

Memorandum –Retaining Methodology

TERRA STUDIO

To: [REDACTED] – Barker & Associates
From: Terra Studio
Re: Design intent relating to retaining structures and slopes.

This memorandum outlines the overarching design philosophy and intent guiding the use of retaining structures across the site. It explains how key landscape and earthworks strategies are employed to ensure positive outcomes within both the public and private realm. The following table is organised into three key components outlining how these strategies are incorporated into the proposed development: *1.0 Site Overview*, *2.0 Slope Design*, and *3.0 Retaining Wall Design*

1.0 Site Overview

The existing natural topography features several valleys and ecological areas (including consent notice areas, wetlands and streams) which dissect the site non-uniformly. In some areas, the existing slopes are relatively steep, ranging in grade between 1:2 - 1:1 with minimal areas of surrounding flat land.

In addition to the site's existing topographical constraints, a major influence on the proposed development levels is the NOR 6 arterial road, which must meet strict engineering design standards. Its horizontal and vertical alignment is tightly constrained by the designation boundary, the SGA concept plan, existing Grand Drive levels within Ara Hills, and the required tie-in point at the proposed Russell Road / Upper Orewa Road roundabout. In turn, the proposed development levels are therefore established in response to the levels set by these fixed constraints.

Fundamentally, the proposed development seeks to follow the site's natural contours by 'stepping' buildings and earthworks in line with the existing landform. This approach spreads level changes across smaller increments, significantly reducing the need for large vertical retaining walls. Adequate separation from ecological areas is also maintained so that planted batter slopes can be used instead of vertical structures, creating a softer transition between built form and the natural landscape. Additional design measures - such as split-level building typologies that conceal larger walls within the building envelope, as well as stepped and screened retaining wall - are applied wherever possible to further improve and potential visual dominance associated with residential development. This design philosophy is described in detail in *2.0 Slope Design* and *3.0 Retaining Wall Design*.

2.0 Slope Design

2.1 Slopes Interfacing Existing Ecological Areas

Planted batter slopes ranging in gradient from 1:1 to 1:3 are utilized along areas where proposed development interfaces existing ecological areas, including consent notice areas, streams and wetlands. The proposed slopes allow for a gentle transition between the built form and natural landscape while providing a greater surface area for planting.

These slopes are contained within private lots and are proposed to be subject to routine maintenance controlled and operated by the residents society to ensure that the outcome remains positive and that the vegetation flourishes as the development matures over time.



Figure 1 - Examples of generic 1:1 planted slopes used in New Zealand projects



Figure 2 - Cross section showing the stream interfacing a 1:1 slope in Stage 1



Figure 3 - Cross section showing the stream interfacing a 1:3 slope in Stage 1

2.2 Slopes Interfacing Proposed Roads

1:3 planted batter slopes are used in the front and rear yards of lots where they adjoin a public road to either reduce or entirely remove vertical retaining walls. The landscaped slopes provide a gentle buffer between the private and public realm while lowering the height of retaining walls along the street frontage to 1.5m in almost all cases (refer to the Terra Studio retaining wall plans for further detail).



Figure 4 - Cross section showing a dwelling with its rear yard adjoining a public road. A keystone wall is used to define the property boundary while the 1:3 planted slope is used to make up for the difference in height.

2.3 Slopes Between Private Lots

1:3 batter slopes are also used between private lots to reduce retained heights to 1.5m where a 'stepped' wall may not be possible. This allows greater access to daylight for dwellings located below neighboring northern lots as well as providing for a gentler transition where larger height differences may be present.

3.0 Retaining Wall Design

3.1 Retaining Walls Within Private Lots

Split-level housing typologies which incorporate retaining walls into their building envelope and overall function are used in steeper areas of the site, such as on Road 1. These typologies place their living areas on the first floor and utilize the space on top of the retaining walls for functional outdoor living whilst essentially screening the structures from the public realm.



Figure 5 - Cross section example of the split-level typologies proposed to screen larger retaining walls from the public realm.

In a more standard block arrangement where lots back on to each other, retaining walls are kept to a maximum height of 2.5m. Any walls greater than 2.5m either include a 1:3 planted batter slope above them to reduce the height or feature a 'stepped' landscape wall at their base to allow for planted screening. These details are available for viewing in Greenwoods landscape plans and their locations are shown on the Terra Studio retaining plans.

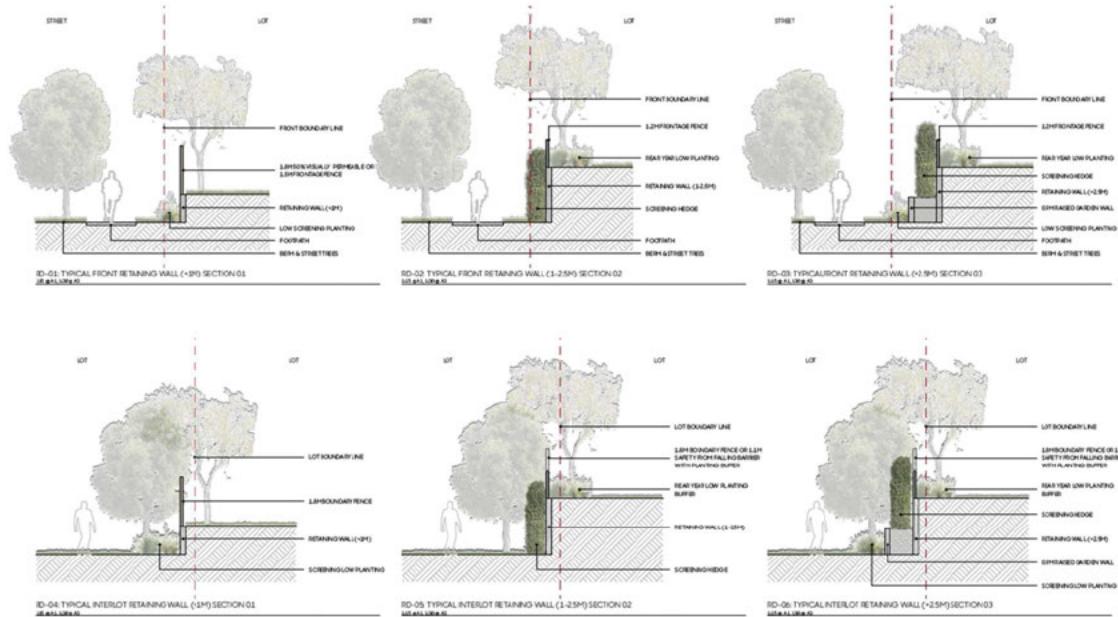


Figure 6 - Extract from Greenwoods landscape plans highlighting the treatment of retaining walls that are less than 1m, between 1m - 2.5m, and greater than 2.5m.



Figure 7 - Cross section showing a generic rear-yard retaining wall between two private lots.

3.2 Retaining Walls Between Side Yards

The proposed development seeks to follow the site's natural contours by 'stepping' buildings and earthworks in line with the existing landform. This approach spreads level changes across smaller increments, significantly reducing the need for large vertical retaining walls, particularly between side yards.

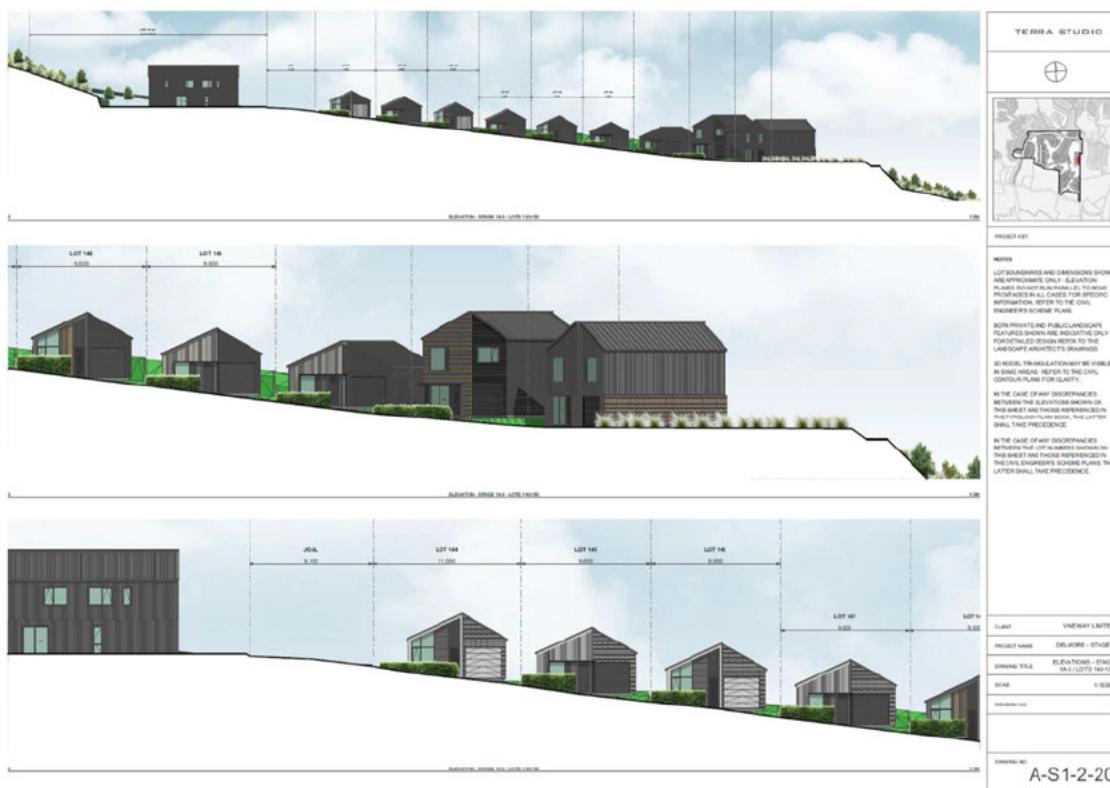


Figure 8 - An example of multiple retaining methodologies being utilized to compliment the natural topography of the site. To the left of the image is a 1:3 batter slope. The middle of the street elevation shows buildings 'stepping' at 1m height intervals. The right of the image shows a 1:1 planted batter slope to the existing consent notice area below.



3.3 Retaining Walls along Street Frontages

Road fronting retaining walls will be constructed of either keystone or recessive black timber. The height of these walls will be capped at 1.5m where possible, with 1:3 planted batter slopes or 'stepped' landscape walls utilized to achieve this height.



Figure 9 - Street level render showing a block of houses serviced by a rear-lane with a 1.5m high retaining wall at the street frontage and a planted 1:3 batter slope above with permeable fencing.