

Attachment 10

Stream Classification, prepared by WorleyParsons, August 2009



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DIVERSE PROPERTY SOLUTIONS

JACARANDA PONDS

STREAM CLASSIFICATION



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21st August 2009

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DIVERSE PROPERTY SOLUTIONS

JACARANDA PONDS STREAM CLASSIFICATION

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Project: 301015-01761 JACARANDA PONDS STREAM CLASSIFICATION

REV	DESCRIPTION	AUTHOR	REVIEWER	WORLEY- PARSONS APPROVAL	DATE	CLIENT APPROVAL	DATE
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DIVERSE PROPERTY SOLUTIONS

JACARANDA PONDS STREAM CLASSIFICATION

CONTENTS

EXECUTIVE SUMMARY

1. INTRODUCTION.....	1
2. BACKGROUND.....	2
3. EXISTING CLASSIFICATION OF WATERCOURSES WITHIN THE SITE	3
4. STREAM GROUND TRUTHING	4
5. RECOMMENDATIONS.....	5
5.1 WATERCOURSE 1	5
5.2 WATERCOURSE 2	6
5.3 WATERCOURSE 3 AND DAM 3.....	8
5.3.1 Watercourse 3.....	8
5.3.2 Dam 3.....	8
5.4 DAMS 1, 2 AND 4 TO 8	10
5.5 INSPECTION OF ADDITIONAL SITES.....	12
6. RECOMMENDED STREAM CLASSIFICATIONS	15
7. REFERENCES	16

APPENDIX A – 1:25,000 SCALE TOPOGRAPHIC MAP FOR WILBERFORCE (9030-1N)



DIVERSE PROPERTY SOLUTIONS

JACARANDA PONDS STREAM CLASSIFICATION

EXECUTIVE SUMMARY

Detailed ground truthing was undertaken to establish whether the streams shown on existing classification mapping developed by the Department of Water & Energy (DWE) actually exist within the Jacaranda Ponds site. The ground truthing involved an assessment of the mapped stream corridors against “on-ground” environmental criteria that have been developed based on the method of classifying watercourses adopted by DWE.

The results of this investigation have been used to recommend modifications to the stream classifications shown on the existing mapping. A summary of the recommended modifications is presented in **Figure 5** as the proposed stream classification mapping for the Jacaranda Ponds site.

It is recommended that Currency Creek (*Watercourse 1*) retain its Category 1 classification. According to DWE guidelines, a minimum Core Riparian Zone (CRZ) width of 40 metres plus a Vegetated Buffer (VB) width of 10 metres will need to be provided along both sides of the watercourse (*measured from the top-of-bank*). Accordingly, a total riparian setback of 50 metres will be required along the north side of the creek.

Furthermore, it is recommended that the sections of Watercourses 2 and 3 that are located within the north-western corner of the site be removed from the existing classification mapping.

It is also recommended that the identified farm dams could be removed as part of any future development of the site. However, it should be noted that alternative measures may be required to allow drainage and detention of stormwater runoff from the site. It is also understood that there would be no riparian setback requirement around any farm dams, should they be retained.



DIVERSE PROPERTY SOLUTIONS

JACARANDA PONDS STREAM CLASSIFICATION

1. INTRODUCTION

The Jacaranda Ponds site is a 179 hectare site located immediately south of the township of Glossodia, as marked by the yellow boundary in **Figure 1**. The site is currently occupied by a chicken farm and egg processing plant. However, there is potential to subdivide the site in the future, to accommodate the future growth of Glossodia.

A preliminary review of environmental constraints has been recently completed for the site. This has identified that additional work is required to determine the constraints associated with the existing watercourses within the site.

According to GIS mapping provided by the NSW Department of Water & Energy (*DWE*), there are several streams that traverse the site (*refer Figure 1*). These streams are classified according to DWE's existing classification system, which relates to the provision of measures to protect and preserve valuable riparian vegetation and habitat.

However, it is understood that the existing stream classification mapping has been developed via a desktop style analysis using 1:25,000 scale topographic maps and therefore, may not truly reflect the "on-ground" conditions across the site. This suggestion has been made based on previous site observations and through comparison of existing stream classification mapping with recent aerial photography.

Accordingly, WorleyParsons was engaged to prepare a stream classification report for the Jacaranda Ponds site, the basis of which would be a detailed ground truthing investigation of the DWE classified streams within the site. The investigation was to consider the appropriateness of the DWE classification and make recommendations for changes where required.

This report documents the outcomes from the investigation and provides the basis for the stream classification changes that are recommended.



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JACARANDA PONDS STREAM CLASSIFICATION

2. BACKGROUND

The classification of a watercourse indicates its environmental value and can determine the required core riparian zone and vegetated buffer width that is to be preserved and protected.

It is understood that the classification system employed by DWE for the Glossodia area is the same as that adopted in the report titled, '*Riparian Corridor Management Study; Covering all of the Wollongong Local Government Area and Calderwood Valley (DIPNR, 2004)*'.

The DWE classification system is summarised in **Table 1**. The recommendations in this report are based on these classifications.

Table 1 **STREAM CLASSIFICATION**

CATEGORY	CLASSIFICATION AND OBJECTIVES
1	Environmental Corridor Maximise the protection of terrestrial and aquatic habitat to: ▪ provide a continuous corridor width for the movement of flora and fauna; ▪ provide extensive habitat (<i>and connectivity between habitat nodes</i>) for terrestrial and aquatic fauna; ▪ Maintain the viability of native riparian vegetation; ▪ Manage edge effects at the riparian/urban interface; ▪ Provide bank stability; ▪ Protect water quality.
2	Terrestrial and Aquatic Habitat Maintain or restore the natural functions of a stream and its aquatic and terrestrial values to: ▪ Maintain the viability of native riparian vegetation; ▪ Provide suitable habitat for terrestrial and aquatic fauna; ▪ Provide bank stability; ▪ Protect water quality.
3	Bank Stability and Water Quality Maintain or restore as much as possible the natural functions of a stream to: ▪ Provide bank stability; ▪ Protect water quality; ▪ Protect native vegetation.

Source: *Riparian Corridor Management Study (DIPNR, 2004)*



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JACARANDA PONDS STREAM CLASSIFICATION

3. EXISTING CLASSIFICATION OF WATERCOURSES WITHIN THE SITE

The Department of Water & Energy (DWE) has identified three main watercourses within the site. These are numbered and shown in **Figure 1**, as per the GIS mapping colour scheme adopted by DWE.

Currency Creek has been labelled for this investigation as Watercourse 1 (W1), which flows along the southern boundary of the site in an easterly direction (*refer Figure 1*). Watercourse 2 (W2) refers to the streamline in the north-western corner of the site that is shown to flow in a north-westerly direction. Watercourse 3 (W3) refers to the streamline and associated Dam 3 (D3) located to the east of W2. All three waterways have been classified as Category 1 watercourses according to the existing DWE mapping.

In addition to these watercourses, several farm dams have been identified at the site and are currently classified as Category 3 watercourses (*refer Figure 1*).

Through comparison with topographic maps for the area, it is evident that the existing classification of watercourses by DWE is primarily based on interpretation of streamlines shown on the 1:25,000 scale topographic map for Wilberforce (*refer Appendix A*). While this level of analysis can provide a basic idea of the watercourses and their likely classification, ground truthing investigations are required to verify the classifications and also identify any additional watercourses that may have been overlooked in the assessment.

Accordingly, it was confirmed that ground truthing was to be undertaken to verify the presence of streams and confirm the classification of the watercourses within the site. The details of these investigations are documented in the following.



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JACARANDA PONDS STREAM CLASSIFICATION

4. STREAM GROUND TRUTHING

A detailed site inspection was undertaken on 23rd July 2009 to ground truth and assess the watercourses identified by DWE (*refer Figure 1*). The inspections targeted the assessment of a variety of “on-ground” criteria, relating to both the physical presence of the watercourses and their capacity to meet the environmental objectives outlined in **Table 1**.

The following features were assessed along each water course:

- the presence of a defined channel (*either intermittent or continuous*) along the alignment of the watercourse;
- the extent of riparian vegetation, specifically:
 - the presence of vegetation with environmental value, such as native species
 - the presence of noxious weeds and degree of weed infestation
- the presence of any ponded water;
- the presence of flow along the stream and the associated flow velocity;
- the presence of any aquatic or terrestrial fauna; and,
- the potential connectivity between any riparian vegetation and upstream or downstream riparian corridors.

Based on the observations made during site investigations and through comparison with the criteria outlined in **Table 1**, several recommendations have been made regarding the classification of streams within the site. These are documented in the following sections.



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JACARANDA PONDS STREAM CLASSIFICATION

5. RECOMMENDATIONS

5.1 WATERCOURSE 1

The alignment of Watercourse 1 (*W1*) and the existing classification by DWE is shown in **Figure 2**. It is recommended that the Category 1 classification be retained for the length of the watercourse that passes along the southern boundary of the site.

This recommendation is based on the following observations:

- the watercourse has significant environmental value;
- main creek channel is continuously flowing (*refer Plate 1*);
- it provides habitat for riparian fauna (*refer Plate 2*);
- it provides a riparian corridor;
- the creek holds (*limited*) aquatic fauna.

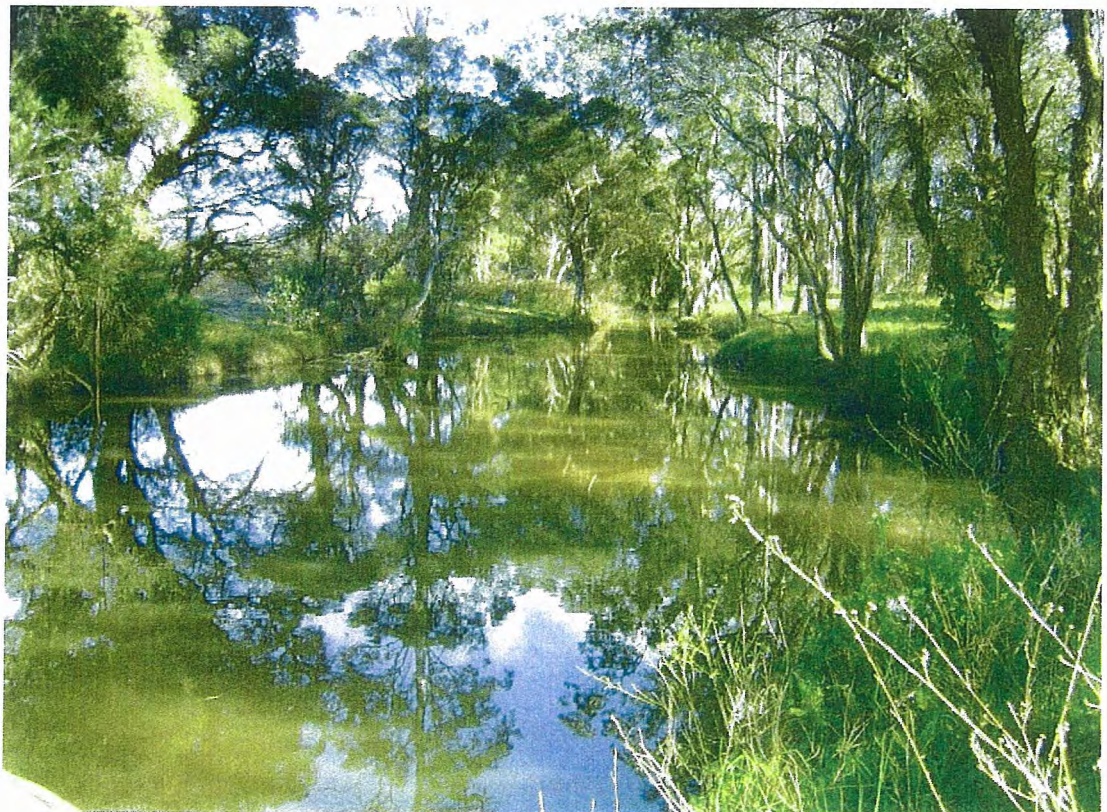


Plate 1: View looking upstream along Currency Creek near south-western site boundary



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JACARANDA PONDS STREAM CLASSIFICATION



Plate 2: View looking upstream along Currency Creek towards western site boundary

5.2 WATERCOURSE 2

The alignment of Watercourse 2 (W2) and the existing classification by DWE is shown in **Figure 3**. It is recommended that the Category 1 classification be removed for the 120 metre length of the watercourse identified within the site boundary. In other words, it is recommended that this section of W2 be removed from the existing mapping of classified watercourses.

This recommendation is based on the following observations:

- no defined channel (*refer Plate 3*);
- no overland flow, dry gully (*refer Plate 4*);
- no significant riparian vegetation;
- no vegetation connectivity upstream from gully (*refer Figure 3*);

It should be noted that this recommendation applies only to the length of Watercourse 2 that lies within the Jacaranda Ponds site (*refer Figure 3*). It is also noted that a designated flow path will need to be retained along the gully to allow drainage of stormwater collected within this section of the site.



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JACARANDA PONDS STREAM CLASSIFICATION



Plate 3: View looking upstream along Watercourse 2 from western site boundary



Plate 4: View looking upstream along Watercourse 2 towards farm sheds



DIVERSE PROPERTY SOLUTIONS

JACARANDA PONDS STREAM CLASSIFICATION

5.3 WATERCOURSE 3 AND DAM 3

The alignment of Watercourse 3 (W3) and its existing classification by DWE is shown in **Figure 3**. As shown, Dam 3 (D3) is located midway along the section of W3 that lies within the site.

5.3.1 Watercourse 3

It is recommended that the Category 1 classification be removed for the entire length of W3 within the site boundary. In other words, it is recommended that these sections of W3 be removed from the existing mapping of classified watercourses.

This recommendation is based on the following observations:

- there is no defined channel for the first 20 metres north of Dam 3 (*refer Plate 5*). There is no significant vegetation other than pasture grass at this location;
- there is no defined channel upstream from Dam 3 (*refer Plate 6*);
- no overland flow, dry gully (*refer Plate 6*); and,
- lack of vegetation connectivity downstream from Dam 3 or upstream from gully (*refer Figure 3*).

It should be noted that this recommendation applies only to the length of Watercourse 3 that lies within the Jacaranda Ponds site (*refer Figure 3*).

Similar to the gully at W2, a designated flow path will need to be retained along the gully to allow drainage of stormwater collected within this section of the site.

5.3.2 Dam 3

It is recommended that the Category 1 classification for Dam 3 be changed to a Category 3, based on the following observations:

- the dam itself provides limited habitat for birds and amphibians (*refer Plate 7*), however;
- there is no defined channel upstream or downstream from the dam (*refer Plates 5 and 6*) and therefore, the dam does not lie on a watercourse; and,
- there is no vegetation connectivity downstream from the dam.



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JACARANDA PONDS STREAM CLASSIFICATION



Plate 5: View looking upstream along Watercourse 3 from northern site boundary



Plate 6: View looking downstream along Watercourse 3 towards Dam 3



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JACARANDA PONDS STREAM CLASSIFICATION



Plate 7: View looking south from northern side of Dam 3

5.4 DAMS 1, 2 AND 4 TO 8

The location of Dams 1, 2 and 4 to 8 and their existing classifications by DWE are shown in **Figure 1**. It is recommended that the Category 3 classification be retained for each dam.

However, it should be noted that DWE have indicated that there is no riparian setback requirement around any of the identified dams that do not lie on a watercourse. This effectively applies to all of the observed dams at the site.

Furthermore, it is evident that all of the dams are man-made and have been constructed as part of past farming activities at the site (*refer Plate 8 for an example*). Accordingly, it is recommended that the dams could be removed as part of any future development of the site, if required.

It is understood that the potential for these dams to provide habitat for wildlife will be explored during the completion of a separate ecological assessment for the site.



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JACARANDA PONDS STREAM CLASSIFICATION



Plate 8: View looking at Dam 5 from the north-west



Plate 9: View looking east across Dam 8



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JACARANDA PONDS STREAM CLASSIFICATION

5.5 INSPECTION OF ADDITIONAL SITES

Available ground surface contours for the site were interrogated to determine locations where additional watercourses may be present, and had not been previously identified by DWE in their existing classification mapping.

The alignments of these “potential” watercourses are shown as the orange line-work in **Figure 4**. These locations were inspected as part of site investigations and it was determined that all could be effectively defined as dry gullies with no riparian vegetation. **Plates 10** through **13** confirm that a majority of the site is pasture land and therefore, has little environmental value.

Accordingly, it is not recommended that any of the additional sites that were inspected be incorporated into the stream classification mapping for the site.



Plate 10: View looking north-west upstream along gully above Dam 6



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Plate 11: View looking south-east downstream along gully towards Dam 6



Plate 12: View looking south-west from western edge of Dam 8



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Plate 13: View looking south from ridge line north of Dams 5 and 6



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JACARANDA PONDS STREAM CLASSIFICATION

6. RECOMMENDED STREAM CLASSIFICATIONS

As discussed above, detailed ground truthing was undertaken to establish whether the classified streams shown on the DWE mapping actually exist within the Jacaranda Ponds site. The ground truthing involved an assessment of the mapped stream corridors against “on-ground” environmental criteria that have been developed based on the method of classifying watercourses adopted by DWE.

The results of this investigation have been used to recommend modifications to the stream classifications shown on the DWE mapping. A summary of the recommended modifications is presented in **Figure 5** as the proposed stream classification mapping for the Jacaranda Ponds site.

It is recommended that Currency Creek (*Watercourse 1*) retain its Category 1 classification. According to DWE guidelines, a minimum Core Riparian Zone (CRZ) width of 40 metres plus a Vegetated Buffer (VB) width of 10 metres will need to be provided along both sides of the watercourse (*measured from the top-of-bank*). Accordingly, a total riparian setback of 50 metres will be required along the north side of the creek.

It is noted that the alignment of the creek shown in DWE mapping may not reflect the actual on-ground alignment of the watercourse. Therefore, it is recommended that the alignment of the top-of-bank on the northern side of the creek be surveyed as part of any future work to map the limit of the riparian setback within the site.

Furthermore, it is recommended that the sections of Watercourses 2 and 3 that are located within the north-western corner of the site be removed from the existing classification mapping.

It is also recommended that the identified farm dams could be removed as part of any future development of the site. However, it should be noted that alternative measures may be required to allow drainage and detention of stormwater runoff from the site. It is also understood that there would be no riparian setback requirement around any farm dams, should they be retained.



DIVERSE PROPERTY SOLUTIONS

JACARANDA PONDS STREAM CLASSIFICATION

7. REFERENCES

- Department of Infrastructure, Planning and Natural Resources (2004), 'Riparian Corridor Management Study; Covering all of the Wollongong Local Government Area and Calderwood Valley', prepared for Wollongong City Council.



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JACARANDA PONDS STREAM CLASSIFICATION

Appendix A - 1:25,000 SCALE TOPOGRAPHIC MAP FOR WILBERFORCE (9030-1N)

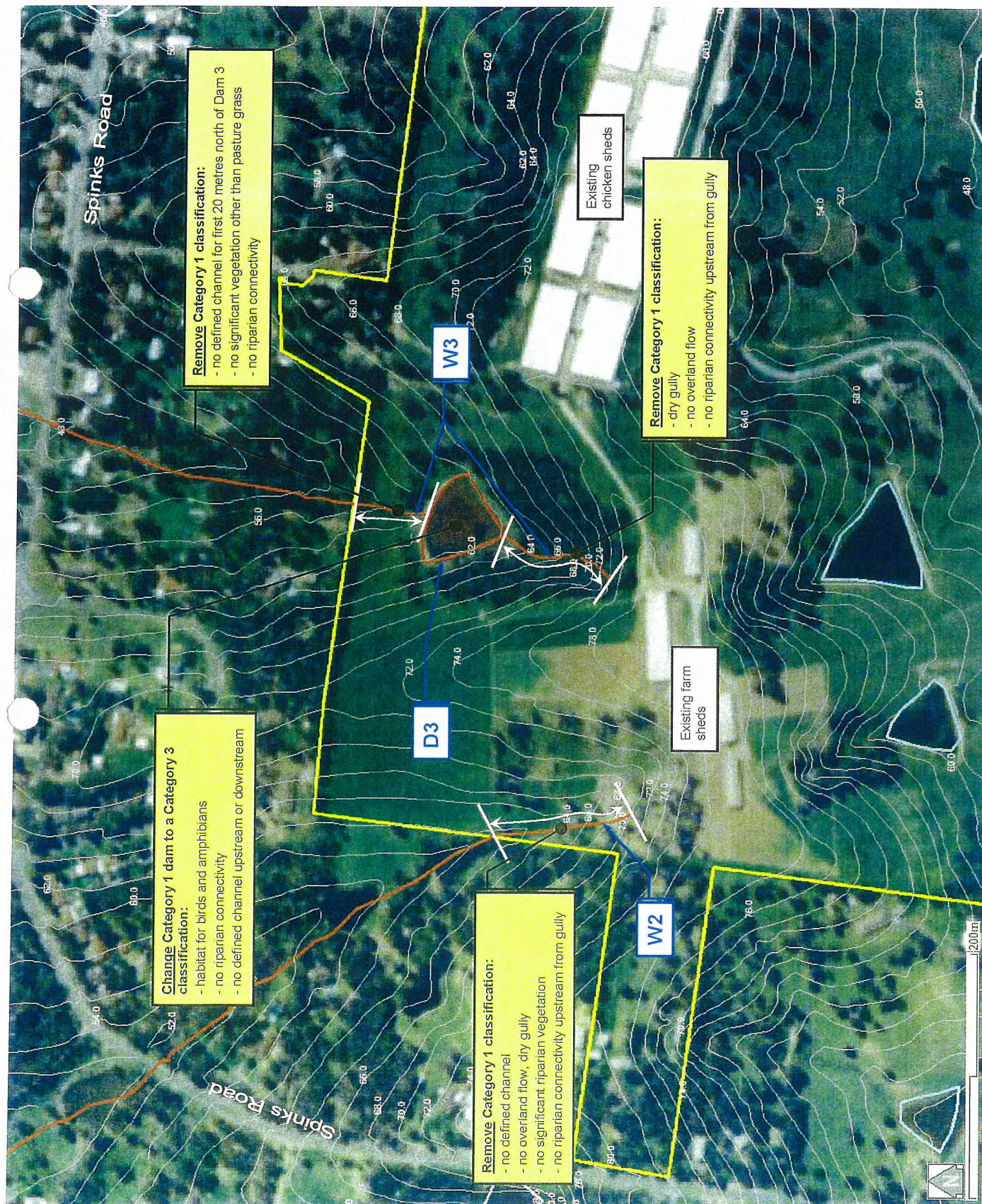
FIGURE 1



FIGURE 2



FIGURE 3



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FIGURE 4



LEGEND



Site Boundary

Additional sites identified and inspected for potential watercourses

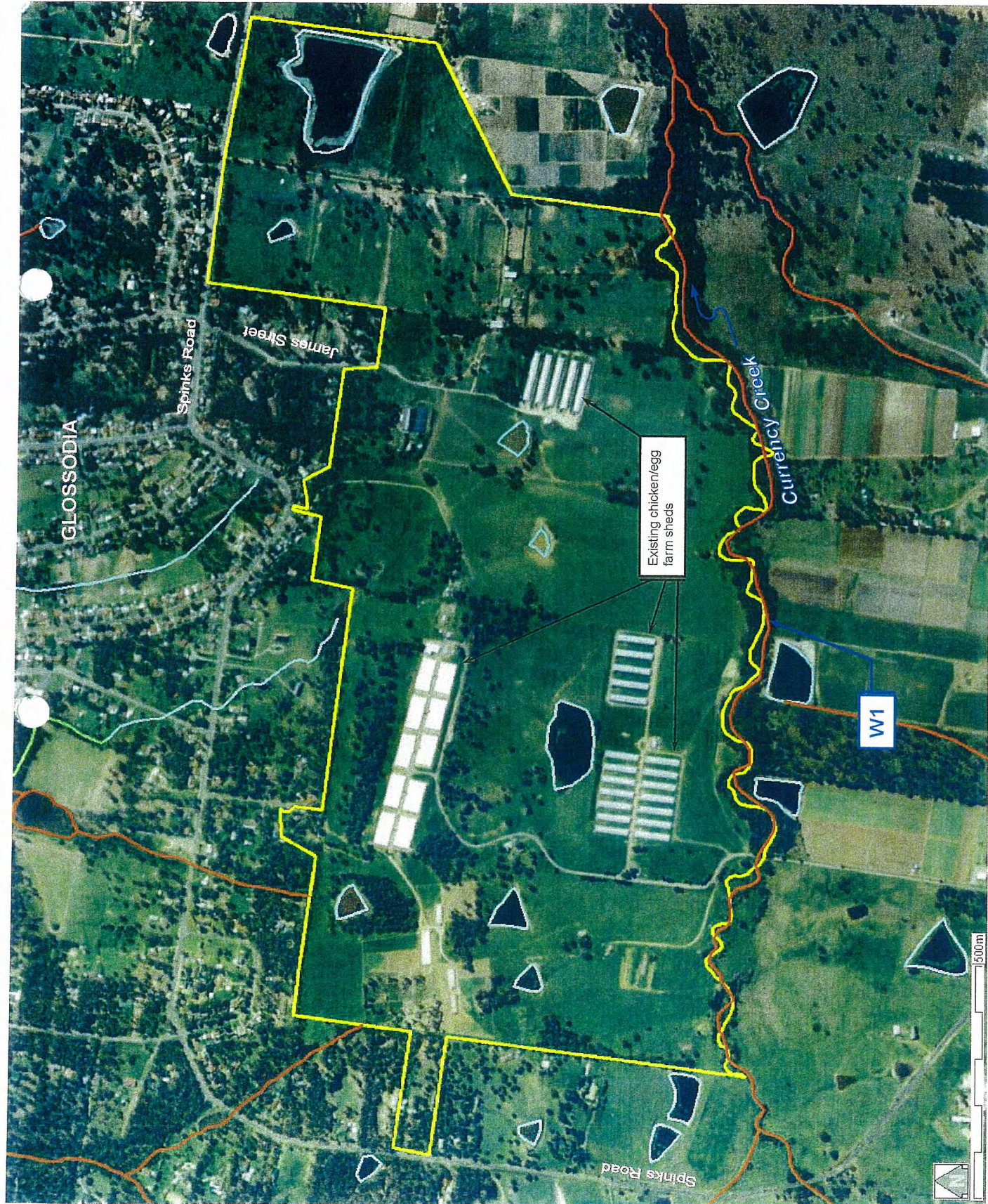
Existing Stream Classification (DWE):

Category 1 watercourse

Category 2 watercourse

Category 3 watercourse

FIGURE 5



LEGEND



Site boundary



Watercourse Identifier

Recommended Stream Classification:

Category 1 watercourse

Category 2 watercourse

Category 3 watercourse / existing farm dam