Our Ref: 6052PM: JAT

Thursday, 27 September 2007

Mr Bob Britten
Department of Water and Energy
Bega Office

Dear Bob

Re: Bevian Road, Rosedale – Riparian Constraints Analysis

Further to our meeting on site in November 2006, we would like to confirm the final riparian constraints of all water courses within the proposed development site, Bevian Road, Rosedale. In addition, this correspondence discusses issues raised by the NSW Department of Primary Industries (DPI), specifically issues raised by NSW Fisheries on site on the 14 March 2007and the agreements reached.

Mapped DNR Rivers

According to DNR riparian mapping (Figure 1) all water courses have been mapped as Category 3 for bank stability and water quality. This mapping was based on a mapped blue line which has had little field verification. Category 3 typically requires a 10m vegetated buffer from the 'top of bank'.

Figure 1: DNR riparian mapping within the Rosedale site.
Source: DNR submission to the South Coast Sensitive Urban Lands Review

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Identification of 'top of bank'

As discussed during your visit to the site in November 2006 the 'top of bank' across the majority of the watercourses in the Bevian Road Site are undefinable due to erosion processes which have formed, in some areas, gullies with steep banks up to 80m wide. Based on this observation, it is our understanding that the Department of Water and Energy are prepared to dispense with the "top of bank" being the primary reference line for mapping the 10 m riparian buffer.

You also confirmed that all watercourses are Category 3 and require a 10m buffer from the edge of the eroded bank to allow for stabilisation of the embankments. You also agreed to reduction of the buffer at pinch points provided appropriate managed landscape treatment within the APZ can be achieved to increase the effective protection of the erosion bank to an equivalent of 10 m. In particular the top of the erosion bank needed to be within the core riparian zone with a buffer extending to a practical distance to achieve water quality and bank stability objectives.

Based on this advice *Conacher Travers* has prepared the following concept riparian zone structure in order to achieve water quality and bank stability objectives.

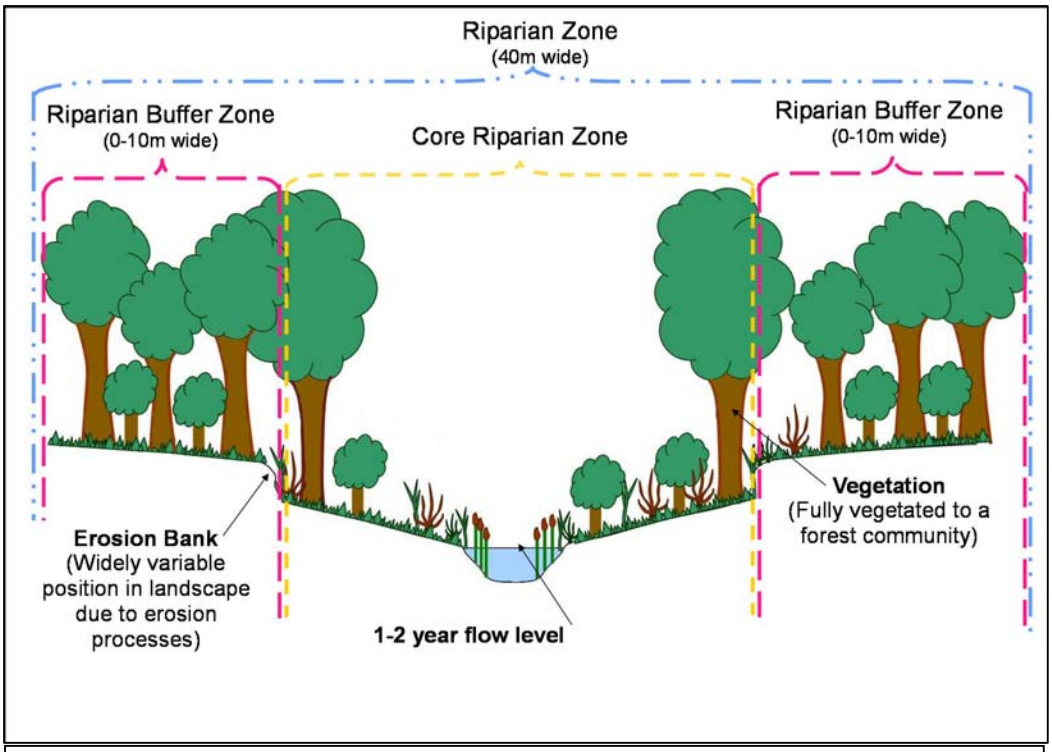

Figure 2: Cross section of a concept riparian zone and proposed rehabilitation. Widths vary depend on the location within the riparian corridor.

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Proposed Riparian Management

A minimum Category 3 management practice has been identified for all watercourses in the northern and central portion of the site (Figure 3), with riparian buffers of 10m from top of the erosion bank. Where reasonable, a maximum 40m riparian zone has been mapped to minimise the Asset Protection Zone (APZ) requirements adjacent to riparian corridors. Where dams are present within the riparian corridor, the effective riparian zone width increases to a maximum of 80m. Riparian zones, as mapped, will protect banks and maintain water quality. In addition, riparian zones provide connectivity to remnant vegetation within the site and offsite enhancing movement opportunities for native fauna.

The 1:2 year flow level is "technically" considered to represent the top of bank in the absence of a defined "top of bank". In addition, the containment of the erosion bank within the total protected riparian zone was considered an important benchmark to achieve. Given the absence of a defined 'top of bank', it was agreed that a reduced riparian buffer would be accepted by DWE at "pinch points". The riparian buffer generally extends greater than 10 m beyond the top of the erosion bank for the majority of the corridor but is reduced to 2.5m at pinch points. As shown on the attached Buffer Analysis Figures (figures 8, 8.1, 8.2 & 8.3), the majority the riparian zone has a riparian buffer exceeding 10 metres. At the pinch points the edge of the buffer would be landscaped within the asset protection zone to provide equivalent protection to a distance of 10 m from the erosion bank.

Drainage lines identified within the southern portion of the site and depicted in Figure 3 (red arrows), are in our opinion, less well formed and do not require protection as Category 3 watercourses. This was supported by you during an additional site visit on the 14 March 2007. However, runoff from these areas will be controlled by best practice stormwater management measures to minimise impacts on the remnant EECs and Bevian Wetland.

Potential for fish habitat and passage

The Rosedale site comprises a network of intermittent watercourses and dams. Currently these dams do not provide for fish passage into the linking watercourses. Based on the current conditions it is considered that the watercourses within the site vary between the defined Class 3 - minimal fish habitat and Class 4 - unlikely fish habitat, in accordance with NSW Fisheries document *Fish Passage Requirements for Waterway Crossings* (Fairfull & Witheridge 2003). The recommended crossings types for these watercourses include culverts, causeways or fords.

One (1) fish species, Marbled Eel, was recorded within one of the northern dams within the site during fauna survey. However, it is considered that the intermittent nature of the watercourses means that they are unlikely to provide significant breeding habitat for fish species. The Bevian wetland within the site may however, provide more significant fish habitat and to a lesser extent the dams within the northern and southern catchments.

The Saltwater Creek ICOLL, which extends from the northern catchment in the subject site, provides an area of significant fish habitat and during open periods will

provide a breeding ground for migratory fish species into the Pacific Ocean. Therefore, fish passage needs to be considered in the design of the proposed structures within watercourses in the northern catchment. *Conacher Travers* recommends the provision of fish passage structures typical of culverts, causeways and fords. The design of these structures is being considered at this stage and conceptual design will be provided in due course.

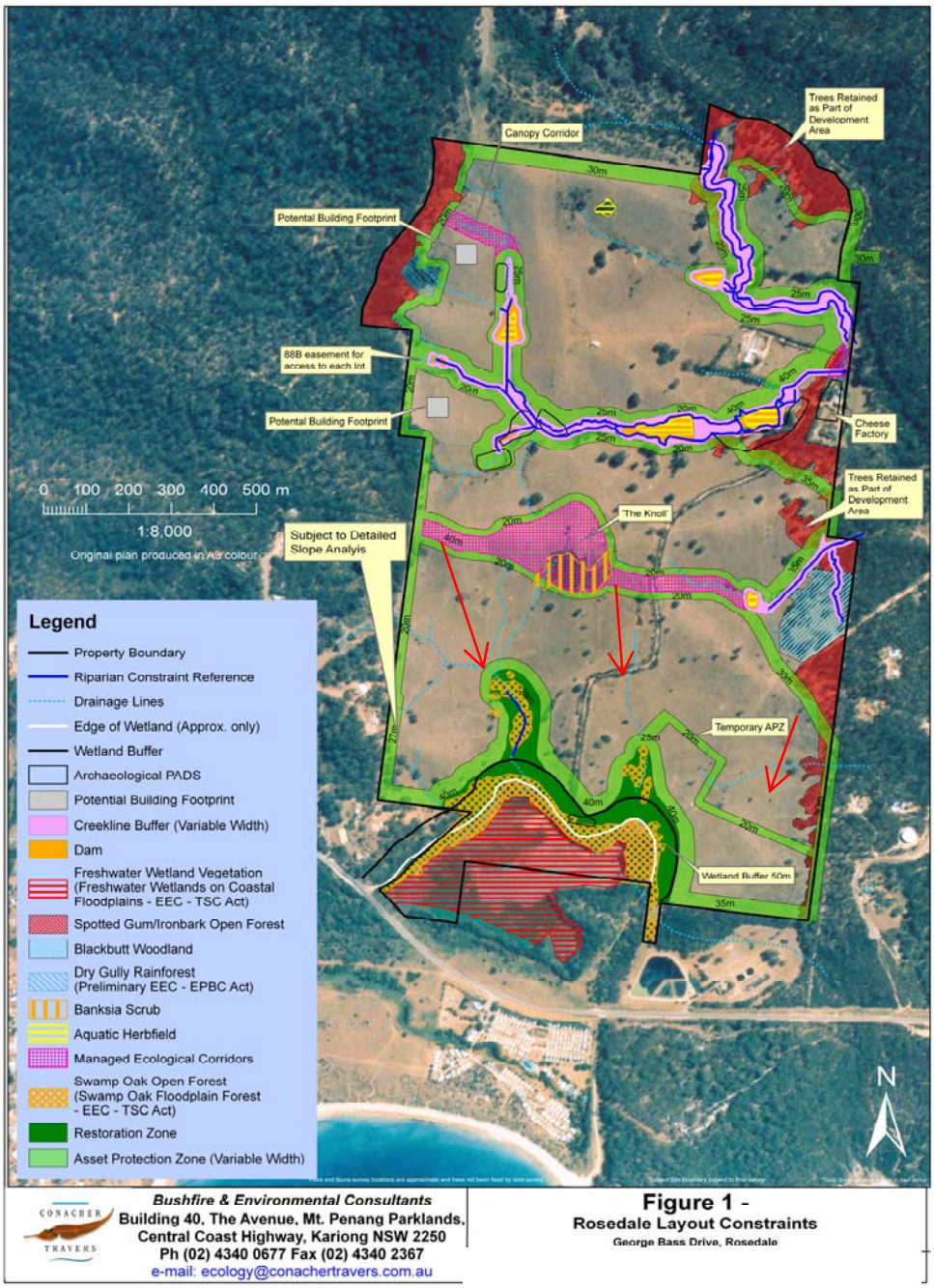

Figure 3: Riparian Constraints – red arrows indicate watercourses considered to be drainage lines only, which will not have Riparian Zones applied. However, runoff from these areas will be managed through best practice stormwater management measures, such as bio-retention strips and detention ponds.

Conclusion

It is considered that the adoption of Water Sensitive Urban Design Principles and the revegetation of riparian zones along significant watercourses will result in improved water quality within the site and maintained water flows across the site. These improvements are likely to result in enhanced vegetation connectivity and consequently fauna movement within the site.

As a result of the significant restoration works within all watercourses, it is expected that the proposed development will significantly improve water quality from the northern and southern catchments and the quality of riparian habitat. Improved fish passage will also result in improved breeding opportunities and more protected watercourses during fish migration events.

The ecological value of Saltwater Creek as an ICOLL will be maintained and the quality of catchment inflows will be significantly improved.

Yours faithfully

John Travers
Director
Conacher Travers

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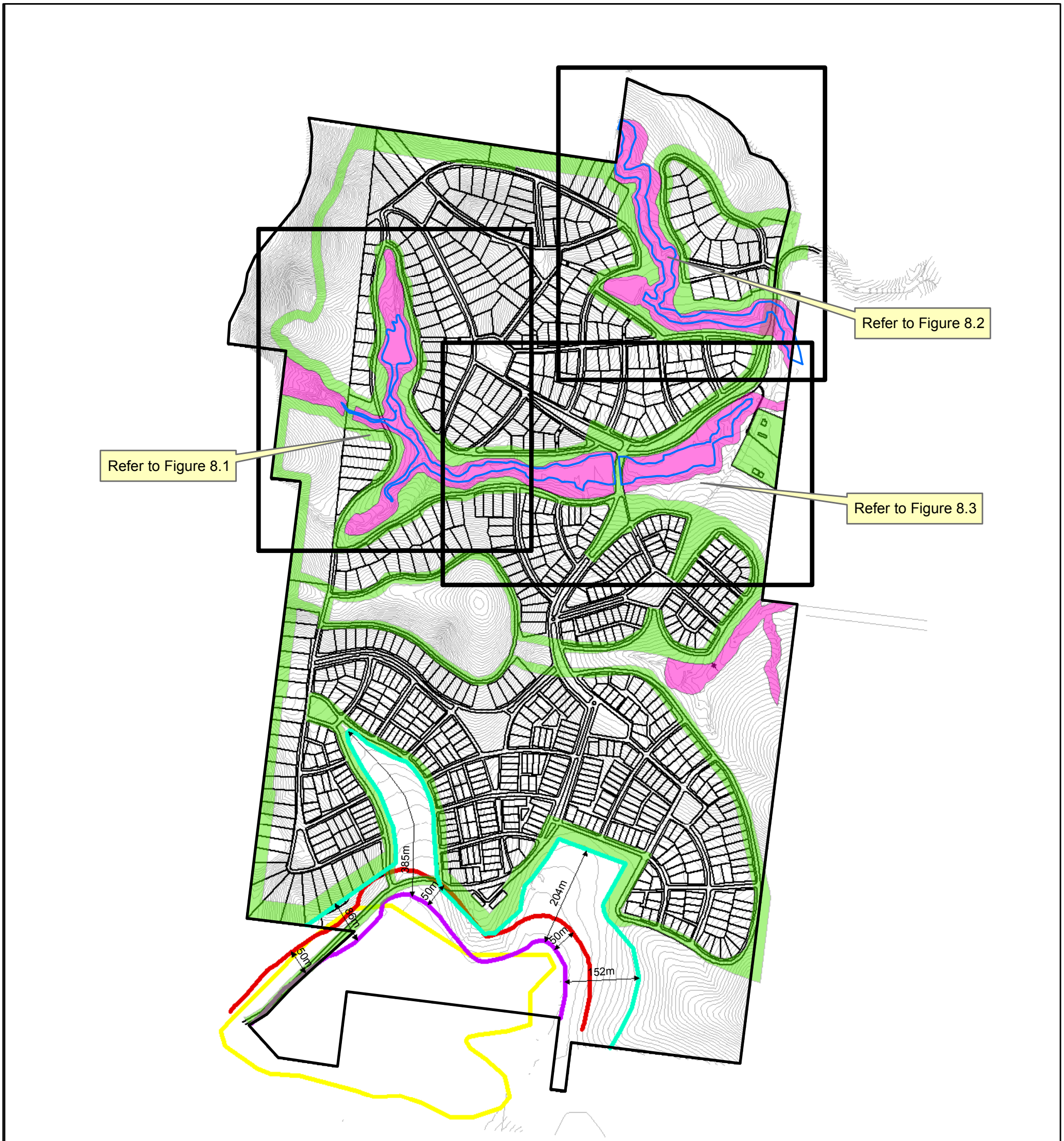

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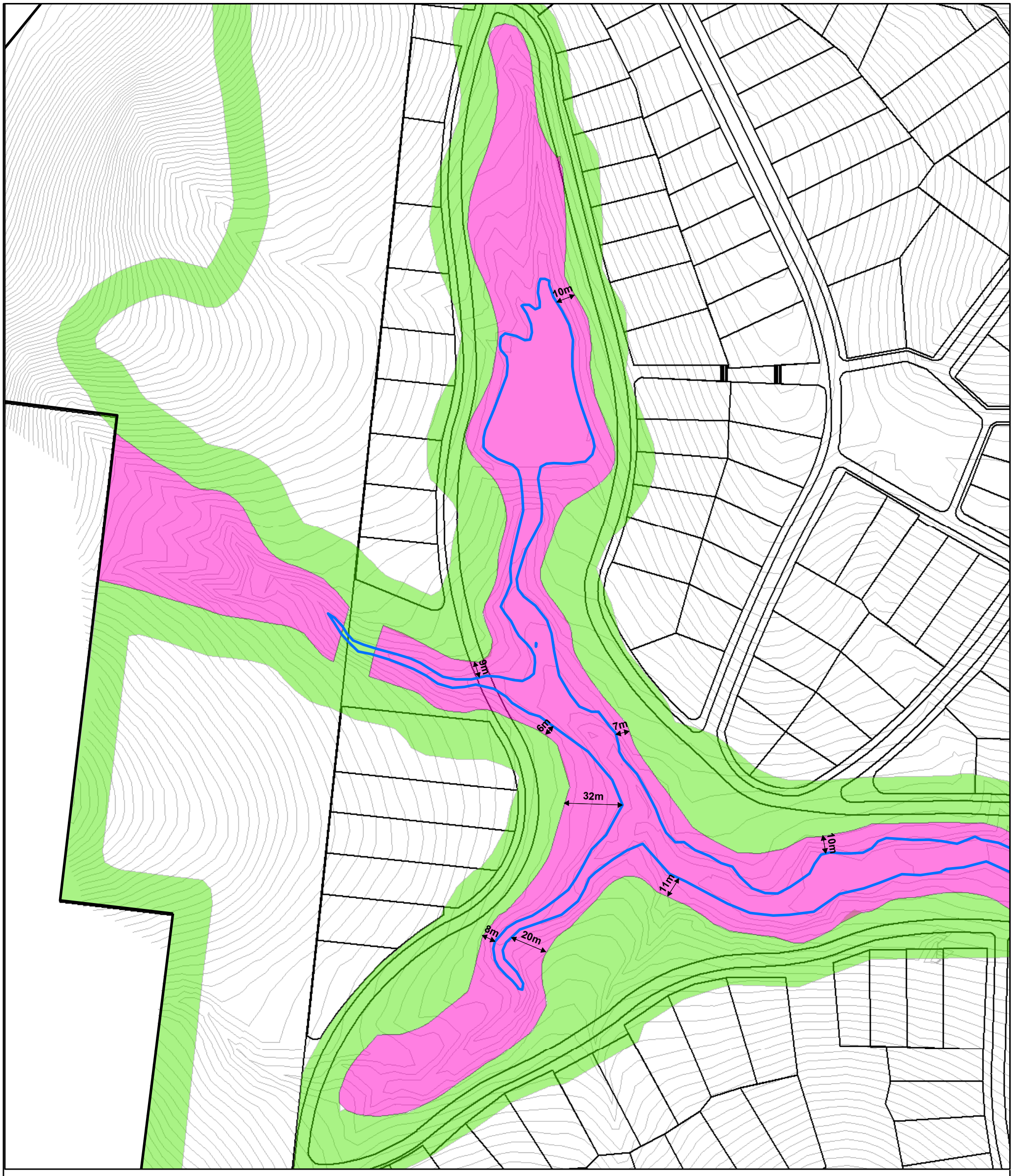
Figure 8 -
Buffer Analysis
Bevian Road, Rosedale

Ver.F8 By.TM/KF
18/10/07
Ref.No.6052

Source: Dept. of Lands 1:25,000 Aerial Photograph,



Legend

- Property Boundary
- Perimeter Asset Protection Zone
- Erosion Gully Bank
- Riparian Zone (Variable Width)

0 20 40 60 80 100 m

1:2,000

Original plan produced in A3 colour

N

*Subject Site boundary subject to final survey

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Figure 8.1 -

Buffer Analysis (Riparian Zone Zoom)

Bevian Road, Rosedale

Ver.F8.1 By.KF
18/10/07
Ref.No.6052

Source: Dept. of Lands 1:25,000 Aerial Photograph,

The entire 'Riparian Zone' is measured between the APZ. 'Core Riparian Zones' form the inner area of the erosion gully banks whilst the 'Riparian Buffer Zone' forms the area from the edge of the erosion gully bank to the APZ.

5m
10m
7m
4m
10m
15m
5m
18m
16m
9m
15m
48m

Legend

- Property Boundary
- Perimeter Asset Protection Zone
- Erosion Gully Bank
- Riparian Zone (Variable Width)

0 20 40 60 80 100 m

1:2,000

Original plan produced in A3 colour

N

*Subject Site boundary subject to final survey

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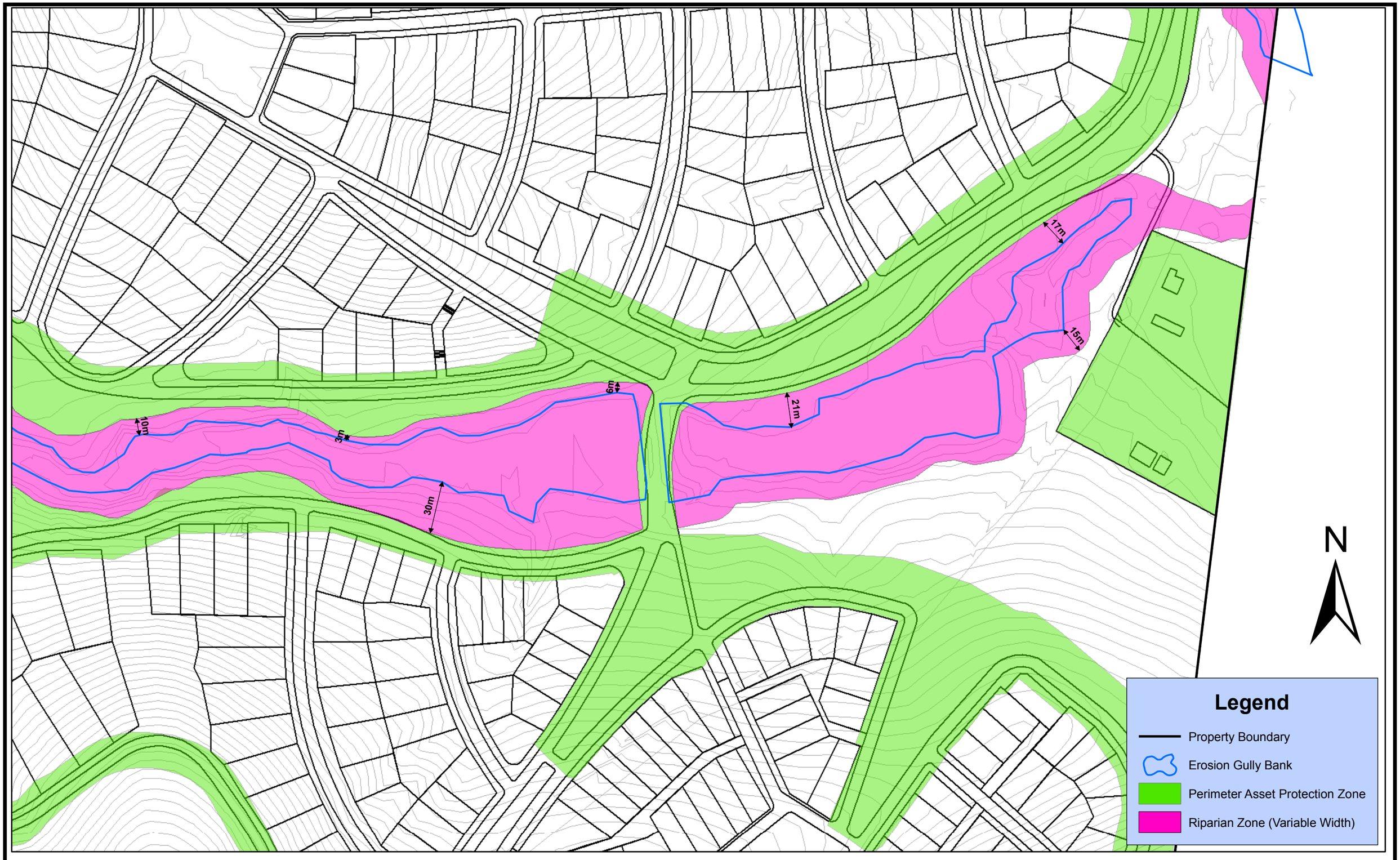
Figure 8.2 -
Buffer Analysis (Riparian Zone Zoom)
Bevian Road, Rosedale

Ver.F8.2 By.KF
18/10/07
Ref.No.6052

Source: Dept. of Lands 1:25,000 Aerial Photograph,



Flora and fauna survey locations are approximate and have not been fixed by land survey.

*Subject Site boundary subject to final survey

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0 20 40 60 80 100 m

1:2,000

Original plan produced in A3 colour

Drawing No.	6052/F8.3	Date
Drawn By	KF	18/10/07
Amendment		Date
A		
B		
C		

Figure 8.3 -
Buffer Analysis (Riparian Zone Zoom)

Bevian Road, Rosedale

Source: DLWC 1:25,000 Aerial Photograph.