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Pages:		9
cc.		-

June 27, 2014

PLANIX Projects
C/- Waterbrook
Attn: Mel Gholami
By Email

Dear Mel

RE: DRAINAGE CONSTRAINTS ASSESSMENT – WATERBROOK BAYVIEW SENIORS LIVING FACILITY - BAYVIEW GOLF COURSE; CABBAGE TREE ROAD, BAYVIEW, NSW

1.0 INTRODUCTION

This assessment provides a drainage constraints assessment to enable development design to be undertaken for a proposed seniors living development at the existing Bayview Golf Course, Cabbage Tree Road, Bayview (the site). Specifically this document shall:

1. Describe the drainage conditions at the site.
2. Document watercourse occurrence in accordance with NSW Office of Water (NOW) classification requirements and provide an assessment of watercourse and riparian conditions.
3. Provide preliminary stormwater and drainage requirements for the proposed development including water quality, quantity and riparian management requirements.
4. Provide a drainage constraints plan.

2.0 SITE DESCRIPTION AND DRAINAGE CONDITIONS

The site is described as Lot 1 DP 662920 and forms part of Bayview Golf Course in Pittwater Council LGA. The development area is approximately 19,958 m^2 and located in the vicinity of the courses existing 4th hole tee and 5th hole green (Figure 1). It is bound by the golf course and then residential development to the north east and south west, Cabbage Tree Road and the golf course to the south east and the golf course then bushland to the north west.

The development area slopes to the south and south east at 9 – 11%, except for vegetated areas adjacent to Cabbage Tree Road which are steeper at 20 – 35%. There are no mapped watercourses within the development area or within the site (Figure 2). There is a number of constructed channels in the vicinity of the development area and a mapped watercourse to the south of Cabbage Tree Road (Figure 2). These direct site runoff to Cahill Creek which flows into Pittwater.

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3.0 WATERCOURSE AND DRAINAGE ASSESSMENT

A site inspection was completed on May 16 and June 4, 2014 to groundtruth watercourse occurrence and assess watercourse and riparian conditions. Outcomes are summarised in Table 1.

Table 1: Watercourse occurrence and conditions assessment.

Drainage Feature [1]	General Comments	Site Inspection Comments	Classification
D1	Natural watercourse flowing from north east of site. Continues onsite site further than depicted on topographic map (see D2 comments).	Catchment approximately 50 ha and a mixture of bushland and urban development. Vegetated with predominately native bushland either side of channel. Channel approximately 1.0 – 1.5m wide and 0.5 – 0.8m deep and includes pool and riffles. Areas of exposed bedrock noted.	First order watercourse.
D2	Downstream portion of D1 found to be natural watercourse but unmapped on topographic map.	Downslope portion has bushland riparian vegetation on the right bank and floodplain. Left bank riparian zone is restricted to steep bank and consists of trees (native and exotic) and ferns. Floodplain vegetation is mown grass (golf course). Some areas of left bank instability noted. In downstream portions, channel is generally narrow (approx. 1.0m) and deep (1.0 – 1.5m) with steep banks and areas of exposed bedrock along bed and banks. Downstream extent has a 0.5m drop to constructed drainage channel (D4).	First order watercourse.
D3	Watercourse from north east of site. Downstream extent at junction with D2 and D4 located onsite. Upstream channel and tributary could not be inspected.	3m downstream extent of watercourse inspected due to dense vegetation restricting access at other locations. Watercourse enters site via 600mm pipe through a concrete headwall. Headwall is topped by a 3m high corrugated iron fence. A scour pool is located at the pipe outlet forming the junction with D2 and D4. Pool depth is approximately 1m. Banks exceed slopes of 1(v):2(h). Riparian vegetation is dense and consists of a mixture of exotic and native species.	Second order watercourse (based on topographic map).
D4	Constructed drainage channel along western boundary of golf course site forming boundary with neighbouring residential development. Conveys flow from upslope watercourses (D1, D2 and D3) around golf course, under Cabbage Tree Road and into golf course irrigation dams. Channel is unmapped on topographic map.	Channel is largely rectangular in shape. Channel width generally 1.0 – 1.5m and 0.8 – 1.5m high. Banks slope at 1:1 or steeper. Some evidence of bank undercutting. Upstream portions form rear boundary of adjacent residential properties. Riparian zone has been cleared and consists of mown grass, landscaping and scattered trees. Numerous pipes noted draining residential stormwater into channel. Riparian vegetation (mixture of native	Constructed open drainage channel – Second order watercourse.

Drainage Feature [1]	General Comments	Site Inspection Comments	Classification
		and exotic) is denser downstream where channel runs parallel with Cabbage Tree Road. Maximum riparian zone width is 10m on the left bank.	
D5	Mapped channel shown as flowing east under Cabbage Tree Road into existing dam.	No watercourse or drainage depression found onsite. Vegetation primarily manicured grass and some scattered trees. No riparian vegetation. Formalised channel starts downstream of golf course irrigation dam.	NA
D6	Constructed drainage channel along north east and eastern boundary of golf course. Receives runoff from upslope golf course (via drainage pit and 500mm culvert outlet) and irrigation dam overflow. Conveys flow along eastern boundary to large dam and Cahill Creek in golf course's eastern extent. Channel is unmapped on topographic map.	Channel is largely rectangular in shape. Channel width generally 1.5 – 2.0m and 1.0 – 1.5m high. Banks slope at 1:2 or steeper. Riparian zone generally consists of footpath, mown grass and scattered trees on the right bank (golf course) and 5 – 10m trees and shrubs (native and exotic) on the left bank.	Constructed open drainage channel – second order watercourse.

Note:

[1] D = Drainage feature/topographic depression

Attachment B provides plates from site inspection and a plan showing the watercourse extent.

4.0 PRELIMINARY STORMWATER REQUIREMENTS

4.1 Riparian Management

As there are no mapped or constructed watercourses within the development area there are no riparian buffer requirements.

Table 2 provides the vegetated riparian zone (VRZ) setback or building setback recommendations for each watercourse. As shown in Attachment B, the distance between the proposed development area and watercourses exceeds all setback requirements.

Table 2: Riparian requirements.

Drainage Feature [1]	Strahler Classification	VRZ/BS Requirement[2] (m)	Distance to Development Area[3] (m)
D1	First order	10 VRZ	120
D2	First order	10 VRZ	80
D3	Second order	20 VRZ	130
D4	Second order	10 BS	80
D6	Second order	10 BS	
Existing Irrigation Dam	First order	10 VRZ	75

Note:

[1] D = Drainage feature/topographic depression.

[2] VRZ = average vegetated riparian zone setback requirement in accordance with NSW Office of Water (2012) *Guidelines for Riparian Corridors on Waterfront Land.* BS = average recommended building setback to constructed channel for water quality purposes.

[3] Distance from watercourse to development area boundary.

4.2 Stormwater Quality

Section B5.9 of Pittwater Council 21 DCP (2014) requires development including Seniors Living development to result in no increase to pollutants discharged with stormwater into the environment.

The proposed development will need to demonstrate that a neutral or beneficial effect (NorBe) on water quality can be achieved. Water quality modelling (MUSIC) is required to determine pollutant generation rates from the existing (golf course) site and design a stormwater management system that treats runoff from the development to a quality that is better or equal to existing conditions.

We would typically expect that this objective would be achieved through a treatment train that includes at source treatment (including rainwater tanks with reuse), driveway swales and an end of line structure, such as a bioremediation basin or wetland. It is envisaged that after treatment, runoff shall be either: reticulated through proposed development water features; directed into the golf course irrigation dam; or discharged into the constructed drainage channel that flows into Cahill Creek.

Water quality analysis and concept stormwater treatment train details are to be provided at DA stage.

4.3 Stormwater Quantity

Section B5.7 of Pittwater Council 21 DCP (2014) requires:

- Onsite detention (OSD) be installed where the development results in additional hardstand of greater than 50 m^2.
- OSD facilities to ensure development does not increase existing stormwater discharge conditions downstream up to the 1% AEP storm event.
- Rainwater tank overflows are to be connected to the OSD facility.
- Stormwater runoff from upstream properties shall bypass the OSD system.

- Rainwater tanks and OSD facilities may be combined in an integrated system and be above or below ground. Should an oversized rainwater tank be used then 25% of the excess storage volume can be credited towards the OSD tank capacity.

- In accordance with Council's tabulated requirements for size and allowable discharge from OSD systems, a minimum 60 L per m^2 of additional hardstand and a discharge rate that replicates the existing conditions.

Based on the current proposed hardstand area of approximately 7,865 m^2 a minimum OSD volume of 472 KL is required provided existing runoff discharge rates can be achieved. Note this does not include any potential offsets for provision of oversized rainwater tanks.

Water quantity analysis and OSD requirements are to be provided at DA stage.

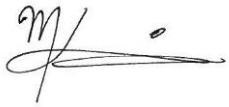
4.4 Requirements under the Water Management Act 2000

The development area is greater than 40m away from all watercourses and so is not considered integrated development under the Water Management Act 2000. A Controlled Activity Approval license is therefore not required.

If you require any further information, please do not hesitate to contact the writer.

For and on behalf of

MARTENS & ASSOCIATES PTY LTD

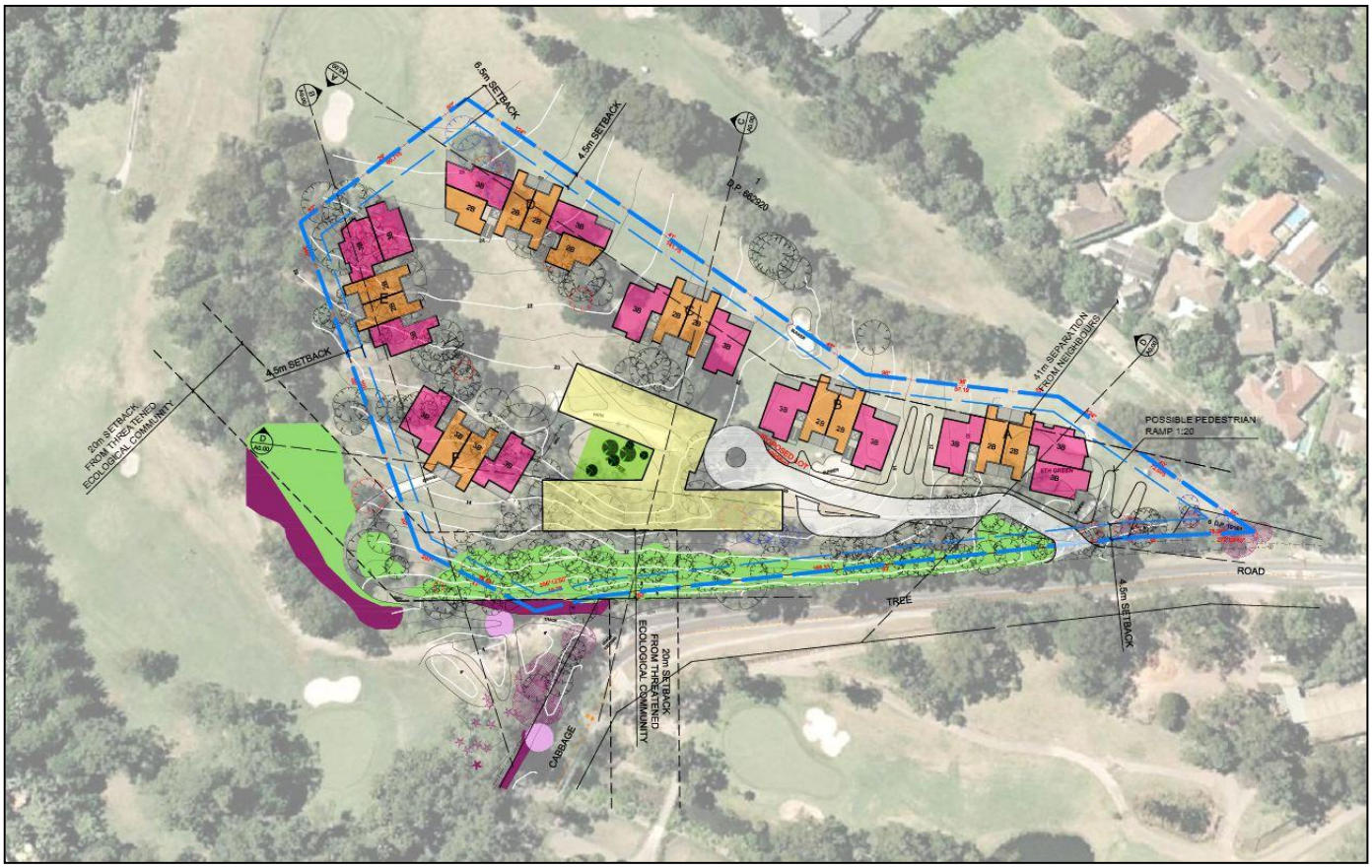


MEGAN KOVELIS
BEnvs (Hons1)
Environmental Scientist

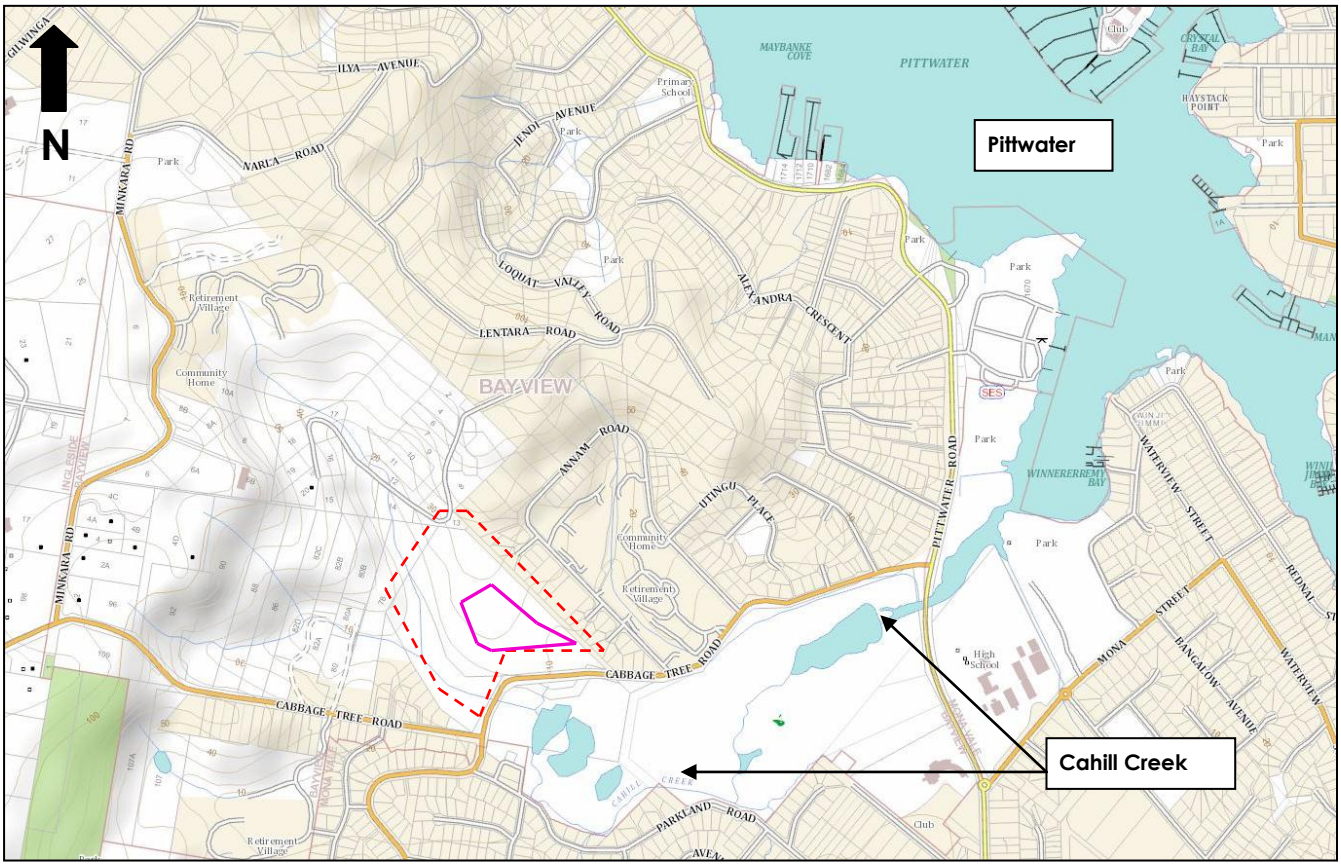
ATTACHMENT A – FIGURES

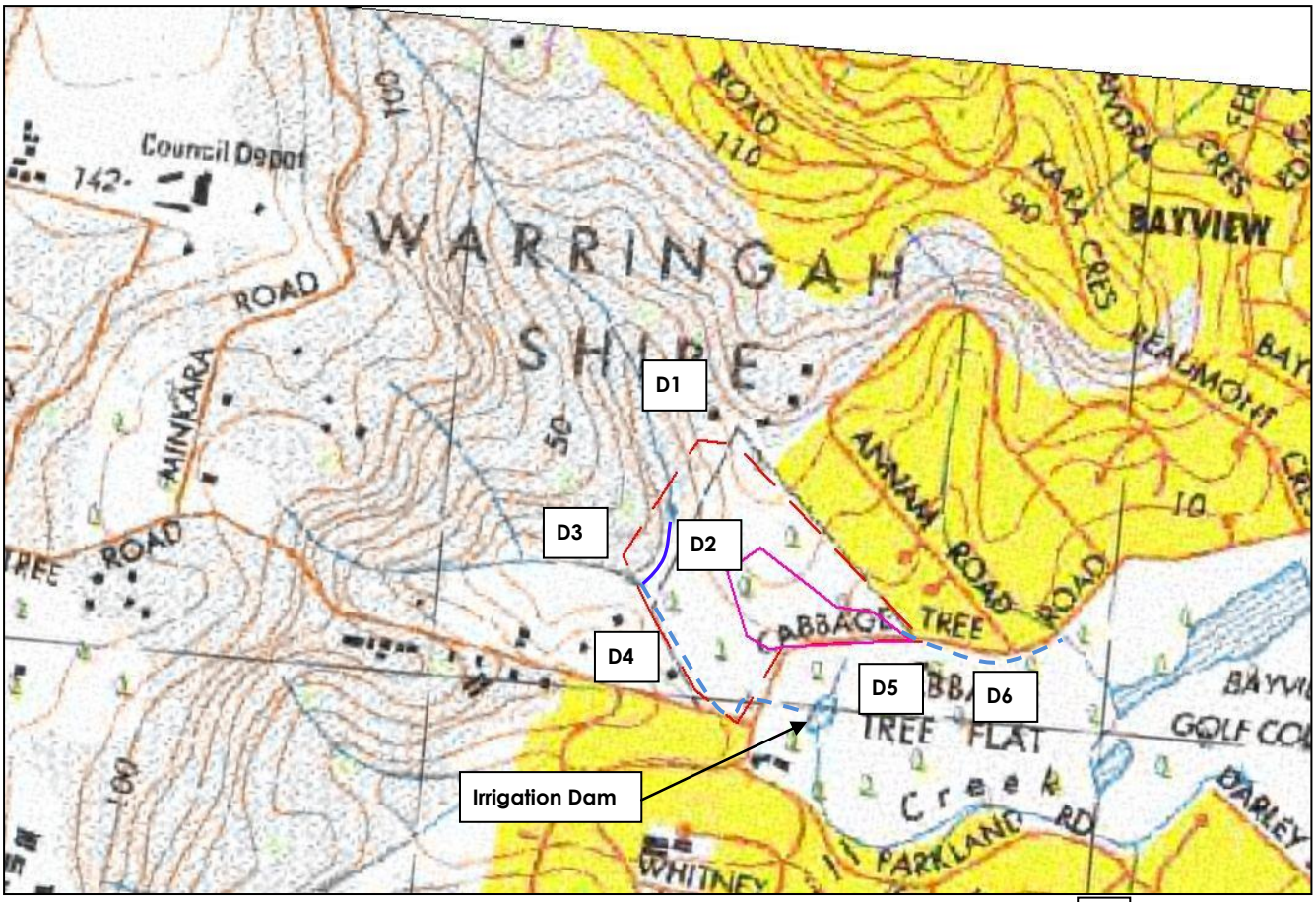
N

Site Boundary — Development Area



Martens & Associates Pty Ltd ABN 85 070 240 890		**Environment | Water | Wastewater | Geotechnical | Civil | Management**	
Drawn:	MLK	**Site Location and Development area** Source: Nearmaps (above), Marchese Partners (below)	Drawing No: Figure 1
Approved:	GT		
Date:	23.06.2014		
Scale:	NA		Job No: P1404179

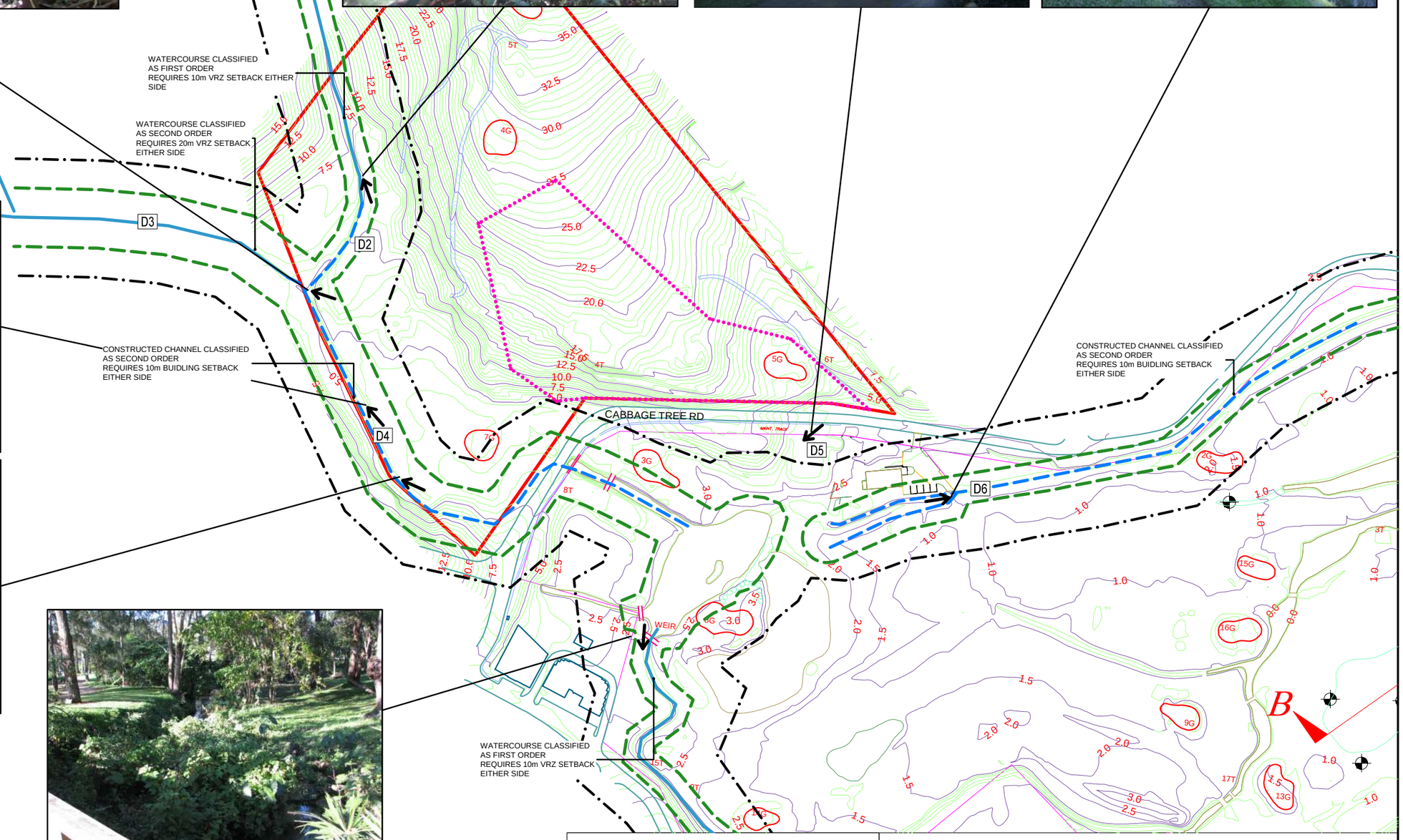




Site Boundary | Development Area | Unmapped watercourse | Constructed Channel | 1 Drainage Feature

Martens & Associates Pty Ltd ABN 85 070 240 890		**Environment | Water | Wastewater | Geotechnical | Civil | Management**	
Drawn:	MLK	**Watercourse Classification** Source: SixViewer (above), 1:25 000 Topographic Map (below)	Drawing No: Figure 2
Approved:	GT		
Date:	11.02.2012		
Scale:	NA		Job No: P1304029

ATTACHMENT B – WATERCOURSE CLASSIFICATION ASSESSMENT



KEY

D3	DRAINAGE FEATURE ID
	SITE BOUNDARY
	WATERCOURSE (BASED ON SITE INSPECTION)
	CONSTRUCTED CHANNEL (BASED ON SITE INSPECTION)
	EXTENT OF WATERFRONT LAND (40M)
	VEGETATED RIPARIAN ZONE WIDTH
	DEVELOPMENT AREA
	PHOTO VIEW DIRECTION

N W E S

0 20 40 60 80 100
UNITS - METRES

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Drawn:	MLK	**WATERCOURSE CLASSIFICATION ASSESSMENT**	Drawing No./ID: **SK001**
Approved:	GT		
Date:	26.06.2014		
Scale @A3:	1:3000	6/37 Leighton Place, Hornsby, NSW 2077 Australia Phone: (02) 9476 9999 Fax: (02) 9476 8767 Email: mail@martens.com.au Internet: http://www.martens.com.au	Project: P1404179 / File: JD02V02 / Revision: A