching much of Stage 12 and 13 from Cemetery Road. This is achieved with a large 12m high RE slope running in parallel with Cemetery Road. This allows all other roads on the lower side of this RE slope to comply with maximum gradients and reduces the heights of retaining features within that lower zone.

This has resulted in Cemetery Road having low connectivity with the wider Milldale Roading network. This is considered in the design by utilising the single house zone for larger residential sites for a lower density (i.e. less people need to access this part of the site via road). Furthermore this housing typology works well for the transition from rural land to residential.

The reduced amount of road connectivity along Cemetery is also mitigated by three additional pedestrian accessways linking Cemetery Road to the roads and walkways on the lower side of the RE slope. Accordingly, while vehicle connections are less frequent than other areas of the development, strong pedestrian links are maintained.

4.4. South facing slopes

Stages 10, 11 and the northern portion of Stage 12 are generally south facing. This design constraint is acknowledged by minimising the use of retaining walls through these areas in favour of RE Slopes. RE Slopes are designed with a maximum slope of 1V:2H. Compared to a vertical retaining wall, this promotes greater access to sun exposure for the lots located on the low side of the retaining features.

4.5. Geotechnical instability

Slope stability is considered the most significant geotechnical risk to the development due to the inherently unstable nature of the Northland Allochthon Geology.

It should be noted that together with the less than favourable Northland Allochthon geology and boundary constraints to the development whereby the relatively steep gradients across the site are fixed, the frequent watercourses and wetland features observed across all stages of the site pose significant constraints to thesuccess of the slope stability remediation for the project.

These features are regularly steeply incised and locally comprise water softened soils.

The landform proposed is dependent on the developer's ability to construct a universal, cohesive, large-scale remediation. The removal of a number of streams and wetlands and realignment of others will be essential to achieving this.

Any effort to retain greater stream extent or wetlands within the design of the subdivision would result in the requirement for large and costly underground palisade walls in order to mitigate the risk of instability, as well as roads, infrastructure, and housing that would need to be significantly set back from water features.

The installation of underfill drainage in the selected reclaimed and realigned watercourses and filling with engineered fill will significantly benefit the global stability of the slopes by providing confining loads with improved shear resistance. Water captured by proposed drainage will be directed into the newly formed watercourses as a form of stream recharge.

The requirement for significant geotechnical intervention will mean the majority of the site needs to be fully earthworked. While this results in stream and wetland loss, it also presents opportunities to realign the key streams into locations that will better integrate with the urban structure of the Precinct Plan.

4.6. Ecology features

As shown on the Ecology Features Plan (Drawings P24-128-00-1400 to 1403-EW), there are a number of freshwater wetland and stream features located across the site. These plans show the following ecology features as classified in the Viridis Ecological Impact Assessment, including:

- Permanent streams;
- Intermittent streams;
- Wetlands on the subject site; and
- Potential wetlands on the neighbouring site at 147 Argent Lane.

The 10m riparian margins around the streams, 10m buffers around the wetlands and 100m offset around the wetlands are also represented on the plans. Those areas of the site, including the 10m margins, buffers and offsets, cover 37 hectares. This is over half of the total site area.

Working around these features poses a major constraint for the site to be developed in accordance with the Precinct Plan. A logical and cohesive urban form could not be achieved without removal and realignment of these features. Retaining and working around these features would render the development layout impractical and would not be viable.

The ability to soften the steepness of the site topography would also be compromised should the ecology features be retained. Typically the topography surrounding the headwaters for the streams and wetlands is the steepest land on the site. If these features were to be retained on their pre-development levels, land above the features would be too steep to support residential development.

Balancing urban design and ecological outcomes is therefore required to ensure a viable and functional realisation of residential outcomes sought for the Wainui Precinct. This is achieved through the following design responses (Refer to Streamworks Drawings P24-128-00-1450 to 1453-EW for details):

1. Retain and enhance all permanent streams;
2. Retain and enhance intermittent streams where possible. There are 6 main intermittent streams that have been identified for retention including streams 6, 20, 26, 35, 42 and 43;
3. Realign the upper reaches of these 6 key streams to enable enhanced and cohesive alignments with the urban structure of the scheme plan;
4. Vertical realignments of these 6 key streams to ensure manageable and compliant gradients for adjacent roads, and to help manage the overall steepness of the site. The proposed vertical realignments are necessary to soften the steeper slopes around the headwater catchment of the retained streams;

5. All retained and realigned streams will be enhanced with instream features and riparian planting as proposed in the Ecological Impact Assessment and as detailed on the Riparian Enhancement Landscape Plans;
6. Culverts have become necessary to facilitate road connectivity across the retained streams. It is proposed to reduce the amount of culverts by only allowing key connecting roads to cross streams. A total of 11 culverts are proposed. Culverts will be fish passage enabled in accordance with a Native Fish Capture and Relocation Plan. Additionally, 5 pedestrian bridges are proposed to link key walkways across streams.
7. Some shorter sections of intermittent streams will be reclaimed with the loss of ecological value compensated for in accordance with the Ecological Impact Assessment; and
8. All wetlands will be reclaimed with the loss of ecological value offset in accordance with the Ecological Impact Assessment. It is noted that all wetlands are of low ecological value. It is proposed to offset the loss of wetlands by creating wetlands and protecting them on rural land north of Milldale.

4.7. Stormwater Management Plan Compliance

The SMP outlines how the effects of stormwater are mitigated and managed within the Wainui Precinct. When the SMP was approved by Auckland Council there was a strong directive from Auckland Council to provide 'at source' stormwater mitigation. This requirement is written into the SMP and was strongly promoted as the main form of stormwater mitigation. At the time the Council was opposed to centralised detention.

The masterplan for Milldale was developed on this basis that stormwater would be managed with 'at-source' stormwater detention devices. These would be in the form of rain gardens located in road reserves for public road stormwater, and privately owned detention tanks for private residential lots.

Since then, there has been a significant change in directive from the Council who now strongly oppose rain gardens. There is now a preference for centralised stormwater management systems.

The layout of Stage 10 – 13 has therefore been designed to accommodate Council's policy change despite the SMP calling for 'at-source' stormwater mitigation. This means there are several large stormwater detention devices designed into the layout of Stages 10 – 13. These devices are identified on several drawings within the engineering drawing set and are referred with the associated contributing catchments on drawing P24-128-00-3400 to 3403-DR.

The areas set aside for stormwater mitigation have sized basins with confirmation the required detention volume can be achieved within Section 4.5 of the Stormwater Design Memorandum (Appendix D to the Infrastructure Report). Detailed design of these devices will be provided at Engineering Approval stage. This detailed design will be undertaken in consultation with the Healthy Waters Department of Auckland Council.

4.8. Precinct Plan Conformance

Given the constraints above outlined there are some significant challenges with conforming to the Wainui Precinct Plan. A pragmatic approach has been taken to precinct plan conformance. This has involved conforming to the main road connections identified on the plan, but never at the detriment of good urban design outcomes.

Refer to drawing P24-128-00-0005-GE for the Precinct Plan conformance plan. This plan demonstrates a strong level of conformance with the Precinct Plan despite these site constraints. The main site constraint that interferes with precinct plan conformance is the retained streams that were not planned for retention within the development. To a large degree the layout of Stages 10 – 13 has been structured around the key connections in the Precinct Plan, retained streams and site topography.

All collector road connections have been enabled with the exception of the east-west link within Stage 13. This road link is still provided but has been down-scaled to a local road link as the site topography is too steep to support an 8% maximum gradient collector road.

The open space corridor and stream edge roads have been provided for along Stream 21 (Milldale Stream), and enabled on the eastern edge of Stage 12 at the neighbouring boundary of 147 Argent Lane. The main active modes link through the core of the development is extended through Stage 11 up to Wainui Road. By in large the critical elements of the Precinct Plan have been adhered too.

5. Conclusion

The proposed subdivision design for Stages 10 – 13 will ensure a balancing of site constraints in order to construct the best practical layout for these final stages of Milldale. The proposed design allows for the urban form to closely align with the structure of the Precinct Plan and provides for a well-connected and functional residential space to further enhance the emerging neighbourhood of Milldale.