Tolucy Pty Ltd
C/- Playout Churcher Architects

Preliminary Watercourse and Riparian Assessment:
Proposed Seniors Living Development;

25 Laitoki Road, Terrey Hills, NSW.

ENVIRONMENTAL

WATER

WASTEWATER

GEOTECHNICAL

CIVIL

PROJECT MANAGEMENT

P1806682JR04V01
January 2019

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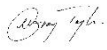
Carolyn Stanley	Gray Taylor Andrew Norris	Gray Taylor	

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All enquiries regarding this project are to be directed to the Project Manager.

Executive Summary

Overview

This Watercourse and Riparian Assessment has been prepared to support a site capability assessment for a proposed seniors living development at 25 Laitoki Road, Terrey Hills. This document is prepared in accordance with relevant Northern Beaches Council guidelines as some proposed development works are within 40m of Neverfail Creek, as mapped on Northern Beaches Council's (NBC) Waterways and Riparian Lands DCP Map (Warringah Council, 2004). The creek is not mapped as a 'blue line' on NSW 1:25 000 topographic maps at the site, although is mapped as a watercourse immediately downstream.

Site and Waterway Analysis

- Neverfail Creek forms an upstream portion of the Kierans Creek sub-catchment within the Cowan Creek catchment. Its river style is described as confined with occasional floodplain pockets (Warringah Council, 2004).
- Upper Kierans Creek has a low ecological, recreational and landscape value (Warringah Council, 2004).
- It is characterised by a high degree of weed infestation due to its urbanised catchment.
- It is graded as a 'Group B' system according to Warringah Council's (2004) Creek Management Study.
- Neverfail Creek has a defined channel (approximately 4-6 m wide and 1-3 m deep from top of bank) and riparian zone that is vegetated with numerous native and exotic species.
- The watercourse appears modified from its natural state. Stormwater discharges from upslope properties have incised the channel and in some sections the banks are greater than 3 m in height with near vertical drops. The erosion has led to a high degree of undercutting resulting in unstable banks.
- Erosional features, such as undercutting and scour pools were noted within the creek.
- Creek water quality is impacted by sedimentation and gross pollutants.
- The downstream watercourse on the adjacent property to the south has been piped.

- The lower portion of the watercourse has had its banks widened likely due to the creation of the headwall and piped easement in conjunction with filling at the overland flow path by up to 1 m on the southern property being 35 Laitoki Road. The restriction of flows causes backing up of stormwater flows and flooding at the southern portion of the site during large rain events.

Future Rehabilitation Scheme

The main objective of a future rehabilitation scheme shall be to remove the environmental weeds and establish indigenous vegetation in riparian areas.

Impact Assessment and Riparian Management Measures

The proposed seniors living development is not located within the 10 m riparian zone with the exception of road and bridge construction, landscaping, stormwater outlets, flood mitigation (site regrading) and revegetation works.

Proposed development shall be designed to have negligible or positive impacts on riparian lands, which shall be achieved by:

- Removal of exotic vegetation currently infesting the riparian zone.
- Revegetation scheme involving revegetation and rehabilitation of the riparian zone to enhance naturally occurring vegetation, including potential indigenous EECs.
- Removal of existing exotic vegetation and revegetation with appropriate indigenous species shall mitigate potential creek channel form and bank erosion/degradation.
- Design of appropriate stormwater measures to mitigate localised erosion and scour.
- Water quality and quantity controls to maintain nature of runoff discharging the site via the creek.
- Minor regrading of areas adjacent to waterway will contain larger flood events within creek channel preventing scouring and erosion of embankments.

A Controlled Activity Approval (CAA) is required under Section 91 of the Water Management Act (2000) for development works to be undertaken on waterfront lands.

Conclusions

Provided riparian management measures recommended are incorporated, the proposed development is not expected to have a detrimental impact on the surrounding waterway environment. Following detailed design of the development at development application (DA) stage, this assessment should be updated accordingly.

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1 Introduction

1.1 Overview

This preliminary watercourse and riparian assessment has been prepared to support a site capability assessment to Northern Beaches Council (NBC) for a proposed seniors living development at 25 Laitoki Road, Terrey Hills (Lot 261 DP 775299). This document is prepared in accordance with NBC's:

- *Guidelines for Preparing a Waterway Impact Statement* (undated).
- *Creek Management Study* (2004).
- Policy No PL 740 Waterways: *Protection of Waterways and Riparian Land Policy* (2010).

1.2 Scope

The scope of this assessment:

- Provides a waterway analysis of the existing creek and riparian environment in the vicinity of the site.
- Discusses the nature of proposed works and site operation in relation to the waterway environment.
- Provides an assessment of likely impact of the development on the waterway environment.
- Details proposed riparian management and mitigation measures for the proposed works to minimise impacts.

1.3 Proposed Development

A preliminary proposal plan as provided by the Client (Attachment C) indicates that the development will include demolition of existing structures on site and construction of multiple senior living housing residences (i.e. houses, townhouses and units) with associated internal access roads, a bridge crossing the watercourse and stormwater infrastructure.

1.4 Riparian Zone Requirements

Past correspondence with Council in regards to DA2013/0796 (seniors living development) (Attachment D) for works adjacent to Neverfail Creek at 83 Booralie Road, Terrey Hills indicated:

- An average width of 10m riparian zone is required either side of Neverfail Creek from top of bank.
- No riparian buffer is required.
- All development must be located outside of the riparian zone.

1.5 Council Mapping

A central portion of the site is mapped as Waterways and Riparian Land by NBC, and this document addresses impacts to the waterway and proposed riparian management works within the mapped area onsite (refer to Figure 2, Attachment B).

1.6 Riparian Management Key Objectives

Key riparian zone management issues shall be considered to enhance the environmental benefits of a sustainable and well maintained riparian zone, and include:

- Maintaining bed and bank stability;
- Protecting and enhancing water quality;
- Maintaining riparian vegetation and fauna biodiversity and ecological viability;
- Managing edge effects at the urban/riparian interface;
- Avoiding impacts that will result in an adverse change in watercourse or riparian land condition;
- Protecting natural creek values, and maintaining and improving access, amenity and scenic quality of waterways and riparian lands; and
- Managing and integrating floodplain processes to minimise risk to life and property.

1.7 Proposed Riparian Zone Works

A Controlled Activity Approval (CAA) will be required in accordance with Section 91 of the *Water Management Act* (2000) prior to commencement of site works to cover all works on waterfront lands. A Vegetation Management Plan (VMP) will likely be required to be submitted with the CAA application.

1.7.1 Clearing and Revegetation

Clearing is required along both banks of the creek to manage the existing dense growth of environmental weeds. Once cleared, regrading and stabilisation works will be required in a number of locations along the creek banks and creek bed to account for the removal of vegetation and remediate ongoing creek bed and bank erosion. Stabilisation works may incorporate both hard and soft engineering approaches, and will be confirmed at detailed design stage. Revegetation of riparian areas will be undertaken subject to advice of a suitably qualified environmental engineer and/or bush revegetation consultant, or the VMP's recommendations.

All creek bank works will be designed to maintain the existing creek functionality and overall capacity where possible. Where possible, large woody debris will be retained for habitat value along the creek bed and banks.

1.7.2 Stormwater

Stormwater management measures shall be appropriately designed to manage site runoff and discharge to the creek in accordance with NBC (Warringah Council, 2012) '*Onsite Stormwater Detention Technical Specification'* requirements. Proposed stormwater system design shall need to be provided as part of the site development plans and is likely to include:

- Site stormwater collected through a series of pit and pipes and discharged to one of two onsite detention (OSD) tanks located adjacent to Neverfail Creek.
- Site roofwater harvested for reuse in a rainwater tank(s). Tank overflow to proposed OSD tanks.
- Both OSD tanks discharge via suitably sized orifices to a suitably designed headwall with riprap outlets to provide controlled discharge into the creek.
- The proposed pipe network, rainwater tanks and OSD tanks to be located outside the required 10 m riparian zone.

- Stormwater discharge points are within the riparian zone.

Detailed design of the stormwater system will be required at DA stage.

1.7.3 Earthworks

Earthworks within riparian lands may include:

- Development works for construction of access road and bridge across the creek to provide flood-free access from the eastern to the western portions of the site.
- Minor excavation during weed removal (primarily topsoil removal).
- Regrading to re-establish creek channel and banks in lower portion of the watercourse for flood mitigation works.
- Creek bank reshaping (where required) for stabilisation and rehabilitation.

Any imported fill material, including growing media and topsoil, shall be certified as either Virgin Excavated Natural Material (VENM) as defined in Schedule 1 of the *Protection of the Environment Operations Act 1997* (POEO Act) or be classified under another waste exemption such as ENM or mulch. Certification shall be supplied by the contractor to confirm that imported material meet the classification.

Appropriate sediment and erosion control (SEC) measures will be implemented during all development works.

Detailed design of all proposed stormwater, bridge design and regrading works to be provided at the DA stage of the development.

2 Site and Waterway Analysis

2.1 Site Description

The site is located at 25 Laitoki Road (Lot 261 DP 775299), Terrey Hills, NSW within Northern Beaches Council (formerly Warringah Council) LGA. The site is approximately 2.02 ha in area and bound by Laitoki Road to the east and rural residential properties to the west and south. A road easement is located to the north, and seniors living developments further north beyond the road easement.

Neverfail Creek, within a vegetated corridor and draining south - south west, traverses the central portion of the site. The creek is not mapped as a 'blue line' on NSW 1:25 000 topographic maps at the site, although is mapped immediately downstream (Figure 2, Attachment B).

The site generally has a south westerly aspect across the eastern portion (i.e. east of existing natural watercourse) and southerly aspect across the western portion (i.e. west of existing natural watercourse), with grades of approximately 5 - 20 % across the development area. Local lithology is characterised as Hawkesbury Sandstone consisting of medium to coarse grained quartz sandstone with minor shale and laminate lenses.

Refer to Attachment A for site survey.

2.2 Waterway Description

The following comments are made in relation to the characteristics of Neverfail Creek and associated riparian lands.

- Neverfail Creek forms an upstream portion of the Kierans Creek sub-catchment within the Cowan Creek catchment. Its river style is described as confined with occasional floodplain pockets (Warringah Council, 2004).
- It is characterised by a high degree of environmental weed infestation due to its urbanised catchment, however is classified as a 'Group B' system according to Warringah Council's (2004) *Creek Management Study* as its downstream portion lies within National Park.
- Within the site locality, Neverfail Creek has a defined channel (approximately 4-8 m wide and 1-3 m deep from top of bank) and riparian zone that is vegetated with numerous native and exotic species.

- Erosional features, such as undercutting and scour pools were noted within the creek.

- Onsite riparian zones were observed to consist primarily of exotic vegetation, noxious weeds and grasses with minor native species.

- The riparian zone is fragmented up- and downstream by urban development.

- During inspection, creek water quality was noted as being impacted by sedimentation and gross pollutants.

- The downstream watercourse on the adjacent property to the south has been piped and the overland flow path filled by up to 1.0 m (i.e. fill pad) constructed for equestrian use.

Plates of the existing waterway environment are provided in Figure 3 (Attachment B).

2.3 Waterway Value

The proposed works are located within 40 m of the upper reaches of Kierans Creek (Warringah Council, 2010), as mapped on NBC's Waterways and Riparian Lands DCP Map (Warringah Council, 2004). Kierans Creek is located approximately 1 km south west of the subject site. Based on Warringah Council's *Creek Management Study* (2004) the following comments on environment quality are made:

- Upper Kierans Creek has a low ecological, recreational and landscape value. Based on recent site inspections Martens concurs with this assessment.

- The creek is classified as a Group B creek which is characterised by: *some degradation in the upper catchments, but high ecological value downstream; generally 10-15% connected impervious area.*

- Riparian vegetation is mostly exotic and native fauna habitat is impacted by surrounding urban development.

- The water quality of upper reaches is poor and impacts the recreational value of potential swimming areas downstream.

- The Keirans Creek catchment has been significantly modified leading to weed invasion, increased bank erosion, sedimentation of lower reaches and increased pollutant loads.

2.4 Flood Assessment

The Preliminary Flood Assessment (Martens, 2018a) indicates that portions of the site are affected by flooding from Neverfail Creek during the 1% Annual Exceedance Probability (AEP) and Probable Maximum Flood (PMF) flood events.

Habitable floor level elevations of the proposed development have been designed to be flood free. Site regrading works will be required within the riparian zone near the southern site boundary to increase available flood storage area onsite, and mitigate potential impacts to residents. Detailed design of all flood mitigation works to be undertaken at the DA stage of the development.

2.5 Proximity of Works to Waterway Environment

Table 1 summarises the location and extent of likely construction and operational activities (associated with the development proposal) relative to riparian lands as identified in Figures 1 and 2 (Attachment B).

Table 1: Location of proposed construction and operational activities relative to riparian lands.

Riparian Land	Construction Works Undertaken	Operational Works Undertaken
Riparian Zone [1]	Environmental weed removal Revegetation Stormwater management measures Earthworks, including site regrading for flood mitigation works Construction of bridge over creek to provide flood free access to western portion of the site Temporary sediment and erosion control Bank stabilisation (as/where required)	Maintenance of stormwater infrastructure (as required) Maintenance of bridge infrastructure (as required) Ongoing riparian vegetation management
Creek Channel	Revegetation Creek bed stabilisation works (as/where required)	None

Notes:

[1] As mapped in *Creek Management Study: Appendix B; Kierans Creek* (Warringah Council, 2004). Note as per Council requirements no riparian buffer is required for this site.

It is noted that, in accordance with Section 8.1.1 of Warringah Council's *Creek Management Study* (2004), the activities listed in Table 1 are permissible development within riparian lands of a Group B creek.

2.6 Rehabilitation Scheme

The main objective of a future rehabilitation scheme for the site is to remove the environmental weeds and establish indigenous vegetation in riparian areas, and may include:

- Weed removal under supervision by appropriate environmental engineer and/or bush regeneration consultant, minor regrading, and mulching of appropriate vegetation.
- Where required, application of temporary crop cover to protect against erosion of bare soil, and/or use of organic mulch/crushed sandstone mulch.
- Riparian zone revegetation using indigenous species, including potential EECs.
- Bank rehabilitation works include revegetation to reinstate indigenous vegetation community.
- Inspection by project ecologist and/or environmental engineer.

A flora and fauna assessment and/or VMP is recommended to outline riparian rehabilitation works, including bank stabilisation, weed control and revegetation. A VMP is likely to be required as part of the DA application, and under General Terms of Approval for development consent, to be submitted with any CAA application for works within waterfront lands.

3 Impact Assessment

Table 2 provides a summary of impacts of the proposed development on the existing waterway and riparian environment.

Table 2: Impact assessment.

Element	Impact	Comment
Water quality	Low, positive	Revegetation to stabilise creek banks shall reduce existing erosion and scour, and appropriate stormwater measures will improve water quality. A water quality assessment shall be undertaken to demonstrate that the proposed site development (outside the creek) will have a neutral or beneficial impact on runoff discharging to the creek.
Channel form, erosion rate and bank stability	Low, positive	The proposed works within the channel aim to remediate the creek through removal of weeds, revegetation, and stabilisation of creek bed and banks where required and construction of appropriately designed stormwater measures. Channel and banks in the lower portions of the creek will provide more stable channel form resulting in less scour and erosion of the channel embankments.
Stormwater discharge and treatment	Low, positive.	Proposed stormwater system design shall capture and treat runoff prior to discharge into the creek to achieve site water quality objectives. Outlet design shall be in accordance with NSW guidelines to protect downstream areas from erosion and scour.
Ecological impacts	Low, positive	Weed removal, revegetation and landscaping with appropriate vegetation species shall be undertaken to rehabilitate the riparian area within the site, and the creek environment. Increased planting shall improve habitat value and corridor value within riparian lands within the subject site. A flora and fauna assessment and/or VMP shall provide additional direction for rehabilitation works.
Landscape impacts	High, positive	The overall landscaping and revegetation of the site shall improve the aesthetic value of the site, water quality of runoff, habitat value and creek environment.
Flood impacts	Low, positive	The proposed development shall be designed to maintain or improve impacts on the existing flood regime of the site and neighbouring properties as a result of the proposed development. Site regrading works will be undertaken near the southern site boundary to increase available flood storage onsite and formalise floodpaths.
Erosion impacts on development	Negligible	The proposed development is at negligible risk of impacts from erosional processes within the waterway area.
Native vegetation	High, positive	The existing riparian corridor is predominately vegetated with exotic and native species. A revegetation and planting scheme shall greatly improve the native vegetation community at the site.
Creekline and/or overland flow	Medium, positive	Revegetation and weed control works within the creek shall be aimed at improving riparian and creek habitat value, and shall improve the overall health of the creek and downstream catchment.

All site works shall be undertaken with suitable sediment erosion control (SEC) devices which are installed and maintained in accordance with NSW Landcom (2004) *Managing Urban Stormwater: Soils and Construction.*

4 Riparian Management and Impact Mitigation Measures

Site development shall be designed to maintain and enhance the biodiversity of the riparian zone, as well as protect water quality and provide bank stability. The proposed seniors living development is not located within the 10 m riparian zone with the exception of road and bridge construction, landscaping, stormwater outlets, flood mitigation (site regrading) works and revegetation works.

Riparian management and impact mitigation measures for the proposed works within the riparian zone have been designed to achieve relevant outcomes identified in Council's *Guidelines for Preparing a Waterway Impact Statement* (undated). Outcomes, performance criteria for development and riparian management measures to achieve them are summarised in Table 3.

Table 3: Provision of riparian management and impact mitigation measures.

Outcome	Performance Criteria	Mitigation Measure To Be Employed Onsite
Protect native species and communities	Maintain natural habitats	Develop an appropriate revegetation scheme to remove exotic species and plant native vegetation to improve habitat value.
	Provide fauna movement routes	Revegetation to maintain and improve corridor connection within riparian zone.
	Prevent unnatural erosion or sediment deposition	Appropriate stormwater system to mitigate flow regime changes as a result of increased impervious area.
		Revegetation and creek bank stabilisation where required to prevent bank erosion/scour/failure.
	Maintain acceptable water quality	An appropriate sediment and erosion control plan shall be prepared to mitigate sedimentation and erosion impacts during construction phase.
		Water quality structures incorporated into the design of the proposed seniors living development.
	Maintain connectivity between waterways and floodplains	No barriers between waterways and floodplains are proposed.
Prevent loss of natural diversity through protecting waterway and riparian vegetation	Avoid introducing plants or animals which may displace natural species	The riparian zone currently contains minimal indigenous/natural vegetation species and has little habitat value. The creek corridor shall be remediated and protected from future infestation by: o Removal of existing exotic weeds. o Revegetation with appropriate native plant species. o Mulching with appropriate organic mulch. o Ongoing weed control and revegetation.
	No increase in nutrient loads to riparian soils and waterways	Installation of appropriate stormwater measures shall result in a neutral or beneficial impact on water quality of runoff reaching the creek and riparian zone.

Outcome	Performance Criteria	Mitigation Measure To Be Employed Onsite
	Avoid displacing species by habitat changes	Planting with native species shall increase habitat value and corridor value within riparian lands.
	Protect natural areas from contamination	Proposed development does not represent an ongoing contamination risk and will result in removal of the existing grazing of horses from the site. Use of chemicals (fertilisers, insecticides etc) will be carefully managed to prevent leaching into groundwater and waterways.
		Martens & Associates (2018b) has completed a Preliminary Site Investigation to identify potential site contamination.
	Prevent the loss of any rare or threatened natural features	Majority of vegetation in the riparian zone is exotic. Existing riparian lands have limited value.
	Protect downstream protected areas such as National Parks	The proposed development shall include water quality, stormwater quantity and vegetation management in order to protect and enhance downstream environments. A CAA will be required for works within waterfront lands.
Minimise damage to public and private property by waterway processes through maintaining the relative stability of the bed and banks	Avoid increases in peak channel flows and sediment exports for events smaller than 2 year ARI	Proposed stormwater measures shall ensure post development discharge flows do not exceed existing flow rates.
	Avoid local erosion at stormwater outlets	Proposed stormwater outlets shall include appropriately engineered outlet control structures.
	Avoid export of weeds from private properties into waterways	Rehabilitation works shall include removal of exotic species from the site and replacement with native species. Ongoing landscape management shall ensure vegetation/weeds are appropriately collected and removed from site.
	Channel banks are not steepened	Where required, bank stabilisation works will be completed to maintain existing channel form, formalise the channel and banks, and ensure banks do not continue to become oversteepened and unstable.
	Channel banks are stable	Creek bank revegetation shall improve channel bank stabilisation.
Preserve natural ecological processes	Streamflow and water quality are natural	Proposed stormwater systems shall ensure water quality and flow rates are maintained post development.
		Use of chemicals (fertilisers, insecticides etc) shall be carefully managed to prevent leaching into groundwater and waterways.
	Aquatic and riparian vegetation are undisturbed and unmodified	There is little native aquatic and riparian vegetation to maintain as the creek is highly disturbed. Proposed planting shall enhance native vegetation and improve habitat value.
	Aquatic and riparian fauna habitat and movement corridors are retained	Proposed revegetation shall improve habitat value of the site and maintain a riparian corridor.
Create opportunities for public access and recreation in waterway corridors	Provide public access along creek corridors where appropriate	The proposed development provides pedestrian access to the creek, and road access across the creek for residents and guests of the proposed seniors living development. Creation of general public access to the creek is not appropriate on the site.

5 Conclusion

The following conclusions are made in relation to the proposed development and impacts on Neverfail Creek, and Keirans Creek sub-catchment:

- The proposed works are located within 40 m of Neverfail Creek, as mapped on Council's Waterways and Riparian Lands DCP Map (Warringah Council, 2004). The site watercourse is not mapped as a 'blue line' on NSW 1:25 000 topographic maps, although Neverfail Creek is mapped as a watercourse immediately downstream of the site.

- Upper Kierans Creek has a low ecological, recreational and landscape value (Warringah Council, 2004).

- The riparian zone is vegetated with native and exotic species.

- Weed management and clearing, revegetation, earthworks including flood mitigation works, stormwater management works, and construction of a bridge and road access between the eastern and western portions of the site shall occur within the riparian zone. These activities are permissible in accordance with Council's Creek Management Study (2004).

- A flora and fauna assessment and/or VMP is recommended to outline riparian rehabilitation works, including bank stabilisation planting, weed control and revegetation.

- Proposed development shall have a positive impact on riparian lands. This can be attributed to:

    - Removal of exotic vegetation currently infesting the riparian zone.

    - Revegetation scheme involving revegetation and rehabilitation of the riparian zone to enhance native vegetation.

    - Proposed development works shall maintain and/or formalise the existing channel form and prevent erosion/degradation of the creek as a result of removing existing exotic vegetation, and be able to contain larger flood flows within the channel.

    - Water quality and quantity controls to maintain nature of runoff discharging the site via the creek.

- Appropriate stormwater system design to mitigate localised creek erosion and scour.

- All site works will be undertaken with suitable sediment erosion control (SEC) devices which are installed and maintained in accordance with NSW Landcom (2004) *Managing Urban Stormwater: Soils and Construction*.

- A CAA is required under Section 91 of the *Water Management Act* (2000) for development works to be undertaken on waterfront lands.

- Provided mitigation measures recommended are incorporated, the proposed development is expected to have a positive impact on the waterway environment.

6 References

Martens and Associates (2018a) *Preliminary Flood Assessment: 25 Laitoki Road, Terrey Hills, NSW* (Ref: P1806682JR05V01).

Martens and Associates (2018b) *Preliminary Site Investigation: Proposed Seniors Living, 25 Laitoki Road, Terrey Hills, NSW* (Ref: P1806682JR02V01).

NSW Landcom (2004) *Managing Urban Stormwater: Soils and Construction*.

Warringah Council (undated) *Guidelines for Preparing a Waterways Impact Statement.*

Warringah Council (2004) *Creek Management Study.*

Warringah Council (2010) *Protection of Waterways and Riparian Land Policy.*

Warringah Council (2012) On-Site Stormwater Detention, Technical Specification.

7 Attachment A – Site Survey


M.G.A.
(MAP GRID of AUSTRALIA)
(APPROXIMATE TRUE NORTH)
2
D.P. 530145
51
D.P. 651178
(SITE UNDER CONSTRUCTION)
TOORONGA
(NOT FORMED)
ROAD
ABT. 2m DEEP NATURAL WATER COURSE
DENSE VEGETATION
VEGETATION
WATER COURSE
SCATTERED TREES, SHRUBS & GRASSY AREAS
NATURAL
261
SITE AREA
2.023ha
SEPTIC TANKS
(APPROX POSITION)
METAL SHED
POST & RAIL FENCE
INGROUND POOL
PAVED TERRACE
ONE & TWO STOREY BRICK HOUSE TILE ROOF No. 25
VERANDAH
DOORSTEP
CARPORT METAL ROOF
BITUMEN
DRIVEWAY
LAWN
ROAD
LAITOKI
BENCH MARK
CUT ON KERB
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LEGEND

TREE 0.10ø, 5H, 4S — DENOTES APPROX. 0.1øm DIAMETER OF TREE; DENOTES APPROX. 5m HEIGHT OF TREE; DENOTES APPROX. 4m SPREAD OF TREE

GUTTER — DENOTES TOP OF GUTTER

TOP OF BANK

BOTTOM OF BANK

O/HEAD ELECTRIC LINES

BOARDS SEWER

WATER LINES

GAS LINES

0 2 4 6 8 10 20 METRES

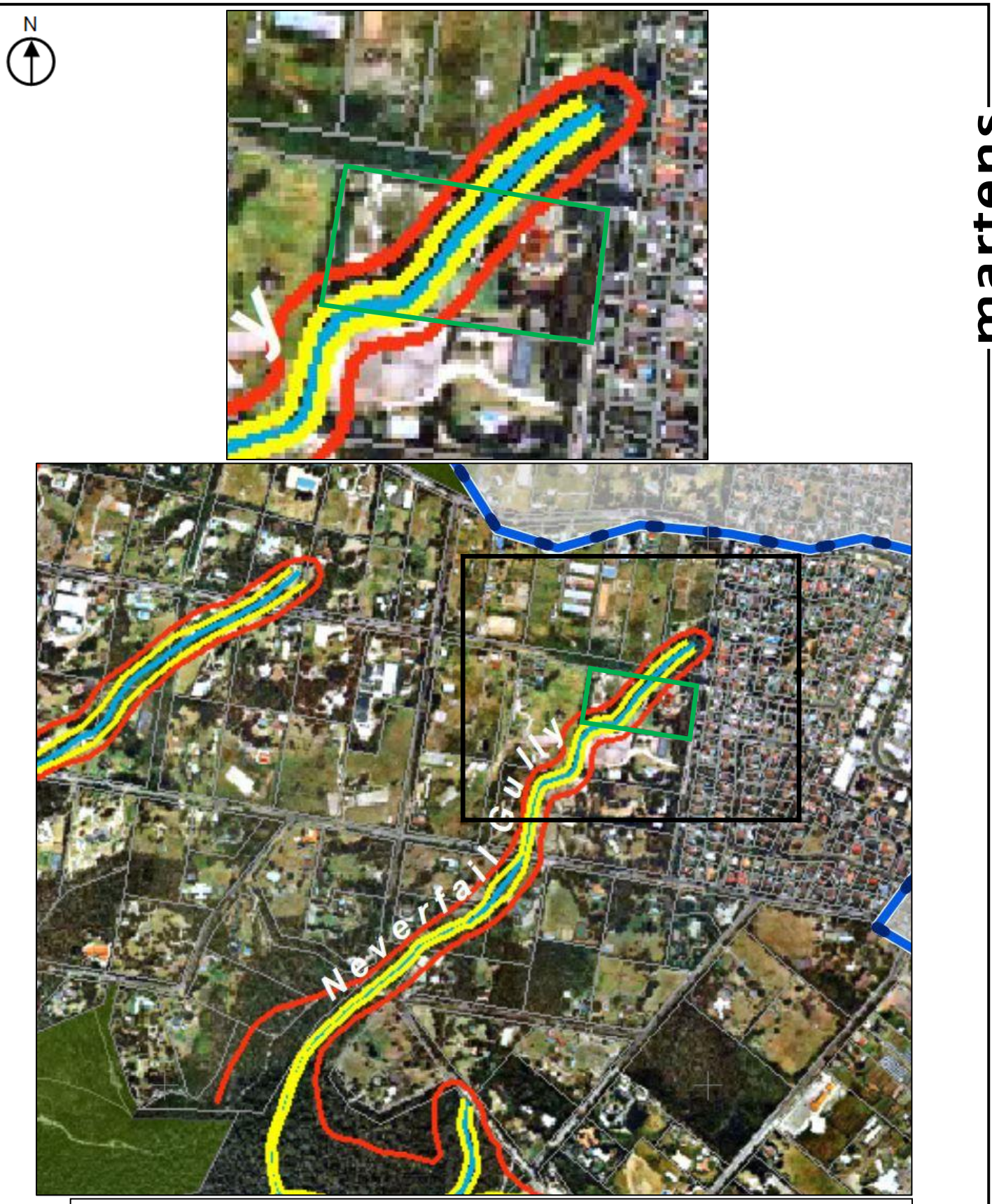
SCALE 1:200

PLAN SHOWING BOUNDARIES, RELATIVE HEIGHTS & PHYSICAL FEATURES OVER LOT 261 IN D.P. 775299 KNOWN AS No. 25 LAITOKI ROAD, TERREY HILLS.

L.G.A.: NORTHERN BEACHES

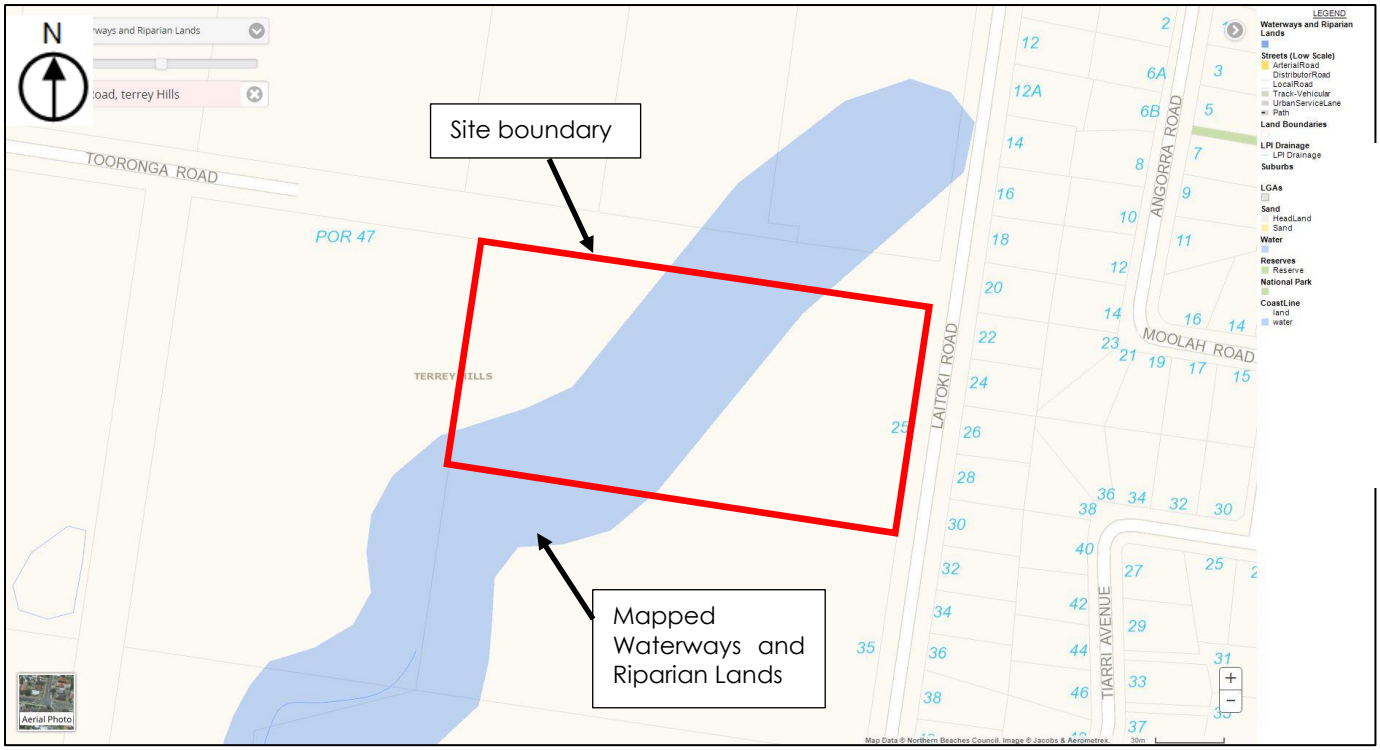
CLIENT	TOLUCY PTY LTD					REF No.	20773
PROPERTY	No. 25 LAITOKI ROAD, TERREY HILLS						
DATUM	A.H.D.	SCALE	1:200 @ B1	DATE	21/11/2017	SHEET No.	2 of 3
SURVEYED	G.C.	DRAWN	H.H.	DWG No.	20773	REV No.	00

8 Attachment B - Figures

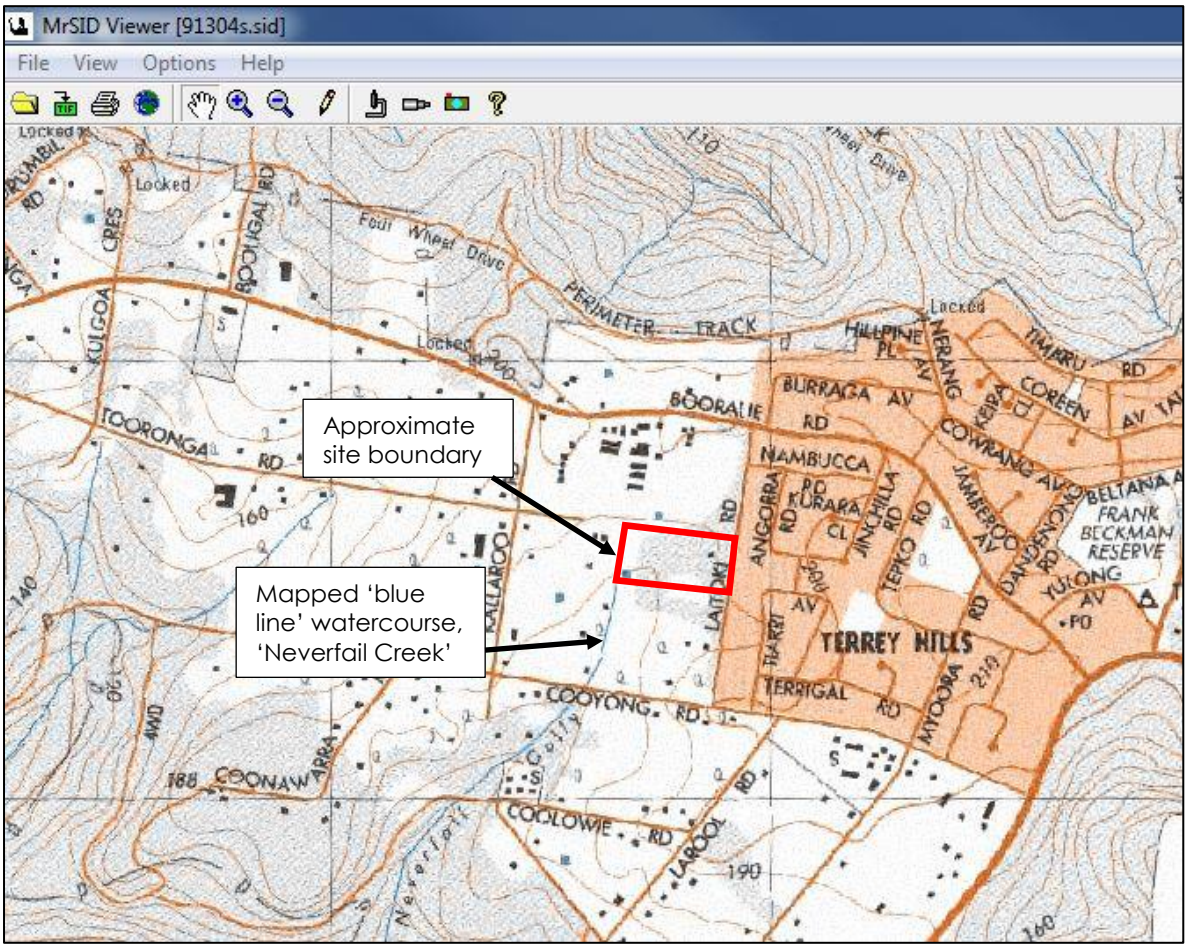


martens

Martens & Associates Pty Ltd ABN 85 070 240 890		**Environment | Water | Wastewater | Geotechnical | Civil | Management**	
Drawn:	CS	**Location of Proposed Development Relative to Riparian Lands** **25 Laitoki Road, Terrey Hills, NSW** Mapping Source: Warringah Council (2004)	**FIGURE 1**
Approved:	GT		
Date:	January 2019		
Scale:	NA		Job No: P1806682



Waterways and Riparian Lands Mapping
Source: Northern Beaches Council website, 2018



NSW 1:25 000 Topographic Mapping
Source: Department of Finance, Services and Innovation, 2016

Martens & Associates Pty Ltd ABN 85 070 240 890		**Environment | Water | Wastewater | Geotechnical | Civil | Management**	
Drawn:	CS	**NBC and Topographic Mapping** **25 Laitoki Road, Terrey Hills, NSW**	**FIGURE 2**
Approved:	GT		
Date:	January 2019		
Scale:	NA		Job No: P1806682

Plate 1: View north east of creek near northern site boundary.

Plate 2: View south west of creek and vegetated banks, near northern site boundary.

Plate 3: Dense exotic and native vegetation near northern portion of creek reach, view to west.

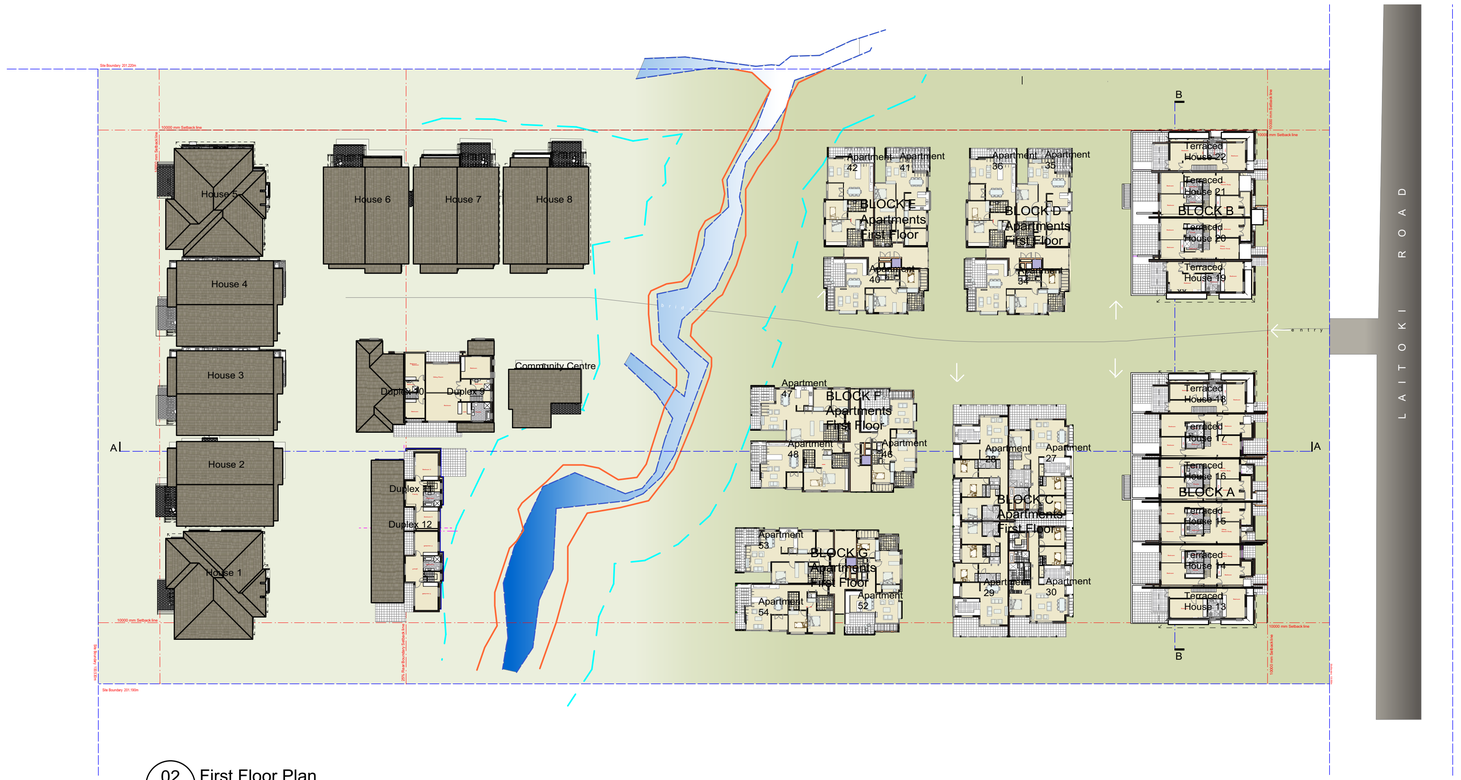
Plate 4: View east of disturbed creek, from northern portion of creek reach.

Plate 5: Riparian vegetation onsite and creek channel, view to west of central portion of creek reach.

Plate 6: View of headwall and filling at southern site boundary to adjacent property to south.

Martens & Associates Pty Ltd ABN 85 070 240 890		**Environment | Water | Wastewater | Geotechnical | Civil | Management**	
Drawn:	CS	**Plates: Existing Waterway Environment** **25 Laitoki Road, Terrey Hills, NSW**	**FIGURE 3**
Approved:	GT		
Date:	January 2019		
Scale:	NA		Job No: P1806682

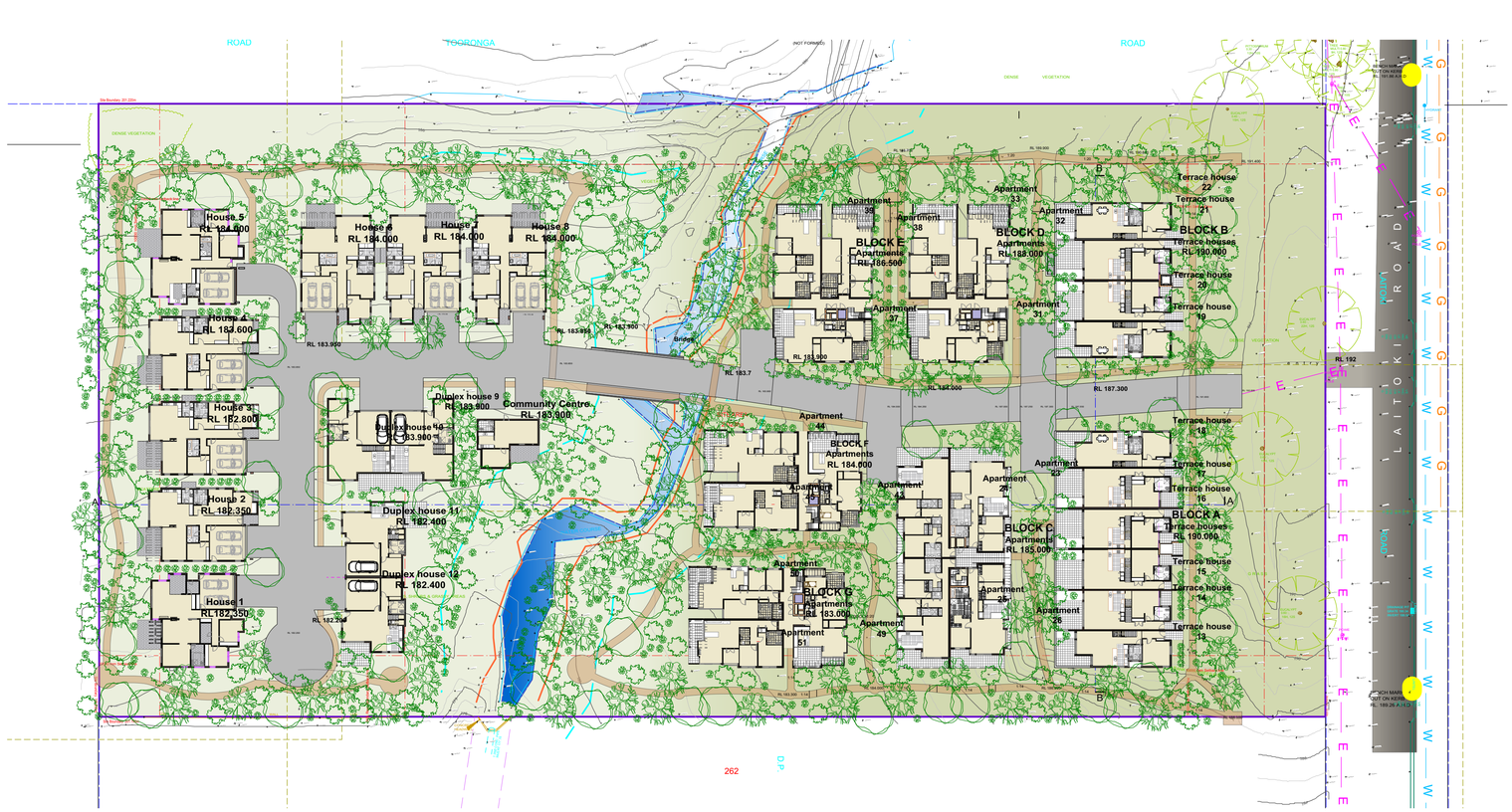
9 Attachment C – Preliminary Site Development Plan



02 First Floor Plan

-

Scale: 1:500



01 Ground Floor Plan

-

Scale: 1:500

north

rev	date	revision notes	by

project

Proposed Seniors Develpoment

25 Laitoki Road, Terry Hills

project # 17-750

client

Tolucy Pty Ltd

dwg

Ground and First Floor Plans

printed	drawn	ckd	scale@A1
11/12/18	PCA	JM	1:500

PRELIMINARY 11/12/18

NOT FOR CONSTRUCTION

stage	drawing #	revision
CS	A102	

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PLAYOUST CHURCHER ARCHITECTS

John J F Playoust & Co Pty Limited ACN 008 503 188 & Brett Churcher Architects Pty Ltd
A C N 0 0 3 7 5 1 6 1 1 trading as Playoust Churcher Architects

10 Attachment D – Council Correspondence regarding Riparian Requirements for Development Adjacent to Neverfail Creek (83 Booralie Road, Terrey Hills; DA2013/0796)

Megan Kovelis

From: Teresa Gizzi <Teresa.Gizzi@warringah.nsw.gov.au>
Sent: Tuesday, 14 May 2013 10:24 AM
To: Megan Kovelis
Cc: Gray Taylor
Subject: RE: P1203558 - Booralie Rd Riparian Management

Good Morning Megan,

I received the following comments from our Environment Officer which should hopefully provide the clarification you require.

> *'To clarify, the word zone should have been used instead of buffer in the following comment.*
>
> *'all development to be located outside a riparian buffer of 10m either side from the top of bank of Neverfail Creek'.*
>
> *Therefore, I can confirm that Council requires a 10m riparian zone either side of the creek from the top of bank. All development must be located outside the riparian zone. There will be no additional land required to make up the total riparian land on the site.'*

If you have any further questions, please do not hestitate to give me a call.

Kind Regards,

Teresa Gizzi | Senior Development Assessment Officer | WARRINGAH COUNCIL
Ph: (02) 9942 2949 | Fax: (02) 9971 4522 | email: teresa.gizzi@warringah.nsw.gov.au

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From: Megan Kovelis [mailto:mkovelis@martens.com.au]
Sent: Monday, 13 May 2013 12:40 PM
To: Teresa Gizzi
Cc: Gray Taylor
Subject: P1203558 - Booralie Rd Riparian Management

Teresa,

Thanks for your time this morning. Just to reiterate, what we seek clarification on are Councils riparian requirements. Correspondence from Council to DoP for the site compatibility certificate (attached) says (page 3) that Council require:

'all development to be located outside a riparian buffer of 10m either side from the top of bank of Neverfail Creek'.

When referring to the definitions section of Councils Protection of Waterways and Riparian Lands Policy and also the Creek Management Study – Council define the riparian buffer as:

'land additional to the riparian zone…..minimum width generally 10m' (i.e. land adjacent to and additional to the prescribed riparian zone).

Can Council please confirm that they actually require a 10m riparian zone either side of the creek (from top of bank), and if there is any riparian buffer (i.e. additional land) required to make up the total riparian land onsite.

As we discussed, there is a consultant meeting happening mid this week – so if we can have a response from Council by COB Tuesday it would be appreciated.

Kind Regards,

Martens & Associates Pty Ltd

Megan Kovelis
Environmental Scientist
BEnvSc (Hons1)

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