

Zhiva Living Dural Pty Ltd atf The Zhiva Living
C/- Mills Oakley

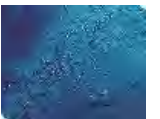


Drainage Line Classification: 4 Vineys Road, Dural, NSW.

ENVIRONMENTAL



WATER



WASTEWATER



GEOTECHNICAL



CIVIL



PROJECT
MANAGEMENT



P1806980JR01V03
July 2019

Copyright Statement

Martens & Associates Pty Ltd (Publisher) is the owner of the copyright subsisting in this publication. Other than as permitted by the Copyright Act and as outlined in the Terms of Engagement, no part of this report may be reprinted or reproduced or used in any form, copied or transmitted, by any electronic, mechanical, or by other means, now known or hereafter invented (including microcopying, photocopying, recording, recording tape or through electronic information storage and retrieval systems or otherwise), without the prior written permission of Martens & Associates Pty Ltd. Legal action will be taken against any breach of its copyright. This report is available only as book form unless specifically distributed by Martens & Associates in electronic form. No part of it is authorised to be copied, sold, distributed or offered in any other form.

The document may only be used for the purposes for which it was commissioned. Unauthorised use of this document in any form whatsoever is prohibited. Martens & Associates Pty Ltd assumes no responsibility where the document is used for purposes other than those for which it was commissioned.

Limitations Statement

The sole purpose of this report and the associated services performed by Martens & Associates Pty Ltd is to prepare a Drainage Line Classification in accordance with the scope of services set out in the contract / quotation between Martens & Associates Pty Ltd and Zhiva Living Dural Pty Ltd at The Zhiva Living C/- Mills Oakley (hereafter known as the Client). That scope of works and services were defined by the requests of the Client, by the time and budgetary constraints imposed by the Client, and by the availability of access to the site.

Martens & Associates Pty Ltd derived the data in this report primarily from a number of sources which may include for example site inspections, correspondence regarding the proposal, examination of records in the public domain, interviews with individuals with information about the site or the project, and field explorations conducted on the dates indicated. The passage of time, manifestation of latent conditions or impacts of future events may require further examination / exploration of the site and subsequent data analyses, together with a re-evaluation of the findings, observations and conclusions expressed in this report.


In preparing this report, Martens & Associates Pty Ltd may have relied upon and presumed accurate certain information (or absence thereof) relative to the site. Except as otherwise stated in the report, Martens & Associates Pty Ltd has not attempted to verify the accuracy or completeness of any such information (including for example survey data supplied by others).

The findings, observations and conclusions expressed by Martens & Associates Pty Ltd in this report are not, and should not be considered an opinion concerning the completeness and accuracy of information supplied by others. No warranty or guarantee, whether express or implied, is made with respect to the data reported or to the findings, observations and conclusions expressed in this report. Further, such data, findings and conclusions are based solely upon site conditions, information and drawings supplied by the Client etc. in existence at the time of the investigation.

This report has been prepared on behalf of and for the exclusive use of the Client and is subject to and issued in connection with the provisions of the agreement between Martens & Associates Pty Ltd and the Client. Martens & Associates Pty Ltd accepts no liability or responsibility whatsoever for or in respect of any use of or reliance upon this report by any third party.

© July 2019
Copyright Martens & Associates Pty Ltd
All Rights Reserved

Head Office
Suite 201, Level 2, 20 George Street
Hornsby, NSW 2077, Australia
ACN 070 240 890 ABN 85 070 240 890
Phone: +61-2-9476-9999
Fax: +61-2-9476-8767
Email: mail@martens.com.au
Web: www.martens.com.au

Document and Distribution Status							
Author(s)		Reviewer(s)		Project Manager		Signature	
Carolyn Stanley		Dr Daniel Martens Mo Shahrokhian		Mo Shahrokhian			
Revision No.	Description	Status	Release Date	Document Location			
				File Copy	Zhiva Living Dural Pty Ltd atf The Zhiva Living	Mills Oakley	
2	Draft	Draft	25/01/2019	1E, 1P	1P	1P	
2	Final	Final	29/01/2019	1E, 1P	1P	1P	
3	Final	Final	2/07/2019	1E, 1P	1P	1P	

Distribution Types: F = Fax, H = hard copy, P = PDF document, E = Other electronic format. Digits indicate number of document copies.

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

Contents

1 SCOPE	5
2 ANALYSIS	6
2.1 Site Survey	6
2.2 1:25,000 Scale Topographic Map	6
2.3 Council and NSW Government Mapping	6
2.4 Site Inspection	6
2.1 Analysis of Historical Aerial Photographs	7
3 NRAR ADVICE	10
4 CONCLUSION	11
5 REFERENCES	12
6 ATTACHMENT A – SITE SURVEY AND OBSERVED DRAINAGE LINE	13
7 ATTACHMENT B - FIGURES	15
8 ATTACHMENT C – RIPARIAN PLAN (SITE DESIGN STUDIOS, 2019)	24

1 Scope

This drainage line classification assessment has been prepared by Martens & Associates (MA) in relation to the land located at 4 Vineys Road in Dural, NSW (the 'site').

This revised report has been prepared to support the submission of an amended Site Compatibility Certificate (SCC) to the NSW Department of Planning and Environment (DPE) for proposed development at the subject site. The report has also been prepared with the assistance and discussions with the Natural Resources Access Regulator (NRAR).

This document has been prepared in accordance with the following:

- *Hornsby Development Control Plan, 2013.*
- *Guidelines for riparian corridors on waterfront land* (NSW Department of Primary Industries – Office of Water (NSW DPI OoW); 2012).

2 Analysis

2.1 Site Survey

Site contours and the position of the drainage depression within the site are shown in Attachment A.

2.2 1:25,000 Scale Topographic Map

Figure 1 at Attachment B provides a copy of the 1:25,000 scale map for the site. This shows that a 'blue' line is drawn within the site, suggesting that a 1st order watercourse could possibly be present.

2.3 Council and NSW Government Mapping

The site is not mapped as Waterways and Riparian Land or Terrestrial Biodiversity by Hornsby Shire Council's (HSC) *Local Environmental Plan 2013*.

The site is not mapped as having high biodiversity value on the NSW Biodiversity Values Map, nor is the site mapped as containing native vegetation on the Native Vegetation Regulatory Map.

2.4 Site Inspection

A site inspection was undertaken on 20 December, 2018 by Dr Daniel Martens, MA's principal hydrologist and engineer. The inspection included undertaking the following:

1. Inspecting the dam and dam embankment upslope of the site.
2. Inspecting the drainage line within the site.
3. Inspecting the drainage line downslope of the site.

The aim of the inspection was to assist in assessing whether the mapped 'blue line' constituted a watercourse. Based on this inspection, the following drainage line 'reaches' were identified:

1. Reach 1 – Upslope of farm dam and embankment, located on adjacent property to the west.
2. Reach 2 – Upper portion of the drainage line, reach is located in the western portion of the site.
3. Reach 3 – This constructed reach is located in the central portion of the site.

4. Reach 4 – This reach is located in the eastern portion of the site, discharging offsite towards Tunks Creek to the east.

Reach locations are shown on the site survey at Attachment A.

2.1 Analysis of Historical Aerial Photographs

An analysis of historical photographs was undertaken to assist with classifying the drainage line within the site. Images included in the assessment were sourced from Google Earth and Nearmaps, and included images for 2003, 2007, 2014 and 2018. These images are provided at Figures 2, 3, 4 and 5 at Attachment B.

Results of the aerial photograph interpretation assessment are provided in Table 1.

Table 1: Waterway historical aerial image, and site inspection comments.

Historical Aerial Images ²					
Reach ID ¹	March 2003	November 2007	November 2014	September 2018	Site Inspection Comments (20 December, 2018)
R1	<p>A farm dam is visible on the neighbouring property to the west of the subject site.</p> <p>No bed or banks, or watercourse is visible.</p>	<p>An adjoining small dam has been constructed to the north of the existing dam. A shed has been constructed to the north of the new smaller dam.</p> <p>Orchards are visible to the west of the dam.</p> <p>No bed or banks, or watercourse is visible.</p>	<p>Vegetation to south and east of dam more established. Significant surface vegetation on dam waters.</p> <p>No bed or banks, or watercourse is visible.</p>	<p>The two dams have been amalgamated. Growth of vegetation along the southern and eastern dam embankments.</p> <p>No bed or banks, or watercourse is visible.</p>	<p>An upslope online farm dam is located on the adjacent property to the west. The dam receives overland flow from the north and west.</p> <p>Water seepage at the base of the dam embankment was observed.</p> <p>No bed or banks, or watercourse observed.</p>
R2	<p>No bed or banks, or watercourse is visible.</p>	<p>No bed or banks, or watercourse is visible.</p>	<p>No bed or banks, or watercourse is visible.</p>	<p>No bed or banks, or watercourse is visible.</p>	<p>This reach is characterised as a grassed swale receiving intermittent shallow and broad overland flows from the upslope dam.</p> <p>No riparian vegetation and no material ecological value.</p> <p>No bed or banks, or watercourse occurs in this reach.</p>
R3	<p>Evidence of earthworks or construction, soil erosion, gully head and excavated drainage channel.</p> <p>Limited vegetation.</p> <p>No watercourse is visible.</p>	<p>Image shows stabilised gully head and rock boulder lined stormwater drainage channel.</p> <p>Vegetation is present within the drainage channel.</p> <p>No watercourse is visible.</p>	<p>Some increase in vegetation within the rock lined channel, rock lined channel perimeter generally visible.</p> <p>No watercourse is visible.</p>	<p>Some increase in vegetation within the rock lined channel, largely obscuring rock lined channel.</p> <p>No watercourse is visible.</p>	<p>The drainage channel at this reach was a constructed stormwater feature. Multiple stormwater pipes were observed to be connected into the rock lined stormwater channel.</p> <p>Central portions of the channel had been colonised by a variety of weed species.</p> <p>Very limited habitat value.</p> <p>Potential as a weed plume source to downstream areas.</p> <p>Likely classification as a stormwater drain and not a watercourse.</p>

Historical Aerial Images ²

Reach ID ¹	March 2003	November 2007	November 2014	September 2018	Site Inspection Comments (20 December, 2018)
R4	The reach is heavily vegetated, no watercourse channel or other elements visible.	Growth of vegetation, otherwise little change from 2003 aerial image.	<p>Clearing of some vegetation within the reach area to the south of the tennis court on the neighbouring property to the north of the subject site.</p> <p>No watercourse channel or other elements are visible.</p>	<p>Little change from 2014 image.</p> <p>No watercourse channel or other elements are visible.</p>	<p>This reach appears to be a 'natural watercourse'. The watercourse was observed to flow offsite, draining to the east and towards Tunks Creek.</p> <p>Shallow defined bed and banks were observed, to a depth of approximately 0.3 to 0.5 m and approximately 1 – 1.5 m channel width. The riparian zone is vegetated with native and exotic species, and retains habitat and ecological value.</p> <p>Where R3 (gully head) was observed to be wide and deep, R4 is conversely narrow and shallow. This shows that the natural creek morphology is not consistent, and substantiates that R3 is not a natural watercourse.</p>

Notes:

¹ See Figure 6, Attachment B for reach locations and drainage line photograph locations.

² Historical aerial images are provided in Figures 2-5, Attachment B.

3 NRAR Advice

NRAR (Jeremy Morice) agreed during discussions with MA (19 March, 2019) that Reaches 1 and 2 were not considered to be watercourses, and that no riparian zones were required. NRAR also agreed that Reach 4 should be considered as a first order watercourse, and appropriate riparian zone widths should be adopted.

NRAR advised that the lower part of the stormwater drainage channel (Reach 3) may possibly be considered a first order watercourse.

4

Conclusion

On the basis of our site inspection and review of a number of historical aerial photographs, we conclude as follows:

1. Reach 1 is not a watercourse, as it contains a farm dam and only supports broad overland flows during storm events.
2. Reach 2 is not a watercourse. There is no defined channel with bed and banks. The reach is characterised by a broad shallow and grassed overland flow path with no riparian vegetation or habitat value. This reach can be regraded and integrated into a revised future site stormwater management scheme.
3. Reach 3 is a rock lined stormwater drain that has been constructed as part of historical erosion control works. The reach is significantly wider than downslope areas in Reach 4, and is characterised by invasive weeds within the drainage line.

Whilst we are of the view that Reach 3 is a constructed stormwater drainage channel and not a watercourse, we note that NRAR may ultimately come to a different view. On that basis, we recommend that it be treated as a first order watercourse, and understand that a riparian offset has been incorporated into the site design.

A riparian plan to accommodate riparian requirements applicable to Reaches 3 and 4 is provided at Attachment C. We have reviewed the plan and observe that it is consistent with NRAR's riparian policy, and note that General Terms of Approval (GTAs) have already been provided by NRAR under the former development application (DA/668/2018).

4. Reach 4 is a first order watercourse. It has been modified to some degree, but the extent of riparian vegetation is reasonable and the corridor provides ecological value.

5 References

Hornsby Shire Council (2015) *Water Sensitive Urban Design (WSUD) Reference Guidelines*.

Hornsby Shire Council (1997) *Sustainable Best Water Practices*.

Hornsby Shire Council (2011) *Sustainable Total Water Cycle Management Strategy*.

Hornsby Shire Council (2006) *Biodiversity Conservation Strategy, 2006*.

Hornsby Shire Council (2008) *Guidelines for the preparation of Vegetation Management and Restoration Plans*.

Hornsby Development Control Plan, 2013

NSW Department of Primary Industries – Office of Water (2012) *Guidelines for riparian corridors on waterfront land*.

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

Site Design Studios (2019) *DA Landscape Plan - Riparian Plan*.

6 **Attachment A – Site Survey and Observed Drainage Line**

NO INVESTIGATION OF UNDERGROUND SERVICES HAVE BEEN MADE. ALL RELEVANT AUTHORITIES SHOULD BE NOTIFIED PRIOR TO ANY EXCAVATION ON OR NEAR THE SITE.

DEVELOPERS & EXCAVATORS MAY BE HELD FINANCIALLY RESPONSIBLE BY THE ASSET OWNER SHOULD THEY DAMAGE UNDERGROUND NETWORKS UNLESS USING CAN.

- CAUSE DEATH OR SERIOUS INJURY TO WORKERS & THE GENERAL PUBLIC
 - INCONVENIENCE LOSSES OF ELECTRICITY, GAS, WATER & COMMUNICATIONS
 - LEAD TO CRIMINAL PROSECUTION & DAMAGES CLAIMS
 - CAUSE EXPENSIVE FINANCIAL LOSSES TO BUSINESS
 - CUT OFF EMERGENCY SERVICES
 - DELAY PROJECT COMPLETION TIMES WHILE THE DAMAGE IS REPAIRED
- MINIMISE YOUR RISK & DIAL BEFORE YOU DIG TELEPHONE 1120

NOTES:

- 1) TITLE BOUNDARY AND DIMENSIONS ARE SHOWN. BOUNDARY REGISTRATION HAS NOT BEEN UNDERTAKEN.
- 2) ORIGIN OF LEVELS: FM 20146 RL 206.961 (A.M.D.) (L.I.C 2016)
- 3) SITE COMPREHENDS LOT 24 (D.P. 128664) LOT 1 (D.P. 230172)
- 4) SITE AREA 2.884ha BY TITLE DIMENSIONS.
- 5) UNDERGROUND SERVICES HAVE NOT BEEN INVESTIGATED.
- 6) (D) DONOTES WATER LEVEL.
- 7) TREE NAMES SHOWN CONSTITUTE OUR OPINION ONLY. IF TREE SPECIES IDENTIFICATION IS IMPORTANT FOR DESIGN OR HERITAGE REASONS THEY SHOULD BE DETERMINED BY A QUALIFIED ARBORIST.
- 8) CAUTION: SHOULD ANY DEVELOPMENT OR CONSTRUCTION BE PLANNED ON OR NEAR THE BOUNDARIES, THE BOUNDARIES SHOULD BE CLEARLY MARKED ON SITE.
- 9) CONTOUR INTERVALS: MAJORS 1.0m MINORS 0.5m

- D — APPROXIMATE LINE OF OPTIC CABLE
- S — APPROXIMATE LINE OF SOWER LINE
- W — APPROXIMATE LINE OF WATER MAINS LINE

ISSUE	DATE	AMENDMENT	TITLE	SCALE (H/T A3)	DATE	AND	SURVEYOR (M)	1
A	18-17	FINAL ISSUE OF PLAN	PLAN SHOWING SELECTED DETAIL & LEVELS OVER NO. 3 QUARRY ROAD & 4 VINEYS RD, DURAL	LGA: HORNSBY	REFERENCE: 17431	CLIENT: H INVESTMENTS	DATE: 22-12-18	SHEET

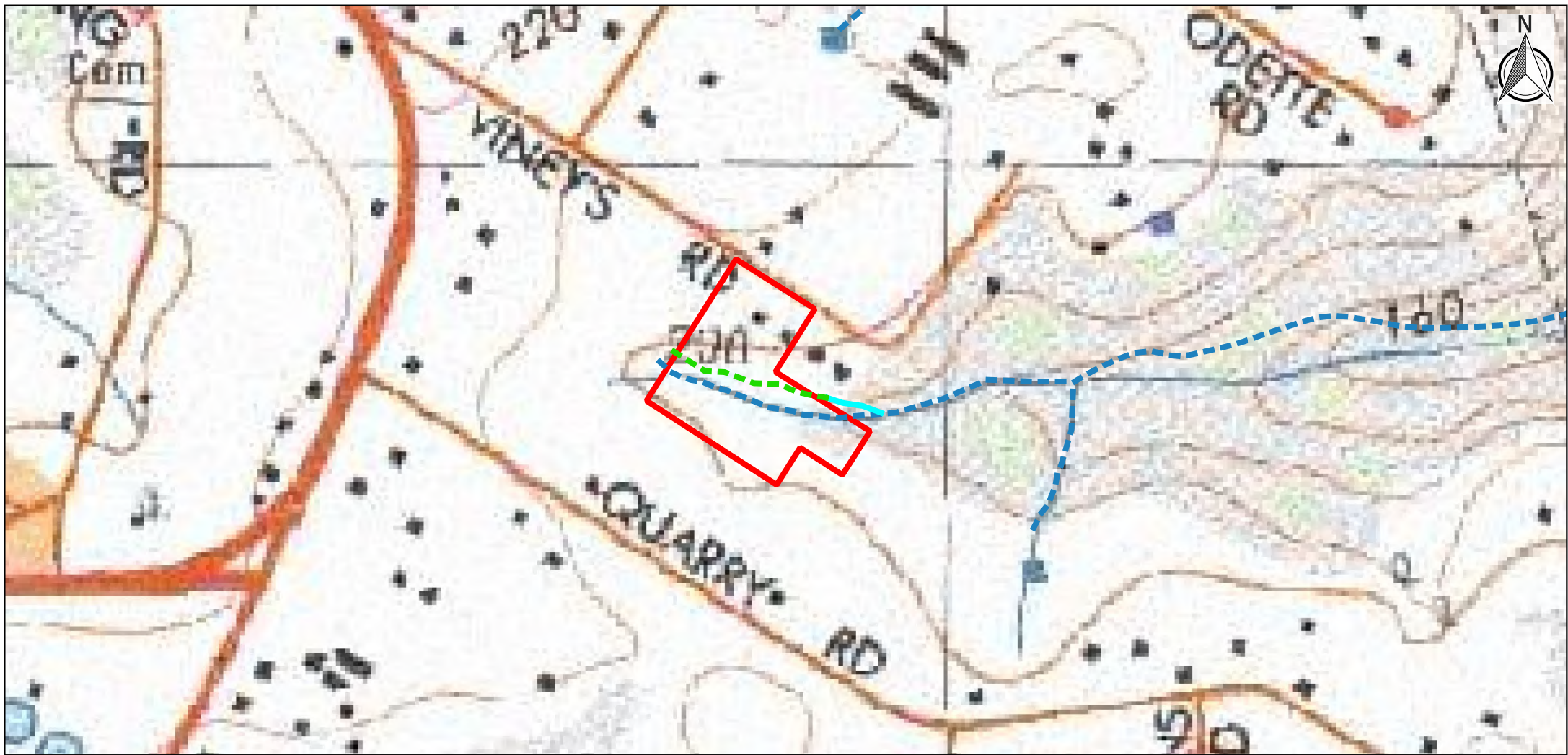
Higgins Surveyors
PROPERTY & DEVELOPMENT CONSULTANTS

A.B.N. 39 323 853 094
LEVEL 3, SUITE 3.05
25 KINGS STREET NORTH SYDNEY
PO BOX 1105
OWN POWER 1220

PH +61 2 9264 0044
FAX +61 2 9267 5468
info@higginsurveyors.com.au



7 **Attachment B - Figures**

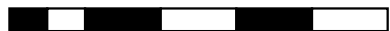


Legend

- Lot Bdy
- Mapped 'Blue Line'
- Observed Drainage Line
- Observed Watercourse

Topographic Map

50 0 50 100 150 200 m



1:5,000

Martens & Associates Pty Ltd

ABN 85 070 240 890

Environment | Water | Wastewater | Geotechnical | Civil | Management

Drawn: PD

Approved: DM

Date: 29/01/2019

Scale: 1:5000 (A4)

Site - NSW 1:25,000
Topographic Mapping
4 Vineys Road, Dural, NSW
Source: Depth of Finance,
Services and Innovation, 2016

Figure 1

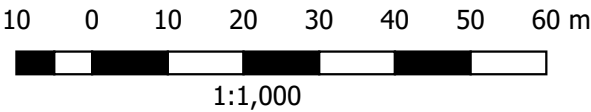
Job No: P1806980



Legend

- Reach
- Lot Bdy

2003.03.09 Aerial Google Earth



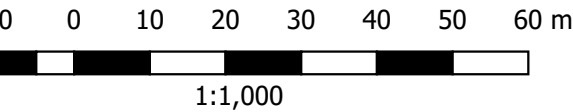
Martens & Associates Pty Ltd		ABN 85 070 240 890	
Environment Water Wastewater Geotechnical Civil Management			
Drawn:	PD	Site - Aerial 4 Vineys Road, Dural, NSW Source: Google Earth, 9/03/2003	Figure 2
Approved:	DM		
Date:	29/01/2019		
Scale:	1:1000 (A4)		Job No: P1806980



Legend

- Reach
- Lot Bdy

2007.11.03 Aerial Google Earth



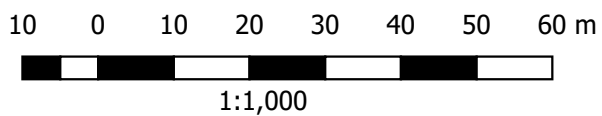
Martens & Associates Pty Ltd		ABN 85 070 240 890	
Environment Water Wastewater Geotechnical Civil Management			
Drawn:	PD	Site - Aerial 4 Vineys Road, Dural, NSW Source: Google Earth, 3/11/2007	Figure 3
Approved:	DM		
Date:	29/01/2019		
Scale:	1:1000 (A4)		Job No: P1806980



Legend

- Reach
- Lot Bdy

2014.11.30 Aerial Nearmap



Martens & Associates Pty Ltd

ABN 85 070 240 890

Environment | Water | Wastewater | Geotechnical | Civil | Management

Drawn: PD

Approved: DM

Date: 29/01/2019

Scale: 1:1000 (A4)

Site - Aerial
4 Vineys Road, Dural, NSW
Source: Nearmap, 30/11/2014

Figure 4

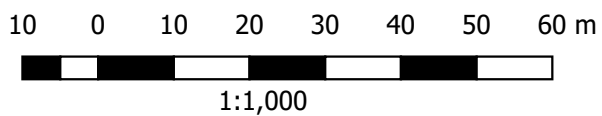
Job No: P1806980



Legend

- Reach
- Lot Bdy

2018.09.16 Aerial Nearmap



Martens & Associates Pty Ltd

ABN 85 070 240 890

Environment | Water | Wastewater | Geotechnical | Civil | Management

Drawn: PD

Approved: DM

Date: 29/01/2019

Scale: 1:1000 (A4)

Site - Aerial
4 Vineys Road, Dural, NSW
Source: Nearmap, 16/09/2018

Figure 5

Job No: P1806980



Legend

--- Mapped 'Blue Line'

— Reach

--- Observed Drainage Line

— Observed Watercourse

□ Lot Bdy

R1

Reach identification / locations

P1

Plate location / image direction
(refer to Figures 7 and 8)

2018.09.16 Aerial Nearmap

10 0 10 20 30 40 50 60 m



1:1,000

Martens & Associates Pty Ltd

ABN 85 070 240 890

Environment | Water | Wastewater | Geotechnical | Civil | Management

Drawn: PD

Approved: DM

Date: 29/01/2019

Scale: 1:1000 (A4)

Mapped 'Blue Lines' -
Observed Reach Locations
4 Vineys Road, Dural, NSW
Source: Nearmap, 16/09/2018

Figure 6

Job No: P1806980



Plate 1: (Reach 1) View west across dam and to orchards on adjacent property to west of the subject site.



Plate 2: (Reach 2) View south east of grassed swale (observed 'drainage line'), to east of the dam.



Plate 3: (Reach 2) View west across grassed swale, observed 'drainage line' (Reach 2) toward constructed drainage line (Reach 3).



Plate 4: (Reach 3) View west of constructed stormwater drain and old erosion gully head. Vegetation is exotic and of low ecological value.



Plate 5: (Reach 3) View north of stormwater pipe discharging to Reach 3.



Plate 6: (Reach 3) View south of stormwater pipe discharging to Reach 3.

Martens & Associates Pty Ltd		ABN 85 070 240 890	
Environment Water Wastewater Geotechnical Civil Management			
Drawn:	CS	Plates: Existing Waterway Environment 4 Vineys Road, Dural, NSW	Figure 7
Approved:	MS		
Date:	29/01/2019		Job No: P1806980
Scale:	-		



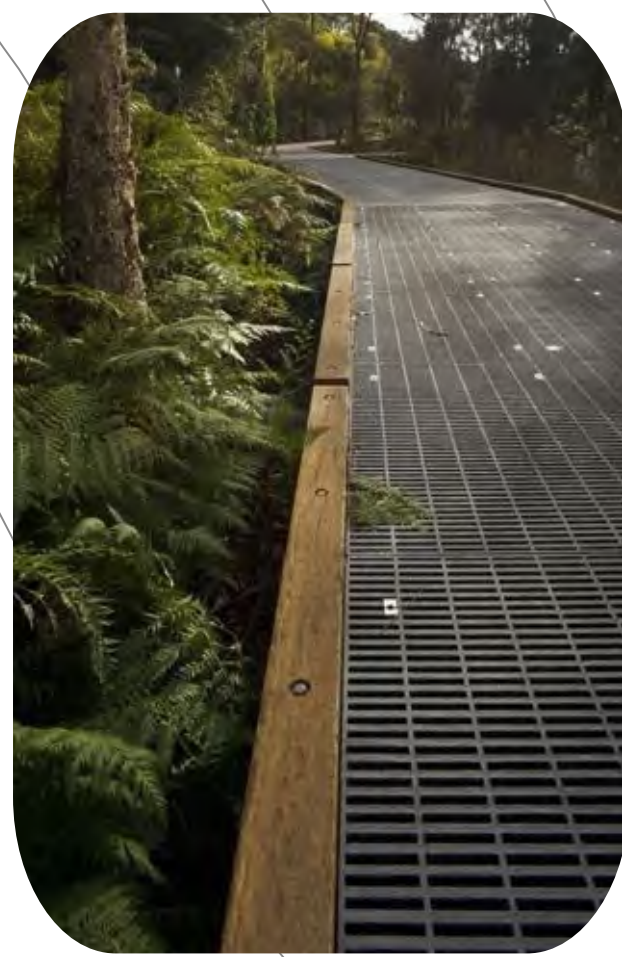
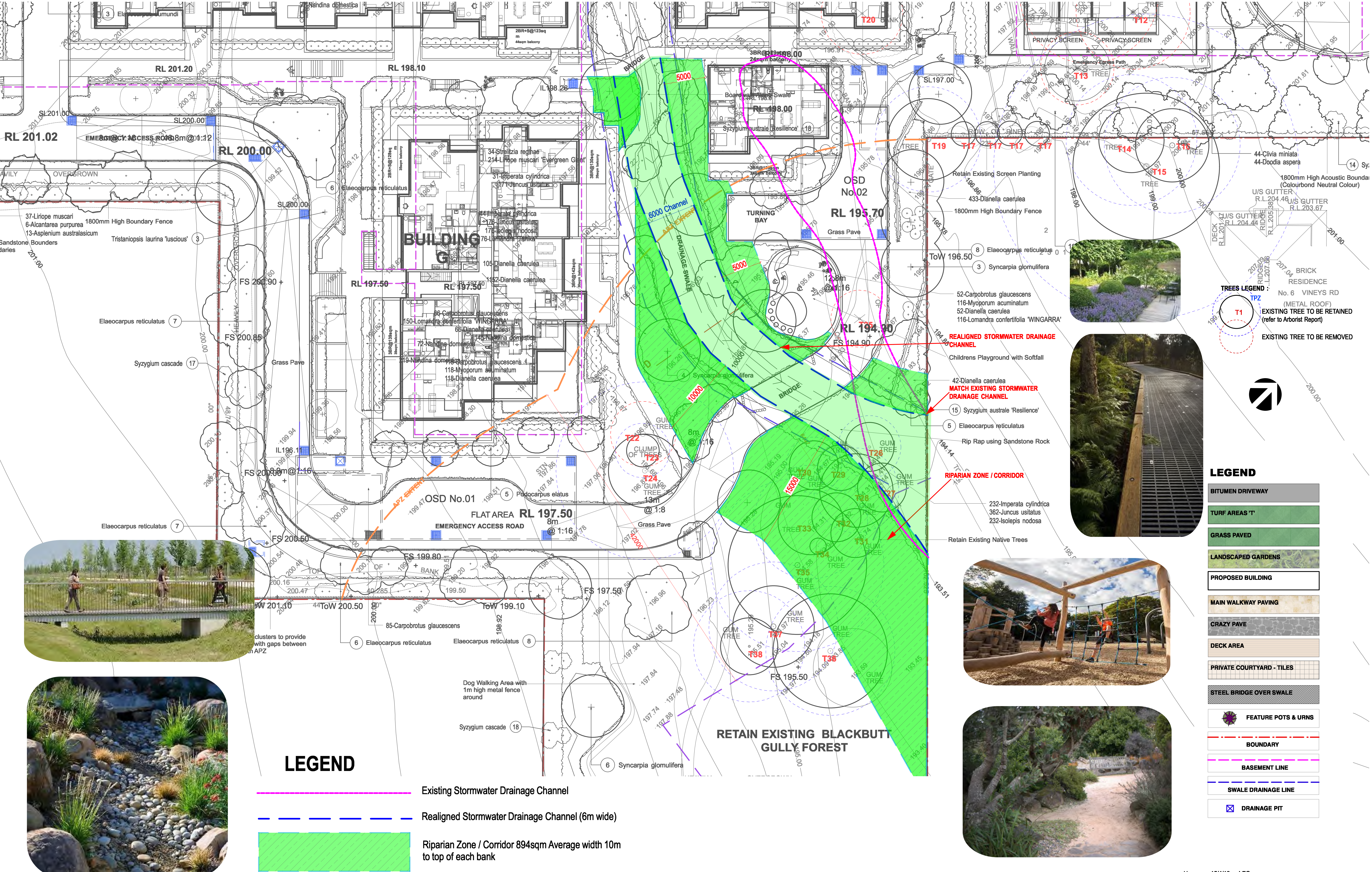
Plate 7: (Reach 3) View west of vegetated (constructed) drainage channel and historical erosion gully.



Plate 8: (Reach 4) View east of watercourse banks and channel, and riparian vegetation.

Martens & Associates Pty Ltd		ABN 85 070 240 890	
Environment Water Wastewater Geotechnical Civil Management			
Drawn:	CS	Plates: Existing Waterway Environment 4 Vineys Road, Dural, NSW	Figure 8
Approved:	MS		
Date:	29/01/2019		Job No: P1806980
Scale:	-		

8 Attachment C – Riparian Plan (Site Design Studios, 2019)



LEGEND

- Existing Stormwater Drainage Channel
- Realigned Stormwater Drainage Channel (6m wide)
- Riparian Zone / Corridor 894sqm Average width 10m to top of each bank

- TREES LEGEND:
- T1 EXISTING TREE TO BE REMOVED
 - TPZ EXISTING TREE TO BE RETAINED (refer to Arborist Report)

LEGEND

- BITUMEN DRIVEWAY
- TURF AREAS 'T'
- GRASS PAVED
- LANDSCAPED GARDENS
- PROPOSED BUILDING
- MAIN WALKWAY PAVING
- CRAZY PAVE
- DECK AREA
- PRIVATE COURTYARD - TILES
- STEEL BRIDGE OVER SWALE
- FEATURE POTS & URNS
- BOUNDARY
- BASEMENT LINE
- SWALE DRAINAGE LINE
- DRAINAGE PIT