Table 6-34. Red Bank Creek 15. Landform and site details.

Site name	Landform unit	Distance to water	Number of recorded artefacts	Artefact density	Probability of associated subsurface deposits
Red Bank Creek 15	Flat drainage	<10m	5	Very low	Low

Figure 6-117. Red Bank Creek 15. Location of site and recorded artefacts.

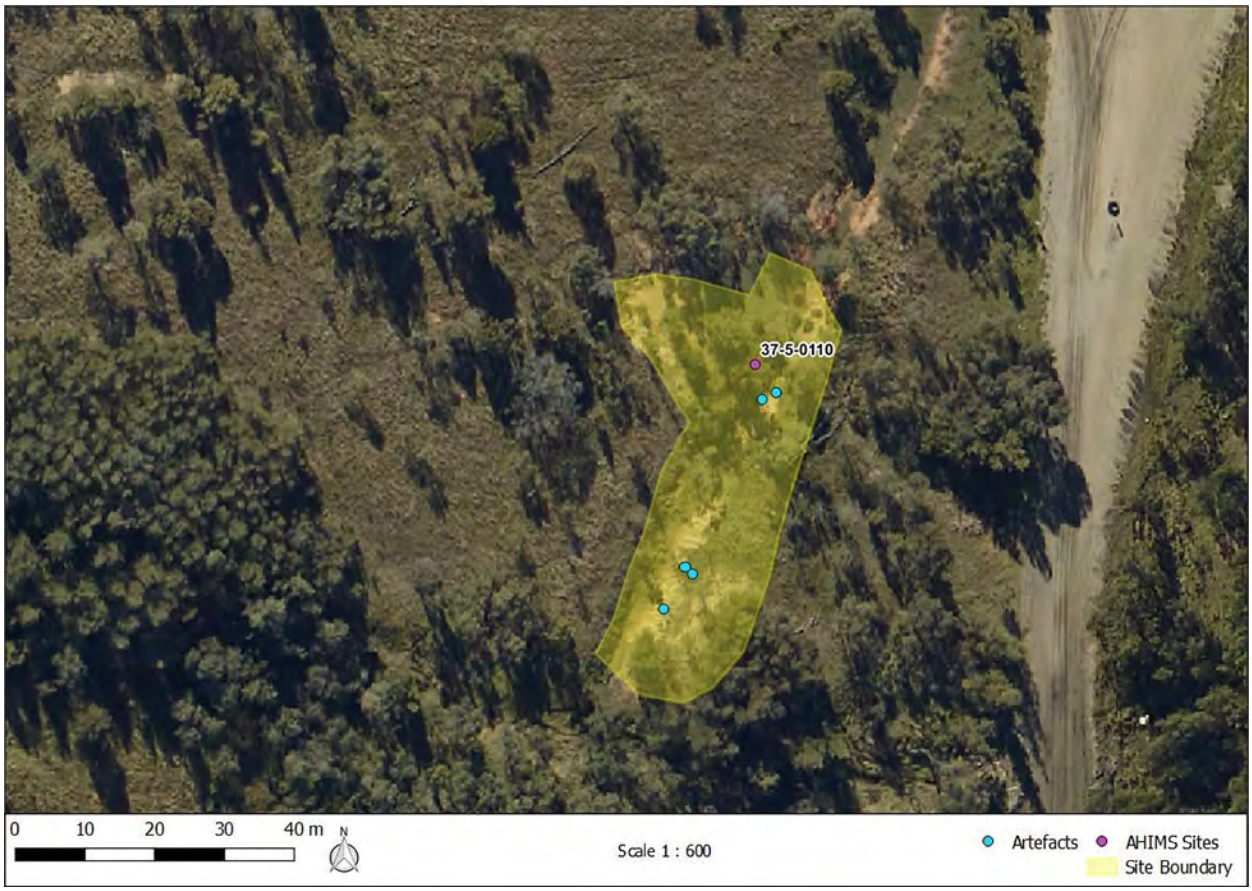


Figure 6-118. Red Bank Creek 15. View of site.

1. RED BANK CREEK 15 CONSISTS OF FIVE ARTEFACTS RECORDED ALONG AN ARTIFICIAL DRAINAGE CHANNEL ON THE NORTH BANK OF REDBANK CREEK.

Figure 6-119. Red Bank Creek 15. Selection of artefacts.

	
1. RED BANK CREEK 15. 311695E, 6396710N (GDA ZONE 56). RANGE OF MUDSTONE FLAKES.	2. RED BANK CREEK 15. 311706E 6396734N (GDA ZONE 56). RANGE OF MUDSTONE FLAKES.

Red Bank Creek 8 (#37-5-0115)

Centre GPS Coordinates: 312119E, 6396619N (GDA 94 Zone 56).

Previously recorded AHIMS Red Bank Creek 8 (#37-5-0115) was originally recorded in 1983 by Koettig and Hughes as an artefact scatter consisting of three artefacts including a chert core with the site measuring approximately 5m by 5m. At the time of recording, the site was described as being located within an exposure adjacent to Redbank Creek with thick grass cover present beyond the exposure. During the 2015 survey over 80 artefacts were recorded within the vicinity of site Red Bank Creek 8. The site boundary of Red Bank Creek 8 was extended by OzArk with Red Bank Creek 8 to also encompass AHIMS sites #37-5-0512 (United Collieries 13) and #37-5-0023 (Warkworth Agip 8). Artefacts were recorded within a number of large exposures and the site is continually impacted by gully and in-stream erosion. It has also been extensively impacted by the construction of Dam 2. The site has also been impacted by the construction of an electricity easement which runs north-south through the site. The new site boundary extends 200m (northwest-southeast) and 70m (southwest-northeast) covering 0.7ha (**Table 6–35** and **Figures 6–120**, **6–121** and **6–122**).

Table 6-35. Red Bank Creek 8. Landform and site details.

Site name	Landform unit	Distance to water	Number of recorded artefacts	Artefact density	Probability of associated subsurface deposits
Red Bank Creek 8	Flat/ drainage	0m	80+	Low-moderate	Low-moderate

Figure 6-120. Red Bank Creek 8. Location of site and recorded artefacts.

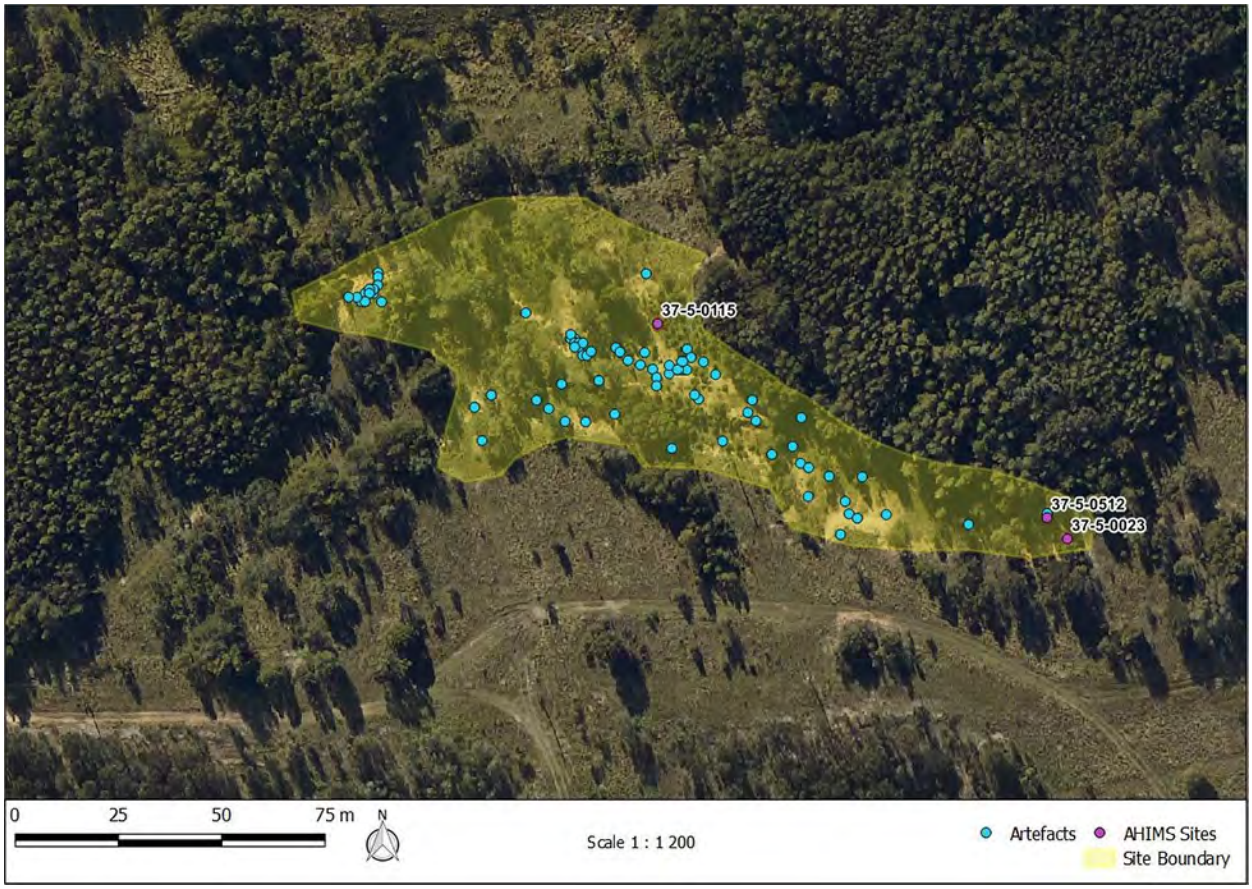


Figure 6-121. Red Bank Creek 8. View of site.

	
1. Red Bank Creek 8 consists of over 100 artefacts recorded within large areas of exposure. An electricity easement runs through the centre of the site.	2. Area with A horizon soils in the north of Red Bank Creek 8, south of Redbank Creek.

Figure 6-122. Red Bank Creek 8. Selection of artefacts.

	
1. RED BANK CREEK 8. 312082E, 6396625N (GDA ZONE 56). A REDUCED, MULTIDIRECTIONAL MUDSTONE CORE WITH MORE THAN 10 FLAKE SCARS.	2. RED BANK CREEK 8. 312034E 6396646N (GDA ZONE 56). RANGE OF MUDSTONE FLAKES.
	
3. RED BANK CREEK 8. 312095E, 6396634N (GDA ZONE 56). A REDUCED, MULTIDIRECTIONAL SILCRETE CORE.	4. RED BANK CREEK 8. 312110E, 6396629N (GDA ZONE 56). RANGE OF MUDSTONE AND SILCRETE FLAKES.

Red Bank Creek 5 (#37-5-0116)

Centre GPS Coordinates: 311209E, 6396747N (GDA 94 Zone 56).

Previously recorded AHIMS site Red Bank Creek 5 (#37-5-0116) was originally recorded in 1983 by Koettig and Hughes as a large artefact scatter consisting of a number of knapping floors adjacent to Redbank Creek. At the time of recording, the site was described as being located on a terrace overlooking Redbank Creek between Redbank Creek to the north and hillslopes to the south with the artefacts exposed due to extensive erosion. The site was partially salvaged in 1983 with nearly 3,000 artefacts being recovered from surface collection and subsurface investigations. During the 2015 survey over 50 artefacts were recorded within the vicinity of Red Bank Creek 5. The site is concentrated within exposures with the artefacts being impacted by gully and in-stream

erosion. The new site boundary extends 150m (east-west) and 80m (north-south) covering 1.1ha (**Table 6–36** and **Figures 6–123**, **6–124** and **6–125**).

Table 6-36. Red Bank Creek 5. Landform and site details.

Site name	Landform unit	Distance to water	Number of recorded artefacts	Artefact density	Probability of associated subsurface deposits
Red Bank Creek 5	Flat drainage	10m	50+	Moderate	High

Figure 6-123. Red Bank Creek 5. Location of site and recorded artefacts.

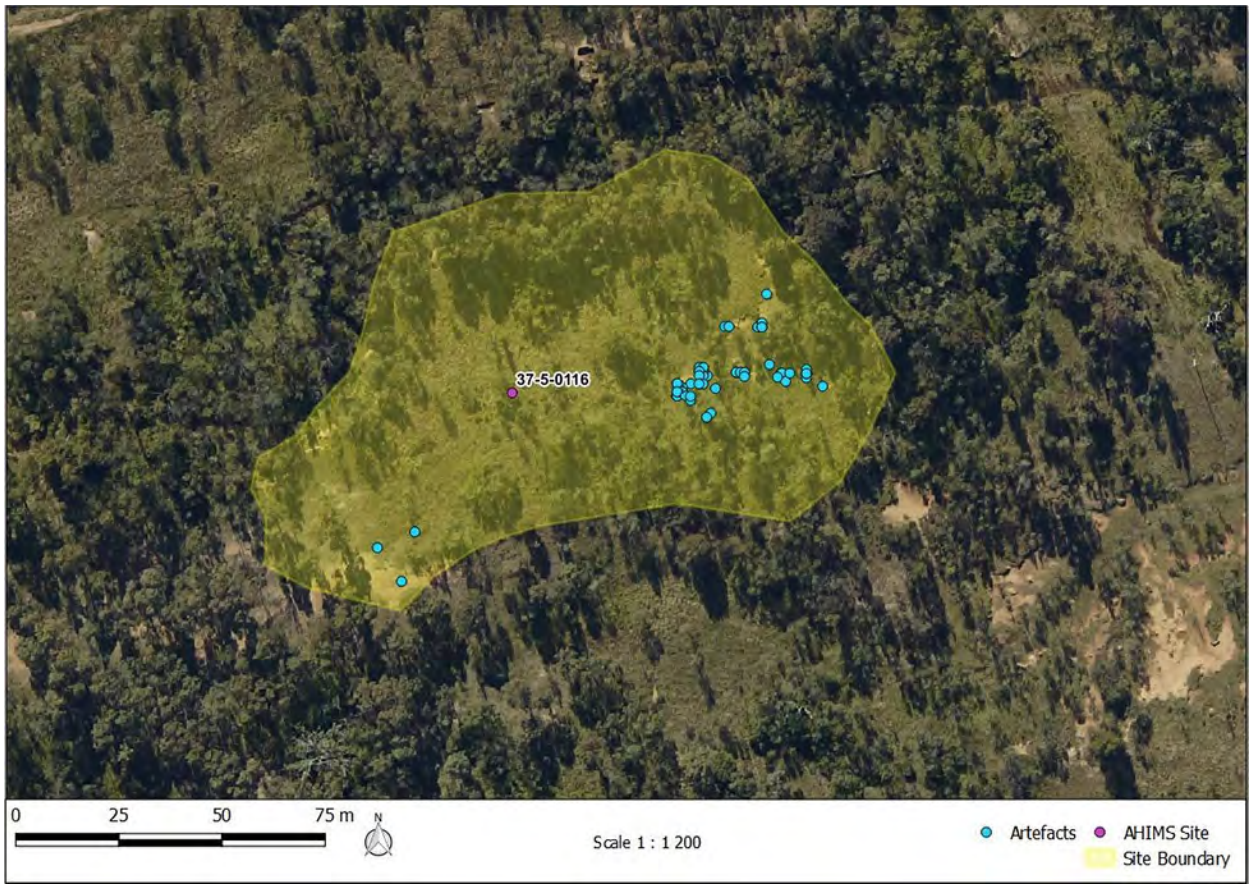
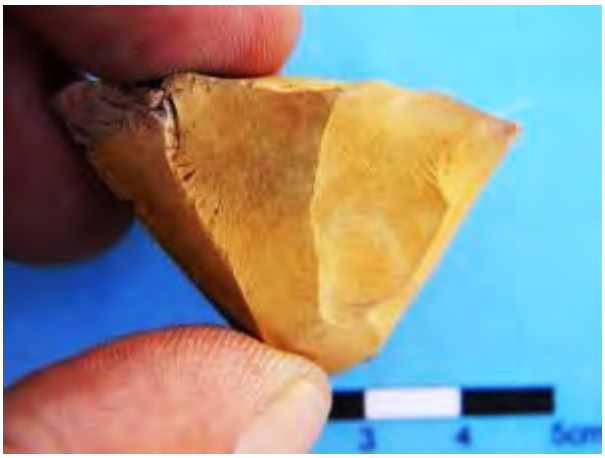


Figure 6-124. Red Bank Creek 5. View of site.

1. RED BANK CREEK 5 CONSISTS OF OVER FIFTY ARTEFACTS RECORDED WITHIN LARGE AREAS OF EXPOSURE.

Figure 6-125. Red Bank Creek 5. Selection of artefacts.

	
1. RED BANK CREEK 5. 311245E, 6396741N (GDA ZONE 56). RANGE OF SILCRETE AND MUDSTONE ARTEFACTS.	2. RED BANK CREEK 5. 311179E 6396694N (GDA ZONE 56). A UNIDIRECTIONAL MUDSTONE CORE. SIZE 50MM.

Wambo 202 (#37-5-0343)

Centre GPS Coordinates: 308850E, 6397962N (GDA 94 Zone 56).

Previously recorded AHIMS site Wambo 202 (#37-5-0343) was originally recorded in 2002 by Elizabeth White as an isolated artefact visible within an exposure afforded by an access track and a Telstra trench. At the time of recording, the site was described as being located within an area that had been heavily disturbed by the construction of the Golden Highway, the installation of underground cables and erosion. During the 2015 two artefacts were visible within an eroding gully within the vicinity of Wambo 202. The new site boundary based on the results of the recent survey extends 30m (north-south) by 30m (east-west) covering 0.09ha (**Table 6–37** and **Figures 6–126**, **6–127** and **6–128**). The majority of this site, including the two recorded artefacts, is outside of the Project Disturbance Area.

Table 6-37. Wambo 202. Landform and site details.

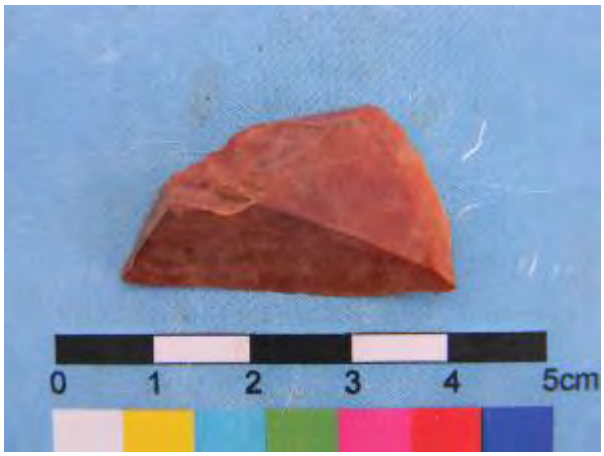
Site name	Landform unit	Distance to water	Number of recorded artefacts	Artefact density	Probability of associated subsurface deposits
Wambo 202	Lower-slope	0m	2	Very low	Low

Figure 6-126. Wambo 202. Location of site in relation to the Project Disturbance Boundary.

Figure 6-127. Wambo 202. View of site.

	1. WAMBO 202 CONSISTS OF TWO ARTEFACTS RECORDED ON THE EDGE OF A GULLY IN SMALL EXPOSURES.

Figure 6-128. Wambo 202. Selection of artefacts.

	
1. WAMBO 202. 308851E, 6397975N (GDA ZONE 56). A MUDSTONE FLAKE.	2. WAMBO 202. 308852E 63967959N (GDA ZONE 56). A MUDSTONE END SCRAPER WITH STEEP RETOUCH.

Wambo 190 (#37-5-0349)

Centre GPS Coordinates: 309204E, 6397081N (GDA 94 Zone 56).

Previously recorded AHIMS site Wambo 190 (#37-5-349) was originally recorded in 2002 by Leila Haglund as an artefact scatter consisting of four artefacts visible within a bulldozed area for a fire trail. The site measured 30m by 7m. At the time of recording, the site was described as being located on top of a gentle ridge within a formerly grazed paddock vegetated by regenerating woodland. During the 2015 survey four artefacts were recorded along an eroding access track adjacent to a fence line. The new site boundary based on the results of the recent survey extends 75m (northwest-southeast) and 55m (southwest-northeast) covering 0.2ha (**Table 6–38** and **Figures 6–129**, **6–130** and **6–131**).

Table 6-38. Wambo 190. Landform and site details.

Site name	Landform unit	Distance to water	Number of recorded artefacts	Artefact density	Probability of associated subsurface deposits
Wambo 190	Upper-slope	150m	4	Very low	Low

Figure 6-129. Wambo 190. Location of site and recorded artefacts.

Figure 6-130. Wambo 190. View of site.

	1. WAMBO 190 CONSISTS OF FOUR ARTEFACTS RECORDED ALONG AN ERODING ACCESS TRACK AND A FENCE LINE.

Figure 6-131. Wambo 190. Selection of artefacts.

1. WAMBO 190. 309206E, 6397072N (GDA ZONE 56). A QUARTZ AND A MUDSTONE FLAKE.

2. WAMBO 190. 309237E 63967062N (GDA ZONE 56). A COMPLETE MUDSTONE FLAKE.

United Collieries 23 (#37-5-0520)

Centre GPS Coordinates: 312357E, 6396285N (GDA 94 Zone 56).

Previously recorded AHIMS site United Collieries 23 (#37-5-0520) was originally recorded by HLA-Envirosciences in 2007 as an artefact scatter consisting of four artefacts. At the time of recording, the site was described as being located on a cleared road directly east of Dam 3. Following the 2015 survey over 30 artefacts were visible along an access track within the vicinity of United Collieries 23. The new site boundary based on the results of the recent survey extends 310m (northwest-southeast) and 70m (southwest-northeast) covering 1.7ha (**Table 6–39** and **Figures 6–132**, **6–133** and **6–134**). The new site boundaries encompass site #37-5-0518 (United Collieries 2).

Table 6-39. United Collieries 23. Landform and site details.

Site name	Landform unit	Distance to water	Number of recorded artefacts	Artefact density	Probability of associated subsurface deposits
United Collieries 23	Flat/ drainage	120m	30+	Low	Low

Figure 6-132. United Collieries 23. Location of site and recorded artefacts.

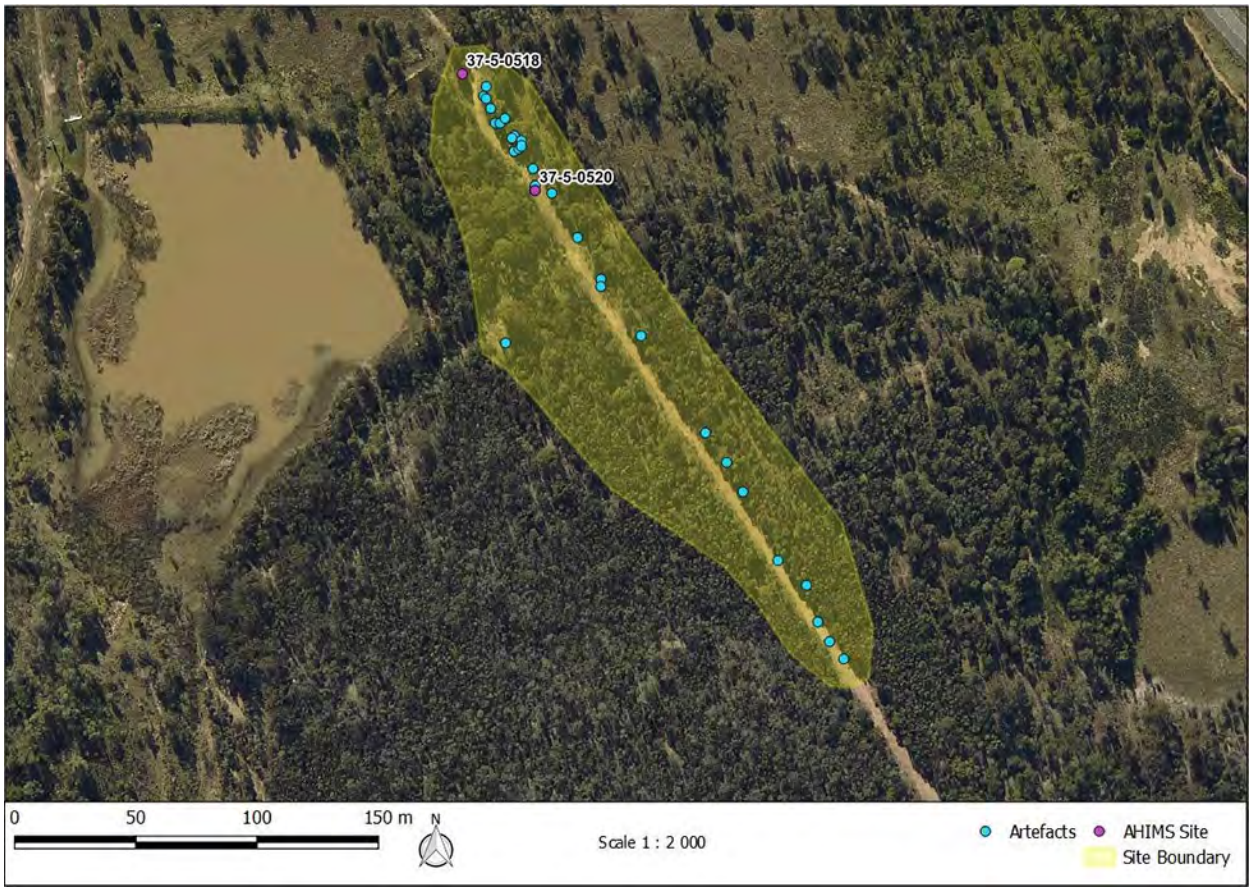
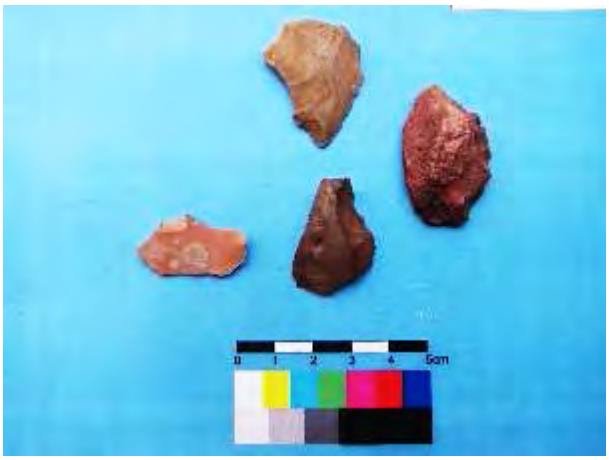


Figure 6-133. United Collieries 23. View of site.

1. United Collieries 23 consists of more than thirty artefacts recorded along an eroding access track.

Figure 6-134. United Collieries 23. Selection of artefacts.

	
1. UNITED COLLIERIES 23. 312305E, 6396382N (GDA ZONE 56). RANGE OF SILCRETE AND MUDSTONE FLAKES.	2. UNITED COLLIERIES 23. 312432E 63966190N (GDA ZONE 56). A MULTIDIRECTIONAL SILCRETE CORE.

United 6 (#37-5-0523)

Centre GPS Coordinates: 311879E, 6396514N (GDA 94 Zone 56).

Previously recorded AHIMS site United 6 (#37-5-0523) was originally recorded in 2001 by Umwelt (Australia) Pty Ltd as an artefact scatter consisting of three artefacts located in erosion scour on an unformed road. At the time of recording, the site was described as being an extension of Red Bank Creek 24 recorded by Koettig and Hughes in 1983. The sites dimensions were recorded as 3m by 2m on previously cultivated land and land which has been impacted by mining related activities. During the 2015 survey more than 30 artefacts were recorded along the access track approximately 50m to the east and west of the site's original coordinates.

Two nearby sites (#37-5-0092; Red Bank Creek 24 and #37-5-0102; Red Bank Creek 23) are located 45m north and 15m south of United 6 respectively. These sites were first salvaged under permit granted in 1983. A further salvage of both sites took place in 2009 (Insite Heritage 2010b) that collected 52 artefacts from the site #37-5-0092, and although the site was visited, no artefacts were visible in 2009 at #37-5-0102. This variable spread of artefacts is characteristic of the 2015 recordings.

The new site boundary extends 230m (northwest-southeast) by 35m (southwest-northeast) covering 0.6ha (**Table 6–40** and **Figures 6–135**, **6–136** and **6–137**).

Table 6-40. United 6. Landform and site details.

Site name	Landform unit	Distance to water	Number of recorded artefacts	Artefact density	Probability of associated subsurface deposits
United 6	Flat/ drainage	0m	30+	Low	Low

Figure 6-135. United 6. Location of site and recorded artefacts.

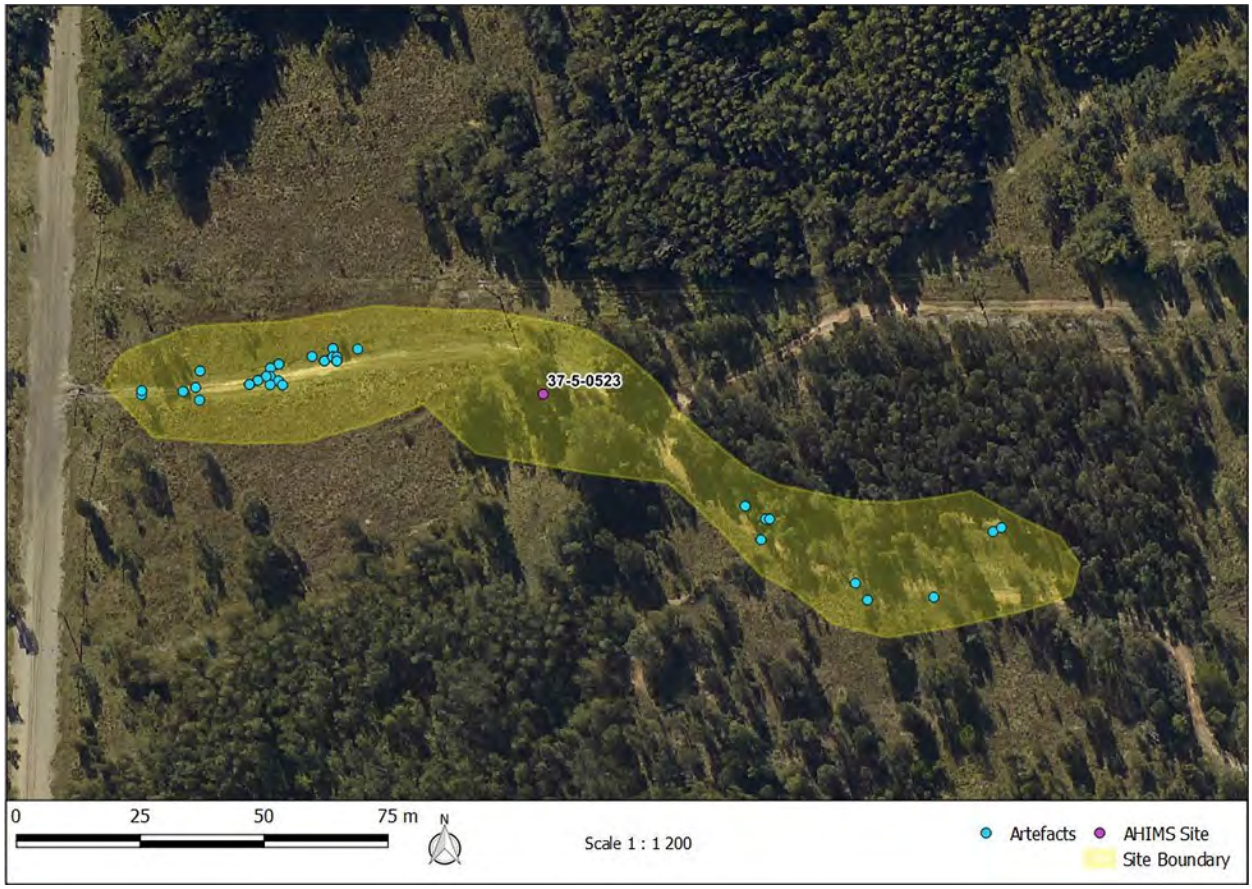


Figure 6-136. United 6. View of site.

	UNITED 6 CONSISTS OF MORE THAN THIRTY ARTEFACTS VISIBLE ALONG AN ACCESS TRACK.

Figure 6-137. United 6. Selection of artefacts.

<table>
<tr><td>  </td><td>  </td></tr>
<tr><td>1. UNITED 6. 311814E, 6396530N (GDA ZONE 56). A MULTIDIRECTIONAL SILCRETE CORE WITH SIX FLAKE SCARS.</td><td>2. UNITED 6. 311919E 6396491N (GDA ZONE 56). A MULTIDIRECTIONAL MUDSTONE CORE.</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>3. UNITED 6. 311798E, 6396523N (GDA ZONE 56). TWO MUDSTONE FLAKES.</td><td>4. UNITED 6. 311814E 6396527N (GDS ZONE 56). TWO MUDSTONE FLAKES.</td></tr>
</table>

UCL 12-1 (#37-5-0576)

Centre GPS Coordinates: 310477E, 6396730N (GDA 94 Zone 56).

Previously recorded AHIMS site UCL 12-1 (#37-5-0576) was originally recorded in 2008 by Insite Heritage as an artefact scatter consisting of two artefacts located within an erosion scour on a mid-slope landform. During the 2015 survey of the Project Area more than eight artefacts were recorded within a disturbed area of an artificial drainage channel in the south, as well as a further eight artefacts scattered throughout the adjacent landform to the north. In an area with evidence of historic rubbish dumping (bottles and other items) a possible knapped glass object was recorded (**Figure 6–141**). The glass bottle base is of unknown age but is not recent and the knapping is confined to one of the broken halves of the base. The fineness and consistency of the knapping suggests that it is not natural and no other incidences were noted in breaks/shatters on the other glass located in the vicinity. The site boundary extends 320m (north-south) by 400m

(east-west) covering 9.6ha which closely approximates the site boundary as originally recorded and shown on the #37-5-0576 site card. Therefore, this recording is not amending the site boundaries but adding recent artefact recordings to the original 2008 recording (**Table 6–41** and **Figures 6–138**, **6–139** and **6–140**).

Table 6-41. UCL 12-1. Landform and site details.

Site name	Landform unit	Distance to water	Number of recorded artefacts	Artefact density	Probability of associated subsurface deposits
UCL 12-1	Lower-slope to mid-slope	150m	15+	Low	Low

Figure 6-138. UC 12-1. Location of site and recorded artefacts.

Figure 6-139. UCL 12-1. View of site.

	
1. UCL 12-1 CONSISTS OF MORE THAN FIFTEEN ARTEFACTS LOCATED ALONG AN ARTIFICIAL DRAINAGE LINE.	2. DENSELY REGENERATING CASUARINAS WITHIN UCL 12-1.

Figure 6-140. UCL 12-1. Selection of artefacts.

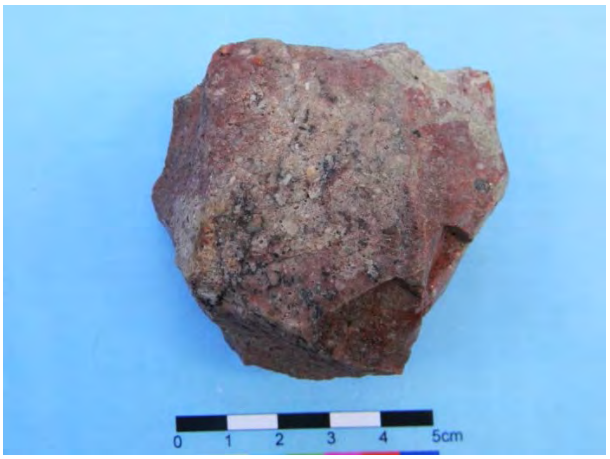
	
1. UCL 12-1. 310427E, 6396614N (GDA ZONE 56). RANGE OF SILCRETE FLAKES.	2. UCL 12-1. 310424E 6396614N (GDA ZONE 56). A MULTIDIRECTIONAL SILCRETE CORE.

Figure 6-141. UCL 12-1. Possible knapped glass artefact.

	
1. RED BANK CREEK 47. 310508E, 6396854N (GDA ZONE 56). BASE OF BOTTLE DISPLAYING POSSIBLE KNAPPING (TO LEFT).	2. UCL 12-1. 310508E, 6396854N (GDA ZONE 56). DETAIL OF POSSIBLE KNAPPING ON GLASS BOTTLE.

Red Bank Creek 47 (#37-6-0325)

Centre GPS Coordinates: 312878E, 6396647N (GDA 94 Zone 56).

Previously recorded AHIMS site Red Bank Creek 47 (#37-6-0325) was originally recorded in 1983 by Koettig and Hughes as an artefact scatter consisting of more than 200 artefacts on the steeply eroded edge of a terrace overlooking Redbank Creek. At the time of recording, the site was described as extending 70m by 4.7m. During the 2015 survey over 30 artefacts were visible in large exposures within the vicinity of Red Bank Creek 47. The site is located on the northwest bank of Dam 1 and has been heavily impacted by fluctuating water levels and mining related activities, particularly the construction of Dam 1. The site contains no *in situ* archaeological deposits. The new site boundary encompasses AHIMS site #37-6-0323 (Red Bank Creek 45) and extends 320m (north-south) and 250m (east-west) covering 5.3ha (**Table 6–42** and **Figures 6–142**, **6–143** and **6–144**).

Table 6-42. Red Bank Creek 47. Landform and site details.

Site name	Landform unit	Distance to water	Number of recorded artefacts	Artefact density	Probability of associated subsurface deposits
Red Bank Creek 47	Flat/ drainage	30m	30+	Low	Low

Figure 6-142. Red Bank Creek 47. Location of site and recorded artefacts.

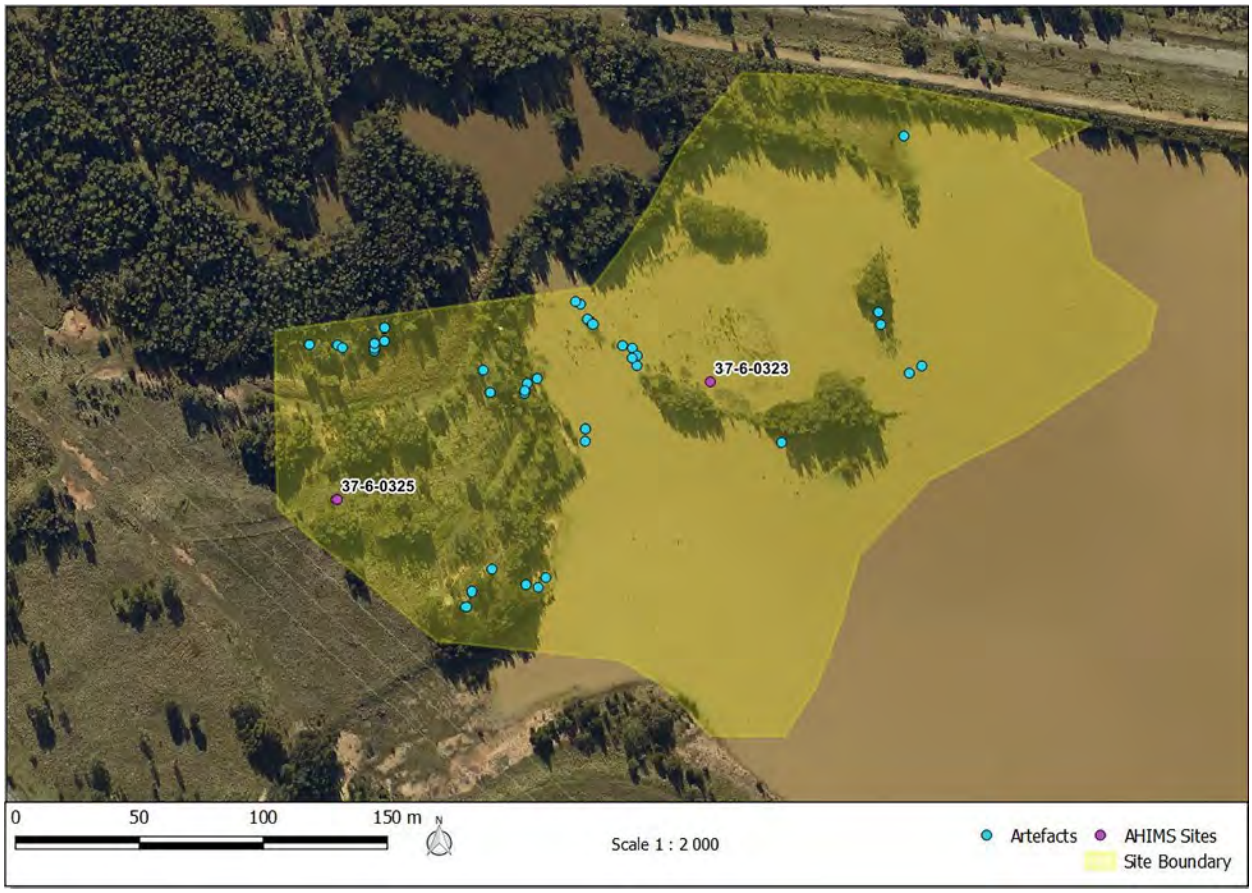


Figure 6-143. Red Bank Creek 47. View of site.

1. RED BANK CREEK 47 CONSISTS OF OVER THIRTY ARTEFACTS ON THE WESTERN EDGE OF DAM 1.

2. WESTERN PORTION OF RED BANK CREEK 47 ON THE NORTHERN BANK OF REDBANK CREEK.

Figure 6-144. Red Bank Creek 47. Selection of artefacts.

<table>
<tr><td>  </td><td>  </td></tr>
<tr><td>1. RED BANK CREEK 47. 312780E, 6396634N (GDA ZONE 56). TWO MUDSTONE FLAKES.</td><td>2. RED BANK CREEK 47. 312825E 6396646N (GDA ZONE 56). A MUDSTONE BLADE WITH STEEP RETOUCH TO ONE MARGIN.</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>3. RED BANK CREEK 47. 312719E, 6396650N (GDA ZONE 56). RANGE OF MUDSTONE FLAKES.</td><td>4. RED BANK CREEK 47. 312780E, 6396635N (GDA ZONE 56). RANGE OF MUDSTONE AND SILCRETE FLAKES.</td></tr>
</table>

Red Bank Creek 48 (#37-6-0326)

Centre GPS Coordinates: 312627E, 6396551N (GDA 94 Zone 56).

Previously recorded AHIMS site Red Bank Creek 48 (#37-5-0326) was originally recorded in 1983 by Koettig and Hughes as an artefact scatter consisting of six artefacts. At the time of recording, the site was described as being located within an exposed area surrounded by thick grass cover and regenerating Casuarinas. The sites dimensions were recorded as measuring 15m by 3m. During the 2015 survey a single artefact was recorded 50m northwest of the site's original coordinates along a bund within the electricity easement. There are general disturbances in the vicinity such as small sink holes (mine subsidence) and fencing. The new site boundary extends 80m (northwest-southeast) and 40m (southwest-northeast) covering 0.2ha (**Table 6–43** and **Figures 6–145** and **6–146**).

Table 6-43. Red Bank Creek 48. Landform and site details.

Site name	Landform unit	Distance to water	Number of recorded artefacts	Artefact density	Probability of associated subsurface deposits
Red Bank Creek 48	Flat/ drainage	60m	1	Very Low	Low

Figure 6-145. Red Bank Creek 48. Location of site and recorded artefacts.

Figure 6-146. Red Bank Creek 48. View of site.

1. RED BANK CREEK 48 IS LOCATED WITHIN AN ELECTRICITY EASEMENT.

UC2/1 (#37-6-1033)

Centre GPS Coordinates: 313323E, 6396475N (GDA 94 Zone 56).

Previously recorded AHIMS site UC2/1 (#37-6-1033) was originally recorded in 1981 by South East Archaeology in 2000 as an extensive artefact scatter on the valley flat through which Redbank Creek flows. At the time of recording, the site was described as corresponding with previously recorded AHIMS sites #37-6-0131 and #37-6-0275. As a result of the 2015 survey, more than 25 artefacts were recorded within the site's boundary as delineated in 2000. The new site boundary extends 410m (northwest-southeast) and 80m (southwest-northeast) covering 8ha which closely approximates the site boundary as originally recorded and shown on the #37-6-1033 site card. Therefore, this recording is not amending the site boundaries but adding recent artefact recordings to the original 2008 recording. A small dam is located within the site's boundary (**Table 6–44** and **Figures 6–147**, **6–148** and **6–149**).

Table 6-44. UC2/1. Landform and site details.

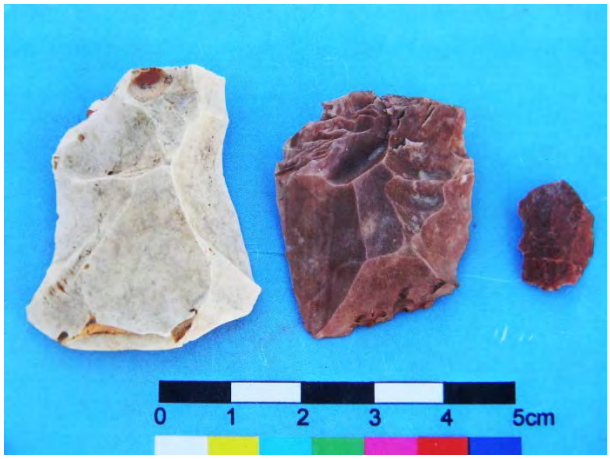
Site name	Landform unit	Distance to water	Number of recorded artefacts	Artefact density	Probability of associated subsurface deposits
UC 2/1	Flat/ drainage	0m	25+	Low	Low

Figure 6-147. UC 2/1. Location of site and recorded artefacts.

Figure 6-148. UC2/1. View of site.

	1. UC2/1 CONSISTS OF OVER THIRTY ARTEFACTS TO THE EAST OF DAM 1. ARTEFACTS ARE VISIBLE WITHIN EROSION SCALDS.

Figure 6-149. UC2/1. Selection of artefacts.

	
1. UC2/1. 3133120E, 6396435N (GDA ZONE 56). RANGE OF MUDSTONE FLAKES.	2. UC2/1. 313271E 6396488N (GDA ZONE 56). A MUDSTONE BLADE WITH STEEP, UNIFACIAL RETOUCH TO ONE MARGIN.
	
3. UC2/1. 313293E 6396654N (GDA ZONE 56). SILCRETE END SCRAPER WITH SEMI-STEEP RETOUCH.	4. UC2/1. 313271E 6396309N (GDA ZONE 56). RANGE OF MUDSTONE AND SILCRETE FLAKES.

Site 146 (#37-6-1777)

Centre GPS Coordinates: 313461E, 6396646N (GDA 94 Zone 56).

Previously recorded AHIMS site 146 (#37-6-1777) was originally recorded in 2007 by McCardle Cultural Heritage Pty Ltd as an artefact scatter consisting of two artefacts: a mudstone flake with retouch and a mudstone flake. The site measured approximately 3m by 10m. At the time of recording, the site was described as being located on an eroding slope within a cleared paddock vegetated by thick grass cover and used for agricultural activities including grazing and ploughing. During the 2015 survey over 15 artefacts were recorded within the vicinity of site 146. The site is diffused and located within an electricity easement, east of the Golden Highway with artefacts visible within exposed areas. The new site boundary extends 360m (northwest-southeast) and 44m (southwest-northeast) covering 1.6ha (**Table 6–45** and **Figures 6–150**, **6–151** and **6–152**).

Table 6-45. Site 146. Landform and site details.

Site name	Landform unit	Distance to water	Number of recorded artefacts	Artefact density	Probability of associated subsurface deposits
146	Flat drainage	150m	15+	Low	Low

Figure 6-150. Site 146. Location of site and recorded artefacts.

Figure 6-151. Site 146. View of site.

	1. SITE 146 CONSISTS OF 15+ ARTEFACTS THAT ARE VISIBLE WITHIN EXPOSED AREAS IN AN ELECTRICITY EASEMENT.

Figure 6-152. Site 146. Selection of artefacts.

	
1. SITE 146. 313481E, 6396634N (GDA ZONE 56). MUDSTONE FLAKE WITH POSSIBLE EDGE WEAR ON THE DISTAL END.	2. SITE 146. 313543E, 6396570N (GDA ZONE 56). A SILCRETE BLADE.

United Collieries 5 (#37-6-1912)

Centre GPS Coordinates: 312882E, 6396331N (GDA 94 Zone 56).

Previously recorded AHIMS site United Collieries 5 (#37-6-1912) was originally recorded in 2007 by HLA-Envirosciences as an isolated find, a chert flake. At the time of recording, the site was considered to be in a disturbed context with the artefact located on the edge of a large drainage channel cut as part of Dam 1 constructions. During the 2015 survey more than 50 artefacts were visible along the artificial drainage channel within the vicinity of United Collieries 5 as well as previously recorded AHIMS site #37-6-1911 (United Collieries 4 [Singleton]). The new site boundary for United Collieries 5 extends 550m (northwest-southeast) by 150m (southwest-northeast) and encompasses the above AHIMS site. It covers 3.1ha (**Table 6–46** and **Figures 6–153**, **6–154** and **6–155**).

Table 6-46. United Collieries 5. Landform and site details.

Site name	Landform unit	Distance to water	Number of recorded artefacts	Artefact density	Probability of associated subsurface deposits
United Collieries 5	Flat/ drainage	200m	50+	Low-moderate	Low

Figure 6-153. United Collieries 5. Location of site and recorded artefacts.

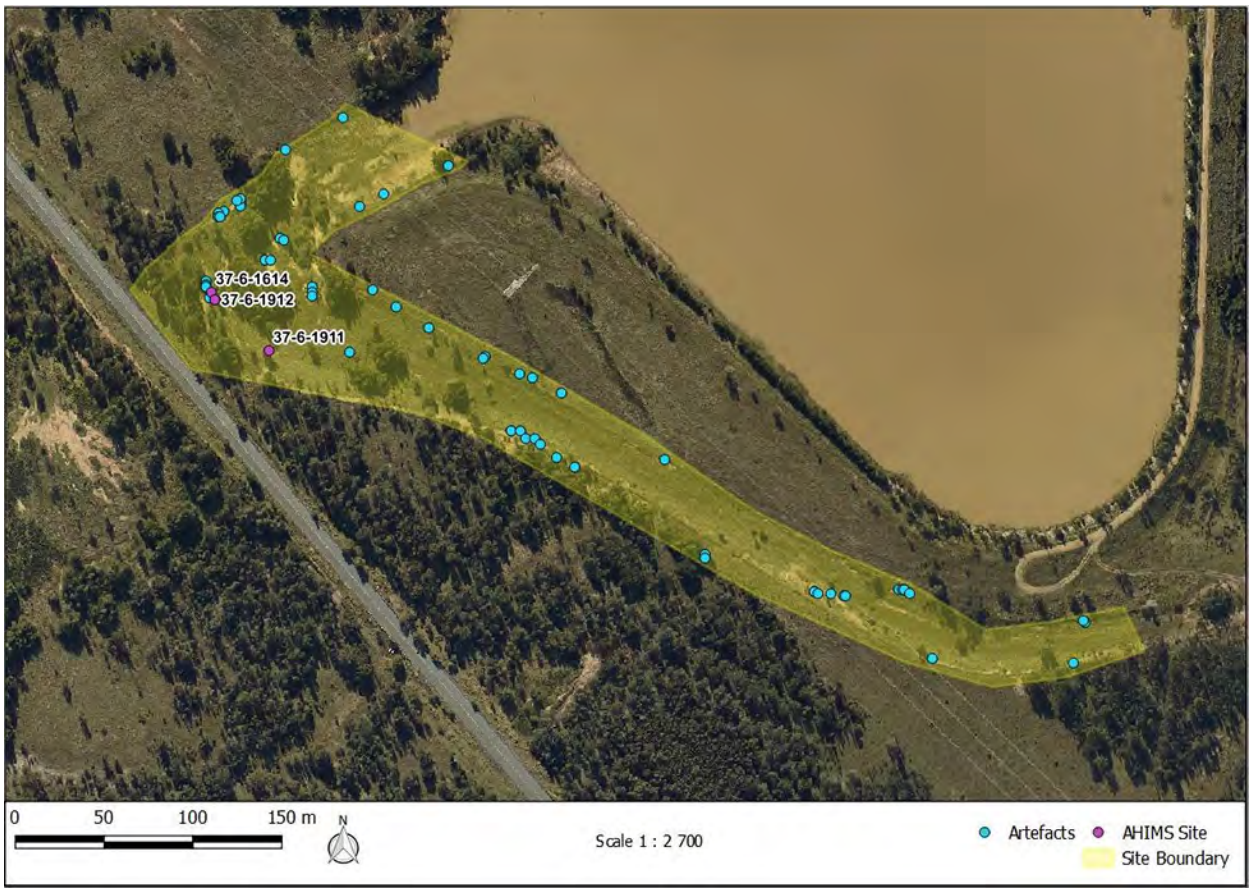
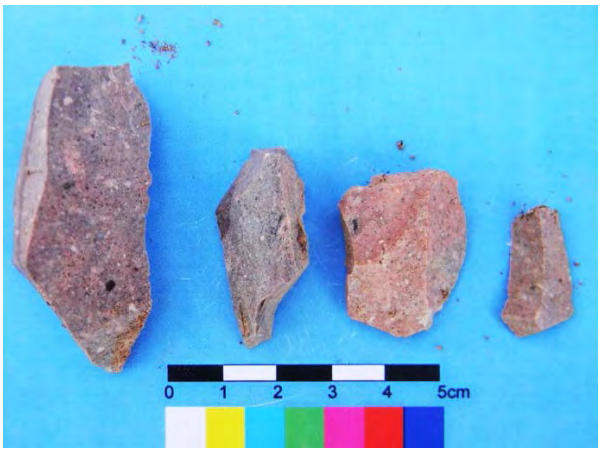


Figure 6-154. United Collieries 5. View of site.

1. UNITED COLLIERIES 5 CONSISTS OF MORE THAN 50 ARTEFACTS LOCATED ALONG AN ARTIFICIAL DRAINAGE CHANNEL DRAINING TO DAM 1.

2. EXPOSURES ALONG THE ARTIFICIAL DRAINAGE CHANNEL. UNITED COLLIERIES 5 IS ON BOTH BANKS OF THIS CHANNEL.

Figure 6-155. United Collieries 5. Selection of artefacts.

<table>
<tr><td>  </td><td>  </td></tr>
<tr><td>1. United Collieries 5. 312815E, 6396389N (GDA Zone 56). A volcanic axe blank.</td><td>2. United Collieries 5. 310424E 6396614N (GDA Zone 56). Range of silcrete flakes.</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>3. 1. United Collieries 5. 312703E, 6396452N (GDA Zone 56). A silcrete end scraper with steep retouch.</td><td>4. United Collieries 5. 312663E, 6396452N (GDA Zone 56). A silcrete grind stone with abrasions.</td></tr>
</table>

United Collieries 9 (#37-6-1913)

Centre GPS Coordinates: 312608E, 6396599N (GDA 94 Zone 56).

Previously recorded AHIMS site United Collieries 9 (#37-6-1913) was originally recorded in 2007 by HLA-Envirosciences as an artefact scatter consisting of between 25 and 30 artefacts visible within several exposures and erosion scours in an electricity easement. At the time of recording, the site was described as encompassing an unsealed track and a water pipeline. The site extended approximately 50m by 50m. During the 2015 survey less than 10 artefacts were recorded within a large exposure within the electricity easement in close proximity to United Collieries 9. The new site boundary delineated following the results of the recent survey extends 40m (southwest-northeast) by 30m (northwest-southeast) covering 0.1ha (**Table 6–47** and **Figures 6–156**, **6–157**and **6–158**).

Table 6-47. United Collieries 9. Landform and site details.

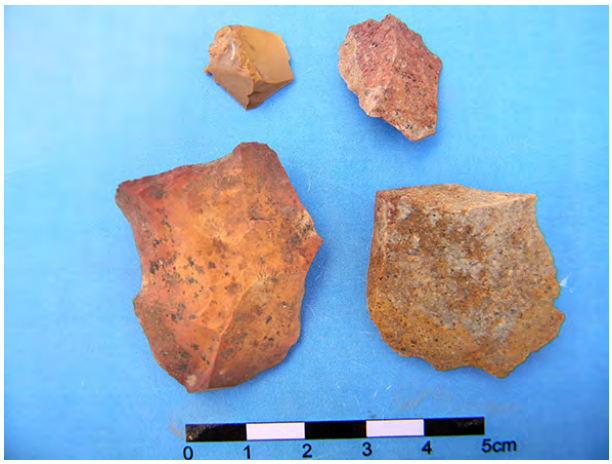
Site name	Landform unit	Distance to water	Number of recorded artefacts	Artefact density	Probability of associated subsurface deposits
United Collieries 9	Flat/ drainage	25m	<10	Low	Low

Figure 6-156. United Collieries 9. Location of site and recorded artefacts.

Figure 6-157. United Collieries 9. View of site.

1. UNITED COLLIERIES 9 CONSISTS OF LESS THAN TEN ARTEFACTS RECORDED ALONG A LARGE EXPOSURE WITHIN AN ELECTRICITY EASEMENT.

Figure 6-158. United Collieries 9. Selection of artefacts.

	
1. United Collieries 9. 312606E, 6396601N (GDA Zone 56). Range of silcrete and mudstone flakes.	2. United Collieries 9. 312613E, 6396610N (GDA Zone 56). Silcrete core.

United Collieries 10 (#37-6-1914)

Centre GPS Coordinates: 312558E, 6396674N (GDA 94 Zone 56).

Previously recorded AHIMS site United Collieries 10 (#37-6-1914) was originally recorded in 2007 by HLA-Envirosciences as an artefact scatter consisting of six artefacts several exposures and erosion scours within in an electricity easement. The sites dimensions were originally recorded as being 20m by 20m. At the time of recording, the site was described as being located within a disturbed surface. During the 2015 survey over 40 artefacts were visible along a number of small exposures of what is the far northern bank of Redbank Creek and immediate landforms to the north. The erosion edge parallels the eastern boundary of the electricity easement. The new site boundary delineated following the results of the recent survey extends 140m (northwest-southeast) and 45m (southwest-northeast) covering 0.6ha (**Table 6–48** and **Figures 6–159**, **6–160** and **6–161**).

Table 6-48. United Collieries 10. Landform and site details.

Site name	Landform unit	Distance to water	Number of recorded artefacts	Artefact density	Probability of associated subsurface deposits
United Collieries 10	Flat/ drainage	50m	40+	Low	Low

Figure 6-159. United Collieries 10. Location of site and recorded artefacts.

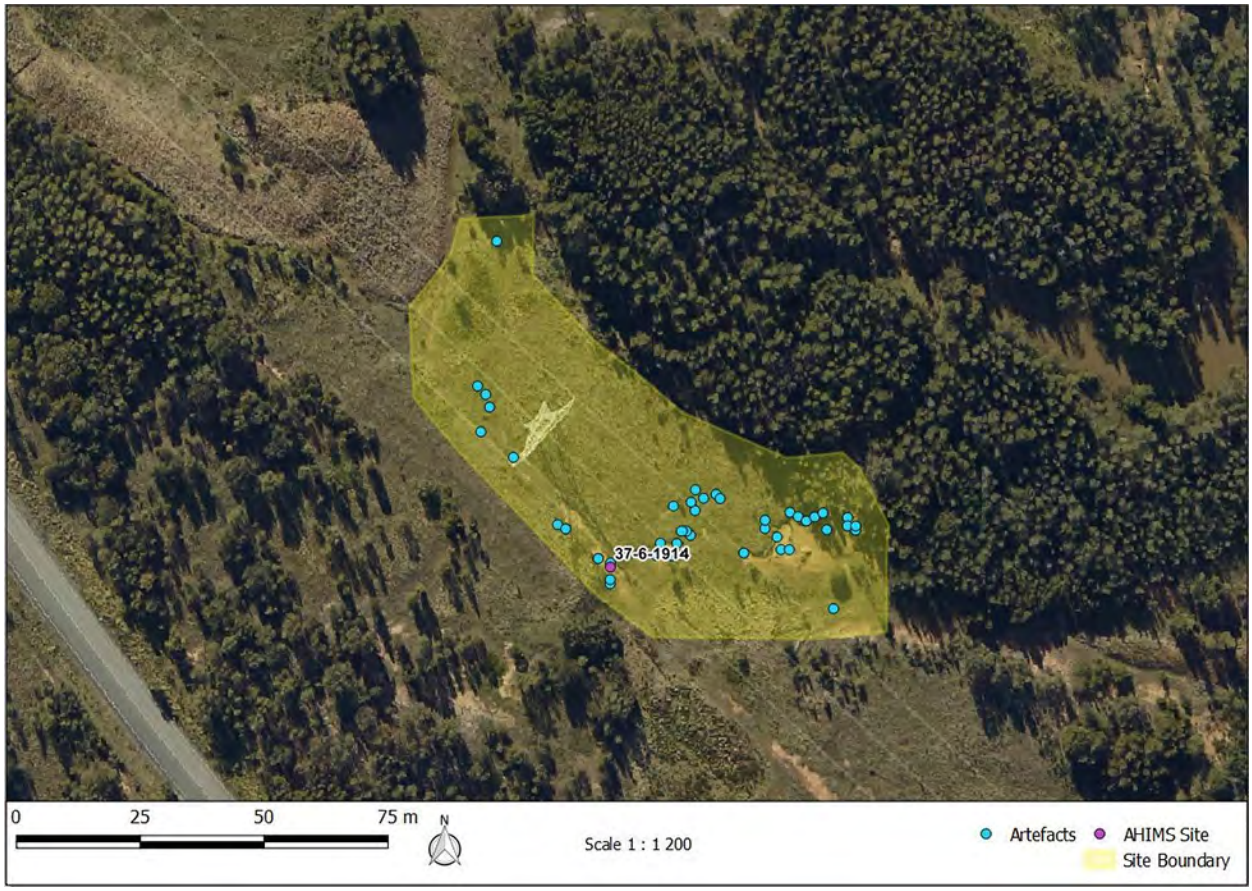


Figure 6-160. United Collieries 10. View of site.

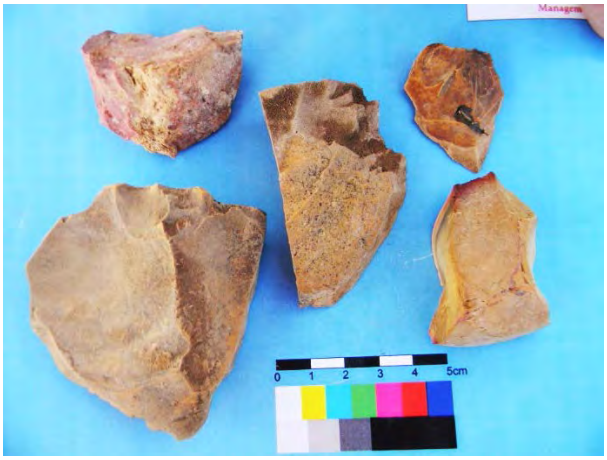
1. UNITED COLLIERIES 10 CONSISTS OF MORE THAN FORTY ARTEFACTS RECORDED ALONG A NUMBER OF SMALL EXPOSURES WITHIN AN ELECTRICITY EASEMENT.

Figure 6-161. United Collieries 10. Selection of artefacts.

1. UNITED COLLIERIES 10. 312574E, 6396666N (GDA ZONE 56). RANGE OF SILCRETE AND MUDSTONE FLAKES.

2. UNITED COLLIERIES 10. 312565E 6396656N (GDA ZONE 56). A MUDSTONE BLADELET CORE.

3. UNITED COLLIERIES 10. 312574E, 6396672N (GDA ZONE 56). A MUDSTONE BLADE WITH STEEP RETOUCH TO ONE MARGIN.



4. UNITED COLLIERIES 10. 312601E, 6396664N (GDA ZONE 56). RANGE OF SILCRETE AND MUDSTONE FLAKES.

6.5 SITES SUBSUMED INTO LARGER SITES

A number of previously recorded sites have been subsumed into the extended site boundaries discussed in **Section 6.4**.

These sites are listed in **Table 6–49**.

Table 6-49. AHIMS sites subsumed into larger sites.

AHIMS site subsumed	Site that subsumed the sites in column 1
#37-5-0027 (Malabar)	#37-5-0096 (Red Bank Creek 28)
#37-5-0577 (UCL12-2)	#37-5-0099 (Red Bank Creek 31)
#37-5-0023 (Warkworth Agip 8) #37-5-0512 (United Collieries 13)	#37-5-0115 (Red Bank Creek 8)
#37-5-0518 (United Collieries 2)	#37-5-0520 (United Collieries 23)
#37-6-0323 (Redbank Creek No.45)	#37-6-0325 (Red Bank Creek 47)

AHIMS site subsumed	Site that subsumed the sites in column 1
#37-6-0131 (Agip 6 Warkworth) #37-6-0275 (Red Bank Creek 10)	#37-6-1033 (UC2/1)
#37-6-1911 (United Collieries 4 [Singleton])	#37-6-1912 (United Collieries 5)

7 TEST EXCAVATION PROGRAM

7.1 BACKGROUND

The test excavation program followed an extensive program of surface survey across areas that will be potentially impacted by the Project. The main Aboriginal heritage surface survey was conducted over 15 days from 23 March to 17 April 2015. Subsequent surveys were undertaken from 22 June to 23 June 2015 and on 17 September 2015 to assess new areas that had been identified during the Project design phase. In total there have been 19 days of survey associated with the Project. The assessment consisted of full pedestrian assessment of potentially impacted areas in unmodified landforms.

From 27 July to 11 August 2015 a test excavation and auger program was conducted at locations within the proposed disturbance area.

The methodology for the test excavation program was sent to all RAPs and Wonnarua Knowledge Holders on 18 June 2015 and comments invited. A copy of the methodology was also sent to OEH on 13 July 2015. The test excavation methodology is presented in **Appendix 5**.

In addition, on 12 July 2015 an addendum test excavation methodology was sent to RAPs and Wonnarua Knowledge Holders (**Appendix 6**). The reason for this addendum was that additional surface survey had taken place on Wambo Coal lease areas from 22 to 24 June 2015 as set out in the *Additional Study Area Aboriginal Heritage Survey Methodology* that was sent to all RAPs and Wonnarua Knowledge Holders on 19 May 2015 (**Appendix 2**). As a result of this survey, two additional locations were proposed to be included in the United Collieries test excavation program.

At the close of the 28 day review period (Friday 17 July 2015), one extensive comment on the test excavation methodology was received from the Native Title Claimant group, the Plains Clan of the Wonnarua People (PCWP). This comment supported the test excavation methodology but outlined areas in which the respondent felt it could be improved. Several ideas from the PCWP comment were incorporated into the methodology, although many of the comments were beyond the capabilities of a test excavation program and were better suited to a major salvage program. However, as a result of input from the PCWP, an auger program had been incorporated into the test excavation program and the methodology of the auger program was strengthened as a result of the PCWP comment on the test excavation methodology.

In August 2015 a test excavation summary was sent to all RAPs and Wonnarua Knowledge Holders (**Appendix 7**).

Archaeological results from the survey and test excavation program were presented to a meeting non-Native Title Claimant RAP groups on Wednesday 25 November 2015 (for the status of Native

Title Claimant Groups and non-Native Title RAP groups within the consultation process for the Project, please see the accompanying ACHA).

7.2 TEST EXCAVATION METHODOLOGY

The Survey Area is relatively large and contains areas of varying archaeological potential. In addition, due to the high degree of vegetation regrowth, large areas of the Survey Area afforded very low ground surface visibility to the extent that it is impossible to know exactly where a test excavation program (i.e. excavation pits) should be located in order to reveal meaningful information. It was therefore the aim of the test excavation program to employ two programs that were run simultaneously to examine the archaeological potential of the Survey Area: a test excavation program and a geoarchaeological auger program.

The two programs had the following objectives:

- Geoarchaeological auger program. Using hand augers a team investigated areas in the vicinity of Redbank Creek and surrounding landforms where either the initial assessment was that soil depths are too shallow to preserve archaeological deposits or that ground surface visibility was too low in order to make such an assessment. By sampling such landforms, the geoarchaeological auger program was designed to inform the test excavation program as to where further investigation may or may not be warranted; and

- Archaeological test excavation program. In areas, primarily along Redbank Creek, where the survey recorded artefact exposures the test excavation program was used to investigate the extent and nature of deposits beyond the artefact exposures. A secondary aim of the test excavation program was to investigate any locations where the geoarchaeological auger program indicated that further investigation was warranted.

In this way the test excavation program targeted those areas displaying higher archaeological potential that had a good probability of containing not only further Aboriginal objects, but also intact subsurface archaeological deposits.

The test excavation program was concentrated along Redbank Creek as the survey, as well as previous investigations, have shown that landforms on either side of this drainage system have the greatest archaeological potential in the Survey Area.

Although once part of the Redbank Creek system, the concentration of artefacts recorded during the survey around Dam 1 was not investigated further during the test excavation program. As indicated in **Section 3.7.3**, this area has been subject to modification in the past and would not warrant further, subsurface archaeological investigation due to the invasive nature of the past disturbances.

7.2.1 Purpose of the Test Excavation Program

Although the archaeologically sensitive areas that will be impacted by the Project are within a landscape that has undergone varying degrees of disturbance, there was still the potential for partially intact features and/or archaeological deposits to exist within the proposed disturbance area.

The purpose of the test excavation program was to understand more completely the nature of the sub-surface material within the Project Disturbance Boundary to better inform mitigation strategies in terms of the proposed Project impacts. Data obtained from the test excavation program informed the mitigation and management options in this ACHA.

The aims were therefore to:

1. Establish the extent and nature the of sub-surface archaeological deposits within the Project Disturbance Area;
2. Use the data gained from the test excavation program to better evaluate the archaeological significance and potential of the Survey Area; and
3. Develop, in consultation with the RAPs, an informed management strategy for the Project Disturbance Boundary to assist in mitigating the proposed impacts.

Excavations undertaken as per the Code of Practice do not require an AHIP under the NPW Act.

7.2.2 Code requirements for the Test Excavation Program

The Code of Practice lists a number of requirements pertaining to test excavation. These requirements are enumerated below and further information pertaining to these requirements follow in subsequent sections of this document.

Requirement 14 (Test excavation which is not excluded from the definition of harm):

Sub-surface investigation will not be excluded from harm where they are carried out in the following areas:

- *in or within 50m of an area where burial sites are known or are likely to exist*
- *in or within 50m of a declared Aboriginal place*
- *in or within 50m of a rock shelter, shell midden or earth mound*
- *in areas known or suspected to be Aboriginal missions or previous Aboriginal reserves or institutes*
- *in areas known or suspected to be conflict or contact sites.*

  - None of the test excavation locations are known to be located within the vicinity of the items listed under Requirement 14 of the Code.

- **Requirement 15a** (Consultation): As the archaeological test excavation program was part of the Project, consultation has been ongoing with the RAPs and had been, at the time of the test excavation program, completed to the stage described in subclause 80C (6) of the *National Parks and Wildlife Regulation 2009* (NPW Regulation).

- **Requirement 15b** (Test excavation sampling strategy): The test excavation methodology (**Appendices 5** and **6**) set out the proposed sampling strategy for the test excavation program and this is also set out in **Section 7.2.3** below.

- **Requirement 15c** (Notification):

    - *the location of the proposed test excavation and the subject area.*

        - The test excavation methodology clearly showed those areas that would be investigated (**Appendices 5** and **6**; **Section 7.5.2**).

    - *the name and contact details of the legal entity with overall responsibility for the project.*

        - United Collieries Pty Ltd, PMB 13, Singleton NSW, 2330

    - *the name and contact details of the person who will be carrying out the test excavations where this is different to the legal entity with overall responsibility for the project.*

        - OzArk Environmental & Heritage Management, 145 Wingewarra St, DUBBO, NSW, 2830

    - *the proposed date of commencement, and estimated date of completion, of the test excavations.*

        - Anticipated Commencement: 27/07/15

        - Anticipated Completion: 14/08/15

            Weather permitting, the projected date for the excavations was for three weeks: 27 July to 14 August 2015.

    - *the location of the temporary storage location for any Aboriginal objects uncovered during the test excavations.*

        - Aboriginal objects recovered during the excavations were temporarily housed in a locked container at 21 Agnes Ave, CRESTWOOD, NSW, 2620 (OzArk branch office) as the objects underwent analysis. Following analysis they are stored in a locked container at United Collieries until such times as a Care and Control agreement is reached with RAPs.

- **Requirement 16a** (Test Excavation): The test excavation program adhered to Requirement of 16a as set out in this document (see **Section 7.2.3**).

- **Requirement 16b** (Objects recovered during test excavations): Aboriginal objects recovered during the excavations were temporarily housed in a locked container at 21 Agnes Ave, CRESTWOOD, NSW, 2620 (OzArk branch office) as the objects underwent analysis. Following analysis they are stored in a locked container at United Colliery until

such times as a Care and Control agreement is reached with RAPs, Wonnarua Knowledge Holders and OEH.

- **Requirement 17** (When to stop test excavations): the test excavation program adhered to the requirements set out in the Code: Any test excavation carried out under this requirement will cease when suspected human remains are encountered; or when enough information has been recovered to adequately characterise the objects present with regard to their nature and significance.

7.2.3 Sampling Strategy

The test excavation program sampling strategy was governed by three criteria:

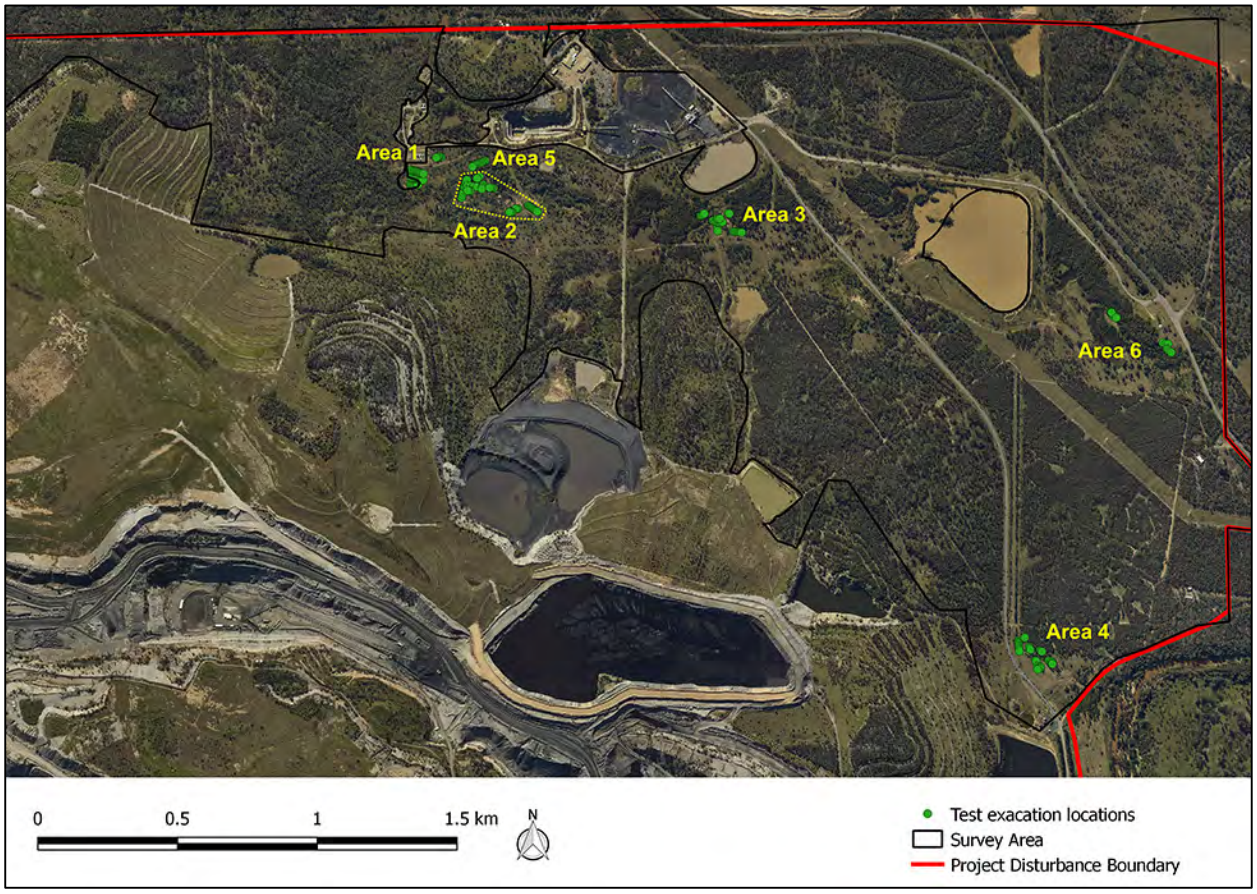
1. Initial test excavation program: At these locations the test excavation program investigated the extent and nature of archaeological deposits adjacent to known artefact scatters;
2. Auger locations to test soil depth: The initial phase of the auger program was to investigate three areas where there are known artefact scatters but where the initial analysis is that soil depths are too shallow to preserve archaeological deposits and thereby making test excavation unwarranted. However, to test the survey analysis, a hand auger program took place at these locations to determine if further test excavation was warranted; and
3. Auger locations where ground surface visibility is low: Following the completion of criterion 2 above, the auger program investigated other areas along Redbank Creek and adjacent landforms where ground surface visibility was low and where there were no known artefact scatters. Should the auger program in these areas indicate that test excavation would be warranted, then test excavation would take place at these locations to determine the presence or absence of archaeological deposits.

As noted above, no testing took place surrounding Dam 1 as there has been a high degree of previous disturbance in this area that would make test excavation unwarranted.

7.2.4 Additional Areas Investigated

As will be shown below, the results of the test excavation program were such that the program advanced quicker than was initially envisaged at the time of the preparation of the test excavation methodology. As a result, two additional areas were subjected to test excavation: Area 5 and Area 6. These areas were investigated by the same sampling strategy as set out in **Section 7.2.5.1** and are shown in **Figure 7–1**.

Figure 7-1. The Survey Area showing the location of all areas investigated during the test excavation program.



7.2.5 Initial Test Pit Locations

Area 1: This area has a moderate degree of disturbance from drainage works and the majority of the artefacts were recorded along raised bunds. The aim of the test excavation in this area was to determine if there are intact archaeological deposits in areas less-disturbed by the earthworks.

Area 2: This area is an extensive series of exposures on the southern bank of Redbank Creek. The aim of the test excavation in this area was to investigate the nature and extent of deposits adjacent to the visible artefact exposures.

Area 3: Like Area 2, Area 3 is an extensive series of exposures on the southern bank of Redbank Creek. The aim of the test excavation in this area was to investigate the nature and extent of deposits adjacent to the visible artefact exposures.

Area 4: An extensive artefact exposure was recorded along a minor drainage line in the Wambo lease area. Soil profiles adjacent to the exposures appear intact. The aim of the test excavation in this area was to investigate the nature and extent of deposits adjacent to the visible artefact exposures.

Area 5: Only a few artefacts were recorded in this area during the survey but as it lay directly across Redbank Creek from Area 2, Area 5 was investigated to gain some insight into the nature of deposits on the northern bank of Redbank Creek.

Area 6: The placement of this area was to investigate the nature of archaeological deposits in the eastern portion of Redbank Creek. Excavations took place on both the northern and southern bank of the creek.

7.2.5.1 Sampling strategy

The sampling strategy in the six areas designated for initial test excavation (**Figure 7–1**) took the form of first excavating 0.5m by 0.5m excavation squares at 10m intervals to create a linear transect of 50m (called here the 'initial transect'). These transects were placed directly adjacent to known concentrations of artefacts (i.e. out of erosion areas) that had been identified in during the survey or through the geoarchaeological auger program.

If the final pit of the initial transect recorded reasonable numbers of artefacts (i.e. more than 15 – equivalent to 60 artefacts per square metre[10]) the initial transect could be expanded linearly, in 10m intervals, until such time as it is clear that the site boundary had been passed (i.e. test excavation pits that are recording no artefacts or very low artefact densities of less than five artefacts per pit), the extent of potential impact has been reached or the transect has been expanded to a maximum linear distance of 100m.

If, along the initial transect, reasonable numbers of artefacts (i.e. more than 15 – equivalent to 60 artefacts per square metre) or archaeological features were encountered, then a further transect (also at 10m intervals) could be placed at right angles to the pit containing the artefacts/features so that it runs away from the watercourse (or across a particular landform). An archaeological feature could be such things as a hearth or an unusually high concentration of artefacts. This transect would continue until it is clear the site boundary had been passed. Along any one initial transect these perpendicular transects would be limited to a maximum of two.

Thus, at any one location a minimum of six pits were excavated and it was envisioned that, at most locations, allowing for perpendicular expansion, that up to 11 pits would be excavated to give a testing area of 50m by 50m (i.e. six pits along the initial transect = 50m plus five pits perpendicular to the transect = 50m).

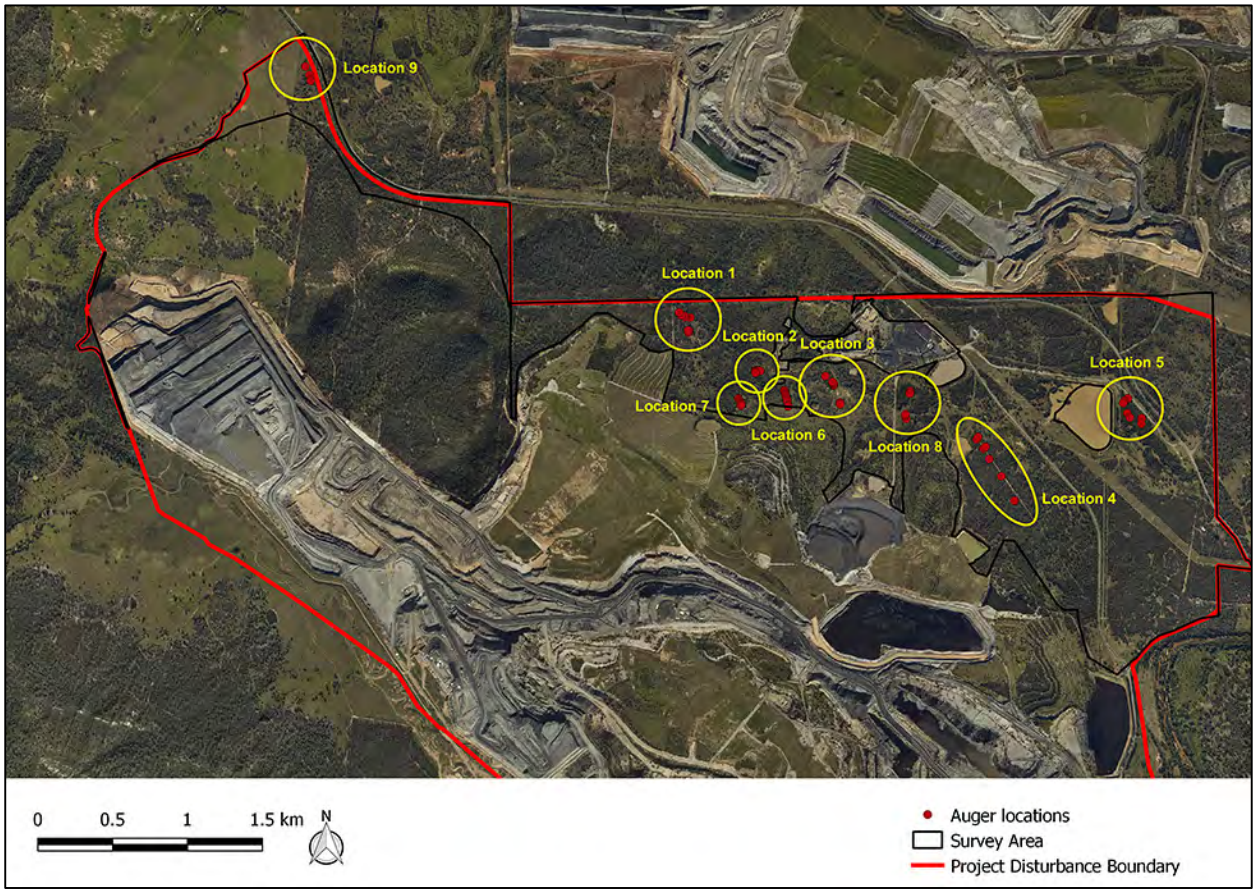
Should notable concentrations of artefacts (i.e. in excess of 60 artefacts per square metre) and/or archaeological features such as hearths be encountered in any pit along any transect, the methodology allowed for additional 0.5m by 0.5m pits to be placed immediately adjacent to the

[10] For the purposes of this investigation an artefact was defined as having dimensions greater than 15mm.

pit containing the artefacts/feature to allow a full examination of the feature (up to the maximum of 3m^2 allowed under the Code of Practice).

In this way transects not only investigated the distribution of artefacts along a watercourse or landform feature, but also the distribution away from the watercourse (or across a landform feature) to determine site boundaries.

Figure 7-2. The Survey Area showing the location of all areas investigated during the auger program.



7.2.6 Auger program to investigate soil depth adjacent to known artefact scatters

At four locations (Locations 1, 7, 4 and 9; **Figure 7–2**) artefacts were recorded during the survey but were located in areas where a shallow soil depth was assumed. To test this conclusion, a hand-auger program was deployed in order to confirm or refute the initial analysis of shallow soil depth. If the auger program revealed soil depths that may contain archaeological deposits in these areas then, following the completion of Areas 1–6 outlined in **Section 7.2.5**, the test excavation program would move to these locations and carry out test excavation using the same sampling strategy as outlined in **Section 7.2.5.1**.

7.2.6.1 Sampling strategy

The aim of the auger program was to identify any more-recent overburden and the depth of the A1 and A2 soil horizons in relation to the B soil horizon. The auger program attempted to identify

the horizontal extent of potential archaeological deposits and investigate whether a landform contains features such as palaeochannels, buried soils and/or palaeosols. The nature of the auger program is that an extensive landform can be tested relatively quickly.

The auger program hand-augered boreholes on a 10m grid and recorded soil texture, soil colour (recorded moist using the Munsell colour system), soil pH and soil inclusions from each borehole. Should the data from each borehole indicate no soil change from the previous borehole, then the auger team could decide to only fully record anomalous boreholes. This information was recorded using pre-prepared recording forms.

If soil sequences were identified that had archaeological potential, then the auger program was followed by a test excavation program as outlined in **Section 7.5.2**.

7.2.7 Auger program to investigate areas of low ground surface visibility

At several locations along Redbank Creek the vegetation was so thick that it was impossible to see the ground surface and to accurately evaluate the archaeological potential of particular areas. In the five areas shown in **Figure 7–2** (Locations 2, 3, 5, 6 and 8), the auger program determined if test excavation in these areas was warranted. The auger program in these areas followed the completion of the auger program outlined in **Section 7.2.6**. The auger program followed the same sampling and recording methodology as set out in **Section 7.2.6.1**.

If the auger program in these areas revealed soils and/or soil depth indicating that test excavation was warranted, then test excavation could take place in those areas following the methodology set out in **Section 7.2.5.1**.

7.2.8 Sampling strategy compliance with the Code: Requirement 16

1 Test excavation units must be placed on a systematic grid appropriate to the scale of the area—either PAD or site—being investigated e.g. 10m intervals, 20m intervals, or other justifiable and regular spacing.

- The sampling strategy outlined above complies with this requirement.

2 Any test excavation point must be separated by at least 5m.

- The sampling strategy outlined above complies with this requirement. It should be noted that while the initial transects had 10m intervals that the Code allows expansion around pits displaying notable concentrations of artefacts (i.e. more than 60 artefacts per square metre) or archaeological features. These ‘expansions’ are limited to a maximum area of $3m^2$.

3 Test excavations units must be excavated using hand tools only.

- The sampling strategy outlined above complies with this requirement.

4 Test excavations must be excavated in 0.5m by 0.5m units.

- The sampling strategy outlined above complies with this requirement.

5 Test excavations units may be combined and excavated as necessary to understand the site characteristics, however:

i) the maximum continuous surface area of a combination of test excavation units at any single excavation point conducted in accordance with point 1 (above) must be no greater than $3m^2$;

- The sampling strategy outlined above complies with this requirement.

ii) the maximum surface area of all test excavation units must be no greater than 0.5% of the area—either PAD or site—being investigated.

- The number and size of test excavations undertaken as part of this program was managed to ensure that this requirements was satisfied.

6 Where the 0.5m by 0.5m excavation unit is greater than 0.5% of the area then point 5 (ii) (above) does not apply.

- Not applicable. As all potential archaeological deposits are spatially large, less than 0.5 per cent of the known potential archaeological deposits dimensions were investigated.

7 The first excavation unit must be excavated and documented in 5cm spits at each area — either PAD or site—being investigated. Based on the evidence of the first excavation unit, 10cm spits or sediment profile/stratigraphic excavation (whichever is smaller) may then be implemented.

- Initial excavation squares were excavated in 5cm spits to determine whether archaeological stratigraphy was present. If stratigraphy was not present, spit size was increased to 10cm.

8 All material excavated from the test excavation units must be sieved using a 5mm aperture wire-mesh sieve.

- The excavated material from all pits was sieved on site using dry sieving through nested sieves of 6–8mm and 2.5–3.5mm mesh (which is considered to satisfy the 5mm aperture wire-mesh sieve requirement).

9 Test excavation units must be excavated to at least the base of the identified Aboriginal object-bearing units, and must continue to confirm the soils below are culturally sterile.

- This requirement was fulfilled in the field and all excavation squares were excavated to the basal clays. To ensure that, as suspected, these basal clays are culturally sterile, several deeper probes in each excavation area were excavated into these clays to ensure that they are, in fact, culturally sterile.

11 Photographic and scale-drawn records of the stratigraphy/soil profile, features and informative Aboriginal objects must be made for each single excavation point.

- A standard excavation recording form was used for each excavated pit. Details included; date, site recorder, spit number and depth, description of finds, description of soil, sketch plan of excavation (if relevant to show structure), end of spit levels, soil pH (when necessary or appropriate) and a bucket tally.
- If appropriate (i.e. intact archaeological stratigraphy was recorded) section drawings were completed for appropriate pits. If no archaeological stratigraphy was recorded then digital photographs were taken of a representative section of each pit and a suitably representative drawing made of the pit section to show the soil profile.
- Analysis of all excavated lithics were made in order to determine the site's characteristics and to enable the site to be compared with other sites in the region. Analysis also assisted in determining what type of activities the Aboriginal people carried out at the site and their relationship with local resources (fauna, flora, water and stone). All artefacts were analysed and selectively photographed.

12 Test excavations units must be backfilled as soon as practicable.

- Each excavator was responsible for sieving the deposit from their pit, retrieving the artefacts and, in conjunction with the supervising archaeologist, correctly recording their provenance. Deposits were sieved on to tarpaulins and the spoil used to backfill the pit.

13 Following test excavation, an Aboriginal Site Impact Recording form must be completed and submitted to the AHIMS Registrar as soon as practicable, for each AHIMS site that has been the subject of test excavation in accordance with the requirements of the Code.

- It is the responsibility of OzArk to ensure that this requirement is met.

7.3 THE ARTEFACT CATALOGUE

7.3.1 Analysis terminology

The artefact catalogue of the excavation assemblage forms the basis of the presentation and discussion of test excavation results that follow. The full catalogue is presented in **Appendix 21**.

Preliminary examination of the assemblage prior to cataloguing noted that it was not a complex assemblage with almost all artefacts being unmodified flakes. As a result, a tailored analysis was carried out on the assemblage that allowed the site's characteristics to be captured. The flake attributes that were analysed for the assemblage are shown in **Table 7–1**.

Table 7-1. Description of artefact catalogue.

Catalogue entry	Description of catalogue entry
Area	Denotes which of the six excavation areas is being referred to (see **Figures 6–1** and **6–2**).
Transect	(Tr) Denotes which transect within an area is being referred to.
Square	(Sq) Denotes which square within a transect is being referred to.

Catalogue entry	Description of catalogue entry
Spit	All spits were 5cm. Therefore Spit 1 is 0cm to 5cm. If no spit is recorded it is because, due to the paucity of results, the entire pit was excavated in one spit.
Artefact type	Describes the type of artefact recorded. At this excavation, primarily flakes or less commonly blades, cores or scarpers etc. The following abbreviations are used: F = Flake; B = Blade; FP = Flaked Piece; BF = Backed Flake; BB = Backed Blade; M = Microlith; ES = End scraper; SS = Side scraper; A = Ground edge axe; AB = Axe blank; C = Core; S = Shatter; AH = Anvil/hammerstone; O = Other
Raw Material	Silcrete, mudstone, quartz and volcanics were recorded in the Survey Area. The following abbreviations are used: MS = Mudstone; S = Silcrete; C = Chert; T = Tuff; B = Basalt; V = Volcanics (other); PW = Petrified Wood; QZ = Quartzite; Q = Quartz; O = Other
Integrity	Records whether an artefact is complete or broken, and if broken, what type of break has occurred (i.e. whether the break is to the top (proximal) end of a flake, to the bottom (distal) end or medial if both proximal and distal ends are missing. Rarely longitudinal breaks (i.e. broken down the flake's axis) were recorded.
Max. dimension	Most often this measurement is along the plane of percussion. In some instances, such as when a flake is inordinately wide, measurement along the largest plane is taken. Size ranges are provided where: 1 = 0-10mm; 2 = 10-20mm; 3 = 20-30mm; 4 = 30-50mm; 5 = 50-100mm; 6 = greater than 100mm.
Reduction phase	The percentage of cortex in comparison to the full artefact was catalogued according to the following scale. Primary reduction (1): 50% or more cortex; Secondary reduction (2): 1% to 50% cortex; Tertiary reduction (3): no cortex.
Rotation	A parallel rotation (p) is one where the dorsal scars are in the same direction as the flake's plane of percussion. A rotated flake (r) is one where the dorsal flake scars are at a varying angle to the flake's plane of percussion. Not discernible (n) refers to flakes with cortical dorsal surfaces where rotation cannot be determined or on often small flakes that only retain one previous flake scar on the ventral surface.
Platform type	Records the proximal characteristics of a flake. Terms used to describe platforms are 'simple' (s) for what would commonly be regarded as a standard platform showing no faceting; 'point' (p) for very small platforms; 'Cortex' © for platforms containing cortex; 'Crushed' (cr) for platforms displaying crushing/shattering to the platform; and "Flaked (f) for platforms displaying platform preparation in the form of several flake removals from the platform surface.
Platform size	When intact on an artefact the platform size was described through the following abbreviations: 1 = Point; 2 = Very small (up to c. 3mm); 3 = Small (up to c. 5mm); 4 = Moderate (up to c. 10mm); 5 = Large (over c. 10mm)
Termination type	Records the distal characteristics of a flake. At this excavation 'Feather' (f) terminations were common where a flake terminates in a smooth, triangular cross-section. Also present were 'Step/Hinge' (sh) terminations and rarely 'Plunge' (p) terminations.
Notes	Any additional comments are provided here.

A discussion on why these attributes were analysed follows.

Artefact type

Description: Possible artefact types include flakes, blades, retouched flakes/blades, cores, scrapers, shatter/fragments and other (hammerstones, grindstones, ground-edge axes) although not all may be present at any one site.

Issues: Classing artefacts, generally, does not usually entail significant problems. A minority of artefacts are difficult to define such as ambiguities between recognising flaked pieces (flakes subsequently used as a core to source further flakes), and between cores and scrapers.

Uses: This category will be used to assess differences in provisioning strategies (e.g. core provisioning as opposed to flake provisioning), differences in site function/use

(e.g. presence/absence of grindstones), and the taphonomic effects of past land use on the site (are more broken artefacts part of the assemblage?).

Raw Material

Description: A largely self-explanatory attribute, raw materials expected to be present include silcrete, mudstone, quartz and volcanics.

Issues: This category often has problems for analysts without a geological background. Even then, without breaking an artefact, the true nature of the stone will sometimes remain uncertain. Illustrations are provided in **Table 7–2** to remove the ambiguity often associated with stone raw material identification. This will allow other researchers to identify the type of stone recorded here as, for example, 'silcrete'.

Uses: Raw material is an important attribute, which may broadly indicate the place of origin of an artefact. The dominance of one raw material or another may also be used to group or differentiate sites. Raw material is also frequently used in concert with attributes in the creation of analytic units for more in-depth inter and intra site comparisons.

Table 7-2. Examples of raw materials from the Survey Area.

Description	Illustration
Silcrete At the Survey Area the silcrete ranged from a pinkish colour (as illustrated here) through to a very pale colour. At a small scale the silcrete contains many small inclusions although it is generally fine-grained of good knapping quality. The example to right comes from Area 1 TR2 SQ1 Spit 4.	
Mudstone At the Survey Area mudstone ranged from a light orange (as illustrated here) to a reddish colour. The mudstone is fine-grained of good knapping quality. The example to right comes from Area 1 TR2 SQ4 Spit 2.	

Volcanics At the Survey Area volcanics were rare with a single example being recorded. The volcanic is fine-grained and of good knapping quality. The example to right comes from Area 1 TR2 SQ9 Spit 2.	

Artefact Breakage

Description: At a basic level, flakes break in three different ways. Two are transverse (at 90 degrees to the direction of percussion) – proximal and distal; one is longitudinal (along the plane of percussion).

Issues: It is occasionally difficult to be certain of the breakage on an artefact. In most cases, however, the kind of breakage can be ascertained.

Use: It is important to differentiate broken from complete flakes for the purposes of analysis, as the two are not comparable in regard to a number of measures. The amount of artefact breakage in an assemblage also indicates the degree of fragmentation to which the assemblage has been subject. In highly fragmented assemblages, the actual number of artefacts represented may be significantly exaggerated. Quantifying breakage allows a more accurate approximation of artefact numbers to be made.

Dimensions[11]

Description: Percussive dimensions measure the maximum length of the flake in the direction of force application from the point that force was applied. In this regard it relates to the length of core face that was removed during the manufacture of the artefact.

Issues: There is some uncertainty as to what these attributes are actually measuring in terms of the flake manufacturing process.

Use: Flake dimensions are expected to correlate with differences in the provisioning and reduction strategies at different places. For example, the reduction of cores at a site will produce

[11] From experience OzArk does not routinely weigh artefacts as this information has been found to closely correlate either to artefact size or the raw material from which the flake has been struck. Thus smaller artefacts are lighter than larger artefacts when made from the same material and artefacts made from denser stone (such as volcanics) are heavier than comparably sized artefacts from lighter (less-dense) stones such as IMT. In practice, the category cataloguing the maximum size of the artefact is analogous with the artefact's weight.

a large number of moderate to small flakes and some larger flakes. As a result, a histogram of flake length will show a relatively consistent increase in number of flakes from large to small. Contrastingly, when most flakes are the result of retouching or maintenance tasks on other flakes, the majority of the flakes remaining should be very small, with comparably few large to moderate flakes. However, it may be the case that a few moderate to large flakes will be discarded at the site as they are exhausted through excessive/heavy retouch or simply thrown away prior to a reprovisioning event. In such a case, a histogram of artefact size should show bimodality in regard to length (a small peak in the moderate range and a large peak in the small range).

Reduction

Description: This category refers to the level of reduction evident on an artefact. This is assessed by the amount of cortex remaining on the artefact. Cortex refers to the 'skin' of a rock – the surface that has been weathered to a different texture and colour by exposure to the elements over a long period. The amount of cortex as a percentage of surface area will be measured on all artefacts (in relation to flakes, cortex can, by definition only occur on the dorsal and platform surfaces). The nature of cortex – its shape and texture – will vary depending on where the raw material was sourced. This measurement will help determine if a particular artefact is at a primary, secondary or tertiary level of reduction.

Issues: This is a relatively unambiguous descriptive category.

Use: When a natural cobble is first selected it will usually be covered in cortex. Therefore the first artefacts produced from it will have a complete coverage of cortex on the dorsal side (primary reduction). As the cobble is increasingly reduced the amount of cortex on each artefact will rapidly decrease (secondary reduction) until it ceases to be present on artefacts (tertiary reduction). As a result of this trend, it should be possible to determine how early in the reduction sequence the artefact was produced. If large numbers of artefacts or a high proportion of the artefacts of a raw material retain cortex it may indicate that the site is located in close proximity to the source. Differences between the proportions of artefacts retaining cortex between different raw material indicates relative differences in distance to source. This does not necessarily mean distance in terms of measurable distance across the landscape; it may also reflect length of time since leaving the source. For example, the last campsite when a group is returning to the source of the raw material may be very close to the source in terms of distance, but distant in terms of time elapsed since the group left the source. If artefacts with cortex are occurring in sites a long distance from the place of origin of the natural cobble, then it is likely that cobbles were being transferred to the site when still only slightly reduced. This would imply an attempt to maximise the amount of stone being provisioned with the weight of transported material being a relatively minor concern.

Rotation

Description: Describes whether a particular flake was struck from a core that was rarely rotated (a unidirectional or bidirectional core), or from a core that has been rotated frequently (a multidirectional core).

Issues: There is little ambiguity in assessing this category. If the orientation of previous flakes was unclear, this category is left blank.

Use: An examination of the direction in which previous flake scars on an artefact's dorsal surface have been removed, along with the orientation in which the flake itself was removed from its core, will give evidence about the core from which the flake was struck. This enables a greater sample pool to determine the types of cores used in the Project Disturbance Boundary even if the original core may not have been recorded in the investigation.

Platform Surface

Description: Platform surface will be recorded as one of the following: simple, point, cortical, crushed or flaked.

Issues: This is a largely unambiguous descriptive attribute.

Use: The surface of a platform provides information about the history of the core prior to the detachment of the flake, and also about methods employed to control the flaking process. In particular 'point' platforms often imply the use of an intermediary punch (or in-direct percussion) to remove a flake; while 'simple' platforms are often indicative of free-hand percussion. Crushing on the platform surface can imply a bipolar reduction technique where the core is first rested on an anvil prior to the flake being detached. Platforms displaying flaking have been linked to the systematic production of 'blades'. Patterns in the spatial distribution of these attributes may be used to infer differences in reduction strategies.

Platform Size

Description: Platform size will be recorded as fulfilling one of a series of size ranges.

Issues: This is a largely unambiguous descriptive attribute.

Use: Like the platform surface, platform size is illustrative in determining the type of reduction technique used to detach a flake. Generally speaking, the smaller (finer) the platform size implies a greater likelihood that it was detached by in-direct percussion rather than direct percussion which often results in a large platform size.

Termination

Description: Termination refers to the way in which force leaves a core during the detachment of a flake. Every complete flake has a termination. There are patterns in the forms that terminations

will take, with the three major categories (those to be used here) being feather, hinge/step and plunging (outrepasse).

Issues: This is a largely unambiguous descriptive attribute although care needs to be taken to distinguish terminations on a previous flake scar from hinge/step terminations or breakages.

Use: Different terminations have different implications both for flake and core morphology. A flake with a feather termination (in which force exits the core at a low or gradual angle) will have a continuous sharp edge around the periphery beneath the platform. This has advantages in terms of the amount of the flake edge that can be used for cutting and also makes the flake more amenable to subsequent retouching or resharpening activities. Detaching flakes with feather terminations also has minimal impact on the effective platform angle of the core, and so platform angle thresholds are reached relatively slowly while feather terminating flakes continue to be produced.

Hinge and step terminating flakes have none of these advantages. They result in edges that are amenable neither to cutting nor to retouching. Furthermore, hinge and step terminations lead to rapidly increasing effective platform angles, leading to a requirement for core rejuvenation and core exhaustion. For these reasons, such terminations are considered undesirable or *aberrant*. The number of aberrant flake terminations is expected to increase towards the end of a core's use-life, as reduction in core size and increase in core platform angle make it increasingly difficult to detach feather terminating flakes. In areas where aberrantly terminating flakes are relatively common it may be inferred that core potential was more thoroughly exploited. From this it may in turn be inferred that the pressure to realize core potential (e.g. a strategy of heavy raw material conservation) was greater. Increased mobility/emphasis on portability is one possible explanation of such a pattern.

Plunging or outrepasse flakes have the opposite effect on core morphology to step and hinge flakes, in that they remove the entire core face and part of the core bottom. As a result, such flakes may be used to rejuvenate cores in which core angles have become high but which still retain useable potential (e.g. are still quite large). The presence of outrepasse flakes may be taken to indicate core rejuvenation and the requirement to increase core use-life.

7.3.2 Research Considerations

Stone artefacts are probably the most resilient physical evidence of Aboriginal occupation in Australia and for many parts of the country form the most abundant archaeological evidence of Aboriginal occupation. Stone artefacts are important because they are tangible evidence of Aboriginal use of an area and can potentially contain information about lithic activities, the organisation of stone technologies, and potentially information about larger-scale issues of settlement organisation across regions and even social change over time.

The kinds of information which can be obtained from stone artefacts may vary considerably, depending in part on:

- The numbers of artefacts which can be examined and recorded: generally, the larger the number of artefacts the more reliable will be statistical statements about them;
- The presence of other assemblages with which the artefacts can be compared;
- The condition of sites in which they occur: generally undisturbed sites have more information potential than disturbed sites, depending on the scale at which research is carried out; and
- The theory which underlies the artefact recording and analysis.

7.3.2.1 Statistically useful sample sizes

A large enough number of artefacts need to be recorded so that analyses can be based on statistically sound data (Leonard and Jones 1989). The numbers of artefacts which are needed in a sample will depend on how common or rare certain kinds of artefacts are. If a summary of most common raw material types is required then a random sample of 20 or 30 artefacts might suffice. On the other hand if no backed artefacts were found, and this type normally makes up 1% of an assemblage, then several hundred artefacts would need to be recorded to indicate whether or not backed artefacts are present on a site or in a certain landscape setting. Ideally, sample sizes should be large enough to be able to carry out statistical tests of significance (Clegg 1990).

7.3.2.2 Condition

As a general rule artefacts from undisturbed sites may be able to provide more information than artefacts from disturbed sites. On sites in good physical condition it may be possible to identify artefacts relating to individual lithic activities, such as knapping floors (Hiscock & Mitchell 1993). It may be possible to refit or conjoin artefacts, and analyse the evidence from those activities (White 1999). On very heavily disturbed sites the artefacts themselves may be very broken, making it harder to analyse them.

7.3.2.3 Theory and recording

Stone artefacts can be recorded and analysed in different ways to give different kinds of information about different topics. The variables that are recorded and the interpretations which are made will depend in part on the theory which underlies the analysis. If someone wants to know what stone tools were used for, then artefacts should be examined under a microscope for use-wear and residues. If someone wants to know how stone was flaked and tools were made then a technological analysis may record data on stone flaking such as patterns of scarring on cores or flakes. If someone wants to know about how stone materials were obtained (procured),

transported and discarded then recording might focus on stone raw materials – information about raw material types and where they occur naturally in the landscape will be critical, and raw material type and size of artefacts may be recorded.

Consulting projects may seek to provide a basic description of an assemblage, recording just a few variables to give information about general topics. The present analysis records provenance information (where each artefact was found) and nine other variables, with some additional information for modified artefacts and cores. This level of recording should not be regarded as a definitive record of the assemblage. If artefacts are kept in a safe place they can be reanalysed in the future to provide new information and address new questions.

7.4 TEST EXCAVATION RESULTS

7.4.1 Preamble

The results of the test excavation program were surprisingly sparse. 153 0.5m by 0.5m excavation squares were excavated at six separate localities: a total of 38.25 square metres. From this area of excavation, 192 artefacts were recovered; an average of five artefacts per square metre or 1.25 artefacts per excavation square. This density of artefacts is extremely low.

In addition there were only two excavation squares that recorded artefacts in numbers greater than 20 and these squares were located in different areas and squares excavated adjacent to them failed to recorded similar artefact numbers.

Therefore, in summary, the results show an extremely low incidence of subsurface artefacts apart from two isolated clusters. This is in marked contrast to the surface artefacts that were visible within metres of the excavation squares. While more shall be said in the discussion section below (**Section 8.2**), it would appear that, as a result of the historic disturbances to the area, that intact subsurface deposits are extremely rare within the Survey Area and that the visible artefacts are either remnants of sites that have completely eroded away or have been re-deposited at their current location from elsewhere. What can be said with some certainty is that the visible surface artefacts are not the eroded portion of a site that extends into the non-eroded portions of the adjacent landform.

Consequently, due to the low artefact numbers it is difficult to draw many conclusions from the test excavation assemblage as any one location did not record artefacts in sufficient quantities to make analysis, beyond the most basic, meaningful (see **Section 8.2.1**).

Table 7–3 summarises the location and results from each excavation square (locations of each area are shown in **Figure 7–1**). The artefact count in this table records all artefacts, regardless of size, and regardless of whether they are broken or pieces catalogued as ‘shatter’. As can be seen in this table, 104 excavation squares (or 68 per cent) recorded no artefacts and a further 41 excavation squares (or 27 per cent) recorded between one and five artefacts. Therefore only

five per cent of the excavation squares contained artefacts at a density greater than 20 per square metre: a benchmark which is commonly regarded as the division between a 'background scatter of artefacts' and artefacts being recorded at densities that allow meaningful interpretation.

This underlines the extreme paucity of data with which this report can both compare to contemporary excavations elsewhere and to the results obtained within the Survey Area by former researchers stretching back to the early 1980s.

Table 7-3. Summary of results from each excavation square.

GDA Zone 56 East	GDA Zone 56 North	Area	Transect	Square	Artefacts (total)	Excavated?
310983	6396758	Area 1	TR1	1	0	yes
310988	6396757	Area 1	TR1	2	1	yes
310993	6396757	Area 1	TR1	3	0	yes
310997	6396756	Area 1	TR1	4	0	yes
311003	6396755	Area 1	TR1	5	0	yes
311007	6396756	Area 1	TR1	6	0	yes
311011	6396755	Area 1	TR1	7	1	yes
310986	6396780	Area 1	TR2	1	1	yes
310991	6396779	Area 1	TR2	2	2	yes
310996	6396778	Area 1	TR2	3	0	yes
311001	6396777	Area 1	TR2	4	1	yes
311006	6396776	Area 1	TR2	5	0	yes
311010	6396775	Area 1	TR2	6	0	yes
311015	6396773	Area 1	TR2	7	0	yes
311019	6396773	Area 1	TR2	8	0	yes
311024	6396773	Area 1	TR2	9	1	yes
311029	6396771	Area 1	TR2	10	1	yes
310985	6396808	Area 1	TR3	1	0	yes
310991	6396806	Area 1	TR3	2	0	yes
310997	6396804	Area 1	TR3	3	0	yes
311001	6396803	Area 1	TR3	4	2	yes
311006	6396802	Area 1	TR3	5	1	yes
311011	6396800	Area 1	TR3	6	0	yes
311016	6396798	Area 1	TR3	7	3	yes
311021	6396797	Area 1	TR3	8		no
311026	6396795	Area 1	TR3	9	2	yes
311030	6396794	Area 1	TR3	10	1	yes
311076	6396852	Area 1	TR4	1	0	yes
311081	6396853	Area 1	TR4	2	2	yes
311085	6396856	Area 1	TR4	3	0	yes
311089	6396855	Area 1	TR4	4	0	yes
311094	6396853	Area 1	TR4	5	5	yes
311188	6396734	Area 2	TR1	1	0	yes
311193	6396733	Area 2	TR1	2	1	yes

GDA Zone 56 East	GDA Zone 56 North	Area	Transect	Square	Artefacts (total)	Excavated?
311197	6396732	Area 2	TR1	3	1	yes
311267	6396744	Area 2	TR2	1	4	yes
311271	6396745	Area 2	TR2	2	0	yes
311276	6396743	Area 2	TR2	3	0	yes
311281	6396743	Area 2	TR2	4	0	yes
311338	6396657	Area 2	TR3	1	0	yes
311343	6396656	Area 2	TR3	2	0	yes
311347	6396656	Area 2	TR3	3	0	yes
311360	6396668	Area 2	TR4	1	0	yes
311364	6396669	Area 2	TR4	2	0	yes
311369	6396669	Area 2	TR4	3	1	yes
311407	6396680	Area 2	TR5	1	0	yes
311411	6396677	Area 2	TR5	2	0	yes
311414	6396674	Area 2	TR5	3	0	yes
311418	6396672	Area 2	TR5	4	0	yes
311422	6396669	Area 2	TR5	5	0	yes
311426	6396667	Area 2	TR5	6	0	yes
311430	6396664	Area 2	TR5	7	0	yes
311434	6396661	Area 2	TR5	8	0	yes
311438	6396659	Area 2	TR5	9	0	yes
311186	6396772	Area 2	TR6	1	0	yes
311182	6396763	Area 2	TR6	2	7	yes
311178	6396753	Area 2	TR6	3	39	yes
311177	6396745	Area 2	TR6	4	0	yes
311175	6396735	Area 2	TR6	5	3	yes
311172	6396725	Area 2	TR6	6	0	yes
311170	6396716	Area 2	TR6	7	0	yes
311167	6396708	Area 2	TR6	8	0	yes
311175	6396749	Area 2	TR6	9	0	yes
311181	6396759	Area 2	TR6	10	0	yes
311222	6396778	Area 2	TR7	1	1	yes
311231	6396784	Area 2	TR7	2	0	yes
311239	6396740	Area 2	TR8	1	1	yes
311241	6396745	Area 2	TR8	2	3	yes
311242	6396750	Area 2	TR8	3	0	yes
311244	6396755	Area 2	TR8	4	0	yes
311188	6396751	Area 2	TR9	1	0	yes
311199	6396750	Area 2	TR9	2	2	yes
311211	6396749	Area 2	TR9	3	1	yes
311222	6396747	Area 2	TR9	4	1	yes
312067	6396626	Area 3	TR1	1	1	yes
312072	6396624	Area 3	TR1	2	0	yes
312077	6396622	Area 3	TR1	3	0	yes
312082	6396621	Area 3	TR1	4	0	yes

GDA Zone 56 East	GDA Zone 56 North	Area	Transect	Square	Artefacts (total)	Excavated?
312087	6396620	Area 3	TR1	5	0	yes
312093	6396620	Area 3	TR1	6	0	yes
312100	6396621	Area 3	TR1	7	0	yes
312081	6396632	Area 3	TR2	1	0	yes
312086	6396633	Area 3	TR2	2	0	yes
312091	6396634	Area 3	TR2	3	0	yes
312022	6396645	Area 3	TR3	1	1	yes
312026	6396645	Area 3	TR3	2	0	yes
312030	6396648	Area 3	TR3	3	0	yes
312035	6396651	Area 3	TR3	4	0	yes
312121	6396653	Area 3	TR4	1	0	yes
312125	6396652	Area 3	TR4	2	0	yes
312140	6396587	Area 3	TR5	1	0	yes
312144	6396586	Area 3	TR5	2	0	yes
312149	6396586	Area 3	TR5	3	0	yes
312155	6396586	Area 3	TR5	4	0	yes
312159	6396585	Area 3	TR5	5	1	yes
312164	6396585	Area 3	TR5	6	0	yes
312169	6396584	Area 3	TR5	7	0	yes
312081	6396612	Area 3	TR6	1	0	yes
312082	6396600	Area 3	TR6	2	0	yes
312083	6396590	Area 3	TR6	3	0	yes
313159	6395126	Area 4	TR1	1	0	yes
313158	6395121	Area 4	TR1	2	1	yes
313159	6395117	Area 4	TR1	3	0	yes
313159	6395114	Area 4	TR1	4	0	yes
313160	6395108	Area 4	TR1	5	0	yes
313161	6395103	Area 4	TR1	6	0	yes
313162	6395097	Area 4	TR1	7		no
313162	6395092	Area 4	TR1	8	0	yes
313163	6395087	Area 4	TR1	9	0	yes
313221	6395054	Area 4	TR2	1		no
313223	6395051	Area 4	TR2	2	0	yes
313227	6395033	Area 4	TR2	3	0	yes
313232	6395028	Area 4	TR2	4	1	yes
313235	6395026	Area 4	TR2	5	14	yes
313228	6395022	Area 4	TR2	6	0	yes
313234	6395030	Area 4	TR2	7	0	yes
313232	6395025	Area 4	TR2	8	1	yes
313268	6395054	Area 4	TR3	1	0	yes
313274	6395051	Area 4	TR3	2	0	yes
313278	6395049	Area 4	TR3	3	0	yes
313280	6395044	Area 4	TR3	4	2	yes
313281	6395041	Area 4	TR3	5	0	yes

GDA Zone 56 East	GDA Zone 56 North	Area	Transect	Square	Artefacts (total)	Excavated?
313237	6395090	Area 4	TR4	1	0	yes
313240	6395088	Area 4	TR4	2	23	yes
313244	6395085	Area 4	TR4	3	11	yes
313243	6395085	Area 4	TR4	4	3	yes
313197	6395101	Area 4	TR5	1	0	yes
313200	6395097	Area 4	TR5	2	0	yes
313201	6395093	Area 4	TR5	3	0	yes
313204	6395091	Area 4	TR5	4	0	yes
313182	6395135	Area 4	TR5	5	0	yes
311206	6396819	Area 5	TR1	1	0	yes
311209	6396822	Area 5	TR1	2	0	yes
311213	6396825	Area 5	TR1	3	0	yes
311219	6396827	Area 5	TR1	4	0	yes
311223	6396829	Area 5	TR1	5		no
311230	6396831	Area 5	TR1	6	0	yes
311236	6396833	Area 5	TR1	7		no
311241	6396835	Area 5	TR1	8	0	yes
311245	6396838	Area 5	TR1	9	0	yes
311251	6396840	Area 5	TR1	10	0	yes
313676	6396190	Area 6	TR1	1	0	yes
313686	6396186	Area 6	TR1	2	0	yes
313695	6396185	Area 6	TR1	3	0	yes
313691	6396168	Area 6	TR2	1	0	yes
313694	6396165	Area 6	TR2	2	0	yes
313699	6396160	Area 6	TR2	3		no
313706	6396155	Area 6	TR2	4	0	yes
313498	6396292	Area 6	TR3	1	1	yes
313498	6396292	Area 6	TR3	2	1	yes
313501	6396291	Area 6	TR3	3	4	yes
313501	6396290	Area 6	TR3	4	2	yes
313497	6396286	Area 6	TR3	5	8	yes
313500	6396286	Area 6	TR3	6	8	yes
313489	6396299	Area 6	TR3	7	1	yes
313489	6396301	Area 6	TR3	8	2	yes
313492	6396299	Area 6	TR3	9	6	yes
313493	6396298	Area 6	TR3	10	3	yes
313512	6396279	Area 6	TR3	11		no
313510	6396279	Area 6	TR3	12	4	yes

7.4.2 Description of Excavation Areas

The following section will describe the landscape features of each excavation area along with an analysis of any landform modification present that may pertain to the excavation results. Excavation areas are shown in **Figure 7–1**.

Area 1

Located on the northern bank of Redbank Creek in an area of moderate modification from the construction of a vent and explosives compounds. In association with these compounds there have been considerable drainage works that impact the landform to the east of the compounds. These drainage works take the form of raised bunds that have been constructed to run parallel to Redbank Creek and aim to slow down water movement from across the landform as it runs towards RedBank Creek. While the bunds and the immediate area surrounding the bunds is obviously modified and of little archaeological interest there are areas between the bunds where the degree of modification was less certain. As the survey recorded a reasonable number of artefacts in association with the bunds, it was the intention of the test excavation program to investigate between the bunds to ascertain if intact archaeological deposits remain.

Four transects (Tr1-4) were investigated and a total of 31 excavation squares excavated; specifically, seven squares in Tr1, nine squares in Tr2 (Square 8 was not excavated in TR2), 10 squares in Tr3 and five squares in Tr4. Tr1 is located to the south of the southern-most bund that runs from the explosive's compound, Tr2 and Tr3 are between this bund and the major bund that runs south of the vent compound and Tr4 is located to the north of this major bund (**Figures 7–3** and **7–4**).

The landform occupied by the transects is reasonably level with a gradual slope to the south and Redbank Creek. The area has been previously cleared of trees although regrowth trees today create an open woodland.

Area 1 is in the vicinity of previously recorded sites 37-5-0099 (Red Bank Creek 31), 37-5-0100 (Red Bank Creek 32) and 37-5-0577 (UCL 12-2).

Figure 7-3. Location of transects within Area 1 showing total artefact numbers from each square.

Figure 7-4. Area 1. View of transects.

1. VIEW OF TRANSECT 1 VIEW EAST. REDBANK CREEK IS TO THE SOUTH (RIGHT).

2. VIEW OF TRANSECT 3 VIEW EAST.

Area 2

Area 2 stretches for approximately 285m on the southern bank of Redbank Creek some 135m east of Area 1. The transects at Area 2 were positioned to capture information concerning two aspects of this area. Firstly, the transects were placed along the non-eroded portions of extensive

artefact exposures where scores of artefacts are visible on the eroded clay pans that line Redbank Creek at this location. Secondly, attempts were made to gain further information concerning site 37-5-0116 (Red Bank Creek 5) which was excavated by Koettig and Hughes (1983) and later studied by Peter Hiscock (1984) as he formulated his Redbank reduction strategy (**Section 4.4.3**). Although the 30 year old excavations were no longer in evidence, a number of transects were laid out to fully investigate the landform excavated by Koettig and Hughes to determine if further portions of the site remained intact.

Area 2 has undergone less artificial modification when compared to Area 1 although the effects of extensive and prolonged erosion are manifest. Additionally, Len Dyall on the site card for 37-5-0025 (Agip 2 Malabar) which is located in proximity to Area 2, notes that, at the time of his assessment in 1981, the area was a "former wheat paddock". Therefore, a long history of ploughing in the area can also be assumed. It is interesting to note that Dyall recorded over 500 artefacts at Agip 2 Malabar and a further 50 at 37-5-0025 (Malabar) that is located some 150m east also in proximity to Area 2. Therefore there has been a long history of recording surface artefacts in this area. It is noted, however, that the area has undergone salvage in 1983 and 2,945 artefacts were recovered from the site (Koettig and Hughes 1983: 37). Therefore the artefacts observed in 2015 are likely to not have been present immediately post-1983 and represent new accumulations of surface artefacts.

The landform is reasonably level and is part of creek flats with a moderately graded hill rising to the south of the flats approximately 200m south of the current bed of Redbank Creek. As noted by Koettig in the site card for 37-5-0116: "(the site) is located on a terrace-like landform between Redbank Creek to the north and a shallow channel which is being entrenched into the valley fill at the break of slope between the terrace and the hillslopes to the south. This channel joins Redbank Creek at the east of the site area." The anabranch ("a shallow channel") of Redbank Creek mentioned by Koettig is still discernible today and it is an indication that, at this location, channel changes and flooding events would be reasonably frequent; again to the detriment of the archaeological deposits in the area.

Nine transects were excavated at Area 2 with a total of 42 excavation squares. Specifically this was comprised of: Tr1 (three squares located in the middle of the 'terrace-like landform'); Tr2 (four squares located along the current southern bank of Redbank Creek); Tr3 (three squares located on the southern bank of the anabranch to Redbank Creek); Tr4 (three squares 30m to the east of Tr3 again on the southern bank of the anabranch; Tr5 (nine squares on the southern bank of Redbank Creek to the east of where the anabranch joins the main channel); Tr6 (10 squares on the western extent of the 'terrace-like landform'); Tr7 (two squares on the northern extent of the 'terrace-like landform' on the southern bank of Redbank Creek); Tr8 (four squares on the eastern extent of the 'terrace-like landform') and Tr9 (four squares located across the 'terrace-like landform' to the north of Tr1). All squares were spaced 5m apart except for Tr6, Tr7 and Tr9

where they were spaced 10m apart. At Tr6 two supplementary pits (Sq9 and Sq10) were excavated 5m north and south of Sq3 where a concentration of artefacts was recorded (**Figures 7–5** and **7–7**).

The nine transects therefore comprehensively sampled the 'terrace-like landform' that contained the site Red Bank 5, as well as landforms along both the southern bank of Redbank Creek and its associated anabranch.

Koettig (1983) provides well-drawn plans of the excavation areas at Red Bank 5, however, her excavation areas (Area A and B) are somewhat difficult to precisely locate to today's landscape. From the best estimation it would appear that they were to the north and south of Tr2 (Koettig and Hughes 1983: figure 17). **Figure 7–6** superimposes the Koettig and Hughes excavations on a 1987 aerial (as this represents the landscape more as Koettig and Hughes would have experienced it) at a location that best fits the topography and locational information provided in Koettig and Hughes 1983: figure 17. While the georeferenced 1987 image is not precise, it is generally accurately aligned and this demonstrates the perils of interpreting the current landscape that has such a history of erosional disturbance. As can be seen, in the 28 years that separates the aerial of **Figure 7–5** from that of **Figure 7–6**, the landscape has changed remarkably with old erosion areas grassing over and new erosion areas emerging (such as to the south of Tr6).

Figure 7-5. Location of transects within Area 2 showing total artefact numbers from each square.

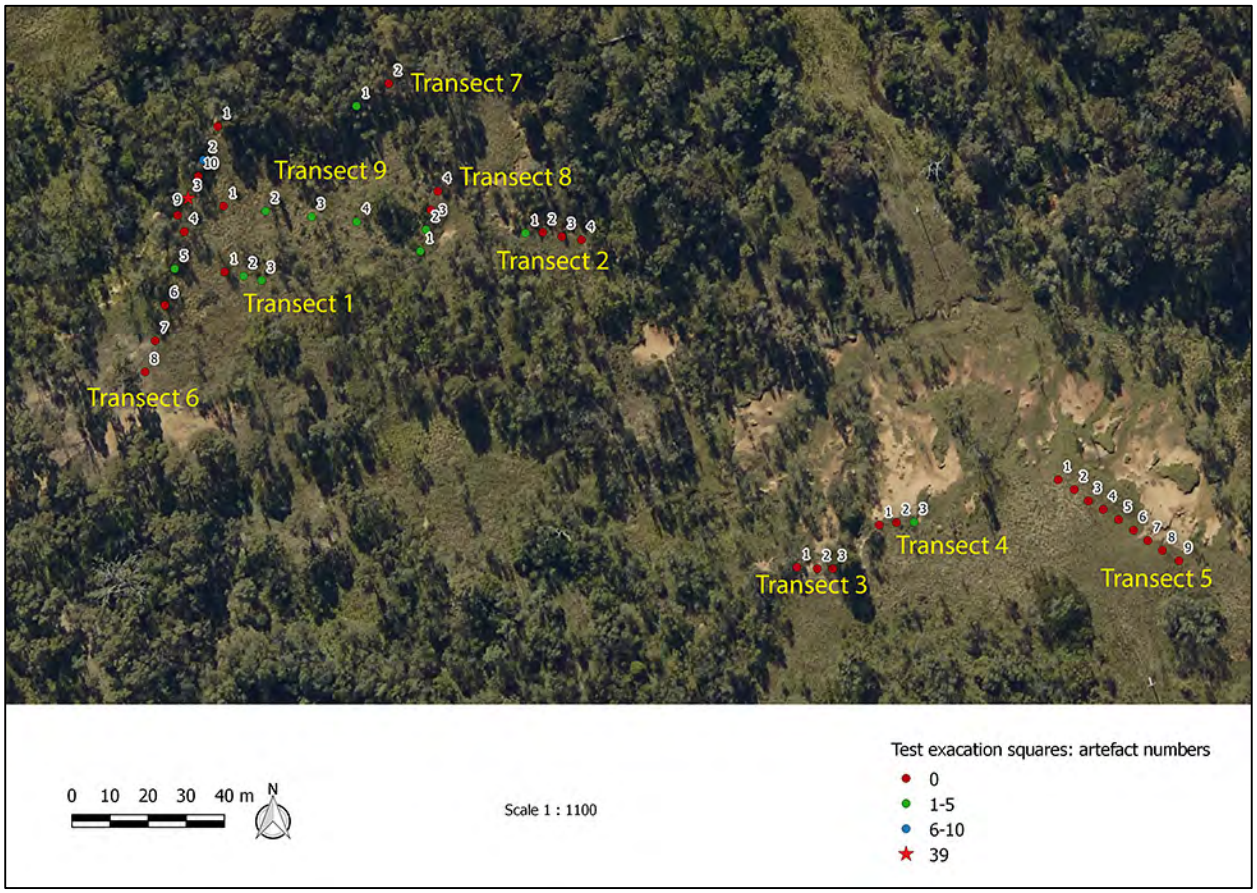


Figure 7-6. 1987 image of Area 2 with Koettig and Hughes 1983 excavations superimposed.

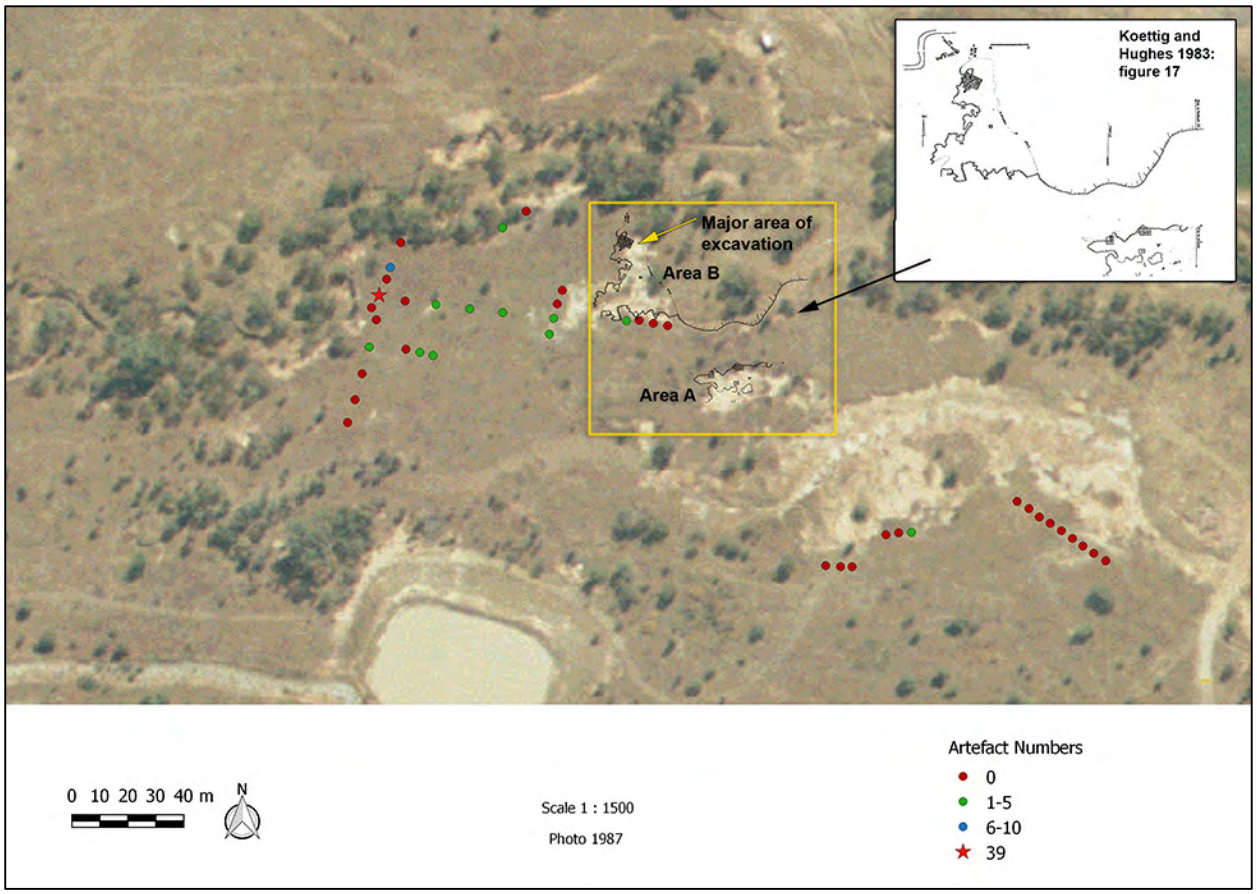


Figure 7-7. Area 2. View of transects.

1. VIEW OF TRANSECT 1 VIEW EAST CLOSE TO THE AHIMS LOCATION FOR RED BANK CREEK 5.

2. VIEW OF TRANSECT 2 VIEW NORTH TOWARDS REDBANK CREEK.

3. VIEW OF TRANSECT 5 VIEW NORTHWEST. THIS TRANSECT IS ALONG THE BOUNDARY OF A LARGE EROSION SCALD.

4. VIEW OF TRANSECT 9 VIEW EAST. THIS TRANSECT CROSSES THE LANDFORM CONTAINING RED BANK CREEK 5.

Area 3

Area 3 is located on the southern bank of Redbank Creek, approximately 560m east of Area 2. During the survey it was evident that this area had undergone considerable disturbance in the past although there were scores of surface artefacts visible. Therefore, Area 3 was selected for test excavation to determine if intact deposits remained at this location and whether the visible artefacts originated locally from deposits in non-eroded landforms.

Six transects were investigated at Area 3 through the excavation of 26 excavation squares (**Figures 7–8** and **7–10**). Specifically this was comprised of: Tr1 (seven squares alongside an artificial culvert where surface artefacts were visible); Tr2 (three squares on the other side of the culvert from Tr1); Tr3 (four squares alongside a graded diversion for Redbank Creek where surface artefacts were visible); Tr4 (two squares placed to the northeast of an erosion scald to determine if this area held potential); Tr5 (seven squares placed alongside an erosion scald where artefacts were visible) and Tr6 (three squares placed perpendicular to Tr1 to determine if deposits showed more potential away from the disturbances surrounding Redbank Creek.

At the time of the survey Area 3 was confusing and it seemed that Redbank Creek braided into two channels at this location. However, during the course of the test excavation and subsequent research it is clear that the entire area was disturbed during the building of the nearby dam (Dam 2). Indeed, what were assumed to be channels of Redbank Creek are in fact a diversion for the creek constructed south of the Dam 2 and a water channel diverting water to another dam. The extent of the modification at this location can be clearly seen in the 1987 aerial (**Figure 7–9**). While the investigation of why artefact numbers were so low at Area 3 followed the test excavation, it is now clear that the area is highly modified and that any surface artefacts are not related to nearby deposits. As can be seen from a comparison of **Figure 7–8** with **Figure 7–9**, the landscape today belies the high degree of modification that has previously occurred at this location.

Area 3 is located within proximity to 37-5-0115 (Red Bank Creek 8) and 37-5-0103 (Red Bank Creek 22). Although both sites are listed as valid on AHIMS it is likely 37-5-0115 has been impacted by the drainage works described above that occurred after the site's recording.

Figure 7-8. Location of transects within Area 3 showing total artefact numbers from each square.

Figure 7-9. Location of transects within Area 3 superimposed on a 1987 aerial.

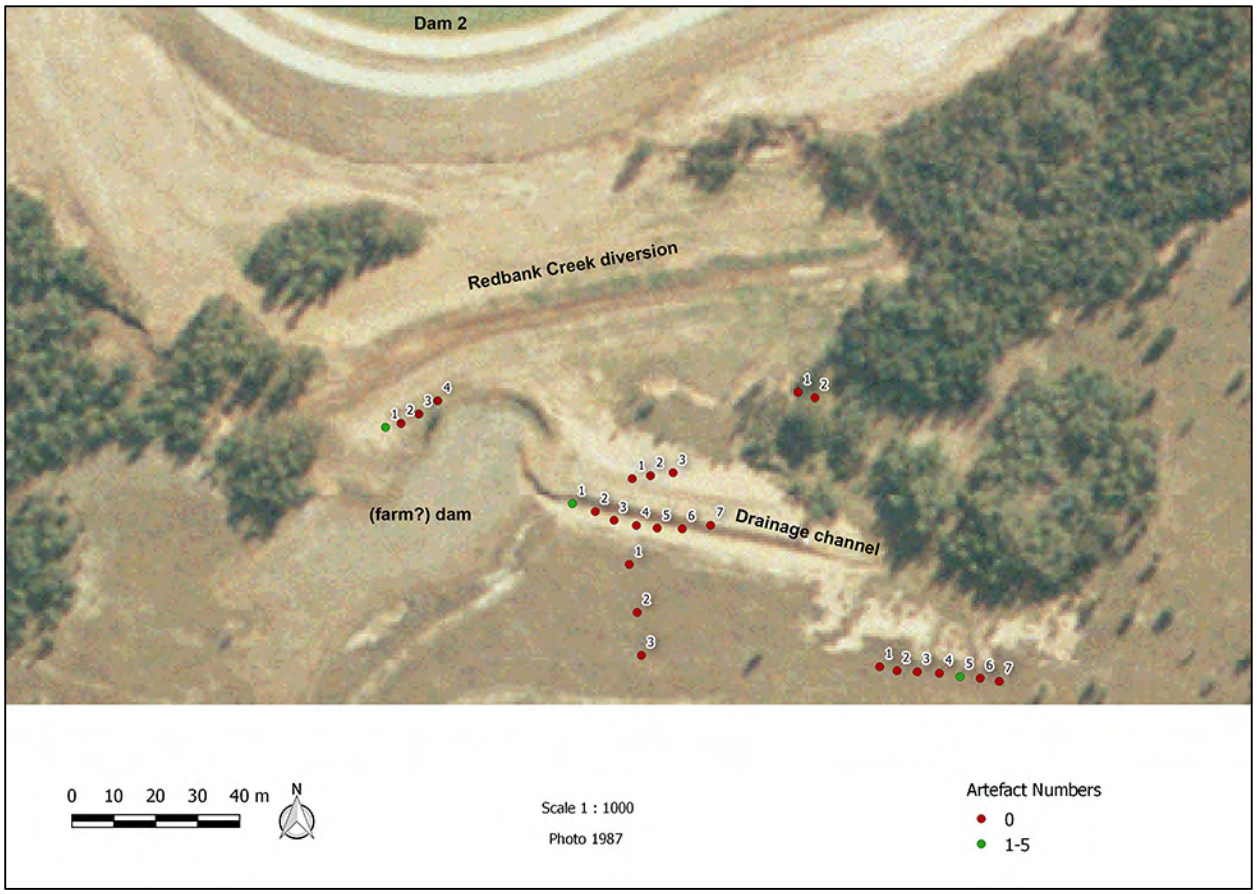


Figure 7-10. Area 3. View of transects.

1. VIEW OF TRANSECT 1 VIEW SOUTHEAST ACROSS THE DRAINAGE CHANNEL.

2. VIEW OF TRANSECT 3 VIEW WEST. LOCATED ON THE EDGE OF AN ARTIFICIAL CHANNEL FOR REDBANK CREEK.

	
3. View of Transect 5 view west. Located close an erosion scald.	4. View of Transect 6 view north. This transect is perpendicular to Redbank Creek.

Area 4

Area 4 is located within the Wambo lease area adjacent to an unnamed tributary to Wollombi Brook that it joins approximately 250m southeast from Area 4. The area is close-by active work areas for the Wambo mine and has undergone disturbances in the form of trenching for underground services, roads and electricity easements. Area 4 is in a relatively flat landform on either side (east and west) of the in-stream erosion area of the drainage line. Tr1 and Tr2 were located in open paddocks while Tr3 to Tr5 were located in regrowth Casuarina woodland.

Five transects were investigated at Area 4 through the excavation of 31 excavation squares (**Figures 7–11** and **7–13**). Specifically this was comprised of: Tr1 (nine squares located to the west of the drainage line spaced 5m apart); Tr2 (eight squares initially consisting of five squares spaced 5m apart although three extra squares [Sq6, Sq7 and Sq8] were excavated in the vicinity of Sq5 to investigate the slightly higher artefact count of this square. Sq8 was immediately adjacent to Sq5, Sq7 was 5m to the east of Sq5 and Sq6 was 5m to the west of Sq5); Tr3 (five squares spaced 5m apart located on the eastern bank of the drainage line); Tr4 (four squares spaced 5m apart located on the eastern bank of the drainage line approximately 40m north of Tr3) and Tr5 (initially consisted of four squares spaced 5m apart on the eastern bank of the drainage line although a further square [Sq5] was excavated 36m northeast of Tr5 Sq1 as part of Tr5).

Reference to the 1987 aerial (**Figure 7–12**) shows that, apart from increased tree cover today, Area 4 has not undergone the sort of historic modification seen at Area 3.

Area 4 occupies the same landform as 37-6-1611 (Haul Road 1) which has been previously salvaged under permit with portions of the site salvaged and other portions covered with geofabric and buried under the haul road.

Figure 7-11. Location of transects within Area 4 showing total artefact numbers from each square.

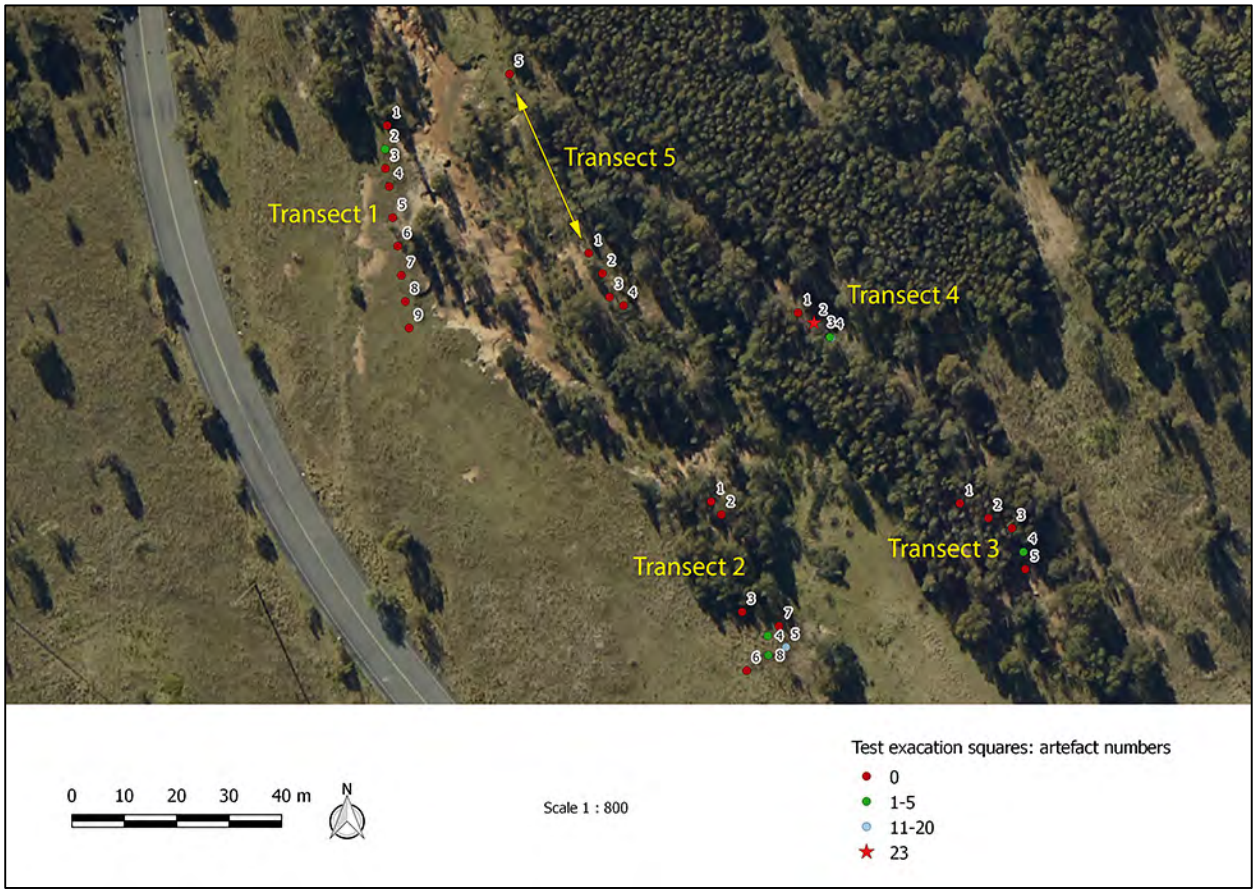


Figure 7-12. Location of transects within Area 4 superimposed on a 1987 aerial.

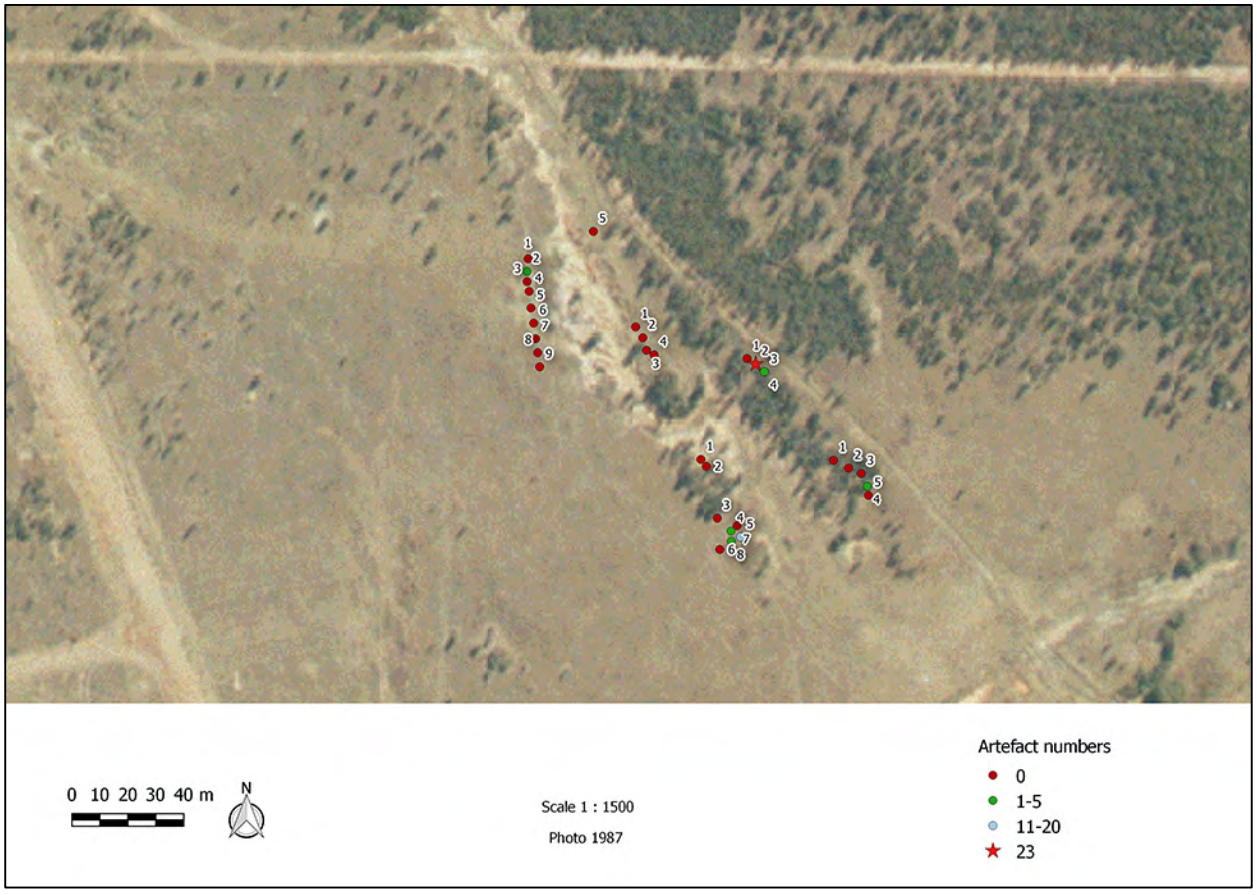


Figure 7-13. Area 4. View of transects.

	
1. VIEW OF TRANSECT 1 VIEW SOUTHWEST ACROSS THE BANK OF THE DRAINAGE LINE.	2. VIEW OF TRANSECT 3 VIEW NORTH. LOCATED ON THE EASTERN BANK OF THE DRAINAGE LINE.
	
3. VIEW OF TRANSECT 4 VIEW NORTH. LOCATED ON THE EASTERN BANK OF THE DRAINAGE LINE (TO LEFT).	4. VIEW OF TRANSECT 5 VIEW SOUTH. LOCATED ON THE EASTERN BANK OF THE DRAINAGE LINE (TO RIGHT).

Area 5

Area 5 was an additional area added to the test excavation program as time allowed further areas to be investigated.

Area 5 is located on the northern bank of Redbank Creek opposite Area 2. The rationale of its placement was to obtain information on deposits from both sides of the creek.

Area 5 is located in an open paddock and while there are disturbances nearby such as a drainage bund to the north, there was little sign of disturbance beyond that arising from the area's past agricultural use (vegetation clearing, stock trampling and erosion).

Area 5 consisted of a single transect (Tr1) of 10 excavation squares (Sq1 to Sq10) spaced 5m apart. However Sq5 and Sq7 were not excavated due to both the difficulty of excavation

(extremely hard, compact soil) and the lack of results from the other squares (**Figures 7–14** and **7–15**).

No previously recorded sites exist with the vicinity of Area 5.

Figure 7-14. Location of transect within Area 5 showing total artefact numbers from each square.

Figure 7-15. Area 5. View of transect.

1. View of Transect 1 view west. Located on the northern bank of Redbank Creek (to left).

Area 6

Area 6 was an additional area added to the test excavation program as time allowed further areas to be investigated.

Area 6 was investigated to gain an understanding of deposits on either side of Redbank Creek at a location within the Survey Area where Redbank Creek is the closest to Wollombi Brook. Wollombi Brook 'as the crow flies' is approximately 1km to the east and to the south of Area 6, although if one were to follow Redbank Creek from Area 6, it is approximately 2.2km before it reaches Wollombi Brook to the east.

Area 6 is adjacent to a historic farm house, and particularly the area containing Tr1 and Tr2, would have been part of the property's orchard (some trees still remain and the orchard can be seen on the 1987 aerial; **Figure 7–18**) and would have been impacted by the activities around the house. Tr3, on the opposite side of Redbank Creek appears to have been part of an area that was cropped in the past and one can assume disturbances from activities such as ploughing (the farrow lines adjacent to Tr3 can just be discerned in the 1987 aerial [**Figure 7–18**] although, from the evidence of this aerial, Tr3 is just beyond the plough zone). To the south of Tr3 is an extensive area that was disturbed as part of the drainage works during the construction of Dam 1 (cf. **Figure 7–18**) and, subsequent to the 1987 aerial, a series of large dams have been constructed to the west of Tr3 (see current aerial; **Figure 7–16**).

Currently Tr1 and Tr2 are in an open paddock on the edge of the Casuarina regrowth lining Redbank Creek while Tr3 is within the Casuarina regrowth. All transects are on flat land although the landform rises between the area of Tr1 and the area of Tr3 so that Tr3 is at a higher elevation.

Three transects were excavated at Area 6 comprising of 19 excavation squares although Tr3 Sq11 was not excavated. Tr1 and Tr2 are linear transects with the excavation squares spaced at 5m intervals. At Tr3, due to the density of the Casuarina regrowth, six clusters consisting of two immediately adjacent squares were excavated. These clusters were randomly positioned where the vegetation allowed access.

Specifically the transects excavated at Area 6 consisted of Tr1 (three squares located on the northern bank of Redbank Creek just outside the fringing Casuarina regrowth); Tr2 (four squares located on the northern bank of Redbank Creek just outside the fringing Casuarina regrowth) and Tr3 (12 squares located on the southern/western bank of Redbank Creek within the fringing Casuarina regrowth). **Figure 7–16** shows the location of the Area 6 transects, **Figure 7–17** shows a detail of the Tr3 clustering of pits, **Figure 7–18** shows these transects superimposed on a 1987 aerial and **Figure 7–19** shows the environment of each transect.

No previously recorded sites exist with the vicinity of Area 6.

Figure 7-16. Location of transects within Area 6 showing total artefact numbers from each square.

Figure 7-17. Detail of excavation square locations at Area 6 Tr3.

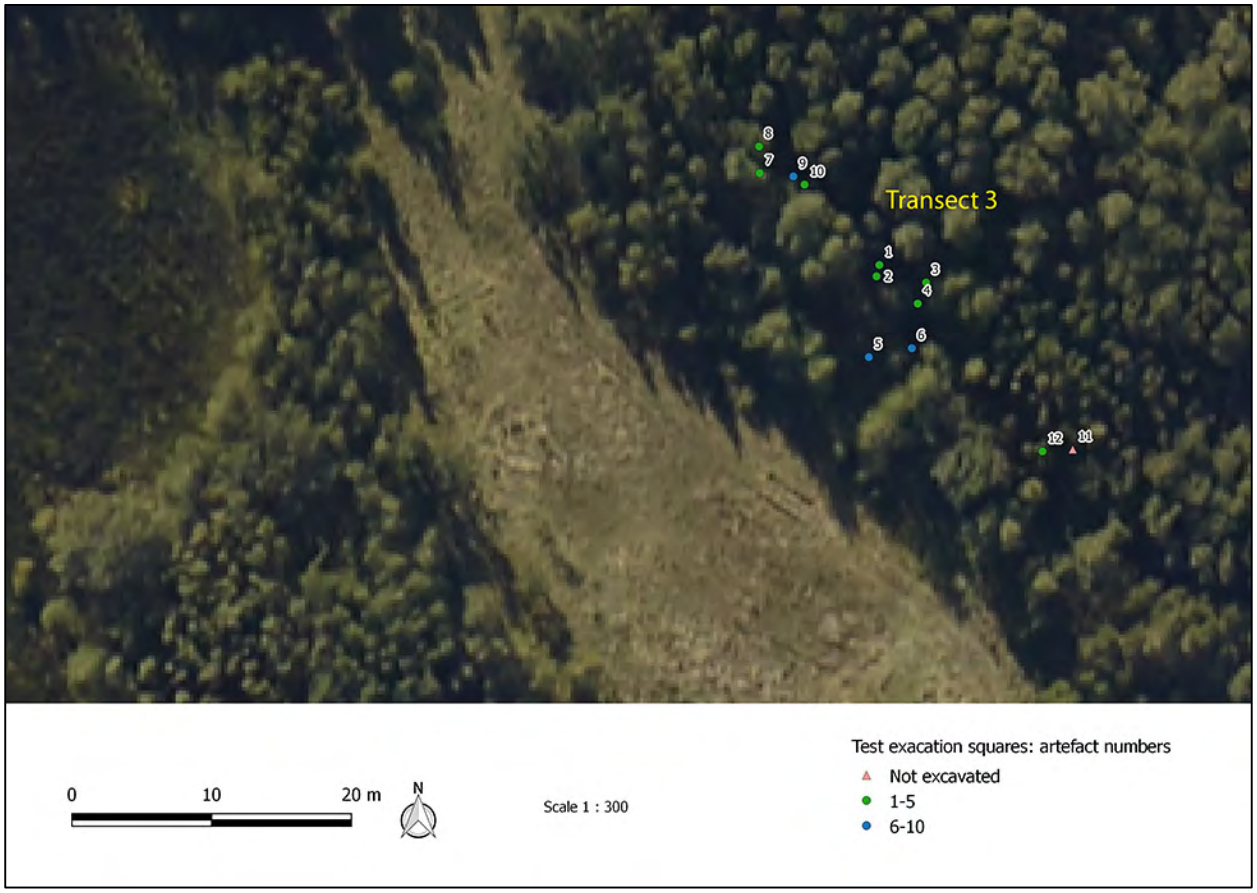


Figure 7-18. Location of transects within Area 6 superimposed on a 1987 aerial.

Figure 7-19. Area 6. View of transects.

1. VIEW OF TRANSECT 1 VIEW NORTH TOWARDS THE HISTORIC FARM HOUSE.

2. VIEW OF TRANSECT 2 VIEW SOUTHWEST. LOCATED ON THE EDGE OF THE FRINGING CASUARINA REGROWTH ADJACENT TO REDBANK CREEK.

	3. VIEW OF TRANSECT 3 VIEW NORTH. NOTE THE PAIRED PITS THAT WERE EXCAVATED AT EACH LOCATION AT TR3.

7.4.2.1 Stratigraphy

Archaeological stratigraphy was not present at any of the excavation squares investigated. Generally excavation squares consisted of a thin (c. 5cm) humic layer at the surface resting on a light clay loam extending down to the basal clays. This generalisation varied from area to area as will be examined below but the general sequence of a thin A1 Horizon resting on a 10-20cm A2 Horizon resting on the B Horizon was reasonably consistent across the investigation area. Excavated depths typically averaged around 20cm. Auger probes into the basal clays were undertaken at several locations and this determined that the clays are deep (at least one metre) and culturally sterile.

Area 1, Area 2 Tr1-5, Area 3 and Area 4 Tr4 were excavated in 5cm spits. However, the lack of artefacts in these areas meant that a change of strategy was agreed to between the archaeologists and the RAPs present. As a result, excavation squares at Area 2 Tr6-9, Area 4 Tr1-3 and Tr5, Area 5 and Area 6 were excavated as a single unit. It was felt that without artefacts to justify a finer excavation methodology that the main aim of the test excavation program was to identify where there may be surviving archaeological deposits of any note. It was felt that this would be best achieved by excavating each excavation square as a single unit enabling more squares to be excavated and thereby increasing the opportunities of intersecting with archaeological deposits.

<u>Area 1</u>

Soils in this area had a higher clay content when compared with some of the other investigation areas and distinct soil profiles were often lacking with the A Horizon extending in an undifferentiated manner to the B Horizon. **Figure 7–20** illustrates some typical excavation squares from each transect at Area 1. These illustrations demonstrate that at Area 1 the A Horizon was generally shallow and of high clay content. The nature of the soils indicates that this area has not been subject to re-deposition of eroded materials as leached soils and/or fine grain sandy loams are lacking. However, the lack of an A1 Horizon suggests that this area has been stripped

of its humic layers leaving the heavier A2 clay loams in place. Additionally, there were few indications of disturbance to the extant profiles (through actions such as ploughing) although in some instances, such as at Tr3 Sq3 (**Figure 7–21**) there were discontinuities in the soil profile but as these did not extend to the surface it is difficult to interpret them as being the result of more-recent disturbances and are probably the result of natural disturbances in the past such as erosion or tree roots.

Figure 7-20. Test Excavation Area 1. Stratigraphy.

<table>
<tr><td>  </td><td>  </td></tr>
<tr><td>1. Test Excavation Area 1: Tr1 Sq6.</td><td>2. Test Excavation Area 1: Tr2 Sq5.</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>3. Test Excavation Area 1: Tr3 Sq5.</td><td>4. Test Excavation Area 1: Tr4 Sq2.</td></tr>
</table>

Figure 7-21. Test Excavation Area 1. Tr3 Sq3.

	1. Test Excavation Area 1: Tr3 Sq3.

Area 2

Area 2 demonstrated more evidence of leaching and re-deposition of soils when compared to Area 1. In some transects (such as Tr2 and Tr3; **Figure 7–22.2** and **Figure 7–22.3**) the A Horizon only consisted of leached loams indicating that the effects of sheetwash erosion are manifest. At other locations (such as Tr1; **Figure 7–22.1**) there appeared to be evidence of ploughing with parallel depressions having been cut into the B Horizon.

At some locations there was a differentiation in the soil profile of the A Horizon. Of note is Tr6 Sq3 (**Figure 7–22.6**) which produced the most artefacts of any test square in the entire test excavation program. Although shallow (c. 20cm) the A Horizon has two distinct zones: an upper brownish clay loam and a lower light brown clay loam. This excavation square was excavated as a single unit, however, it was noted that the artefacts were recovered from the lower of these horizons just above the underlying B Horizon.

In general, soil depths were shallow across Area 2 with few excavation squares extending beyond 20cm. While there was some variation in the colouring of the soil with some areas retaining more humic matter (making the soils darker), the same general sequence of soils were observed: namely, very thin A1 Horizon (often only extending to the depth of grass roots), a relatively thin A2 Horizon (sometimes containing gravels) and a consistent, culturally sterile B Horizon clay.

Figure 7-22. Test Excavation Area 2. Stratigraphy.

1. Test Excavation Area 2: Tr1 Sq2.

2. Test Excavation Area 2: Tr2 Sq1.

3. Test Excavation Area 2: Tr3 Sq2.

4. Test Excavation Area 2: Tr4 Sq1.

5. Test Excavation Area 2: Tr5 Sq5.

6. Test Excavation Area 2: Tr6 Sq3.

7. TEST EXCAVATION AREA 2: TR7 SQ2.

8. TEST EXCAVATION AREA 2: TR8 SQ2.

9. TEST EXCAVATION AREA 2: TR9 SQ4.

Area 3

As noted in **Section 7.4.2**, Area 3 has been heavily modified by drainage works associated with the nearby Dam 2. Although surface artefacts were visible along the banks of what are now known to be artificial channels, these failed to be associated with subsurface deposits. In some cases the visible artefacts were within 50cm of some excavation pits that failed to record any subsurface artefacts (**Figure 7–23.1**). Of interest in this area was a series of auger probes that were undertaken into the B Horizon to ensure that this horizon was culturally sterile. As can be seen in **Figure 7–23.2** and **Figure 7–23.4**, these probes indicate that there has been distinctive depositional histories within the B Horizon indicating that the sequence of stripping by erosion and re-deposition of fine, leached soils has been occurring at this location for some time.

Soil depths at Area 3 were generally shallow although some pits in Tr3 extended down to at least 30cm before the B Horizon was reached. Apart from Tr6 (**Figure 7–23.8**), the soil of all transects demonstrated shallow humic levels and undifferentiated leached clay loam (which was very hard packed in most places) extending down to the B Horizon.

Figure 7-23. Test Excavation Area 3. Stratigraphy.

1. Test Excavation Area 3: Tr1 Sq4. Flags indicate the location of surface artefacts.

2. Test Excavation Area 3: Tr1 Sq4. Results of auger probe to 1.35m.

3. Test Excavation Area 3: Tr2 Sq3.

4. Test Excavation Area 3: Tr2 Sq1. Results of auger probe to 0.7m.

5. Test Excavation Area 3: Tr3 Sq2.

6. Test Excavation Area 3: Tr4 Sq1.

	
7. TEST EXCAVATION AREA 3: TR5 SQ6.	8. TEST EXCAVATION AREA 3: TR6 SQ1.

Area 4

Area 4 demonstrated, in general, hard-packed light clay loams indicating past stripping of topsoils and re-deposition. Auger probes into the B Horizon failed to indicate substantial changes within the B Horizon with the general sequence being a graduation either from light friable clays to more-orange friable clays (**Figure 7–24.2**) or orange clays graduating from moist, non-friable clays at the top to dry, friable clays at the bottom of the probe.

At Tr2 Sq5 14 artefacts were recorded at the interface between the light grey A2 Horizon at the top and the darker grey A2 Horizon at the bottom (**Figure 7–24.3**). This distinct soil profile was somewhat replicated, although less distinct, in the immediately adjacent Sq8 (which only recorded a single artefact) and was absent in both Sq7 (5m east of Sq5; no artefacts) and Sq6 (5m west of Sq5; no artefacts). This soil profile in the A2 Horizon was present but less distinct in Sq4 (5m north of Sq5; one artefact) and absent in Sq3 (5m north of Sq4; no artefacts). It therefore appears that the profile associated with artefacts in Sq5 is an isolated phenomenon.

The other concentration of artefacts recorded at Area 4 was from Tr4 Sq2 (**Figure 7–24.6**) where 23 artefacts were recovered. Nine of these artefacts were from spit 1 (0-5cm), six were from spit 2 (5-10cm) and eight artefacts were from spit 3 (10-15cm). Stratigraphically, however, there is very little differentiation in the soil profile of the excavation square to help explain this distribution as the profile is a fairly consist light brown clay loam.

Figure 7-24. Test Excavation Area 4. Stratigraphy.

	
1. Test Excavation Area 4: Tr1 Sq3.	2. Test Excavation Area 4: Tr1 Sq1. Results of auger probe to 0.63m.
	
3. Test Excavation Area 4: Tr2 Sq5.	4. Test Excavation Area 4: Tr2 Sq5. Results of auger probe to 1.01m.
	
5. Test Excavation Area 4: Tr3 Sq2.	6. Test Excavation Area 4: Tr4 Sq2.

	7. TEST EXCAVATION AREA 4: TR5 SQ3.

Area 5

In the west of the single transect at Area 5 (i.e. Sq1; **Figure 7–25.1**) there were two distinct A2 layers below a thin A1 Horizon. The topmost layer is a dark brown clay loam extending down approximately 15cm before a light brown layer is reached that extends for approximately 5cm to B Horizon clays. This pattern was fairly consistent in the western excavation squares but in the east of the transect (i.e. Sq10; **Figure 7–25.2**) there was only a single, leached, light brown clay loam comprising the A2 Horizon.

No artefacts were recorded at Area 5 so this soil profile has no association with recorded artefacts.

Figure 7-25. Test Excavation Area 5. Stratigraphy.

	
1. TEST EXCAVATION AREA 5: TR1 SQ1.	2. TEST EXCAVATION AREA 5: TR1 SQ10.

Area 6

Both Tr1 and Tr2 are located on creek flats adjacent to a historic farm house. Excavation of all excavation squares at these transects failed to reach the B Horizon as the A Horizon consisted of thick, sandy alluvial deposits (**Figure 7–26.1–3**). At the bottom of excavation of Tr1 Sq1 (42cm)

an auger probe extended the investigation a further 110 cm to a total depth of 1.52m and the alluvium deposits still continued without sign of the basal clays (**Figure 7–26.2**). It is therefore clear that this northern/eastern side of Redbank Creek is a thick alluvial deposit in which it would be rare to encounter intact archaeological deposits due to the frequency of flooding events.

At Tr3 which is on the other side of Redbank Creek and at a higher elevation, the soil profile was without the alluvial deposits noted at Tr1 and Tr2. Here a typical profile was for the top-most 15cm to be a dark brown sandy, friable clay and then the remaining A2 Horizon being a light brown friable clay with a lower clay content than the layer above it (**Figure 7–26.4**). At approximately 30cm the orange basal clays were encountered. This soil profile suggests that the A1 Horizon has been largely stripped from the area leaving the more clayey A2 Horizons at the surface.

Figure 7-26. Test Excavation Area 6. Stratigraphy.

<table>
<tr><td>  </td><td>  </td></tr>
<tr><td>1. Test Excavation Area 6: Tr1 Sq1.</td><td>2. Test Excavation Area 6: Tr1 Sq1. Results of auger probe to 1.52m.</td></tr>
<tr><td>  </td><td>  </td></tr>
<tr><td>3. Test Excavation Area 6: Tr2 Sq1.</td><td>4. Test Excavation Area 6: Tr3 Sq5.</td></tr>
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