Appendix F
Field investigation

F.1 Field survey – Transect descriptions

Refer to Technical Report 2 Aboriginal cultural heritage assessment - Part 6 Appendix F_F1-F2

F.2 Field survey – Photograph catalogue

Refer to Technical Report 2 Aboriginal cultural heritage assessment - Part 6 Appendix F_F1-F2

F.3 Field survey - Identified Aboriginal sites – Site descriptions

Table F.2 Aboriginal sites identified during the field survey

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
37-2-0278	37-2-0278	SU1	Low density artefact scatter (<20)	305566	6408579	Five artefacts identified on sloped cattle track within 2 m x 5 m area approximately 40 m south of unnamed 2nd order creek intersecting Plashett Reservoir, 150 m to the west. The site includes yellow, red and black mudstone flakes and flaked pieces. The site is in proximity to an alluvial floodplain associated with the creek; soils were considered skeletal with limited subsurface potential. The closest site is located approximately 115 m northeast (HTP-N-IF07). Previously recorded as an isolated find and collected as part of authorised impacts.	North	Valid	Within 200 m of project area
37-2-0503	37-2-0503	SU1	Low density artefact scatter (<20)	294905	6415871	Three artefacts comprising 1 silcrete flake, 1 silcrete flaked piece and 1 quartz Bondi point identified on bank of ephemeral stream. This site was unable to be relocated as part of this assessment.	North	Valid	Within 200 m of project area
37-2-0549	37-2-0549	SU1	Low density artefact scatter (<20)	305704	6408734	Eight artefacts recorded on gentle incline covering an area of 50 m x 10 m on northern bank landform of unnamed 2nd order creek located approximately 70 m west of a dam and 250 m northeast of Plashett Reservoir. The site comprises yellow and red mudstone flakes and flaked pieces. Due to position of the site adjacent to ephemeral creek, soils were assessed as skeletal with limited subsurface potential. The closest previously recorded site is located approximately 90 m southwest (HTP-N-IF07). This AHIMS site was reidentified as part of the 2024 survey within 45 m of the GPS coordinates.	North	Valid	Within project area
37-2-2021	37-2-2021	SU1	Low density artefact scatter (<20)	310366	6419307	No site card available. A site in the vicinity of this location was reidentified as part of the current assessment. The site comprised 2 artefacts: 1 pale grey/yellow silcrete flake and 1 red mudstone flake, located approximately 5 m apart. The artefacts were located in an open, eroded landscape with sparse vegetation. Landscape suggests periodic water runoff which possibly contributed to exposure of these artefacts. Landform is slightly elevated with slopes leading down to lake. Silcrete flake is partially embedded and in good condition while mudstone flake appears slightly weathered.	North	Valid	Within disturbance area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
37-2-5134	37-2-5134	SU2	Low density artefact scatter (<20)	305573	6405410	One yellow mudstone flake identified on slope of eroding shallow gully that had been partially revegetated. The site is situated 25 m northwest of an access track connected to proposed Tower 184. Due to the erosion processes in the surrounding landscape, it was determined that the soils were skeletal, with limited remaining subsurface potential. The closest water source is an unnamed drainage channel approximately 70 m north with the closest site located 65 m northwest (HTP-N-IF10). This destroyed AHIMS site was reidentified as part of the 2024 survey within 15 m of the original location. The presence of artefacts at the site likely reflects remnant material.	North	Valid	Within 200 m of project area
37-2-6495	37-2-6495	SU1	Low density artefact scatter (<20)	305008	6406703	Eight artefacts identified on gently inclined hillslope landform covering an area of 100 m x 20 m, 70 m west of a 1st order stream connected to a tributary of Parnells Creek 240 m to the north. The site comprises yellow and red mudstone flakes and two red mudstone cores. Due to the position of the site on an eroded floodplain, soils were assessed as skeletal with limited subsurface potential. The closest previously recorded site is located approximately 75 m northwest (HTP-N-AS47). This AHIMS site was reidentified as part of the 2024 survey within 5 m of the GPS coordinates.	North	Valid	Within disturbance area
37-2-6496	37-2-6496	SU1	Isolated find	305205	6407064	One yellow mudstone core identified on an eroding surface exposure on a gently inclined, revegetated hillslope approximately 70 m northeast of Tower 189. Due to the erosion processes occurring in the surrounding landscape, it was determined that the soils were skeletal, with limited remaining subsurface potential. The closest water source is an unnamed ephemeral drainage line 90 m south with the closest site located 140 m southeast (#37-2-5354). This AHIMS site was reidentified as part of the 2024 survey within 5 m of the original GPS coordinates.	North	Valid	Within project area
37-2-6497	37-2-6497	SU1	Low density artefact scatter (<20)	305260	6407334	Ten artefacts recorded on a gently sloped erosion scar in a 5 m x 15 m area on the north-west bank of Parnells Creek. The site includes yellow silcrete flakes and flaked pieces. Due to position of the site adjacent to an ephemeral creek, soils were assessed as skeletal with limited subsurface potential. The closest sites are located approximately 65 m southwest (HTP-N-IF08) and 65 m northeast (#37-2-6514). This AHIMS site was reidentified as part of the 2024 survey within 15 m of the original GPS coordinates.	North	Valid	Within disturbance area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
37-2-6498	37-2-6498	SU1	Isolated find	305022	6405832	Isolated mudstone flake identified within exposure underneath existing transmission line.	North	Valid	Within disturbance area
37-2-6501	37-2-6501	SU1	Isolated find	305017	6406533	One red silcrete core located on gently inclined exposure 40 m west of an ephemeral 1st order stream. The area surrounding the site has been subject to disturbance from clearance and erosion processes, which demonstrated limited potential for remaining subsurface deposits. The closest previously recorded site is located 70 m northeast (HTP-N-AS14). This valid AHIMS site was reidentified as part of the 2024 survey within 15 m of the original GPS coordinates.	North	Valid	Within disturbance area
37-2-6503	37-2-6503	SU1	Low density artefact scatter (<20)	305011	6406226	Twenty artefacts situated on and adjacent to south of an access track 20 m south of Tower 184 within a 50 m x 6 m area. The artefacts comprise pink and red silcrete flakes, chert flakes and a broken basalt axe with evident polish. Due to the erosion present in the surrounding landscape, it was determined that the soils were skeletal, with limited remaining subsurface potential. The closest water source is an unnamed drainage channel approximately 150 m northeast with associated artefact scatters #37-2-6502 and HTP-N-AS67 within a 50 m radius to the southeast and southwest. This AHIMS site was reidentified as part of the 2024 survey within 20 m of the original GPS coordinates.	North	Valid	Within disturbance area
37-2-6515	37-2-6515	SU2	Isolated find	306045	6404710	One red silcrete flake recorded on gently inclined slope beneath a transmission line approximately 45 m southwest of an access track. The area surrounding the site has been subject to prior disturbance from clearance and construction, demonstrating limited potential for remaining intact subsurface deposits. The closest water source is an unnamed drainage channel 10 m northwest with surrounding sites situated 15 m southeast (HTP-N-IF13) and 40 m northwest (HTP-N-IF12). These sites likely form a remnant background scatter associated with previously destroyed AHIMS sites. Though the site card identified potential subsurface deposit in this locale, this was reassessed as part of this assessment and is considered no longer extant.	North	Valid	Within 200 m of project area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
37-2-6555	37-2-6555	SU1	Low density artefact scatter (<20)	295777	6415698	The site card records this site as 1 multi-platform silcrete core located in open woodland clearing. When revisited for this assessment, more artefacts were observed, including 1 silcrete core (pale yellow), and 2 silcrete flakes (pale yellow and reddish-orange, possibly heat-affected), along with a mudstone flake (red). The site is located on a sheet washed area that has accumulated leaf litter, and an ant nest has disturbed the area, limiting visibility.	North	Valid	Within 200 m of project area
37-2-6616	37-2-6616	SU1	Moderate density artefact scatter (21-50)	304711	6406663	Recorded as part of a micro siting program for the geotechnical works associated with HTP. A moderate density artefact scatter comprising 35+ indurated mudstone flakes, 1 with retouch and 3 cores of the same material. The site is located on an eroded exposure, less than 10 m south of an existing vehicle track. Parnells Creek is located approximately 200 m northwest of the site.	North	Valid	Within project area
37-6-0604 (Trig Road cultural landscape)	37-6-0604	SU32	Rockshelter, art (pigment or engraved), PAD	334864	6355227	A rockshelter identified beneath a waterfall of an intermittent stream between Trig Road and Sweetmans Creek in Corrabare State Forest. The original site card records 43 motifs including hand stencils (n=23 white, n=5 yellow), boomerangs (n=2), an axe, and a small number of animal motifs in charcoal. On relocation, the shelter contains extensive art and considerable deposits. Site features comprise hand stencils (19 white and 2 yellow) with various lengths of forearm, 4 large white ochre patches located in pairs, some smaller indeterminate white patches, 1 axe stencil (possibly a steel axe), 1 boomerang/bundi/nullanulla stencil, and 1 motif of possible dancing man. White, yellow and potentially red ochre is present as well as charcoal motifs. Charcoal motifs are not well defined but appear grander in scale. Rockshelter HTP-C-RS21 is 16 m to the east and grinding groove site (HTP-N-GG1) is in a nearby gully 80 m to the east. The site is situated on steep escarpment landform above Sweetmans Creek (4th order), 240 m to the west.	Central	Valid	Within 200 m of project area
37-6-0724	37-6-0724	SU31	Low density artefact scatter (<20)	335508	6368305	Originally recorded as a single quartz flake identified on sharp bend of Broken Back Road in Pokolbin State Forest. On relocation, this site was identified as 7 artefacts chert, silcrete, quartz and glass (potential artefact) raw material types. One flaked artefact type was identified, with remainder cores or core fragments. Objects are in secondary or tertiary positions, likely having been washed down slope and potentially moved by vehicle action.	Central	Valid	Within disturbance area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
37-6-1979	37-6-1979	SU - SMA	Low density artefact scatter (<20)	325282	6382092	This site was originally recorded as comprising 28 artefacts identified on exposures within contour banks. Salvage activities at the site resulted in the identification of a further 44 surface artefacts. On reinspection of the site, six artefacts were recorded on a gently inclined exposure 30 m southeast of an access track connected to a large dam within Bulga Mine operations area. The site is distributed over a 10 m x 20 m area and includes red mudstone flakes. Due to extensive construction and erosion in the surrounding landscape, it was determined that the soils were skeletal, limiting remaining subsurface potential. The closest water source is an unnamed drainage channel located approximately 230 m southwest with the closest artefact site #37-6-1981 located 170 m northeast of the site.	North	Valid	Within 200 m of project area
37-6-2064	37-6-2064	SU12	Low density artefact scatter (<20)	320964	6392361	Three artefacts recorded on grassy plain 140 m east of the Golden Highway and 140 m northwest of Tower 125. The site encompasses a 20 m x 5 m area comprising an orange silcrete flake, red mudstone core and a yellow mudstone artefact (potential grinding plate). Due to clearance for pastoral grazing and location on a floodplain, it was determined that the soils were mostly skeletal, with limited remaining subsurface potential. The closest water source is the Hunter River (1 km east) with a high concentration of previously recorded AHIMS sites (n=>50) situated between this site and the river. The closest site (#37-6-3157) is located approximately 60 m east. This valid AHIMS site was reidentified as part of the 2024 survey within 10 m of the original location.	North	Valid	Within 200 m of project area
37-6-2779	37-6-2779	SU32	Culturally modified tree (carved or scarred)	337376	6347827	No site card available. A previously recorded site, comprising 1 tentative culturally modified tree with a single north facing scar identified on southwest slope of Cabans Road 70 m south of the intersection with an unnamed access track. The eucalypt tree was recorded in good condition with an estimated circumference of approximately 2.5 m. The elongated oval scar measures 250 cm x 80 cm with approximately 40 cm of regrowth measuring <10 cm in depth. The scar is positioned 70 cm above the ground with no evidence of disturbance. The closest water source is an unnamed drainage channel located down a gully 220 m north-east of the site, with site #37-6-2780 located 100 m northwest. This valid AHIMS site was reidentified as part of the 2024 survey within 10 m of the original GPS coordinates.	Central	Non-cultural – Appendix F.6	Within disturbance area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
37-6-2780	37-6-2780	SU32	Grinding groove	337313	6347899	No site card available. A previously recorded site identified approximately 7 m southwest of the documented location. One grinding groove was observed adjacent to a natural waterhole, on an exposed sandstone slab.	Central	Valid	Within 200 m of project area
37-6-2833	37-6-2833	SU14	Isolated find	324535	6386960	One yellow mudstone core recorded on a graded vehicle access track 90 m northeast of a large dam within Bulga Mine operations area. The landscape surrounding the site has been subject to disturbance from clearance and construction, with soils surrounding the site showing limited potential for remaining subsurface deposits. The closest water source is an unnamed drainage channel 90 m northwest with site HPT-N-IF32 located 40 m northeast. The site card identifies this site as a glass artefact; however this was not observed during survey undertaken for this assessment.	North	Valid	Within project area
37-6-2842	37-6-2842	SU - SMA	Low density artefact scatter (<20), PAD	324482	6380804	A moderate density artefact scatter (n=>23 artefacts) recorded along the northeast bank of Nine Mile Creek toward the intersection with an ephemeral creekline to the southeast covering an approximate area of 80 m x 8 m. The site includes cores, scrapers, points and flakes, with some tools with evidence of heat treatment. Raw material types include red silcrete as well as yellow, grey and orange chert/mudstone. The landscape surrounding the site has been subject to disturbance from regular flooding, with the movement of soils and artefacts in the area surrounding the site suggesting potential for remaining subsurface deposits. The closest recorded site is HTP-N-IF56, located approximately 220 m to the southeast. This valid AHIMS site was reidentified as part of this survey within 65 m of the original location.	North	Valid	Within project area
37-6-3038	37-6-3038	SU8	Low density artefact scatter (<20)	313924	6402181	Three artefacts identified on vehicle track component of #37-6-2842 (a low-density artefact scatter), previously recorded on AHIMS as destroyed. Six nearby registered AHIMS sites (destroyed) associated with the main adjacent track and within a 50 m radius of this site. The presence of artefacts at the site likely reflects remnant material.	North	Valid	Within project area
37-6-3039	37-6-3039	SU8	Low density artefact scatter (<20)	313731	6402114	Nine silcrete artefacts identified on a graded vehicle track for trucks, on very gently inclined slope 60 m west of 37-6-3040 on the same vehicle track. The presence of artefacts at the site likely reflects remnant material.	North	Valid	Within disturbance area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
37-6-3040	37-6-3040	SU8	Isolated find	313797	6402112	One small red silcrete artefact identified on a graded vehicle track for trucks, on a very gently inclined slope 60 m east of 37-6-3039 on the same vehicle track. Although site #37-6-3040 is registered as destroyed on AHIMS, the presence of artefacts at the site likely reflects remnant material.	North	Valid	Within project area
37-6-3078	37-6-3078	SU13	Isolated find	321984	6390579	One red mudstone flake identified on a cattle track exposure within a cleared paddock adjacent to a dam. The site is situated 25 m west of Doctors Creek, a deeply incised 2nd order creek.	North	Valid	Outside project area
37-6-3082	37-6-3082	SU12	Low density artefact scatter (<20)	321500	6391559	Two yellow silcrete and 1 yellow mudstone artefacts (possible grinding stones). Artefacts within a 3 m^2 area adjacent to a cattle trough within a paddock cleared for pastoral grazing. Artefacts are unlikely to be in situ. The artefacts associated with previously recorded site #37-6-3082 comprises an isolated find and are within 150 m of artefact sites #37-6-3080 and #37-6-3081.	North	Valid	Within disturbance area
37-6-3096	37-6-3096	SU12	Isolated find	321309	6392213	One large, yellow mudstone flake (9 cm x 6 cm) located in a waterlogged swampy area within a cleared paddock. Site is situated 80 m southwest of #37-6-3095 and approximately 250 m southeast of a concentration of artefact sites (#37-6-3156 to #37-6-3163). The site is situated on floodplain landform to the west of the Hunter River.	North	Valid	Within 200 m of project area
37-6-3099	37-6-3099	SU12	Isolated find	321498	6392578	One orange mudstone core, measuring approximately 120 mm x 80 mm, subangular with multidirectional flake scars. The site is situated in a cleared cattle paddock with signs of disturbance to the north characterised by areas of excavation, presumably a rubbish pit, to accommodate the deposition of farm refuse. The Hunter River is 400 m to the east, with a high concentration of registered artefact sites within 300 m of the eastern bank of the river.	North	Valid	Outside project area
37-6-3100	37-6-3100	SU12	Isolated find	321034	6392528	One broken red silcrete cobble on a very gently inclined cleared paddock near a transmission line. The site is in proximity to multiple artefact sites on the floodplain west of the Hunter River, 770 m east.	North	Valid	Within disturbance area
37-6-3103	37-6-3103	SU12	Isolated find	320964	6392427	One pale orange silcrete artefact (7 cm x 7 cm) with evidence of retouch, creating a serrated edge. Situated on exposure within a cleared paddock on floodplain landform to the west of Hunter River.	North	Valid	Within 200 m of project area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
37-6-3116	37-6-3116	SU12	Isolated find, PAD	321023	6392368	A single mudstone flake situated on terrace landform adjacent to Hunter River in a cleared paddock. The site is located approximately 90 m east of a gravel road traversing northeast - southwest and 70 m of an unsealed vehicle track leading to the Hunter River situated approximately 400 m from the track. The site is considered to contain subsurface cultural material due to site location on elevated terrace landform overlooking the Hunter River.	North	Valid	Within project area
37-6-3156	37-6-3156	SU12	Low density artefact scatter (<20)	321034	6392413	Originally recorded as an isolated find, this site comprises a mudstone flake located on a slight rise in a cleared paddock. On relocation, 4 artefacts were recorded on track exposures within a cleared grassy paddock on floodplain landform to the west of the Hunter River, surrounded by a concentration of artefact sites #37-6-3157 to 37-6-3164 and 37-6-2064. This site includes 1 yellow mudstone flake with use wear, 1 large mudstone, a white quartzite flake and a red silcrete flake. The site covers an area of approximately 40 m x 20 m.	North	Valid	Within disturbance area
37-6-3157	37-6-3157	SU12	Isolated find, PAD	321023	6392368	One complete yellowish-red tuff flake (potential hand axe) located within a cleared grassy paddock on floodplain landform 1 km west of Hunter River. This site is surrounded by a concentration of artefact sites including #37-6-3158 and #37-6-3159 to the southeast and east respectively.	North	Valid	Within project area
37-6-3163	37-6-3163	SU12	Low density artefact scatter (<20), PAD	321110	6392372	A low-density artefact scatter comprising 2 mudstone flakes. The site is located on a slight rise in a cleared paddock, approximately 990 m west of the Hunter River, approximately 170 m east of a rail line and parallel to the Golden Highway. The site is considered to contain sub-surface cultural material.	North	Valid	Within disturbance area
37-6-3348	37-6-3348	SU11	Low density artefact scatter (<20)	317622	6396211	Two yellow and 1 red mudstone flake located on an animal track exposure situated on gently inclined hillslope above the confluence of Wollombi Brook and Hunter River. The site is surrounded by a high concentration of artefact sites within a 200 m radius: 37-6-3345 to 37-6-3354; 37-6-3357 to 37-6-3360; 37-6-3373 to 37-6-3376 and 37-6-3385 to 37-6-3389.	North	Valid	Within disturbance area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
37-6-3350	37-6-3350	SU11	Low density artefact scatter (<20)	317721	6396183	One broken yellow mudstone flake, 1 silcrete flaked piece, 1 petrified wood artefact on gently inclined hillslope with regrowth woodland above lower order tributaries to the Hunter River. A concentration of registered AHIMS sites within a 100 m radius to the southwest could not be relocated during survey (37-6-3744 to 37-6-3746; 37-6-3749 to 37-6-3754 and 37-6-3757 to 37-6-3760).	North	Valid	Within project area
37-6-3379	37-6-3379	SU11	Low density artefact scatter (<20)	317267	6396401	Four mudstone artefacts identified on an eroded area approximately 5 m x 5 m adjacent to Alignment A Tower 142. The site is situated on very gently inclined hillslope within a cleared paddock, 170 m east of Wollombi Brook (8th order stream). AHIMS sites within a 200 m radius include: 37-6-3377 to 37-6-3377; 37-6-3390 to 37-6-339a and 37-6-3411.	North	Valid	Within disturbance area
37-6-3384	37-6-3384	SU11	Low density artefact scatter (<20)	317319	6396457	Twenty-three artefacts located on eroded exposures on north facing lower hillslope, approximately 120 m east of Wollombi Brook (8th order). Artefacts primarily comprise mudstone flakes, covering an area of 120 m x 35 m. Nearby sites follow the spur to the south (#37-6-3379 to #37-6-3383) and the foot slope contour to the east (#37-6-3390 and #37-6-3391).	North	Valid	Within disturbance area
37-6-3435/ 37-6-3450/ 37-6-3451	37-6-3435/ 37-6-3450/ 37-6-3451	SU11	Low density artefact scatter (<20)	318381	6396097	Thirteen artefacts identified on cattle track erosions within a cleared paddock on very gently inclined hillslopes surrounding a 2nd order tributary to the Hunter River. Artefacts comprise silcrete and mudstone flakes and flaked pieces covering an area of approximately 80 m x 60 m. This site was unable to be relocated during this assessment.	North	Valid	Within 200 m of project area
37-6-3484	37-6-3484	SU11	Low density artefact scatter (<20)	318916	6396094	No site card is available for this site. A survey identified six artefacts located on gently sloping footslope, 10 m west of a 2nd order tributary to Hunter River, in proximity to 3 other AHIMS sites along the same creek bank (#37-6-3485 to 3487). The artefacts were identified within surface exposures in 2 concentrations comprising a pink silcrete flake, a grey silcrete flake, 1 mudstone cores and three mudstone flakes.	North	Valid	Within disturbance area
37-6-3488	37-6-3488	SU11	Low density artefact scatter (<20)	319003	6396055	Four artefacts identified on a cattle track in a cleared paddock used for grazing. Artefacts comprise 2 red mudstone cores, a yellow/red silcrete flake and a large silcrete core situated on a foot slope west of a 2nd order tributary to Hunter River.	North	Valid	Within disturbance area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
37-6-3492	37-6-3492	SU11	Isolated find	318613	6396013	A single silcrete flake, located within a plough line of a heavily disturbed paddock. The site is located on a low crest between 2 tributaries to the Hunter River.	North	Valid	Within disturbance area
37-6-3499	37-6-3499	SU11	Isolated find	319335	6395933	A single mudstone flake located on an eroded surface exposure on a lower hillslope above the terrace adjacent to Hunter River. The site is part of a low-density scatter across the landform. It is within 40 m of 5 previously recorded isolated finds (#37-6-3496 to 3501) and is associated with a wider concentration of artefact sites across the same landform.	North	Valid	Within project area
37-6-3502	37-6-3502	SU11	Low density artefact scatter (<20), PAD	319250	6395928	Two artefacts, 1 large mudstone flake and 1 yellow silcrete core, are situated within a cleared grassy paddock on an eroded surface exposure. The gently inclined hillslope slopes north-west to a 2nd order tributary to the Hunter River. The site is surrounded by a high concentration of sites within a 120 m radius: 37-6-3493 to 35-6-3510, 37-6-3515 and 37-6-3516.	North	Valid	Within disturbance area
37-6-3505	37-6-3505	SU11	Isolated find, PAD	319195	6395917	One large silcrete core (16 cm x 20 cm) located on a gentle hillslope, 250 m south of a terrace adjacent to Hunter River. There are several other artefact sites and PAD within a 20 m radius (#37-6-3506 to 3508). Site is recorded on AHIMS as being an area of PAD.	North	Valid	Within project area
37-6-3506	37-6-3506	SU11	Isolated find	319203	6395929	The site card records 2 artefacts within the site. However, the survey undertaken as part of this assessment relocated only 1 artefact comprising 1 large mudstone core (6 cm x 6 cm) located on gentle hillslope landform, 250 m south of the terrace adjacent to Hunter River. There are several other artefact sites and an area of PAD within a 50 m radius (#37-6-3502, 37-6-3504 to 3508). Site is recorded on AHIMS as a low-density artefact scatter.	North	Valid	Within disturbance area
37-6-3507	37-6-3507	SU11	Isolated find	319193	6395933	One large mudstone core (9 cm x 9 cm) located on gentle hillslope landform, 250 m south of the terrace adjacent to Hunter River. There are several other artefact sites and an area of PAD within a 50 m radius (#37-6-3502, 37-6-3504 to 3509).	North	Valid	Within disturbance area
37-6-3508	37-6-3508	SU11	Low density artefact scatter (<20), PAD	319180	6395906	A low-density artefact scatter comprising 2 mudstone multi-platform cores, three mudstone flakes and 1 feldspar multi-platform core. The site is situated on plain landform >1 km south of Hunter River. This site was relocated as part of the fieldwork undertaken for this assessment.	North	Valid	Within project area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
37-6-3514	37-6-3514	SU11	Low density artefact scatter (<20)	319348	6395751	Two red mudstone flakes located on a vehicle access track adjacent to a fence line situated on a cleared gently inclined hillslope. Previously documented as a silcrete flake (isolated find), but this particular artefact was not identified at the time of survey.	North	Valid	Within project area
37-6-3515	37-6-3515	SU11	Low density artefact scatter (<20)	319272	6395887	Thirteen artefacts identified on a surface exposure underneath a clump of isolated trees within a cleared grazing paddock on very gently inclined hillslope landform. Assemblage comprises 4 silcrete flakes, 2 silcrete cores, 4 mudstone flakes and 3 mudstone cores. Site is part of a broader concentration of artefact sites on the lower foot slope adjacent to Hunter River. The original site card identifies this site as an isolated find.	North	Valid	Within disturbance area
37-6-3516	37-6-3516	SU11	Isolated find	319263	6395861	A single large (9 cm x 10 cm) red mudstone core located on a small sheet wash exposure on very gently inclined hillslope cleared for cattle grazing. The site is 25 m southwest of HTP-N-AS33 (#37-6-3515), a more densely concentrated artefact scatter downslope.	North	Valid	Within project area
37-6-3714	37-6-3714	SU18	Rockshelter, art (pigment or engraved)	332004	6368329	A large shelter, measuring 10 m x 3 m, located north of Campbell Springs Trail in Pokolbin State Forest. At least 146 motifs were recorded comprising white (n=26) and yellow (n=13) hand stencils, white (n=2) and yellow (n=1) boomerangs, 2 white axes, a snake, 4 lizards, 2 men, and a bird. A large number of tally marks were also noted in both white pigment and charcoal. This site was relocated during this assessment, with the shelter observed in a good condition.	Central	Valid	Within project area
37-6-3782 (Trig Road cultural landscape)	37-6-3782	SU32	Rockshelter, art (pigment or engraved)	335115	6355507	Low rock shelter formed by rock overhang, facing north on a steep upper scarp. The shelter features potentially deep deposit, with a small ochre motif on the roof. Large rockfalls are evident in the shelter which may contain further motifs on their underside. Series of three rock shelters on the upper scarp within 80 m. This is the northernmost shelter, #37-6-3789 and HTP-C-RS17 are situated on the same scarp to the south.	Central	Valid	Within 200 m of project area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
37-6-3786 (Trig Road cultural landscape)	37-6-3786	SU32	Rockshelter, art (pigment or engraved)	334833	6355581	Sandstone overhang with a second, small, fire-affected cave to the east. The roof of the main shelter has significantly eroded, resulting in sandy PAD on the base. The rock shelter is located at a low point of the scarp, facing north. The opening of the main shelter measures 6 m high, 3 m depth. Small cave measures 1.1 m high at entrance 1 m and 1 m deep. Two nearby sites along the same scarp line: a rockshelter HTP-C-RS11, situated 34 m to the east; and a culturally modified tree, HTP-C-CMT01, located 25 m to the west. The confluence of a 2nd order stream with Sweetmans Creek (4th order) is 370 m to the west at the base of the spur.	Central	Valid	Outside project area
37-6-3787 (Trig Road cultural landscape)	37-6-3787	SU32	Rockshelter, art (pigment or engraved)	334729	6354829	A large shelter (art dimensions are provided as 9 m x 3 m), located on Sweetmans Creek and west of Trig Road in Corrabare State Forest. The site card describes the art as a 'white indeterminate line drawing of [a] elongated shape [and] 2 infilled ochr[e] markings'. The site has been impacted by weathering.	Central	Valid	Outside project area
37-6-3789 (Trig Road cultural landscape)	37-6-3789	SU32	Rockshelter, art (pigment or engraved), stone arrangement	335154	6355500	North facing rockshelter on a steep upper scarp. Site consists of 2 rockshelters, the smaller shelter contains the charcoal motif of a potential macropod. The larger rockshelter features a stone arrangement with stones stacked on top of each other, 4–5 courses high and approximately 1 m long. Both shelters feature relatively deep sandy deposits largely made up of sandstone eroding from with then shelter. Series of 3 rockshelters on the upper scarp within 80 m. This is the central shelter, #37-6-3782 and HTP-C-RS17 are situated on the same scarp.	Central	Valid	Within 200 m of project area
37-6-3790 (Trig Road cultural landscape)	37-6-3790	SU32	Rockshelter, art (pigment or engraved)	334975	6354469	A rockshelter (no dimensions provided), located north of Trig Road in Corrabare State Forest. The site card describes the art as a 'small faded charcoal drawing' and the measurements provided are 50 cm x 50 cm. The site has been impacted by weathering.	Central	Valid	Outside project area
37-6-3967	37-6-3967	SU31	Grinding groove	336074	6369676	This site is described as a small group of four axe grinding grooves situated on the eastern side of Broken Back Road (approximately 40 m from the track), on small exposure of flat sandstone outcropping. At least 2 grooves were observed during the survey at this location, however visibility was poor due to heavy leaf litter.	Central	Valid	Within 200 m of project area
37-6-4049	37-6-4049	SU11	Isolated find	320012	6394709	A single mudstone core located on upper hillslope landform within a cleared grazing paddock above Sandy Hollow Creek (650 m to the west). The site was unable to be relocated during this assessment.	North	Valid	Within disturbance area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
37-6-4068	37-6-4068	SU11	Low density artefact scatter (<20)	319346	6395731	Originally documented as an isolated find. On reinspection during this survey, 3 artefacts comprising 1 yellow/red silcrete flake, 1 red mudstone flake and a large yellow mudstone core were located on a vehicle access track adjacent to a fence line situated in a cleared grazing paddock on gently inclined hillslope.	North	Valid	Within project area
45-3-0263	45-3-0263	SU33	Rockshelter, art (pigment or engraved), grinding groove, low density artefact scatter	338026	6339457	A long, low rockshelter (approximately 2 m high) with a sandy base located on a densely wooded upper hillslope. Based on interpretation from Tracey Howie (A&G), the art possibly depicts the story of the Billy and dingo siblings and includes a howling dingo in ochre. Tracey believed the deeper red streaks may depict ancestral beings within the Milky Way. Potentially a classroom, teaching what to be wary of, and the dingo provides a warning. There is also a faint hand stencil with red ochre, and a person carrying a club. Additional charcoal motifs have faded. Artefacts comprise 2 quartz flakes, 1 within the shelter and 1 washed downhill; a fine-grained basalt flake with platform preparation and potential retouch; a basalt scraper with retouch, 5 pink quartz flakes and a cobble with flake scars. Several grind stones with pitting and red ochre identified at back of shelter. The shelter is in good condition.	South	Valid	Within 200 m of project area
45-3-0972 (Abbots Falls cultural landscape)	45-3-0972	SU27	Grinding groove	344805	6340441	Grinding groove site on a sandstone platform within Jilliby Jilliby Creek (3rd order) above a small waterfall. The original site card documents 4 grooves: 39 cm x 8 cm x 2cm; 32 cm x 7 cm x 1 cm; 24 cm x 4 cm x 0.2 cm; and 32 cm x 6 cm x 0.5 cm. However, during the survey, this site was more extensive than documented, and dozens of grooves were observed in the creek bed and surrounds. Peter Leven (ADOAC) suggested he has observed thousands of grooves in this locale when conditions are favourable.	South	Valid	Outside project area
45-3-2140 (Flat Rock cultural landscape)	45-3-2140	SU32	Rockshelter, art (pigment or engraved)	338476	6346764	A large rockshelter measuring approximately 16 m wide x 4 m deep x 4 m high. The rockshelter is oriented west and located at headwaters of a tributary of Watagans Creek, between Langans Road and Krafts Road. At least 64 motifs are recorded, in charcoal and ochre, including 21 human figures, 7 kangaroos, 3 emus, 8 weapons, 3 shields and 3 snakes. The art includes a number of battle scenes. This site was relocated in good condition at the time of survey.	Central	Valid	Outside project area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
45-3-2445	45-3-2445	SU33	Rockshelter, art (pigment or engraved), grinding groove, low density artefact scatter	337015	6335781	Long and low rockshelter formed by cavernous weathering. Approximately 1.5 m high with a sandy floor deposit. Art comprises groups of white, short, vertical parallel lines and dots (possibly for counting), 2 axe heads or bundi, white hand stencils with some forearms, and indeterminate charcoal markings. The shelter is situated 70 m west of Bees Nest Ridge Road on steep, west facing scarp. Rockshelter site #45-6-2446 is situated on the same scarp, 180 m to the north.	South	Valid	Outside project area
45-3-2449	45-3-2449	SU28	Grinding groove	346011	6338536	This previously documented was relocated during the survey and was originally recorded as 8 grinding grooves. Improved survey conditions allowed for the identification of 28+ grinding grooves on an exposed sandstone platform measuring 5 m x 3 m above a small waterfall associated with an unnamed 2nd order stream. The site is situated on the steep mid slope of an escarpment within dense forest.	South	Valid	Within project area
45-3-2456	45-3-2456	SU32	Grinding groove	335448	6353652	This site comprises 72 grinding grooves located on a ridgeline 5 m east of Trig Road and 2.1 km north-east of Flick Road intersection. The site covers an area of approximately 11 m x 10 m across 3 separate sandstone bedrock platforms. The grinding grooves measure between 10 cm and 25 cm long with a maximum width of 6 cm and were identified in small parallel clusters. There are varying counts of grooves on the north (n=18), south (n=23) and east (n=31) exposures. Disturbance in the surrounding area is confined to the construction and maintenance of Trig Road. The closest water source is an unnamed drainage channel down a gully 95 m west with the nearest site located 940 m northwest (#37-6-3790). This valid AHIMS site was reidentified as part of the 2024 survey 146 m south of the original location. The 2024 survey identified more grooves than were initially recorded (eastern platform added) with the potential for additional grooves to be obscured by surrounding soil and leaf litter.	Central	Valid	Within project area
45-3-3059/45-3-4565	45-3-3059/45-3-4565	SU33	Rockshelter, art (pigment or engraved)	339489	6340755	Small, shallow, west facing sandstone rockshelter with art. The rockshelter roof has collapsed but the wall with engraving and red ochre art is still intact. Red and white ochre, with picking depicts kangaroo prints, sticks, dingo heads and arches. At least 14 pairs of eastern grey kangaroo feet are depicted. Several dingo heads including dingo head bowing, dingo head in profile, another looking straight on. Two rounded lines in identifiable shapes. Conservation has been installed on top of shelter in the form of a concrete tube to redirect water.	South	Valid	Within 200 m of project area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
45-3-3088	45-3-3088	SU33	Rockshelter, art (pigment or engraved), grinding groove, PAD	335115	6335347	A large shelter, 15 m wide x 7.5 m deep x 2 m high, with a deposit estimated to be approximately 45 cm in depth. Two motifs were noted, both charcoal kangaroos, and grinding grooves were recorded under the dripline. The site is located south of Wollombi Brook, between Walkers Ridge Road and Basin Forest Road. This site was relocated during the survey for this assessment. A relatively deep deposit was noted, with cooked bone, crab claw and shell on the surface (potentially modern from campers). No art was noted, though recording conditions were not ideal.	South	Valid	Within 200 m of project area
45-3-3583 (Flat Rock cultural landscape)	45-3-3583	SU32	Rockshelter, art (pigment or engraved)	337170	6347130	Rockshelter with art, located mid-slope within dense forest. Art comprises white stencil handprints and charcoal markings. This site was relocated as part of the survey, though it has high cultural value, there was very little shared on the specifics of this.	Central	Valid	Outside project area
45-3-3619	45-3-3619	SU32	Grinding groove	337655	6347324	Site card not available. Recorded location is almost on top of #45-3-3581.	Central	Valid	Within 200 m of project area
45-3-4121	45-3-4121	SU33	Rockshelter (no cultural markers)	336228	6336048	AHIMS #45-3-4121, #45-3-4122, #45-3-4123, #45-3-4124 and #45-3-4125 represent five rockshelter sites side-by-side on the same cliff face, all north of Watagans Ridge Forest Road. This site card represents an overhang 3 m high and 1.5 m deep (no width is recorded). No other notable features are recorded. This site was relocated during the survey.	South	Valid	Within 200 m of project area
45-3-4122	45-3-4122	SU33	Rockshelter (no cultural markers)	336240	6335996	AHIMS #45-3-4121, #45-3-4122, #45-3-4123, #45-3-4124 and #45-3-4125 represent 5 rockshelter sites side-by-side on the same cliff face, all north of Watagans Ridge Forest Road. A narrow and low shelter, approximately 1.5 m high x 1.5 m deep, with no other notable features recorded. This site was relocated during the survey.	South	Valid	Within 200 m of project area
45-3-4123	45-3-4123	SU33	Aboriginal ceremony and dreaming, rockshelter	336264	6336021	AHIMS #45-3-4121, #45-3-4122, #45-3-4123, #45-3-4124 and #45-3-4125 represent a number of rockshelter sites and sandstone features side-by-side on the same cliff face, all north of Watagans Ridge Forest Road. This site card represents a sandstone arch, which the recorder associates with ceremony. This site was relocated during the survey, though the RAPs present did not elaborate on the cultural value of this site.	South	Valid	Within 200 m of project area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
45-3-4543	45-3-4543	SU30	Grinding groove	346964	6336352	Grinding groove site on a sandstone platform within Jilliby Jilliby Creek (3rd order) above a small waterfall. Site comprises 4 grooves: measuring 39 cm x 8 cm x 2cm, 32 cm x 7 cm x 1 cm, 24 cm x 4 cm x 0.2 cm, and 32 cm x 6 cm x 0.5cm.	South	Valid	Within 200 m of project area
45-3-4562/ 45-3-3378/ 45-3-3381	45-3-4562/ 45-3-3378/ 45-3-3381	SU27	Culturally modified tree (carved or scarred)	344224	6340559	AHIMS #45-3-4562, #45-3-3378 and #45-3-3381 represent a single scarred tree, with a scar measuring approximately 98 cm long x 88 cm wide, and 68 cm from the ground. The site is located in an informal(?) parking area at the intersection of Watagan Forest Road and Wollombi Forest Road. This site was relocated as part of the survey.	South	Valid	Within 200 m of project area
45-3-4563 (Abbots Falls cultural landscape)	45-3-4563	SU27	Grinding groove	344919	6340521	A large grinding groove site situated adjacent to a water hole at the confluence of 2 x 2nd order creeks which join Dora Creek 335 m to the north. Two additional grinding groove sites are located within 130 m: 45-3-4564 and 45-3-0972. These additional sites are situated on the eastern creekline, creating a complex of grinding groove sites.	South	Valid	Outside project area
45-3-4564 (Abbots Falls cultural landscape)	45-3-4564	SU27	Grinding groove	344817	6340479	Extensive grinding groove site with axe and spear grooves in multiple directions on sandstone platform above a waterfall within a 2nd order creek. Additionally, this site comprises a yellow ochre source. Approximately 90 m southwest of #45-3-4563.	South	Valid	Outside project area
45-3-4583	45-3-4583	SU33	Rockshelter, art (pigment or engraved)	338408	6341214	Heavily eroded and weathered north facing rockshelter with art on the upper scarp within open forest. The art is pecked and depicts 2 kangaroo tracks passing each other (parallel but 1 set is upside down). One track has been partially broken off. The 2 tracks potentially symbolise a travel route (RAP interpretation). The rockshelter base comprises a sandy deposit.	South	Valid	Outside project area
45-3-4623	45-3-4623	SU25	Aboriginal ceremony and dreaming, Aboriginal resource and gathering	340729	6345493	This site card represents the cultural significance of Watagan Creek, and as a valuable resource gathering site and travel route. The project crosses Watagan Creek between proposed towers 19 and 20, though this area is noted as a non-disturbance area (i.e. would be spanned). This creek was observed during the survey, though participants did not share specific values associated with the creek.	South	Valid	Within 200 m of project area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
45-6-2445	45-6-2445	SU31	Rockshelter, art (pigment or engraved)	329260	6370075	West facing, low rockshelter with art on moderately inclined upper hillslope west of Broken Back Trail. The shelter has a sandy floor overlying sandstone. The art comprises lines and dots (potentially for counting); 2 axe heads or bundi; white stencil hands some with forearms and some indistinct charcoal markings. This site is situated approximately 180 m south of another rockshelter with art (45-6-2446) on same elevation.	Central	Valid	Within 200 m of project area
45-6-2446	45-6-2446	SU31	Rockshelter, art (pigment or engraved)	329328	6370236	Rockshelter with art comprising a series of parallel, vertical white lines, several white ochre hand stencils, a charcoal turtle and other indeterminate shapes. The shelter is approximately 4 m high and 4 m deep with sandy deposit overlying a sandstone floor. Wind exposure is eroding the art. A large bird nest is located within the shelter. The shelter is situated 70 m west of Bees Nest Ridge Road on a steep, west facing scarp. Rockshelter site #45-6-2445 is situated on the same scarp, 180 m to the south.	Central	Valid	Within 200 m of project area
HTP-C-AR01	37-6-4486	SU23	Aboriginal resource and gathering	333790	6355904	Aboriginal resource and gathering site consisting of 10+ mature grass trees within a 10 m x 10 m area on a very gently inclined upper hillslope adjacent east of Becketts Road. The tallest grass tree is approximately 4 m high with eight arms with several seedlings observed in the surrounding landscape in isolated pockets. The closest water source is an unnamed drainage line located 100 m south, with Sweetmans Creek situated 380 m to the northeast. Another recorded site is located 280 m south (HTP-C-CMT07).	Central	Valid	Within disturbance area
HTP-C-AR02	37-6-4485	SU24	Aboriginal resource and gathering	334620	6352591	Aboriginal resource and gathering site consisting of native hibiscus shoots along the banks of an unnamed creek located 170 m east of Flick Road. The site is located within regenerated forest. At the time of recording, the RAPs noted that this important resource was used for cordage. The closest recorded site consists of non-cultural overhang 100 m north (HTP-C-RS27).	Central	Valid	Within disturbance area
HTP-C-AR03	TBC	SU22	Aboriginal resource and gathering	333163	6358843	Five circular holes, each approximately 15 cm in diameter on a sandstone platform sloping towards the northwest. Four of the holes are on 1 outcrop with an additional 3 broken holes on the edge of the platform. A fifth complete hole is located 1 m to the south on a separate rock. The site is situated on a moderately steep hillslope, 65 m east of a 1st order drainage line)	Central	Valid	Within 200 m of project area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
HTP-C-AR04	TBC	SU23	Aboriginal resource and gathering	334339	6353690	Two joined holes in a sandstone rock platform beside Sweetmans Creek (3rd order) within dense regrowth forest. The joined holes measure approximately 40 cm in length, between 15-20 cm in width, and a depth of approximately 40 cm. Grinding groove site, HTP-C-GG04, is located on the other side of the creek, 60 m to the north.	Central	Valid	Within 200 m of project area
HTP-C-AS01	TBC	SU31	Low density artefact scatter (<20)	330615	6369433	Four artefacts comprising three silcrete retouched flakes and 1 potentially backed chalcedony flake. Site is located on a gently inclined hillslope on a vehicle access track within open forest, ~70 m east of Campbell Springs Trail.	Central	Valid	Within 200 m of project area
HTP-C-AS02	TBC	SU31	Low density artefact scatter (<20)	331596	6368575	Two artefacts comprising 1 quartz flake and 1 river cobble manuport located on a ridge along an access track within dense open forest.	Central	Valid	Within disturbance area
HTP-C-AS03	TBC	SU31	Low density artefact scatter (<20)	327488	6368331	Two artefacts comprising a grey silcrete core and flake identified on a crest on the road verge of Broken Back Trail.	Central	Valid	Within project area
HTP-C-CMT01	TBC	SU32	Culturally modified tree (carved or scarred)	334814	6355567	One tentative culturally modified tree with two west facing rings on hillslope identified 50 m south of an unnamed access track 300 m east of Sweetmans Creek. The eucalypt tree was recorded in good condition with an estimated circumference of 1 m at the base. The 2 rings are approximately 25 cm in diameter. The site is located roughly 20 m west of another recorded site (#37-6-3786) with an additional rockshelter with PAD (HTP-C-RS12) and non-cultural overhangs (HTP-C-RS09) within 60 m to the east.	Central	Tentative	Outside project area
HTP-C-CMT02	TBC	SU22	Culturally modified tree (carved or scarred)	332950	6358375	One tentative culturally modified tree with 2 small west facing rings at the top of a ridge located 125 m south of Hawkins Road. The eucalypt tree was recorded in good condition with an estimated circumference of 1.5 m at the base. The two rings are approximately 25 cm in diameter with the lower ring situated approximately 6 m above the ground. The area surrounding the site has been previously logged. The closest water source is an unnamed drainage channel located 180 m north with the closest recorded site (HTP-C-CMT03) approximately 110 m southeast.	Central	Tentative	Within project area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
HTP-C-CMT03	-	SU22	Culturally modified tree (carved or scarred)	333058	6358353	One tentative culturally modified tree with 1 small east facing ring at the top of a steep ridge located 130 m south of Hawkins Road. The eucalypt tree was recorded in good condition with an estimated circumference of 1 m at the base. The ring is approximately 30 cm in diameter and situated approximately 14 m above the ground. The area surrounding the site has been previously logged. The closest water source is an unnamed drainage channel located 200 m northwest with the closest recorded site (HTP-C-CMT02) approximately 110 m northwest.	Central	Non-cultural – Appendix F.6	Within project area
HTP-C-CMT04	-	SU22	Culturally modified tree (carved or scarred)	333212	6359177	One tentative culturally modified tree with no scar situated on a gentle slope above the confluence of 2 x 1st order creeks (70 m east and 100 m northwest) and 350 m east of North Road. The eucalypt tree was recorded in good condition with an estimated circumference of roughly 80 cm at the base. The tree has a protruding bulge on the lower portion of trunk facing south. The area surrounding the site has been previously logged. The closest recorded site is HTP-C-CMT05, approximately 160 m southwest of the site.	Central	Non-cultural – Appendix F.6	Within disturbance area
HTP-C-CMT05	37-6-4483	SU22	Culturally modified tree (carved or scarred)	333171	6359020	One tentative culturally modified tree with a single east facing scar recorded at the base of a gully 10 m west of an unnamed creek and 260 m east of North Road. The stringybark (eucalypt) tree was recorded in poor condition with a burnt trunk and an estimated circumference of ~2.2 m. The elongated scar measures 140 cm x 25 cm with limited evidence of regrowth. The scar is positioned approximately 1 m above the ground with no evidence of disturbance in the surrounding area. The closest recorded site, a non-cultural overhang, is located 20 m northeast along the same tributary (HTP-C-RS18). Additional sites including HTP-C-AR03 and HTP-C-CMT04 were recorded 175 m southeast and 160 m northeast respectively.	Central	Tentative	Within disturbance area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
HTP-C-CMT06	TBC	SU32	Culturally modified tree (carved or scarred)	334555	6356920	One culturally modified tree with a single west facing scar located on the side of a hillslope 140 m southeast of Crawfords Road and 145 m southwest from Sweetmans Creek Road. The tall (~60 m) ghost gum tree was recorded in good condition with an estimated circumference of approximately 2.5 m. The long narrow scar measures 150 cm x 20 cm with regrowth measuring to <10 cm in depth. The scar is positioned 2.55 m above the ground with no evidence of disturbance. The closest water source is an unnamed drainage channel situated 160 m south. The nearest recorded sites include two non-cultural overhangs (HTP-C-RS20 and HTP-C-RS21) within 40 m east and HTP-C-SA03 230 m northeast of the site.	Central	Tentative	Within 200 m of project area
HTP-C-CMT07	-	SU23	Culturally modified tree (carved or scarred)	333754	6355617	One tentative culturally modified tree with a single north facing scar recorded on a hillslope located adjacent east of Becketts Road approximately 90 m northeast of Tower 43. The rough bark angophora tree was recorded in poor condition with a burnt trunk and an estimated circumference of approximately 2.4 m. The ovoid scar measures 300 cm x 50 cm and extends to the base of the trunk with limited regrowth. The closest water source is an unnamed drainage channel located 100 east with previously recorded site HTP-C-AR01 located 290 m north.	Central	Non-cultural – Appendix F.6	Within disturbance area
HTP-C-CMT08	-	SU23	Culturally modified tree (carved or scarred)	334014	6354820	One tentative culturally modified tree with a single southeast facing scar on top of a ridgeline located 95 m west of Crumps Road. The eucalypt tree was recorded in good condition with an estimated circumference of approximately 2.8 m. The ovoid scar measures 110 cm x 30 cm with <10 cm of evident regrowth. The scar is positioned 25 cm above the ground with no evidence of disturbance. Active revegetation was identified within the surrounding area. The closest water source is an unnamed drainage channel located 160 m northeast, with HTP-C-SA04 within 10 m west of the site.	Central	Non-cultural – Appendix F.6	Within project area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
HTP-C-CMT09	-	SU32	Culturally modified tree (carved or scarred)	333908	6354622	One tentative culturally modified tree with a single south facing scar and 2 protruding bulges higher up on the trunk identified on a hillcrest 40 m northwest above Crumps Road. The eucalypt tree was recorded in good condition with an estimated circumference of ~1.2 m. The unevenly shaped scar is 105 cm x 25 cm with <5 cm of regrowth. The scar is positioned approximately 60 cm above the ground with no evidence of disturbance. The closest water source is an unnamed drainage channel located 200 m northwest, with 2 sites (HTP-C-CMT10 and HTP-C-CMT11) located 200 m southeast of the site.	Central	Non-cultural – Appendix F.6	Within disturbance area
HTP-C-CMT10	TBC	SU23	Culturally modified tree (carved or scarred)	334051	6354494	One culturally modified tree with 2 scars, north and southwest facing, recorded on a hillslope 130 m east of Crumps Road. The eucalypt tree was recorded in good condition with an estimated circumference of ~2.6 m. The north facing scar begins at ground level and measures 210 cm x 25 cm. The southwest facing scar is 127 cm from base of tree and measures 200 cm x 35 cm. The site is located within regrowth forest and has no evidence of disturbance. The closest water source is an unnamed tributary 90 m southeast with HTP-C-CMT11 located 8 m southeast of the site.	Central	Tentative	Within 200 m of project area
HTP-C-CMT11	TBC	SU23	Culturally modified tree (carved or scarred)	334069	6354491	One tentative culturally modified tree with a single west facing scar identified at the base of a gully 180 m east of Crumps Road. The stringybark (eucalypt) tree was recorded in poor condition with a burnt trunk removing most of the dry face. The tree has an estimated circumference of ~2.8 m. The unevenly shaped scar is 160 cm x 30 cm and reaches the base of the trunk with limited evidence of regrowth. The site is located within regrowth forest and has no evidence of disturbance. The closest water source is an unnamed tributary 75 m southeast with HTP-C-CMT10 located 8 m northwest of the site.	Central	Tentative	Within 200 m of project area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
HTP-C-CMT12	-	SU23	Culturally modified tree (carved or scarred)	334264	6354159	One tentative culturally modified tree with 2 north facing scars identified on a hillslope 50 m southeast of an unmaintained access track coming off Crumps Road and 300 m west of Flick Road. The eucalypt tree was recorded in poor condition with a burnt trunk with an estimated circumference of ~2.1 m. The upper ovoid scar is positioned 160 cm above the ground surface and is 120 cm x 10 cm. The lower unevenly shaped scar commences at the base of the trunk and tapers. It measures 80 cm x 20 cm. The closest water source is an unnamed drainage channel (180 m south) that is a tributary of Sweetmans Creek, located 300 m east. The site is within 80 m of 3 sites to the southeast, HTP-C-CMT13, HTP-C-CMT14, HTP-C-CMT15.	Central	Non-cultural – Appendix F.6	Within disturbance area
HTP-C-CMT13	-	SU23	Culturally modified tree (carved or scarred)	334276	6354132	One tentative culturally modified tree with a single west facing scar identified on a hillslope 60 m southeast of an unmaintained access track coming off Crumps Road and 280 m west of Flick Road. The eucalypt tree was recorded in poor condition with a burnt trunk and an estimated circumference of ~1.8 m. The tapered scar is 120 cm x 17 cm with <10 cm of potential regrowth. The scar commences at the base of the trunk with no evidence of disturbance. The closest water source is an unnamed drainage channel (160 m south) that is a tributary of Sweetmans Creek, located 280 m east. The site is within a 50 m diameter of three sites to the northwest (HTP-C-CMT12) and southeast (HTP-C-CMT14 and HTP-C-CMT15).	Central	Non-cultural – Appendix F.6	Within disturbance area
HTP-C-CMT14	-	SU23	Culturally modified tree (carved or scarred)	334291	6354114	One tentative culturally modified tree with a single west facing scar identified on a hillslope 90 m southeast of an unmaintained access track coming off Crumps Road and 260 m west of Flick Road. The eucalypt tree was recorded in poor condition with a burn trunk and an estimated circumference of ~2 m. The unevenly shaped scar is 150 cm x 40 cm with limited regrowth. The scar commences at the base of the trunk with no evidence of disturbance. The closest water source is an unnamed drainage channel (140 m south) that is a tributary of Sweetmans Creek, located 280 m east. The site is within a 50 m diameter of 3 sites to the northwest (HTP-C-CMT12 and HTP-C-CMT13) and south-east (HTP-C-CMT15).	Central	Non-cultural – Appendix F.6	Within disturbance area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
HTP-C-CMT15	-	SU23	Culturally modified tree (carved or scarred)	334304	6354092	One tentative culturally modified tree with a single northwest facing scar recorded on a hillslope 110 m southeast of an unmaintained access track coming off Crumps Road and 250 m west of Flick Road. The eucalypt tree was recorded in poor condition with a burnt trunk removing most of its dry face. The tree has an estimated circumference of ~2.5 m. The ovoid scar is 120 cm x 40 cm with limited evidence of regrowth. The scar commences at the base of the trunk with no evidence of disturbance. The closest water source is an unnamed drainage channel (120 m south) that is a tributary of Sweetmans Creek, located 280 m east. The site is within an 80 m diameter of 3 sites to the northwest (HTP-C-CMT12 and HTP-C-CMT13 and HTP-C-CMT14).	Central	Non-cultural – Appendix F.6	Within disturbance area
HTP-C-CMT16	TBC	SU32	Culturally modified tree (carved or scarred)	339374	6345944	One tentative culturally modified tree with a single south facing scar identified on a hillslope 85 m northeast of Langans Road down the slope. The stringybark (eucalypt) tree was recorded in good condition with an estimated circumference of ~2.9 m. The tapered scar is 350 cm x 40 cm with <10 cm of evident regrowth. The scar commences at the base of the trunk with no evidence of disturbance. The closest water source is an unnamed drainage channel approximately 180 m northeast. The site may form part of a larger significant landscape, with other sites located 10 m west (HTP-C-CMT17) and 65 m west (HTP-C-RS14).	Central	Tentative	Within 200 m of project area
HTP-C-CMT17	TBC	SU32	Culturally modified tree (carved or scarred)	339368	6345945	One tentative culturally modified tree with 2 scars, southeast and west facing, recorded on a hillslope 85 m northeast of Langans Road down the slope. The stringybark (eucalypt) tree was recorded in good condition with an estimated circumference of ~3.4 m. The south-east tapered scar commences at the base of the trunk and measures 250 cm x 30 cm with limited regrowth. The second west facing scar commences at the base of the trunk and measures 290 cm x 43 cm with <10 cm of evident regrowth. There is no evidence of disturbance in the surrounding landscape. The closest water source is an unnamed drainage channel approximately 180 m northeast. The site may form part of a larger significant landscape, with other sites located 10 m east (HTP-C-CMT16) and 55 m west (HTP-C-RS14).	Central	Tentative	Within 200 m of project area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
HTP-C-CMT18	-	SU21	Culturally modified tree (carved or scarred)	332940	6360639	One tentative culturally modified tree with a single south facing scar identified on a rolling plain adjacent south to Wollombi Road behind a fence. The eucalypt tree was recorded in good condition with an estimated circumference of ~3 m. The large elongated scar is roughly 260 cm x 60 cm with <10 cm of evident regrowth. The scar, which was potentially taken for a bark slab, commences from the base of the trunk. Most of the mature trees in the surrounding landscape have been previously removed, with no disturbance to the tree evident. The closest water source is a 2nd order tributary to Congewai Creek located 90 m southeast of the site. The nearest recorded site is HTP-C-GG04 310 m south.	Central	Non-cultural – Appendix F.6	Within project area
HTP-C-CMT19	-	SU31	Culturally modified tree (carved or scarred)	330248	6370027	One tentative culturally modified tree with a single east facing ring identified at the top of a ridge on the south side of Broken Back Trail 180 m north-west of the junction with Campbell Springs Trail. The eucalypt tree was recorded in good condition with an estimated circumference of ~1.5 m at the base. The ring is approximately 30 cm in diameter and located 7 m above the ground. The site is located in regrowth forest with no disturbance evident. The closest water source in an unnamed drainage channel 120 m northeast with the nearest recorded site (#37-6-3710) located 370 m northwest of the site.	Central	Non-cultural – Appendix F.6	Within disturbance area
HTP-C-CMT20	TBC	SU31	Culturally modified tree (carved or scarred)	327055	6368316	One tentative culturally modified tree with a single west facing scar recorded on the hillslope abutting a drainage channel connected to Yellowrock Creek 80 m west with Broken Back Trail 220 m southeast. The eucalypt tree was recorded in good condition with an estimated circumference of ~1.4 m at the base. The narrow scar is roughly 180 cm x 3 cm with regrowth almost to full closure. The site is located in regrowth forest with no disturbance evident. The closest recorded site is 50 m south (#37-6-3715).	Central	Tentative	Outside project area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
HTP-C-CMT21	-	SU24	Culturally modified tree (carved or scarred)	335293	6350958	One tentative culturally modified tree with a single northwest facing scar identified on the north-west hillslope of a drainage line 175 m southeast of Crumps Road and 220 m northwest of Mahogany Road. The eucalypt tree was recorded in good condition with sap dripping from the scar and an estimated circumference of ~2.4 m. The ovoid scar measures 120 cm x 15 cm with >10 cm of regrowth. The scar is located 140 cm above the ground with limited evidence of disturbance in the surrounding area. The closest recorded site is HTP-C-IF03 located 130 m northwest of the site.	Central	Non-cultural – Appendix F.6	Within disturbance area
HTP-C-CMT22	-	SU24	Culturally modified tree (carved or scarred)	338392	6346248	One tentative culturally modified tree with a single south facing scar recorded on a hillslope 100 m north of an unnamed access track connected to Langans Road (450 m down the track). The eucalypt tree was recorded in good condition with an estimated circumference of ~2.5 m. The narrow scar measures 120 cm x 8 cm with >10 cm of regrowth. The scar is located 180 cm above the ground with limited evidence of disturbance in the surrounding area. The closest water source is an unnamed drainage line 60 m northeast with another recorded site (HTP-C-GG05) located 130 m northwest of the site.	Central	Non-cultural – Appendix F.6	Within disturbance area
HTP-C-CP01 (Flat Rock cultural landscape)	45-3-5504	SU32	Cultural place	338558	6347025	A cultural place, identified by RAPs as "Flat Rock". The site is a wide, flat sandstone outcrop on a ridgeline with views across the valley to the east. It is situated directly beside Langans Road.	Central	Valid	Within disturbance area
HTP-C-GG01	TBC	SU32	Grinding groove	335996	6349860	A single grinding groove and waterhole identified on sandstone boulder below a sandstone scarp to the east. The site is situated on a steep hillslope with sandstone bedrock exposures and outcropping within regrowth forest. Rockshelter sites HTP-C-RS15 and HTP-C-RS16 are 16 m to the east along this ridgeline.	Central	Valid	Within 200 m of project area
HTP-C-GG02	TBC	SU32	Grinding groove	334912	6355216	Two grinding grooves on sandstone bedrock identified within a narrow drainage channel that feeds into Sweetmans Creek (4th order), 280 m to the west. Rockshelter site with art #37-6-0604 is 40 m downslope. The site is located on a moderately inclined upper slope within regrowth forest.	Central	Valid	Within 200 m of project area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
HTP-C-GG03	37-6-4484	SU23	Grinding groove	334340	6353752	Three grinding grooves on a sandstone platform beside Sweetmans Creek (3rd order) within dense regrowth forest. RAPs identified 1 of the grooves as created by seed grinding and the other 2, parallel grooves for axe grinding. Another grinding groove site, HTP-C-GG05, is located on the other side of the creek, 60 m to the south.	Central	Valid	Within project area
HTP-C-GG04	TBC	SU21	Grinding groove	332949	6360321	Four axe grinding grooves on a sandstone platform within a 1st order creek line. RAPs noted that the grooves are relatively flat so were likely used for sharpening rather than creating/shaping axe edges. There are potentially more grooves that are obscured by sediment and grass. The grooves measure 30 cm, 20 cm, 15 cm and 30 cm in length. Two scars are oriented north-south, 1 northeast to southwest and 1 east-west.	Central	Valid	Within 200 m of project area
HTP-C-GG05	45-3-5006	SU24	Grinding groove	338283	6346330	A single grinding groove identified on sandstone bedrock within a creekline above a small waterfall. The groove measures 15 cm long x 8 cm wide x 2 cm deep.	Central	Valid	Within project area
HTP-C-IF01	TBC	SU32	Isolated find	335612	6350925	A single milky quartz core identified on a vehicle track, Mahogany Road, near the intersection with Cabans Road. The site is located on a ridgeline within dense regrowth forest.	Central	Valid	Within disturbance area
HTP-C-IF02	TBC	SU31	Isolated find	330538	6369387	One yellow silcrete flake recorded at the intersection of Campbell Springs Trail and an unnamed access track. The landscape around the site has been subject to disturbance through construction and erosion, with the movement of soils in the surrounding area suggesting limited potential for remaining subsurface deposits. The closest water source is an unnamed drainage channel located 140 m east down the slope with another recorded site (HTP-C-AS01) 80 m northeast of the site.	Central	Valid	Within disturbance area
HTP-C-IF03	TBC	SU24	Isolated find	335211	6351063	One grinding stone, 9 cm in length. Located within an ephemeral drainage line on a moderately inclined hillslope to the south of Crumps Road within dense regrowth forest.	Central	Valid	Within disturbance area
HTP-C-RS01	-	SU22	Rockshelter (no cultural markers)	333110	6358268	North facing sandstone overhang located 90 m northwest of Hawkins Road and 140 m northeast a drainage channel at the top of a steep rise. Site is located 120 m southeast of HTP-C-RS02. The rockshelter measures 3 m wide x 2 m deep, with an estimated height of <2 m. The exposed shelter floor was mostly bedrock with extensive weathering noted throughout. No cultural markers were identified at the time of survey.	Central	Non-cultural – see Appendix F.4	Within project area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
HTP-C-RS02	37-6-4492	SU22	Rockshelter (no cultural markers)	332998	6358310	East facing sandstone overhang located 220 m northwest of Hawkins Road and 150 m northeast a drainage channel at the top of a steep rise. Site is located 120 m north-west of HTP-C-RS01. The rockshelter measures 6 m wide x 2 m deep, with an estimated height of <2 m. The exposed shelter floor was mostly bedrock with extensive weathering noted throughout. No cultural markers were identified at the time of survey.	Central	Tentative	Within project area
HTP-C-RS03	-	SU22	Rockshelter, PAD	333287	6358087	A potential south-easterly facing rockshelter situated on a steep slope. The shelter is approximately 6 m long x 3 m wide. No art or artefacts were noted at time of survey. There is considered to be a PAD at this site, however no depths or location were recorded.	Central	Non-cultural – see Appendix F.4	Within project area
HTP-C-RS04	-	SU22	Rockshelter (no cultural markers)	333462	6357708	West facing sandstone overhang located 110 m north of Lumbeys Road and 100 m south of a drainage channel at the top of a steep rise. Site is located 270 m southwest of #37-6-0726. The rockshelter measures 2 m wide x 3 m deep, with an estimated height of <1 m. The exposed shelter floor was mostly bedrock. No cultural markers were identified at the time of survey.	Central	Non-cultural – see Appendix F.4	Within disturbance area
HTP-C-RS05	TBC	SU22	Rockshelter (no cultural markers)	333637	6357236	Southwest facing sandstone overhang located 370 m north of Crawfords Road and 210 m north of a drainage channel at the top of a steep rise. Site is located adjacent south of HTP-C-RS13. The rockshelter measures 3 m wide x 1 m deep, with an estimated height of <1 m. The exposed shelter floor was mostly bedrock. No cultural markers were identified at the time of survey.	Central	Tentative	Within 200 m of project area
HTP-C-RS06	TBC	SU23	Rockshelter (no cultural markers)	333958	6354891	West facing sandstone overhang located 130 m west of Crumps Road and 210 m west of a drainage channel at the top of a steep rise. Site is located 40 m southeast of HTP-C-SA02. The rockshelter measures 2 m wide x 1 m deep, with an estimated height of <1 m. The exposed shelter floor was mostly bedrock. No cultural markers were identified at the time of survey.	Central	Tentative	Within 200 m of project area
HTP-C-RS07	TBC	SU32	Rockshelter (no cultural markers)	333005	6358040	West facing sandstone overhang located 70 m northwest of Hawkins Road and 90 m southeast of a drainage channel at the top of a steep slope. Site is located 290 m west of HTP-C-RS03. The rockshelter measures 3 m wide x 2 m deep, with an estimated height of <1 m. The exposed shelter floor was mostly bedrock. No cultural markers were identified at the time of survey.	Central	Tentative	Within 200 m of project area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
HTP-C-RS08	TBC	SU32	Rockshelter (no cultural markers)	335618	6355473	West facing sandstone overhang located 70 m east of Hayes Road and 360 m northwest of a Peach Tree Gully at the top of a steep slope. Site is located 200 m northeast of #37-6-0725. The rockshelter measures 3 m wide x 2 m deep, with an estimated height of <1 m. The exposed shelter floor was mostly bedrock. No cultural markers were identified at the time of survey.	Central	Tentative	Within 200 m of project area
HTP-C-RS09	TBC	SU32	Rockshelter (no cultural markers)	334877	6355563	North facing sandstone overhang located 200 m northeast of Trig Road and 360 m east of Sweetmans Creek at the top of a hillslope. Site is located adjacent east of #37-6-3786 and HTP-C-CMT01. The rockshelter measures 3 m wide x 5 m deep, with an estimated height of <2 m. The exposed shelter floor was mostly bedrock with extensive weathering noted throughout. No cultural markers were identified at the time of survey.	Central	Tentative	Within 200 m of project area
HTP-C-RS10	TBC	SU32	Rockshelter (no cultural markers)	333883	6354947	North facing sandstone overhang located 90 m southwest of Crumps Road and 460 m east of a tributary off Sweetmans Creek at the top of a hillslope. Site is located 50 m northwest of HTP-C-SA01. The rockshelter measures 5 m wide x 2 m deep, with an estimated height of <2 m. The exposed shelter floor was mostly bedrock with pockets of eroded sand from the roof noted throughout. No cultural markers were identified at the time of survey.	Central	Tentative	Within 200 m of project area
HTP-C-RS11	TBC	SU32	Rockshelter, PAD	334872	6355223	A sandstone overhang on escarpment, 230 m above Sweetmans Creek (4th order) to the west. The shelter does not contain art and there is limited deposit (<10 cm, likely degrading sandstone from the shelter roof). The shelter is 15 m east of a large rockshelter with multiple hand stencils and art (#37-6-0604). It is also 40m downslope of grinding groove site HTP-C-GG02.	Central	Tentative	Within 200 m of project area
HTP-C-RS12	TBC	SU22	Rockshelter (no cultural markers)	333641	6357224	South-east facing sandstone overhang located 360 m north of Crawfords Road and 230 m north of a drainage channel at the top of a steep rise. Site is located 10 m south of HTP-C-RS05 and HTP-C-RS13. The rockshelter measures 6 m wide x 3 m deep, with an estimated height of <1 m. The exposed shelter floor was mostly bedrock with extensive weathering noted throughout. No cultural markers were identified at the time of survey.	Central	Tentative	Within 200 m of project area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
HTP-C-RS13	TBC	SU22	Rockshelter (no cultural markers)	333637	6357238	South facing sandstone overhang located 370 m north of Crawfords Road and 210 m north of a drainage channel at the top of a steep rise. Site is located adjacent north of HTP-C-RS05. The rockshelter measures 6 m wide x 3 m deep, with an estimated height of <2 m. The exposed shelter floor was mostly bedrock with pockets of exfoliated sand at the dripline. No cultural markers were identified at the time of survey.	Central	Tentative	Within 200 m of project area
HTP-C-RS14 (Flat Rock cultural landscape)	TBC	SU32	Rockshelter, art (pigment or engraved), PAD	339311	6345956	Rockshelter with art on a moderately steep upper slope east of Langmans Road. This site was undocumented but known to RAPs. The art comprises kangaroos and a figure that RAPs identified as a male figure with ceremonial headwear, a "clever man". The shelter contains intact bark and charcoal and potential archaeological deposit within the shelter. The artwork is very difficult to see due to water running on rock surface and staining. RAPs noted the site had much more art ~20 years previously. Two culturally modified trees (HTP-C-CMT16) are located 50 m to the east.	Central	Valid	Within 200 m of project area
HTP-C-RS15	TBC	SU32	Rockshelter, PAD	336009	6349857	A potential west facing rockshelter identified on a sandstone escarpment below Cabans Road. The shelter measures ~1.2 m high x ~5 m x 2.2 m deep with yellow sandy deposit. No artefacts or art were recorded at time of survey.	Central	Tentative	Within 200 m of project area
HTP-C-RS16	TBC	SU32	Rockshelter, PAD	336012	6349855	A potential west facing rockshelter identified on a sandstone escarpment below Cabans Road. The shelter measures 1.5 m high x 2.3 m wide x 1.2 m deep with yellow sandy deposit at base. No artefacts or art were recorded at time of survey.	Central	Tentative	Within 200 m of project area
HTP-C-RS17	TBC	SU24	Rockshelter, PAD	336833	6348214	A potential west facing rockshelter identified on a relatively steep slope within regrowth forest. The site comprises a shallow overhang that measures ~1.5 m high x 2.5 m long x <1 m deep with shallow sandy deposits. No art or artefacts were recorded at time of survey.	Central	Tentative	Within 200 m of project area
HTP-C-RS18	-	SU22	Rockshelter, PAD	333188	6359029	A potential east facing rockshelter situated on a gently inclined hillslope. Internally, the shelter is approximately 1.5 m high x 6 m long x 4 m deep with the dripline/entry measuring 1.5 m high x 3.5 m long. A sandy loam deposit is present at base of shelter, and no surface artefacts were identified. No art or evidence of charcoal, however considered by RAPs as a good vantage point looking over the creekline. A small hole in the north wall also considered to aerate smoke from fires within the shelter.	Central	Non-cultural – see Appendix F.4	Within project area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
HTP-C-RS19	TBC	SU22	Rockshelter, PAD	333744	6356985	Potential rockshelter with deposit identified by RAPs. The site comprises a low sandstone overhang on a very steep lower slope beside a 2nd order tributary to Sweetmans Creek. The shelter measures 2 m high at the entrance, sloping steeply towards the back. It is 15 m wide and 8 m deep	Central	Tentative	Within 200 m of project area
HTP-C-RS20	TBC	SU32	Rockshelter (no cultural markers)	334574	6356927	South facing sandstone overhang located 130 m southwest of Sweetmans Creek Road and 160 m north of a drainage channel at the top of a steep slope. Site is located immediately between HTP-C-CMT06 and HTP-C-RS21. The rockshelter measures 4 m wide x 3 m deep, with an estimated height of <3 m. The exposed shelter floor was mostly bedrock with pockets of eroded sand from the roof noted throughout. Roof collapse evident as well as extensive weathering. No cultural markers were identified at the time of survey.	Central	Tentative	Within 200 m of project area
HTP-C-RS21	TBC	SU32	Rockshelter (no cultural markers)	334591	6356924	Southeast facing sandstone overhang located 110 m southwest of Sweetmans Creek Road and 160 m north of a drainage channel at the top of a steep slope. Site is located adjacent east of HTP-C-RS21. The rockshelter measures 15 m wide x 3 m deep, with an estimated height of <3 m. The exposed shelter floor was mostly bedrock with extensive weathering throughout. No cultural markers were identified at the time of survey.	Central	Tentative	Within 200 m of project area
HTP-C-RS22	-	SU23	Rockshelter (no cultural markers)	334350	6354051	East facing sandstone overhang located 200 m west of Flick Road and 150 m west of Sweetmans on a hillslope at the base of a cliff. Site is located 60 m southeast of HTP-C-CMT15. The rockshelter measures 5 m wide x 2 m deep, with an estimated height of <1 m. The exposed shelter floor was mostly bedrock with evidence of roof collapse. No cultural markers were noted at the time of survey.	Central	Non-cultural – see Appendix F.4	Within project area
HTP-C-RS23	-	SU23	Rockshelter (no cultural markers)	334424	6353550	Northwest facing sandstone overhang located 100 m west of Flick Road and 190 m east of Sweetmans at the top of a hillslope. Site is located 50 m south-west of HTP-C-RS24. The rockshelter measures 10 m wide x 4 m deep, with an estimated height of >4 m. The exposed shelter floor was mostly bedrock with evidence of weathering throughout. No cultural markers were identified at the time of survey.	Central	Non-cultural – see Appendix F.4	Within project area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
HTP-C-RS24	-	SU23	Rockshelter, PAD	334473	6353574	A potential rockshelter internally measuring ~1 m high x 6 m wide, with dripline measuring approximately ~1.2 m high. Sandy deposits present in shelter and has been subject to substantial roof collapse. No art or artefacts were recorded at time of survey.	Central	Non-cultural – see Appendix F.4	Within disturbance area
HTP-C-RS25	TBC	SU23	Rockshelter (no cultural markers)	334593	6353419	East facing sandstone overhang located 50 m east of Flick Road and 100 m east of a tributary of Sweetmans at the top of a hillslope. Site is located 210 m southeast of HTP-C-RS23. The rockshelter measures 6 m wide x 4 m deep, with an estimated height of <1 m. The exposed shelter floor was mostly bedrock with pockets of eroded sand from the roof throughout. No cultural markers were identified at the time of survey.	Central	Tentative	Within 200 m of project area
HTP-C-RS26	TBC	SU24	Rockshelter (no cultural markers)	335137	6351506	North-west facing sandstone overhang located adjacent south of a drainage channel and 90 m north of a dirt track off Cabans Road at the top of a hillslope. Site is located 450 m northeast of HTP-C-IF03. The rockshelter measures 6 m wide x 3 m deep, with an estimated height of <2 m. The exposed shelter floor was mostly bedrock and covered in leaf litter. Extensive weathering noted throughout. No cultural markers were noted at the time of survey.	Central	Tentative	Within 200 m of project area
HTP-C-RS27	-	SU24	Rockshelter (no cultural markers)	334617	6352680	East facing sandstone overhang located 140 m east of Flick Road and 40 m northeast of a drainage channel at the top of a hillslope. Site is located 90 m north of HTP-C-AR02. The rockshelter measures 8 m wide x 2 m deep, with an estimated height of <2 m. The exposed shelter floor was mostly bedrock and covered in leaf litter. Extensive weathering noted throughout. No cultural markers were identified at the time of survey.	Central	Non-cultural – see Appendix F.4	Within disturbance area
HTP-C-RS28	TBC	SU24	Rockshelter (no cultural markers)	338580	6346268	Northwest facing sandstone overhang located adjacent north of a drainage channel and 120 m northwest of a dirt track off Lagans Road and 40 m at the top of a hillslope. Site is located 190 m east of HTP-C-CMT22. The rockshelter measures 2 m wide x 1 m deep, with an estimated height of <1 m. The exposed shelter floor was mostly bedrock with pockets of eroded sand from the roof. No cultural markers were identified at the time of survey.	Central	Tentative	Within 200 m of project area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
HTP-C-RS29	-	SU24	Rockshelter (no cultural markers)	337210	6347458	A potential east facing rockshelter. The site comprises a small sandstone overhang (approx. 1 m high x 1 m wide x 1 m deep) which has been significantly eroded, resulting in a shallow sandy deposit on the sandstone base. No deposit or cultural markers were identified at the time of survey.	Central	Non-cultural – see Appendix F.4	Within project area
HTP-C-RS30	-	SU24	Rockshelter (no cultural markers)	335952	6349514	A potential north west facing rockshelter identified during survey. The site comprises a small sandstone overhang (approx. 2 m high and 6 m wide) situated within a rock shelf on a steep slope. No deposit or cultural markers were identified at the time of survey.	Central	Non-cultural – see Appendix F.4	Within project area
HTP-C-RS31	-	SU24	Rockshelter (no cultural markers)	335774	6349922	A potential rockshelter identified during survey. The site comprises a small sandstone overhang (<1 m x 1 m x 1 m) however has been identified to be too small for human occupation. No deposit or cultural markers were identified at the time of survey.	Central	Non-cultural – see Appendix F.4	Within project area
HTP-C-RS32	TBC	SU24	Rockshelter (no cultural markers)	335418	6350337	Potential southeast facing rockshelter identified by RAPs. The site comprises a small sandstone overhang within a large rock shelf on a very steep slope. No deposit or cultural markers were identified at the time of survey.	Central	Tentative	Within 200 m of project area
HTP-C-RS33	TBC	SU24	Rockshelter (no cultural markers)	335443	6350347	Potential southeast facing rockshelter identified by RAPs. The site comprises a small sandstone overhang (~ 1 m high) situated within a large rock shelf on a very steep slope. The shelter measures approximately 1 m high at the entrance. No deposit or cultural markers were identified at the time of survey.	Central	Tentative	Within 200 m of project area
HTP-C-RS34	-	SU24	Rockshelter (no cultural markers)	335470	6350378	A potential east facing rockshelter situated on a steep slope between two 1st order streams. The site comprises a small sandstone overhang (approx. 1 m high x 2 m wide) which has eroded from the rock shelf. No deposit or cultural markers were identified at the time of survey.	Central	Non-cultural – see Appendix F.4	Within project area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
HTP-C-RS35	-	SU24	Rockshelter (no cultural markers)	335508	6350472	Potential east facing rockshelter identified by RAPs. The site comprises a sandstone overhang on a steep slope. The shelter measures approximately 4 m high at its entrance. No deposit or cultural markers were identified at the time of survey.	Central	Non-cultural – see Appendix F.4	Within disturbance area
HTP-C-RS36	TBC	SU18	Rockshelter (no cultural markers)	332489	6366194	A potential south facing rockshelter situated on the steep slope near a 1st order stream. The site comprises a large sandstone overhang (approx. 6 m high x 4 m wide). No deposit or cultural markers were identified at the time of survey.	Central	Tentative	Within 200 m of project area
HTP-C-RS37	TBC	SU31	Rockshelter (no cultural markers)	332312	6366329	A potential east facing rockshelter situated on the steep slope adjacent to a 1st order stream. The site comprises a small sandstone overhang (approx. 1.5 m height x 1 m depth) however a section of the overhang appears to have collapsed, making the depth of the shelter >2 m. No deposit or cultural markers were identified at the time of survey.	Central	Tentative	Within 200 m of project area
HTP-C-RS38	TBC	SU31	Rockshelter (no cultural markers)	332032	6367705	A potential east facing rockshelter situated on a moderately steep slope. The site comprises a small sandstone overhang (approx. 1 m high x 2 m wide) which has eroded from the rock shelf. No cultural markers or deposit were noted at the time of survey and was identified to be too wet and small for human occupation.	Central	Tentative	Within 200 m of project area
HTP-C-RS40	TBC	SU18	Rockshelter (no cultural markers)	331228	6369636	A potential south facing rockshelter situated on a moderate slope near the confluence of two 1st and 2nd order streams. The site comprises a large sandstone overhang (approx. 4 m high x 4 m wide x 6 m deep). No deposit or cultural markers were identified at the time of survey.	Central	Tentative	Outside project area
HTP-C-RS41	TBC	SU18	Rockshelter (no cultural markers)	330818	6370617	A potential south facing rockshelter situated on a moderately steep slope. The site comprises a small sandstone overhang (approx. 0.7 m high x 1.5 m wide) which has eroded from the rock shelf. No deposit or cultural markers were identified at the time of survey.	Central	Tentative	Outside project area
HTP-C-RS42	TBC	SU18	Rockshelter (no cultural markers)	330804	6370635	A potential south facing rockshelter situated on a moderately steep slope. The site comprises a small sandstone overhang (approx. 1 m high x 2 m wide). No deposit or cultural markers were identified at the time of survey.	Central	Tentative	Outside project area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
HTP-C-RS43	TBC	SU31	Rockshelter (no cultural markers)	331018	6369868	Potential east facing rockshelter. The site comprises a heavily eroded sandstone overhang on a moderately steep slope. The shelter measures approximately 4 m high at the entrance. No deposit or cultural markers were identified at the time of survey.	Central	Tentative	Within 200 m of project area
HTP-C-RS44	TBC	SU24	Rockshelter, PAD	336827	6348227	A potential southeast facing rockshelter with evident sandstone overhang measuring ~1.9 m high x 6 m long x 2 m deep. No artefacts or art identified, however 150 mm of sediment noted during survey.	Central	Tentative	Within 200 m of project area
HTP-C-RS45	-	SU18	Rockshelter, PAD	331074	6371056	A south facing rockshelter located near an ephemeral watercourse. The site comprises a small overhang (approx. 1 m). The shelter is approximately 2 m high x 2 m wide. Sandy deposits were identified in proximity to the shelter (depth of PAD not recorded).	Central	Non-cultural – see Appendix F.4	Within project area
HTP-C-RS46	-	SU18	Rockshelter (no cultural markers)	331070	6371077	A potential rockshelter situated on a moderately steep slope within a sandstone rock shelf. The shelter is approximately 2 m high x 2 m wide. No cultural markers or deposit were identified at the time of survey.	Central	Non-cultural – see Appendix F.4	Within project area
HTP-C-RS47	-	SU18	Rockshelter (no cultural markers)	331203	6370682	A potential rockshelter situated on a moderately steep slope within a sandstone rock shelf. The shelter is approximately 1.5 m high at the entrance. No cultural markers or deposit were identified at the time of survey.	Central	Non-cultural – see Appendix F.4	Within project area
HTP-C-RS48	TBC	SU18	Rockshelter (no cultural markers)	331243	6370729	A potential south facing rockshelter situated on a moderately steep slope near the confluence of 2 x 1st order tributaries of Monkey Place Creek. The shelter is approximately 1 m high at the entrance. No cultural markers or deposit were identified at the time of survey.	Central	Tentative	Within 200 m of project area
HTP-C-RS49	TBC	SU24	Rockshelter (no cultural markers)	337350	6347471	A potential southeast facing rockshelter adjacent to a 1st order stream identified by RAPs. The site comprises a very shallow sandstone overhang (approx. 4 m high x 5 m wide x 1 m deep). No cultural markers wereidentified at the time of survey.	Central	Tentative	Within 200 m of project area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
HTP-C-RS50	-	SU24	Rockshelter (no cultural markers)	337335	6347286	Potential west facing rockshelter identified by RAPs. The site comprises a sandstone overhang on a very steep slope beside a 2nd order tributary. The shelter measures approximately 2.5 m high at the entrance, is 10 m wide and 2 m deep. No cultural markers were identified at the time of survey.	Central	Non-cultural – see Appendix F.4	Within project area
HTP-C-RS51	-	SU18	Rockshelter (no cultural markers)	331077	6371038	East facing sandstone overhang located 20 m east of a dirt track connected to Broken Back Trail and 220 m west of Monkey Place Creek at the top of a steep rise. Site is located within 10 m of HTP-C-RS52. The rockshelter measures 3.5 m wide x 4 m deep, with an estimated height of <1 m. Animal disturbance was prevalent in the thin layer of eroded sand on the shelter floor with evidence of roof delamination and weathering throughout the site. No cultural markers were identified at the time of survey.	Central	Non-cultural – see Appendix F.4	Within project area
HTP-C-RS52	-	SU18	Rockshelter (no cultural markers)	331077	6371039	South facing sandstone overhang located 10 m east of a dirt track connected to Broken Back Trail and 230 m west of Monkey Place Creek at the top of a steep rise. Site is within 10 m of HTP-C-RS51. The rockshelter measures 5 m wide x 4 m deep, with an estimated height of <50 cm. Animal disturbance was prevalent in the thin layer of eroded sand on the shelter floor with evidence of weathering throughout the site. No cultural markers were identified at the time of survey.	Central	Non-cultural – see Appendix F.4	Within project area
HTP-C-RS53	-	SU18	Rockshelter (no cultural markers)	331179	6370703	East facing sandstone overhang located adjacent west of a drainage channel associated with Monkey Place Creek and 170 m north of a dirt track connected to Broken Back Trail part way up a hillslope. Site is located 30 m north-west of HTP-C-RS47. The rockshelter measures 12 m wide x 2 m deep, with an estimated height of >1 m. The shelter floor was predominantly bedrock with a thin lens of eroded sand from the roof. There was some evidence of weathering throughout the site. No cultural markers were identified at the time of survey.	Central	Non-cultural – see Appendix F.4	Within disturbance area
HTP-C-RS54	-	SU18	Rockshelter (no cultural markers)	331686	6369348	North facing sandstone overhang located 25 m southeast of a dirt track connected to Campbell Springs Trail and 80 m south a drainage channel at the top of a steep rise. Site is located 65 m northeast of HTP-C-RS59. The rockshelter measures 3 m wide x 2 m deep, with an estimated height of <1 m. The shelter floor was predominantly bedrock with evidence of weathering throughout the small site. No cultural markers were identified at the time of survey.	Central	Non-cultural – see Appendix F.4	Within project area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
HTP-C-RS55	-	SU18	Rockshelter (no cultural markers)	331556	6369404	South facing sandstone overhang located adjacent north of a dirt track connected to Campbell Springs Trail and 50 m southwest a drainage channel at the top of a steep rise. Site is located 70 m northwest of HTP-C-RS57. The rockshelter measures 7 m wide x 1 m deep, with an estimated height of <2 m. The shelter floor consisted of predominantly bedrock with evidence of weathering throughout the site. No cultural markers were identified at the time of survey.	Central	Non-cultural – see Appendix F.4	Within project area
HTP-C-RS56	-	SU18	Rockshelter (no cultural markers)	331737	6369183	North facing sandstone overhang located 180 m south of a dirt track connected to Campbell Springs Trail and 300 m northeast of a drainage channel at the top of a steep rise. Site is located 160 m southeast of HTP-C-RS59. The rockshelter measures 14 m wide x 6 m deep, with an estimated height of <2 m. The shelter floor was predominantly bedrock with a thin lens of eroded sand from the roof. Evidence of weathering throughout the site. No cultural markers were identified at the time of survey.	Central	Non-cultural – see Appendix F.4	Within disturbance area
HTP-C-RS57	-	SU18	Rockshelter (no cultural markers)	331599	6369347	Shallow north facing sandstone overhang located adjacent north of a dirt track connected to Campbell Springs Trail and 80 m southwest of a drainage channel at the base of a cliff. Site is located 30 m northeast of HTP-C-RS58. The rockshelter measures 8 m wide x 0.5 m deep, with an estimated height of <2 m. The shelter has a limited bedrock floor with evidence of roof collapse surrounding the site. No cultural markers were identified at the time of survey.	Central	Non-cultural – see Appendix F.4	Within project area
HTP-C-RS58	-	SU18	Rockshelter (no cultural markers)	331576	6369329	North facing sandstone overhang located adjacent north of a dirt track connected to Campbell Springs Trail and 100 m southwest a drainage channel at the top of a steep rise. Site is situated 30 m southwest of HTP-C-RS57. The rockshelter measures 15 m wide x 8 m deep, with an estimated height of <2 m. The shelter floor consisted of predominantly bedrock with evidence of weathering throughout the large site. No cultural markers were identified at the time of survey.	Central	Non-cultural – see Appendix F.4	Within project area
HTP-C-RS59	-	SU18	Rockshelter (no cultural markers)	331641	6369304	North facing sandstone overhang located 35 m south of a dirt track connected to Campbell Springs Trail and 130 m southwest of a drainage channel at the peak of a hillslope. Site is located 60 m southwest of HTP-C-RS54. The rockshelter measures 5 m wide x 1 m deep, with an estimated height of <1 m. The shelter floor comprised predominantly bedrock. No cultural markers were identified at the time of survey.	Central	Non-cultural – see Appendix F.4	Within project area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
HTP-C-RS60	-	SU18	Rockshelter (no cultural markers)	331811	6368753	Shallow north facing sandstone overhang located 230 m northeast of a dirt track connected to Campbell Springs Trail and 100 m south of a drainage channel at the top of the hillslope. Site is located 280 m northeast of HTP-C-AS02. The rockshelter measures 4 m wide x 0.5 m deep, with an estimated height of <1 m. The shelter comprises a limited bedrock floor. No cultural markers were identified at the time of survey.	Central	Non-cultural – see Appendix F.4	Within disturbance area
HTP-C-RS61	TBC	SU32	Rockshelter, PAD	338679	6346874	A potential southwest facing rockshelter identified on a hillslope ~150 m south of Flat Rock. Approximately ~200-300 mm of sand deposit was observed with recent sandstone breakage apparent, surrounding the overhang with evident delamination. The shelter measures approximately 2.5 m high x 7 m wide x 2 m deep.	Central	Tentative	Within 200 m of project area
HTP-C-RS62	-	SU18	Rockshelter (no cultural markers)	332464	6366923	North facing sandstone overhang located adjacent south of a drainage channel associated with Deep Creek and 220 m south of a dirt track connected to Campbell Springs Trail at the bottom of a hillslope. Site is located 400 m west of #37-6-3743. The rockshelter measures 20 m wide x 3 m deep, with an estimated height of >3 m. The shelter consists of a limited bedrock floor with extensive weathering noted throughout. No cultural markers were identified at time of survey.	Central	Non-cultural – see Appendix F.4	Within project area
HTP-C-RS63	-	SU18	Rockshelter (no cultural markers)	332226	6367748	Shallow south facing sandstone overhang located 170 m east of Campbell Springs Trail and 70 m north-east of a drainage channel up a steep slope at the base of a cliff. Site is situated 45 m east of HTP-C-RS64. The rockshelter measures at least 20 m wide x 1 m deep, with an estimated height of >3 m. The shelter comprises limited bedrock floor with extensive weathering throughout. No cultural markers were identified at time of survey.	Central	Non-cultural – see Appendix F.4	Within project area
HTP-C-RS64	-	SU18	Rockshelter (no cultural markers)	332180	6367743	South facing sandstone overhang located 120 m east of Campbell Springs Trail and 60 m north of a drainage channel up a steep slope at the base of a cliff. Site is located 45 m west of HTP-C-RS63. The rockshelter measures at least 15 m wide x 1 m deep, with an estimated height of >3 m. The exposed shelter floor consists of mostly bedrock with pockets of exfoliated sand from the roof. Extensive weathering evident throughout. No cultural markers were identified at time of survey.	Central	Non-cultural – see Appendix F.4	Within disturbance area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
HTP-C-RS65	-	SU18	Rockshelter (no cultural markers)	332230	6367642	Northeast facing sandstone overhang located adjacent west of drainage channel and 220 m east of Campbell Springs Trail on hillslope. Site is located 20 m west of HTP-C-RS66. The rockshelter measures at least 7 m wide x 3 m deep, with an estimated height of >4 m up an exposed hole in the roof. The shelter floor consists of primarily bedrock with extensive weathering noted throughout. No cultural markers were noted at time of survey.	Central	Non-cultural – see Appendix F.4	Within project area
HTP-C-RS66	-	SU18	Rockshelter (no cultural markers)	332253	6367639	Southwest facing, mostly collapsed, sandstone overhang located adjacent east of a drainage channel and 190 m east of Campbell Springs Trail at the base of a gully. Site is located 20 m east of HTP-C-RS65. The rockshelter measures at least 10 m wide x 2 m deep, with an estimated height of <2 m. The exposed shelter floor comprises mostly bedrock with extensive weathering throughout. No cultural markers were identified at time of survey.	Central	Non-cultural – see Appendix F.4	Within project area
HTP-C-RS67	-	SU18	Rockshelter (no cultural markers)	332252	6367391	South facing, mostly collapsed, sandstone overhang located 40 m north of a drainage channel and 180 m east of Campbell Springs Trail at the top of a hillslope. Site is situated 240 m south of HTP-C-RS66. The rockshelter measures 9 m wide x 1 m deep, with an estimated height of <0.5 m. The exposed shelter floor comprises primarily bedrock with extensive weathering throughout. No cultural markers were identified at time of survey.	Central	Non-cultural – see Appendix F.4	Within project area
HTP-C-SA01 (Trig Road cultural landscape)	TBC	SU23	Stone arrangement	333922	6354924	Stone arrangement situated on sandstone outcrop on a spurcrest on escarpment landform. The stone arrangement comprises 20 subangular stones, varying in size, and arranged in semi-circular U-shape. Other sites within 60 m on this upper scarp include 2 rockshelters (HTP-C-RS06, HTP-C-RS06) and another stone arrangement (HTP-C-SA02).	Central	Valid	Within 200 m of project area
HTP-C-SA02 (Trig Road cultural landscape)	TBC	SU23	Stone arrangement	333979	6354904	Two U-shaped stone arrangements situated on sandstone outcrop on a spurcrest on escarpment landform. The larger stone arrangement measures approximately 1 m x 2 m, and the smaller measures 1.5 m x 1 m. The base of the 'U' is oriented north with features oriented northsouth. The smaller stone arrangement is located approximately 5 m northeast downslope of the larger stone arrangement which is located at the very top. Other sites within 60 m on this upper scarp include 2 rockshelters (HTP-C-RS06, HTP-C-RS06) and another stone arrangement (HTP-C-SA01).	Central	Valid	Within 200 m of project area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
HTP-C-SA03	TBC	SU32	Stone arrangement	334631	6357139	Stone arrangement on hillcrest impacted by installation of a survey marker. The site comprises a scatter of sandstone rocks with some rocks still stacked. RAPS noted that they first observed the arrangement 20 years ago when the intact arrangement was about 5 feet high. They also noted the absence of old trees and stumps suggesting that this land was once clear and provided a view of Mount Yango and the surrounds.	Central	Valid	Within 200 m of project area
HTP-C-SA04 (Trig Road cultural landscape)	TBC	SU23	Stone arrangement	334005	6354818	Stone arrangement on the top of a ridge line identified by RAPS. RAPS noted that this site may be a marker as they have seen similar ones elsewhere. Arrangement is oriented due east-west. It is 1 m in length and 50cm across. The site is located 6 m east of HTP-C-CMT08	Central	Valid	Within 200 m of project area
HTP-N-AS01	37-2-6667	SU1	High density artefact scatter (>50)	306781	6411512	Fifty-seven artefacts scattered across an area approximately 500 m x 200 m on gently inclined footslope south of Wisemans Creek (2nd order). Artefacts have been exposed by sheet wash erosion, vehicle and animal tracks. Artefacts are predominantly mudstone (n=31) and silcrete (n=15), with 8 tuff, 4 quartz, 2 quartzite and 1 chalcedony. All artefacts, apart from 1 core, are flakes or broken flakes and four artefacts display evidence of retouch. Site is adjacent to HTP-N-AS02 on same landform.	North	Valid	Within disturbance area
HTP-N-AS02	TBC	SU1	Low density artefact scatter (<20), PAD	306744	6411334	Six artefacts scattered across an area approximately 100 m x 200 m on a gently inclined footslope to the south of Wisemans Creek (2nd order). Site is adjacent to HTP-N-OS01, directly north on same landform. Artefacts comprise silcrete and mudstone flakes and flake pieces, and a worked cobble with 60% cortex.	North	Valid	Within disturbance area
HTP-N-AS03	TBC	SU1	Low density artefact scatter (<20)	306594	6411285	Two red silcrete distal flakes identified on vehicle track on gently inclined footslope to the south of Wisemans Creek (2nd order). Site is situated on same landform as HTP-N-AS01 and HTP-N-AS02.	North	Valid	Within disturbance area
HTP-N-AS04	TBC	SU1	Low density artefact scatter (<20)	306456	6410910	Eighteen artefacts on a very gently inclined slope, scattered across an area approximately 60 m x 60 m. Artefacts were identified across a sheet wash scald exposure within a paddock cleared for pastoral grazing. Artefacts comprise 10 mudstone, 7 silcrete and 2 quartz artefacts, predominantly flakes and broken flakes in addition to three cores.	North	Valid	Within 200 m of project area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
HTP-N-AS05	TBC	SU1	Low density artefact scatter (<20), PAD	306518	6410653	Eight artefacts comprising 1 mudstone core, 1 mudstone flake, 3 mudstone angular fragments, and 3 tuff angular fragments. HTP-N-AS05 is 1 of 3 sites within a cleared paddock on gently inclined hillslope beside a drainage channel that feeds into a nearby dam. Two other sites in proximity to the same drainage line within 200 m include #37-2-6144 and HTP-N-AS06. Artefacts have been exposed by vehicle and animal tracks.	North	Valid	Within project area
HTP-N-AS06	TBC	SU1	Low density artefact scatter (<20)	306426	6410630	Three artefacts. HTP-N-AS06 is 1 of 3 sites situated within a cleared paddock on gently inclined hillslope adjacent to a drainage channel that feeds into a dam. The sites within an area 100 m^2 are HTP-N-AS05 HTP-N-AS06 and HTP-N-IF04. Artefacts have been exposed by vehicle and animal tracks.	North	Valid	Within disturbance area
HTP-N-AS07	TBC	SU1	Low density artefact scatter (<20)	306167	6409436	Three artefacts identified on banks of 1st order drainage line beneath a dam. HTP-N--AS06 is located on same drainage line 240 m north, above the dam.	North	Valid	Within 200 m of project area
HTP-N-AS08	TBC	SU1	Low density artefact scatter (<20)	306036	6409658	Two mudstone flakes, 1 with possible retouch, identified on sheet-wash erosion scour on very gently inclined hillslope beside a drainage line within a cleared paddock. Situated 140 m west of HTP-N-IF05.	North	Valid	Within 200 m of project area
HTP-N-AS09	TBC	SU1	Low density artefact scatter (<20)	306196	6410212	Twenty artefacts comprising mudstone, silcrete and milky white quartz, with a total of 18 flakes and 2 cores located on large eroded surface exposure on gentle hillslope, 110 m east of Parnells Creek (3rd order).	North	Valid	Within 200 m of project area
HTP-N-AS10	TBC	SU1	Low density artefact scatter (<20)	305074	6407159	Twenty artefacts comprising 18 flakes and 2 cores of mudstone, silcrete and milky white quartz. Site is located on large, eroded surface exposure adjacent to a dam approximately 115 m east of Parnells Creek.	North	Valid	Within 200 m of project area
HTP-N-AS11	TBC	SU1	Moderate density artefact scatter (21-50)	304865	6406993	Forty-six mudstone and silcrete artefacts scattered across an area approximately 270 m x 150 m between Parnells Creek (3rd order) and a 2nd order tributary to Parnells Creek (i.e. within at least 80 m of a creek). Artefacts have been exposed by erosion, predominantly from sheet wash processes. Vegetation comprises predominantly regrowth woodland and grasses.	North	Valid	Within project area
HTP-N-AS12	TBC	SU1	Low density artefact scatter (<20)	304635	6406766	Two mudstone flakes located on large sheet wash exposure. Located downslope, 100 m from large artefact site HTP-N-AS15 and 140 m upslope from Parnells Creek (3rd order).	North	Valid	Within 200 m of project area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
HTP-N-AS13	TBC	SU1	Low density artefact scatter (<20)	304856	6406779	Three artefacts located within 10 m radius, on a gentle hillslope with re-vegetation, 150 m upslope from 2nd order tributary to Parnells Creek. Large artefact scatter, HTP-N-AS15 is situated 140 m upslope. Artefacts have been exposed on surface by a fence line and ant's nest.	North	Valid	Within 200 m of project area
HTP-N-AS14	TBC	SU1	Low density artefact scatter (<20)	305086	6406555	Two artefacts, 1 mudstone core and 1 silcrete flake, located on eroded surface exposure in proximity to a 1st order drainage line. Site is within 80 m of #37-2-6501, #37-2-6504 and HTP-N-AS16.	North	Valid	Within 200 m of project area
HTP-N-AS15	37-2-6666	SU1	High density artefact scatter (>50), PAD	304743	6406566	A large artefact scatter (n=224) covering an area measuring approximately 280 m x 250 m. Artefacts were identified on areas of exposure due to sheet wash and animal tracks across a very gently inclined hillslope. Artefact material predominantly mudstone and silcrete with very few artefacts displaying evidence of retouch. Nearest watercourses comprise a 2nd order tributary to Parnells Creek 150 m to the southwest, and Parnells Creek (3rd order) 240 m to the northwest.	North	Valid	Within disturbance area
HTP-N-AS16	TBC	SU1	Low density artefact scatter (<20)	305096	6406470	Three artefacts, two mudstone flakes and a silcrete flake, on a sheet wash exposure beside a 1st order drainage line. Located approximately 100 m downslope of HTP-N-AS17 (west), #37-2-6501 (north-west), HTP-N-AS14 (north) and #37-2-5112 (east).	North	Valid	Within 200 m of project area
HTP-N-AS17	TBC	SU1	Low density artefact scatter (<20)	305000	6406387	Fourteen artefacts scattered across an area measuring approximately 120 m x 120 m on very gently inclined hillslope adjacent to a 1st order drainage line. Artefacts comprise 8 mudstone flakes, 2 silcrete cores, a chalcedony flaked piece and a hammer stone.	North	Valid	Within disturbance area
HTP-N-AS18	TBC	SU1	Low density artefact scatter (<20)	304874	6406322	Four artefacts comprising 3 mudstone flakes and 1 mudstone core located on an eroded surface exposure on upper hillslope. Site is situated 210 m from a 2nd order tributary to Parnells Creek.	North	Valid	Within 200 m of project area
HTP-N-AS19	TBC	SU2	Low density artefact scatter (<20)	305288	6405637	Nineteen artefacts identified across an area approximately 120 m^2 on gently inclined hillslope that has been largely cleared of trees apart from the hillcrests. Surface exposures are evident as a result of sheet wash erosion, revealing subsoil profile (thick cracking clay) and modifications to the landscape. Artefacts comprise mudstone and silcrete flakes and cores. Two artefacts present evidence of retouch and 2 artefacts have been heat treated.	North	Valid	Within project area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
HTP-N-AS20	TBC	SU2	Low density artefact scatter (<20)	305486	6405332	Three artefacts comprising 2 silcrete flakes (1 has been heat treated) and a mudstone flake, exposed on hillslope by sheet wash processes along a drainage line. Artefact site #37-2-5134 is 100m downslope to the northeast.	North	Valid	Within disturbance area
HTP-N-AS21	TBC	SU2	Low density artefact scatter (<20)	305668	6405220	Two silcrete flakes located on large, eroded surface exposure on gently inclined hillslope. Three registered AHIMS sites located within 60 m: #37-2-6512 (northwest), #37-2-5338 (northeast) and #37-2-6505 (southeast).	North	Valid	Within 200 m of project area
HTP-N-AS22	TBC	SU2	Low density artefact scatter (<20)	305736	6405158	Two artefacts comprising 1 mudstone flake and 1 milky white quartz flake located on large, eroded surface exposure on a hillslope, 40 m south of #37-2-6505 and 180 m north of an ephemeral, unnamed 2nd order creek.	North	Valid	Within 200 m of project area
HTP-N-AS23	TBC	SU8	Low density artefact scatter (<20)	313871	6402130	Fourteen artefacts comprising mudstone and silcrete flakes and cores on a lower hillslope south of Hobden Gully. Artefacts were identified on a vehicle track across an area measuring approximately 20 m x 50 m in proximity to 7 (destroyed) AHIMS sites, including 2 with PAD (#37-6-3041 to 3038).	North	Valid	Within 200 m of project area
HTP-N-AS24	TBC	SU8	Low density artefact scatter (<20)	314494	6402188	Large artefact scatter (<20 artefacts) located on an eroded surface exposure on dam embankment beneath a clump of isolated tree canopies. Site comprises 16 mudstone flakes and 4 mudstone cores.	North	Valid	Within project area
HTP-N-AS25	TBC	SU11	Low density artefact scatter (<20)	316381	6397660	Thirteen artefacts located on cleared transmission line easement within Hunter Valley Operations mining complex rehabilitated land. Artefact assemblage comprising: a large mudstone flake, 5 silcrete flakes; 2 silcrete cores, 6 silcrete flakes and 2 chert flakes. HTP-N-IF20 is located on the same track, 50 m to the west.	North	Valid	Within 200 m of project area
HTP-N-AS26	TBC	SU11	Low density artefact scatter (<20)	318904	6396022	Ten artefacts identified on scald exposure at confluence of two 1st order drainage lines.	North	Valid	Within 200 m of project area
HTP-N-AS27	TBC	SU11	Low density artefact scatter (<20)	319298	6395932	Twenty artefacts identified on footslope of terrace adjacent to Hunter River. Located on pastureland with disturbance from livestock exposing lithics. Assemblage comprises a large proportion of cores. This site is surrounded by 20 previously recorded AHIMS artefact sites within 200 m: #37-63497 to 3516.	North	Valid	Within disturbance area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
HTP-N-AS28	TBC	SU1	High density artefact scatter (>50)	322324	6390278	Sixty artefacts identified across an exposure approximately 130 m x 50 m on southern terrace of Doctors Creek (2nd order). Paddock has been cultivated and ploughed. Assemblage comprises mudstone and silcrete artefacts, with a predominance of broken flakes.	North	Valid	Outside project area
HTP-N-AS29	TBC	SU13	Low density artefact scatter (<20)	323480	6387819	Four artefacts, including 2 mudstone and 2 silcrete flake fragments, in sandy clay erosion scar north of 1st order tributary to Loder Creek (4th order) situated 180 m downslope to the site. Surface visibility was low due to presence of river stones and quartz in densely compacted matrix.	North	Valid	Outside project area
HTP-N-AS30	37-6-4488	SU13	High density artefact scatter (>50)	324047	6387437	A very high-density artefact scatter (n=323) identified on large exposure (30 m x 40 m). The site is located 70 m north of an unnamed 3rd order tributary to Loder Creek. Disturbance from the creation of a water management contour and from sheet wash processes.	North	Valid	Within disturbance area
HTP-N-AS31	TBC	SU13	Low density artefact scatter (<20)	323993	6387494	Three yellow mudstone artefacts, located in a sheet wash erosion, 80 m north of an unnamed 3rd order tributary to Lodus Creek. Site is 60 m northwest of a large artefact site, HTP-N-AS30, on the same lower hillslope.	North	Valid	Within disturbance area
HTP-N-AS32	37-6-4487	SU14	High density artefact scatter (>50), PAD	325890	6385197	High density artefact scatter (n=126) with potential archaeological deposit, located within banks of gully of an unnamed 3rd order stream, atop eroded wash. The soil profile comprises a brownish white sandy clay. Assemblage comprises mudstone, silcrete and chert flake fragments. Evidence of retouching on 1 piece. Artefacts range in colour and size, although mudstone is primarily yellow and silcrete is primarily red.	North	Valid	Within disturbance area
HTP-N-AS33	TBC	SU14	Low density artefact scatter (<20), PAD	325914	6385048	Fifteen artefacts and an area of potential archaeological deposit identified within scald exposure on alluvial plain near confluence of a 2nd and 3rd order stream. The main scatter of fifteen artefacts consists of primarily silcrete, mudstone, quartzite and chert materials, exhibiting a range of sizes and colours. The substrate comprises red sandy clay, and surrounding vegetation primarily grassland and scattered Casuarina saplings. Ceramic sherds were identified within sheet wash exposure.	North	Valid	Within disturbance area
HTP-N-AS34	TBC	SU14	Low density artefact scatter (<20)	325620	6384061	Two silcrete artefacts on scald exposure on hillcrest with dense grass and scrub. The site is 80 m south on same hillcrest landform as registered artefact site #37-6-2838.	North	Valid	Within 200 m of project area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
HTP-N-AS35	TBC	SU14	Low density artefact scatter (<20)	325598	6383986	Three artefacts identified within an eroded, partially waterlogged pit of red sandy clay on very gently inclined upper hillslope. Artefacts comprise 1 grey chert flake piece and 2 reddish yellow flakes. Site is situated on similar landform with 6 nearby sites within a 160 m radius: HTP-N-IF42, IF43, IF44, AS40, AS41, AS42 and AS43.	North	Valid	Within 200 m of project area
HTP-N-AS36	TBC	SU14	Low density artefact scatter (<20)	325607	6383901	Four artefacts identified on cracked orange clay scald exposure with an anthill. Two yellowish red mudstone and 2 grey chert artefacts. Site is situated on similar landform with 6 sites within a 160 m radius: HTP-N-IF42, IF43, IF44, AS40, AS41, AS42 and AS43.	North	Valid	Within 200 m of project area
HTP-N-AS37	TBC	SU14	Low density artefact scatter (<20)	325599	6383353	Twelve artefacts on raised embankment used as a vehicle track on the lower hillslope adjacent to 1st order drainage line. Artefacts comprise 9 mudstone flake fragments and three silcrete flake fragments varying in shades of colour from red, orange, yellow, and light grey, all subangular. Site is situated on a similar landform with 6 sites in a 160 m radius: HTP-N-IF42, IF43, IF44, AS40, AS41, AS42 and AS43	North	Valid	Within disturbance area
HTP-N-AS38	TBC	SU14	Low density artefact scatter (<20)	325513	6382292	Twelve artefacts identified on banks of drainage line (1st order). Artefacts comprise 4 mudstone flakes, 1 silcrete flake, 1 quartzite flake, 4 broken mudstone flakes and a distal silcrete flake. Site is within 150 m of 2 destroyed AHIMS sites (37-6-1968 and 37-6-1979).	North	Valid	Within disturbance area
HTP-N-AS39	TBC	SU17	Moderate density artefact scatter (21-50)	327146	6377341	Large artefact scatter (n=35) identified on a deflated subsoil surface near a transmission line easement. Artefacts recorded comprise a variety of material and tool types including yellow and grey chert, red silcrete and dark volcanic rock. Tool types include cores, flakes and points. Estimated density of 10-15 artefacts/m². Site is situated 50 m north of drainage line (2nd order) with a small scatter on the other side, HTP-N-AS40.	North	Valid	Within project area
HTP-N-AS40	TBC	SU17	Low density artefact scatter (<20)	327130	6377240	Two chert artefacts on yellow sandy vehicle track exposure. The site is located 50 m south of a drainage line (2nd order) with a large scatter on the other side, HTP-N-AS39.	North	Valid	Within project area
HTP-N-AS41	TBC	SU17	Low density artefact scatter (<20)	327352	6376884	Ten artefacts identified on a vehicle access track across an area approximately 30 m x 4 m. Artefacts include 8 mudstone flake fragments, 1 silcrete core and an angular red silcrete fragment.	North	Valid	Within 200 m of project area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
HTP-N-AS42	TBC	SU17	Low density artefact scatter (<20)	327188	6376835	Five artefacts within a sandy scald exposure within a re-forested area with leaf litter and grasses obstructing exposure visibility. Artefacts comprise 1 silcrete core, 2 silcrete flake fragments and 2 chert flake fragments. Site is situated on terrace landform beside an ephemeral third order creek line	North	Valid	Within 200 m of project area
HTP-N-AS43	TBC	SU17	Low density artefact scatter (<20)	328111	6375810	Three artefacts, comprising 2 mudstone and 1 silcrete artefact, identified on terrace landform north of Monkey Place Creek (5th order) and exposed beneath a tree in a row of planted trees.	North	Valid	Within 200 m of project area
HTP-N-AS44	TBC	SU - SMA	Low density artefact scatter (<20)	329704	6373781	A small artefact scatter (n=15) exposed on a dirt vehicle track on the terrace between Monkey Place Creek to the south and a 4th order tributary to the north. Assemblage predominantly chert and mudstone flakes, grey, red or tan.	North	Valid	Outside project area
HTP-N-AS45	TBC	SU17	Low density artefact scatter (<20)	328989	6373874	Low density artefact scatter (n=20) located on exposed areas of dirt vehicle track on terrace landform adjacent to Monkey Place Creek (5th order). The assemblage consists of primarily yellow, red and grey chert/mudstone flakes, with 2 cores, a backed red artefact and muller.	North	Valid	Within disturbance area
HTP-N-AS46	TBC	SU1	Low density artefact scatter (<20)	305465	6410225	At least 4 artefacts identified at fence intersection on gently inclined hillslope within a cleared paddock with evident regrowth. Artefacts comprised IMTC flakes, identified on an exposure.	North	Tentative	Outside project area
HTP-N-AS47	TBC	SU1	Low density artefact scatter (<20)	304952	6406750	Four artefacts located on sandy clay exposure near a vehicle track and fence line. Site is situated on very gently inclined hillslope with re-growth vegetation, 170 m to the south of a 2nd order tributary to Parnells Creek.	North	Valid	Within project area
HTP-N-AS48	TBC	SU1	Low density artefact scatter (<20)	305201	6410530	Two mudstone flakes identified on banks of ephemeral 2nd order creek.	North	Valid	Outside project area
HTP-N-AS49	TBC	SU14	Low density artefact scatter (<20)	324830	6386497	Two surface artefacts; silcrete and mudstone. Located on the edge of an excavated drainage channel.	North	Valid	Within project area
HTP-N-AS50	TBC	SU9	Low density artefact scatter (<20)	316377	6399748	Sixteen artefacts located on cleared transmission line easement within Hunter Valley Operations mining complex rehabilitated land that has been subject to significant ground disturbance and land modification. Artefact assemblage comprises a large mudstone flake, 9 silcrete flakes, 2 silcrete cores and 4 chert flakes. The site is located 50 m east of HTP-N-IF17.	North	Valid	Within disturbance area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
HTP-N-AS51	TBC	SU2	Low density artefact scatter (<20)	306171	6404397	Two artefacts identified on small exposure in an ephemeral creek line adjacent to a transmission line.	North	Valid	Within 200 m of project area
HTP-N-AS52	TBC	SU1	Low density artefact scatter (<20), PAD	310564	6412864	Twenty-one artefacts comprising 19 mudstone flakes, 1 with possible retouch, 1 pink silcrete flake and 1 white silcrete flake. Site is located on an exposure along a modified dam wall, approximately 60 m north of Pikes Creek and approximately 165 m west of Pikes Gully Road.	North	Valid	Within disturbance area
HTP-N-AS53	TBC	SU1	Low density artefact scatter (<20)	310236	6412883	Sixteen artefacts comprising 14 mudstone flakes, 1 silcrete flake with evidence of heat treatment and 1 FGS flake. Site is located along an eroded bank of Pikes Creek.	North	Valid	Within disturbance area
HTP-N-AS54	TBC	SU1	Low density artefact scatter (<20)	310501	6412920	Two artefacts comprising 1 yellow silcrete proximal flake with evidence of heat treatment and 1 yellow silcrete complete flake. Site is situated within a cleared paddock on a surface exposure within a dam wall, approximately 90 m north of Pikes Creek.	North	Valid	Within disturbance area
HTP-N-AS55	TBC	SU17	Low density artefact scatter (<20)	329478	6372743	Thirteen artefacts comprising mudstone, silcrete and quartz flakes and cores within an area of exposure. Site is located on a gentle slope within an open forest approximately 70 m southeast of a 2nd order ephemeral creekline.	Central	Valid	Within disturbance area
HTP-N-AS56	TBC	SU15	Low density artefact scatter (<20)	324462	6380557	Eight artefacts comprising 1 mottled silcrete core, 3 grey silcrete flakes, 3 pink/red silcrete flakes and 1 mudstone flake. Site is located on a disturbed vehicle access track within an electrical transmission easement corridor.	North	Valid	Within disturbance area
HTP-N-AS57	TBC	SU15	Low density artefact scatter (<20)	324726	6380266	Four artefacts comprising 2 mudstone flakes, 1 quartz flake and 1 grey IMTC flake. Site is located on a large scald within an electrical transmission easement corridor.	North	Valid	Within project area
HTP-N-AS58	TBC	SU - SMA	Low density artefact scatter (<20)	324247	6381509	Sixteen artefacts identified on scald within a disturbed landscape between Bulga mine and Singleton Military Army land. Artefacts include 2 red silcrete flakes, 12 mudstone flakes and a fine-grained basalt flake with potential use wear on dorsal surface.	North	Valid	Within 200 m of project area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
HTP-N-AS59	TBC	SU14	Low density artefact scatter (<20)	325990	6385450	Sixteen mudstone flakes located on bank north of an ephemeral unnamed creekline and likely extending along this creekline. The site has undergone disturbed through bioturbation and erosion processes.	North	Valid	Within project area
HTP-N-AS60	TBC	SU14	Low density artefact scatter (<20)	325900	6385452	Ten artefacts comprising 6 yellow/orange mudstone flakes, 3 pink silcrete flakes and 1 grey mudstone flake. Site is located on an alluvial plain within an embankment of drainage dam.	North	Valid	Within disturbance area
HTP-N-AS61	TBC	SU14	Low density artefact scatter (<20)	325947	6385332	Twelve artefacts comprising 7 mudstone flakes including 1 with retouch, 1 grey silcrete flake, 1 yellow silcrete core and 3 pink/red silcrete flakes. The site is located on a gently undulating hillslope in proximity to a dam and drainage channel. Artefacts were located on various exposures including an erosion scald and animal tracks. Erosion and bioturbation processes have occurred in proximity to drainage channel.	North	Valid	Within disturbance area
HTP-N-AS62	TBC	SU14	Low density artefact scatter (<20)	325744	6385878	Three artefacts comprising 2 pink mudstone flakes and 1 yellow/orange mudstone flake. Site is located on gently inclined hillslope on an animal track indicating signs of erosion and approximately 90 m east of a 2nd order ephemeral creekline. The surrounding landscape has been historically disturbed from mining activity, vegetation clearance and erosion.	North	Valid	Within disturbance area
HTP-N-AS63	TBC	SU10	Low density artefact scatter (<20)	316592	6398906	Eighteen artefacts comprising 1 multi-platform mudstone core, 1 banded silcrete blade/flake,6 silcrete flakes, 8 mudstone flakes and 2 fine-grained silcrete flakes. Site is situated within a cleared cattle paddock that had recently undergone tilling at time of recording. The surface topsoil is considered disturbed across the broader landscape. Site is <200 m west of the Hunter River and approximately 85 m east of Archerfield Road.	North	Valid	Within disturbance area
HTP-N-AS64	TBC	SU11	Low density artefact scatter (<20)	316288	6398214	Two artefacts comprising 1 large silcrete hand tool or 'chopper' with potential use-wear along edges and 1 mudstone flake. Site is located on scald exposure within a cleared plain that is heavily disturbed due to mining activities. Site is <15 m south of an unnamed track east of Archerfield Road and >350 m west of the Hunter River.	North	Valid	Within disturbance area
HTP-N-AS66	TBC	SU1	Low density artefact scatter (<20)	305074	6406368	Fifteen artefacts comprising 4 grey mudstone flakes, 7 pink mudstone flakes with 2 showing evidence of retouch and use-wear, 1 milky quartz flake and 3 red silcrete flakes. Site is located on a large erosion scald in proximity to an ephemeral creekline that has been heavily eroded.	North	Valid	Within project area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
HTP-N-AS67	TBC	SU1	Low density artefact scatter (<20)	304993	6406199	Seventeen artefacts comprising 5 pink silcrete flakes, 3 pink mudstone flakes and 9 grey/white mudstone flakes. Site is located within a cleared paddock on eroded hillslope with evident sheetwash.	North	Valid	Within disturbance area
HTP-N-AS68	TBC	SU1	Low density artefact scatter (<20)	304972	6405946	Seven artefacts comprising 6 mudstone flakes and 1 large pink silcrete flake located on an erosion scald on modified hillslope landform.	North	Valid	Within 200 m of project area
HTP-N-AS69	TBC	SU5	Low density artefact scatter (<20)	309663	6400980	Three artefacts comprising 1 fine-grained IMT river cobble with 1 large flake removed and some platform preparation with a smaller flake removed, 1 potential granite river cobble hammerstone with pecking on both ends and a poor quality IMT core with possible flakes removed and retouch. The site was identified in an area subject to clearing and grazing on a cleared paddock. The general area is described as a gentle rise with possible drainage lines to the north and south.	North	Valid	Within disturbance area
HTP-N-AS70	TBC	SU1	Low density artefact scatter (<20)	295833	6415702	Six artefacts comprising 3 mudstone flakes, 1 quartz flake, 1 chert flake and 1 silcrete flake. Site is located within a forested area on a tributary embankment and situated approximately 70 m north of McDonalds Road.	North	Valid	Within 200 m of project area
HTP-N-AS71	37-2-6665	SU1	Low density artefact scatter (<20), PAD	310279	6419078	This site is associated with AHIMS #37-2-2021. Approximately 30 artefacts identified on an embankment within a sheet wash exposure, approximately 3 m east of Lake Liddell. Large anthills on the exposure have contributed to surface disturbance. Assemblage primarily comprises pink and grey silcrete, yellow and red mudstone, quartz and basalt flakes. Of note, 1 single backed quartz flake with a 2 mm backed edge was identified. This site may be associated with a quartz knapping site according to RAPs and notable basalt artefacts identified. PAD identified within the site (10 m x 5 m) with brown/orange sandy clay prevalent along the lake edge.	North	Valid	Within disturbance area
HTP-N-AS72	TBC	SU1	Low density artefact scatter (<20)	295652	6415774	Low density open artefact scatter site comprising a large pale pink IMTC flake and on micro pale pink IMGC flake identified on an erosion scald in proximity to a large ants nest. The extent of the site consists of 2 m long x 2 m wide.	North	Valid	Within project area
HTP-N-AS73	TBC	SU1	Low density artefact scatter (<20)	300168	6415139	Low-density open artefact scatter comprising of four IMTC flakes, a coarse-grained pink/purple silcrete flake and a coarse IMTC core located on an erosion scald on a gently incline spur crest.	North	Valid	Within project area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
HTP-N-AS74	TBC	SU1	Low density artefact scatter (<20)	300640	6415043	Low-density open artefact scatter on an erosion scald within a grassland landscape. Assemblage comprises four medial IMTC flakes; a small pink silcrete flake, yellow fine-grained silcrete flakes, and an IMTC flake with signs of heat treatment and retouch.	North	Valid	Within project area
HTP-N-AS75	TBC	SU1	Low density artefact scatter (<20)	300681	6414992	A low-density open artefact scatter comprising six stone artefacts on slope landform. The assemblage comprises one yellow mudstone distal flake with feather termination, 1 mudstone proximal flake, 1 complete red chert flake with feather termination, 1 red silcrete complete flake with plain platform and feather termination, 1 red chert flaked piece unable to be orientated, and 1 chalcedony proximal flake with plain platform. Site is situated to the east of Saddlers Creek.	North	Valid	Within project area
HTP-N-AS76	TBC	SU1	Low density artefact scatter (<20)	295841	6415713	A low-density surface stone artefact scatter comprising two stone artefacts on slope landform. One red chert core with 0-33% cortex, and three scars and 1 brownish grey mudstone angular fragment. Site is situated north of Mcdonalds Road, immediately south of overhead powerline easement. Evidence of previous land clearing to cater for installation of easement.	North	Valid	Within project area
HTP-N-CMT01	TBC	SU17	Culturally modified tree (carved or scarred), isolated find	328012	6374298	One tentative culturally modified birthing tree and isolated find identified within a drainage line that feeds into Monkey Place Creek roughly 850 m north of the site. The site is located 220 m south-east of Tower 78. The eucalypt tree was recorded in poor condition, with a dead portion of the trunk lying east to west at the base of split stump. The circumference of the tree base is estimated to be around 3.8 m with the split of the trunk starting at 1.2 m above the ground surface. A single chert artefact was identified 10 m east with limited surface visibility suggesting that additional artefacts may be present. Due to the location within a stream bed with evidence of soil movement and erosion, it was determined that the soils were skeletal, with limited potential for subsurface deposits. The closest previously recorded site is #37-6-3981 located 380 m west of the site.	North	Tentative	Within 200 m of project area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
HTP-N-GG01	TBC	SU17	Grinding groove	327225	6377113	A complex of 4 sandstone boulders containing grinding grooves in an area of open woodland. The boulders are located within 50 m of each other near a 3rd order drainage line that feeds into a dam. Three of the boulders are situated adjacent to a vehicle track. The site comprises 14 parallel grooves on a sandstone boulder to the south of the track, 6 grooves on 2 boulders to the north of the track and a boulder, 40 m to the east, with 3 grooves of which 1 is oval rather than U-shaped. One of the project RAPs observed that his may have been used to grind food.	North	Valid	Within project area
HTP-N-IF01	TBC	SU1	Isolated find	306636	6411171	One yellowish pink mudstone distal fragment identified on a small scald exposure within a cleared grassy area on gently inclined upper hillslope. This site is part of a low-density artefact scatter exposed on isolated scalds across the hillslope.	North	Valid	Within disturbance area
HTP-N-IF02	TBC	SU1	Isolated find	306599	6411140	One white silcrete fragment with 40% cortex identified on gently inclined upper hillslope. This site is part of a low-density artefact scatter exposed on isolated scalds across the hillslope.	North	Valid	Within project area
HTP-N-IF03	TBC	SU1	Isolated find	306568	6411052	One reddish pink mudstone flake identified on gently inclined upper hillslope. This site is part of a low-density artefact scatter exposed on isolated scalds across the hillslope.	North	Valid	Within project area
HTP-N-IF04	TBC	SU1	Isolated find	306448	6410557	One yellow mudstone flake. Site is 1 of 3 sites within a cleared paddock on gently inclined hillslope beside a drainage channel that feeds into a dam. The site is situated nearby to previously registered sites within an area 100 m^2: HTP-N-AS05 HTP-N-AS06 and #37-2-6144. Artefacts have been exposed by vehicle and animal tracks.	North	Valid	Within disturbance area
HTP-N-IF05	TBC	SU1	Isolated find	306338	6410257	One white chert proximal flake identified on a sheet wash erosion scar on a very gently inclined hillslope within a cleared paddock. The site is situated 140 m east of HTP-N-AS09.	North	Valid	Within disturbance area
HTP-N-IF06	TBC	SU1	Isolated find	305809	6408766	One orange mudstone distal flake identified along an animal track exposure on the banks of a dam on hillslope landform east of Plashett Reservoir.	North	Valid	Within disturbance area
HTP-N-IF07	TBC	SU1	Isolated find	305637	6408672	One orange mudstone proximal flake identified on a small exposure on a level terrace 180 m east of Plashett Reservoir	North	Valid	Within 200 m of project area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
HTP-N-IF08	TBC	SU1	Isolated find	305207	6407293	One mudstone core located on an eroded surface exposure adjacent to Parnells Creek (approximately 20 m).	North	Valid	Within disturbance area
HTP-N-IF09	TBC	SU1	Isolated find	304616	6406858	Isolated silcrete heat shatter flake identified in a sandy clay exposure on a very gently inclined slope, 70 m from Parnells Creek (3rd order).	North	Valid	Within 200 m of project area
HTP-N-IF10	TBC	SU2	Isolated find	305546	6405472	One small mudstone flake identified on scald exposure on gentle hillslope beside a drainage line. This site is situated approximately 65 m north of #37-2-5134 (destroyed).	North	Valid	Within 200 m of project area
HTP-N-IF11	TBC	SU2	Isolated find	305679	6404986	A single mudstone flake identified on a small scald exposure within a cleared grazing paddock on hillslope landform above a dam.	North	Valid	Within disturbance area
HTP-N-IF12	TBC	SU2	Isolated find	306021	6404738	One mudstone flake located on a small, eroded surface exposure on a gently inclined hillslope beside an ephemeral creek (1st order). It is located 28 m northwest of #37-2-6515 and is likely part of a broader background scatter.	North	Valid	Within 200 m of project area
HTP-N-IF13	TBC	SU2	Isolated find	306054	6404701	Large mudstone core located on large, eroded surface exposure adjacent to drainage channel extending south to northeast within the project area. It is located 8 m southeast of #37-2-6515 and is likely part of a broader background scatter.	North	Valid	Within 200 m of project area
HTP-N-IF14	TBC	SU8	Isolated find	314029	6402178	One isolated mudstone flake located on an eroded surface depression within cattle grazing paddock. Site is located within 150 m of 8 destroyed sites: #37-6-3036 to 3038 and #37-6-3041 to 3045.	North	Valid	Within project area
HTP-N-IF15	TBC	SU8	Isolated find	314253	6402219	One yellow silcrete core identified beside a vehicle track.	North	Valid	Within disturbance area
HTP-N-IF16	TBC	SU11	Isolated find	318950	6396089	One yellowish red silcrete flake located on a cattle track exposure adjacent to a 2nd order tributary to the Hunter River. Part of artefact scatter #37-6-3485, recorded 20 m south on the same drainage line.	North	Valid	Within disturbance area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
HTP-N-IF17	TBC	SU9	Isolated find	316313	6399779	One red mudstone core with 40% cortex on the edge of a vehicle track. HTP-N-AS50 is located 50 m east on same vehicle track.	North	Valid	Within project area
HTP-N-IF18	TBC	SU11	Isolated find	316537	6397182	One indurated mudstone (IMT) flake on a vehicle track exposure beside an ephemeral drainage line that feeds into a dam within a grazing paddock.	North	Valid	Within 200 m of project area
HTP-N-IF19	TBC	SU11	Isolated find	317230	6396484	One mudstone flake located on an eroded surface exposure on a lower hillslope east of Wollombi Creek. Adjacent to artefact site #37-6-3384. Nearby sites follow the spur to the south (#37-6-3379 to 37-6-3383) and footslope contour to the east 37-6-3390 and 37-6-3391).	North	Valid	Within disturbance area
HTP-N-IF20	TBC	SU11	Isolated find	319462	6395835	One surface artefact on dam wall situated on lower hillslope above Hunter River floodplain to the northeast.	North	Valid	Within 200 m of project area
HTP-N-IF21	TBC	SU11	Isolated find	319018	6395970	One silcrete core situated on a gently inclined hillslope above a 2nd order tributary to the Hunter River. May be associated with #37-6-3522, which is 60 m upslope to the south.	North	Valid	Within 200 m of project area
HTP-N-IF22	TBC	SU11	Isolated find	319376	6395885	One large surface lithic (12 cm) beside the fence line of a densely grassed grazed paddock. A series of other artefacts have been exposed 50-160 m south along this fence line comprising HTP-N-IF27 and AHIMS site 37-6-3514/37-6-4068.	North	Valid	Within project area
HTP-N-IF23	TBC	SU11	Isolated find	319360	6395830	One surface artefact beside the fence line of a densely grassed grazed paddock. A series of other artefact have been exposed 50-110 m south along this fence line comprising AHIMS site 37-6-3514/37-6-4068 and HTP-N-IF26 to the north.	North	Valid	Within disturbance area
HTP-N-IF24	TBC	SU12	Isolated find	320935	6392607	One red, subangular silcrete artefact (130 mm x 100 mm) with 5% of cortex, situated to the west of a cattle track and east of the fence line, embedded within loamy exposure. Located on a lower hillslope above the floodplain to the Hunter River.	North	Valid	Within 200 m of project area
HTP-N-IF25	TBC	SU12	Isolated find	320974	6392570	One large orange/red silcrete core (8 cm x 10 cm), embedded in a trampled paddock with very little surface exposure. Located on a lower hillslope above the floodplain to the Hunter River.	North	Valid	Within 200 m of project area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
HTP-N-IF26	TBC	SU12	Isolated find	321124	6392416	One silcrete flake (50 mm x 40 mm) on a level, grassy paddock, 800 m southwest of the Hunter River. The edges of the flake show signs of serration, suggesting possible retouching. AHIMS sites are concentrated within a 100 m radius to the west: #37-6-3156 to 3163.	North	Valid	Within project area
HTP-N-IF27	TBC	SU12	Isolated find	321288	6392455	One silcrete core identified on small exposure within cleared grazing paddock on very gently inclined footslope.	North	Valid	Within 200 m of project area
HTP-N-IF28	TBC	SU12	Isolated find	321293	6392435	One pale orange mudstone artefact (80 mm x 60 mm) with 50% cortex, embedded in a cleared grazing paddock with limited surface exposure on very gently inclined footslope.	North	Valid	Within 200 m of project area
HTP-N-IF29	TBC	SU13	Isolated find	322580	6390269	One large silcrete artefact, exposed by trampling around a cattle trough. Site is situated 68 m east of Doctors Creek (2nd order).	North	Valid	Outside project area
HTP-N-IF30	TBC	SU13	Isolated find	323526	6387806	One silcrete artefact (11 cm x 10 cm) with 50% cortex. Identified on a gently inclined hillslope south of a concentration of AHIMS sites: 37-6-156 to 3163. The paddock has been cleared for pastoral grazing, but grass cover provides low visibility.	North	Valid	Outside project area
HTP-N-IF31	TBC	SU14	Isolated find	324573	6386972	One large orange mudstone core (110 mm x 90 mm) with approximately 60% cortex, identified within flat grassy grazing paddock. This site is part of a wider (200 m x 320 m) low density scatter across the landform, comprising AHIMS sites #37-6-3156 to 3164, 37-6-2064, 37-6-3103, 37-6-3098.	North	Valid	Within disturbance area
HTP-N-IF32	TBC	SU14	Isolated find	324892	6386452	One chert core located on vehicle access track beside a dam and drainage channel. Area of high disturbance due to cutting and bulk earthworks associated with the dam and vehicle track.	North	Valid	Within project area
HTP-N-IF33	TBC	SU14	Isolated find	325906	6385009	One pinkish red mudstone flake on sheet wash exposure on a very gently inclined hillslope above the confluence of a 2nd and 3rd order creek.	North	Valid	Within disturbance area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
HTP-N-IF34	TBC	SU14	Isolated find	325678	6383795	One greyish yellow silcrete distal flake identified in a large scald exposure beside a vehicle track caused by sheet erosion and earthworks with spoil heaps located surrounding area. Site is situated on similar landform with five previously recorded sites in a 250 m radius: HTP-N-IF34, IF36, IF37, AS35 and AS36.	North	Valid	Within disturbance area
HTP-N-IF35	TBC	SU14	Isolated find	325694	6383970	One yellow mudstone broken flake identified on an area of sheet wash erosion on a hillcrest. Site is situated on a similar landform to 5 sites in a 250 m radius: 250 m radius: HTP-N-IF34, IF35, IF37, AS35 and AS36.	North	Valid	Within disturbance area
HTP-N-IF36	TBC	SU14	Isolated find	325531	6383790	One artefact identified in an open eucalypt forest. Artefact is a potential grinding tool (13 cm x 11 cm). Site is situated on a similar landform with five previously recorded sites within a 250 m radius: 250 m radius: HTP-N-IF34, IF35, IF36, AS35 and AS36.	North	Valid	Within 200 m of project area
HTP-N-IF37	TBC	SU14	Isolated find	325567	6383189	One backed yellow silcrete flake (50 mm x 20 mm), situated on a modified slope formed by a track embankment. The embankment soil is predominantly light red compacted sand with rock inclusions.	North	Valid	Within project area
HTP-N-IF38	TBC	SU16	Isolated find	325380	6379347	One yellowish grey silcrete horseshoe core identified on bank of a shallow, moderately incised ephemeral creekline in woodland with low surface exposure.	North	Valid	Within disturbance area
HTP-N-IF39	TBC	SU16	Isolated find	326294	6378294	One chalcedony core identified on a small exposure (2 m x 2 m) on a gently inclined wooded slope.	North	Valid	Within disturbance area
HTP-N-IF40	TBC	SU17	Isolated find	327180	6376722	One retouched porcelain flake on small exposure of brown sandy clay, within an area of re-forestation with long grass and low surface visibility, beside an ephemeral third order creek line.	North	Valid	Outside project area
HTP-N-IF41	TBC	SU17	Isolated find	328864	6373923	One yellow chert artefact with retouch on 1 margin, located on a dirt track, 170 m west of Monkey Place Creek (5th order). Low density artefact scatter HTP-N-AS52 is located on the same track, 130 m to the east.	North	Valid	Within disturbance area
HTP-N-IF42	TBC	SU1	Isolated find	305168	6410568	One pink silcrete core identified in an area mapped as having high archaeological potential 80m to the east of a 3rd order ephemeral creekline. Visibility within the cleared paddock is very low due to grass cover, but there is likely subsurface archaeological potential	North	Valid	Outside project area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
HTP-N-IF43	TBC	SU1	Isolated find	305141	6410328	One pink silcrete proximal flake identified on scald exposure on a hillslope cleared for pastoral grazing. Site is situated 90 m north of #37-2-6136.	North	Valid	Outside project area
HTP-N-IF44	TBC	SU1	Isolated find	305175	6410185	One small (5 mm) orange mudstone fragment identified on scald exposure on a hillslope cleared for pastoral grazing. Site is located 90 m southeast of #37-2-6136.	North	Valid	Outside project area
HTP-N-IF45	TBC	SU1	Isolated find	305332	6410162	One red mudstone angular fragment identified on small scald exposure on a very gently inclined hillslope cleared for pastoral grazing.	North	Valid	Outside project area
HTP-N-IF46	TBC	SU17	Isolated find, PAD	326661	6375405	One pink silcrete core identified in an area mapped as having high archaeological potential 80 m to the east of a 3rd order ephemeral creekline. Visibility within the cleared paddock is very low due to grass cover, but there is likely subsurface archaeological potential.	North	Valid	Within 200 m of project area
HTP-N-IF47	TBC	SU12	Isolated find	321080	6392309	One silcrete artefact (11 cm x 10 cm) with 50% cortex. Identified on a gently inclined hillslope to the south of a concentration of AHIMS sites: 37-6-156 to 3163. The paddock has been cleared for pastoral grazing but grass cover provides low visibility.	North	Valid	Within disturbance area
HTP-N-IF48	TBC	SU11	Isolated find	318876	6395905	One silcrete flake, identified on a gentle slope to the west of a 1st order creek, beside re-growth trees. Ground surface exposure is limited.	North	Valid	Within 200 m of project area
HTP-N-IF49	TBC	SU8	Isolated find	314382	6402208	One angular artefact on a track beside a sealed road that runs along the crest of the hill.	North	Valid	Within project area
HTP-N-IF50	TBC	SU12	Isolated find	321145	6392370	One large orange mudstone core (110 mm x 90 mm) with approximately 60% cortex, identified within a flat grassy grazing paddock. This site is likely part of a wider (200 m x 320 m) low density scatter, as noted by nearby AHIMS sites (n=11).	North	Valid	Within project area
HTP-N-IF51	TBC	SU11	Isolated find	319345	6395715	One large mudstone core located in proximity to a fence line adjacent to a vehicle access track across a flat, grassy paddock. Artefacts were identified along 170 m of track to the north and have been recorded as sites: 37-6-4068, 37-6-3514, HTP-N-IF53, HTP-N-IF22 and HTP-N-IF23.	North	Valid	Within project area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
HTP-N-IF52	TBC	SU11	Isolated find	319351	6395779	One red mudstone core located on vehicle access track exposure adjacent to fence line within a cleared grazing paddock. Artefacts were identified for 170 m along this track to the north and have been recorded as sites: 37-6-4068, 37-6-3514, HTP-N-IF52, HTP-N-IF22 and HTP-N-IF23.	North	Valid	Within disturbance area
HTP-N-IF53	TBC	SU2	Isolated find	305645	6405132	One hammer stone (9 cm in length) identified on scald exposure within a cleared paddock on gently inclined hillslope landform. Other artefact sites within 130 m on the same landform include #37-2-6512, 37-2-5338, 37-2-6505, HTP-N-AS21 and HTP-N-AS22.	North	Valid	Within 200 m of project area
HTP-N-IF54	TBC	SU1	Isolated find	306429	6410790	One yellow mudstone flake identified on very gently inclined hillslope above a dam within a cleared, grassy paddock.	North	Valid	Within 200 m of project area
HTP-N-IF55	TBC	SU1	Isolated find	309799	6413269	One medial mudstone flake located on an eroded surface exposure underneath tree canopy within a cleared paddock.	North	Valid	Within 200 m of project area
HTP-N-IF56	TBC	SU1	Isolated find	295717	6415739	One pink mudstone flake with negative flake scars identified on a surface exposure in proximity to a cluster of isolated trees. Site is located on a very gently inclined rise slope.	North	Valid	Within project area
HTP-N-IF57	TBC	SU14	Isolated find	325827	6385707	One mudstone flake identified on gently undulating hill slope along fence line within a cleared paddock. The surrounding landscape has been cleared of vegetation with evident regrowth present.	North	Valid	Within disturbance area
HTP-N-IF58	TBC	SU9	Isolated find	316426	6399355	One proximal silcrete flake with evidence of retouch identified on largely modified dam wall in proximity to the Hunter Valley Operations mining complex south car park. Landscape has undergone high levels of previous disturbance from establishment of mining infrastructure, facilities and dam.	North	Valid	Within disturbance area
HTP-N-IF59	TBC	SU9	Isolated find	316458	6399272	One silcrete core identified along an animal track near a modified dam wall in proximity to Hunter Valley Operations mining complex south car park and facilities. Landscape has undergone high levels of disturbance for established mining infrastructure, facilities and dam.	North	Valid	Within disturbance area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
HTP-N-IF60	TBC	SU9	Isolated find	316399	6399667	One silcrete flake identified on a large surface exposure along a power line easement within mine rehabilitation land. Site is located <5 m from a 1st-order ephemeral drainage line.	North	Valid	Within project area
HTP-N-IF61	TBC	SU33	Isolated find	304333	6414041	One red mudstone flaked piece identified on very gentle slope landform to the east of an unnamed tributary that feeds into Plashett Reservoir. Artefact was recorded along an unsealed vehicle access track.	North	Valid	Outside project area
HTP-N-IF62	TBC	SU1	Isolated find	304304	6414038	A single red mudstone flaked piece with banding identified on very gentle slope landform to the east of an unnamed tributary that feeds into Plashett Reservoir. Two negative scars present on artefact. Artefact was recorded along an unsealed vehicle access track.	North	Valid	Within project area
HTP-N-IF63	TBC	SU1	Isolated find	295361	6415784	A single red chert complete flake identified on lower slope landform. No secondary modification or cortex. Site is situated east of Edderton Road, and north of McDonalds Road underneath overhead powerline easement. Evidence of previous land clearing to cater for installation of easement. Site is situated ~15 m north of constructed dam.	North	Valid	Within project area
HTP-N-IF64	TBC	SU1	Isolated find	295739	6415710	A single coarse grained silcrete proximal flake (pain platform) identified on hill slope landform. No cortex of secondary modification. Site is situated north of Mcdonalds Road, underneath overhead powerline easement. Evidence of previous land clearing to cater for installation of easement.	North	Valid	Outside project area
HTP-N-IF65	TBC	SU1	Isolated find	296227	6415674	A single yellowish mudstone core identified on gently inclined hill slope. Artefact comprises two negative scars, and 0-33% cortex. Site is situated north of Mcdonalds Road, immediately south of overhead powerline easement. Evidence of previous land clearing to cater for installation of easement.	North	Valid	Within project area
HTP-N-IF66	TBC	SU1	Isolated find	295281	6415800	One red chert angular fragment identified on gentle slope landform to the south of overhead powerline easement. Stone artefact is situated at base of tree in a heavily eroded area (~20 cm erosion) from stock trampling nearby to dam. Evidence of previous land clearing to accommodate overhead powerline easement.	North	Valid	Within project area
HTP-N-IF67	TBC	SU1	Isolated find	300605	6415069	Isolated mudstone proximal flake showing signs of heat treatment and retouch. Identified on an erosion scald nearby to a stream channel.	South	Valid	Outside project area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
HTP-N-IF68	TBC	SU1	Isolated find	300182	6415106	A single yellowish proximal chert flake with plain platform identified on moderate slope landform west of Saddlers Creek. No cortex or secondary modification evident. Located adjacent to informal vehicle access track.	North	Valid	Within project area
HTP-N-IF69	TBC	SU1	Isolated find	300609	6415056	Isolated IMTC flake identified on a small surface exposure likely caused by wild pigs.	South	Valid	Outside project area
HTP-N-IF70	TBC	SU1	Isolated find	300203	6415094	One red chert complete flake with flaked platform and feather termination identified on moderate slope landform west of Saddlers Creek. Evidence of 0-33% cortex. Located adjacent to informal vehicle access track.	North	Valid	Within project area
HTP-N-IF71	TBC	SU35	Isolated find	304324	6414042	A single isolated chert flake with plain platform and feather termination identified on vehicle access track along ridgeline which has been subjected to heavy erosion processes.	North	Valid	Within project area
HTP-S-AR01	TBC	SU30	Aboriginal resource and gathering	348593	6336684	The site comprises a cluster of native grass trees and geebung trees. Stakeholders present during the survey identified that geebung fruit was an Aboriginal bush food, and grass trees were utilised for weaving and used as rope for various practices. The area is heavily disturbed due to established vehicle tracks with no evident exposures in proximity to the site. The site is in proximity to AHIMS #45-3-2457.	South	Valid	Within project area
HTP-S-AS01	TBC	SU27	Moderate density artefact scatter (21-50)	337018	6336193	An artefact scatter (n=52) spanning Walkers Ridge Forest Road along the ridge crest. Artefacts are eroding out of road verges. Of note were 2 black quartz cores - 1 with retouch - a red quartz or jasper flake, and 1 cloudy quartz flake.	South	Valid	Within project area
HTP-S-AS02	TBC	SU27	Low density artefact scatter (<20)	336118	6335639	Two artefacts identified on spur crest beside Walkers Ridge Forest Road. Artefacts comprise a coarse silcrete core with three negative scars, and a reduced river pebble IMT core with at least three multi-directional negative scars. Both artefacts show evidence of platform preparation. Exposed bedrock is evident east of road verge.	South	Valid	Within project area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
HTP-S-CMT01	-	SU28	Culturally modified tree (carved or scarred)	346133	6338229	One culturally modified tree with a single east facing scar identified on a hillslope oriented northeast of an unnamed drainage line approximately 190 m south-east of an unnamed access track off Watagan Forest Road. The stringybark (eucalypt) tree was recorded in good condition with an estimated circumference of approximately 5 m at base of trunk. The elongated scar measures 340 cm x 50 cm with roughly 30 cm of regrowth that has some uneven bulbs along the sides. The scar is situated 220 cm above the ground surface with limited evidence of disturbance in the surrounding area. The rock shelf abutting the drainage channel was vegetated with ferns and mature trees. The closest recorded site is #45-3-2454 190 m northwest of the site.	South	Non-cultural – Appendix F.6	Within project area
HTP-S-CMT02	-	SU30	Culturally modified tree (carved or scarred)	346311	6336972	One culturally modified tree with two scars, north and south facing, recorded on the southeast side of Watagan Forest Road along the hillcrest 280 m northeast of the intersection with McKenzies Road. The ironbark tree was recorded in good condition with an estimated circumference of approximately 3.8 m at the base of the trunk. The north elongated scar commences 200 cm from the ground surface and measures 240 cm x 30 cm with wide, deep regrowth >30 cm. The second tentative south facing scar commences at the base of the trunk and measures 260 cm x 35 cm with <10 cm of evident regrowth. The site is located in regrowth forest with limited evidence of disturbance in the surrounding landscape. The closest water source is an unnamed drainage channel 140 m southeast with the nearest sites including non-cultural overhangs (HTP-S-RS04 and HTP-S-RS05) approximately 890 m southwest and #45-3-4543 890 m southeast of the site.	South	Non-cultural – Appendix F.6	Within project area
HTP-S-CMT03	TBC	SU33	Culturally modified tree (carved or scarred)	338678	6341140	One tentative culturally modified tree with 1 small east facing ring at the top of a steep ridge located 130 m south of Hawkins Road. The eucalypt tree was recorded in good condition with an estimated circumference of 1 m at the base. The ring measures approximately 30 cm in diameter and situated approximately 14 m above the ground. The area surrounding the site has been previously logged. The closest water source is an unnamed drainage channel located 200 m northwest with the closest recorded site (HTP-C-CMT02) approximately 110 m northwest.	South	Tentative	Within 200 m of project area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
HTP-S-CMT04	-	SU27	Culturally modified tree (carved or scarred)	335804	6335366	One tentative culturally modified tree with a single south facing scar recorded on the northwest side of Walkers Ridge Road. The turpentine tree was recorded in good condition despite the dryface being burnt with potential axe marks beside the scar. The circumference of the tree was estimated to be approximately 2.2 m at the base of the trunk. The scar measures 67 cm x 9 cm with 8 cm of regrowth. The scar commences 94 cm above the ground surface. The closest water source is an unnamed drainage line 260 m east of the site with the nearest site (HTP-S-IF02) located 180 m southwest down the track.	South	Non-cultural – Appendix F.6	Within project area
HTP-S-CS01	45-3-5009	SU33	Contemporary site (wishing well)	347608	6338802	Wishing well on west side of Martinsville Hill Road. Circular concrete base to approximately 1m high and covered with timber roof supported by timber posts. According to RAPs it was used to water bullock teams and used by Aboriginal people as a water source prior to colonisation. Artefact site #45-3-2456 is located 35 m to the north.	South	Valid	Within disturbance area
HTP-S-CS02	TBC	SU27	Contemporary site (culturally modified tree)	344737	6340654	Peter Leven's son scarred this tree when he was 8-9 yrs old to make a shield. In the last 15 years the tree has regrown and has healed on both sides of the original cuts.	South	Valid	Outside project area
HTP-S-GG01	TBC	SU26	Grinding groove	342643	6344030	Five grinding grooves on a sandstone boulder within a 3rd order tributary to Watagans Creek. The grooves are oriented north-west to south-east. The longest groove measures 34 cm x 6 cm. The remaining four grooves measure between 19–29 cm in length. The creek is situated within a steep gully within regrowth forest.	South	Valid	Within project area
HTP-S-GG02	TBC	SU33	Grinding groove, isolated find	336998	6335627	Ten grinding grooves, and 3 deep waterholes, located on a sandstone platform at confluence of two 1st order creeks. Several grooves are currently underwater. One stone implement, 12 cm in length which had been worked, flaked and polished was identified in the creekline. Rockshelter site #45-3-2445 is located 150 m north adjacent to the eastern tributary.	South	Valid	Outside project area
HTP-S-IF01	TBC	SU33	Isolated find	336435	6336101	One quartz flake with a negative scar identified on a saddle along the ridgeline beside Walkers Ridge Forest Road.	South	Valid	Within project area
HTP-S-IF02	TBC	SU27	Isolated find	335625	6335273	One quartz core identified on Walkers Ridge Road on gently inclined hillslope landform. The core comprises 2 negative scars and cortex.	South	Valid	Within project area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
HTP-S-RS01	TBC	SU30	Rockshelter (no cultural markers)	345560	6334821	South-east facing sandstone overhang located 100 m northwest of a drainage channel and >500 m east of Watagan Forest Road on a hillslope. The rockshelter measures approximately 1 m wide x <1 m deep and <1 m height. Site is located 155 m northeast of HTP-S-RS02. The exposed shelter floor comprises primarily of bedrock. No cultural markers were noted at time of survey.	South	Tentative	Outside project area
HTP-S-RS02	TBC	SU30	Rockshelter (no cultural markers)	345432	6334732	South facing sandstone overhang located 25 m north of a drainage channel and 400 m east of Watagan Forest Road on a hillslope. The rockshelter measures approximately <1 m wide x <1 m deep and <1 m height. Site is located 155 m southwest of HTP-S-RS01. The exposed shelter floor comprises mostly of bedrock. No cultural markers were recorded at time of survey.	South	Tentative	Outside project area
HTP-S-RS03	TBC	SU30	Rockshelter (no cultural markers)	345464	6335166	This sandstone overhang is an east and west facing tunnel-like shelter. The shelter is situated 460 m north of a drainage channel and 480 m east of Watagan Forest Road on a hillslope. The rockshelter measures approximately 1 m wide x 0.5 m deep and <1 m height. Site is located 360 m north of HTP-S-RS01. The shelter floor was covered by leaf litter. No cultural markers were identified at time of survey.	South	Tentative	Outside project area
HTP-S-RS04	TBC	SU29	Rockshelter (no cultural markers)	345708	6336325	Southwest facing extremely shallow sandstone overhang located 100 m west of a drainage channel and 200 m south of Watagan Forest Road on a hillslope. The rockshelter measures approximately 2 m wide x <0.5 m deep and 2 m height. Site is located 75 m southeast of HTP-S-RS05. The shelter floor was covered by leaf litter and exposed to weathering. No cultural markers were noted at time of survey.	South	Tentative	Within 200 m of project area
HTP-S-RS05	TBC	SU29	Rockshelter (no cultural markers)	345640	6336360	South facing sandstone overhang located 160 m west of a drainage channel and 170 m south of Watagan Forest Road. The rockshelter measures approximately 6 m wide x 1 m deep and <1 m height. The shelter floor was predominantly bedrock with a thin lens of eroded sand from the roof. No cultural markers were identified at time of survey.	South	Tentative	Within 200 m of project area
HTP-S-RS06	-	SU30	Rockshelter (no cultural markers)	346996	6336156	Southeast facing sandstone overhang located 10 m west of a drainage channel and 385 m west of Tin Dog Point Road at the top of a hillcrest. Cannot determine measurements, site could not be accessed at time of survey. Site is located 45 m northwest of HTP-S-RS18. No cultural markers were noted at time of survey.	South	Non-cultural – see Appendix F.4	Within project area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
HTP-S-RS07	-	SU26	Rockshelter (no cultural markers)	342772	6343896	West facing sandstone overhang located 20 m north of Farrells Road and 120 m southeast of a drainage channel at the top of a hillslope. The rockshelter measures 1 m wide x 1 m deep, with an estimated height of <1 m. The shelter floor consists of predominantly bedrock with a thin lens of eroded sand from the roof. No cultural markers were identified at time of survey.	South	Non-cultural – see Appendix F.4	Within disturbance area
HTP-S-RS08	TBC	SU33	Rockshelter (no cultural markers)	341544	6344544		South	Tentative	Within 200 m of project area
HTP-S-RS09	-	SU26	Rockshelter (no cultural markers)	341839	6344597	East facing sandstone overhang located 65 m northeast of Big Bend Road, 210 m northwest of a drainage channel at the top of a hillslope. The rockshelter measures 1 m wide x <1 m deep and <1 m height. The exposed shelter floor comprises mostly bedrock. No cultural markers were noted at time of survey.	South	Non-cultural – see Appendix F.4	Within disturbance area
HTP-S-RS10	TBC	SU26	Rockshelter (no cultural markers)	341633	6344549	Northwest facing sandstone overhang located 100 m northwest of Watagan Creek Road, 10 m east of a drainage channel at the top of a hillslope. The rockshelter measures 1 m wide x 0.5 m deep, with an estimated height of 1 m. The exposed shelter floor comprises mostly bedrock. No cultural markers were identified at time of survey.	South	Tentative	Within 200 m of project area
HTP-S-RS11	TBC	SU26	Rockshelter (no cultural markers)	341630	6344567	North facing sandstone overhang located 115 m east of Watagan Creek Road, 10 m east of a drainage channel on a hillslope. The rockshelter measures 2.5 m wide x 1 m deep, with an estimated height of 1.5 m. The exposed shelter floor consists of predominantly bedrock with a thin lens of eroded sand from the roof. No cultural markers were noted at time of survey.	South	Tentative	Within 200 m of project area
HTP-S-RS12	-	SU26	Rockshelter (no cultural markers)	341783	6344683	North facing sandstone overhang located 170 m northwest of Big Bend Road and 130 m east of a drainage channel on a hillslope. Site is located 60 m east of HTP-S-RS13. The rockshelter measures 2 m wide x 1 m deep, with an estimated height of 1 m. The exposed shelter floor comprises primarily of bedrock. No cultural markers were recorded at time of survey.	South	Non-cultural – see Appendix F.4	Within project area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
HTP-S-RS13	-	SU26	Rockshelter, PAD	341724	6344689	A potential series of 3 small rockshelters measuring approximately 1 m high x 3 m long x 1 m deep. There are very limited deposits, mainly sandstone eroding from roof. The shelter is south facing, located on steep slope within dense regrowth forest.	South	Non-cultural – see Appendix F.4	Within disturbance area
HTP-S-RS14	TBC	SU26	Rockshelter, art (pigment or engraved)	341624	6344692		South	Valid	Within 200 m of project area
HTP-S-RS15	-	SU26	Rockshelter (no cultural markers)	341534	6344753	West facing sandstone overhang located 45 m east of Watagan Creek Road and 130 m west of a drainage channel on a hillcrest. The rockshelter measures 3 m wide x 2 m deep, with an estimated height of 2 m. The exposed shelter floor consists of mostly bedrock. No cultural markers were noted at time of survey.	South	Non-cultural – see Appendix F.4	Within project area
HTP-S-RS16	45-3-5007	SU26	Rockshelter (no cultural markers)	341565	6344772	South facing sandstone overhang located 95 m east of Watagan Creek Road, 110 m west of a drainage channel on a ridge. The rockshelter measures 6 m wide x 3 m deep, with an estimated height of 2 m. The exposed shelter floor comprises predominantly of bedrock with a thin lens of eroded sand from the roof. No cultural markers were recorded at time of survey.	South	Valid	Within disturbance area
HTP-S-RS17	-	SU26	Rockshelter (no cultural markers)	341109	6345070	North facing sandstone overhang located 40 m west of Watagan Creek Road and 375 m west of Watagan Creek on a ridge. The rockshelter measures 2 m wide x 0.5 m deep, with an estimated height of 2 m. The exposed shelter floor comprises predominantly bedrock with a thin lens of eroded sand from the roof. No cultural markers were identified at time of survey.	South	Non-cultural – see Appendix F.4	Within disturbance area
HTP-S-RS18	-	SU30	Rockshelter (no cultural markers)	347028	6336124	South facing sandstone overhang located 30 m east of a drainage channel and 360 m west of Tin Dog Point Road on a hillslope. The rockshelter measures 2 m wide x 1 m deep, with an estimated height of 1 m. The exposed shelter floor comprises predominantly bedrock with a thin lens of eroded sand from the roof. Site is located 45 m south of HTP-S-RS06. No cultural markers were noted at time of survey.	South	Non-cultural – see Appendix F.4	Within project area

Site ID	AHIMS	Survey unit	Site type	Easting	Northing	Description	HTP Section	Site status	Proximity to project
HTP-S-RS19	45-3-5008	SU31	Rockshelter (no cultural markers)	346534	6335179	A rockshelter with no evidence of cultural art or pigment. The rockshelter faces north-east, with overhap. A silty-and sediment is present across the floor, 5cm depth near opening, and ~50 cm depth towards the rear. A small hollowed out bulbous shelter is situated directly ontop but cannot be accessed safely and as unable to be surveyed. Shelter is located relatively close to ridgeline (~30-50 m). Rockshelter measures 5 m long x 2 m high x 2 m deep. The condition of the shelter is unstable and is cracked on verge of collapse.	South	Valid	Within project area
HTP-S-RS20	45-3-5004	SU31	Rockshelter (no cultural markers)	346523	6335232	A cavernous rockshelter, facing north-east, situated nearby to ridgeline with good views. Evidence of partial roof collapse and wind erosion. No artwork identified. A sandy-silt deposit of approximately 10 cm is present along the base of the rockshelter. Rockshelter measures 4 m long x 2 m high x 2 m deep.	South	Valid	Within project area

F.4 Field survey - Identified Aboriginal sites – Rockshelter criteria review

The selection criteria is outlined in *section 8.4.1* of this report. Table F.3 evaluates potential rockshelters within the project impact area and disturbance area against these criteria, to determine whether or not they are considered an Aboriginal site for the purposes of this assessment.

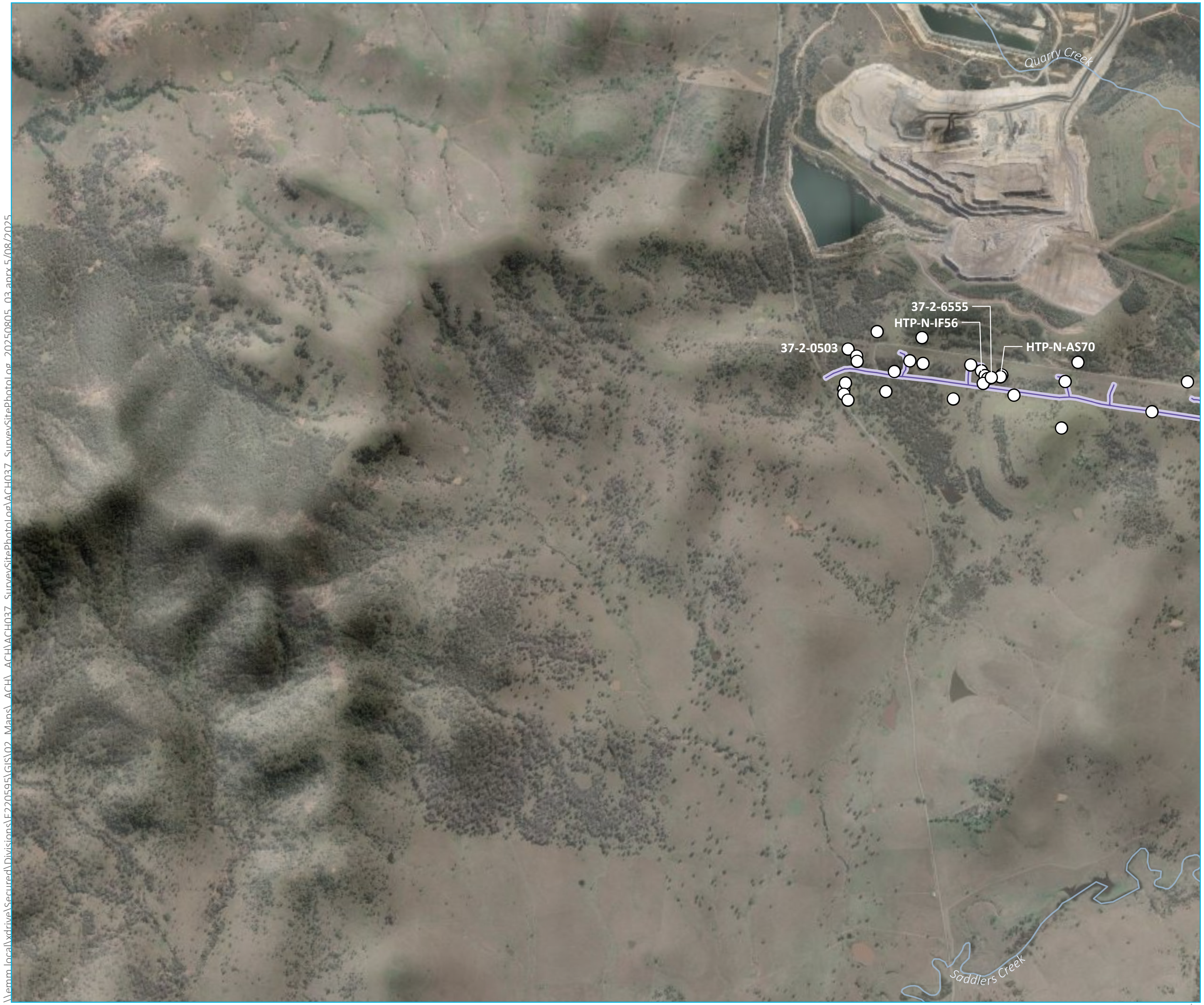
Table F.3 Evaluation of potential rockshelters within the project impact area against the criteria established in Section 8.4.1; sites presented in red meet at least three criteria and are considered a valid site for the purposes of this assessment.

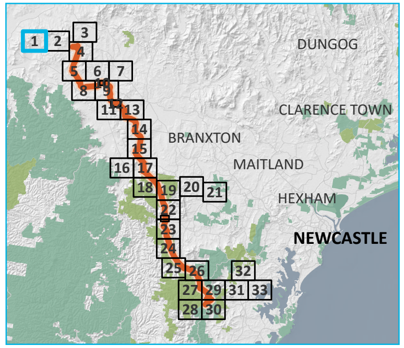
Site	Proximity to project	Criteria 1	Criteria 2	Criteria 3	Criteria 4	Criteria 5	Criteria 6	Evaluation
HTP-C-RS01	Within project impact area		x	x				Does not meet criteria
HTP-C-RS02	Within project impact area		x	x		x		Meets at least three criteria
HTP-C-RS03	Within project impact area			x		x		Does not meet criteria
HTP-C-RS04	Within project impact area			x				Does not meet criteria
HTP-C-RS18	Within project impact area		x			x		Does not meet criteria
HTP-C-RS22	Within project impact area		x		x			Does not meet criteria
HTP-C-RS23	Within project impact area				x	x		Does not meet criteria
HTP-C-RS24	Within project impact area				x	x		Does not meet criteria
HTP-C-RS27	Within project impact area		x			x		Does not meet criteria
HTP-C-RS29	Within project impact area			x				Does not meet criteria
HTP-C-RS30	Within project impact area							Does not meet criteria
HTP-C-RS31	Within project impact area							Does not meet criteria
HTP-C-RS34	Within project impact area							Does not meet criteria
HTP-C-RS35	Within project impact area							Does not meet criteria
HTP-C-RS45	Within project impact area			x	x			Does not meet criteria
HTP-C-RS46	Within project impact area			x	x			Does not meet criteria
HTP-C-RS47	Within project impact area			x	x			Does not meet criteria
HTP-C-RS50	Within project impact area					x		Does not meet criteria

Site	Proximity to project	Criteria 1	Criteria 2	Criteria 3	Criteria 4	Criteria 5	Criteria 6	Evaluation
HTP-C-RS51	Within project impact area			x				Does not meet criteria
HTP-C-RS52	Within project impact area			x	x			Does not meet criteria
HTP-C-RS53	Within project impact area				x	x		Does not meet criteria
HTP-C-RS54	Within project impact area			x				Does not meet criteria
HTP-C-RS55	Within project impact area			x				Does not meet criteria
HTP-C-RS56	Within project impact area					x		Does not meet criteria
HTP-C-RS57	Within project impact area					x		Does not meet criteria
HTP-C-RS58	Within project impact area			x		x		Does not meet criteria
HTP-C-RS59	Within project impact area							Does not meet criteria
HTP-C-RS60	Within project impact area							Does not meet criteria
HTP-C-RS62	Within project impact area					x		Does not meet criteria
HTP-C-RS63	Within project impact area			x				Does not meet criteria
HTP-C-RS64	Within project impact area			x		x		Does not meet criteria
HTP-C-RS65	Within project impact area							Does not meet criteria
HTP-C-RS66	Within project impact area					x		Does not meet criteria
HTP-C-RS67	Within project impact area					x		Does not meet criteria
HTP-S-RS06	Within project impact area			x	x			Does not meet criteria
HTP-S-RS07	Within project impact area							Does not meet criteria
HTP-S-RS09	Within project impact area				x			Does not meet criteria
HTP-S-RS12	Within project impact area				x			Does not meet criteria
HTP-S-RS13	Within project impact area				x	x		Does not meet criteria
HTP-S-RS15	Within project impact area			x	x			Does not meet criteria
HTP-S-RS16	Within project impact area			x	x	x		Meets at least three criteria

Site	Proximity to project	Criteria 1	Criteria 2	Criteria 3	Criteria 4	Criteria 5	Criteria 6	Evaluation
HTP-S-RS17	Within project impact area			x	x			Does not meet criteria
HTP-S-RS18	Within project impact area				x	x		Does not meet criteria
HTP-S-RS19	Within project impact area			x	x	x		Meets at least three criteria
HTP-S-RS20	Within project impact area			x	x	x		Meets at least three criteria

F.5 Field survey - Identified Aboriginal sites – Photograph catalogue





KEY

○ Photographic record

Project impact area

Access track

Existing environment

Minor road

Named watercourse

INSET KEY

HTP corridor

NPWS reserve

State forest

Source: EMM (2025); DCSSS (2024); ESRI (2024); GA (2009); DPIE (2023)

0 250 500 m

GDA2020 MGA Zone 56

N

Survey Site Photo Log Overview Map

Map 1 of 33

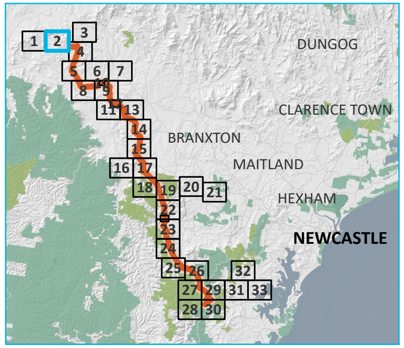
Hunter Transmission Project

Aboriginal Cultural Heritage Assessment

Figure Appendix

EMM

creating opportunities



KEY

Photographic record

Project impact area

Access track

Existing environment

Minor road

Named watercourse

Named waterbody

INSET KEY

HTP corridor

NPWS reserve

State forest

Survey Site Photo Log Overview Map

Map 2 of 33

Hunter Transmission Project

Aboriginal Cultural Heritage Assessment

Figure Appendix

Source: EMM (2025); DCSSS (2024); ESRI (2024); GA (2009); DPIE (2023)

0 250 500 m

GDA2020 MGA Zone 56

EMM creating opportunities

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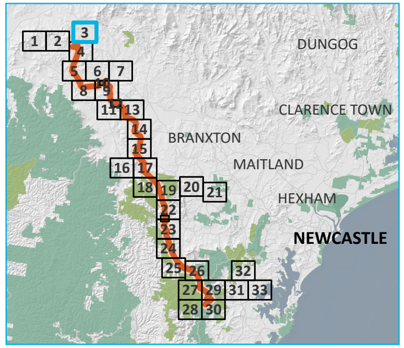
Source: EMM (2025); DCSSS (2024); ESRI (2024); GA (2009); DPIE (2023)

0 250 500 m

GDA2020 MGA Zone 56

N



KEY

- Photographic record

Project impact area

- Construction support site
- Access track

Existing environment

- Rail line
- Major road
- Minor road
- Named watercourse
- Named waterbody

INSET KEY

- HTP corridor
- NPWS reserve
- State forest

Survey Site Photo Log Overview Map

Map 3 of 33

Hunter Transmission Project

Aboriginal Cultural Heritage Assessment

Figure Appendix

EMM

creating opportunities

KEY

Photographic record

Project impact area

HTP corridor

Bayswater South switching station

Construction support site

Access track

Existing environment

Major road

Minor road

Named watercourse

Named waterbody

INSET KEY

HTP corridor

NPWS reserve

State forest

Source: EMM (2025); DCSSS (2024); ESRI (2024); GA (2009); DPIE (2023)

Survey Site Photo Log Overview Map

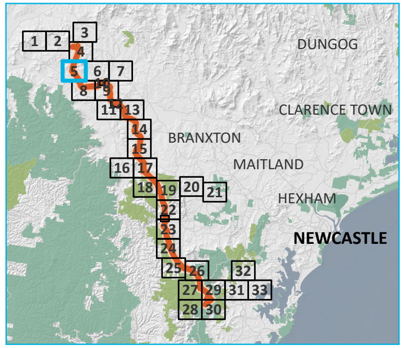
Map 4 of 33

Hunter Transmission Project

Aboriginal Cultural Heritage Assessment

Figure Appendix

EMM creating opportunities



KEY

○ Photographic record

Project impact area
- HTP corridor
- Laydown area
- Access track

Existing environment
- Major road
- Minor road
- Named watercourse
- Named waterbody

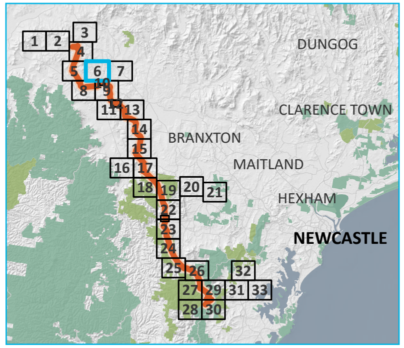
INSET KEY
- HTP corridor
- NPWS reserve
- State forest

Source: EMM (2025); DCSSS (2024); ESRI (2024); GA (2009); DPIE (2023)

Survey Site Photo Log Overview Map
Map 5 of 33

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure Appendix

EMM creating opportunities



KEY

Photographic record

Project impact area

Access track

Existing environment

Major road

Minor road

Named watercourse

Named waterbody

INSET KEY

HTP corridor

NPWS reserve

State forest

Survey Site Photo Log Overview Map

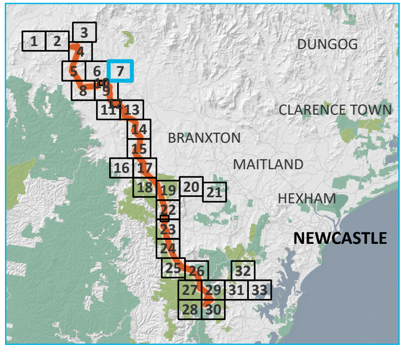
Map 6 of 33

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure Appendix

EMM
creating opportunities

Source: EMM (2025); DCSSS (2024); ESRI (2024); GA (2009); DPIE (2023)

0 250 500 m
GDA2020 MGA Zone 56
N



KEY

○ Photographic record

Existing environment

Rail line

Major road

Minor road

Named watercourse

Named waterbody

INSET KEY

HTP corridor

NPWS reserve

State forest

Source: EMM (2025); DCSSS (2024); ESRI (2024); GA (2009); DPIE (2023)

0 250 500 m

GDA2020 MGA Zone 56

N

Survey Site Photo Log Overview Map
Map 7 of 33

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure Appendix

EMM
creating opportunities

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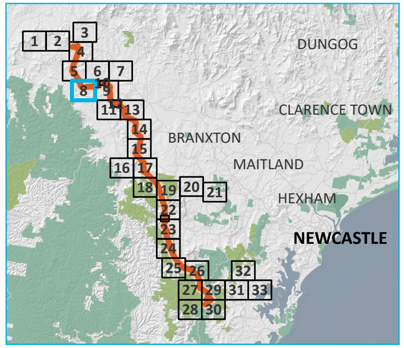


KEY

- Photographic record

Project impact area

- HTP corridor
- Access track

Existing environment

- Major road
- Minor road
- Named watercourse
- Named waterbody

INSET KEY

- HTP corridor
- NPWS reserve
- State forest

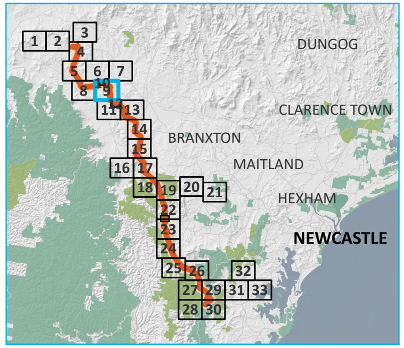
Source: EMM (2025); DCSSS (2024); ESRI (2024); GA (2009); DPIE (2023)

0 250 500 m
GDA2020 MGA Zone 56
N

Survey Site Photo Log Overview Map
Map 8 of 33

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure Appendix

EMM
creating opportunities



KEY

- Photographic record

Project impact area

- HTP corridor
- Laydown area
- Access track

Existing environment

- Major road
- Minor road
- Named watercourse
- Named waterbody

INSET KEY

- HTP corridor
- NPWS reserve
- State forest

Source: EMM (2025); DCSSS (2024); ESRI (2024); GA (2009); DPIE (2023)

0 250 500 m
GDA2020 MGA Zone 56
N

Survey Site Photo Log Overview Map
Map 9 of 33

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure Appendix

EMM
creating opportunities

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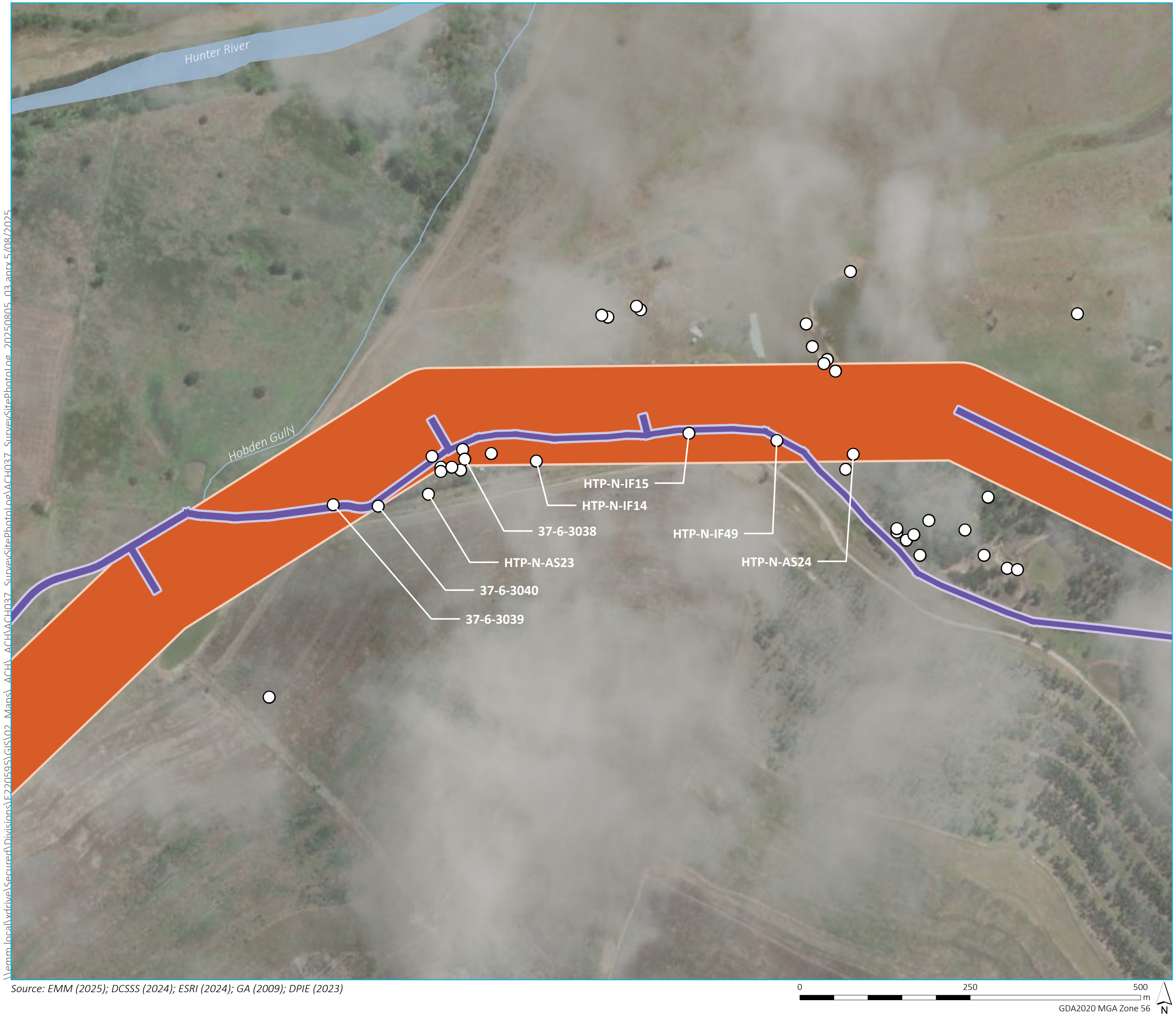
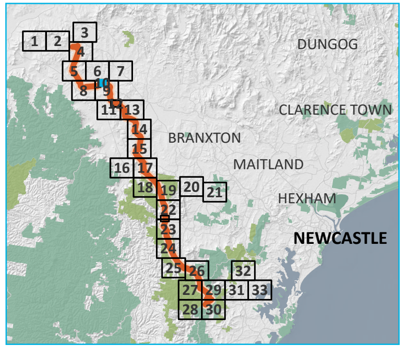


Source: EMM (2025); DCSSS (2024); ESRI (2024); GA (2009); DPIE (2023)



KEY

Photographic record

Project impact area

HTP corridor

Access track

Named watercourse

Named waterbody

INSET KEY

HTP corridor

NPWS reserve

State forest

Survey Site Photo Log Overview Map

Map 10 of 33

Hunter Transmission Project

Aboriginal Cultural Heritage Assessment

Figure Appendix

EMM creating opportunities

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KEY

Photographic record

Project impact area

HTP corridor

Access track

Existing environment

Rail line

Major road

Minor road

Named watercourse

Named waterbody

INSET KEY

HTP corridor

NPWS reserve

State forest

Source: EMM (2025); DCSSS (2024); ESRI (2024); GA (2009); DPIE (2023)

Survey Site Photo Log Overview Map
Map 11 of 33

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure Appendix

EMM creating opportunities

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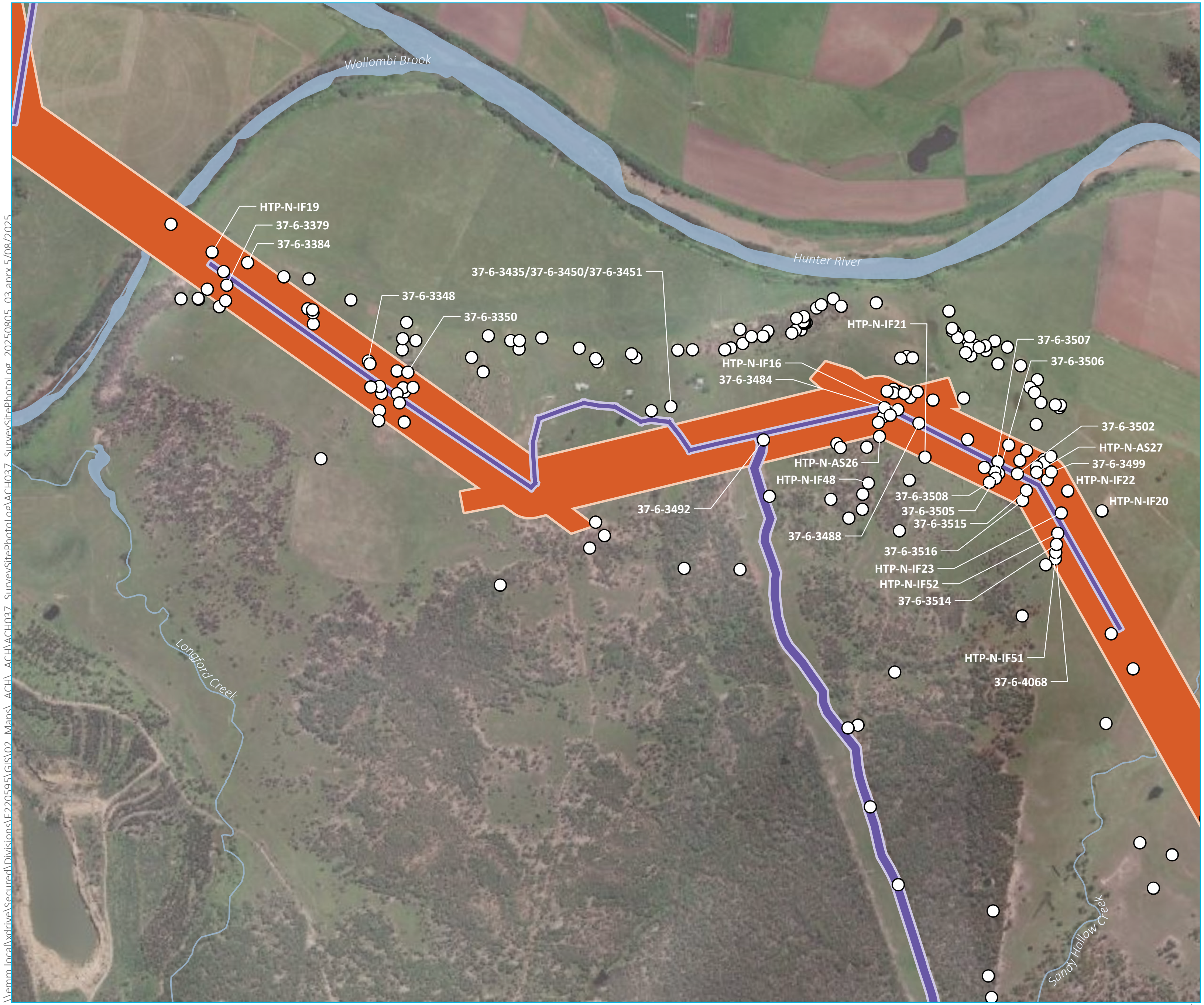

Source: EMM (2025); DCSSS (2024); ESRI (2024); GA (2009); DPIE (2023)

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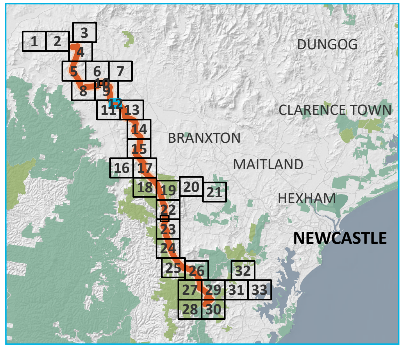

KEY

- Photographic record

Project impact area

- HTP corridor
- Access track
- Named watercourse
- Named waterbody

INSET KEY

- HTP corridor
- NPWS reserve
- State forest

Survey Site Photo Log Overview Map
Map 12 of 33

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure Appendix

EMM
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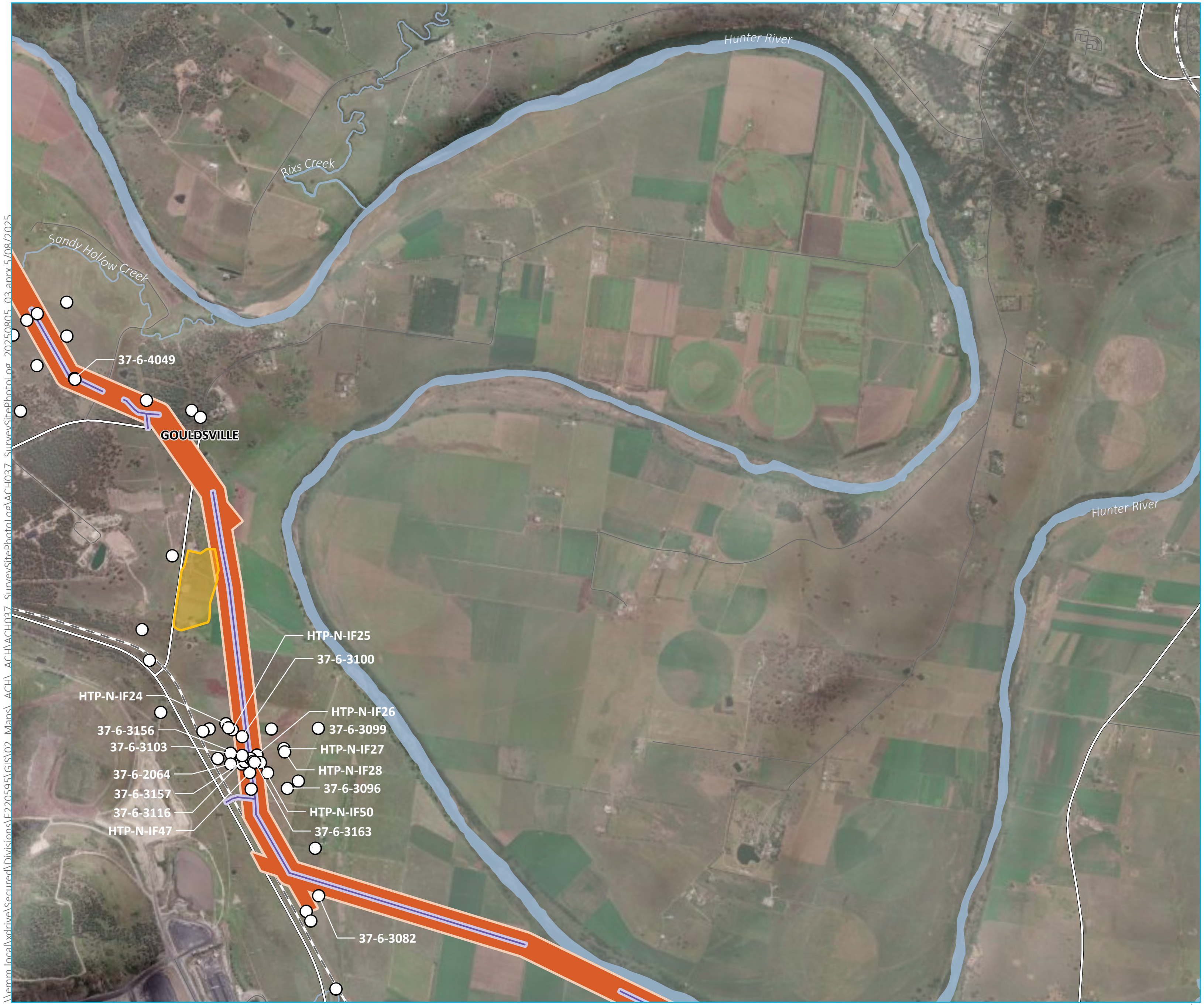

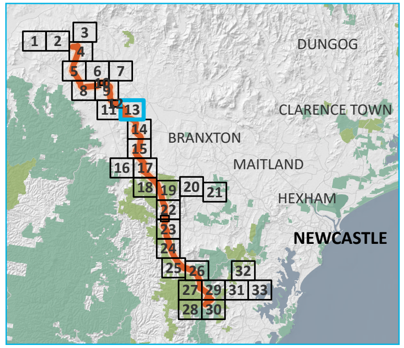

Source: EMM (2025); DCSSS (2024); ESRI (2024); GA (2009); DPIE (2023)

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KEY
- Photographic record

Project impact area
- HTP corridor
- Construction support site
- Access track

Existing environment
- Rail line
- Major road
- Minor road
- Named watercourse
- Named waterbody

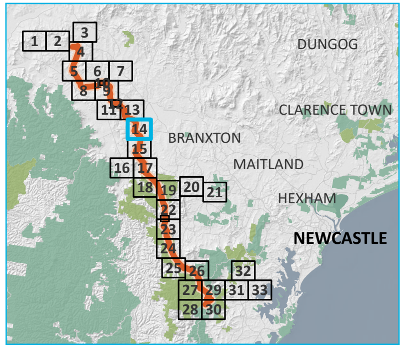
INSET KEY
- HTP corridor
- NPWS reserve
- State forest

Survey Site Photo Log Overview Map
Map 13 of 33

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure Appendix

EMM
creating opportunities

Source: EMM (2025); DCSSS (2024); ESRI (2024); GA (2009); DPIE (2023)



KEY

- Photographic record

Project impact area

- HTP corridor
- Access track

Existing environment

- Rail line
- Major road
- Minor road
- Named watercourse
- Named waterbody

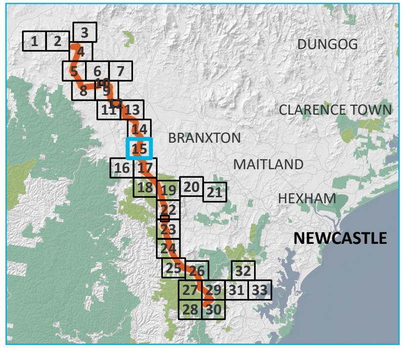
INSET KEY

- HTP corridor
- NPWS reserve
- State forest

Survey Site Photo Log Overview Map
Map 14 of 33

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure Appendix

EMM
creating opportunities



KEY

- Photographic record

Project impact area

- HTP corridor
- Access track

Existing environment

- Rail line
- Major road
- Minor road
- Named watercourse

INSET KEY

- HTP corridor
- NPWS reserve
- State forest

Source: EMM (2025); DCSSS (2024); ESRI (2024); GA (2009); DPIE (2023)

0 250 500 m
GDA2020 MGA Zone 56
N

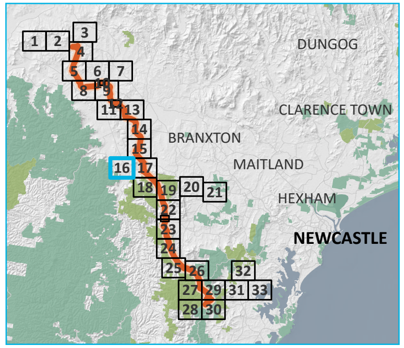
Survey Site Photo Log Overview Map
Map 15 of 33

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure Appendix

EMM
creating opportunities

Source: EMM (2025); DCSSS (2024); ESRI (2024); GA (2009); DPIE (2023)

0 250 500 m
GDA2020 MGA Zone 56
N



KEY

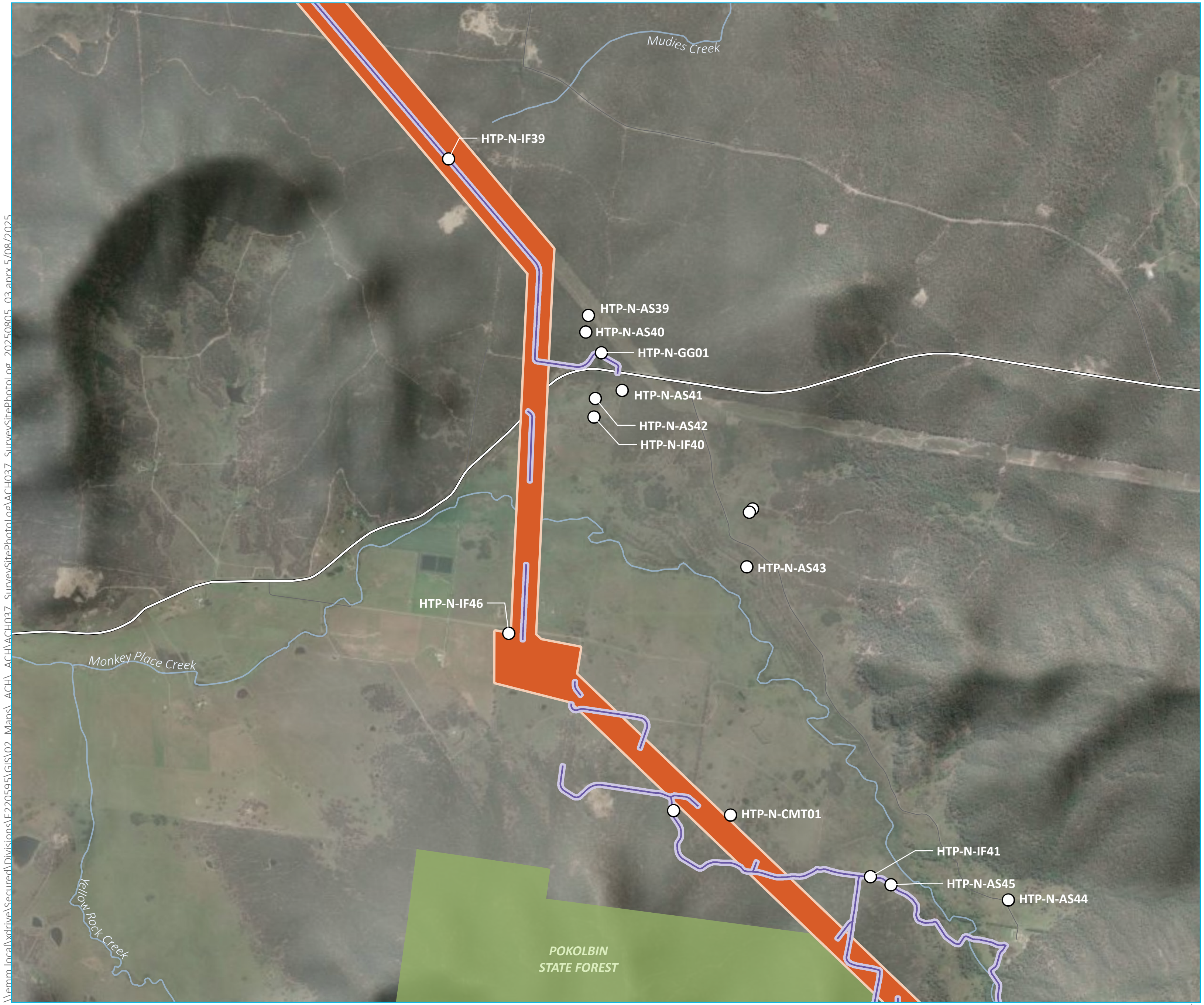
Existing environment
- Major road
- Minor road
- Named watercourse
- Named waterbody
- NPWS reserve

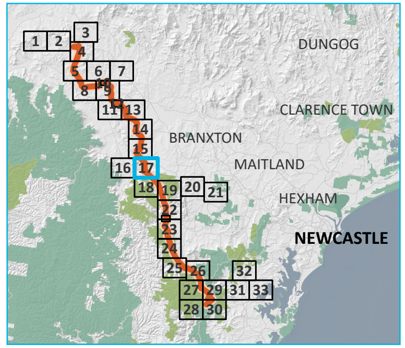
INSET KEY
- HTP corridor
- NPWS reserve
- State forest

Survey Site Photo Log Overview Map
Map 16 of 33

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure Appendix

EMM
creating opportunities





KEY

Photographic record

Project impact area

HTP corridor

Access track

Existing environment

Major road

Minor road

Named watercourse

State forest

INSET KEY

HTP corridor

NPWS reserve

State forest

Source: EMM (2025); DCSSS (2024); ESRI (2024); GA (2009); DPIE (2023)

0 250 500 m

GDA2020 MGA Zone 56

N

Survey Site Photo Log Overview Map

Map 17 of 33

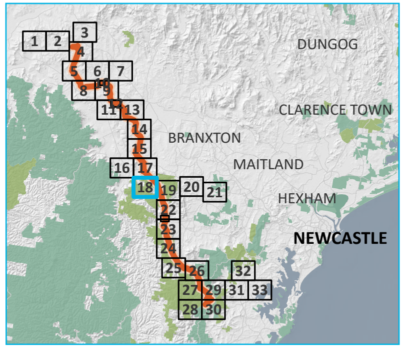
Hunter Transmission Project

Aboriginal Cultural Heritage Assessment

Figure Appendix

EMM

creating opportunities



KEY

Photographic record

Project impact area

HTP corridor

Access track

Existing environment

Major road

Named watercourse

State forest

INSET KEY

HTP corridor

NPWS reserve

State forest

Source: EMM (2025); DCSSS (2024); ESRI (2024); GA (2009); DPIE (2023)

0 250 500 m

GDA2020 MGA Zone 56

N

Survey Site Photo Log Overview Map

Map 18 of 33

Hunter Transmission Project

Aboriginal Cultural Heritage Assessment

Figure Appendix

EMM creating opportunities

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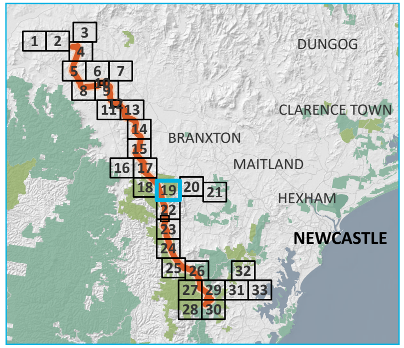

KEY

Photographic record

Project impact area

HTP corridor

Laydown area

Access track

Existing environment

Major road

Minor road

Named watercourse

Named waterbody

State forest

INSET KEY

HTP corridor

NPWS reserve

State forest

Source: EMM (2025); DCSSS (2024); ESRI (2024); GA (2009); DPIE (2023)

0 250 500
m
GDA2020 MGA Zone 56
N

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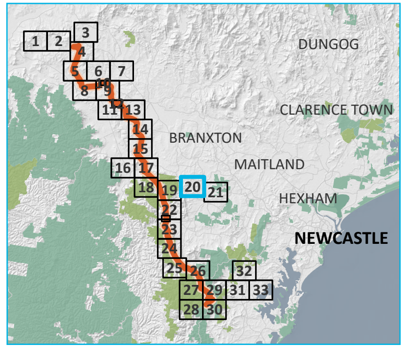
Survey Site Photo Log Overview Map
Map 19 of 33

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure Appendix

EMM
creating opportunities



KEY

- Photographic record

Existing environment

- Major road
- Minor road
- Named watercourse
- Named waterbody

INSET KEY

- HTP corridor
- NPWS reserve
- State forest

Source: EMM (2025); DCSSS (2024); ESRI (2024); GA (2009); DPIE (2023)

0 250 500 m

GDA2020 MGA Zone 56

N

Survey Site Photo Log Overview Map

Map 20 of 33

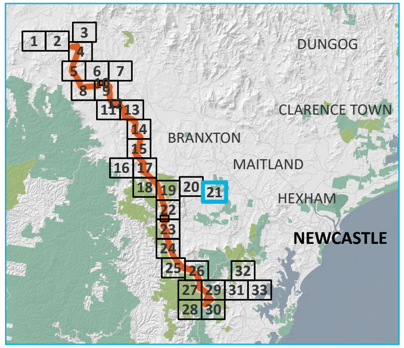
Hunter Transmission Project

Aboriginal Cultural Heritage Assessment

Figure Appendix

EMM

creating opportunities



KEY

- Photographic record

Existing environment

- Rail line
- Major road
- Minor road
- Named watercourse
- Named waterbody
- NPWS reserve
- State conservation area

INSET KEY

- HTP corridor
- NPWS reserve
- State forest

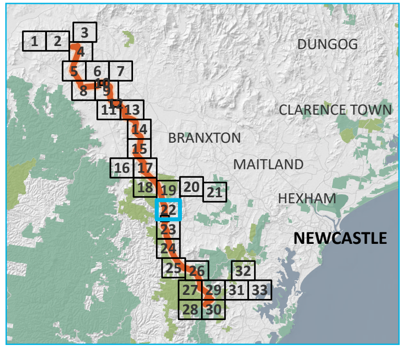
Source: EMM (2025); DCSSS (2024); ESRI (2024); GA (2009); DPIE (2023)

0 250 500 m
GDA2020 MGA Zone 56
N

Survey Site Photo Log Overview Map
Map 21 of 33

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure Appendix

EMM
creating opportunities



KEY

Photographic record

Project impact area

HTP corridor

Construction support site

Laydown area

Access track

Existing environment

Major road

Minor road

Named watercourse

Named waterbody

State forest

NPWS reserve

INSET KEY

HTP corridor

NPWS reserve

State forest

Source: EMM (2025); DCSSS (2024); ESRI (2024); GA (2009); DPIE (2023)

0 250 500 m
GDA2020 MGA Zone 56
N

Survey Site Photo Log Overview Map
Map 22 of 33

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure Appendix

EMM
creating opportunities

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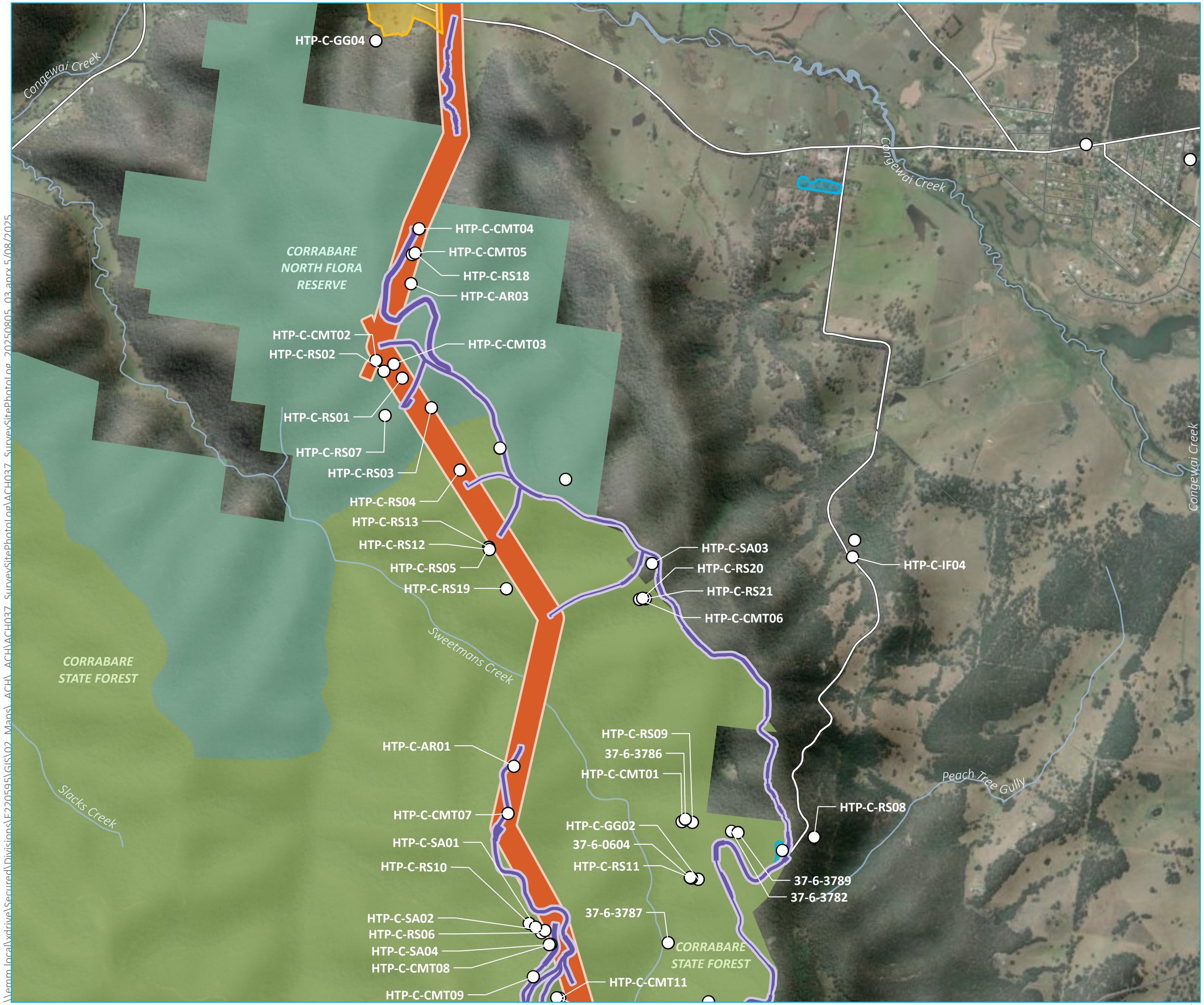

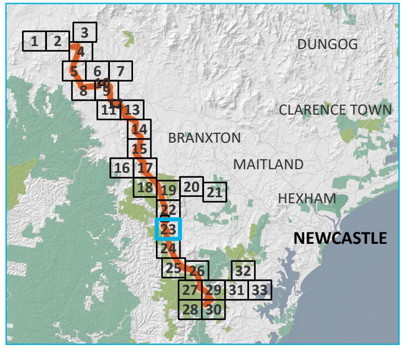

KEY

- Photographic record

Project impact area

- HTP corridor
- Construction support site
- Laydown area
- Access track

Existing environment

- Major road
- Minor road
- Named watercourse
- Named waterbody
- State forest
- NPWS reserve

INSET KEY

- HTP corridor
- NPWS reserve
- State forest

Source: EMM (2025); DCSSS (2024); ESRI (2024); GA (2009); DPIE (2023)

Survey Site Photo Log Overview Map
Map 23 of 33

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure Appendix

EMM creating opportunities

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Source: EMM (2025); DCSSS (2024); ESRI (2024); GA (2009); DPIE (2023)

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GDA2020 MGA Zone 56
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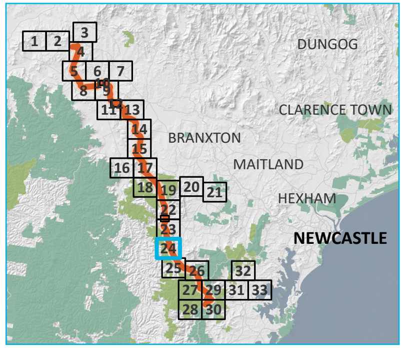

KEY

Photographic record

Project impact area

HTP corridor

Laydown area

Access track

Existing environment

Major road

Minor road

Named watercourse

State forest

NPWS reserve

INSET KEY

HTP corridor

NPWS reserve

State forest

Survey Site Photo Log Overview Map

Map 24 of 33

Hunter Transmission Project

Aboriginal Cultural Heritage Assessment

Figure Appendix

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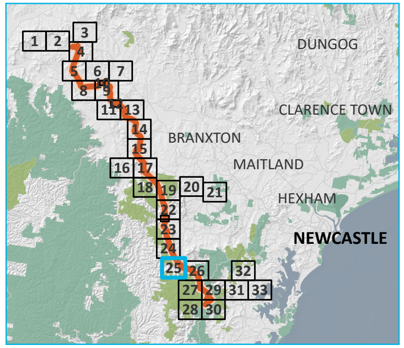
creating opportunities

Source: EMM (2025); DCSSS (2024); ESRI (2024); GA (2009); DPIE (2023)



KEY

○ Photographic record

Project impact area

HTP corridor

Access track

Existing environment

Major road

Named watercourse

State forest

NPWS reserve

INSET KEY

HTP corridor

NPWS reserve

State forest

Survey Site Photo Log Overview Map
Map 25 of 33

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure Appendix

EMM
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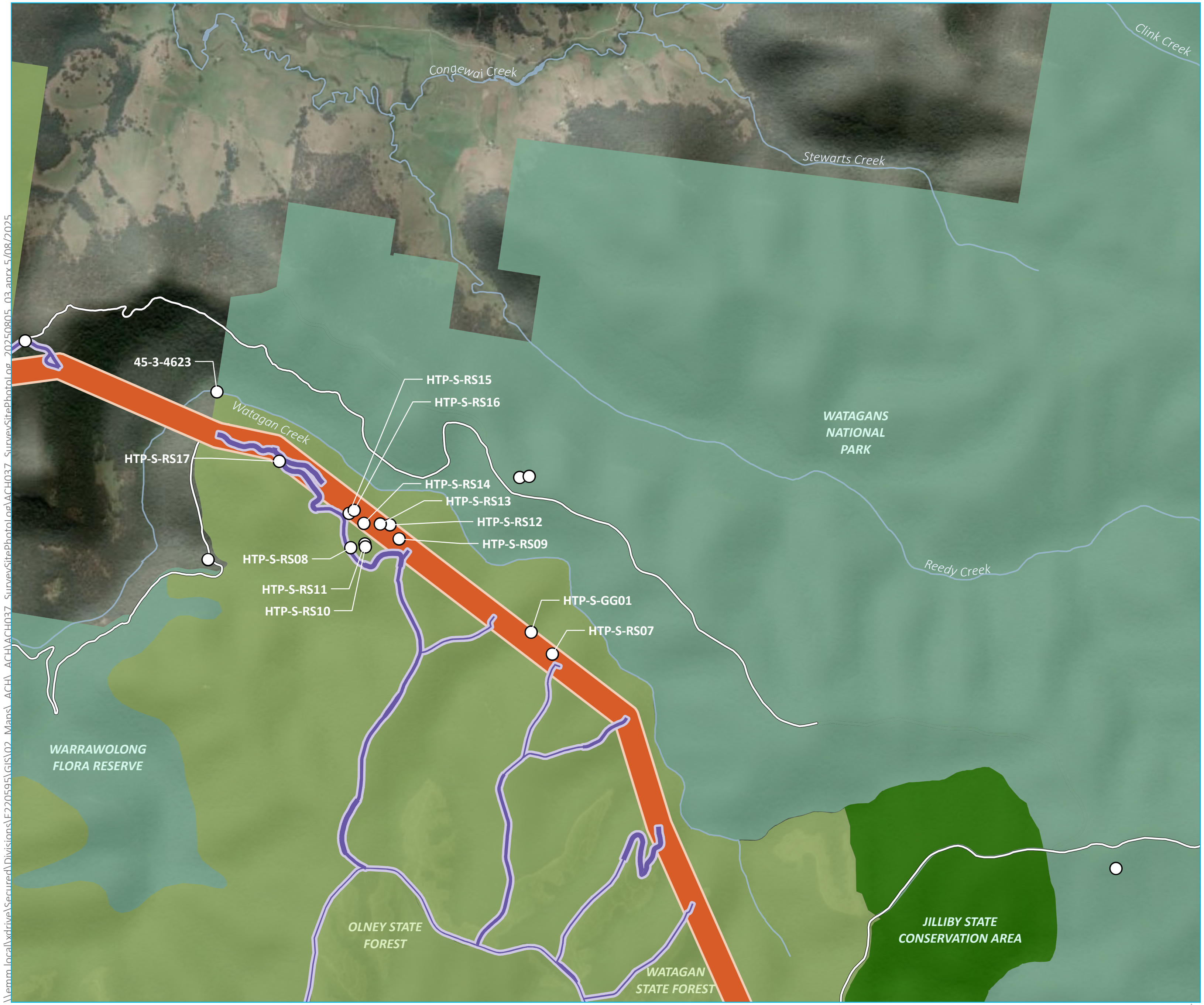

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GDA2020 MGA Zone 56
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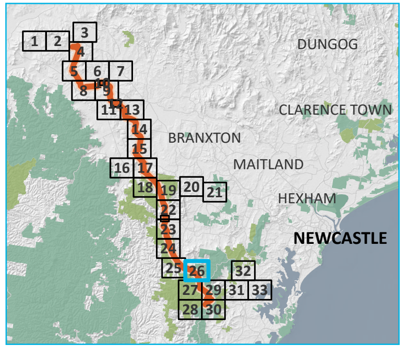


KEY

- Photographic record

Project impact area

- HTP corridor
- Access track

Existing environment

- Major road
- Minor road
- Named watercourse
- Named waterbody
- State forest
- NPWS reserve
- State conservation area

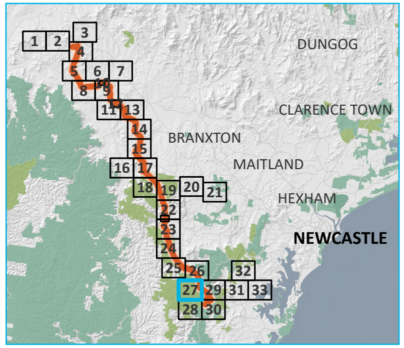
INSET KEY

- HTP corridor
- NPWS reserve
- State forest

Survey Site Photo Log Overview Map
Map 26 of 33

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure Appendix

EMM
creating opportunities



KEY

Photographic record

Project impact area

HTP corridor

Laydown area

Access track

Existing environment

Major road

Minor road

Named watercourse

State forest

NPWS reserve

State conservation area

INSET KEY

HTP corridor

NPWS reserve

State forest

Source: EMM (2025); DCSSS (2024); ESRI (2024); GA (2009); DPIE (2023)

0 250 500 m

GDA2020 MGA Zone 56

N

Survey Site Photo Log Overview Map

Map 27 of 33

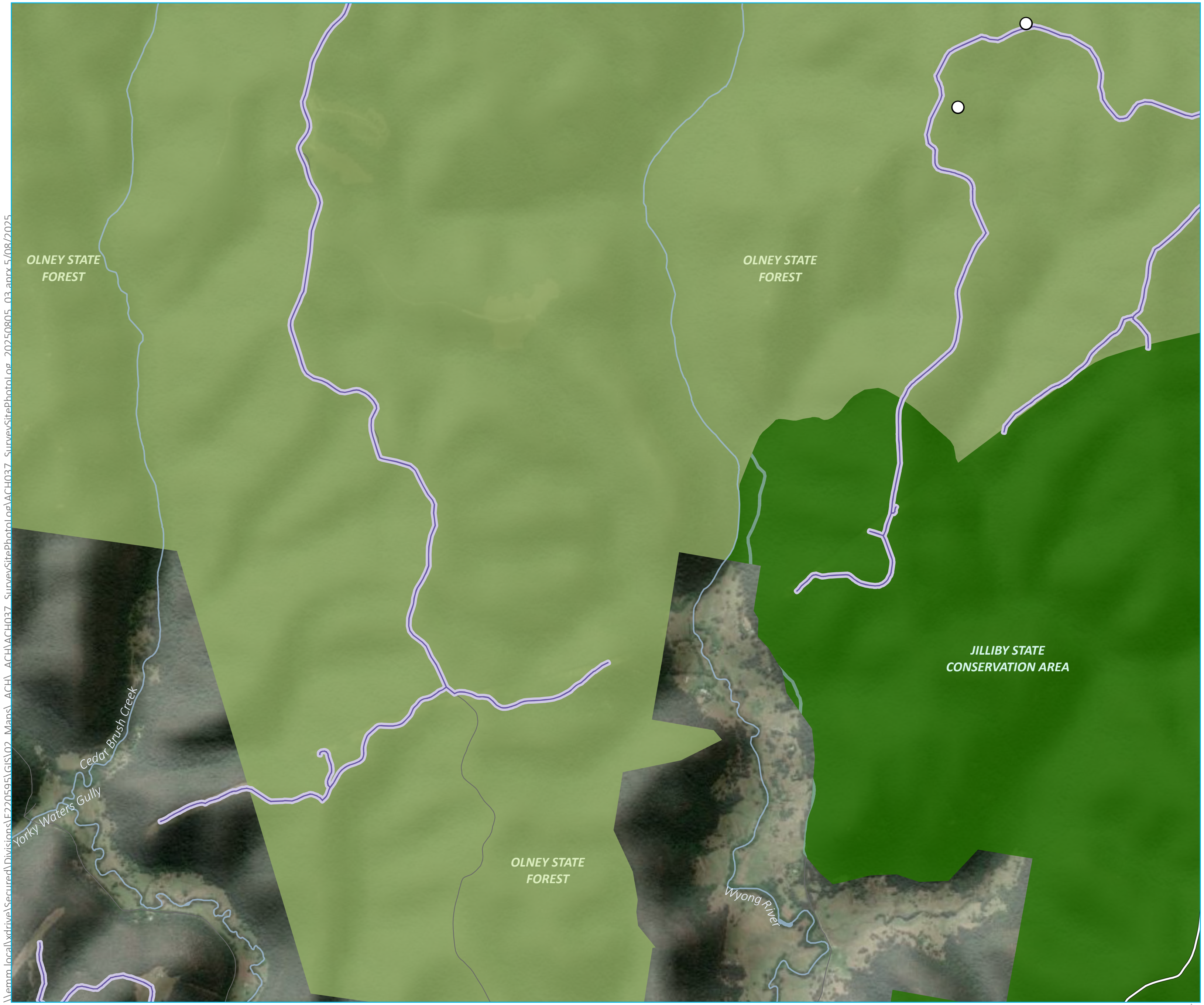
Hunter Transmission Project

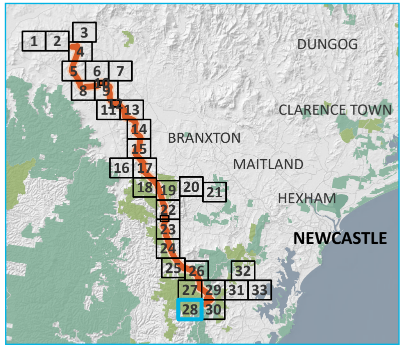
Aboriginal Cultural Heritage Assessment

Figure Appendix

EMM

creating opportunities





KEY

Photographic record

Project impact area

Access track

Existing environment

Major road

Minor road

Named watercourse

Named waterbody

State forest

NPWS reserve

State conservation area

INSET KEY

HTP corridor

NPWS reserve

State forest

Source: EMM (2025); DCSSS (2024); ESRI (2024); GA (2009); DPIE (2023)

0 250 500 m

GDA2020 MGA Zone 56

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Survey Site Photo Log Overview Map

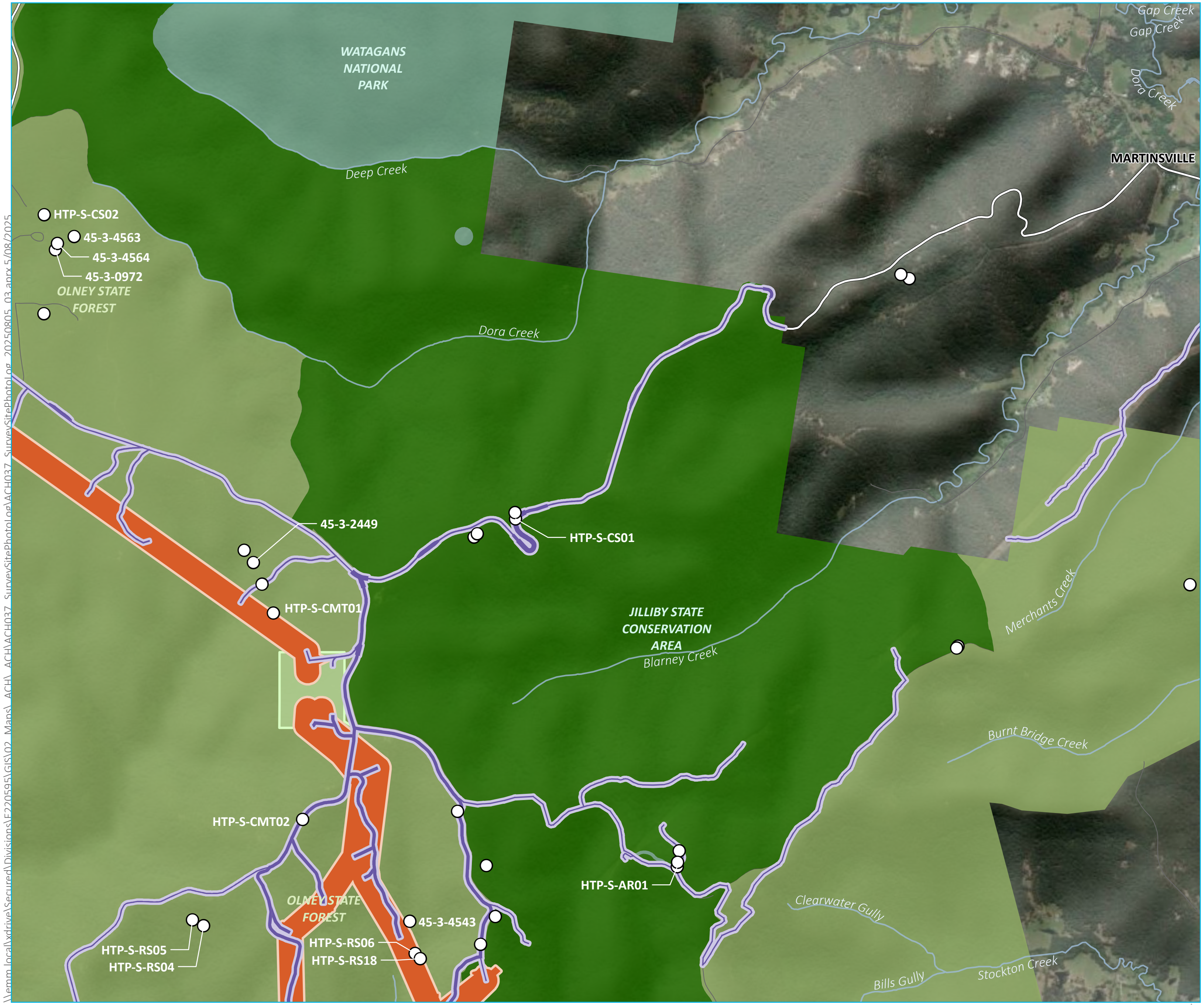
Map 28 of 33

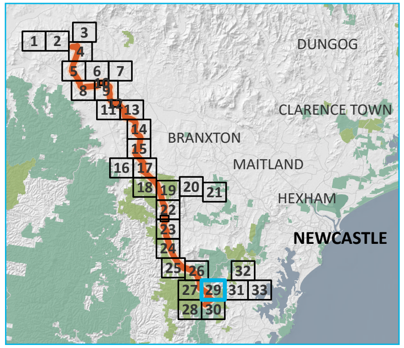
Hunter Transmission Project

Aboriginal Cultural Heritage Assessment

Figure Appendix

EMM creating opportunities





KEY

Photographic record

Project impact area

HTP corridor

Olney switching station

Access track

Existing environment

Major road

Minor road

Named watercourse

Named waterbody

State forest

NPWS reserve

State conservation area

INSET KEY

HTP corridor

NPWS reserve

State forest

Source: EMM (2025); DCSSS (2024); ESRI (2024); GA (2009); DPIE (2023)

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Survey Site Photo Log Overview Map

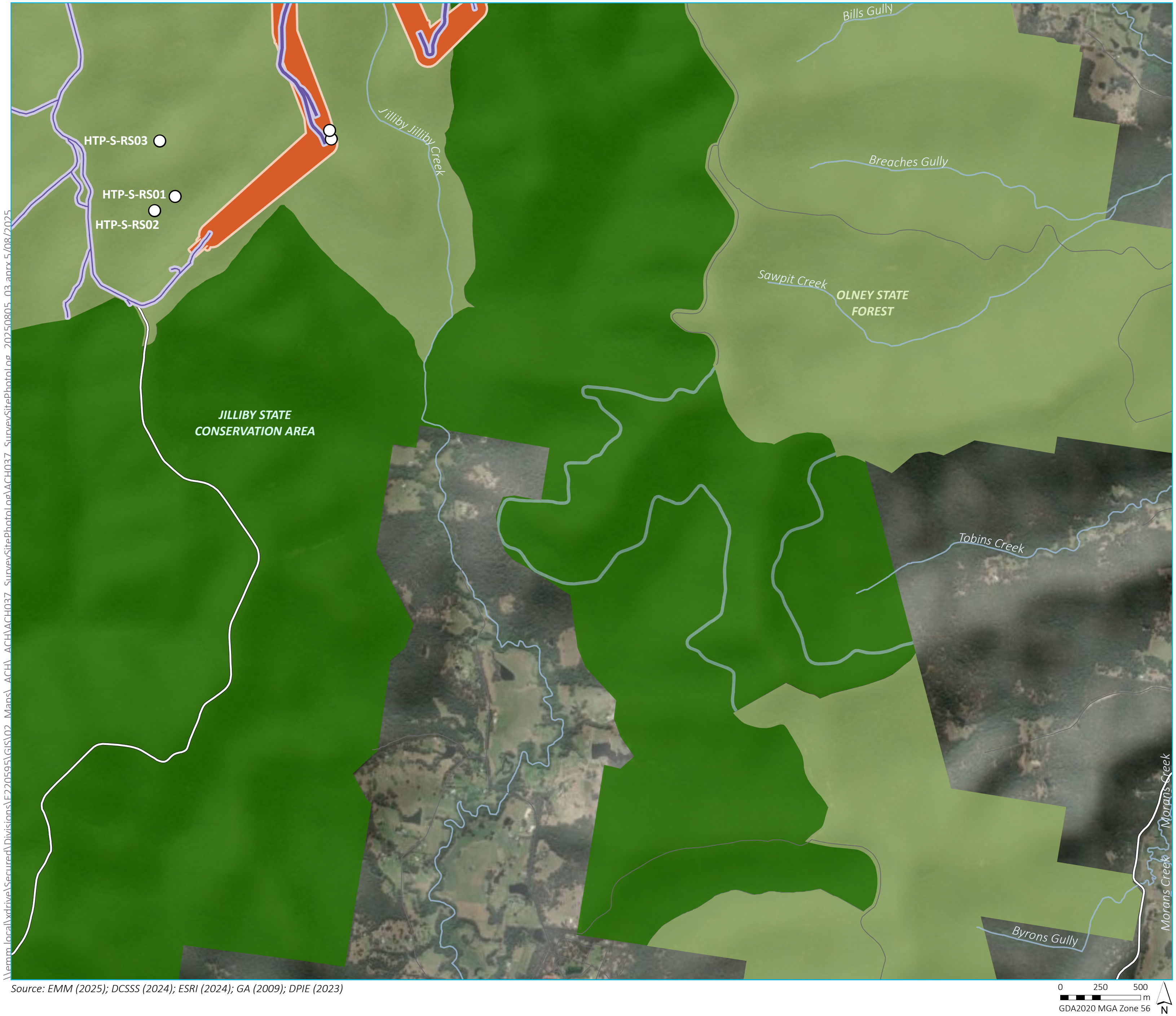
Map 29 of 33

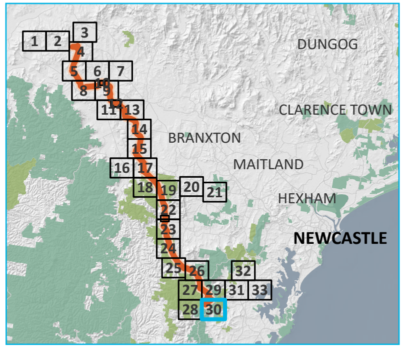
Hunter Transmission Project

Aboriginal Cultural Heritage Assessment

Figure Appendix

creating opportunities





KEY

- Photographic record

Project impact area

- HTP corridor
- Access track

Existing environment

- Major road
- Minor road
- Named watercourse
- State forest
- NPWS reserve
- State conservation area

INSET KEY

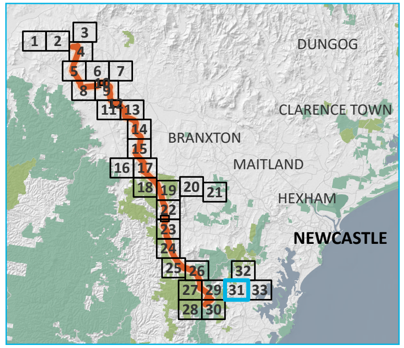
- HTP corridor
- NPWS reserve
- State forest

Source: EMM (2025); DCSSS (2024); ESRI (2024); GA (2009); DPIE (2023)

Survey Site Photo Log Overview Map
Map 30 of 33

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure Appendix

EMM
creating opportunities



KEY

- Photographic record

Project impact area

- Access track

Existing environment

- Major road
- Minor road
- Named watercourse
- Named waterbody
- State forest

INSET KEY

- HTP corridor
- NPWS reserve
- State forest

Source: EMM (2025); DCSSS (2024); ESRI (2024); GA (2009); DPIE (2023)

0 250 500 m
GDA2020 MGA Zone 56
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Survey Site Photo Log Overview Map
Map 31 of 33

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure Appendix

EMM
creating opportunities

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Source: EMM (2025); DCSSS (2024); ESRI (2024); GA (2009); DPIE (2023)

KEY

Photographic record

Project impact area

Construction support site

Access track

Existing environment

Major road

Minor road

Named watercourse

Named waterbody

State forest

NPWS reserve

State conservation area

INSET KEY

HTP corridor

NPWS reserve

State forest

Survey Site Photo Log Overview Map

Map 32 of 33

Hunter Transmission Project

Aboriginal Cultural Heritage Assessment

Figure Appendix

EMM creating opportunities

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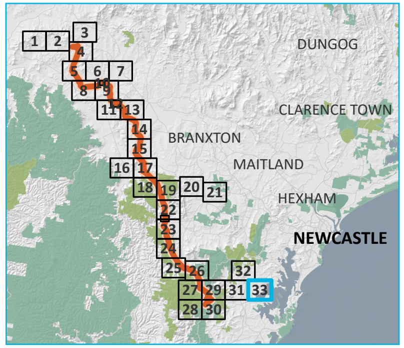
Source: EMM (2025); DCSSS (2024); ESRI (2024); GA (2009); DPIE (2023)



KEY

Photographic record

Project impact area

Eraring Substation upgrade

Access track

Existing environment

Rail line

Minor road

Named watercourse

Named waterbody

State conservation area

INSET KEY

HTP corridor

NPWS reserve

State forest

Survey Site Photo Log Overview Map
Map 33 of 33

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure Appendix

EMM creating opportunities

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F.6 Field survey – Scarred tree assessment

CONSULTING
ARBORICULTURISTS
& HORTICULTURISTS

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REPORT:

ARBORICULTURAL ASSESSMENT
OF
Scarred Tree/s

AT

Hunter Transmission Project

FOR

EMM on behalf of Energy Co.

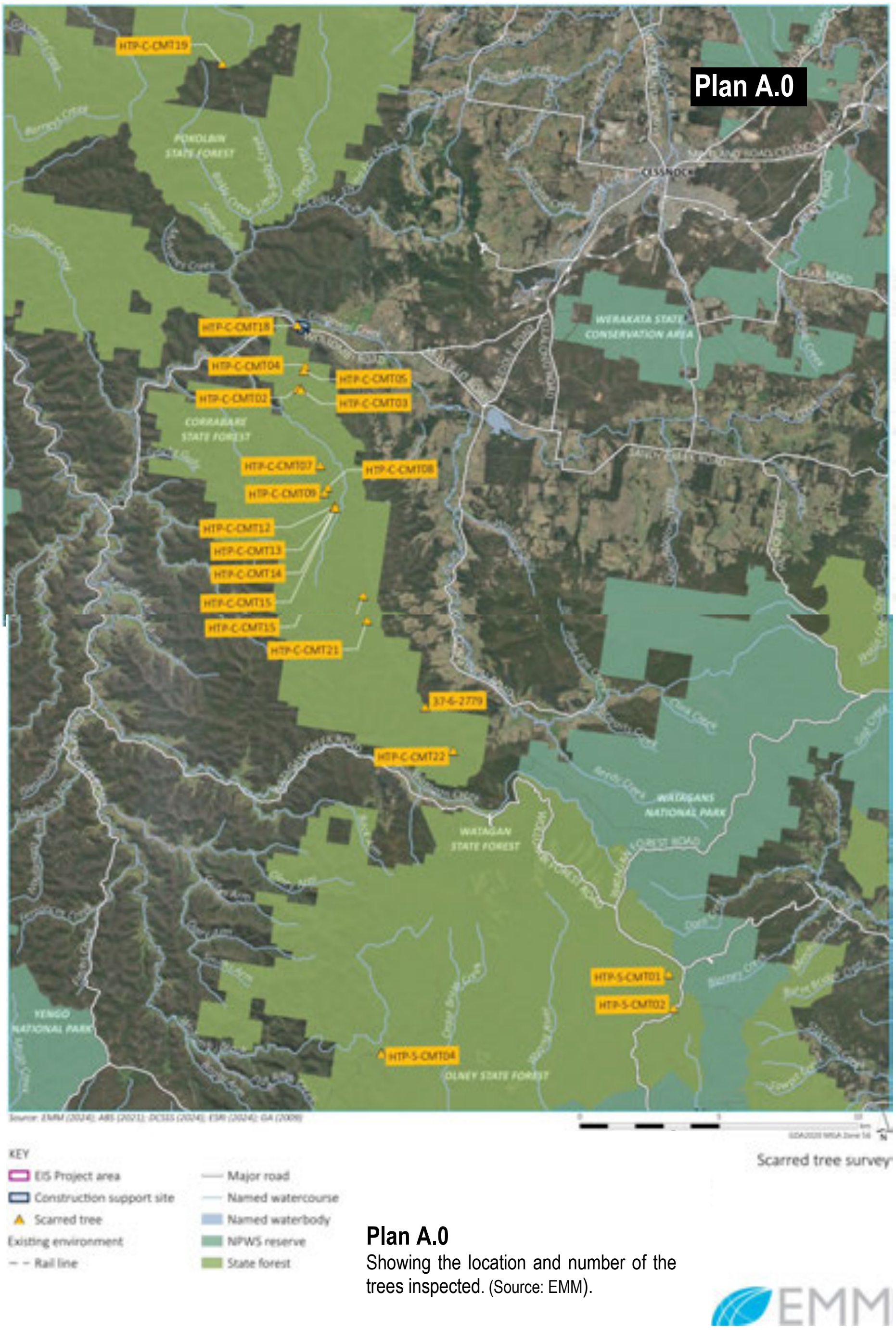
Prepared 2/12/2024
Reference 27021

Contents

1.0 SUMMARY

Urban Tree Management Australia© (UTMA) has prepared this report for Alan Williams – Technical Lead, Aboriginal Heritage | Associate Director, EMM, Sydney, Ground floor, 20 Chandos Street, St Leonards NSW 2065, on behalf of Energy Co.

The report examined 19 trees located within the project boundaries (Plan A.0) within Pokolbin State Forest, Corrabare State Forest, and Watagans State Forest. The assessment examined trunk wounds, eclosed voids from grafted branches (potential Ring Trees) and an anomalous trunk outgrowth, to assist in determining whether the inspected modifications to each tree were of Aboriginal cultural origin. Each tree was inspected in the company of Registered Aboriginal Party (RAP) members, Peter Leven, Tori Leven and Isaac Scully for trees TN1- TN18, and James Barry for tree TN19. All observations and findings were discussed with each RAP member. Of the 19 trees examined 1 tree TN5 / HTP-C-CMT05 contained wounds of Aboriginal Cultural origin. A summary of the findings for each tree is provided in Table 1.0.



Plan A.0
Showing the location and number of the trees inspected. (Source: EMM).

Table 1.0 Summary of each tree including likely age, wound/s, and cause.

UTMA Tree No. / Archaeological No.	Genus and species / Common name	1. Age range of tree in yrs. approx. / 2. Age range of wound/s in yrs. approx.	Likely origin of wound/s
TN1 / HTP-C-CMT18	*Eucalyptus acmenoides* Shauer White Mahogany	**1.** 100 - <125 **2.1** 20 - <40 (W1)	Wound 1 (W1) mechanical, from abrasion impact event from a motor vehicle during adjacent boundary fence construction.
TN2 / HTP-C-CMT02	*Angophora costata* (Geartn.) Britten Smooth-barked Apple	**1.** 75 - <100 **2.1** 40 - <60 (Enclosed Void 1)	Enclosed Void 1 (EV1) in crown from naturally grafted branches.
TN3 / HTP-C-CMT03	*Angophora costata* (Geartn.) Britten Smooth-barked Apple	**1.** 75 - <100 **2.1** 40 - <60 (Enclosed Void 1)	Enclosed Void 1 (EV1) in crown from naturally grafted branches.
TN4 / HTP-C-CMT04	*Angophora costata* (Geartn.) Britten Smooth-barked Apple	**1.** 50 - <70 **2.1** 20 - <30 (Excrescence EX1)	Excrescence 1 (EX1) from naturally grafted branches. Excrescence on lower trunk expected to be an occluded branch stub or live branch section. Containing an acutely ascending to upright branch where branch and trunk occluded closing the void between the 2 structures with the branch remains subsumed, evident as an exaggerated protuberance contiguous with the trunk.
TN5 / HTP-C-CMT05	*Syncarpia glomulifera* (Sm.) Nied. Turpentine	**1.** 250 - <300 **2.1** 150 - <200 (W1) **2.2** 150 - <200 (W2) **2.3** 10- <20 (W3)	Wounds 1 and 2 (W1 and W2) of Aboriginal cultural origin. Wound 3 (W3) from fire damage.
TN6 / HTP-C-CMT12	*Eucalyptus crebra* F. Muell. Narrow-leaved Red Ironbark	**1.** 100 - <125 **2.1** 20 - <40 (W1) **2.2** 20 - <40 (W2)	Wounds 1 and 2 (W1 and W2) mechanical wounds by Longicorn Borers.
TN7 / HTP-C-CMT13	*Syncarpia glomulifera* (Sm.) Nied. Turpentine	**1.** 150 - <175 **2.1** 50 - <75 (W1)	Wound 1 (W1) mechanical wound by Longicorn Borers.
TN8 / HTP-C-CMT15	*Syncarpia glomulifera* (Sm.) Nied. Turpentine	**1.** 150 - <175 **2.1** 50 - <75 (W1)	Wound 1 (W1) mechanical wound by Longicorn Borers extended by fire damage.
TN9 / HTP-C-CMT14	*Eucalyptus crebra* F. Muell. Narrow-leaved Red Ironbark	**1.** 150 - <175 **2.1** 10 - <20 (W1)	Wound 1 (W1) mechanical, from abrasion impact event from tree or branch with partial bark delamination along wound margin left.
TN10 / HTP-S-CMT04	*Eucalyptus acmenoides* Shauer White Mahogany	**1.** 250 - <300 **2.1** 50 - <75 (W1)	Wound 1 (W1) mechanical wound by Longicorn Borers and secondary consumption by fire.
TN11 / HTP-S-CMT02	*Eucalyptus pilularis* Sm. Blackbutt	**1.** 250 - <275 **2.1** 50 - <75 (W1) **2.2** 50 - <75 (W2)	Wounds 1 and 2 (W1 and W2) mechanical wounding by Longicorn Borers.
TN12 / HTP-S-CMT01	*Eucalyptus saligna* Sm. Sydney Blue Gum	**1.** 350 - <450 **2.1** 70 - <90 (W1)	Wound 1 (W1) mechanical wounding by Longicorn Borers.
TN13 / HTP-C-CMT07	*Eucalyptus acmenoides* Shauer White Mahogany	**1.** 200 - <250 **2.1** 50 - <75 (W1) **2.2** 50 - <75 (W2) **2.3** 50 - <75 (W3)	Wounds 1, 2 and 3 (W1 – W3) mechanical wounding by Longicorn Borers.
TN14 / HTP-C-CMT08	*Angophora costata* (Geartn.) Britten Smooth-barked Apple	**1.** 50 - <70 **2.1** 10 - <20 (W1)	Wound 1 (W1) mechanical wounding by Longicorn Borers.
TN15 / HTP-C-CMT09	*Angophora costata* (Geartn.) Britten Smooth-barked Apple	**1.** 200 - <225 **2.1** 30 - <40 (W1)	Wound 1 (W1) mechanical wounding by Longicorn Borers.
TN16 / HTP-C-CMT21	*Angophora costata* (Geartn.) Britten Smooth-barked Apple	**1.** 125 - <150 **2.1** 20 - <40 (W1)	Wound 1 (W1) mechanical wounding by Longicorn Borers.
TN17 / #37-6-2779	*Eucalyptus acmenoides* Shauer White Mahogany	**1.** 300 - <350 **2.1** 30 - <50 (W1)	Wound 1 (W1) mechanical wounding by Longicorn Borers.
TN18 / HTP-C-CMT22	*Eucalyptus saligna* Sm. Sydney Blue Gum	**1.** 200 - <225 **2.1** 40 - <60 (W1)	Wound 1 (W1) mechanical, from abrasion impact event from nearby fallen tree.
TN19 / HTP-C-CMT19	*Angophora costata* (Geartn.) Britten Smooth-barked Apple	**1.** 75 - <100 **2.1** 40 - <60 (Enclosed Void 1)	Enclosed Void 1 (EV1) in crown from naturally grafted branches.

2.0 INTRODUCTION

Danny Draper *(the author)* attended *the site* containing the 19 trees from 25 – 29 November 2024, and *the trees* and their growing environments and wounding, were examined and assessed from the ground. This assessment was undertaken to determine the likely causes and estimated age of scarring, eclosed voids from grafted branches (potential Ring Trees) and an anomalous trunk outgrowth, and the wounds' longevity and protection if shown to be of Aboriginal cultural origin, subject to proposed works nearby or removal and conservation, where appropriate.

The dimensions of the tree wound/s or other modifications were recorded, and each tree and wound/s or modifications photographed by the author. The age of each tree provided is an estimate only and offered within a range due to the uncertainty of such unsubstantiated field observations without the application of Dendrochronology or other records. Without such precise data the age of trees is usually considered in stages of life span against their biomass *in situ* as Young (0-20%), Mature (20-80%) and Over-mature (senescent) (80-100%).

3.0 METHODOLOGY

Each inspection was undertaken by a visual assessment conducted from the ground and considered as part of the assessment/s the remaining lifespan of a live tree or durability of the remains of a dead tree where the scarred section is to be preserved.

A glossary of terms is included as Appendix B covering the description of the tree/s.

Assessment of Trees

The following criteria were recorded to reflect the status of the trees being: Age class, Condition class, Form class, Dimensions, Crown cover (live foliage as %), Crown density (density of live foliage evident as %), vigour class and Sustainable Retention Index Value (SRIV) version 4 (IACA, 2010) of each live tree (Appendix A), where appropriate.

The age of the trees was estimated from a sound professional knowledge or research of the individual tree taxa, growth of trees within the region based on habitat, rainfall, soil type and land use practices and considered against the dimensions of each tree encountered and the limitations of its growing environment *in situ*. A tree may be described in greater detail than others where it was considered appropriate to describe the location of the wound or the circumstances which may have led more accurately to its formation.

The height of the remains of the tree was recorded using a Nikon Forestry Pro laser guided clinometer or by approximation.

Assessment of Wounds to Determine Arboricultural Status of Scarred Tree/s

As a tree grows vascular cambium as a thin layer of dynamic cells close to the surface produces xylem to form wood on the inner side, and phloem to form bark on the outer side. The cambium grows as a continuous ring and is laid down as fibres along the trunk, stems, and roots when a new growth increment layer is developed. The vascular cambium translocates nutrients in solution through the fibres from the roots to the leaves through the xylem and sugars produced in the leaves as photosynthates through the phloem and ray cells and to the roots. Their structural importance allows for strength and flexibility as energy from loading forces from the tree's mass and wind movement stimulates adaptive growth and reactive growth. The shape and form of a tree is affected as wind moves energy along stems from the distal to proximal end dissipating and diminishing through damping, through the trunk and roots, and out into the ground (James *et al* 2006, Mattheck & Breloer 1994, pp. 14-19).

When the vascular cambium is disrupted, a wound occurs. If the vascular cambium is severed to a sufficient depth, fibres above and below will become desiccated and die forming a wound with the extent of tissue dieback often unpredictable and extending beyond the initial point of wounding. The coating of live tissue allows for dispersal of energy through damping to be distributed over the entire tree, with additional or less wood produced locally on trunk, branches and roots depending on loading forces of compression, tension, torsion, and shear. The stimulus of wounding usually changes the distribution of loading forces and the growth responses from the tree which can manifest as altered growth patterns as the load bearing capacity of the tree is modified and the crown and growing conditions alter over the life of the tree. Such changes may be caused by shedding branches, hollowing from termites, ants, fungal decay or fire, clearing of nearby trees increasing exposure to winds, branch shedding, further wounding, e.g., by borer insects, bird grazing or fire, and root damage from excavation, root pruning, fire, soil cultivation or erosion.

When wounding occurs the tree's biomechanics predispose it to attempt to restore the alignment of its fibres and to protect it from pathogens by the growth of new wood and to isolate the wound through 4 walls of defence as provided by (CODIT) Compartmentalization of Decay In Trees (Shigo and Marx 1977, and Shigo 1989, p. 45 and Kevin T. Smith and Walter C. Shortle US Dept Agriculture 2020) by chemically altering surrounding wood and walling off the damage using barriers provided by existing cellular structures as Walls 1-3 and finally to conceal the wound separating it from the damage caused at the time of wounding beneath layers of new wood as Wall 4. While the CODIT model interprets compartmentalisation as defence against microorganisms, the response of trees is also considered biological to seal a wound from penetrating air, to prevent an embolism where air is required for wood fungi spores to settle and colonise the disrupted tissue (Schmidt, 2006, p. 175 and Liese & Dujesiefkem, 1996).

At the time of wounding Wall 1 is formed by plugging xylem vessels vertically above and below the wound. Wall 2 is formed tangentially in growth rings by the concentration of lignin in the cells of late season's growth acting to prevent the inward spread of pathogens. Wall 3 forms at the sides of the wound from ray cells producing toxins which limits the spread laterally. Wall 4 is formed from intensified cell formation in the cambium forming callus as undifferentiated and unlignified wood around the wound site after wounding and forms the wound margins initially to wall off and separate damaged wood tissue from live tissue (Schmidt, 2006, p. 175 and Stobbe *et al*. 2002, 1996). Later outside the callus the cambium produces *Wound wood* differentiated to produce lignin (Schmidt, 2006, p. 177). Research on callus tissue formed after trunk wounding (Stobbe *et al*, 2002) noted that surface callus were usually clearly divided into three stages: an initial stage of parenchyma cell formation (first stage), and two stages of restructuring, being the formation of a wound periderm in the outer callus (second stage) and the subsequent formation of a wound cambium in the inner tissue (third stage), and noted that surface callus was only fully developed when the wound cambium had formed. Allowing a fully functional tissue of bark, cambium, and wood to develop at the edges of the wound surface (wound face) where bark and most of the cambium had been removed (Stobbe *et al*, 2002).

Wound wood cells may be slightly larger and stronger and can be stimulated by loading forces, particularly as the wounded trunk or branch becomes hollow. The sides of the wound are *wound* *margin left* and *wound margin right* which slowly converge and usually form an oblong, circular, awl or elliptical shape (Draper and Richards 2009). The distal and proximal ends of a wound are the *wound apex* and *wound base* respectively, and may be irregular, jagged, obtuse, rounded, truncate to acute (<90^{O}) where the margins converge often forming a wound seam or partial occlusion above the *wound apex* and below the *wound base* extending from the wound face (Draper and Richards 2009). The necrotic sapwood exposed by the removal of the bark and dysfunctional cambium is the *wound face*, although on older wounds this may be absent if a void is evident as a *cavity* or a deeper void as a *hollow* in heartwood (Draper and Richards 2009). The sapwood of most species has very poor durability once exposed to the atmosphere (Bootle, 2005, p. 234). However, the *wound face* may be heartwood dependent on the depth of the wounding.

No matter what the shape of the wound the tree will ultimately attempt to align the living fibres to grow over and conceal the wound to restore the cover of living wood around and along the stem. Ultimately most margins converge as a wound seam of wound wood and graft to conceal the *wound face,* and it is then that the tree has achieved wound *occlusion* (Draper and Richards 2009). The living tissue disrupted at the time of wounding will always die, remain damaged and continue to deteriorate even when a wound is occluded by successive growth rings because *trees do not heal*, *trees can only conceal* the damaged cells with consecutive layers formed by each season's growth (Mattheck and Breloer 1994, pp. 12-16) of cells added radially as rings in the diameter of stems and roots by the elongation of roots and stems by tip extension.

Wound margins encroach over the wound face as each successive growth ring increment is added around the tree. The *wound margin depth* on the left and right sides usually deepens over time before the wound is occluded and can be measured perpendicular from the wound face to the outer edge of the trunk, or from the outer edge of the trunk to the inner edge of the void if the wound face is absent and margins are incurved (Draper and Richards 2009). It is not uncommon for the depth of the *wound margin right* and *wound margin left* or the distances from the *initial wound margin* to the *wound margin* to be different because of *reaction wood* growth along each margin stimulated by differential loading along the stem in compression, tension, torsion or shear, stimulating more wood to be laid down on the side bearing the greatest load and cell distortion (Mattheck and Breloer 1994, pp. 12-16). Where margins are of a similar width and depth they are usually equally loaded or both neutrally loaded (Mattheck, 2004, p. 17).

As the wound wood margins grow across the wound face from the point of initial wounding a general differentiation in the colour of bark and its texture from surrounding unwounded tissue will sometimes be evident and can assist to indicate the extent of the width of the wound and the approximate location or extent of the *initial wound margin* (Draper and Richards 2009). However, this may become less apparent over time with wounds that have been *occluded* for long periods due to the successive growth increments added sometimes concealing the wound entirely, or on trees with thick bark.

By measuring the width of the wound between the left and right *initial wound margin* the diameter of the trunk at the time of wounding and the approximate age of the tree can be estimated. The location of a wound on a trunk is static as necrotic tissue although the diameter of the live stem is increased circumferentially by rings as growth increments, hence the wound margins and wound occlusion. The circumference of the trunk and stems of large old trees increases with age and the layers may be slightly thinner over a radial distance where such growth has slowed, than for younger trees or where they are not stimulated by loading where a crown has been partly shed or died back.

The trees *in situ* were expected to have had a relatively good growth rate due to their location on well-drained soil with a comparable average annual rainfall of 758.0 mm recorded at the nearby Station: Pokolbin (Ben Ean), Number: 61056, Opened: 1905, Now: Open, Latitude: 32.80° S and Longitude: 151.28° E, Elevation: 140 m (Australian Government Bureau of Meteorology, 2024) approximately 15 - <40 km away.

To differentiate between *cultural scarring*, historical scarring, recent mechanical damage or natural causes, the following were considered:

1. Age class
2. Ease of access to the location of wounding
3. Tree and its dimensions at the time of wounding
4. Extent of wounding, its symmetry (symmetrical / asymmetrical)
5. Extent of growth around wound site since initial wounding whether tree alive/dead
6. Impact of that wounding on the tree since the wounding event
7. Land use history
8. Condition class
9. Vigour class
10. Influence of its growing environment and its constraints
11. Proximity to other trees, shape and growth habit
12. Crown form
13. Shading
14. Rainfall
15. Insect damage
16. Fire
17. Soil
18. Aspect
19. Slope
20. Drainage

This Arboricultural assessment will assist to determine the status of scarred tree/s and to manage the tree/s. This is achieved by eliminating natural or mechanical causes of wounding, and by determining the estimated remaining safe life span or works to prolong a live tree *in situ* or to conserve and protect remaining sections that may be recovered and relocated to a *Keeping Place,* or similar, as appropriate.

Assessment of Crossing Branches to Determine Arboricultural Status of Ring Tree/s

Ring Trees are trees modified by the cultural activities of Aboriginal people artificially crossing branches to enclose a section forming a permanent void as a ring used as a marker of pathways, ceremonial places or burial sites. *"Ring trees demarcate boundaries and mark special areas on Country. The trees mark significant cultural locations in the landscape and have been found at "water junctions and inlets, campsites and burial grounds. Knowledge of these important places which the ring trees mark could then be conveyed to visitors to Country involved in trade and ceremony."* Watti Watti Elder Uncle Doug Nicholls (Powers J, 2018).

A Ring Tree is achieved as the result of young flexible branches being crossed or entwined, often tied against one another or to the trunk to form an enclosed section by their continued growth overtime, usually forming a graft at the union. As the manipulated crossing branches continue to grow the soft malleable branches are prestressed into a fixed position and the resulting growth appears atypical for the tree allowing the uncommon and distinctive shape to be used as a marker. Along the Murray River in Watti Watti Country some Ring Trees may have 1 or up to 4 rings (Powers J, 2018).

Crossing branches also form enclosed voids or enclosed rings of natural origins. Many of these enclosed areas will be linear in shape where branches are parallel or triangular where crossed branches diverge. This may occur when young flexible branches of narrow diameter are twisted or partially broken by movement in wind or storm events. Such branches may also cross by randomly growing in contact with another in competition for space and light or be bent under loading from the mass of fruit or foliage, weighted down by interception from rain or snow, or may be weakened or fractured by borer insects or grazing animals or by abrasion from falling trees or rubbing branches.

Some crossing branches graft and grow to utilise the additional structural support of natural bracing above a branch junction, but as a result the original branch junction becomes weaker, no longer stimulated by the movement and oscillation of the branches in wind loading events (Slater D and Ennos AR, 2016), or loading from rain and interception, as the temporary retention of water on foliage and its absorption by bark on stems before being evaporated later. Trees with smooth thin bark that is decorticated (shed) annually and have branches with a twisting growth habit such as *Angophora costata* (Geartn.) Britten - Smooth-barked Apple, are more prone to the occurrence of natural bracing forming enclosed voids or enclosed rings by crossed branches grafting naturally. *Eucalyptus melliodora* A.Cunn. ex Schauer – Yellow Box, has smooth thin bark shed annually and was favoured by Wiradjuri and Ngunnawal peoples to form Ring Trees.

Longicorn Borers

Longicorn Borers attack live trees, and their larvae generally burrow in sapwood along the grain disrupting the cambial layer causing localised wounds as the cambium dies (Jones and Elliot, 1986, pp. 195 – 198, Jones, Elliot and Jones 2015, p. 310, and Creffield, 1996, pp. 4-7). "*They mainly enter trees through wounds and their attacks may be cumulative with adult females laying eggs in tissue damaged by active borer larvae* (Jones and Elliot, 1986, p. 196)". The longicorn larvae burrow in circular holes and may burrow deeper into heartwood to pupate with adults exiting via flight holes, oval, 6x10 mm at the trunk surface (Jones and Elliot, 1986, pp. 195 – 198, Jones, Elliot and Jones 2015, p. 310, and Creffield, 1996, pp. 4-7). "*Most species in this genus of wood borers (Phoracantha), primarily attack only damaged or stressed (often drought-stressed) native trees"* (Angus, 2023, p. 111).

The *Phoracantha semipunctata* - Eucalyptus Longicorn Borer Beetle (order Cerambycidae), can survive for several years in a Eucalypt as larvae or pupae before emerging (Angus, 2023, p. 111), increasing the damage from burrowing and grazing in the cambium. As the clutch of insect eggs develop, the larvae and pupae spread out, continue to develop and as they grow their burrowing increases in diameter as they chew and tunnel through the live cambial tissue creating a wound by ringbarking areas of Xylem and Phloem, until emerging as adults at the trunk surface from oval holes 8-10 mm up to 10-15 mm. Severe, prolonged or repeated attacks by Longicorn borers can ringbark and kill trees with reduced vigour and resilience.

4.0 TREE ASSESSMENT

4.1 Assessment of Tree/s – TN1 / HTP-C-CMT18

Tree No. / Archaeological No. Genus & species Common Name	**1. Age Class** **Y** = Young **M** = Mature **O** = Over-mature (Senescent) **2. Age range of tree** in yrs. approx. **3. Age range of wound/s,** in yrs. approx. **4. Date range since tree died** in yrs. approx., e.g., died, cut down, ring-barked	**Condition** **G** = Good **F** = Fair **P** = Poor **D** = Dead	**Form** **D** = Dominant **C** = Co-dominant **I** = Intermediate **S** = Suppressed **F** = Forest **E** = Emergent	**Height** in metres approx. / **Crown spread** approx. length x breadth metres / **Crown spread orientation.**	**Trunk diameter** in mm @ 1.4m, or as stated / **Trunk diameter orientation**	**Crown cover / Crown density** approx. %	**SRIV** Age, Vigour, Condition / Index Rating App A. / Remaining life expectancy 1. Long 2. Medium 3. Short
TN1 / HTP-C-CMT18 *Eucalyptus acmenoides* Shauer White Mahogany	1. M 2. 100 - <125 3.1 20 - <40 (W1) 4. N/A	F	F	19 x 15	800 x 650, 725 Av., N/S	70 / 90	MGVF – 9 / 2

Eucalyptus acmenoides Schauer. – White Mahogany is a tree of open and tall open forest (Brooker and Kleinig, 1999, p. 251, and Boland et al, 2006, p. 506), persistent bark throughout, grey to red-brown, thin, and stringy (Elliot and Jones, 1986, p. 15 and PlantNET, 2024). It has a distribution along the coastal plain extending to the ranges from near Sydney in NSW to north of Cooktown in Queensland (Brooker and Kleinig, 1999, p. 283 and Boland *et al*, 2006, p. 544). In NSW it commonly occurs on hills and ridges below 300 mm altitude growing on clay and loam soils (Boland et al, 2006, p. 544). It can attain a height of 15 – 30 m (Elliot and Jones, 1986, p. 15) or 25 – 60 m with a trunk diameter 1 m DBH (Boland et al, 2006, p. 526) and a crown spread of 5-15 m (Elliot and Jones, 1986, p. 15).

E. acmenoides Schauer. – White Mahogany, heartwood has a green density of 1200 kg / m^3 approx. (Bootle 2005, p. 303) and air dry density (ADD) 1000 kg / m^3 approx. (Bootle 2005, p. 350) and 795 - 1010 kg / m^3 (Boland *et al*, 2006, p. 526). Sapwood rarely attacked by Lyctus borers and heartwood is termite resistant (Boland *et al*, 2006, p. 526, Bootle 2005, p. 303). The wood is strong and very durable (Boland *et al*, 2006, p. 526), with an above ground durability class of AG1, and an inground durability class of IG1 (Bootle 2005, p. 303) and is used for heavy engineering construction, poles, sleeper, ship building, flooring, joists, and weatherboards (Bootle 2005, p. 303, and Boland *et al*, 2006, p. 526). The tree grows within a rainfall range of 700-1700 mm (Boland *et al*, 2006, p. 506).

Tree TN1 / HTP-C-CMT18 (Photograph 1.0) was growing within the Hunter Transmission Project boundaries in an area with an expected comparable average annual rainfall of 758.0 mm recorded approximately 15 - <40 km away at the nearby Station: Pokolbin (Ben Ean), Number: 61056, opened 1905 to present (Australian Government Bureau of Meteorology, 2024). The tree was expected to be growing at a rate typical for the species with an estimated age of 100 - <125 years and appeared to have been of good vigour. Tree of forest form with 1 trunk wound (W1) recorded.

Wound 1 *(W1)*

Basal wound SW side, oval, asymmetrical (Photograph 1.1). Wound and wound face extended from ground to 2600 mm and 430 mm at widest at centre. Minimal wound margin development distally at wound apex indicative of recent occurrence. Wound at base of trunk and 260 mm diameter buttress root to east, extending from 105 -230 mm and 170 mm long, contiguous with the wound margin right as a narrow horizontal laceration 5-10 mm deep to heartwood with negligible weathering (Photographs 1.1 – 1.3). The line of the horizontal wound was parallel to the fence line consistent with a vehicular collision likely caused during the installation of the boundary fence.

The resulting abrasion wound and bark laceration to the cambium with the projectile moving from right to left causing a partial delamination of bark to sapwood resulting in the large wound face. Bark fragments were evident protruding above and below the horizontal abrasion laceration which caused a vertical split delaminating the bark peeling it from right to left allowing cambial dysfunction as air ingress subsequent embolisms and cambium necrosis in the area forming the wound face (Photograph 1.3).

Wound margin depth right and left 130 mm. Apex irregular, diagonal sloping upwards to left margin indicative of a tearing wound vertically along the fibres. Wound face entire to sapwood with decay evident at wound base to heartwood adjacent wound margin right (Photograph 1.2).

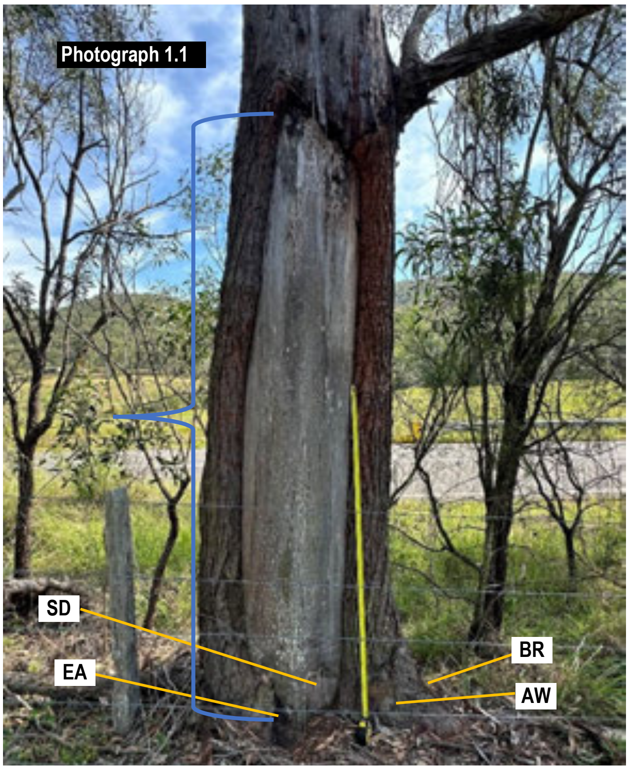
Conclusion

Wound 1 – Mechanical, from an abrasion impact event, 20 - <40 years ago.

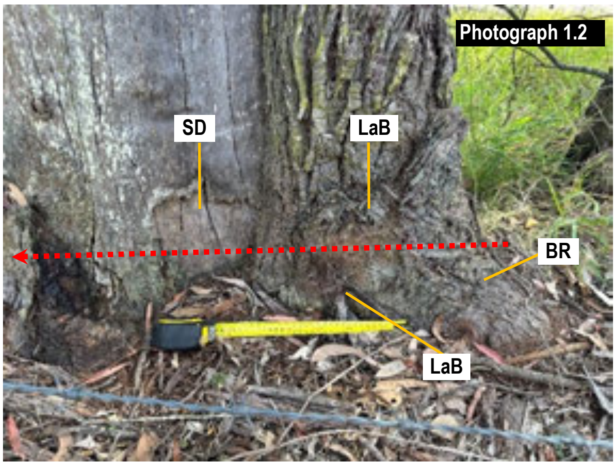
Risks to tree

Not applicable as wound not of Aboriginal cultural origin.

Photograph 1.0 Taken 25/11/2024 by Danny Draper. View to northwest of tree TN1 / HTP-C-CMT18 *Eucalyptus acmenoides* Shauer - White Mahogany (centre), showing Wound 1 (W1) on southeast side.

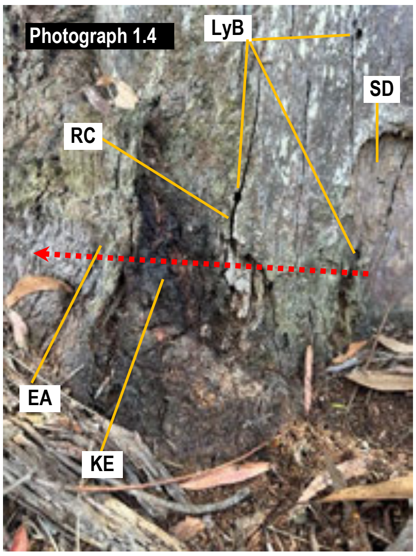


Photograph 1.1 Taken 25/11/2024 by Danny Draper. View to northwest of tree TN1 / HTP-C-CMT18 *E. acmenoides* Shauer - White Mahogany (centre), showing Wound 1 (W1) on southeast side, shown with a yellow retractable tape measure extended to 1500 mm with buttress root (BR) parallel to the fence line with an abrasion wound (AW) with projectile moving from right to left causing a partial delamination of bark to sapwood causing the wound face (blue brace). Sapwood decay (SD) at wound base. Projectile exit abrasion (EA) and kino (sap) exudate (darker area) into borer activity within wound margin. Wound a strike by a motor vehicle during recent fencing works close to the tree.

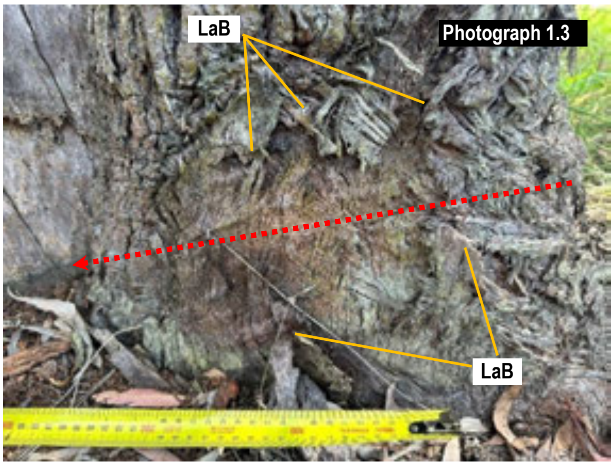


Photograph 1.2 Taken 25/11/2024 by Danny Draper. View to northwest of tree TN1 / HTP-C-CMT18 *E. acmenoides* Shauer - White Mahogany showing a yellow retractable tape measure extended to 300 mm and a line of abrasion from right to left (red broken arrow) across a buttress root (BR) with lacerated bark (LaB) fragments protruding above and below the abrasion incision which caused a vertical split of the bark delaminating the bark peeling it from right to left allowing cambial dysfunction as air ingress subsequent embolisms and cambium necrosis in the area forming the wound face. Sapwood decay (SD) at wound base. Projectile exit abrasion (EA) and kino (sap) exudate (darker area) into borer activity within wound margin.

Photograph 1.3 Taken 25/11/2024 by Danny Draper. View to northwest of tree TN1 / HTP-C-CMT18 *E. acmenoides* Shauer - White Mahogany showing a yellow retractable tape measure extended to 300 mm and a line of abrasion from right to left (red broken arrow) across a buttress root (BR) with lacerated bark (LaB) fragments protruding above and below the abrasion incision.



Photograph 1.4 Taken 25/11/2024 by Danny Draper. View to northwest of tree TN1 / HTP-C-CMT18 *E. acmenoides* Shauer - White Mahogany showing sapwood decayed (SD) to heartwood at wound base. Projectile exit abrasion (EA) line of abrasion from right to left (red broken arrow), and kino exudate (KE) (sap) darker area, into borer activity within wound margin. Round holes 1-2 m diameter from Lyctid borers (LyB) in dead wood. Vertical lines 1 mm wide desiccated ray cells (RC).



4.0 TREE ASSESSMENT

4.1 Assessment of Tree/s – TN2 / HTP-C-CMT02

Tree No. / Archaeological No. Genus & species Common Name	**1. Age Class** **Y** = Young **M** = Mature **O** = Over-mature (Senescent) **2. Age range of tree** in yrs. approx. **3. Age range of wound/s,** in yrs. approx. **4. Date range since tree died** in yrs. approx., e.g., died, cut down, ring-barked	**Condition** **G** = Good **F** = Fair **P** = Poor **D** = Dead	**Form** **D** = Dominant **C** = Co-dominant **I** = Intermediate **S** = Suppressed **F** = Forest **E** = Emergent	**Height** in metres approx. / **Crown spread** approx. length x breadth metres / **Crown spread orientation.**	**Trunk diameter** in mm @ 1.4m, or as stated / **Trunk diameter orientation**	**Crown cover / Crown density** approx. %	**SRIV** Age, Vigour, Condition / Index Rating App A. / Remaining life expectancy 1. Long 2. Medium 3. Short
TN2 / HTP-C-CMT02 *Angophora costata* (Geartn.) Britten Smooth-barked Apple	1. M 2. 75 - <100 3.1 40 - <60 (Enclosed Void 1) 4. N/A	F	I	25 x 8	1070 x 700, 885 Av., N/S	80 / 85	MGVF – 9 / 2

Angophora costata (Geartn.) Britten – Smooth-barked Apple is medium tree, coastal (Elliot and Jones, 1982, p. 196 and Boland *et al*, 2006, p. 214) and can attain a height of 15-25 m (Boland *et al*, 2006, p. 296) or 10-30 m (Elliot and Jones, 1982, p. 196) with a trunk diameter 0.5 – 1.0 m and up to 1.2 m (Boland *et al*, 2006, p. 214) and a crown spread of 6-15 m (Elliot and Jones, 1982, p. 196).

A. costata (Geartn.) Britten heartwood has a green density of 1240 kg / m^3 approx. (Bootle 2005, p. 239) and air dry density (ADD) 990 kg / m^3 (Bootle 2005, p. 239) and 755 – 1045 kg / m^3 (Boland *et al*, 2006, p. 214). Sapwood susceptible to Lyctid borers and heartwood very hard, strong, but not durable (Boland *et al*, 2006, p. 214, Bootle 2005, p. 239) The wood is used mainly for fence palings and (Bootle 2005, p. 239, Boland *et al*, 2006, p. 214). The tree grows within a rainfall range of 600-1200 mm (Boland *et al*, 2006, p. 214).

Tree TN2 / HTP-C-CMT02 (Photograph 2.0) was growing within the Hunter Transmission Project boundaries in an area with an expected comparable average annual rainfall of 758.0 mm recorded approximately 15 - <40 km away at the nearby Station: Pokolbin (Ben Ean), Number: 61056, opened 1905 to present (Australian Government Bureau of Meteorology, 2024). The tree was expected to be growing at a rate typical for the species with an estimated age of 75 - <100 years and appeared to have been of good vigour. Tree of intermediate form, slightly leaning with 1 enclosed void recorded.

<u>Enclosed Void 1 *(EV1)*</u>

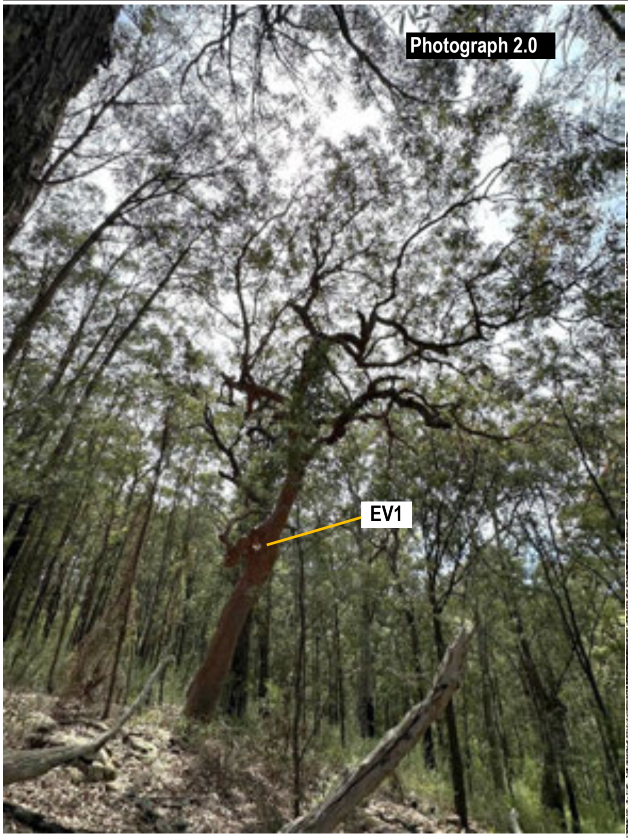
Enclosed void in the lower crown from crossed branches forming a graft (Photographs 2.1 - 2.3).

<u>Conclusion</u>

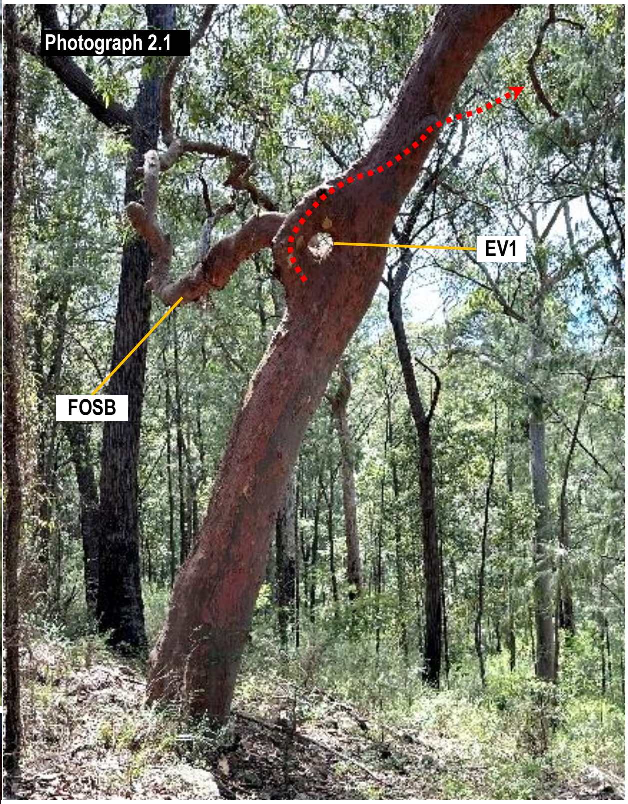
<u>Wound 1</u> – Enclosed void in the lower crown from naturally grafted branches, 40 - <60 years old.

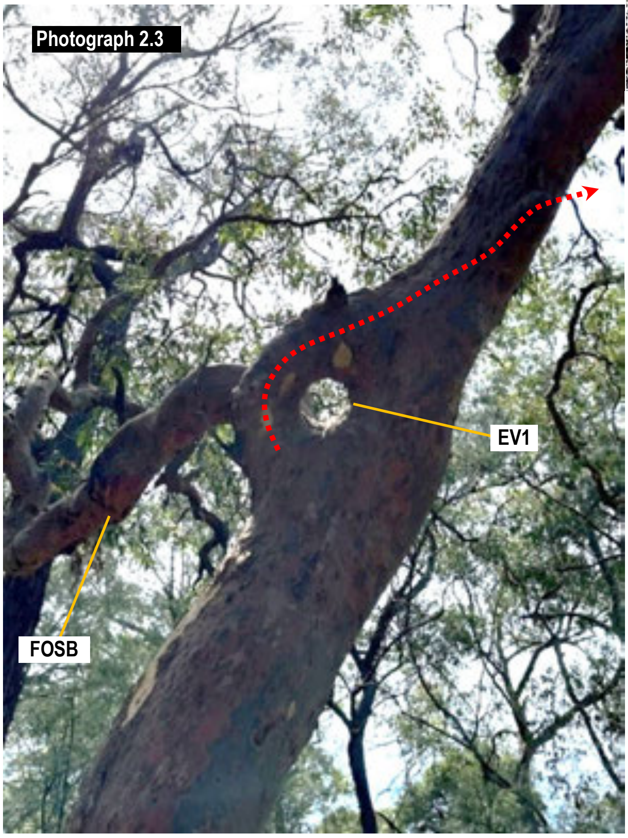
<u>Risks to tree</u>

Not applicable as enclosed void not of Aboriginal cultural origin.

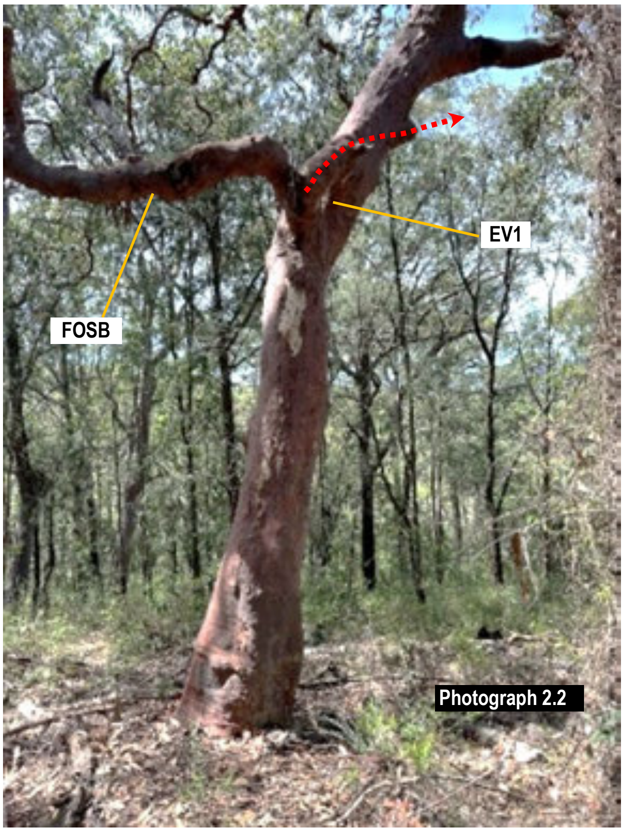


Photograph 2.0 Taken 25/11/2024 by Danny Draper. View to northeast of tree TN2 / HTP-C-CMT02 *Angophora costata* (Geartn.) Britten – Smooth-barked Apple (centre left), showing Enclosed Void 1 (EV1) in the lower crown from naturally grafted branches.





Photographs 2.1 – 2.3 Taken 25/11/2024 by Danny Draper. Views of tree TN2 / HTP-C-CMT02 *A. costata* (Geartn.) Britten – Smooth-barked Apple showing Enclosed Void 1 (EV1) in the lower crown from naturally grafted branches. The lower first order structural branch (FOSB) showing characteristic twisted and distorted growth habit allowing branches to often cross and become grafted. Red broken arrow showing growth of a branch that shed its end after becoming grafted with the trunk.



4.0 TREE ASSESSMENT

4.1 Assessment of Tree/s – TN3 / HTP-C-CMT03

Tree No. / Archaeological No. Genus & species Common Name	**1. Age Class** **Y** = Young **M** = Mature **O** = Over-mature (Senescent) **2. Age range of tree** in yrs. approx. **3. Age range of wound/s,** in yrs. approx. **4. Date range since tree died** in yrs. approx., e.g., died, cut down, ring-barked	**Condition** **G =** Good **F =** Fair **P =** Poor **D** = Dead	**Form** **D** = Dominant **C** = Co-dominant **I** = Intermediate **S** = Suppressed **F** = Forest **E** = Emergent	**Height** in metres approx. / **Crown spread** approx. length x breadth metres / **Crown spread orientation.**	**Trunk diameter** in mm @ 1.4m, or as stated / **Trunk diameter orientation**	**Crown cover / Crown density** approx. %	**SRIV** Age, Vigour, Condition / Index Rating App A. / Remaining life expectancy 1. Long 2. Medium 3. Short
TN3 / HTP-C-CMT03 *Angophora costata* (Geartn.) Britten Smooth-barked Apple	1. M 2. 75 - <100 3.1 40 - <60 (Enclosed Void 1) 4. N/A	F	F	25 x 8	1070 x 700, 885 Av., N/S	80 / 85	MGVF – 9 / 2

Angophora costata (Geartn.) Britten – Smooth-barked Apple is medium tree, coastal (Elliot and Jones, 1982, p. 196 and Boland *et al*, 2006, p. 214) and can attain a height of 15-25 m (Boland *et al*, 2006, p. 296) or 10-30 m (Elliot and Jones, 1982, p. 196) with a trunk diameter 0.5 – 1.0 m and up to 1.2 m (Boland *et al*, 2006, p. 214) and a crown spread of 6-15 m (Elliot and Jones, 1982, p. 196).

A. costata (Geartn.) Britten heartwood has a green density of 1240 kg / m^3 approx. (Bootle 2005, p. 239) and air dry density (ADD) 990 kg / m^3 (Bootle 2005, p. 239) and 755 – 1045 kg / m^3 (Boland *et al*, 2006, p. 214). Sapwood susceptible to Lyctid borers and heartwood very hard, strong, but not durable (Boland *et al*, 2006, p. 214, Bootle 2005, p. 239) The wood is used mainly for fence palings and (Bootle 2005, p. 239, Boland *et al*, 2006, p. 214). The tree grows within a rainfall range of 600-1200 mm (Boland *et al*, 2006, p. 214).

Tree TN3 / HTP-C-CMT03 (Photograph 3.0) was growing within the Hunter Transmission Project boundaries in an area with an expected comparable average annual rainfall of 758.0 mm recorded approximately 15 - <40 km away at the nearby Station: Pokolbin (Ben Ean), Number: 61056, opened 1905 to present (Australian Government Bureau of Meteorology, 2024). The tree was expected to be growing at a rate typical for the species with an estimated age of 75 - <100 years and appeared to have been of good vigour. Tree of forest form with 1 enclosed void recorded.

<u>Enclosed Void 1 *(EV1)*</u>

Enclosed void in the lower crown from an upright first order structural branch (FOSB) crossing against the trunk forming a natural graft (Photographs 3.0 and 3.1).

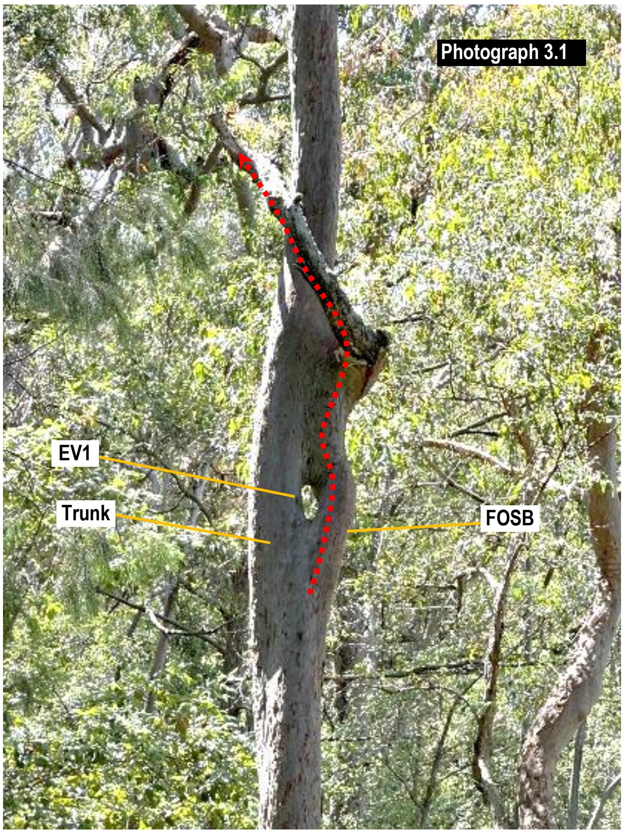
<u>Conclusion</u>

<u>Wound 1</u> – Enclosed void in the lower crown from naturally grafted branches, 40 - <60 years old.

<u>Risks to tree</u>

Not applicable as enclosed void not of Aboriginal cultural origin.

Photograph 3.0 Taken 25/11/2024 by Danny Draper. View to southeast of tree TN3 / HTP-C-CMT03 *Angophora costata* (Geartn.) Britten – Smooth-barked Apple (centre left), showing Enclosed Void 1 (EV1) in the lower crown from naturally grafted branches.



Photograph 3.1 Taken 25/11/2024 by Danny Draper. View of tree TN3 / HTP-C-CMT03 *A. costata* (Geartn.) Britten – Smooth-barked Apple showing Enclosed Void 1 (EV1) in the lower crown from an upright first order structural branch (FOSB) grafting naturally with the trunk. Red broken arrow showing growth of the FOSB that has died back after becoming grafted with the trunk.

4.0 TREE ASSESSMENT

4.1 Assessment of Tree/s – TN4 / HTP-C-CMT04

Tree No. / Archaeological No. Genus & species Common Name	**1. Age Class** **Y** = Young **M** = Mature **O** = Over-mature (Senescent) **2. Age range of tree** in yrs. approx. **3. Age range of wound/s,** in yrs. approx. **4. Date range since tree died** in yrs. approx., e.g., died, cut down, ring-barked	**Condition** **G =** Good **F =** Fair **P =** Poor **D** = Dead	**Form** **D** = Dominant **C** = Co-dominant **I** = Intermediate **S** = Suppressed **F** = Forest **E** = Emergent	**Height** in metres approx. / **Crown spread** approx. length x breadth metres / **Crown spread orientation.**	**Trunk diameter** in mm @ 1.4m, or as stated / **Trunk diameter orientation**	**Crown cover / Crown density** approx. %	**SRIV** Age, Vigour, Condition / Index Rating App A. / Remaining life expectancy 1. Long 2. Medium 3. Short
TN4 / HTP-C-CMT04 *Angophora costata* (Geartn.) Britten Smooth-barked Apple	1. M 2. 50 - <70 3.1 20 - <30 (Excrescence 1) 4. N/A	G	F	15 x 8	300 x 360, 330 Av., N/S	90 / 90	MGVG – 9 / 2

Angophora costata (Geartn.) Britten – Smooth-barked Apple is medium tree, coastal (Elliot and Jones, 1982, p. 196 and Boland *et al*, 2006, p. 214) and can attain a height of 15-25 m (Boland *et al*, 2006, p. 296) or 10-30 m (Elliot and Jones, 1982, p. 196) with a trunk diameter 0.5 – 1.0 m and up to 1.2 m (Boland *et al*, 2006, p. 214) and a crown spread of 6-15 m (Elliot and Jones, 1982, p. 196).

A. costata (Geartn.) Britten heartwood has a green density of 1240 kg / m^3 approx. (Bootle 2005, p. 239) and air dry density (ADD) 990 kg / m^3 (Bootle 2005, p. 239) and 755 – 1045 kg / m^3 (Boland *et al*, 2006, p. 214). Sapwood susceptible to Lyctid borers and heartwood very hard, strong, but not durable (Boland *et al*, 2006, p. 214, Bootle 2005, p. 239) The wood is used mainly for fence palings and (Bootle 2005, p. 239, Boland *et al*, 2006, p. 214). The tree grows within a rainfall range of 600-1200 mm (Boland *et al*, 2006, p. 214).

Tree TN4 / HTP-C-CMT04 (Photograph 4.0) was growing within the Hunter Transmission Project boundaries in an area with an expected comparable average annual rainfall of 758.0 mm recorded approximately 15 - <40 km away at the nearby Station: Pokolbin (Ben Ean), Number: 61056, opened 1905 to present (Australian Government Bureau of Meteorology, 2024). The tree was expected to be growing at a rate typical for the species with an estimated age of 50 - <70 years and appeared to have been of good vigour. Tree of forest form with 1 trunk excrescence recorded.

<u>Wound 1 *(W1)*</u>

Excrescence as a triangular outgrowth from trunk on south side (Photographs 4.0 and 4.1). Excrescence extended from 950 – 1850 mm and was 420 mm at widest at centre and 280 mm wide vertically. Excrescence on lower trunk expected to be an occluded branch stub or live branch section containing an acutely ascending to upright branch where branch and trunk occluded closing the void between the 2 structures with the branch end having died back and shed with the live remains subsumed and coalesced, evident as an exaggerated protuberance contiguous with the trunk expressed as a triangular outgrowth.

<u>Conclusion</u>

<u>Wound 1</u> – Excrescence as triangular outgrowth, occurring naturally from grafted branches or branch sections, 20 - <30 years old.

<u>Risks to tree</u>

Not applicable as enclosed void not of Aboriginal cultural origin.

Photograph 4.0 Taken 25/11/2024 by Danny Draper. View to east of tree TN4 / HTP-C-CMT04 *Angophora costata* (Geartn.) Britten – Smooth-barked Apple (centre) showing trunk and Excrescence 1 (EX1) from naturally grafted branches. Excrescence on lower trunk expected to be an occluded branch stub or live branch section containing an acutely ascending to upright branch where branch and trunk occluded closing the void between the 2 structures with the branch end having died back and shed with the live remains subsumed and coalesced, evident as an exaggerated protuberance contiguous with the trunk expressed as this triangular outgrowth. Shown with a yellow retractable tape measure extended to 1500 mm.

Photograph 4.1 Taken 25/11/2024 by Danny Draper. View to east of tree TN4 / HTP-C-CMT04 *A. costata* (Geartn.) Britten – Smooth-barked Apple lower trunk section showing Excrescence 1 (EX1) as a triangular outgrowth with a yellow retractable tape measure extended to 550 mm.

Photograph 4.2 Taken 25/11/2024 by Danny Draper. View to north of tree TN4 / HTP-C-CMT04 *A. costata* (Geartn.) Britten – Smooth-barked Apple lower trunk section showing Excrescence 1 (EX1) at the narrow of the triangular outgrowth with a yellow retractable tape measure extended to 550 mm.

4.0 TREE ASSESSMENT

4.1 Assessment of Tree/s – TN5 /HTP-C-CMT05

Tree No. / Archaeological No. Genus & species Common Name	**1. Age Class** **Y** = Young **M** = Mature **O** = Over-mature (Senescent) **2. Age range of tree** in yrs. approx. **3. Age range of wound/s,** in yrs. approx. **4. Date range since tree died** in yrs. approx., e.g., died, cut down, ring-barked	**Condition** **G** = Good **F** = Fair **P** = Poor **D** = Dead	**Form** **D** = Dominant **C** = Co-dominant **I** = Intermediate **S** = Suppressed **F** = Forest **E** = Emergent	**Height** in metres approx. / **Crown spread** approx. length x breadth metres / **Crown spread orientation.**	**Trunk diameter** in mm @ 1.4m, or as stated / **Trunk diameter orientation**	**Crown cover / Crown density** approx. %	**SRIV** Age, Vigour, Condition / Index Rating App A. / Remaining life expectancy 1. Long 2. Medium 3. Short
TN5 /HTP-C-CMT05 *Syncarpia glomulifera* (Sm.) Nied. Turpentine	1. M 2. 250 - <300 3.1 150 - <200 (W1) 3.2 150 - <200 (W2) 3.3 10 - <20 (W3) 4. N/A	F	F	25 x 8	900 x 980, 940 Av., N/S	90 / 90	MGVF – 9 / 2

Syncarpia glomulifera Sm. (Nied.) – Turpentine is a small to medium sized tree (Elliot and Jones 2010, p. 159) to large tree 40-45 m to 55 m high (Boland *et al*, 2006, p. 628 and PlantNet, 2024) with a trunk diameter up to 1 – 1.3 m DBH, typically with the trunk 2 thirds the height with little taper (Boland *et al*, 2006, p. 628) with a crown spread of 5-12 m (Elliot and Jones, 2010, p. 159) "*with fibrous to stringy, persistent bark*", (PlantNET, 2024). Open grown specimens readily coppice with multiple first order structural branches (FOSB) forming on a short trunk (acaulescent).

S. glomulifera Sm. (Nied.) heartwood has a green density of 700 - 1005 kg / m^3 (Boland *et al*, 2006, p. 628) to 1130 kg / m^3 approx. (Bootle 2005, p. 354) and air dry density (ADD) 930 kg / m^3 (Bootle 2005, p. 354). Sapwood not susceptible to Lyctid borers and heartwood is termite resistant (Bootle 2005, p. 355) the heartwood is strong, hard with an interlocked grain, durable and used for poles, sleepers, shipbuilding, wharfs, bridge decking and building construction (Bootle 2005, p. 355, Boland *et al*, 2006, p. 498). The tree grows within a rainfall range of 1000 - 2000 mm (Boland *et al*, 2006, p. 628). "*The timber is difficult to ignite and among the world's most resistant to damage by fire.*" (Boland *et al*, 2006, p. 628).

Tree TN5 /HTP-C-CMT05 (Photograph 5.0) was growing within the Hunter Transmission Project boundaries in an area with an expected comparable average annual rainfall of 758.0 mm recorded approximately 15 - <40 km away at the nearby Station: Pokolbin (Ben Ean), Number: 61056, opened 1905 to present (Australian Government Bureau of Meteorology, 2024). The tree was expected to be growing at a rate typical for the species with an estimated age of 250 - <300 years and appeared to have been of good vigour. Tree of forest form, straight, with 3 trunk wounds.

<u>Wound 1 *(W1)*</u>

Basal wound, narrow, linear, vertical, symmetrical, 1 down slope to south adjacent a girdling root, 230 mm diameter (Photographs 5.1-5.3). Wound extended from ground to 1200 mm and 470 mm at widest at centre. Wound cavity opening width extended by fire and width depth right 250 mm and left 130 mm connected to the hollow trunk and consumed by fire. Wound margins incurved or splayed into the inner side of the hollow trunk but partly consumed by fire.

<u>Wound 2 *(W2)*</u>

Trunk wound, narrow, linear, vertical, on NE side, symmetrical (Photographs 5.4 – 5.5). Wound extended from 200 – 1300 mm into the hollow trunk. Wound cavity opening extended from 550 - 950 mm and was 30 mm at widest. Wound possible occluded but opened by recent fire. Wound margins incurved or splayed into the inner side of the hollow trunk but partly consumed by fire.

<u>Wound 3 *(W3)*</u>

Basal, triangular, on upslope side to west, asymmetrical. Wound extended from ground to 2 m and 1100 mm at widest at base. Wound not developed in necrotic tissue. Trunk hollow, 570 mm deep, from fire damage and likely initially from decay.

<u>Conclusion</u>

Wound 1 (W1) - Wound of Aboriginal cultural origin, 150 - <200 years old.

Wound 2 (W2) - Wound of Aboriginal cultural origin, 150 - <200 years old.

Wound 3 (W3) - Wound caused by fire, 10 - <20 years old.

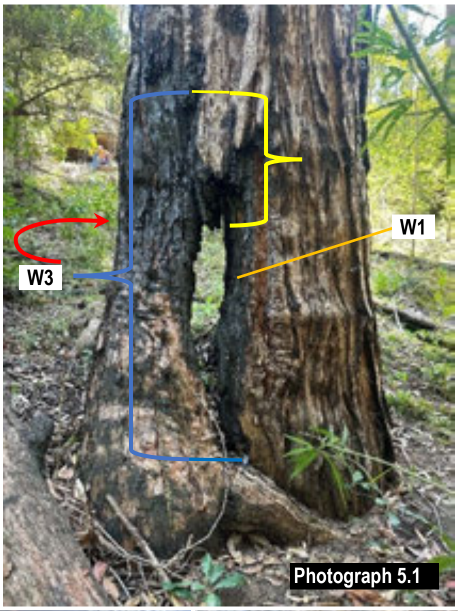
<u>Risks to tree</u>

The tree wounds can be expected to continue to decay over time with new growth likely to be in balance but fire damage to trunk likely to have compromised structural integrity. If the tree is to be removed, a section containing the wounds could be moved to a keeping place in consultation with Aboriginal stake holders. To be retained *in situ* the tree would require a radial tree protection zone (TPZ) of 40 m per AS4970(2009, p. 11) Sec. 3, 3.2 *Determining the TPZ.*

If the tree is required for removal the trunk section containing the wound could be retained ex situ with the trunk cut near ground and at 1 m above the wound apex to recover the wound baring section for it to be retained on site or relocated to a keeping place as determined by the Aboriginal stake holders.

Photograph 5.0

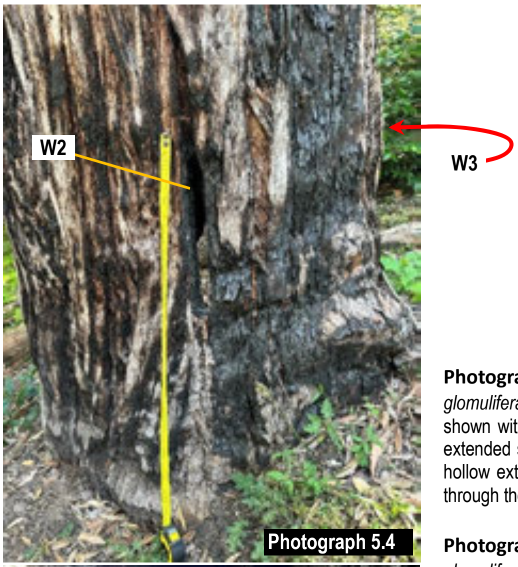
Photograph 5.0 Taken 25/11/2024 by Danny Draper. View to southeast of tree TN5 / HTP-C-CMT05 *Syncarpia glomulifera* (Sm.) Nied. – Turpentine (centre), showing Wounds 1 – 3 (W1-W3).



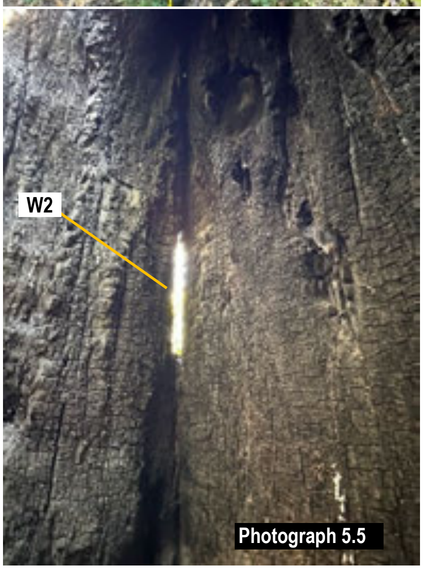
Photograph 5.1


Photograph 5.3


Photograph 5.2



Photograph 5.4



Photograph 5.5

Photograph 5.1 Taken 25/11/2024 by Danny Draper. View to north of tree TN5 / HTP-C-CMT05 *S. glomulifera* (Sm.) Nied. – Turpentine, showing Wound 1 (W1), extent shown by a blue brace, wound apex shown with a yellow brace (see detail in Photograph 5.2). Wound opening width expected to have been extended slightly by consumption by a recent fire while noting the resistance of this species to fire. Trunk hollow extending to Wound 3 (W3) on the upslope side caused by fire with its opening to ground visible through the opening to Wound 1.

Photograph 5.2 Taken 25/11/2024 by Danny Draper. View to north of tree TN5 / HTP-C-CMT05 *S. glomulifera* (Sm.) Nied. – Turpentine showing Wound 1 (W1) and partly occluded wound apex extending distally as a partial occlusion seam (yellow brace). Wound opening width expected to have been extended slightly by consumption by a recent fire while noting the resistance of this species to fire.

Photograph 5.3 Taken 25/11/2024 by Danny Draper. View to south of tree TN5 / HTP-C-CMT05 *S. glomulifera* (Sm.) Nied. – Turpentine from inside hollow trunk showing Wound 1 (W1) and partly occluded wound apex extending distally within the trunk hollow (yellow brace). Extent of old wound indicated by splayed growth on each side of the wound margins internally, with minor consumption by fire following the preformed shape of the wound.

Photograph 5.4 Taken 25/11/2024 by Danny Draper. View to south of tree TN5 / HTP-C-CMT05 *S. glomulifera* (Sm.) Nied. – Turpentine showing Wound 2 (W2) with a yellow retractable tape measure extended to 1 m. Narrow wound opening width expected to have been extended slightly by consumption by a recent fire and may have reopened an occluded wound margin while noting the resistance of this species to fire.

Photograph 5.0 Taken 25/11/2024 by Danny Draper. View to north of tree TN5 / HTP-C-CMT05 *S. glomulifera* (Sm.) Nied. – Turpentine from inside hollow trunk showing Wound 2 (W2). Extent of old wound indicated by splayed growth on each side of the wound margins internally, with minor consumption by fire following the preformed shape of the wound while noting the resistance of this species to fire.

4.0 TREE ASSESSMENT

4.1 Assessment of Tree/s – TN6 / HTP-C-CMT12

Tree No. / Archaeological No. Genus & species Common Name	**1. Age Class** **Y** = Young **M** = Mature **O** = Over-mature (Senescent) **2. Age range of tree** in yrs. approx. **3. Age range of wound/s,** in yrs. approx. **4. Date range since tree died** in yrs. approx., e.g., died, cut down, ring-barked	**Condition** **G =** Good **F =** Fair **P =** Poor **D** = Dead	**Form** **D** = Dominant **C** = Co-dominant **I** = Intermediate **S** = Suppressed **F** = Forest **E** = Emergent	**Height** in metres approx. / **Crown spread** approx. length x breadth metres / **Crown spread orientation.**	**Trunk diameter** in mm @ 1.4m, or as stated / **Trunk diameter orientation**	**Crown cover / Crown density** approx. %	**SRIV** Age, Vigour, Condition / Index Rating App A. / Remaining life expectancy 1. Long 2. Medium 3. Short
TN6 / HTP-C-CMT12 *Eucalyptus crebra* F. Muell. Narrow-leaved Red Ironbark	1. M 2. 100 - <125 3.1 20 - <40 (W1) 3.2 20 - <40 (W2) 4. N/A	F	F	25 x 9	500, N/S	85 / 90	MGVF – 9 / 2

Eucalyptus crebra F. Muell. – Narrow-leaved Red Ironbark is a small to medium woodland to tall forest tree, north of Picton on the central coastal plain and northwest slopes and plains of NSW (Brooker and Kleinig, 1999, p. 229, Boland *et al*, 2006, p. 482) and can attain a height of 20-30 m (Elliot and Jones, 1986, p. 66) or 25 m up to 35 m with a trunk diameter up to 0.7 – 1.5 m (Boland *et al*, 2006, p. 482) and a crown spread of 10-15 m (Elliot and Jones, 1986, p. 66).

E. crebra F. Muell. heartwood has a green density of 1160 kg / m^3 (Bootle 2005, p. 288) and air dry density (ADD) 1090 kg / m^3 (Bootle 2005, p. 288) and 890 - 1200 kg / m^3 (Boland *et al*, 2006, p. 482). Sapwood resistant to Lyctus borers (Boland *et al*, 2006, p. 482, Bootle 2005, p. 288) and heartwood resistant to termites (Bootle 2005, p. 278). The heartwood has an inground durability of 3 which is high and above ground durability of 1 which is high (Bootle, 2005, p. 288, Boland *et al*, 2006, p. 482). Timber used for heavy engineering, construction, railway sleepers, cross arms, flooring and wharfage (Bootle 2005, p. 288, Boland *et al*, 2006, p. 482). The tree grows within a rainfall range of 450-1900 mm (Boland *et al*, 2006, p. 482).

Tree TN6 / HTP-C-CMT12 (Photograph 6.0) was growing within the Hunter Transmission Project boundaries in an area with an expected comparable average annual rainfall of 758.0 mm recorded approximately 15 - <40 km away at the nearby Station: Pokolbin (Ben Ean), Number: 61056, opened 1905 to present (Australian Government Bureau of Meteorology, 2024). The tree was expected to be growing at a rate typical for the species with an estimated age of 100 - <125 years and appeared to have been of good vigour. Tree of forest form, straight with 2 trunk wounds recorded.

<u>Wound 1 *(W1)*</u>

Basal trunk wound on north side, narrow, asymmetrical (Photographs 6.0 and 6.1). Wound extended from ground to 1530 mm. Wound face extended from ground to 985 mm and was 230 mm at widest at 750 mm. Wound margin depth right 90 mm and left 50 mm. Wound face to sapwood with depressions to heartwood adjacent apex at right margin and 500-680 mm adjacent right margin Indicative of Longicorn Borer activity in live sapwood (Photographs 6.2-6.4).

<u>Wound 2 *(W2)*</u>

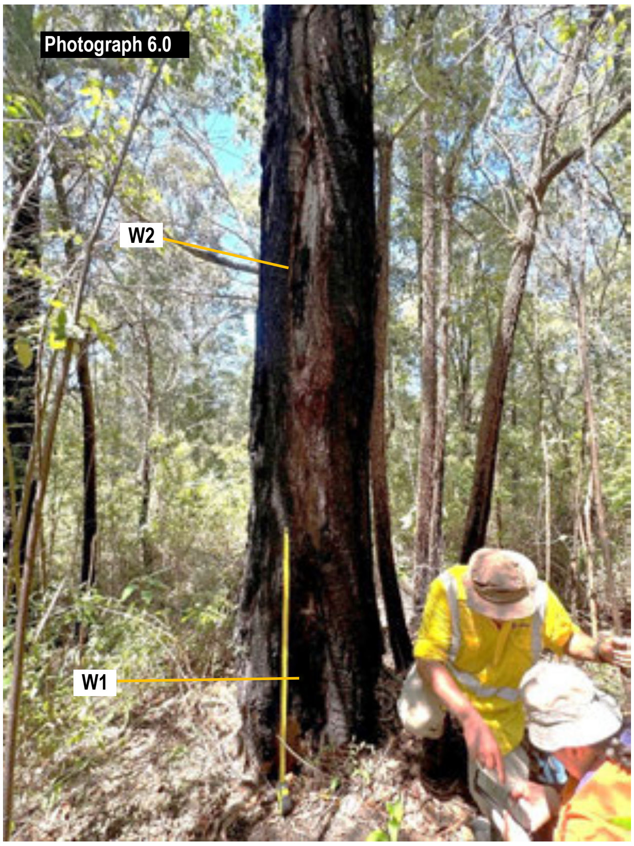
Trunk wound on north side, narrow, awl to elliptical shaped, asymmetrical (Photographs 6.1 and 6.5). Wound extended from 1740 - 3990 mm. Wound face extended from 1830 - 3160 mm and was 105 mm at widest at 2200 mm. Margins entire. Wound margin depth right 75 mm and left 50 mm. Wound face to sapwood distally and proximally with oval holes and galleries 10-12 mm wide consistent with Longicorn Borers. Longicorn Borer galleries exposed by fire damage where sap wood consumed from 2050 - 2450 mm (Photographs 6.5 and 6.6).

<u>Conclusion</u>

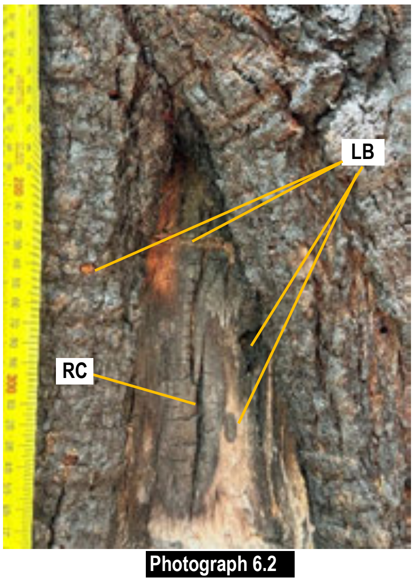
<u>Wounds 1 and 2</u> – Caused by Longicorn Borers, 20 - <40 years ago.

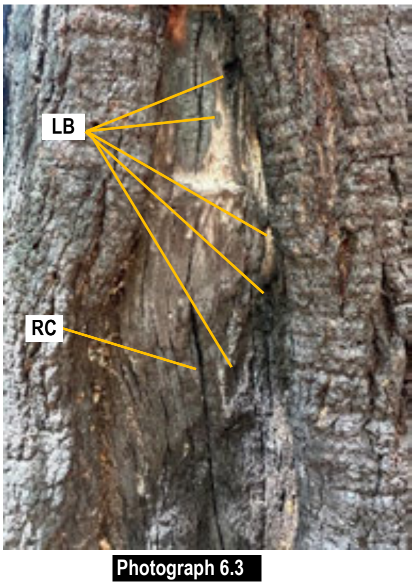
<u>Risks to tree</u>

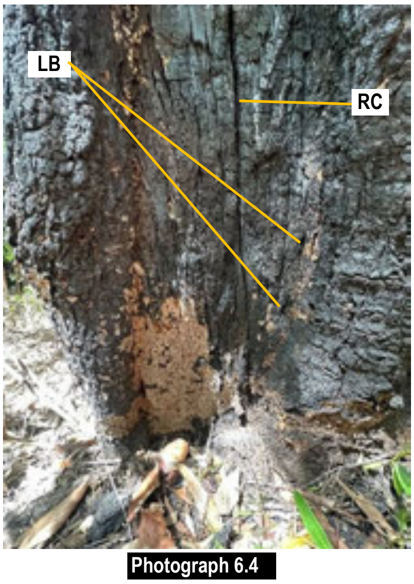
Not applicable as enclosed void not of Aboriginal cultural origin.



Photograph 6.0 Taken 26/11/2024 by Danny Draper. View to south of tree TN6 / HTP-C-CMT12 *Eucalyptus crebra* F. Muell. – Narrow-leaved Red Ironbark, showing Wounds 1 and 2 (W1 and W2) and a yellow retractable tape measure extended to 1 m.



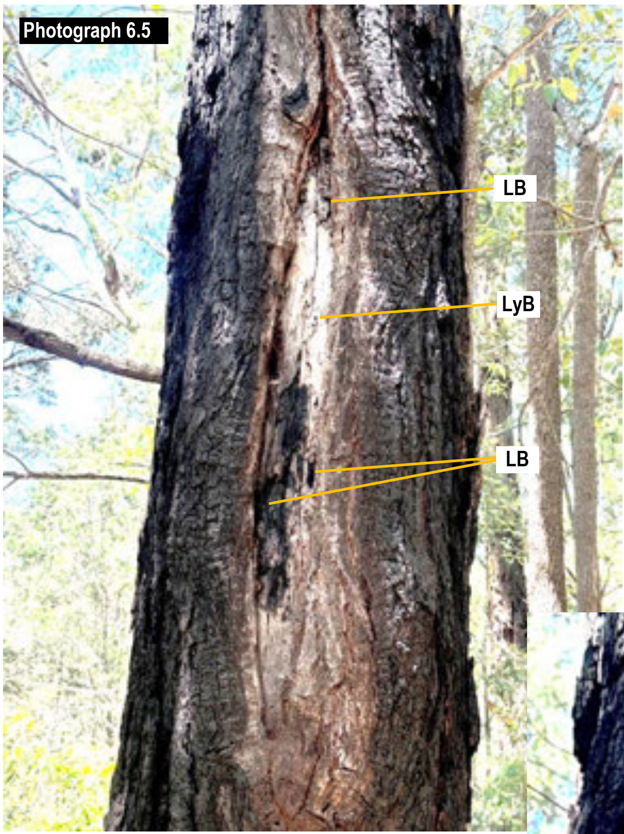


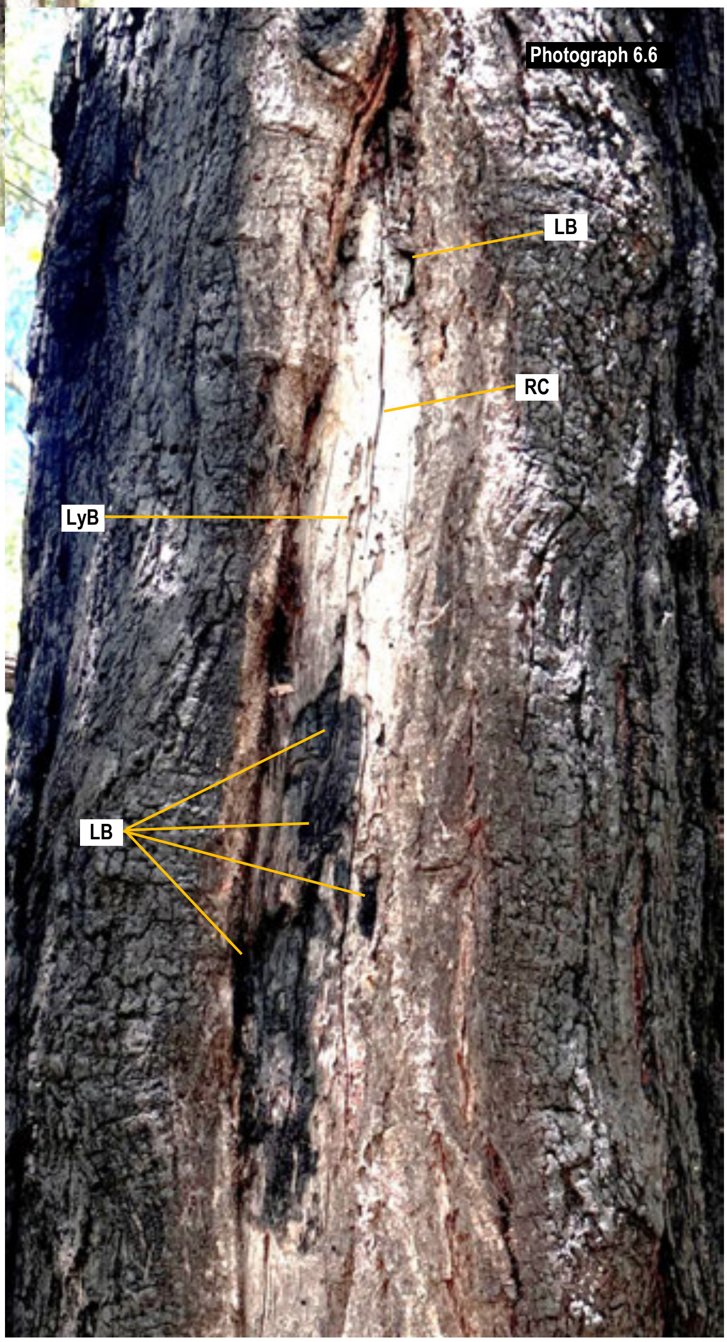


Photograph 6.2 Taken 26/11/2024 by Danny Draper. View to south of tree TN6 / HTP-C-CMT12 *E. crebra* F. Muell. – Narrow-leaved Red Ironbark, showing Wound 1 (W1) apex with Longicorn Borer (LB) burrows and tunnelling. Desiccated ray cells (RC) shown as vertical narrow cracks.

Photograph 6.3 Taken 26/11/2024 by Danny Draper. View to south of tree TN6 / HTP-C-CMT12 *E. crebra* F. Muell. – Narrow-leaved Red Ironbark, showing Wound 1 (W1) wound face centre with Longicorn Borer (LB) burrows and tunnelling. Desiccated ray cells (RC) shown as vertical narrow cracks.

Photograph 6.4 Taken 26/11/2024 by Danny Draper. View to south of tree TN6 / HTP-C-CMT12 *E. crebra* F. Muell. – Narrow-leaved Red Ironbark, showing Wound 1 (W1) base with Longicorn Borer (LB) burrows and tunnelling. Desiccated ray cells (RC) shown as vertical narrow cracks.





Photograph 6.5 Taken 26/11/2024 by Danny Draper. View to south of tree TN6 / HTP-C-CMT12 *Eucalyptus crebra* F. Muell. – Narrow-leaved red Ironbark, showing Wound 2 (W2) with Longicorn Borer (LB) burrows and tunnelling, circular holes 1-2 mm diameter of Lyctid Borers (LyB) in necrotic deadwood and desiccated ray cells (RC) shown as vertical narrow cracks.

Photograph 6.6 Taken 26/11/2024 by Danny Draper. View to south of tree TN6 / HTP-C-CMT12 *E. crebra* F. Muell. – Narrow-leaved Red Ironbark, showing Wound 2 (W2) detail with Longicorn Borer (LB) burrows and tunnelling (oval holes 8x12 mm and burrows 10- 12 mm wide), circular holes 1-2 mm diameter of Lyctid Borers (LyB) in necrotic deadwood and desiccated ray cells (RC) shown as vertical narrow cracks.

4.0 TREE ASSESSMENT

4.1 Assessment of Tree/s – TN7 / HTP-C-CMT13

Tree No. / Archaeological No. Genus & species Common Name	**1. Age Class** **Y** = Young **M** = Mature **O** = Over-mature (Senescent) **2. Age range of tree** in yrs. approx. **3. Age range of wound/s,** in yrs. approx. **4. Date range since tree died** in yrs. approx., e.g., died, cut down, ring-barked	**Condition** **G =** Good **F =** Fair **P =** Poor **D =** Dead	**Form** **D** = Dominant **C** = Co-dominant **I** = Intermediate **S** = Suppressed **F** = Forest **E** = Emergent	**Height** in metres approx. / **Crown spread** approx. length x breadth metres / **Crown spread orientation.**	**Trunk diameter** in mm @ 1.4m, or as stated / **Trunk diameter orientation**	**Crown cover / Crown density** approx. %	**SRIV** Age, Vigour, Condition / Index Rating App A. / Remaining life expectancy 1. Long 2. Medium 3. Short
TN7 / HTP-C-CMT13 *Syncarpia glomulifera* (Sm.) Nied. Turpentine	1. M 2. 150 - <175 3.1 50 - <75 (W1) 4. N/A	F	F	25 x 8	430 x 330, 380 Av., N/S	90 / 90	MGVF – 9 / 2

Syncarpia glomulifera Sm. (Nied.) – Turpentine is a small to medium sized tree (Elliot and Jones 2010, p. 159) to large tree 40-45 m to 55 m high (Boland *et al*, 2006, p. 628 and PlantNet, 2024) with a trunk diameter up to 1 – 1.3 m DBH, typically with the trunk 2 thirds the height with little taper (Boland *et al*, 2006, p. 628) with a crown spread of 5-12 m (Elliot and Jones, 2010, p. 159) "*with fibrous to stringy, persistent bark*", (PlantNET, 2024). Open grown specimens readily coppice with multiple first order structural branches (FOSB) forming on a short trunk (acaulescent).

S. glomulifera Sm. (Nied.) heartwood has a green density of 700 - 1005 kg / m^3 (Boland *et al*, 2006, p. 628) to 1130 kg / m^3 approx. (Bootle 2005, p. 354) and air dry density (ADD) 930 kg / m^3 (Bootle 2005, p. 354). Sapwood not susceptible to Lyctid borers and heartwood is termite resistant (Bootle 2005, p. 355) the heartwood is strong, hard with an interlocked grain, durable and used for poles, sleepers, shipbuilding, wharfs, bridge decking and building construction (Bootle 2005, p. 355, Boland *et al*, 2006, p. 498). The tree grows within a rainfall range of 1000 - 2000 mm (Boland *et al*, 2006, p. 628). "*The timber is difficult to ignite and among the world's most resistant to damage by fire.*" (Boland *et al*, 2006, p. 628).

Tree TN7 / HTP-C-CMT13 (Photograph 7.0) was growing within the Hunter Transmission Project boundaries in an area with an expected comparable average annual rainfall of 758.0 mm recorded approximately 15 - <40 km away at the nearby Station: Pokolbin (Ben Ean), Number: 61056, opened 1905 to present (Australian Government Bureau of Meteorology, 2024). The tree was expected to be growing at a rate typical for the species with an estimated age of 150 - <175 years and appeared to have been of good vigour. Tree of forest form with 1 trunk wound recorded.

Wound 1 *(W1)*

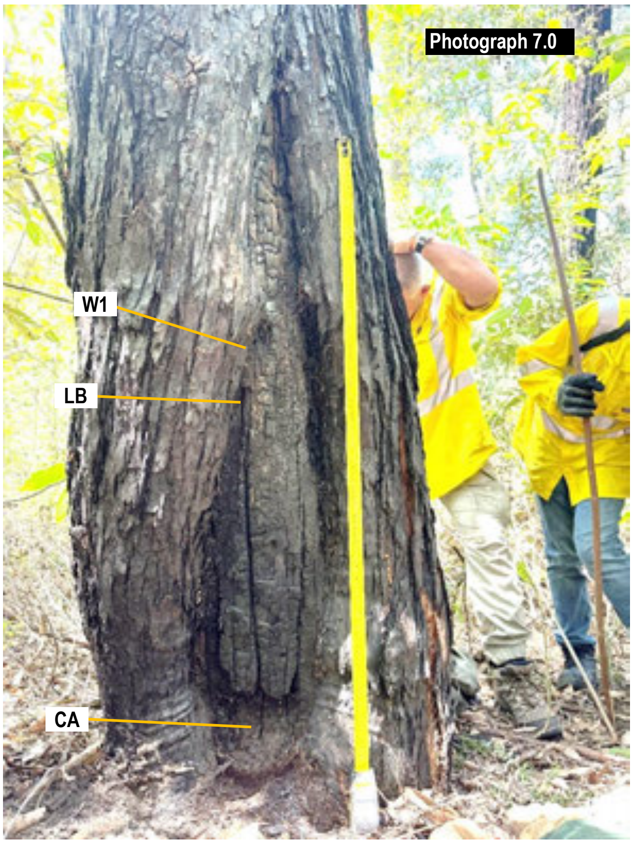
Trunk wound on north side, asymmetrical (Photograph 7.0). Wound extended from ground to 1230 mm. Wound face extended from ground to 1130 mm and was 220 m at widest at 400 mm. Margins entire. Wound margin depth right 85 mm and left 55 mm. Longicorn Borer galleries 690 -790 mm adjacent wound and 500 - 700 mm adjacent right margin (Photograph 7.1). Wound face to sapwood charred and partly consumed by fire. Base of wound face covered by 30 mm of soil, excavated to expose a concave fire consumed cavity extending 30 - 130 mm, 140 mm wide and 45 mm deep (Photograph 7.2).

Conclusion

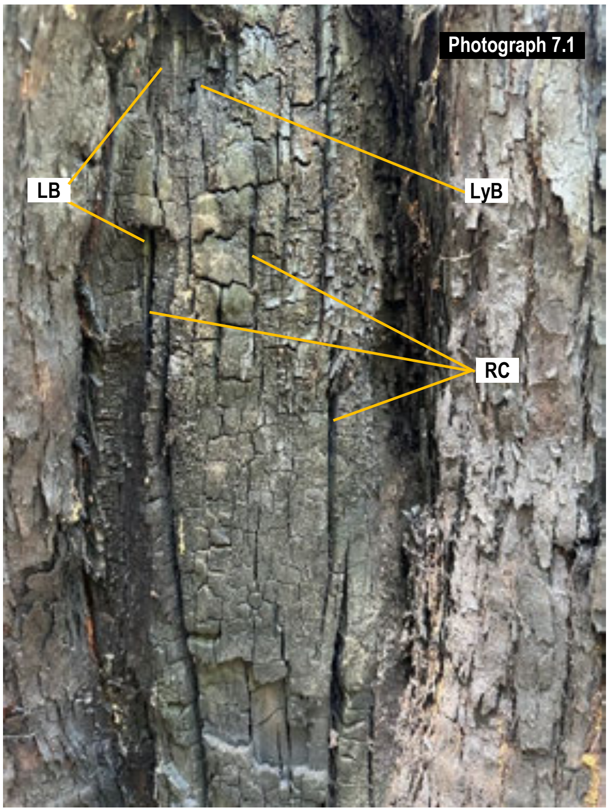
Wound 1 – Caused by Longicorn Borers, 50 - <75 years ago.

Risks to tree

Not applicable as enclosed void not of Aboriginal cultural origin.



Photograph 7.0 Taken 26/11/2024 by Danny Draper. View to south of tree TN7 / HTP-C-CMT13 *Syncarpia glomulifera* (Sm.) Nied. – Turpentine, showing Wound 1 (W1) and a yellow retractable tape measure extended to 1 m with Longicorn Borer (LB) burrows and tunnelling and cavity (CA) at wound base caused by fire.



Photograph 7.1 Taken 26/11/2024 by Danny Draper. View to south of tree TN7 / HTP-C-CMT13 *Syncarpia glomulifera* (Sm.) Nied. – Turpentine, showing Wound 1 (W1) with Longicorn Borer (LB) burrows and tunnelling (oval holes 8x12 mm and burrows 10- 12 mm wide), circular holes 1-2 mm diameter of Lyctid Borers (LyB) in necrotic deadwood and desiccated ray cells (RC) shown as vertical narrow cracks.

Photograph 7.2 Taken 26/11/2024 by Danny Draper. View to south of tree TN7 / HTP-C-CMT13 *Syncarpia glomulifera* (Sm.) Nied. – Turpentine, showing Wound 1 (W1) showing Wound 1 (W1) and a yellow retractable tape measure extended to 300 mm with base of wound face covered by 30 mm of soil, exposed a concave area consumed by fire forming a cavity (CA) 130 mm high, 140 mm wide and 45 mm deep.

4.0 TREE ASSESSMENT

4.1 Assessment of Tree/s – TN8 / HTP-C-CMT15

Tree No. / Archaeological No. Genus & species Common Name	**1. Age Class** **Y** = Young **M** = Mature **O** = Over-mature (Senescent) **2. Age range of tree** in yrs. approx. **3. Age range of wound/s,** in yrs. approx. **4. Date range since tree died** in yrs. approx., e.g., died, cut down, ring-barked	**Condition** **G =** Good **F =** Fair **P =** Poor **D** = Dead	**Form** **D** = Dominant **C** = Co-dominant **I** = Intermediate **S** = Suppressed **F** = Forest **E** = Emergent	**Height** in metres approx. / **Crown spread** approx. length x breadth metres / **Crown spread orientation.**	**Trunk diameter** in mm @ 1.4m, or as stated / **Trunk diameter orientation**	**Crown cover / Crown density** approx. %	**SRIV** Age, Vigour, Condition / Index Rating App A. / Remaining life expectancy 1. Long 2. Medium 3. Short
TN8 / HTP-C-CMT15 *Syncarpia glomulifera* (Sm.) Nied. Turpentine	1. M 2. 150 - <175 3.1 50 - <75 (W1) 4. N/A	F	F	26 x 8	800 x 600, 700 Av., E/W	90 / 90	MGVF – 9 / 2

Syncarpia glomulifera Sm. (Nied.) – Turpentine is a small to medium sized tree (Elliot and Jones 2010, p. 159) to large tree 40-45 m to 55 m high (Boland *et al*, 2006, p. 628 and PlantNet, 2024) with a trunk diameter up to 1 – 1.3 m DBH, typically with the trunk 2 thirds the height with little taper (Boland *et al*, 2006, p. 628) with a crown spread of 5-12 m (Elliot and Jones, 2010, p. 159) "*with fibrous to stringy, persistent bark*", (PlantNET, 2024). Open grown specimens readily coppice with multiple first order structural branches (FOSB) forming on a short trunk (acaulescent).

S. glomulifera Sm. (Nied.) heartwood has a green density of 700 - 1005 kg / m^3 (Boland *et al*, 2006, p. 628) to 1130 kg / m^3 approx. (Bootle 2005, p. 354) and air dry density (ADD) 930 kg / m^3 (Bootle 2005, p. 354). Sapwood not susceptible to Lyctid borers and heartwood is termite resistant (Bootle 2005, p. 355) the heartwood is strong, hard with an interlocked grain, durable and used for poles, sleepers, shipbuilding, wharfs, bridge decking and building construction (Bootle 2005, p. 355, Boland *et al*, 2006, p. 498). The tree grows within a rainfall range of 1000 - 2000 mm (Boland *et al*, 2006, p. 628). "*The timber is difficult to ignite and among the world's most resistant to damage by fire.*" (Boland *et al*, 2006, p. 628).

Tree TN8 / HTP-C-CMT15 (Photograph 8.0) was growing within the Hunter Transmission Project boundaries in an area with an expected comparable average annual rainfall of 758.0 mm recorded approximately 15 - <40 km away at the nearby Station: Pokolbin (Ben Ean), Number: 61056, opened 1905 to present (Australian Government Bureau of Meteorology, 2024). The tree was expected to be growing at a rate typical for the species with an estimated age of 150 - <175 years and appeared to have been of good vigour. Tree of forest form with 1 trunk wound recorded.

<u>Wound 1 *(W1)*</u>

Basal trunk wound on north side extending to hollow trunk, asymmetrical (Photograph 8.1). Wound opening extended from ground to 1380 mm and was 260 mm at widest at 120 mm. Wound margin depth right 80 mm and left 100 mm. No evidence of incurved wound margins extending into the hollow trunk, and with its shallow wound margin depth provided evidence of a young wound age. The initial wound exposing the trunk was highly likely caused by Longicorn Borer and extended by fire damage, expected from fuel likely to have been accumulated against the trunk on the upslope side as *S. glomulifera* (Sm.) Nied is resistant to fire.

Base of wound covered by soil and leaf litter, excavated 140 mm to basal flare 30 mm wide on upslope side and exposed remnant wound margin base right and left, and 110 mm long right and 150 mm long left, 40 mm wide right and 65 mm wide left. Thw trunk hollow was 490 mm deep and 330 mm wide and cavity extended to 1300 mm distally (Photographs 8.2 and 8.3).

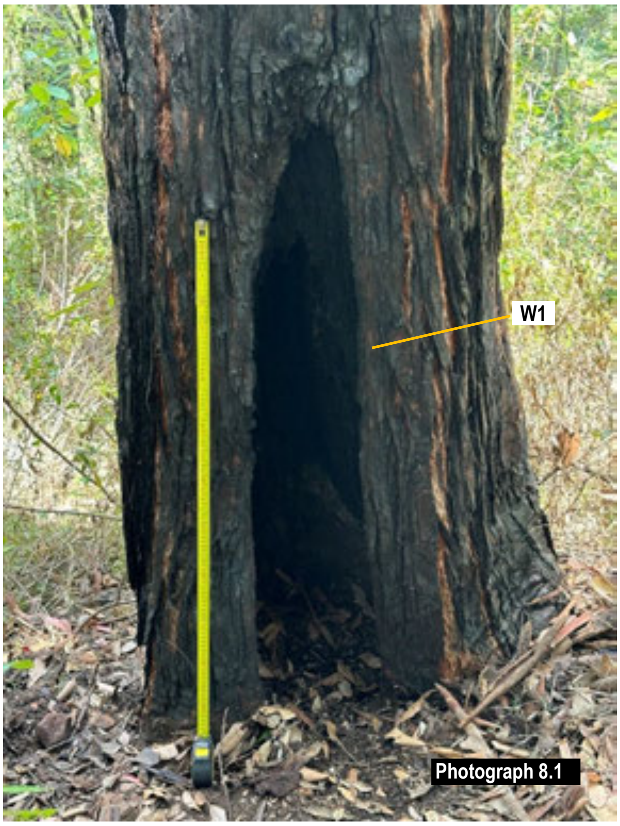
<u>Conclusion</u>

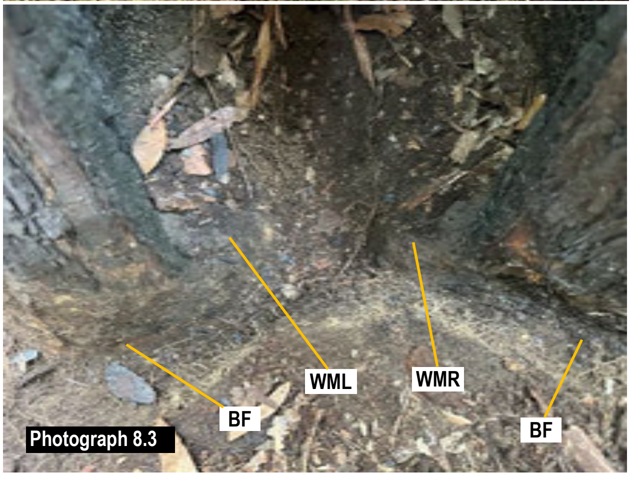
<u>Wound 1</u> – Highly likely to have been caused by Longicorn Borer and extended by fire damage, 50 - <75 years ago.

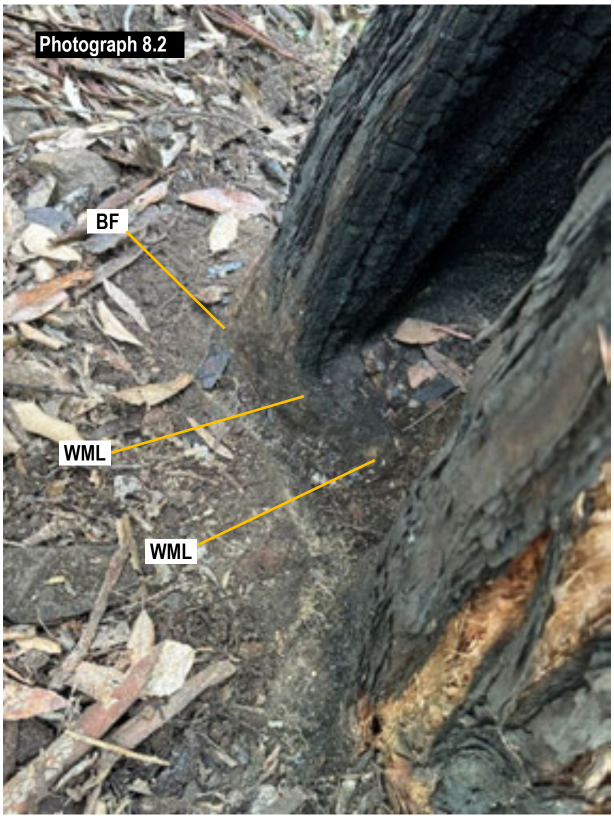
<u>Risks to tree</u>

Not applicable as wound not of Aboriginal cultural origin.

Photograph 8.0 Taken 26/11/2024 by Danny Draper. View to south of tree TN8 / HTP-C-CMT15 *Syncarpia glomulifera* (Sm.) Nied. – Turpentine (centre), showing Wound 1 (W1).







Photograph 8.1 Taken 26/11/2024 by Danny Draper. View to south of tree TN8 / HTP-C-CMT15 *S. glomulifera* (Sm.) Nied. – Turpentine (centre), showing Wound 1 (W1) with a yellow retractable tape measure extended to 1 m.

Photograph 8.2 Taken 26/11/2024 by Danny Draper. View to southeast of base of tree TN8 / HTP-C-CMT15 *S. glomulifera* (Sm.) Nied. – Turpentine (centre), showing basal flare (BF) after excavation to 140 mm and wound base and margin sections right (WMR) and left (WML). Wound margin depth right 80 mm and left 100 mm. No evidence of incurved wound margins in the hollow trunk with its shallow depth evidence of a young wound age highly likely caused by Longicorn Borer and extended by fire damage, expected from fuel likely to have been accumulated against the trunk on the upslope side.

Photograph 8.3 Taken 26/11/2024 by Danny Draper. View to south of base of tree TN8 / HTP-C-CMT15 *S. glomulifera* (Sm.) Nied. – Turpentine (centre), showing basal flare (BF) after excavation to 140 mm and wound base and margin sections right (WMR) and left (WML). White filaments are adventitious roots colonising the humic soil.

4.0 TREE ASSESSMENT

4.1 Assessment of Tree/s – TN9 / TP-C-CMT14

Tree No. / Archaeological No. Genus & species Common Name	**1. Age Class** **Y** = Young **M** = Mature **O** = Over-mature (Senescent) **2. Age range of tree** in yrs. approx. **3. Age range of wound/s,** in yrs. approx. **4. Date range since tree died** in yrs. approx., e.g., died, cut down, ring-barked	**Condition** **G =** Good **F =** Fair **P =** Poor **D =** Dead	**Form** **D** = Dominant **C** = Co-dominant **I** = Intermediate **S** = Suppressed **F** = Forest **E** = Emergent	**Height** in metres approx. / **Crown spread** approx. length x breadth metres / **Crown spread orientation.**	**Trunk diameter** in mm @ 1.4m, or as stated / **Trunk diameter orientation**	**Crown cover / Crown density** approx. %	**SRIV** Age, Vigour, Condition / Index Rating App A. / Remaining life expectancy 1. Long 2. Medium 3. Short
TN9 / TP-C-CMT14 *Eucalyptus crebra* F. Muell. Narrow-leaved Red Ironbark	1. M 2. 150 - <175 3.1 10 - <20 (W1) 4. N/A	G	F	25 x 8	430 x 400, 365 Av., N/S	85 / 85	MGVG – 10 / 2

Eucalyptus crebra F. Muell. – Narrow-leaved Red Ironbark is a small to medium woodland to tall forest tree, north of Picton on the central coastal plain and northwest slopes and plains of NSW (Brooker and Kleinig, 1999, p. 229, Boland *et al*, 2006, p. 482) and can attain a height of 20-30 m (Elliot and Jones, 1986, p. 66) or 25 m up to 35 m with a trunk diameter up to 0.7 – 1.5 m (Boland *et al*, 2006, p. 482) and a crown spread of 10-15 m (Elliot and Jones, 1986, p. 66).

E. crebra F. Muell. heartwood has a green density of 1160 kg / m^3 (Bootle 2005, p. 288) and air dry density (ADD) 1090 kg / m^3 (Bootle 2005, p. 288) and 890 - 1200 kg / m^3 (Boland *et al*, 2006, p. 482). Sapwood resistant to Lyctus borers (Boland *et al*, 2006, p. 482, Bootle 2005, p. 288) and heartwood resistant to termites (Bootle 2005, p. 278). The heartwood has an inground durability of 3 which is high and above ground durability of 1 which is high (Bootle, 2005, p. 288, Boland *et al*, 2006, p. 482). Timber used for heavy engineering, construction, railway sleepers, cross arms, flooring and wharfage (Bootle 2005, p. 288, Boland *et al*, 2006, p. 482). The tree grows within a rainfall range of 450-1900 mm (Boland *et al*, 2006, p. 482).

Tree TN9 / TP-C-CMT14 (Photograph 9.0) was growing within the Hunter Transmission Project boundaries in an area with an expected comparable average annual rainfall of 758.0 mm recorded approximately 15 - <40 km away at the nearby Station: Pokolbin (Ben Ean), Number: 61056, opened 1905 to present (Australian Government Bureau of Meteorology, 2024). The tree was expected to be growing at a rate typical for the species with an estimated age of 150 - <175 years and appeared to have been of good vigour. Tree of forest form with 1 trunk wound recorded.

<u>Wound 1 *(W1)*</u>

Basal trunk wound on west side, asymmetrical (Photograph 9.1). Wound extended from ground to 1300 mm and was mostly occluded. Wound face extended from ground to 580 mm and was 120 mm at widest at base. Wound margin depth right 40 mm and left 30 mm deep basally, and 30 mm deep right and left distally.

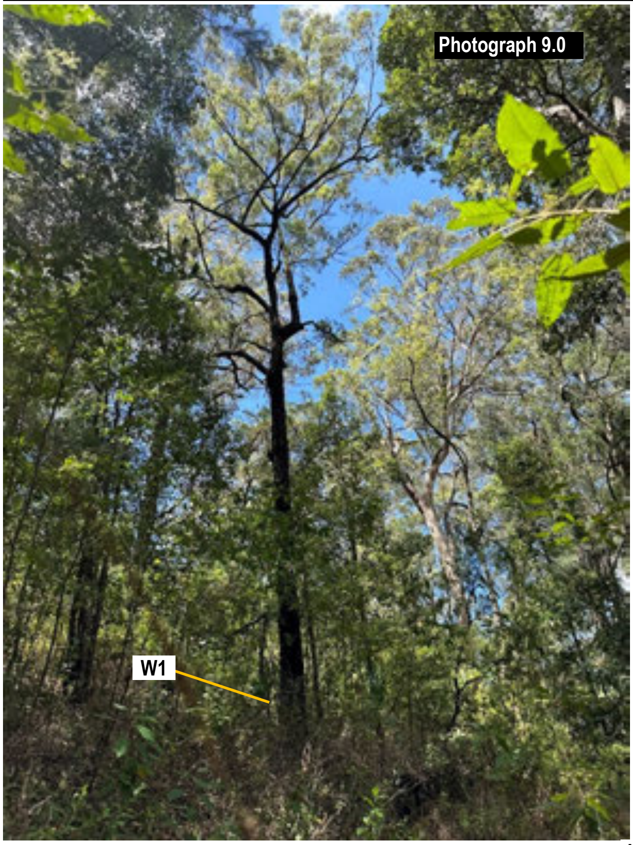
A section of protruding bark vertically, adjacent the wound margin left 80 mm deep, 30 mm wide, 530 mm long from 800 - 1330 mm (Photographs 9.1 and 9.2), consistent with a partial delamination as an abrasion impact event.

<u>Conclusion</u>

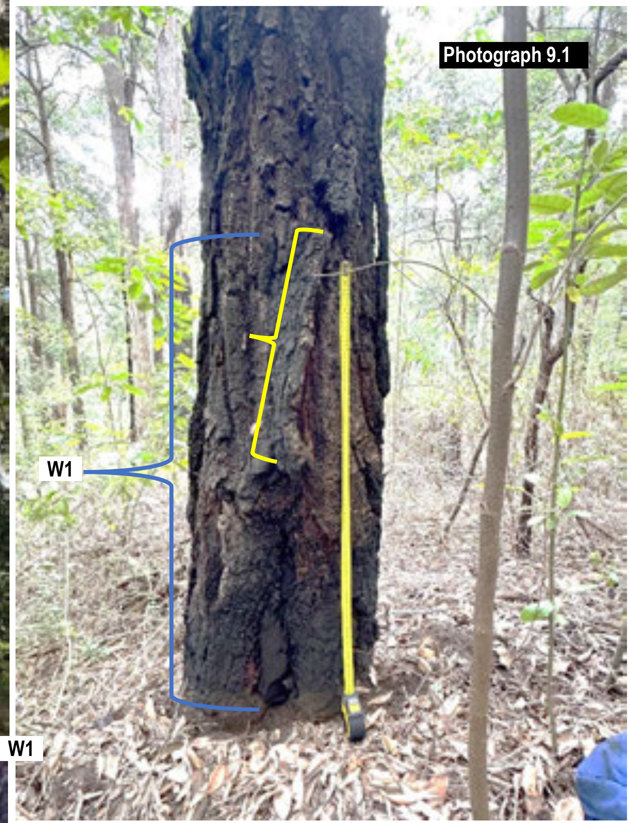
<u>Wound (*W1*)</u> – Mechanical from an abrasion impact event from tree or branch strike with partial bark delamination along wound margin left, 10 - <20 years old.

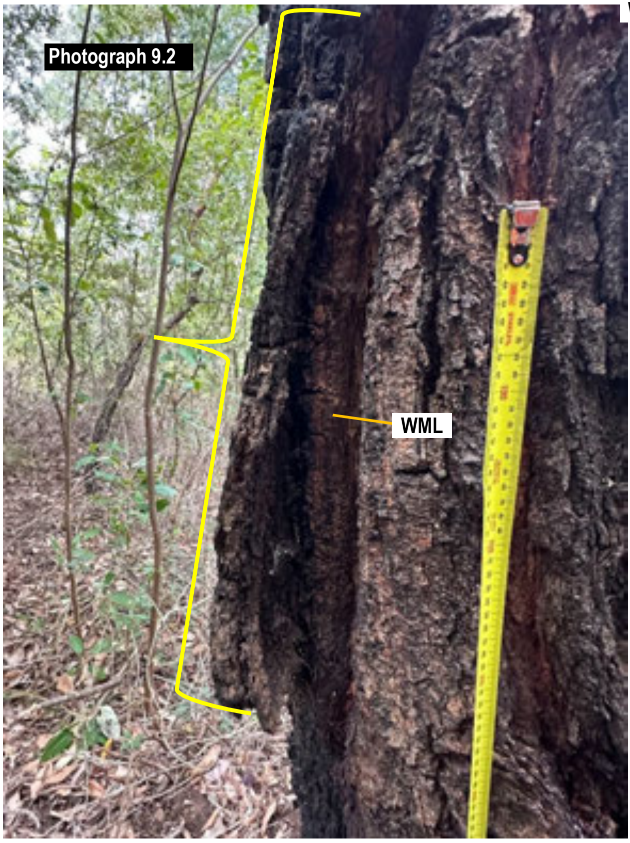
<u>Risks to tree</u>

Not applicable as wound not of Aboriginal cultural origin.



Photograph 9.0 Taken 26/11/2024 by Danny Draper. View to south of tree TN9 / HTP-C-CMT14 *Eucalyptus crebra* F. Muell. – Narrow-leaved Red Ironbark (centre), showing Wound 1 (W1).





Photograph 9.1 Taken 26/11/2024 by Danny Draper. View to east of tree TN9 / HTP-C-CMT14 *E. crebra* F. Muell. – Narrow-leaved Red Ironbark, showing Wound 1 (W1) (blue brace) with a yellow retractable tape measure extended to 1 m. A section of protruding bark adjacent the wound margin left 80 mm deep, 30 mm wide, 530 mm long from 800 - 1330 mm (yellow brace), consistent with a partial delamination as an abrasion impact event.

Photograph 9.2 Taken 26/11/2024 by Danny Draper. View to north of tree TN9 / HTP-C-CMT14 *E. crebra* F. Muell. – Narrow-leaved Red Ironbark, showing Wound 1 (W1) with a yellow retractable tape measure extended to 440 mm. A section of protruding bark adjacent the wound margin left (WML) 80 mm deep, 30 mm wide, 530 mm long from 800 - 1330 mm (yellow brace), consistent with a partial delamination as an abrasion impact event.

4.0 TREE ASSESSMENT

4.1 Assessment of Tree/s – TN10 / HTP-S-CMT04

Tree No. / Archaeological No. Genus & species Common Name	**1. Age Class** **Y** = Young **M** = Mature **O** = Over-mature (Senescent) **2. Age range of tree** in yrs. approx. **3. Age range of wound/s,** in yrs. approx. **4. Date range since tree died** in yrs. approx., e.g., died, cut down, ring-barked	**Condition** **G =** Good **F =** Fair **P =** Poor **D** = Dead	**Form** **D** = Dominant **C** = Co-dominant **I** = Intermediate **S** = Suppressed **F** = Forest **E** = Emergent	**Height** in metres approx. / **Crown spread** approx. length x breadth metres / **Crown spread orientation.**	**Trunk diameter** in mm @ 1.4m, or as stated / **Trunk diameter orientation**	**Crown cover / Crown density** approx. %	**SRIV** Age, Vigour, Condition / Index Rating App A. / Remaining life expectancy 1. Long 2. Medium 3. Short
TN10 / HTP-S-CMT04 *Eucalyptus acmenoides* Shauer White Mahogany	1. M 2. 250 - <300 3.1 50 - <75 (W1) 4. N/A	F	F	25 x 8	700 x 630, 665 Av. N/S	80 / 85	MGVF – 9 / 2

Eucalyptus acmenoides Schauer. – White Mahogany is a tree of open and tall open forest (Brooker and Kleinig, 1999, p. 251, and Boland et al, 2006, p. 506), persistent bark throughout, grey to red-brown, thin, and stringy (Elliot and Jones, 1986, p. 15 and PlantNET, 2024). It has a distribution along the coastal plain extending to the ranges from near Sydney in NSW to north of Cooktown in Queensland (Brooker and Kleinig, 1999, p. 283 and Boland *et al*, 2006, p. 544). In NSW it commonly occurs on hills and ridges below 300 mm altitude growing on clay and loam soils (Boland et al, 2006, p. 544). It can attain a height of 15 – 30 m (Elliot and Jones, 1986, p. 15) or 25 – 60 m with a trunk diameter 1 m DBH (Boland et al, 2006, p. 526) and a crown spread of 5-15 m (Elliot and Jones, 1986, p. 15).

E. acmenoides Schauer. – White Mahogany, heartwood has a green density of 1200 kg / m^3 approx. (Bootle 2005, p. 303) and air dry density (ADD) 1000 kg / m^3 approx. (Bootle 2005, p. 350) and 795 - 1010 kg / m^3 (Boland *et al*, 2006, p. 526). Sapwood rarely attacked by Lyctus borers and heartwood is termite resistant (Boland *et al*, 2006, p. 526, Bootle 2005, p. 303). The wood is strong and very durable (Boland *et al*, 2006, p. 526), with an above ground durability class of AG1, and an inground durability class of IG1 (Bootle 2005, p. 303) and is used for heavy engineering construction, poles, sleeper, ship building, flooring, joists, and weatherboards (Bootle 2005, p. 303, and Boland *et al*, 2006, p. 526). The tree grows within a rainfall range of 700-1700 mm (Boland *et al*, 2006, p. 506).

Tree TN10 / HTP-S-CMT04 (Photograph 10.0) was growing within the Hunter Transmission Project boundaries in an area with an expected comparable average annual rainfall of 758.0 mm recorded approximately 15 - <40 km away at the nearby Station: Pokolbin (Ben Ean), Number: 61056, opened 1905 to present (Australian Government Bureau of Meteorology, 2024). The tree was expected to be growing at a rate typical for the species with an estimated age of 250 - <300 years and appeared to have been of good vigour. Tree of forest form with 1 trunk wound recorded.

Wound 1 (W1)

Basal trunk wound, on N side, elliptical, asymmetrical (Photograph 10.1). Wound extended from ground to 1 m. Apex acute to rounded, base truncated. Wound opening extended from ground to 750 mm and was 280 mm at widest at centre and 200 mm wide at base. Cavity at base 110 mm deep and extended by fire. Wound face to heartwood, partly consumed by fire with sapwood fragments adjacent wound margins (Photographs 10.1-10.3).

Wound margin depth right 80 mm at 340 mm to sapwood fragment from 400 - 600 mm (Photograph 10.2). Wound margin depth left 80 mm to sapwood fragment adjacent wound apex (Photograph 10.3). Fragmented sapwood sections displayed circular burrows 10-15 mm wide, adjacent remnant wound margins, consistent with Longicorn Borer galleries (Photographs 10.2 and 10.3).

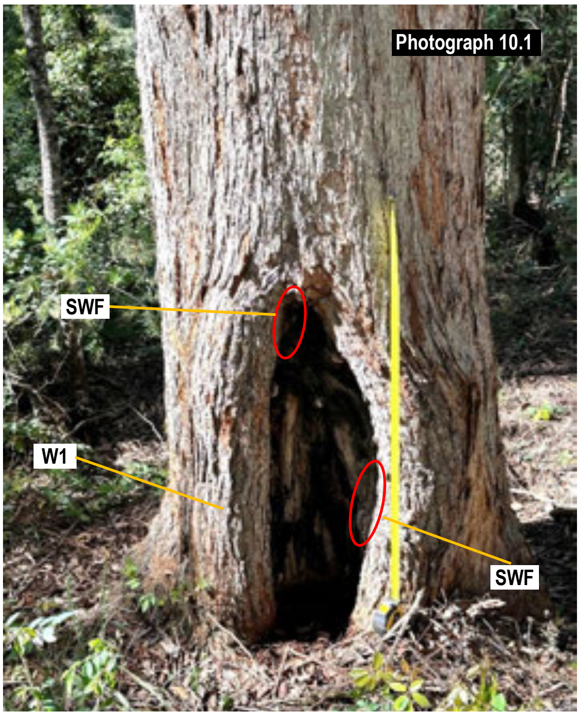
Conclusion

Wound (*W1*) – Caused by Longicorn Borer and extended by fire damage, 50 - <75 years ago.

Risks to tree

Not applicable as wound not of Aboriginal cultural origin.

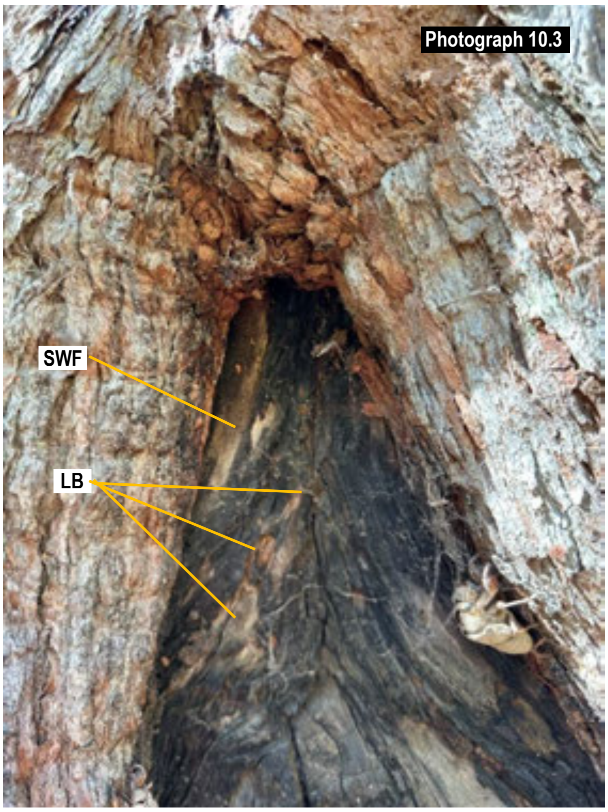
Photograph 10.0 Taken 27/11/2024 by Danny Draper. View to northeast of tree TN10 / HTP-C-CMT04 *Eucalyptus acmenoides* Shauer – White Mahogany (centre), showing Wound 1 (W1).

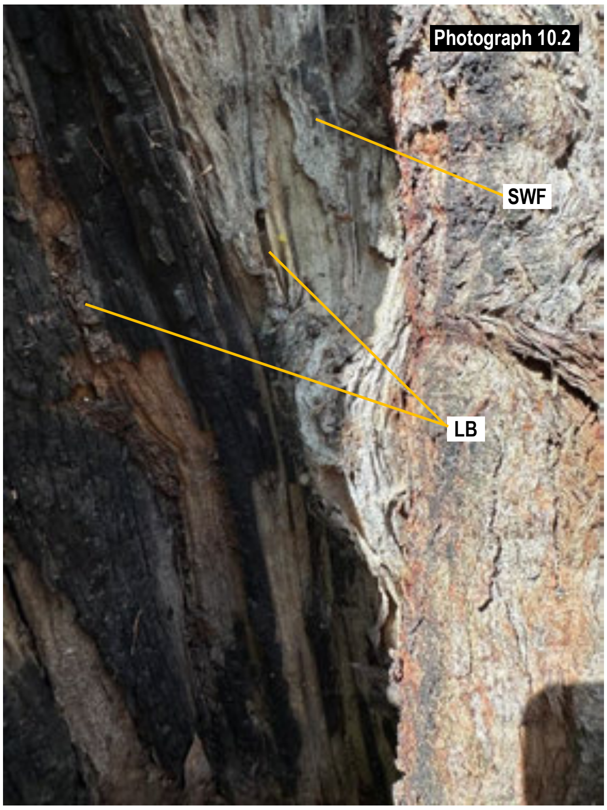


Photograph 10.1 Taken 27/11/2024 by Danny Draper. View to south of tree TN10 / HTP-C-CMT04 *Eucalyptus acmenoides* Shauer – White Mahogany (centre), showing Wound 1 (W1) with a yellow retractable tape measure extended to 1 m. Wound face darkened by fire damage. Remnant sapwood (RSW) adjacent wound margins right and left with details in Photographs 10.2 and 10.3.

Photographs 10.2 Taken 27/11/2024 by Danny Draper. View to south of tree TN10 / HTP-C-CMT04 *E. acmenoides* Shauer – White Mahogany showing sapwood fragment (SWF) from 400 - 600 mm, and Longicorn Borer (LB) holes and burrows.

Photographs 10.3 Taken 27/11/2024 by Danny Draper. View to south of tree TN10 / HTP-C-CMT04 *E. acmenoides* Shauer – White Mahogany showing sapwood fragment (SWF) adjacent wound apex, and Longicorn Borer (LB) holes and burrows.





4.0 TREE ASSESSMENT

4.1 Assessment of Tree/s – TN11 / HTP-S-CMT02

Tree No. / Archaeological No. Genus & species Common Name	**1. Age Class** **Y** = Young **M** = Mature **O** = Over-mature (Senescent) **2. Age range of tree** in yrs. approx. **3. Age range of wound/s,** in yrs. approx. **4. Date range since tree died** in yrs. approx., e.g., died, cut down, ring-barked	**Condition** **G =** Good **F =** Fair **P =** Poor **D** = Dead	**Form** **D** = Dominant **C** = Co-dominant **I** = Intermediate **S** = Suppressed **F** = Forest **E** = Emergent	**Height** in metres approx. / **Crown spread** approx. length x breadth metres / **Crown spread orientation.**	**Trunk diameter** in mm @ 1.4m, or as stated / **Trunk diameter orientation**	**Crown cover / Crown density** approx. %	**SRIV** Age, Vigour, Condition / Index Rating App A. / Remaining life expectancy 1. Long 2. Medium 3. Short
TN11 / HTP-S-CMT02 *Eucalyptus pilularis* Sm. Blackbutt	1. M 2. 250 - <275 3.1 50 - <75 (W1) 3.2 50 - <75 (W2) 4. N/A	F	F	25 x 8	1070 x 700, 885 Av., N/S	80 / 85	MGVF – 9 / 2

Eucalyptus pilularis Sm. – Blackbutt is a medium to very tall forest tree, coastal forests and adjacent ranges of NSW (Brooker and Kleinig, 1999, p. 229, Boland *et al*, 2006, p. 528) and can attain a height of 25-40 m (Elliot and Jones, 1986, p. 177) or to 70 m with a trunk diameter up to 3 m (Boland *et al*, 2006, p. 528) and a crown spread of up to 25 m.

E. pilularis Sm. heartwood has a green density of 1100 kg / m^3 (Bootle 2005, p. 252) and air dry density (ADD) 900 kg / m^3 (Bootle 2005, p. 252) and 720 - 1005 kg / m^3 (Boland *et al*, 2006, p. 528). Sapwood resistant to Lyctus borers (Boland *et al*, 2006, p. 528, Bootle 2005, p. 252) and heartwood resistant to termites (Bootle 2005, p. 252). The heartwood has a moderate durability (Boland *et al*, 2006, p. 528) an inground durability of 2 which is moderate and above ground durability of 1 which is high durability (Bootle, 2005, p. 252). Timber used for poles, sleepers and building framework, veneer and plywood (Bootle 2005, p. 252, Boland *et al*, 2006, p. 528). The tree grows within a rainfall range of 900-1750 mm (Boland *et al*, 2006, p. 528).

Tree TN11 / HTP-S-CMT02 (Photograph 11.0) was growing within the Hunter Transmission Project boundaries in an area with an expected comparable average annual rainfall of 758.0 mm recorded approximately 15 - <40 km away at the nearby Station: Pokolbin (Ben Ean), Number: 61056, opened 1905 to present (Australian Government Bureau of Meteorology, 2024). The tree was expected to be growing at a rate typical for the species with an estimated age of 250 - <275 years and appeared to have been of good vigour. Tree of forest form, straight, slightly leaning to NW with 1 trunk wound (W1) recorded.

<u>Wound 1 *(W1)*</u>

Basal trunk wound, on south side, asymmetrical (Photograph 11.1). Wound extended from ground to 4 m and was 400 mm at widest at base. Wound margin depth right 140 mm and left 100 mm. Secondary wound apex at 2640 mm with delaminated bark and wood section extending downwards to 920 mm above ground, 200 mm wide (Photograph 11.1). Wound face uneven to heartwood with fragments of necrotic sapwood near base from 250 - 1100 mm and 100 mm at widest (Photographs 11.1 and 11.3) with concave sections in sapwood 10-15 mm wide consistent with Longicorn Borer galleries (Photographs 11.2 and 11.3).

<u>Wound 2 *(W2)*</u>

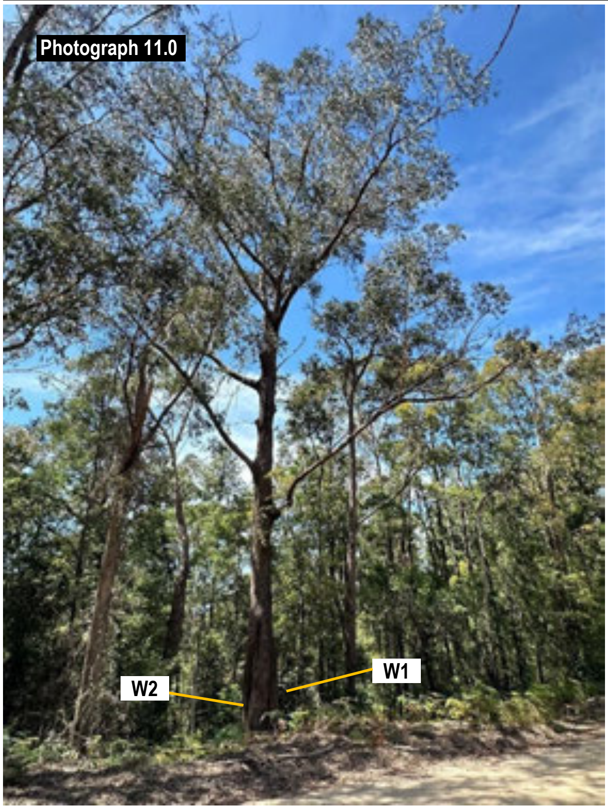
Basal trunk wound on north side, narrow, awl shaped, spiralling, asymmetrical (Photographs 11.0 and 11.1). Wound extended from ground to 3900 mm. Wound face extended from 500 - 1400 mm and was 180 mm at widest at 2000 mm. Wound margin depth right 80 mm and left 160 mm. Wound face entire to necrotic sapwood with concave sections 10-15 mm wide consistent with Longicorn Borer galleries (Photographs 11.4 and 11.5), and secondary circular holes 1-2 mm diameter consistent with Lyctid Borers.

<u>Conclusion</u>

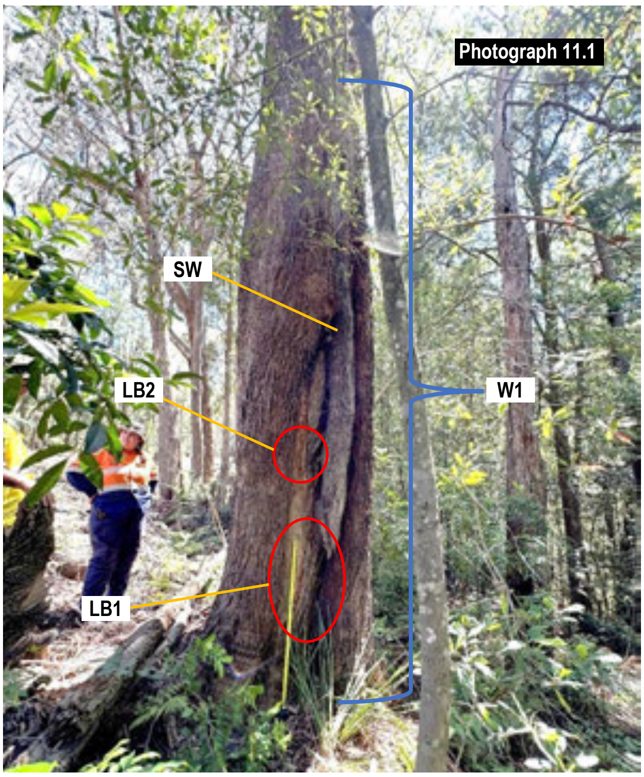
<u>Wounds 1 and 2 (*W1 and W2*)</u> – Caused by Longicorn Borer, 50 - <75 years ago.

<u>Risks to tree</u>

Not applicable as wound not of Aboriginal cultural origin.



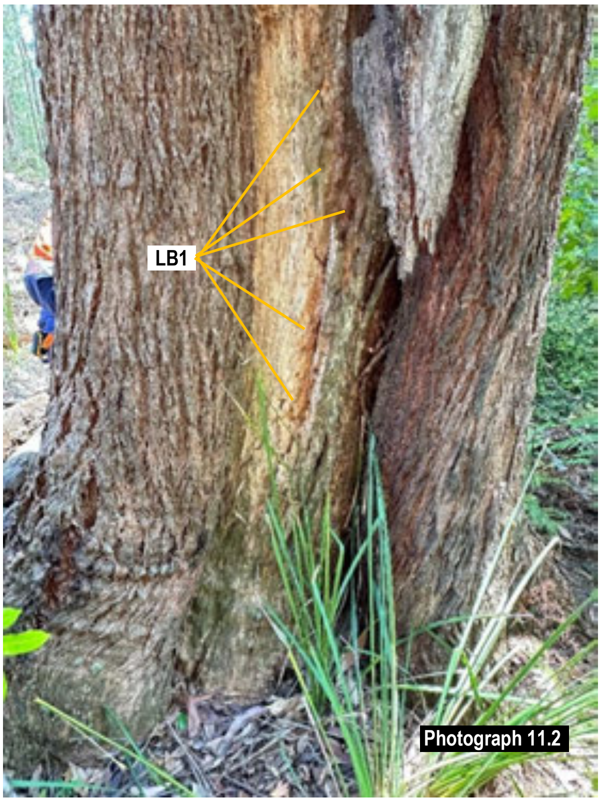
Photograph 11.0 Taken 27/11/2024 by Danny Draper. View to east of tree TN11 / HTP-S-CMT02 *Eucalyptus pilularis* Sm. – Blackbutt, showing Wounds 1 and 2 (W1 and W2).

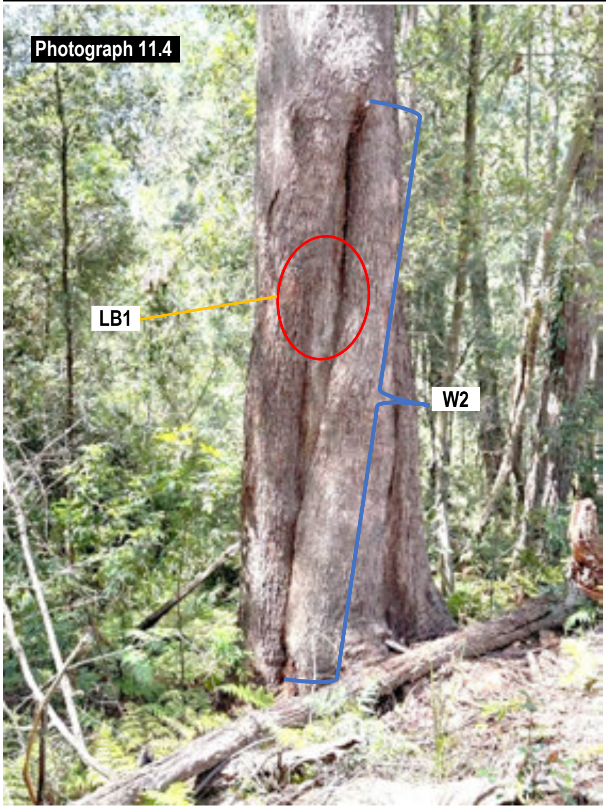


Photograph 11.1 Taken 27/11/2024 by Danny Draper. View to north of tree TN11 / HTP-S-CMT02 *E. pilularis* Sm. – Blackbutt, showing Wound 1 (W1) with a yellow retractable tape measure extended to 1 m. Vertical extent of wound shown with a blue brace. Areas of recent Longicorn Borer burrowing and galleries 1 (LB1) and 2 (LB2) shown in greater detail in Photographs 11.2 and 11.3, respectively. Secondary wound apex (SWA) at 2640 mm with delaminated bark and wood section extending downwards to 920 mm above ground, 200 mm wide.

Photograph 11.2 Taken 27/11/2024 by Danny Draper. View to north of tree TN11 / HTP-S-CMT02 *E. pilularis* Sm. – Blackbutt, showing Wound 1 (W1) areas of recent Longicorn Borer burrowing and gallery 1 (LB1) as concave sections 10-15 mm wide, shown in Photograph 11.1.

Photograph 11.3 Taken 27/11/2024 by Danny Draper. View to north of tree TN11 / HTP-S-CMT02 *E. pilularis* Sm. – Blackbutt, showing Wound 1 (W1) areas of recent Longicorn Borer burrowing and gallery 2 (LB2) as concave sections 10-15 mm wide, shown in Photograph 11.1.





Photograph 11.1 Taken 27/11/2024 by Danny Draper. View to southeast of tree TN11 / HTP-S-CMT02 *E. pilularis* Sm. – Blackbutt, showing Wound 2 (W2) with its vertical extent shown with a blue brace. Areas of recent Longicorn Borer burrowing and galleries 1 (LB1) shown in greater detail in Photograph 11.5.

Photograph 11.2 Taken 27/11/2024 by Danny Draper. View to southeast of tree TN11 / HTP-S-CMT02 *E. pilularis* Sm. – Blackbutt, showing Wound 2 (W2) areas of recent Longicorn Borer burrowing and gallery 1 (LB1) as concave sections 10-15 mm wide, shown in Photograph 11.4.

4.0 TREE ASSESSMENT

4.1 Assessment of Tree/s – TN12 / HTP-S-CMT01

Tree No. / Archaeological No. Genus & species Common Name	**1. Age Class** **Y** = Young **M** = Mature **O** = Over-mature (Senescent) **2. Age range of tree** in yrs. approx. **3. Age range of wound/s,** in yrs. approx. **4. Date range since tree died** in yrs. approx., e.g., died, cut down, ring-barked	**Condition** **G =** Good **F =** Fair **P =** Poor **D** = Dead	**Form** **D** = Dominant **C** = Co-dominant **I** = Intermediate **S** = Suppressed **F** = Forest **E** = Emergent	**Height** in metres approx. / **Crown spread** approx. length x breadth metres / **Crown spread orientation.**	**Trunk diameter** in mm @ 1.4m, or as stated / **Trunk diameter orientation**	**Crown cover / Crown density** approx. %	**SRIV** Age, Vigour, Condition / Index Rating App A. / Remaining life expectancy 1. Long 2. Medium 3. Short
TN12 / HTP-S-CMT01 *Eucalyptus saligna* Sm. Sydney Blue Gum	1. O 2. 350 - <450 3.1 70 - <90 (W1) 4. 40 - <50	D	F	25	1350 x 1300, 1325 Av., N/S	N/A	N/A

Eucalyptus saligna S. – Sydney Blue Gum is a medium to very tall forest tree, coastal (Brooker and Kleinig, 1999, p. 71, Boland *et al*, 2006, p. 294) and can attain a height of 20-45 m (Elliot and Jones, 1986, p. 202) or 30-55 m up to 65 m with a trunk diameter up to 2 – 2.5 m (Boland *et al*, 2006, p. 294) and a crown spread of 10-25 m (Elliot and Jones, 1986, p. 202).

E. saligna S. heartwood has a green density of 1070 kg / m^3 (Bootle 2005, p. 278) and air dry density (ADD) 850 kg / m^3 (Bootle 2005, p. 278) and 620 - 1000 kg / m^3 (Boland *et al*, 2006, p. 294). Sapwood susceptible to Lyctus borers (Boland *et al*, 2006, p. 294, Bootle 2005, p. 302) and heartwood not resistant to termites (Bootle 2005, p. 278). The heartwood has an inground durability of 3 which is low and above ground durability of 2 which is moderately durability (Bootle, 2005, p. 278). Timber used for general building purposes, cladding, panelling and flooring (Bootle 2005, p. 279, Boland *et al*, 2006, p. 294). The tree grows within a rainfall range of 900-1800 mm (Boland *et al*, 2006, p. 296).

Tree TN12 / HTP-S-CMT01 (Photograph 12.0) was growing within the Hunter Transmission Project boundaries in an area with an expected comparable average annual rainfall of 758.0 mm recorded approximately 15 - <40 km away at the nearby Station: Pokolbin (Ben Ean), Number: 61056, opened 1905 to present (Australian Government Bureau of Meteorology, 2024). The tree when alive was expected to be growing at a rate typical for the species with an estimated age of 350 - <400 years and appeared to have been of good vigour. Tree of forest form, dead, with 1 trunk wound recorded.

Wound 1 (W1)

Trunk wound on north side with a cavity, narrow linear, vertical, asymmetrical (Photographs 12.0 and 12.1). Wound extended from 2220 - 6700 mm approx. and was 350 mm at widest at 2700 mm. Wound margin depth 200 mm right and left and each slightly incurved. Collapsed sapwood and heartwood with oval holes and depressions approx. 10x15 mm consistent with Longicorn Borer burrows and galleries located above the wound base in the trunk cavity (Photographs 12.2 and 12.3).

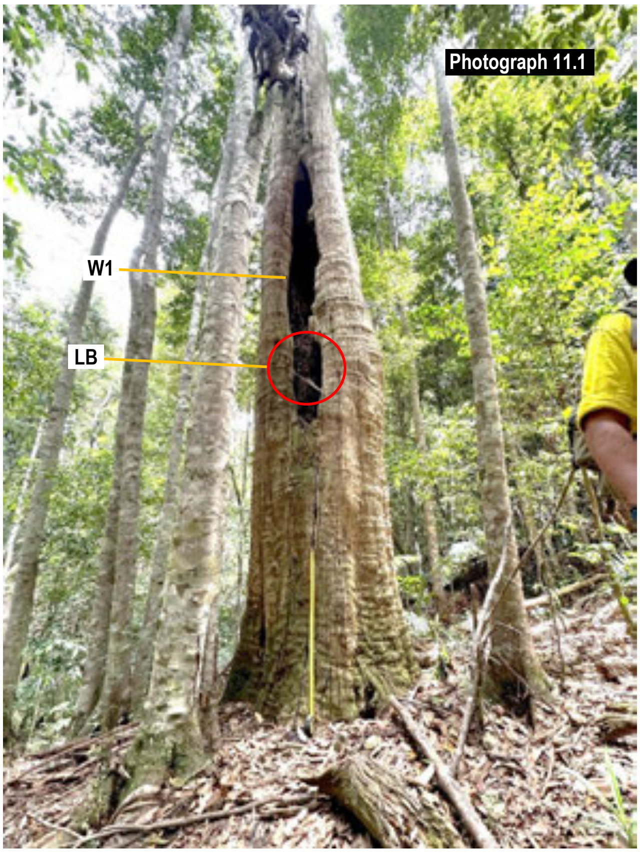
Conclusion

Wound (*W1*) – Caused by Longicorn Borer, 70 - <90 years ago.

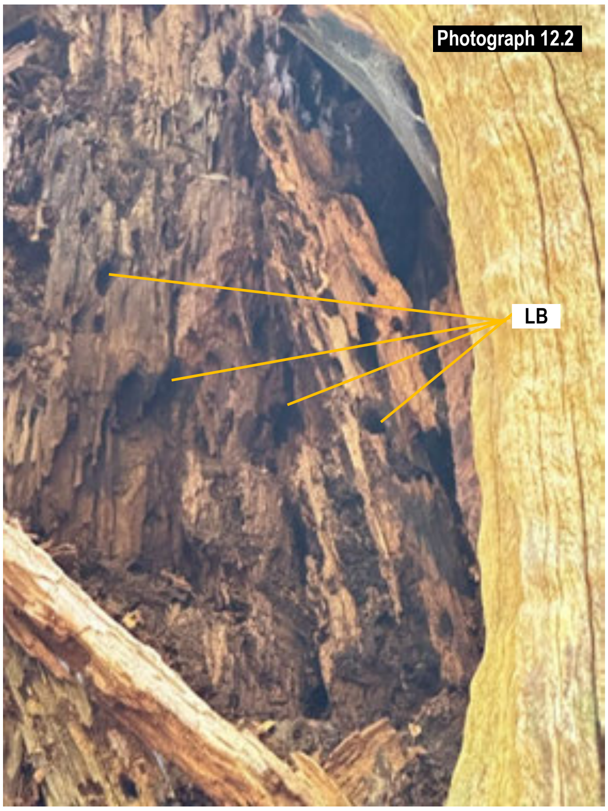
Risks to tree

Not applicable as wound not of Aboriginal cultural origin.

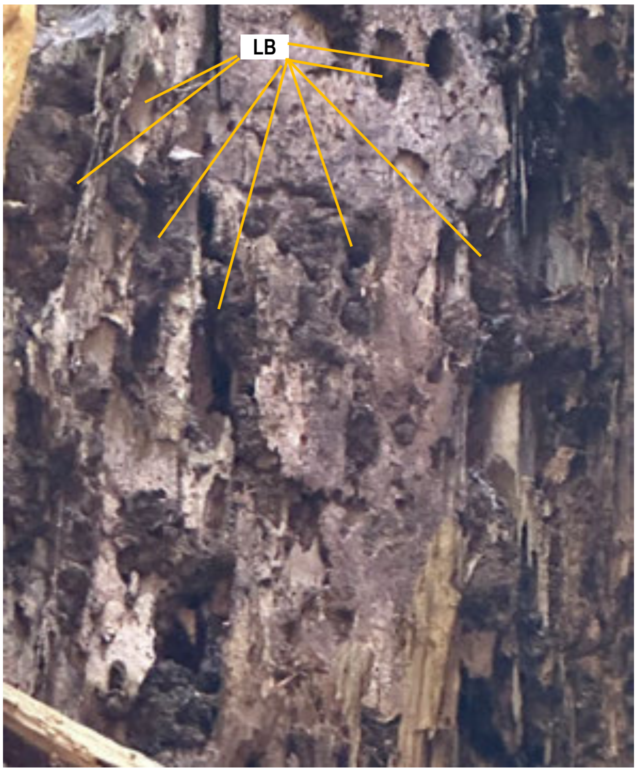
Photograph 12.0 Taken 27/11/2024 by Danny Draper. View to north of tree TN12 / HTP-S-CMT01 *Eucalyptus saligna* Sm. – Sydney Blue Gum (centre), showing Wound 1 (W1).



Photograph 12.1 Taken 27/11/2024 by Danny Draper. View to north of tree TN12 / HTP-S-CMT01 *E. saligna* Sm. – Sydney Blue Gum (centre), showing Wound 1 (W1) and location of collapse Longicorn borer gallery shown in detail in Photographs 11.2 and 11.3.



Photographs 12.2 and **12.3** Taken 27/11/2024 by Danny Draper. View to north of tree TN12 / HTP-S-CMT01 *E. saligna* Sm. – Sydney Blue Gum (centre), showing collapsed Longicorn Borer (LB) gallery with oval holes 10-16 mm, adjacent the wound base as located in Photograph 11.1.



4.0 TREE ASSESSMENT

4.1 Assessment of Tree/s – TN13 / HTP-C-CMT07

Tree No. / Archaeological No. Genus & species Common Name	**1. Age Class** **Y** = Young **M** = Mature **O** = Over-mature (Senescent) **2. Age range of tree** in yrs. approx. **3. Age range of wound/s,** in yrs. approx. **4. Date range since tree died** in yrs. approx., e.g., died, cut down, ring-barked	**Condition** **G** = Good **F** = Fair **P** = Poor **D** = Dead	**Form** **D** = Dominant **C** = Co-dominant **I** = Intermediate **S** = Suppressed **F** = Forest **E** = Emergent	**Height** in metres approx. / **Crown spread** approx. length x breadth metres / **Crown spread orientation.**	**Trunk diameter** in mm @ 1.4m, or as stated / **Trunk diameter orientation**	**Crown cover / Crown density** approx. %	**SRIV** Age, Vigour, Condition / Index Rating App A. / Remaining life expectancy 1. Long 2. Medium 3. Short
TN13 / HTP-C-CMT07 *Eucalyptus acmenoides* Shauer White Mahogany	1. M 2. 200 - <250 3.1 50 - <75 (W1) 3.2 50 - <75 (W1) 3.3 50 - <75 (W1) 4. N/A	P	F	25 x 12	800 x 600 700 Av., N/S	80 / 85	MGVP – 6 / 2

Eucalyptus acmenoides Schauer. – White Mahogany is a tree of open and tall open forest (Brooker and Kleinig, 1999, p. 251, and Boland et al, 2006, p. 506), persistent bark throughout, grey to red-brown, thin, and stringy (Elliot and Jones, 1986, p. 15 and PlantNET, 2024). It has a distribution along the coastal plain extending to the ranges from near Sydney in NSW to north of Cooktown in Queensland (Brooker and Kleinig, 1999, p. 283 and Boland *et al*, 2006, p. 544). In NSW it commonly occurs on hills and ridges below 300 mm altitude growing on clay and loam soils (Boland et al, 2006, p. 544). It can attain a height of 15 – 30 m (Elliot and Jones, 1986, p. 15) or 25 – 60 m with a trunk diameter 1 m DBH (Boland et al, 2006, p. 526) and a crown spread of 5-15 m (Elliot and Jones, 1986, p. 15).

E. acmenoides Schauer. – White Mahogany, heartwood has a green density of 1200 kg / m^3 approx. (Bootle 2005, p. 303) and air dry density (ADD) 1000 kg / m^3 approx. (Bootle 2005, p. 350) and 795 - 1010 kg / m^3 (Boland *et al*, 2006, p. 526). Sapwood rarely attacked by Lyctus borers and heartwood is termite resistant (Boland *et al*, 2006, p. 526, Bootle 2005, p. 303). The wood is strong and very durable (Boland *et al*, 2006, p. 526), with an above ground durability class of AG1, and an inground durability class of IG1 (Bootle 2005, p. 303) and is used for heavy engineering construction, poles, sleeper, ship building, flooring, joists, and weatherboards (Bootle 2005, p. 303, and Boland *et al*, 2006, p. 526). The tree grows within a rainfall range of 700-1700 mm (Boland *et al*, 2006, p. 506).

Tree TN13 / HTP-C-CMT07 (Photograph 13.0) was growing within the Hunter Transmission Project boundaries in an area with an expected comparable average annual rainfall of 758.0 mm recorded approximately 15 - <40 km away at the nearby Station: Pokolbin (Ben Ean), Number: 61056, opened 1905 to present (Australian Government Bureau of Meteorology, 2024). The tree was expected to be growing at a rate typical for the species with an estimated age of 200 - <250 years and appeared to have been of good vigour. Tree of forest form with 3 trunk wounds recorded. Mature basal epicormic shoot down slope to N, 200 mm diameter. Trunk hollow extending vertically to 2500 mm.

Wound 1 *(W1)*

Basal trunk wound on west side, triangular, asymmetrical, extended by fire (Photograph 13.1). Wound extended from ground to 2480 mm and was 650 mm at widest at base. Trunk hollow, 630 mm deep, orientation N/S. Wound margin depth right 100 mm and left 50 mm. Longicorn borer galleries between sapwood and heartwood interface and fragments of sapwood from 1670 - 1960 mm and 130 mm wide (Photographs 13.0, 13.2 and 13.3). Another from 1810 -2050 mm adjacent wound margin right.

Wound 2 *(W2)*

Basal trunk wound, on south side, asymmetrical (Photograph 13.4). Wound extended from ground to 970 mm and was 300 mm at widest at ground. Wound margin depth right 100 mm and left 40 mm. Sapwood fragments adjacent wound margin left. Wound face partly consumed by fire.

Wound 3 *(W3)*

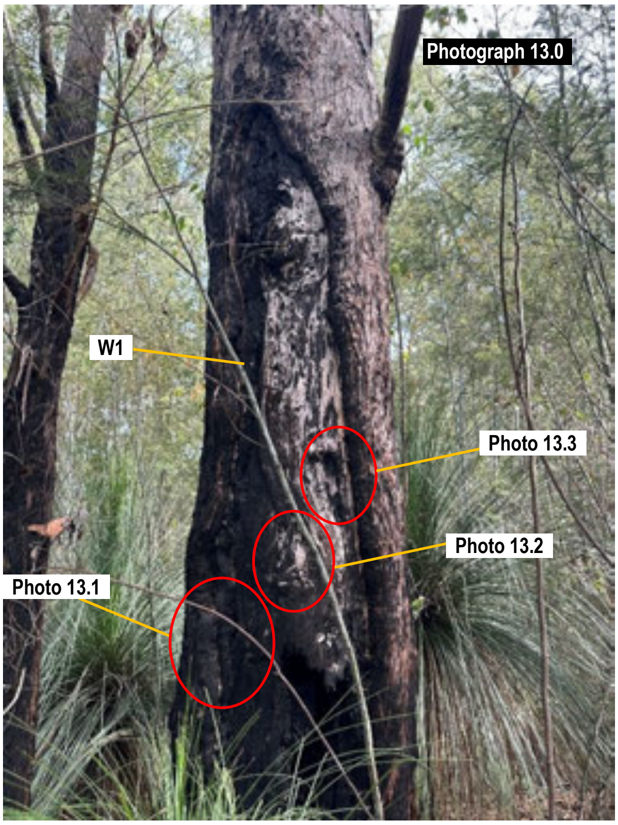
Trunk wound on west side, elliptical, asymmetrical (Photograph 13.5). Wound extended from 980 - 2080 mm and was 280 mm at widest at centre. Apex rounded skewed to a point adjoining wound margin right, base acute centered. Wound margin depth right 70 mm and left 80 mm. Wound face mostly consumed by fire and cavity extended to trunk hollow.

Conclusion

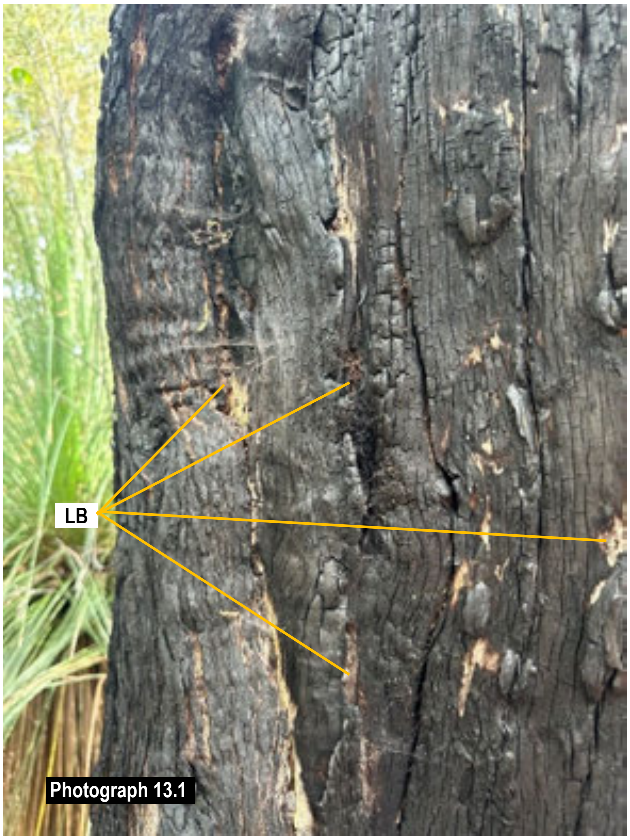
Wounds 1 – 3 (*W1 - W3*) – Caused by Longicorn Borer, 50 - <75 years ago.

Risks to tree

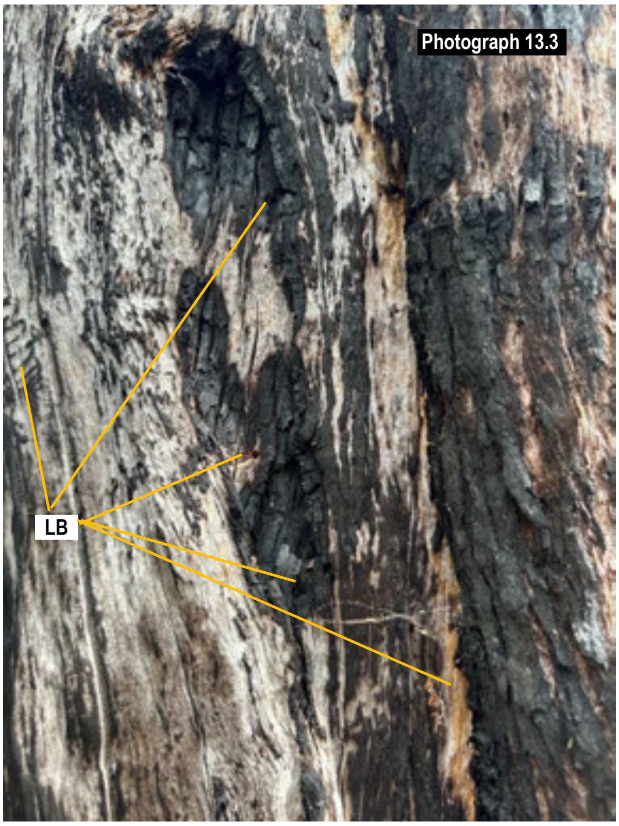
Not applicable as wound not of Aboriginal cultural origin.

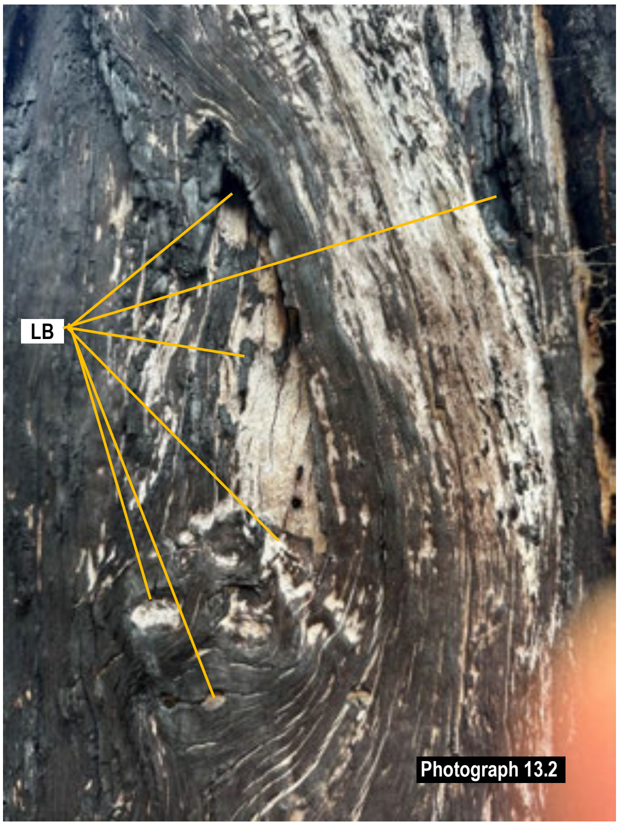


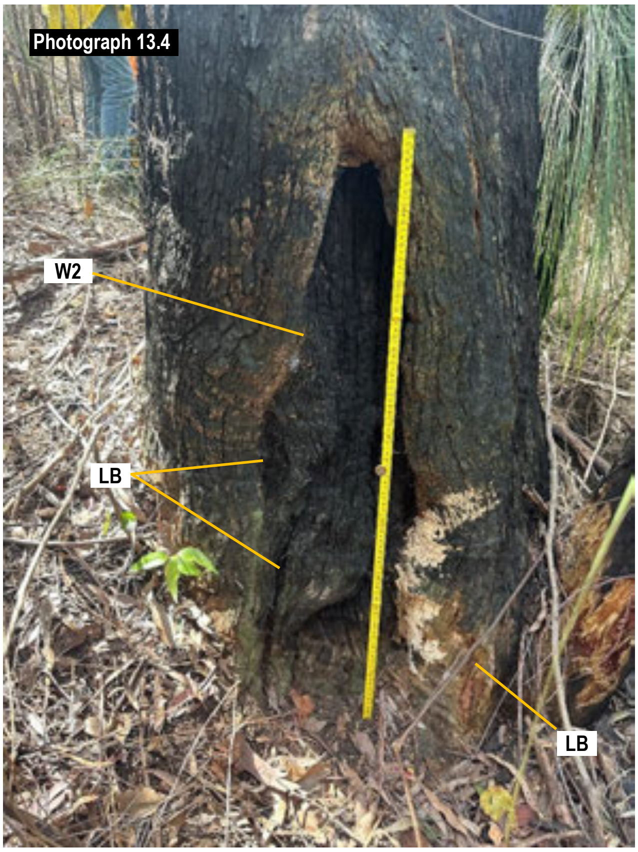
Photograph 13.0 Taken 27/11/2024 by Danny Draper. View to south of tree TN13 / HTP-S-CMT07 *Eucalyptus acmenoides* Shauer – White Mahogany showing Wound 1 (W1). Red circled areas detailed in Photographs 13.1-13.3.



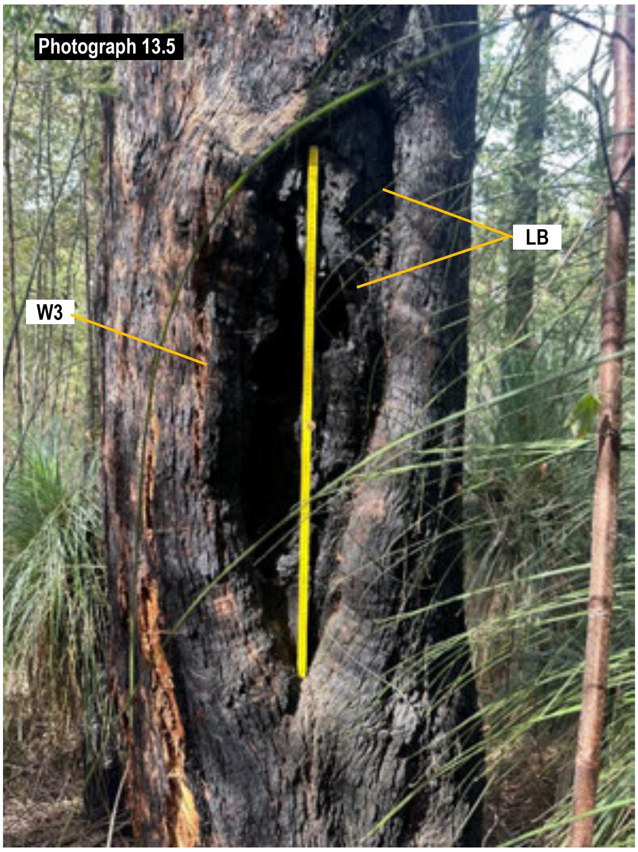
Photographs 13.1 - 13.3 Taken 27/11/2024 by Danny Draper. View to south of tree TN13 / HTP-S-CMT07 *E. acmenoides* Shauer – White Mahogany showing Wound 1 (W1) sections of wound showing Longicorn Borer galleries between sapwood and heartwood interface.







Photograph 13.4 Taken 27/11/2024 by Danny Draper. View to west of tree TN13 / HTP-S-CMT07 *Eucalyptus acmenoides* Shauer – White Mahogany showing Wound 2 (W2) with a yellow folding ruler extended to 1 m. Longicorn Borer (LB) galleries evident adjacent wound margin right. Wound face consumed by fire.



Photograph 13.5 Taken 27/11/2024 by Danny Draper. View to north of tree TN13 / HTP-S-CMT07 *Eucalyptus acmenoides* Shauer – White Mahogany showing Wound 3 (W3) with a yellow folding ruler extended to 1 m. Longicorn Borer (LB) galleries evident adjacent wound margin right. Wound face consumed by fire.

4.0 TREE ASSESSMENT

4.1 Assessment of Tree/s – TN14 / HTP-C-CMT08

Tree No. / Archaeological No. Genus & species Common Name	**1. Age Class** **Y** = Young **M** = Mature **O** = Over-mature (Senescent) **2. Age range of tree** in yrs. approx. **3. Age range of wound/s,** in yrs. approx. **4. Date range since tree died** in yrs. approx., e.g., died, cut down, ring-barked	**Condition** **G** = Good **F** = Fair **P** = Poor **D** = Dead **W3**	**Form** **D** = Dominant **C** = Co-dominant **I** = Intermediate **S** = Suppressed **F** = Forest **E** = Emergent	**Height** in metres approx. / **Crown spread** approx. length x breadth metres / **Crown spread orientation.**	**Trunk diameter** in mm @ 1.4m, or as stated / **Trunk diameter orientation**	**Crown cover / Crown density** approx. %	**SRIV** Age, Vigour, Condition / Index Rating App A. / Remaining life expectancy 1. Long 2. Medium 3. Short
TN14 / HTP-C-CMT08 *Angophora costata* (Geartn.) Britten Smooth-barked Apple	1. Y 2. 50 - <70 3.1 10 - <20 (W1) 4. N/A	F	O	14x 8	260 x 230, 245 Av., N/S	80 / 85	YGVF – 8 / 1

Angophora costata (Geartn.) Britten – Smooth-barked Apple is medium tree, coastal (Elliot and Jones, 1982, p. 196 and Boland *et al*, 2006, p. 214) and can attain a height of 15-25 m (Boland *et al*, 2006, p. 296) or 10-30 m (Elliot and Jones, 1982, p. 196) with a trunk diameter 0.5 – 1.0 m and up to 1.2 m (Boland *et al*, 2006, p. 214) and a crown spread of 6-15 m (Elliot and Jones, 1982, p. 196).

A. costata (Geartn.) Britten heartwood has a green density of 1240 kg / m^3 approx. (Bootle 2005, p. 239) and air dry density (ADD) 990 kg / m^3 (Bootle 2005, p. 239) and 755 – 1045 kg / m^3 (Boland *et al*, 2006, p. 214). Sapwood susceptible to Lyctid borers and heartwood very hard, strong, but not durable (Boland *et al*, 2006, p. 214, Bootle 2005, p. 239) The wood is used mainly for fence palings and (Bootle 2005, p. 239, Boland *et al*, 2006, p. 214). The tree grows within a rainfall range of 600-1200 mm (Boland *et al*, 2006, p. 214).

Tree TN14 / HTP-C-CMT08 (Photograph 14.0) was growing within the Hunter Transmission Project boundaries in an area with an expected comparable average annual rainfall of 758.0 mm recorded approximately 15 - <40 km away at the nearby Station: Pokolbin (Ben Ean), Number: 61056, opened 1905 to present (Australian Government Bureau of Meteorology, 2024). The tree was expected to be growing at a rate typical for the species with an estimated age of 50-<70 years and appeared to have been of good vigour. Tree of open grown form with 1 trunk wound recorded.

Wound 1 (W1)

Trunk wound to east, roughly rectangular, asymmetrical (Photographs 14.0 and 14.1). Wound extended from 660 - 1780 mm and was 225 mm at widest at centre. Wound margin depth right 5-10 mm and left 10-<15 mm. Wound face to sapwood/heartwood interface. Wound face to sapwood with circular concave burrows consistent with Longicorn Borers.

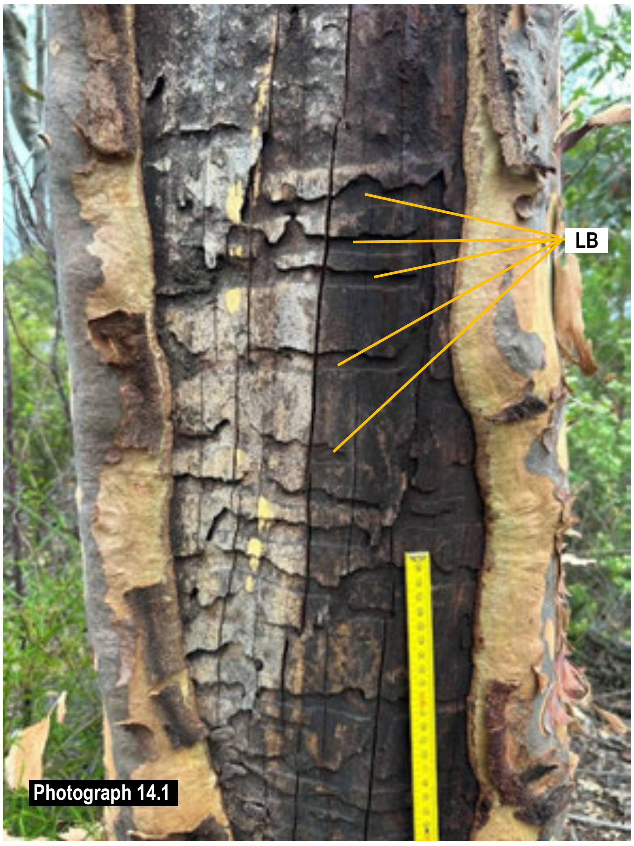
Conclusion

Wound 1 (*W1*) – Caused by Longicorn Borer, 10 - <20 years ago.

Risks to tree

Not applicable as wound not of Aboriginal cultural origin.

Photograph 14.0 Taken 28/11/2024 by Danny Draper. View to west of tree TN14 / HTP-C-CMT01 *Angophora costata* (Geartn.) Britten – Smooth-barked Apple showing Wound 1 (W1) with a yellow foldable ruler extended to 1 m.



Photograph 14.1 Taken 28/11/2024 by Danny Draper. View to west of tree TN14 / HTP-C-CMT08 *Angophora costata* (Geartn.) Britten – Smooth-barked Apple showing Wound 1 (W1) with a yellow folding ruler extended to 1 m. Longicorn Borer (LB) galleries of circular concave burrows evident in wound face sapwood.

4.0 TREE ASSESSMENT

4.1 Assessment of Tree/s – TN15 / HTP-C-CMT09

Tree No. / Archaeological No. Genus & species Common Name	1. **Age Class** **Y** = Young **M** = Mature **O** = Over-mature (Senescent) 2. **Age range of tree** in yrs. approx. 3. **Age range of wound/s,** in yrs. approx. 4. **Date range since tree died** in yrs. approx., e.g., died, cut down, ring-barked	**Condition** **G** = Good **F** = Fair **P** = Poor **D** = Dead	**Form** **D** = Dominant **C** = Co-dominant **I** = Intermediate **S** = Suppressed **F** = Forest **E** = Emergent	**Height** in metres approx. / **Crown spread** approx. length x breadth metres / **Crown spread orientation.**	**Trunk diameter** in mm @ 1.4m, or as stated / **Trunk diameter orientation**	**Crown cover / Crown density** approx. %	**SRIV** Age, Vigour, Condition / Index Rating App A. / Remaining life expectancy 1. Long 2. Medium 3. Short
TN15 / HTP-C-CMT09 *Angophora costata* (Geartn.) Britten Smooth-barked Apple	1. M 2. 200 - <225 3.1 30 - <40 (W1) 4. N/A	G	F	27 x 20	600 x 650, 625 Av., N/S	>90 / >90	MGVG – 10 / 1

Angophora costata (Geartn.) Britten – Smooth-barked Apple is medium tree, coastal (Elliot and Jones, 1982, p. 196 and Boland *et al*, 2006, p. 214) and can attain a height of 15-25 m (Boland *et al*, 2006, p. 296) or 10-30 m (Elliot and Jones, 1982, p. 196) with a trunk diameter 0.5 – 1.0 m and up to 1.2 m (Boland *et al*, 2006, p. 214) and a crown spread of 6-15 m (Elliot and Jones, 1982, p. 196).

A. costata (Geartn.) Britten heartwood has a green density of 1240 kg / m^3 approx. (Bootle 2005, p. 239) and air dry density (ADD) 990 kg / m^3 (Bootle 2005, p. 239) and 755 – 1045 kg / m^3 (Boland *et al*, 2006, p. 214). Sapwood susceptible to Lyctid borers and heartwood very hard, strong, but not durable (Boland *et al*, 2006, p. 214, Bootle 2005, p. 239) The wood is used mainly for fence palings and (Bootle 2005, p. 239, Boland *et al*, 2006, p. 214). The tree grows within a rainfall range of 600-1200 mm (Boland *et al*, 2006, p. 214).

Tree TN15 / HTP-C-CMT09 (Photograph 15.0) was growing within the Hunter Transmission Project boundaries in an area with an expected comparable average annual rainfall of 758.0 mm recorded approximately 15 - <40 km away at the nearby Station: Pokolbin (Ben Ean), Number: 61056, opened 1905 to present (Australian Government Bureau of Meteorology, 2024). The tree was expected to be growing at a rate typical for the species with an estimated age of 200 - <225 years and appeared to have been of good vigour. Tree of forest form with 1 trunk wound recorded.

<u>Wound 1 *(W1)*</u>

Trunk wound, on east side, roughly oval, asymmetrical (Photograph 15.0). Wound extended from 280 - 1480 mm. Wound face extended from 300 - 1450 mm and was 320 mm at widest at centre. Wound margin right entire 50 mm deep and left successional with initial wound margin necrotic 60 mm wide and 10 mm deep, current wound margin irregular 45 mm deep. Wound face entire to necrotic sapwood with oval holes 8x10 to 9x11 mm adjacent wound margin left (Photographs 15.1 and 15.2), consistent with exit holes of adult Longicorn Borer. Some circular holes evident, 1-2 mm diameter, consistent with Lyctid borers in the necrotic wound face.

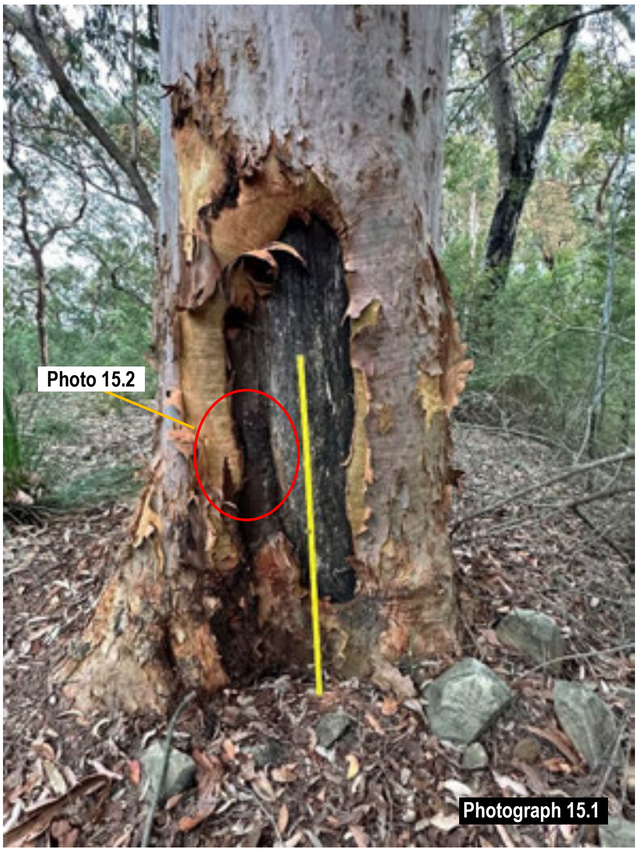
<u>Conclusion</u>

<u>Wound 1 (*W1*)</u> – Caused by Longicorn Borer, 30 - <40 years ago.

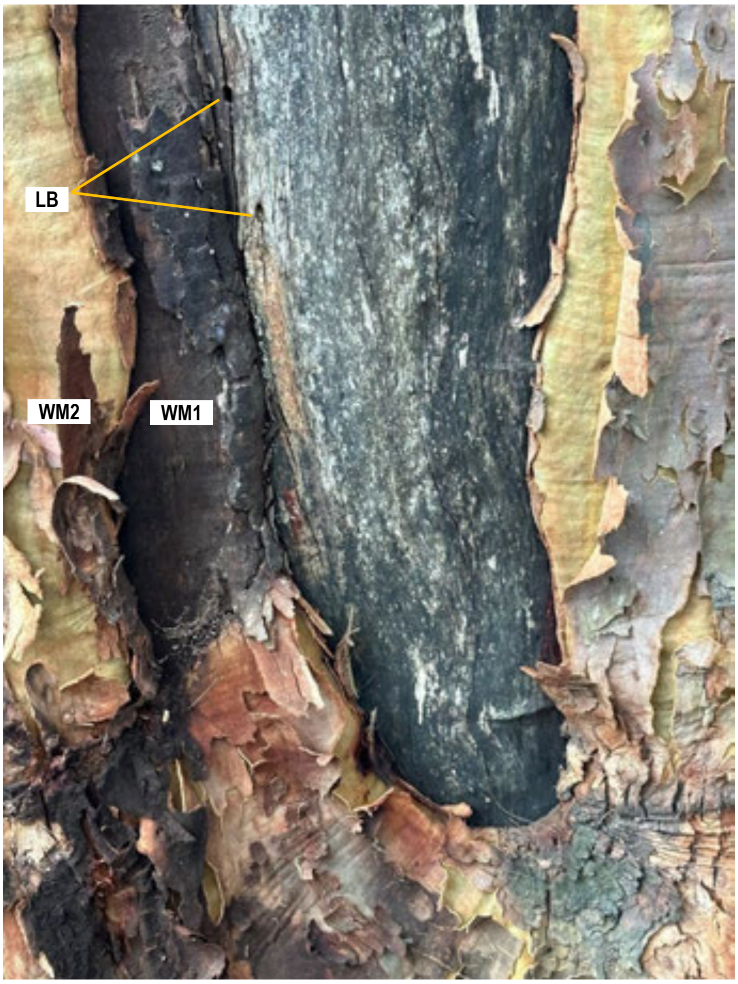
<u>Risks to tree</u>

Not applicable as wound not of Aboriginal cultural origin.

Photograph 15.0 Taken 28/11/2024 by Danny Draper. View to northwest of tree TN15 / HTP-C-CMT09 *Angophora costata* (Geartn.) Britten – Smooth-barked Apple showing Wound 1 (W1).



Photograph 15.1 Taken 28/11/2024 by Danny Draper. View to west of tree TN15 / HTP-C-CMT09 *A. costata* (Geartn.) Britten – Smooth-barked Apple showing Wound 1 (W1) with a yellow foldable ruler extended to 1 m. Red circled area detailed in Photograph 15.2.



Photograph 15.2 Taken 28/11/2024 by Danny Draper. View to west of tree TN15 / HTP-C-CMT09 *A. costata* (Geartn.) Britten – Smooth-barked Apple showing Wound 1 (W1) sections of wound showing oval holes 8x10 mm consistent with Longicorn Borer (LB) exit holes in the sapwood wound face. Successive wound margins at wound margin left showing necrotic initial wound (WM1) margin and current wound margin (WM2).

4.0 TREE ASSESSMENT

4.1 Assessment of Tree/s – TN16 / HTP-C-CMT21

Tree No. / Archaeological No. Genus & species Common Name	**1. Age Class** **Y** = Young **M** = Mature **O** = Over-mature (Senescent) **2. Age range of tree** in yrs. approx. **3. Age range of wound/s,** in yrs. approx. **4. Date range since tree died** in yrs. approx., e.g., died, cut down, ring-barked	**Condition** **G** = Good **F** = Fair **P** = Poor **D** = Dead	**Form** **D** = Dominant **C** = Co-dominant **I** = Intermediate **S** = Suppressed **F** = Forest **E** = Emergent	**Height** in metres approx. / **Crown spread** approx. length x breadth metres / **Crown spread orientation.**	**Trunk diameter** in mm @ 1.4m, or as stated / **Trunk diameter orientation**	**Crown cover / Crown density** approx. %	**SRIV** Age, Vigour, Condition / Index Rating App A. / Remaining life expectancy 1. Long 2. Medium 3. Short
TN16 / HTP-C-CMT21 *Angophora costata* (Geartn.) Britten Smooth-barked Apple	1. M 2. 125 - <150 3.1 20 - <40 (W1) 4. N/A	F	F	30 x 20	600	85 / 85	MGVF – 9 / 2

Angophora costata (Geartn.) Britten – Smooth-barked Apple is medium tree, coastal (Elliot and Jones, 1982, p. 196 and Boland *et al*, 2006, p. 214) and can attain a height of 15-25 m (Boland *et al*, 2006, p. 296) or 10-30 m (Elliot and Jones, 1982, p. 196) with a trunk diameter 0.5 – 1.0 m and up to 1.2 m (Boland *et al*, 2006, p. 214) and a crown spread of 6-15 m (Elliot and Jones, 1982, p. 196).

A. costata (Geartn.) Britten heartwood has a green density of 1240 kg / m^3 approx. (Bootle 2005, p. 239) and air dry density (ADD) 990 kg / m^3 (Bootle 2005, p. 239) and 755 – 1045 kg / m^3 (Boland *et al*, 2006, p. 214). Sapwood susceptible to Lyctid borers and heartwood very hard, strong, but not durable (Boland *et al*, 2006, p. 214, Bootle 2005, p. 239) The wood is used mainly for fence palings and (Bootle 2005, p. 239, Boland *et al*, 2006, p. 214). The tree grows within a rainfall range of 600-1200 mm (Boland *et al*, 2006, p. 214).

Tree TN16 / HTP-C-CMT21 (Photograph 16.0) was growing within the Hunter Transmission Project boundaries in an area with an expected comparable average annual rainfall of 758.0 mm recorded approximately 15 - <40 km away at the nearby Station: Pokolbin (Ben Ean), Number: 61056, opened 1905 to present (Australian Government Bureau of Meteorology, 2024). The tree was expected to be growing at a rate typical for the species with an estimated age of 125 - <150 years and appeared to have been of good vigour. Tree of forest form with 1 trunk wound recorded.

<u>Wound 1 *(W1)*</u>

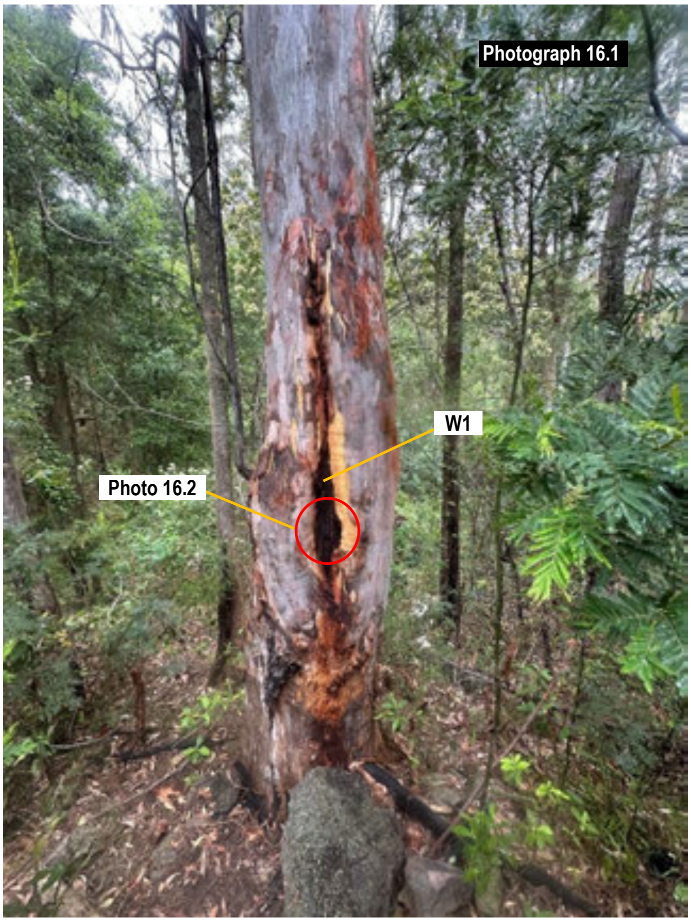
Trunk wound, on north side, awl shaped, narrow vertically, asymmetrical (Photograph 16.1). Wound extended from to 950 - 2970 mm. Wound face extended from 1450 – 2450 mm and 80 mm at widest at centre. Wound margin depths right and left 20 -<30 mm. Wound face entire to necrotic heartwood with kino exudate (sap) and coarse frass from Longicorn Borer active at wound margin right with circular holes 1-<2 mm diameter near wound face centre, consistent with Lyctus Borers (Photographs 16.1 and 16.2).

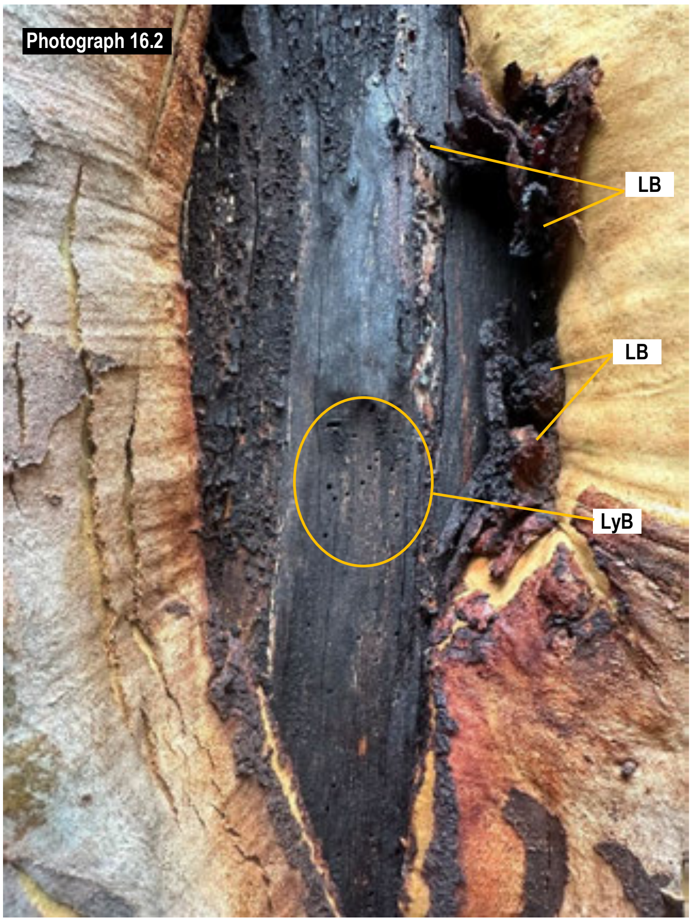
<u>Conclusion</u>

<u>Wound 1 (*W1*)</u> – Caused by Longicorn Borer, 20 - <40 years ago.

<u>Risks to tree</u>

Not applicable as wound not of Aboriginal cultural origin.





Photograph 16.0 Taken 28/11/2024 by Danny Draper. Collage, view to northwest of tree TN16 / HTP-C-CMT21 *Angophora costata* (Geartn.) Britten – Smooth-barked Apple showing Wound 1 (W1).

Photograph 16.1 Taken 28/11/2024 by Danny Draper. View to northwest of tree TN16 / HTP-C-CMT21 *A. costata* (Geartn.) Britten – Smooth-barked Apple showing Wound 1 (W1). Red circled area detailed in Photograph 16.2.

Photograph 16.2 Taken 28/11/2024 by Danny Draper. View to northwest of tree TN16 / HTP-C-CMT21 *A. costata* (Geartn.) Britten – Smooth-barked Apple showing Wound 1 (W1) kino exudate (sap) and coarse frass from Longicorn Borer (LB) active at wound margin right adjacent the necrotic wound face with circular holes 1-<2 mm diameter consistent with Lyctus Borers (LyB) in necrotic tissue, circled orange.

4.0 TREE ASSESSMENT

4.1 Assessment of Tree/s – TN17 / #37-6-2779

Tree No. / Archaeological No. Genus & species Common Name	**1. Age Class** **Y** = Young **M** = Mature **O** = Over-mature (Senescent) **2. Age range of tree** in yrs. approx. **3. Age range of wound/s,** in yrs. approx. **4. Date range since tree died** in yrs. approx., e.g., died, cut down, ring-barked	**Condition** **G** = Good **F** = Fair **P** = Poor **D** = Dead	**Form** **D** = Dominant **C** = Co-dominant **I** = Intermediate **S** = Suppressed **F** = Forest **E** = Emergent	**Height** in metres approx. / **Crown spread** approx. length x breadth metres / **Crown spread orientation.**	**Trunk diameter** in mm @ 1.4m, or as stated / **Trunk diameter orientation**	**Crown cover / Crown density** approx. %	**SRIV** Age, Vigour, Condition / Index Rating App A. / Remaining life expectancy 1. Long 2. Medium 3. Short
TN17 / #37-6-2779 *Eucalyptus acmenoides* Shauer White Mahogany	1. M 2. 300 - <350 3.1 30 - <50 (W1) 4. N/A	F	F	30 x 18	770 x 600, 685 Av., N/S	85 / 85	MGVF – 9 / 2

Eucalyptus acmenoides Schauer. – White Mahogany is a tree of open and tall open forest (Brooker and Kleinig, 1999, p. 251, and Boland et al, 2006, p. 506), persistent bark throughout, grey to red-brown, thin, and stringy (Elliot and Jones, 1986, p. 15 and PlantNET, 2024). It has a distribution along the coastal plain extending to the ranges from near Sydney in NSW to north of Cooktown in Queensland (Brooker and Kleinig, 1999, p. 283 and Boland *et al*, 2006, p. 544). In NSW it commonly occurs on hills and ridges below 300 mm altitude growing on clay and loam soils (Boland et al, 2006, p. 544). It can attain a height of 15 – 30 m (Elliot and Jones, 1986, p. 15) or 25 – 60 m with a trunk diameter 1 m DBH (Boland et al, 2006, p. 526) and a crown spread of 5-15 m (Elliot and Jones, 1986, p. 15).

E. acmenoides Schauer. – White Mahogany, heartwood has a green density of 1200 kg / m^3 approx. (Bootle 2005, p. 303) and air dry density (ADD) 1000 kg / m^3 approx. (Bootle 2005, p. 350) and 795 - 1010 kg / m^3 (Boland *et al*, 2006, p. 526). Sapwood rarely attacked by Lyctus borers and heartwood is termite resistant (Boland *et al*, 2006, p. 526, Bootle 2005, p. 303). The wood is strong and very durable (Boland *et al*, 2006, p. 526), with an above ground durability class of AG1, and an inground durability class of IG1 (Bootle 2005, p. 303) and is used for heavy engineering construction, poles, sleeper, ship building, flooring, joists, and weatherboards (Bootle 2005, p. 303, and Boland *et al*, 2006, p. 526). The tree grows within a rainfall range of 700-1700 mm (Boland *et al*, 2006, p. 506).

Tree TN17 / #37-6-2779 (Photograph 17.0) was growing within the Hunter Transmission Project boundaries in an area with an expected comparable average annual rainfall of 758.0 mm recorded approximately 15 - <40 km away at the nearby Station: Pokolbin (Ben Ean), Number: 61056, opened 1905 to present (Australian Government Bureau of Meteorology, 2024). The tree was expected to be growing at a rate typical for the species with an estimated age of 300 - <350 years and appeared to have been of good vigour. Branch tear wounds on opposite side of tree, narrow and elongated, 250 -<900 mm and less than 300 mm wide, appeared to have been extended vertically by Longicorn Borer activity. Buttress roots down slope each 550 mm diameter at trunk. One bifurcated on upslope side. Tree of forest form with 1 trunk wound recorded.

<u>Wound 1 *(W1)*</u>

Trunk wound, on N side, elliptical, asymmetrical (Photograph 17.0). Wound extended from 600 - 2300 mm with partial occlusion seam distally. Wound face extended from 640 - 3140 mm and was 280 mm at widest at 1520 mm. Wound margin depth right 150 mm deep, with margin loaded in compression and left 65 mm deep loaded in tension. Wound face to sapwood/ heartwood interface. Base of Longicorn borer gallery remnant from 1270-1300 mm,14 mm wide, concave to 4 mm distally and 75 mm from wound margin left (Photographs 17.2 – 17.4). Circular holes 1-2 mm diameter present in wound face consistent with Lyctid borers (Photograph 17.4). Lyctid borer gallery and partial delignification from 860-960 mm adjacent the left wound margin (Photograph 17.5).

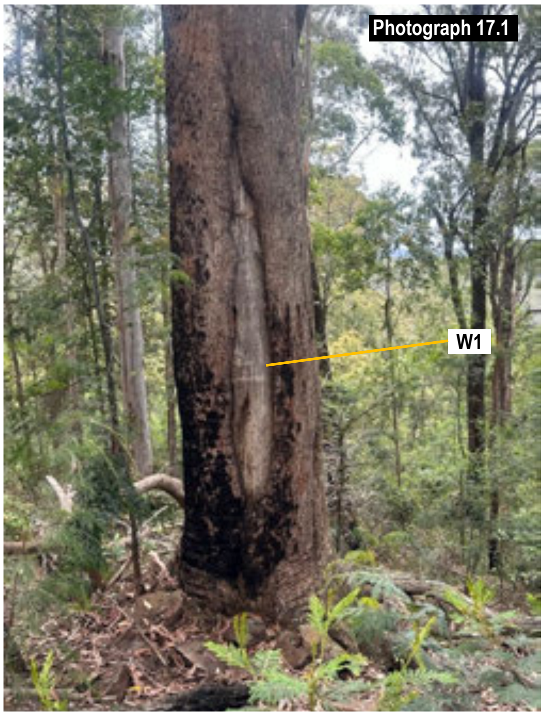
<u>Conclusion</u>

<u>Wound (*W1*)</u> – Caused by Longicorn Borers, 30 - <50 years old.

<u>Risks to tree</u>

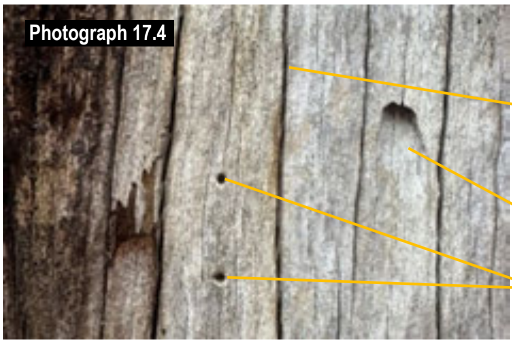
Not applicable as wound not of Aboriginal cultural origin.

Photograph 17.0 Taken 28/11/2024 by Danny Draper. View to northeast of tree TN17 / #37-6-2779 *Eucalyptus acmenoides* Shauer – White Mahogany (centre), showing Wound 1 (W1).



Photograph 17.1 Taken 28/11/2024 by Danny Draper. View to south of tree TN17 / #37-6-2779 *Eucalyptus acmenoides* Shauer – White Mahogany (centre), showing Wound 1 (W1).

Photographs 17.2 – 17.4 Taken 28/11/2024 by Danny Draper. View to south of tree TN17 / #37-6-2779 *E. acmenoides* Shauer – White Mahogany showing Wound 1 (W1) in detail with Longicorn Borer (LB) burrows and tunnelling (oval holes 8x12 mm and burrows 10- 12 mm wide) in sapwood / heartwood interface with sapwood sloughed away, circular holes 1-2 mm diameter of Lyctid Borers (LyB) in necrotic deadwood and desiccated ray cells (RC) shown as vertical narrow cracks.



4.0 TREE ASSESSMENT

4.1 Assessment of Tree/s – TN18 / HTP-C-CMT22

Tree No. / Archaeological No. Genus & species Common Name	**1. Age Class** **Y** = Young **M** = Mature **O** = Over-mature (Senescent) **2. Age range of tree** in yrs. approx. **3. Age range of wound/s,** in yrs. approx. **4. Date range since tree died** in yrs. approx., e.g., died, cut down, ring-barked	**Condition** **G** = Good **F** = Fair **P** = Poor **D** = Dead	**Form** **D** = Dominant **C** = Co-dominant **I** = Intermediate **S** = Suppressed **F** = Forest **E** = Emergent	**Height** in metres approx. / **Crown spread** approx. length x breadth metres / **Crown spread orientation.**	**Trunk diameter** in mm @ 1.4m, or as stated / **Trunk diameter orientation**	**Crown cover / Crown density** approx. %	**SRIV** Age, Vigour, Condition / Index Rating App A. / Remaining life expectancy 1. Long 2. Medium 3. Short
TN18 / HTP-C-CMT22 *Eucalyptus saligna* Sm. Sydney Blue Gum	1. M 2. 200 - <225 3.1 40 - <60 (W1) 4. N/A	F	F	25 x 8	620, N/S	80 / 85	MGVF – 9 / 2

Eucalyptus saligna Sm. – Sydney Blue Gum is a medium to very tall forest tree, coastal (Brooker and Kleinig, 1999, p. 71, Boland *et al*, 2006, p. 294) and can attain a height of 20-45 m (Elliot and Jones, 1986, p. 202) or 30-55 m up to 65 m with a trunk diameter up to 2 – 2.5 m (Boland *et al*, 2006, p. 294) and a crown spread of 10-25 m (Elliot and Jones, 1986, p. 202).

E. saligna Sm. heartwood has a green density of 1070 kg / m^3 (Bootle 2005, p. 278) and air dry density (ADD) 850 kg / m^3 (Bootle 2005, p. 278) and 620 - 1000 kg / m^3 (Boland *et al*, 2006, p. 294). Sapwood susceptible to Lyctus borers (Boland *et al*, 2006, p. 294, Bootle 2005, p. 302) and heartwood not resistant to termites (Bootle 2005, p. 278). The heartwood has an inground durability of 3 which is low and above ground durability of 2 which is moderately durability (Bootle, 2005, p. 278). Timber used for general building purposes, cladding, panelling and flooring (Bootle 2005, p. 279, Boland *et al*, 2006, p. 294). The tree grows within a rainfall range of 900-1800 mm (Boland *et al*, 2006, p. 296).

Tree TN18 / HTP-C-CMT22 (Photograph 18.0) was growing within the Hunter Transmission Project boundaries in an area with an expected comparable average annual rainfall of 758.0 mm recorded approximately 15 - <40 km away at the nearby Station: Pokolbin (Ben Ean), Number: 61056, opened 1905 to present (Australian Government Bureau of Meteorology, 2024). The tree was expected to be growing at a rate typical for the species with an estimated age of 200 - <225 years and appeared to have been of good vigour. Tree of forest form with 1 trunk wound recorded.

Wound 1 (W1)

Trunk wound to south, narrow linear, asymmetrical (Photograph 18.0). Wound extended from 1480 - 2390 mm. The wound face extended from 1820 - 3020 mm and was 120 mm at widest at 2500 mm. Hollow trunk extended 2400 mm above wound apex. Cavity 550 mm deep. Margin depth 120 mm and expected to be incurved into to trunk hollow. Wound abrasion impact from nearby fallen tree 40 - <60 years ago.

Conclusion

Wound 1 – Mechanical wound from an abrasion impact from nearby fallen tree, 40 - <60 years ago.

Risks to tree

Not applicable as enclosed void not of Aboriginal cultural origin.

Photograph 18.0 Taken 28/11/2024 by Danny Draper. View to west of tree TN19 / HTP-C-CMT19 *Eucalyptus saligna* Sm. – Sydney Blue Gum (centre left), showing Wound 1 (W1) in lower trunk. Wound asymmetrical the result of an abrasion impact event from a nearby fallen tree.

4.0 TREE ASSESSMENT

4.1 Assessment of Tree/s – TN19 / HTP-C-CMT19

Tree No. / Archaeological No. Genus & species Common Name	**1. Age Class** **Y** = Young **M** = Mature **O** = Over-mature (Senescent) **2. Age range of tree** in yrs. approx. **3. Age range of wound/s,** in yrs. approx. **4. Date range since tree died** in yrs. approx., e.g., died, cut down, ring-barked	**Condition** **G =** Good **F =** Fair **P =** Poor **D** = Dead	**Form** **D** = Dominant **C** = Co-dominant **I** = Intermediate **S** = Suppressed **F** = Forest **E** = Emergent	**Height** in metres approx. / **Crown spread** approx. length x breadth metres / **Crown spread orientation.**	**Trunk diameter** in mm @ 1.4m, or as stated / **Trunk diameter orientation**	**Crown cover / Crown density** approx. %	**SRIV** Age, Vigour, Condition / Index Rating App A. / Remaining life expectancy 1. Long 2. Medium 3. Short
TN19 / HTP-C-CMT19 *Angophora costata* (Geartn.) Britten Smooth-barked Apple	1. M 2. 75 - <100 3.1 40 - <60 (Enclosed Void 1) 4. N/A	F	F	25 x 8	1070 x 700, 885 Av., N/S	80 / 85	MGVF – 9 / 2

Angophora costata (Geartn.) Britten – Smooth-barked Apple is medium tree, coastal (Elliot and Jones, 1982, p. 196 and Boland *et al*, 2006, p. 214) and can attain a height of 15-25 m (Boland *et al*, 2006, p. 296) or 10-30 m (Elliot and Jones, 1982, p. 196) with a trunk diameter 0.5 – 1.0 m and up to 1.2 m (Boland *et al*, 2006, p. 214) and a crown spread of 6-15 m (Elliot and Jones, 1982, p. 196).

A. costata (Geartn.) Britten heartwood has a green density of 1240 kg / m^3 approx. (Bootle 2005, p. 239) and air dry density (ADD) 990 kg / m^3 (Bootle 2005, p. 239) and 755 – 1045 kg / m^3 (Boland *et al*, 2006, p. 214). Sapwood susceptible to Lyctid borers and heartwood very hard, strong, but not durable (Boland *et al*, 2006, p. 214, Bootle 2005, p. 239) The wood is used mainly for fence palings and (Bootle 2005, p. 239, Boland *et al*, 2006, p. 214). The tree grows within a rainfall range of 600-1200 mm (Boland *et al*, 2006, p. 214).

Tree TN19 / HTP-C-CMT19 (Photograph 19.0) was growing within the Hunter Transmission Project boundaries in an area with an expected comparable average annual rainfall of 758.0 mm recorded approximately 15 - <40 km away at the nearby Station: Pokolbin (Ben Ean), Number: 61056, opened 1905 to present (Australian Government Bureau of Meteorology, 2024). The tree was expected to be growing at a rate typical for the species with an estimated age of 75 - <100 years and appeared to have been of good vigour. Tree of forest form with 1 enclosed void recorded.

<u>*Enclosed Void 1 (EV1)*</u>

Enclosed void in the lower crown (Photographs 19.0-19.3) derived from an inferior first order structural branch (FOSB) towards track, branch extended from 4100 - 4870 mm, and a section crossed with the trunk forming a graft leaving a concave occluded space (COS) adjacent the trunk with the previous enclosed branch trunk section leaving a stub (Photographs 19.2 and 19.3). A lateral from the same branch closer to the trunk ascended a further 1500 mm approx. parallel to the trunk then diverged and was ascending grafted with the trunks forming a roughly triangular enclosed void (Photographs 19.1 and 19.3), the branch died back with epicormic shoots close to the grafted union (Photograph 19.1).

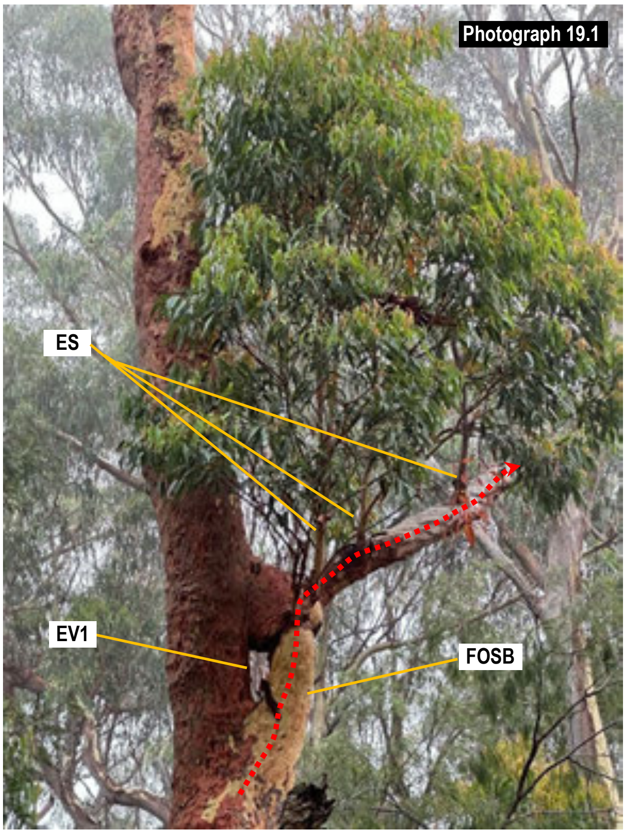
<u>*Conclusion*</u>

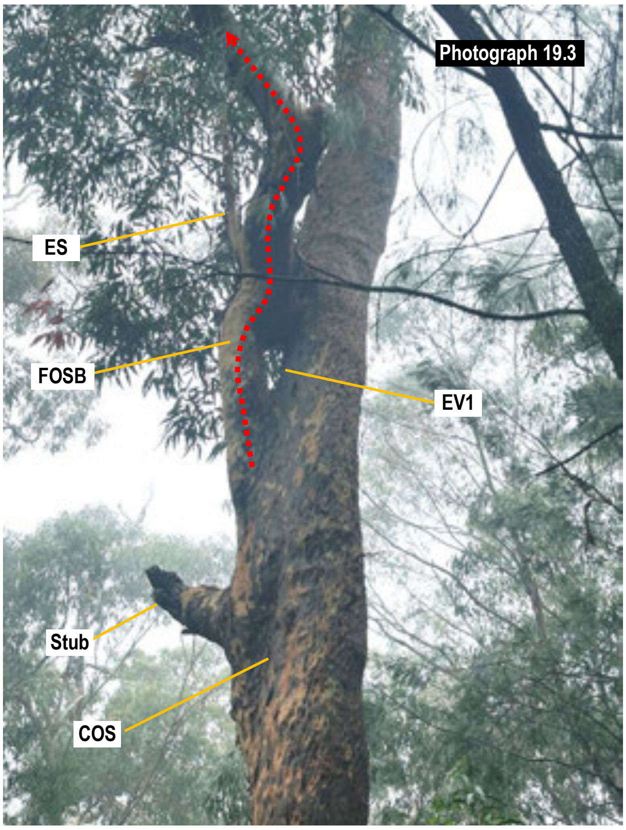
<u>Wound 1</u> – Enclosed void in the lower crown from naturally grafted branches, 40 - <60 years old.

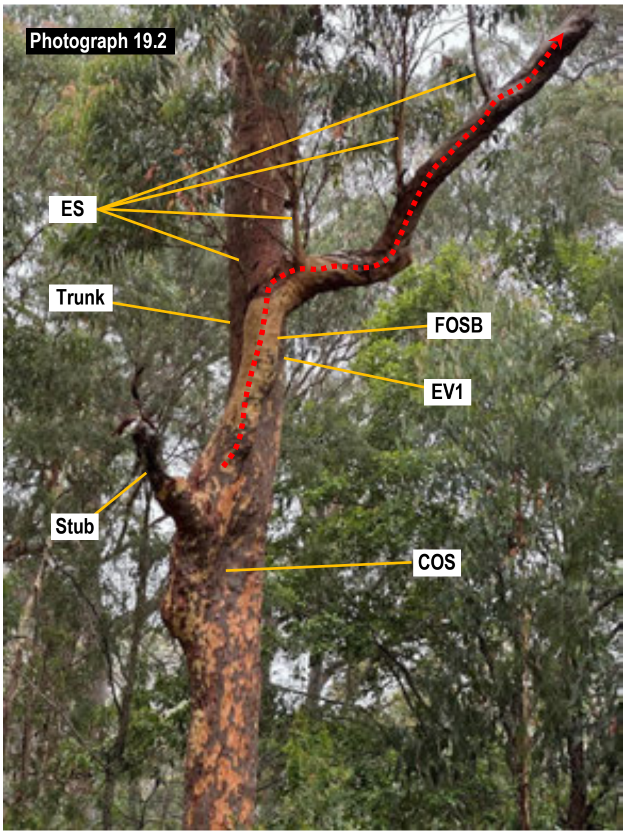
<u>*Risks to tree*</u>

Not applicable as enclosed void not of Aboriginal cultural origin.

Photograph 19.0 Taken 29/11/2024 by Danny Draper. View to west of tree TN19 / HTP-C-CMT19 *Angophora costata* (Geartn.) Britten – Smooth-barked Apple (centre left), showing Enclosed Void 1 (EV1) in the lower crown from naturally grafted branches.







Photographs 19.1 – 19.3 Taken 29/11/2024 by Danny Draper. View to south (Photograph 19.1), to east (Photograph 19.2) and north (Photograph 19.3) of tree TN19 / HTP-C-CMT19 *A. costata* (Geartn.) Britten – Smooth-barked Apple showing Enclosed Void 1 (EV1) in the lower crown from an upright first order structural branch (FOSB) grafting naturally with the trunk. Red broken arrow showing growth of the FOSB that has died back after becoming grafted with the trunk with epicormic shoots (ES) near trunk. Enclosed void in the lower crown derived from an inferior first order structural branch (FOSB) towards track, branch extended from 4100 - 4870 mm, and a section crossed with the trunk forming a graft leaving a concave occluded space (COS) adjacent the trunk with the previous enclosed branch trunk section leaving a stub.

5.0 CONCLUSION

This is provided in tabular form and summarizes the key information.

UTMA Tree No. / Archaeological No.	Genus and species / Common name	1. Age range of tree in yrs. approx. / 2. Age range of wound/s in yrs. approx.	Likely origin of wound/s	Risk to tree and mitigation
TN1 / HTP-C-CMT18	*Eucalyptus acmenoides* Shauer - White Mahogany	**1.** 100 - <125 **2.1** 20 - <40 (W1)	Wound 1 (W1) mechanical, from abrasion impact event from a motor vehicle during adjacent boundary fence construction.	N/A, Tree not of Aboriginal cultural origin.
TN2 / HTP-C-CMT02	*Angophora costata* (Geartn.) Britten - Smooth-barked Apple	**1.** 75 - <100 **2.1** 40 - <60 (Enclosed Void 1)	Enclosed Void 1 (EV1) in crown from naturally grafted branches.	N/A, Tree not of Aboriginal cultural origin.
TN3 / HTP-C-CMT03	*Angophora costata* (Geartn.) Britten - Smooth-barked Apple	**1.** 75 - <100 **2.1** 40 - <60 (Enclosed Void 1)	Enclosed Void 1 (EV1) in crown from naturally grafted branches.	N/A, Tree not of Aboriginal cultural origin.
TN4 / HTP-C-CMT04	*Angophora costata* (Geartn.) Britten - Smooth-barked Apple	**1.** 50 - <70 **2.1** 20 - <30 (Excrescence EX1)	Excrescence 1 (EX1) from naturally grafted branches. Excrescence on lower trunk expected to be an occluded branch stub or live branch section. Containing an acutely ascending to upright branch where branch and trunk occluded closing the void between the 2 structures with the branch remains subsumed, evident as an exaggerated protuberance contiguous with the trunk.	N/A, Tree not of Aboriginal cultural origin.
TN5 /HTP-C-CMT05	*Syncarpia glomulifera* (Sm.) Nied. - Turpentine	**1.** 250 - <300 **2.1** 150 - <200 (W1) **2.2** 150 - <200 (W2) **2.3** 10 - <20 (W3)	Wounds 1 and 2 (W1 and W2) of Aboriginal cultural origin. Wound 3 (W3) from fire damage.	The tree wounds can be expected to continue to decay over time with new growth likely to be in balance but fire damage to trunk likely to have compromised structural integrity. If the tree is to be removed, a section containing the wounds could be moved to a keeping place in consultation with Aboriginal stake holders. To be retained *in situ* the tree would require a radial tree protection zone (TPZ) of 40 m per AS4970(2009, p. 11) Sec. 3, 3.2 *Determining the TPZ*. If the tree is required for removal the trunk section containing the wound could be retained *ex situ* with the trunk cut near ground and at 1 m above the wound apex to recover the wound baring section for it to be retained on site or relocated to a *keeping place* as determined by the Aboriginal stake holders.
TN6 / HTP-C-CMT12	*Eucalyptus crebra* F. Muell. - Narrow-leaved Red Ironbark	**1.** 100 - <125 **2.1** 20 - <40 (W1) **2.2** 20 - <40 (W2)	Wounds 1 and 2 (W1 and W2) mechanical wounds by Longicorn Borers.	N/A, Tree not of Aboriginal cultural origin.
TN7 / HTP-C-CMT13	*Syncarpia glomulifera* (Sm.) Nied. - Turpentine	**1.** 150 - <175 **2.1** 50 - <75 (W1)	Wound 1 (W1) mechanical wound by Longicorn Borers.	N/A, Tree not of Aboriginal cultural origin.
TN8 / HTP-C-CMT15	*Syncarpia glomulifera* (Sm.) Nied. - Turpentine	**1.** 150 - <175 **2.1** 50 - <75 (W1)	Wound 1 (W1) mechanical wound by Longicorn Borers extended by fire damage.	N/A, Tree not of Aboriginal cultural origin.
TN9 / HTP-C-CMT14	*Eucalyptus crebra* F. Muell. - Narrow-leaved Red Ironbark	**1.** 150 - <175 **2.1** 10 - <20 (W1)	Wound 1 (W1) mechanical, from abrasion impact event from tree or branch with partial bark delamination along wound margin left.	N/A, Tree not of Aboriginal cultural origin.
TN10 / HTP-S-CMT04	*Eucalyptus acmenoides* - Shauer - White Mahogany	**1.** 250 - <300 **2.1** 50 - <75 (W1)	Wound 1 (W1) mechanical wound by Longicorn Borers and secondary consumption by fire.	N/A, Tree not of Aboriginal cultural origin.
TN11 / HTP-S-CMT02	*Eucalyptus pilularis* Sm. - Blackbutt	**1.** 250 - <275 **2.1** 50 - <75 (W1) **2.2** 50 - <75 (W2)	Wounds 1 and 2 (W1 and W2) mechanical wounding by Longicorn Borers.	N/A, Tree not of Aboriginal cultural origin.
TN12 / HTP-S-CMT01	*Eucalyptus saligna* Sm. - Sydney Blue Gum	**1.** 350 - <450 **2.1** 70 - <90 (W1)	Wound 1 (W1) mechanical wounding by Longicorn Borers.	N/A, Tree not of Aboriginal cultural origin.
TN13 / HTP-C-CMT07	*Eucalyptus acmenoides* - Shauer - White Mahogany	**1.** 200 - <250 **2.1** 50 - <75 (W1) **2.2** 50 - <75 (W2) **2.3** 50 - <75 (W3)	Wounds 1, 2 and 3 (W1 – W3) mechanical wounding by Longicorn Borers.	N/A, Tree not of Aboriginal cultural origin.
TN14 / HTP-C-CMT08	*Angophora costata* (Geartn.) - Britten - Smooth-barked Apple	**1.** 50 - <70 **2.1** 10 - <20 (W1)	Wound 1 (W1) mechanical wounding by Longicorn Borers.	N/A, Tree not of Aboriginal cultural origin.
TN15 / HTP-C-CMT09	*Angophora costata* (Geartn.) - Britten - Smooth-barked Apple	**1.** 200 - <225 **2.1** 30 - <40 (W1)	Wound 1 (W1) mechanical wounding by Longicorn Borers.	N/A, Tree not of Aboriginal cultural origin.
TN16 / HTP-C-CMT21	*Angophora costata* (Geartn.) - Britten - Smooth-barked Apple	**1.** 125 - <150 **2.1** 20 - <40 (W1)	Wound 1 (W1) mechanical wounding by Longicorn Borers.	N/A, Tree not of Aboriginal cultural origin.
TN17 / #37-6-2779	*Eucalyptus acmenoides* - Shauer - White Mahogany	**1.** 300 - <350 **2.1** 30 - <50 (W1)	Wound 1 (W1) mechanical wounding by Longicorn Borers.	N/A, Tree not of Aboriginal cultural origin.
TN18 / HTP-C-CMT22	*Eucalyptus saligna* Sm. - Sydney Blue Gum	**1.** 200 - <225 **2.1** 40 - <60 (W1)	Wound 1 (W1) mechanical, from abrasion impact event from nearby fallen tree.	N/A, Tree not of Aboriginal cultural origin.
TN19 / HTP-C-CMT19	*Angophora costata* (Geartn.) Britten - Smooth-barked Apple	**1.** 75 - <100 **2.1** 40 - <60 (Enclosed Void 1)	Enclosed Void 1 (EV1) in crown from naturally grafted branches.	N/A, Tree not of Aboriginal cultural origin.

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Tree Risk Assessment

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DISCLAIMER

The author and Urban Tree Management take no responsibility for actions taken and their consequences, contrary to those expert and professional instructions given as recommendations pertaining to safety by way of exercising our responsibility to our client and the public as our duty of care commitment, to mitigate or prevent hazards from arising, from a failure moment in full or part, from a structurally deficient or unsound tree or a tree likely to be rendered thus by its retention and subsequent deterioration from modification/s to its growing environment either existing or proposed, either above or below ground, contrary to our advice.

Appendix A

Matrix - Sustainable Retention Index Value (SRIV) ©

Version 4, 2010
Developed by IACA – Institute of Australian Consulting Arboriculturists www.iaca.org.au

The matrix is to be used with the value classes defined in the Glossary for Age / Vigour / Condition.
An index value is given to each category where ten (10) is the highest value.

Age Class	Vigour Class and Condition Class					
	Good Vigour & Good Condition (GVG)	Good Vigour & Fair Condition (GVF)	Good Vigour & Poor Condition (GVP)	Low Vigour & Good Condition (LVG)	Low Vigour & Fair Condition (LVF)	Low Vigour & Poor Condition (LVP)
	Able to be retained if sufficient space available above and below ground for future growth. No remedial work or improvement to growing environment required. May be subject to high vigour. Retention potential - Medium – Long Term.	Able to be retained if sufficient space available above and below ground for future growth. Remedial work may be required or improvement to growing environment may assist. Retention potential - Medium Term. Potential for longer with remediation or favourable environmental conditions.	Able to be retained if sufficient space available above and below ground for future growth. Remedial work unlikely to assist condition, improvement to growing environment may assist. Retention potential - Short Term. Potential for longer with remediation or favourable environmental conditions.	May be able to be retained if sufficient space available above and below ground for future growth. No remedial work required, but improvement to growing environment may assist vigour. Retention potential - Short Term. Potential for longer with remediation or favourable environmental conditions.	May be able to be retained if sufficient space available above and below ground for future growth. Remedial work or improvement to growing environment may assist condition and vigour. Retention potential - Short Term. Potential for longer with remediation or favourable environmental conditions.	Unlikely to be able to be retained if sufficient space available above and below ground for future growth. Remedial work or improvement to growing environment unlikely to assist condition or vigour. Retention potential - Likely to be removed immediately or retained for Short Term. Potential for longer with remediation or favourable environmental conditions.
(Y) Young.	**YGVG - 9** **Index Value 9** Retention potential - Long Term. Likely to provide minimal contribution to local amenity if height <5 m. High potential for future growth and adaptability. Retain, move or replace.	**YGVF - 8** **Index Value 8** Retention potential - Short – Medium Term. Potential for longer with improved growing conditions. Likely to provide minimal contribution to local amenity if height <5 m. Medium-high potential for future growth and adaptability. Retain, move or replace.	**YGVP - 5** **Index Value 5** Retention potential - Short Term. Potential for longer with improved growing conditions. Likely to provide minimal contribution to local amenity if height <5 m. Low-medium potential for future growth and adaptability. Retain, move or replace.	**YLVG - 4** **Index Value 4** Retention potential - Short Term. Potential for longer with improved growing conditions. Likely to provide minimal contribution to local amenity if height <5 m. Medium potential for future growth and adaptability. Retain, move or replace.	**YLVF - 3** **Index Value 3** Retention potential - Short Term. Potential for longer with improved growing conditions. Likely to provide minimal contribution to local amenity if height <5m. Low-medium potential for future growth and adaptability. Retain, move or replace.	**YLVP - 1** **Index Value 1** Retention potential - Likely to be removed immediately or retained for Short Term. Likely to provide minimal contribution to local amenity if height <5 m. Low potential for future growth and adaptability.
(M) Mature.	**MGVG - 10** **Index Value 10** Retention potential -Medium - Long Term.	**MGVF - 9** **Index Value 9** Retention potential - Medium Term. Potential for longer with improved growing conditions.	**MGVP - 6** **Index Value 6** Retention potential - Short Term. Potential for longer with improved growing conditions.	**MLVG - 5** **Index Value 5** Retention potential - Short Term. Potential for longer with improved growing conditions.	**MLVF - 4** **Index Value 4** Retention potential - Short Term. Potential for longer with improved growing conditions.	**MLVP - 2** **Index Value 2** Retention potential - Likely to be removed immediately or retained for Short Term.
(O) Over-mature.	**OGVG - 6** **Index Value 6** Retention potential - Medium - Long Term.	**OGVF - 5** **Index Value 5** Retention potential - Medium Term.	**OGVP - 4** **Index Value 4** Retention potential - Short Term.	**OLVG - 3** **Index Value 3** Retention potential - Short Term. Potential for longer with improved growing conditions.	**OLVF - 2** **Index Value 2** Retention potential - Short Term.	**OLVP - 0** **Index Value 0** Retention potential - Likely to be removed immediately or retained for Short Term.

Appendix B

Glossary

From
Dictionary for Managing Trees in Urban Environments
Institute of Australian Consulting Arboriculturists (IACA) 2009, CSIRO Publishing.

Wounds

Abrasion Wound *Mechanical wound* causing *laceration* of tissue by an abrasive impact *episode* e.g. grazed by a motor vehicle or the continuous action of the rubbing of *crossed branches* or stems where no graft has formed.

Basal Trunk Wound A wound on the trunk extending to the *root crown* where the base of the wound is open at the ground and usually truncated. Dependent upon the width of its base such a wound may not become *occluded*.

Blaze A wound cut into a tree usually to the sapwood and sometimes extending to heartwood to create a marker point e.g. by a surveyor, the *wound face* may be further incised or painted to denote additional information.

Branch Core After a branch fails or is removed, this is the remaining branch section within the connecting branch or trunk walled off by compartmentalisation.

Branch Tail The tapering underside of a branch at its proximal end where its fibres intertwine to provide some structural support with the fibres of the branch or trunk where it is attached and new layers of such growth are added by each successive growth increment, however, the branch collar forms the greater majority of strength of the branch union (Shigo 1989a, pp. 215–217). *See also Branch core.*

Branch Tear *See Branch Tear Out.*

Branch Tear Out Dislodging of a branch from its point of attachment where it is torn away from the *branch collar* snapping the *branch tail* causing a *laceration*, usually to the underside of the *branch union* of the branch or trunk to which it was attached forming a *tear out wound*.

Branch Tear Wound *See Tear Out Wound.*

Callus Wood Undifferentiated and unlignified wood that forms initially after wounding around the margins of a wound separating damaged existing wood from the later forming lignified wood or *wound wood*.

Canker A *wound* created by repeated localised killing of the *vascular cambium* and bark by wood *decay* fungi and bacterium usually marked by concentric disfiguration. The wound may appear as a depression as each successive *growth increment* develops around the *lesion* forming a *wound margin* (Shigo 1991, p. 140, Keane *et al* 2000, p. 332).

Cavity A usually shallow void often localized initiated by a *wound* and subsequent *decay* within the trunk, branches or roots, or beneath bark, and may be enclosed or have one or more opening.

Decay Process of degradation of wood by microorganisms (Australian Standard 2007, p. 6) and fungus.

Delaminate A *mechanical wound* caused when the bark is stripped from a tree, usually from the trunk as a continuous sheet back to the vascular cambium. This may occur from an impact or abrasion *episode* such as a collision with a motor vehicle and the tree may become *ringbarked*. See also *Partially Delaminated*.

Delamination The separation of fibres often evident as longitudinal splitting of wood (Lonsdale 1999, p. 313).

Delignification The decomposition of *lignin* from *wood* by chemical deterioration, resulting in loss of strength, evident by separation of fibres into hair like strands. See also *Lignification*.

Depth of Margin Distance from outer trunk perpendicular to the *wound face*. This may assist in determining the age of a wound.

Dieback Wound Wounding where *dieback* extends beyond a branch collar as with *natural pruning* and extends to other branches, trunk or roots. See also *Secondary Crown* and *Stag-headed*.

Enclosed Wound Wound with a perimeter of *wound wood* with a well-defined apex, base and margins and often evident on an older wound. On a pruned branch that is rounded the enclosing wound wood from the branch collar may be circular with no definite apex or base evident. However, on a pruned branch where the *wound face* is oval in shape due to *reaction wood*, the enclosing *wound wood* from the branch collar may form a definite apex, base or margins.

Environmental Wounding/Damage Wounding inflicted by environmental factors or modifications to the growing *environment* of a tree, e.g., sun-scald, drought, fire, water logging, wind damage to leaves, branches, bark or roots, phytotoxic damage from chemicals, or air, soil or water pollution.

Fire Wound Wounding caused by fire. Such wounds may cause initial damage or may be secondary from a previous wounding *episode*/s. Some fire damage may be superficial or may destroy a tree in full or part rendering it potentially vulnerable to failure. Note: fire damaged trees can be potentially hazardous and should be assessed carefully.

Hollow A large void initiated by a *wound* forming a *cavity* in the trunk, branches or roots and usually increased over time by *decay* or other contributing factors, e.g., fire, or fauna such as birds or insects e.g., ants or termites. A hollow can be categorized as an *Ascending Hollow* or a *Descending Hollow*.

Horizontal Wound Usually superficial horizontal wounding from insects burrowing between bark layers and revealed by decorticating bark. Often evident on smooth bark Eucalypts.

Impact Wound *Mechanical wound* caused by an impact *episode* e.g., collision by a motor vehicle.

Incision Wound caused by cutting or engraving. See also *Laceration*.

Increment strip A linear, usually narrow, *fluted* section of *adaptive wood,* forming in a place of high *stress* indicating the pattern of *force flow* (Mattheck 2004, p. 140). Evident as lighter coloured bark usually occurring around the edges of a *notch* or *branch stub*, along a *buttress*, or along a *sharp-edged rib*.

Initial Wound Margin The site of initial wounding often evident as a faint line of discoloured bark or bark of a different texture to adjacent undamaged trunk. This may assist in determining the age of a wound.

Insect Wound Wounding to any part of a tree caused by insect activity, e.g., borers and termites.

Laceration Wound caused by tearing. See also *Incision*.

Lightning Strike Wound A wound from a lightning strike. Such a wound may kill a tree outright or cause it to catch fire, or may destroy the tree in full or part, or no injury may be evident, and a tree gradually declines through resulting *stress*. Bark may be exploded from the tree by pressure radiating from the core of the lightning path resulting in further compounded damage through water heating and steam explosions in the tissues and the electrical disruption of living cells (Coder 2004, pp. 35-44).

Mechanical Wound Wounding inflicted by abrasion e.g., by motor vehicles, grass mowing equipment, grazing by horses, cows or birds (parrots); impact e.g., by motor vehicle collisions; drilling e.g., with increment cores, Resistograph, cable bracing, hanging pots, hammocks etc.; branch tearing e.g., from wind damage, collision from falling branches, vandalism; and root severance e.g., root pruning for excavation for building or utility services or for agricultural cultivation.

Open Wound Wound with poor to non-existent perimeter or *callus wood* or *wound wood* on an older wound without well-defined apex, base or margins and often this will be associated with a recent wounding *episode* or an older episode on a senescent tree or a tree in *poor condition* or of *low vigour*, or where repeated wounding episodes such as inflicted by ongoing borer activity damages and continually alters wound perimeters, or repeated scalping of exposed roots by lawn mowing equipment.

Occlusion Growth processes where *wound wood* develops to enclose the *wound face* by the merging of *wound margins* concealing the *wound* and restoring the growing surface of the structure with each *growth increment* gradually realigning *fibres* in the wood longitudinally along the stem to maximise uniform stress loading.

Partial Occlusion *Wound wood* growth that encloses some of the *wound face* by the merging and *grafting* of some sections of the *wound margins*. Usually evident by reduced *wound face* width and indicated where an *apex* or *base* is *acute* with the vertical extent often indicated by the length of an *occlusion seam*.

Partially Bridged Occlusion *Wound wood* partly forming an *occlusion* by joining areas of the *wound margins* across the *wound face* at point/s other than the base or apex and may form an *occlusion seam*.

Pruning Wound A wound created by the act of *pruning*.

Ram's Horning *Wound wood* that becomes curled inward and can wrap around itself as it crosses a void such as a *cavity* and may succumb to cracking with those wounds susceptible to further infestation by *decay* pathogens.

Scarred Tree A tree containing a wound of cultural or scientific interest, inflicted initially for a specific purpose, e.g. by indigenous people to extract implements or carved as a marker or with a pattern for ceremonial purposes, or as a marker and *blaze* by a surveyor or explorer, or from an accidental *wound* that has not *occluded*.

Stepped Incision A localised area of deeper wounding often extending to the heartwood, usually proximally within a *blaze*, removing a vertical semi-circular wedge like section from the *wound face* with a horizontal bench like structure formed by deep cuts as its base. Such wound sections usually taper distally and may be cut around the outer edges to assist removal of the semi-circular wedge, and likely undertaken to inhibit regrowth.

Structural Wound Any wound occurring on a tree as a result of a structural failure e.g., branch splitting or *hazard beam*, diminishing its stability in full or part.

Succession Wound Preceding layers of failed wound margin/s forming a step like sequence away from the *wound face*, where present, to the current wound margin/s indicating repeated cycles of formation and failure of *CODIT Wall 4*.

Sun Scald Wounding Wounding usually on the upper side of branches after sudden exposure to sunlight especially in summer e.g., after excessive pruning of the upper crown, or following storm damage stripping foliage or branches e.g., *Ficus spp.*

Survey Marker Wound *See Blaze.*

Tear Out *See Branch Tear Out.*

Tear Out Wound A wound of usually concave shape created by a *branch tear out*.

Wound Damage inflicted upon a tree through injury to its living cells, from biotic or abiotic causes, e.g., where *vascular cambium* has been damaged by branch breakage, impact or insect attack. Some wounds *decay* and cause *structural deterioration* or *defects*. Trees of *normal vigour* are able to resist and contain infection by walling off areas within the wood by *compartmentalization*. See *Compartmentalization Of Decay In Trees (CODIT)*. An *occlusion* may eventually conceal a wound, but the enclosed *defect* remains internally, and *decay* may continue to develop further weakening the *heartwood* and *sapwood* compromising the tree's *structural integrity*. The cause of a wound may be accidental e.g., *branch tear out* or deliberate e.g. *carved tree*.

Wound Apex The distal end of a wound. The shape may be acute, irregular, jagged, obtuse, rounded, or truncate.

Wound Apex Acute Apex of a wound that is tapering and the *occlusion* interface angle is less than <90°.

Wound Apex Irregular The *wound wood* growth at the apex mostly interrupted forming an edge that is not uniform or jagged. Often this may be influenced by a *successional wound* resulting in disproportionate development of *callous wood* and *wound wood.*

Wound Apex Jagged The *wound wood* growth or tissue damaged initially at the apex that is uneven and likely to have been caused by laceration.

Wound Apex Obtuse Apex of a wound that is tapering and the *occlusion* interface angle is greater than >90°.

Wound Apex Rounded The *wound wood* growth at the apex that is curved.

Wound Apex Truncate The *wound wood* growth or tissue damaged initially at the apex that is even and likely to have been caused by incision.

Wound Base The proximal end of a wound. The shape may be acute, irregular, jagged, obtuse, rounded, or truncate.

Wound Base Acute Base of wound that is tapering and the *occlusion* interface angle is less than <90°.

Wound Base Irregular The *wound wood* growth at the base mostly interrupted forming an edge that is not uniform or jagged. Often this may be influenced by a *successional wound* resulting in disproportionate development of *callous wood* and *wound wood.*

Wound Base Jagged The *wound wood* growth or tissue damaged initially at the base that is uneven and likely to have been caused by laceration.

Wound Base Obtuse Base of wound that is tapering and the *occlusion* interface angle is greater than >90°.

Wound Base Rounded The *wound wood* growth at the base that is curved.

Wound Base Truncate The *wound wood* growth or tissue damaged initially at the base that is even and likely to have been caused by incision.

Wound Face Surface area of tissue exposed by injury, e.g. bark, sapwood, heartwood.

Wound Face Cracks Horizontal Transverse cracks in a *wound face* indicative of failure from *tension* force (Mattheck & Breloer 1994, p. 183).

Wound Face Cracks Vertical Longitudinal cracks in a *wound face* indicative of failure from *compression* force (Mattheck & Breloer 1994, p. 183).

Wound Face Entire Surface of exposed tissue is uniform without damage extending to a different layer or unaffected by borers or decay, e.g. possibly described as *wound face* entire to dead sapwood.

Wound Face Incomplete Surface of exposed tissue is not uniform with damage extending to different layers or affected by borers or decay, e.g. possibly described as *wound face incomplete* with cavity at apex. See also *Wound face entire*.

Wound Face Exposed Heartwood Wound extending to reveal the *heartwood*, or has deteriorated through *decay* to reveal this layer of wood.

Wound Face Exposed Sapwood Wound extending to reveal the sapwood, or has deteriorated through *decay* to reveal this layer of wood.

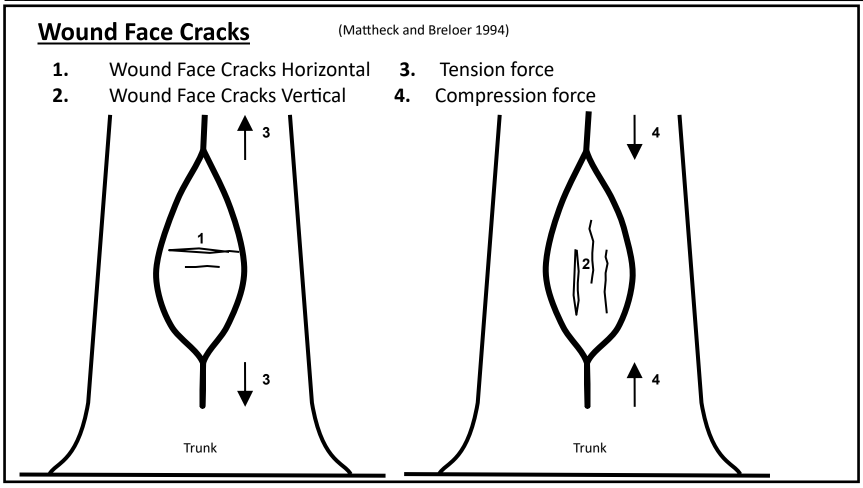
Wound Margin The left and right sides of a *wound* as bound by the alignment of fibres along a stem or root longitudinally, being either the remaining undamaged living cells and new *callus wood* and *wound wood* on older wounds. Here the fibres are usually formed from *meristematic* cells. A wound margin may be circular on a *pruning wound* or form around the perimeter of a *canker*.

Wound Margin Entire The *wound wood* growth in the margin is mostly uninterrupted forming a uniform edge.

Wound Margin Irregular The *wound wood* growth in the margin is mostly interrupted and forms an edge that is not uniform e.g. where repeated wounding *episode*s such as inflicted by ongoing borer activity damages and continually alters the *wound perimeter* with *callus wood* and *wound wood*. See also *Successional Wound*.

Wound Margin Left The left side of a wound margin when the distal and proximal ends of the wound is known, to determine the *wound apex* and *wound base*, respectively.

Wound Margin Right The right side of a wound margin when the distal and proximal end of the wound is known, to determine the *wound apex* and wound base, respectively.



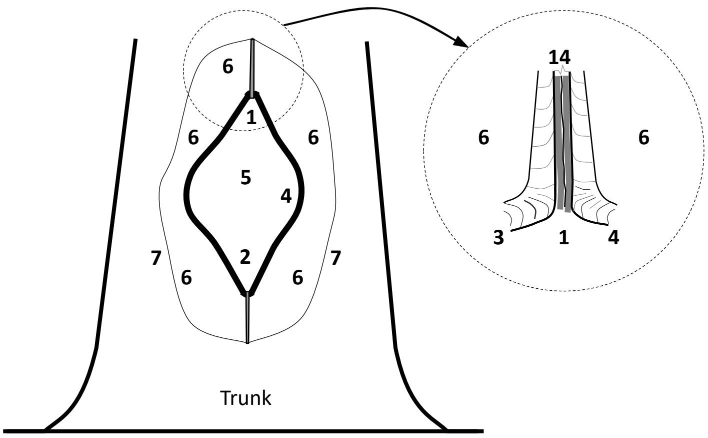
Wound Margin Width Distance from *wound margin* to the site of initial wounding. Where evident the *initial wound margin* may be identified by discoloured bark or bark of a different texture to adjacent undamaged trunk. This may also assist in determining the age of a wound.

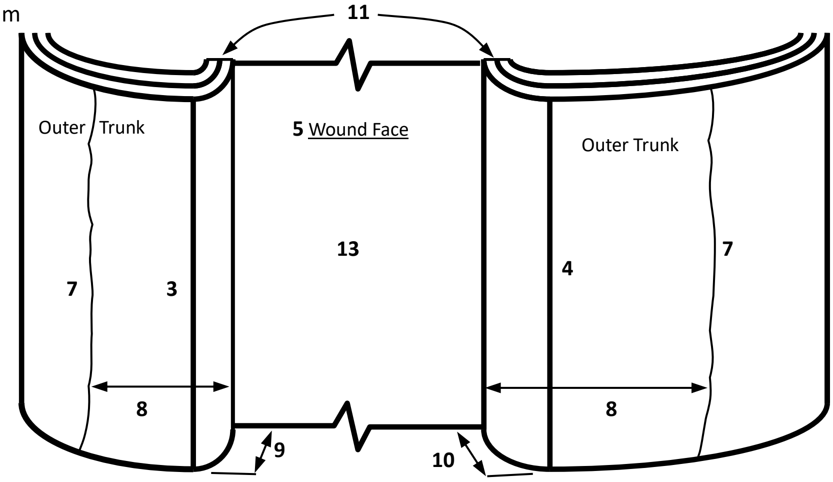
Wound Wood Aged *callus wood* around the margins of a wound that becomes differentiated to form *CODIT Wall 4* producing new lignified wood. This wood may grow to surround a wound and may eventually develop to enclose the wound by *occlusion*.

Wound Diagrams

Wound Parts

1. Apex
2. Base
3. Wound Margin Left
4. Wound Margin Right
5. Wound Face
6. Partial Occlusion
7. Initial Wound Margin
8. Margin Width
9. Left Margin Depth
10. Right Margin Depth
11. Wound Wood
12. Cavity
13. Wound Face Entire
14. Occlusion Seam

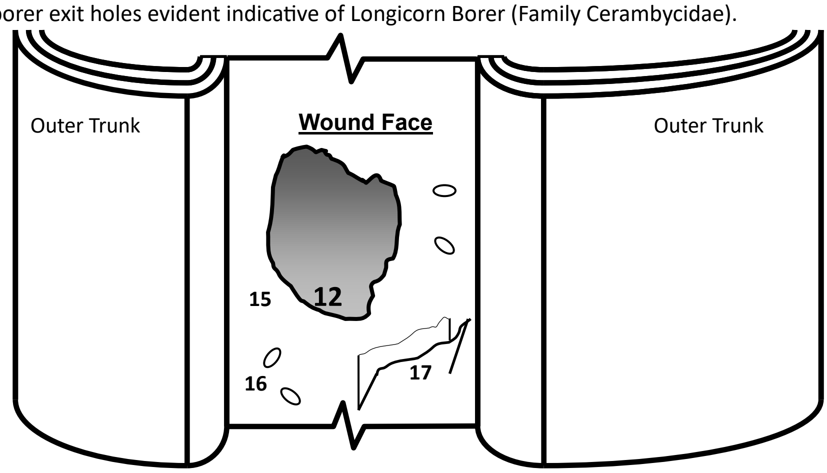




Examples of other Wound Faces

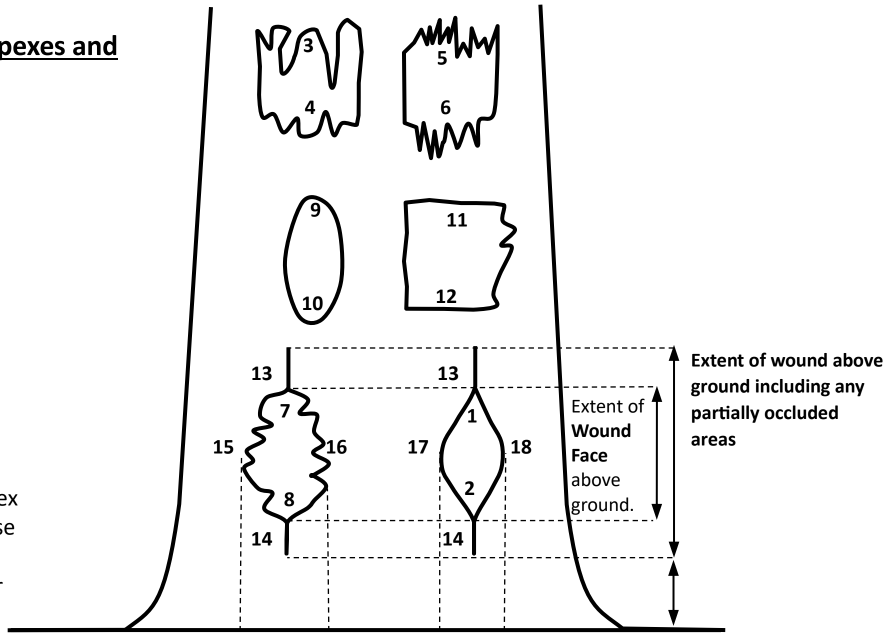
15. Wound face extending from dead sapwood to cavity in heartwood.

16. Oval shaped borer exit holes evident indicative of Longicorn Borer (Family Cerambycidae).



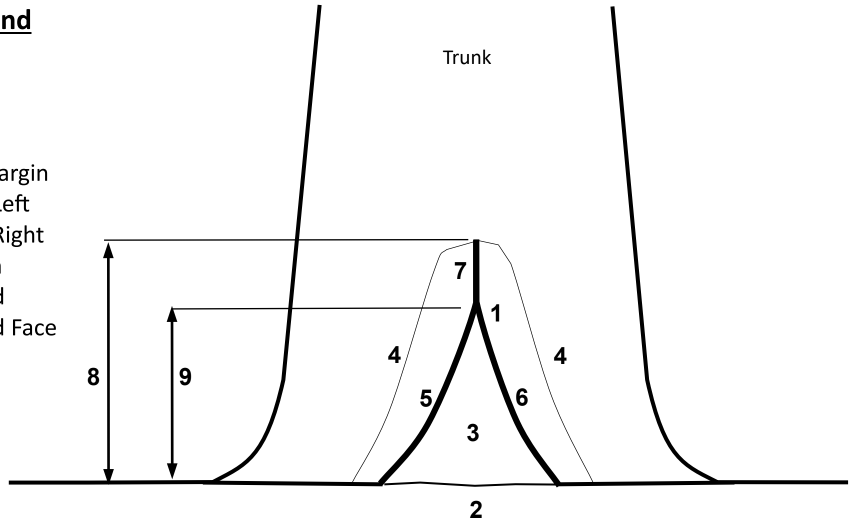
Wounds, Margins, Apexes and Bases

1. Apex Acute
2. Base Acute
3. Apex Irregular
4. Base Irregular
5. Apex Jagged
6. Base Jagged
7. Apex Obtuse
8. Base Obtuse
9. Apex Rounded
10. Base Rounded
11. Apex Truncate
12. Base Truncate
13. Partially Occluded Apex
14. Partially Occluded Base
15. Left Margin Irregular
16. Right Margin Irregular
17. Left Margin Entire
18. Right Margin Entire



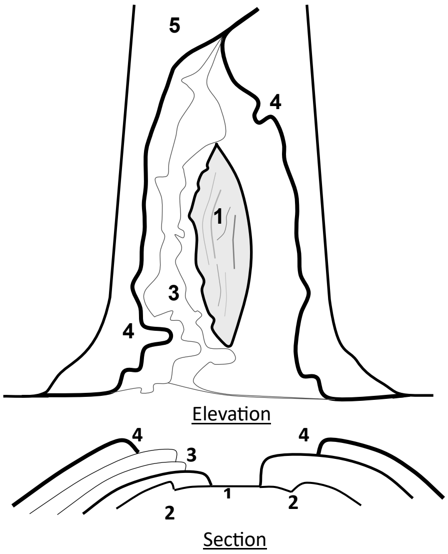
Basal Trunk Wound

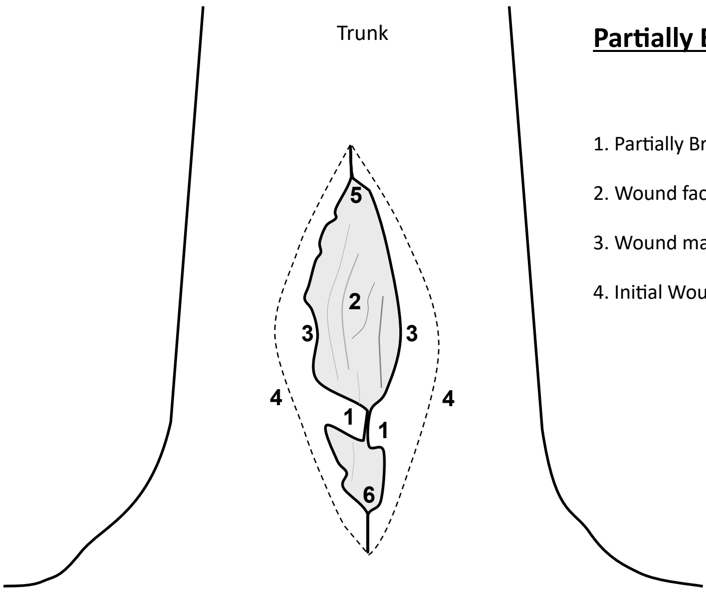
1. Apex
2. Base
3. Wound Face
4. Initial Wound Margin
5. Wound Margin Left
6. Wound Margin Right
7. Partial Occlusion
8. Extent of Wound
9. Extent of Wound Face



Successional Wound

1. Initial wound face
2. Initial wound margins (concealed when viewed in Elevation)
3. Successive wound margins





Partially Bridged Occlusion

1. Partially Bridged Occlusion
2. Wound face
3. Wound margins
4. Initial Wound Margins

Condition of Trees

Condition A tree's *crown form* and growth habit, as modified by its *environment* (aspect, suppression by other trees, soils), the *stability* and *viability* of the *root plate*, trunk and structural branches (first (1st) and possibly second (2nd) order branches), including structural defects such as wounds, cavities or hollows, *crooked* trunk or weak trunk/branch junctions and the effects of predation by pests and diseases. These may not be directly connected with *vigour* and it is possible for a tree to be of *normal vigour* but in *poor condition*. Condition can be categorized as *Good Condition*, *Fair Condition*, *Poor Condition* and *Dead*.

Good Condition Tree is of good habit, with *crown form* not severely restricted for space and light, physically free from the adverse effects of *predation* by pests and diseases, obvious instability or structural weaknesses, fungal, bacterial or insect infestation and is expected to continue to live in much the same condition as at the time of inspection provided conditions around it for its basic survival do not alter greatly. This may be independent from, or contributed to by vigour. See also *Condition*, *Fair Condition* and *Poor Condition*.

Fair Condition Tree is of good habit or *misshapen*, a form not severely restricted for space and light, has some physical indication of *decline* due to the early effects of *predation* by pests and diseases, fungal, bacterial, or insect infestation, or has suffered physical injury to itself that may be contributing to instability or structural weaknesses, or is faltering due to the modification of the *environment* essential for its basic survival. Such a tree may recover with remedial works where appropriate, or without intervention may stabilise or improve over time, or in response to the implementation of beneficial changes to its local environment. This may be independent from, or contributed to by vigour. See also *Condition*, *Good Condition* and *Poor Condition*.

Poor Condition Tree is of good habit or *misshapen*, a form that may be severely restricted for space and light, exhibits symptoms of advanced and *irreversible decline* such as fungal, or bacterial infestation, major die-back in the branch and *foliage crown*, *structural deterioration* from insect damage e.g. termite infestation, or storm damage or lightning strike, ring barking from borer activity in the trunk, root damage or instability of the tree, or damage from physical wounding impacts or abrasion, or from altered local environmental conditions and has been unable to adapt to such changes and may decline further to death regardless of remedial works or other modifications to the local *environment* that would normally be sufficient to provide for its basic survival if in *good* to *fair* condition. Deterioration physically, often characterised by a gradual and continuous reduction in vigour but may be independent of a change in vigour, but characterised by a proportionate increase in susceptibility to, and *predation* by pests and diseases against which the tree cannot be sustained. Such conditions may also be evident in trees of advanced senescence due to normal phenological processes, without modifications to the growing environment or physical damage having been inflicted upon the tree. This may be independent from, or contributed to by vigour. See also *Condition*, *Good Condition* and *Fair Condition*.

Moribund Advanced state of decline, dying or nearly dead.

Dead Tree is no longer capable of performing any of the following processes or is exhibiting any of the following symptoms;
Processes
Photosynthesis via its foliage crown (as indicated by the presence of moist, green or other coloured leaves);
Osmosis (the ability of the root system to take up water);
Turgidity (the ability of the plant to sustain moisture pressure in its cells);
Epicormic shoots or *epicormic strands* in Eucalypts (the production of new shoots as a response to stress, generated from latent or adventitious buds or from a *lignotuber*);
Symptoms
Permanent leaf loss;
Permanent wilting (the loss of turgidity which is marked by desiccation of stems leaves and roots);
Abscission of the *epidermis* (bark desiccates and peels off to the beginning of the sapwood).

Removed No longer present, or tree not able to be located or having been cut down and retained on a site, or having been taken away from a site prior to site inspection.

Periods of Time

Periods of Time The life span of a tree in the urban environment may often be reduced by the influences of encroachment and the dynamics of the environment and can be categorized as *Immediate*, *Short Term*, *Medium Term* and *Long Term*.

Immediate An *episode* or occurrence, likely to happen within a twenty-four (24) hour period, e.g. tree failure or collapse in full or part posing an imminent danger. See also *Short Term*, *Medium Term* and *Long Term*.

Short Term A period of time less than <1 – 15 years. See also *Periods of Time*, *Immediate*, *Medium Term* and *Long Term*.

Medium Term A period of time 15 – 40 years. See also *Periods of Time*, *Immediate*, *Short Term* and *Long Term*.

Long Term A period of time greater than >40 years. See also *Periods of Time*, *Immediate*, *Medium Term* and *Short Term*.

Vigour

Vigour Ability of a tree to sustain its life processes. This is independent of the *condition* of a tree but may impact upon it. Vigour can appear to alter rapidly with change of seasons (seasonality) e.g. dormant, deciduous or semi-deciduous trees. Vigour can be categorized as *Normal Vigour, High Vigour*, *Low Vigour* and *Dormant Tree Vigour*.

Normal Vigour Ability of a tree to maintain and sustain its life processes. This may be evident by the *typical* growth of leaves, *crown cover* and *crown density*, branches, roots and trunk and *resistance* to *predation*. This is independent of the *condition* of a tree but may impact upon it, and especially the ability of a tree to sustain itself against predation. See also *Vigour*, *Low Vigour* and *High Vigour*.

High Vigour *Accelerated growth* of a tree due to incidental or deliberate artificial changes to its growing *environment* that are seemingly beneficial, but may result in *premature aging* or failure if the favourable conditions cease, or promote *prolonged senescence* if the favourable conditions remain, e.g. water from a leaking pipe; water and nutrients from a leaking or disrupted sewer pipe; nutrients from animal waste, a tree growing next to a chicken coop, or a stock feed lot, or a regularly used stockyard; a tree subject to a stringent watering and fertilising program; or some trees may achieve an extended lifespan from continuous *pollarding* practices over the life of the tree.

Low Vigour Reduced ability of a tree to sustain its life processes. This may be evident by the *atypical* growth of leaves, reduced *crown cover* and reduced *crown density*, branches, roots and trunk, and a deterioration of their functions with reduced *resistance* to *predation*. This is independent of the *condition* of a tree but may impact upon it, and especially the ability of a tree to sustain itself against predation. See also *Vigour*, *Normal Vigour* and *High Vigour*.

Dormant Tree Vigour Determined by existing turgidity in lowest order branches in the outer extremity of the crown, with good bud set and formation, and where the last *extension growth* is distinct from those most recently preceding it, evident by bud scale scars. Normal vigour during dormancy is achieved when such growth is evident on a majority of branches throughout the crown.

Good Vigour See *Normal Vigour*.

Poor Vigour See *Low Vigour*.

Health A tree's *vigour* as exhibited by *crown density*, *crown cover*, leaf colour, presence of epicormic shoots ability to withstand *predation* by pests and diseases, *resistance* and the degree of *dieback*.

Age of Trees

Age Most trees have a stable biomass for the major proportion of their life. The estimation of the age of a tree is based on the Knowledge of the expected lifespan of the taxa in situ divided into three distinct stages of measurable biomass, when the exact age of the tree from its date of cultivation or planting is unknown and can be categorized as *Young*, *Mature* and *Over-mature* (British Standards 1991, p. 13, Harris *et al*, 2004, p. 262).

Young Tree aged less than <20% of life expectancy, *in situ*. See also *Age*, *Mature* and *Over-mature*.

Mature Tree aged 20-80% of life expectancy, *in situ*. See also *Age*, *Young* and *Over-mature*.

Over-mature Tree aged greater than >80% of life expectancy, *in situ,* or *senescent* with or without reduced *vigour*, and declining gradually or rapidly but irreversibly to death. See also *Age*, *Young* and *Mature*.

Premature Aging Apparent hastened aging and deterioration of a tree where it has been subject to conditions or practices adverse to expected normal growth, resulting in a *spiral of decline*. The following are examples of processes that may start such cycles:

- Top lopping of a mature tree
- In a new car park, the excavation of soil severing the roots of a tree close to its trunk and then sealing the soil surface with asphalt or concrete up to the trunk
- Open trenching alongside a street tree severing all roots in the trench, then top lopping it for power line clearance, and then extensive damage to bark by abrasion by trucks and excavation equipment as tree is adjacent to a construction site
- Root damage from *soil compaction* to substantial areas of the root plate.

Prolonged Senescence A phenomenon in an *over-mature* tree or tree with *structural deterioration* in its *condition* and often *vigour* as *abnormal vigour* as a result of modifications to the tree or the growing environment essential for its survival where it is sustained beyond the *typical* extent of its life cycle, or prevented from failing in full or part from *structural deterioration* by a beneficial artificial modification to its growing environment either by deliberate or incidental intervention, e.g. water from a leaking tap, water and nutrients from a leaking sewer pipe creating a *hydroponic* environment, or by physically propping up a tree with *structural deterioration* as with a *veteran tree*, or by it *leaning* or growing against another tree or structure for support.

Visual Tree Assessment (VTA) A visual inspection of a tree from the ground based on the principle that, when a tree exhibits apparently superfluous material in its shape, this represents repair structures to rectify *defects* or to reinforce weak areas subject to additional loading forces of compression, tension, torsion and shear. Such assessments should only be undertaken by suitably competent practitioners.

Drop Zone The distance away from a tree that may be physically influenced by a falling branch.

Fall Zone The distance away from a tree that may be physically influenced if it was cut down or subject to *collapse*.

Leaning Trees

Leaning A tree where the *trunk* grows or moves away from upright. A lean may occur anywhere along the *trunk* influenced by a number of contributing factors e.g. genetically predetermined characteristics, competition for space or light, prevailing winds, aspect, slope, or other factors. A *leaning* tree may maintain a *static lean* or display an increasingly *progressive lean* over time and may be hazardous and prone to *failure* and *collapse*. The degrees of leaning can be categorized as *Slightly Leaning*, *Moderately Leaning*, *Severely Leaning* and *Critically Leaning*.

Slightly Leaning A leaning tree where the trunk is growing at an angle within 0°-15° from upright.

Moderately Leaning A leaning tree where the trunk is growing at an angle within 15°-30° from upright.

Severely Leaning A leaning tree where the trunk is growing at an angle within 30°-45° from upright.

Critically Leaning A leaning tree where the trunk is growing at an angle greater than >45° from upright.

Progressively Leaning A tree where the degree of *leaning* appears to be increasing over time.

Static Leaning A leaning tree whose lean appears to have stabilized over time.

Windthrow Tree failure and collapse when a *force* exerted by wind against the *crown* and *trunk* overcomes resistance to that force in the *root plate*, such that the *root plate* is lifted from the soil on one side as the tree tips over.

Symmetry

Symmetry Balance within a *crown,* or *root plate,* above or below the *axis* of the trunk of branch and foliage, and root distribution respectively and can be categorized as *Asymmetrical* and *Symmetrical*.

Asymmetrical Imbalance within a crown, where there is an uneven distribution of branches and the foliage *crown* or *root plate* around the vertical *axis* of the trunk. This may be due to *Crown Form Codominant* or *Crown From Suppressed* as a result of natural restrictions e.g. from buildings, or from competition for space and light with other trees, or from exposure to wind, or artificially caused by pruning for clearance of roads, buildings or power lines. An example of an expression of this may be, crown asymmetrical, bias to west. See also *Symmetrical* and *Symmetry*.

Symmetrical Balance within a crown, where there is an even distribution of branches and the *foliage crown* around the vertical *axis* of the trunk. This usually applies to trees of *Crown Form Dominant* or *Crown Form Forest*. An example of an expression of this may be crown symmetrical. See also *Symmetry* and *Asymmetrical*.

Crown Spread Orientation Direction of the *axis* of *crown spread* which can be categorized as *Orientation Radial* and *Orientation Non-radial*.

Crown Spread Orientation Non-radial Where the crown extent is longer than it is wide, e.g. east/west or E/W. Further examples, north/south or N/S, and may be *Crown Form Codominant*, e.g. **A** or **B**, *Crown Form Intermediate* e.g. **A**, or *Crown Form Suppressed* e.g. **B***, and* crown symmetry is *symmetrical* e.g. **A**, or *asymmetrical* e.g. **B**.

Crown Spread Orientation Radial Where the *crown spread* is generally an even distance in all directions from the trunk and often where a tree has *Crown Form Dominant* and is *symmetrical.*

Diameter at Breast Height (DBH) Measurement of trunk width calculated at a given distance above ground from the base of the tree often measured at 1.4 m. The trunk of a tree is usually not a circle when viewed in cross section, due to the presence of *reaction wood* or *adaptive wood*, therefore an average diameter is determined with a *diameter tape* or by recording the trunk along its narrowest and widest axes, adding the two dimensions together and dividing them by 2 to record an average and allowing the orientation of the longest axis of the trunk to also be recorded. Where a tree is growing on a lean the distance along the top of the trunk is measured to 1.4m and the diameter then recorded from that point perpendicular to the edge of the trunk. Where a *leaning* trunk is *crooked* a vertical distance of 1.4m is measured from the ground. Where a tree branches from a trunk that is less than 1.4m above ground, the trunk diameter is recorded perpendicular to the length of the *trunk* from the point immediately below the base of the flange of the *branch collar* extending the furthest down the trunk, and the distance of this point above ground recorded as *trunk* length. Where a tree is located on sloping ground the DBH should be measured at half way along the side of the tree to average out the angle of slope. Where a tree is *acaulescent* or *trunkless* branching at or near ground an average diameter is determined by recording the radial extent of the trunk at or near ground and noting where the measurement was recorded e.g. at ground.

Significant Important, weighty or more than ordinary.

Significant Tree A tree considered important, weighty or more than ordinary. Example: due to prominence of location, or *in situ*, or contribution as a component of the overall landscape for *amenity* or aesthetic qualities, or *curtilage* to structures, or importance due to uniqueness of taxa for species, subspecies, variety, *crown form*, or as an historical or cultural planting, or for age, or substantial dimensions, or habit, or as *remnant vegetation*, or habitat potential, or a rare or threatened species, or uncommon in cultivation, or of aboriginal cultural importance, or is a commemorative planting.

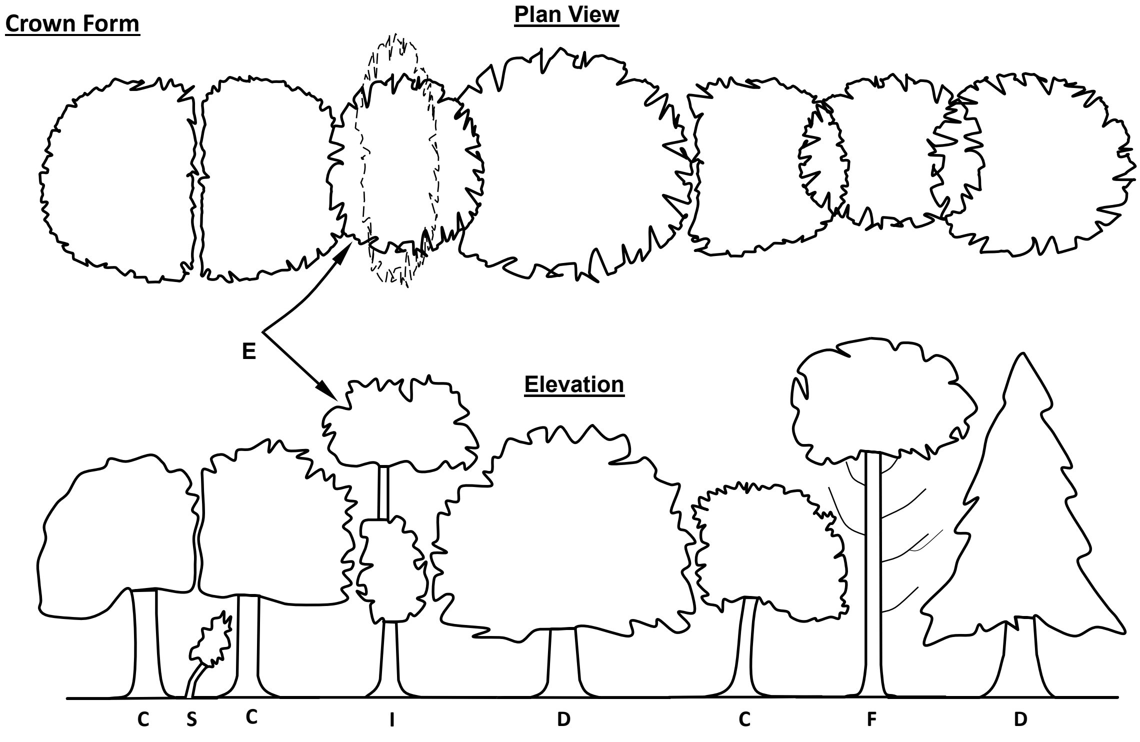
Sustainable Retention Index Value (SRIV) A visual tree assessment method to determine a qualitative and numerical rating for the viability of urban trees for development sites and management purposes, based on general tree and landscape assessment criteria using classes of *age*, *condition* and *vigour*. SRIV is for the professional manager of urban trees to consider the tree *in situ* with an assumed knowledge of the *taxon* and its growing environment. It is based on the physical attributes of the tree and its response to its environment considering its position in a matrix for age class, vigour class, condition class and its sustainable retention with regard to the safety of people or damage to property. This also factors the ability to retain the tree with remedial work or beneficial modifications to its growing environment or removal and replacement. SRIV is supplementary to the decision made by a tree management professional as to whether a tree is retained or removed (IACA - Institute of Australian Consulting Arboriculturists 2005).

Form of Trees

Crown Form The shape of the crown of a tree as influenced by the availability or restriction of space and light, or other contributing factors within its growing environment. Crown Form may be determined for tree shape and habit generally as *Dominant*, *Codominant*, *Intermediate*, *Emergent*, *Forest* and *Suppressed*. The habit and shape of a *crown* may also be considered qualitatively and can be categorized as *Good Form* or *Poor Form*. See also *Forest Grown* and *Open Grown*.

Good Form Tree of *typical* crown shape and habit with proportions representative of the taxa considering constraints such as origin e.g. indigenous or exotic, but does not appear to have been adversely influenced in its development by environmental factors in situ such as *soil water* availability, prevailing wind, or cultural practices such as lopping and competition for space and light. See also *Poor Form*.

Poor Form Tree of *atypical* crown shape and habit with proportions not representative of the species considering constraints and appears to have been adversely influenced in its development by environmental factors in situ such as *soil water* availability, prevailing wind, cultural practices such as lopping and competition for space and light; causing it to be *misshapen* or disfigured by disease or vandalism. See also *Good Form*.



(Source: **D**, **C**, **I** and **S**, and Elevation, Matheny and Clark 1998, **E**, **F** and Plan View, IACA 2005)

Crown Form Codominant Crowns of trees restricted for space and light on one or more sides and receiving light primarily from above e.g. constrained by another tree/s or a building.

Crown Form Dominant Crowns of trees generally not restricted for space and light receiving light from above and all sides. See also *Crown Form Emergent* and *Open Grown*.

Crown Form Emergent Crowns of trees restricted for space on most sides receiving most light from above until the *upper crown* grows to protrude above the canopy in a stand or forest environment. Such trees may be *crown form dominant* or transitional from *crown form intermediate* to *crown form forest* asserting both *apical dominance* and *axillary dominance* once free of constraints for space and light.

Crown Form Forest Crowns of trees restricted for space and light except from above forming tall trees with narrow spreading crowns with foliage restricted generally to the top of the tree. The trunk is usually erect, straight and continuous, tapering gradually, crown often excurrent, with first order branches becoming structural, supporting the live crown concentrated towards the top of the tree, and below this point other first order branches arising radially with each *inferior* and usually temporary, divergent and ranging from horizontal to ascending, often with internodes exaggerated due to competition for space and light in the *lower crown*.

Crown Form Intermediate Crowns of trees restricted for space on most sides with light primarily from above and on some sides only.

Crown Form Suppressed Crowns of trees generally not restricted for space but restricted for light by being *overtopped* by other trees and occupying an understorey position in the canopy and growing slowly.

Forest Grown A tree with *crown form forest* grown in a group with competition for space and light protected from wind, often resulting in a taller tree with a narrow spreading crown that is concentrated towards the top of the tree (Matheny & Clark 1998, p. 18).

Open Grown A tree with *crown form dominant*, grown singly without competition for space and light, exposed to wind, often resulting in a shorter tree with a broad spreading crown that extends towards the ground (Matheny & Clark 1998, p. 18).

Deadwood

Deadwood Dead branches within a tree's crown and considered quantitatively as separate to *crown cover* and can be categorised as *Small Deadwood* and *Large Deadwood* according to diameter, length and subsequent *risk* potential. The amount of dead branches on a tree can be categorized as *Low Volume Deadwood*, *Medium Volume Deadwood* and *High Volume Deadwood*. See also *Dieback.*

Deadwooding Removing of dead branches by *pruning*. Such pruning may assist in the prevention of the spread of *decay* from *dieback* or for reasons of safety near an identifiable target.

Small Deadwood A dead branch up to 10 mm diameter and usually <2 metres long, generally considered of low *risk* potential.

Large Deadwood A dead branch >10 mm diameter and usually >2 metres long, generally considered of high *risk* potential.

Low Volume Deadwood Where <5 dead branches occur that may require *removal*.

Medium Volume Deadwood Where 5-10 dead branches occur that may require *removal*.

High Volume Deadwood High Volume Deadwood Where >10 dead branches occur that may require *removal*.

Dieback

Dieback The death of some areas of the *crown*. Symptoms are leaf drop, bare twigs, dead branches and tree death, respectively. This can be caused by root damage, root disease, bacterial or fungal canker, severe bark damage, intensive grazing by insects, *abrupt changes* in growth conditions, drought, water-logging or over-maturity. Dieback often implies reduced *resistance, stress* or *decline* which may be temporary. Dieback can be categorized as *Low Volume Dieback*, *Medium Volume Dieback* and *High Volume Dieback*.

Low Volume Dieback Where <10% of the *crown cover* has died. See also *Dieback*, *High Volume Dieback* and *Medium Volume Dieback*.

Medium Volume Dieback Where 10-50% of the *crown cover* has died.

High Volume Dieback Where >50% of the *crown cover* has died.

Epicormic Shoots

Epicormic Shoots Juvenile shoots produced at branches or trunk from *epicormic strands* in some Eucalypts (Burrows 2002, pp. 111-131) or sprouts produced from dormant or latent buds concealed beneath the bark in some trees. Production can be triggered by fire, pruning, wounding, or root damage but may also be as a result of *stress* or *decline*. Epicormic shoots can be categorized as *Low Volume Epicormic Shoots*, *Medium Volume Epicormic Shoots* and *High Volume Epicormic Shoots*.

Low Volume Epicormic Shoots Where <10% of the c*rown cover* is comprised of live *epicormic shoots*.

Medium Volume Epicormic Shoots Where 10-50% of the *crown cover* is comprised of live *epicormic shoots*.

High Volume Epicormic Shoots Where >50% of the *crown cover* is comprised of live *epicormic shoots*.

Epicormic Strands In some taxa of the Myrtaceae family narrow bands of meristematic tissue radiate in stems from pith extending to the outer bark containing bud primordia evident as small prickle or dimple structures up to 10 mm diameter, that after the stimulus of a trauma event such as fire or defoliation develop to form new buds allowing *crown regeneration* (Burrows 2001, Pp. 111-131).

Trunk

Acaulescent A *trunkless* tree or tree growth forming a very short *trunk*. See also *Caulescent.*

Caulescent Tree grows to form a *trunk*. See also *Acaulescent*.

Trunk A single stem extending from the *root crown* to support or elevate the *crown*, terminating where it divides into separate *stems* forming *first order branches*. A trunk may be evident at or near ground or be absent in *acaulescent* trees of *deliquescent* habit, or may be continuous in trees of *excurrent* habit. The trunk of any *caulescent* tree can be divided vertically into three (3) sections and can be categorized as *Lower Trunk*, *Mid Trunk* and *Upper Trunk*. For a *leaning* tree these may be divided evenly into sections of one third along the trunk.

F.7 Test excavation – Proposed test pits

Source: EMM (2025); ABS (2021); DCSSS (2024); ESRI (2025); GA (2009)

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GDA2020 MGA Zone 56

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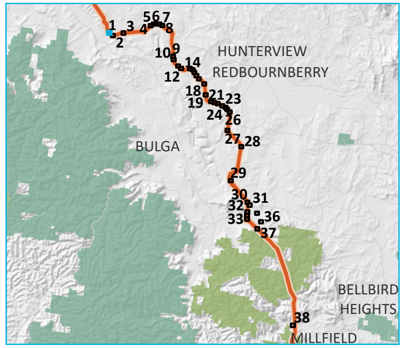


KEY

Proposed test pit

- Phase 1
- Phase 2

Project impact area

- HTP corridor
- Access track

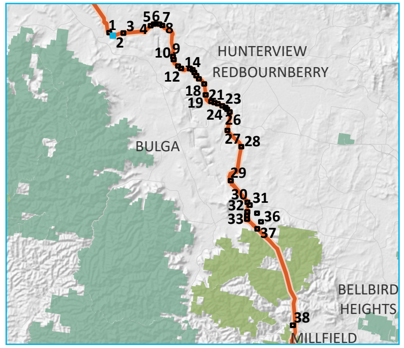
INSET KEY

- Major road
- HTP corridor
- NPWS reserve
- State forest

Proposed test excavation program
Map 1 of 38

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure F.1

EMM
creating opportunities



KEY

Proposed test pit
- Phase 1
- Phase 2

Project impact area
- HTP corridor
- Access track

Existing environment
- Minor road
- Vehicular track
- Named watercourse
- Named waterbody

INSET KEY
- Major road
- HTP corridor
- NPWS reserve
- State forest

Source: EMM (2025); ABS (2021); DCSSS (2024); ESRI (2025); GA (2009)

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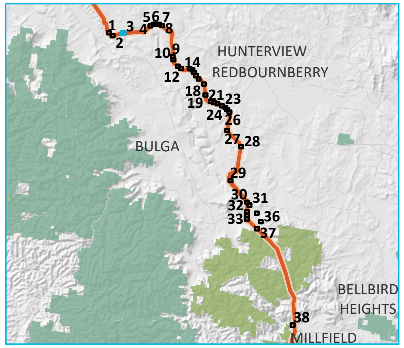
GDA2020 MGA Zone 56

N

Proposed test excavation program
Map 2 of 38

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure F.1

EMM
creating opportunities



KEY

Proposed test pit

- Phase 1
- Phase 2

Project impact area

- HTP corridor
- Access track

Existing environment

- Named waterbody

INSET KEY

- Major road
- HTP corridor
- NPWS reserve
- State forest

Source: EMM (2025); ABS (2021); DCSSS (2024); ESRI (2025); GA (2009)

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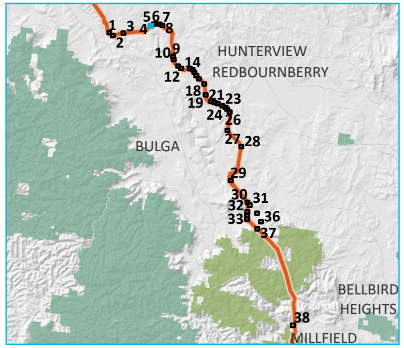
GDA2020 MGA Zone 56
N

Proposed test excavation program
Map 3 of 38

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure F.1

EMM
creating opportunities



KEY

Proposed test pit

- Phase 1
- Phase 2

Project impact area

- HTP corridor
- Access track

Existing environment

- Vehicular track
- Named watercourse

INSET KEY

- Major road
- HTP corridor
- NPWS reserve
- State forest

Proposed test excavation program
Map 4 of 38

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure F.1

EMM
creating opportunities

Source: EMM (2025); ABS (2021); DCSSS (2024); ESRI (2025); GA (2009)

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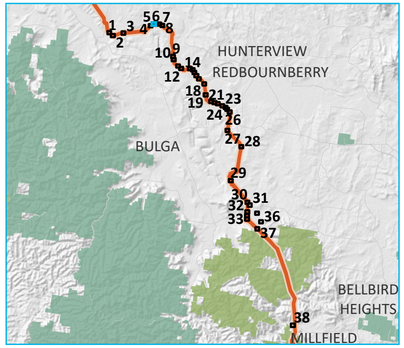
GDA2020 MGA Zone 56
N



KEY

Proposed test pit

Phase 1

Phase 2

Project impact area

HTP corridor

Access track

Existing environment

Vehicular track

Named watercourse

INSET KEY

Major road

HTP corridor

NPWS reserve

State forest

Source: EMM (2025); ABS (2021); DCSSS (2024); ESRI (2025); GA (2009)

0 50 100 m

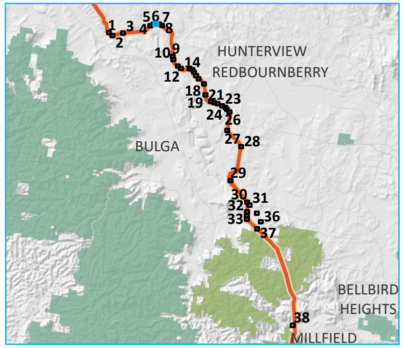
GDA2020 MGA Zone 56

N

Proposed test excavation program
Map 5 of 38

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure F.1

EMM
creating opportunities



KEY

Proposed test pit

- Phase 1
- Phase 2

Project impact area

- HTP corridor
- Access track

Existing environment

- Vehicular track

INSET KEY

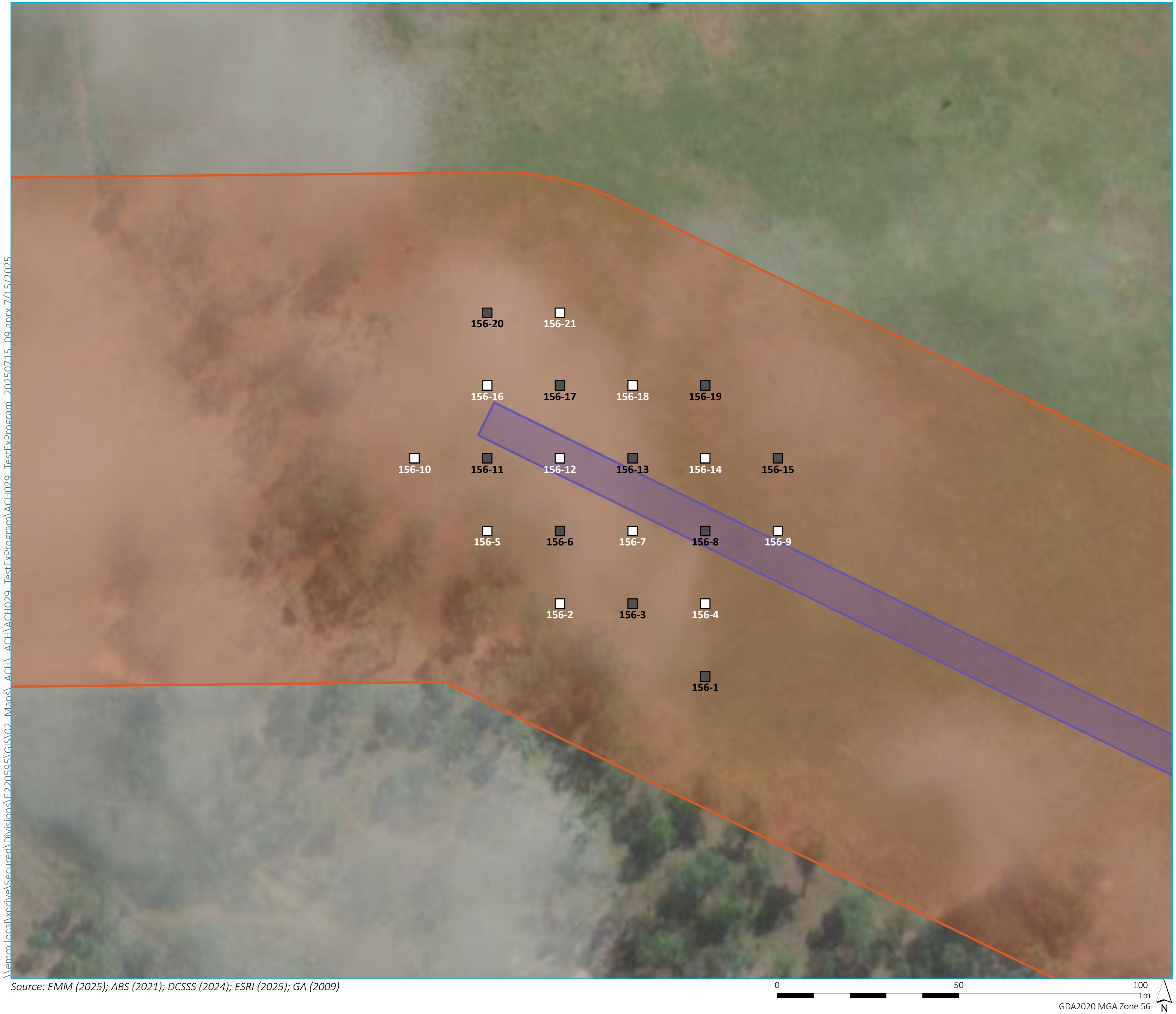
- Major road
- HTP corridor
- NPWS reserve
- State forest

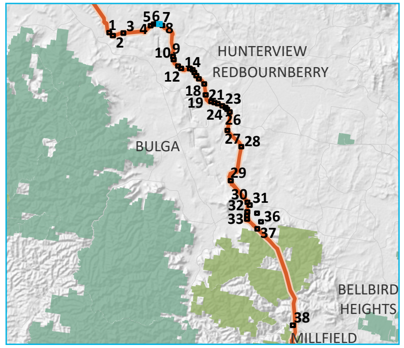
Source: EMM (2025); ABS (2021); DCSSS (2024); ESRI (2025); GA (2009)

Proposed test excavation program
Map 6 of 38

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure F.1

creating opportunities





KEY

Proposed test pit

Phase 1

Phase 2

Project impact area

HTP corridor

Access track

Existing environment

Vehicular track

INSET KEY

Major road

HTP corridor

NPWS reserve

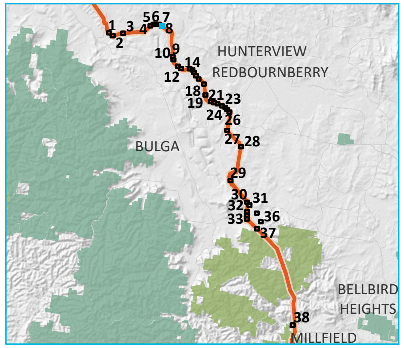
State forest

Proposed test excavation program
Map 7 of 38

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure F.1

EMM creating opportunities

Source: EMM (2025); ABS (2021); DCSSS (2024); ESRI (2025); GA (2009)



KEY

Proposed test pit

Phase 1

Phase 2

Project impact area

HTP corridor

Access track

Existing environment

Vehicular track

INSET KEY

Major road

HTP corridor

NPWS reserve

State forest

Proposed test excavation program
Map 8 of 38

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure F.1

Source: EMM (2025); ABS (2021); DCSSS (2024); ESRI (2025); GA (2009)

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GDA2020 MGA Zone 56
N

EMM
creating opportunities

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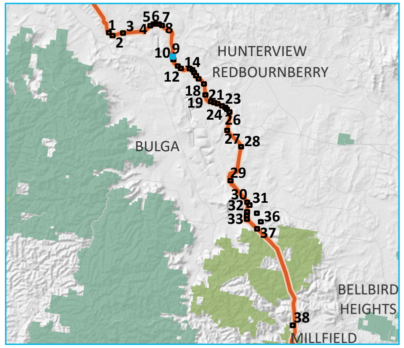

KEY

Proposed test pit

Phase 1

Phase 2

Project impact area

HTP corridor

Access track

Existing environment

Vehicular track

Named waterbody

INSET KEY

Major road

HTP corridor

NPWS reserve

State forest

Proposed test excavation program
Map 9 of 38

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure F.1

EMM creating opportunities

Source: EMM (2025); ABS (2021); DCSSS (2024); ESRI (2025); GA (2009)

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GDA2020 MGA Zone 56

N

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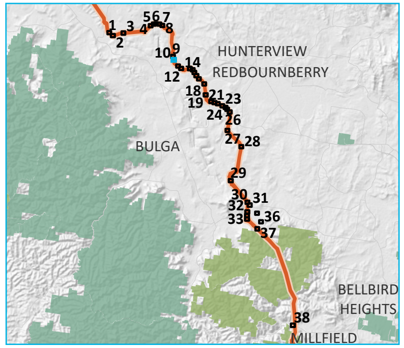


KEY

Proposed test pit

- Phase 1
- Phase 2

Project impact area

- HTP corridor
- Access track

INSET KEY

- Major road
- HTP corridor
- NPWS reserve
- State forest

Source: EMM (2025); ABS (2021); DCSSS (2024); ESRI (2025); GA (2009)

0 50 100 m

GDA2020 MGA Zone 56

N

Proposed test excavation program

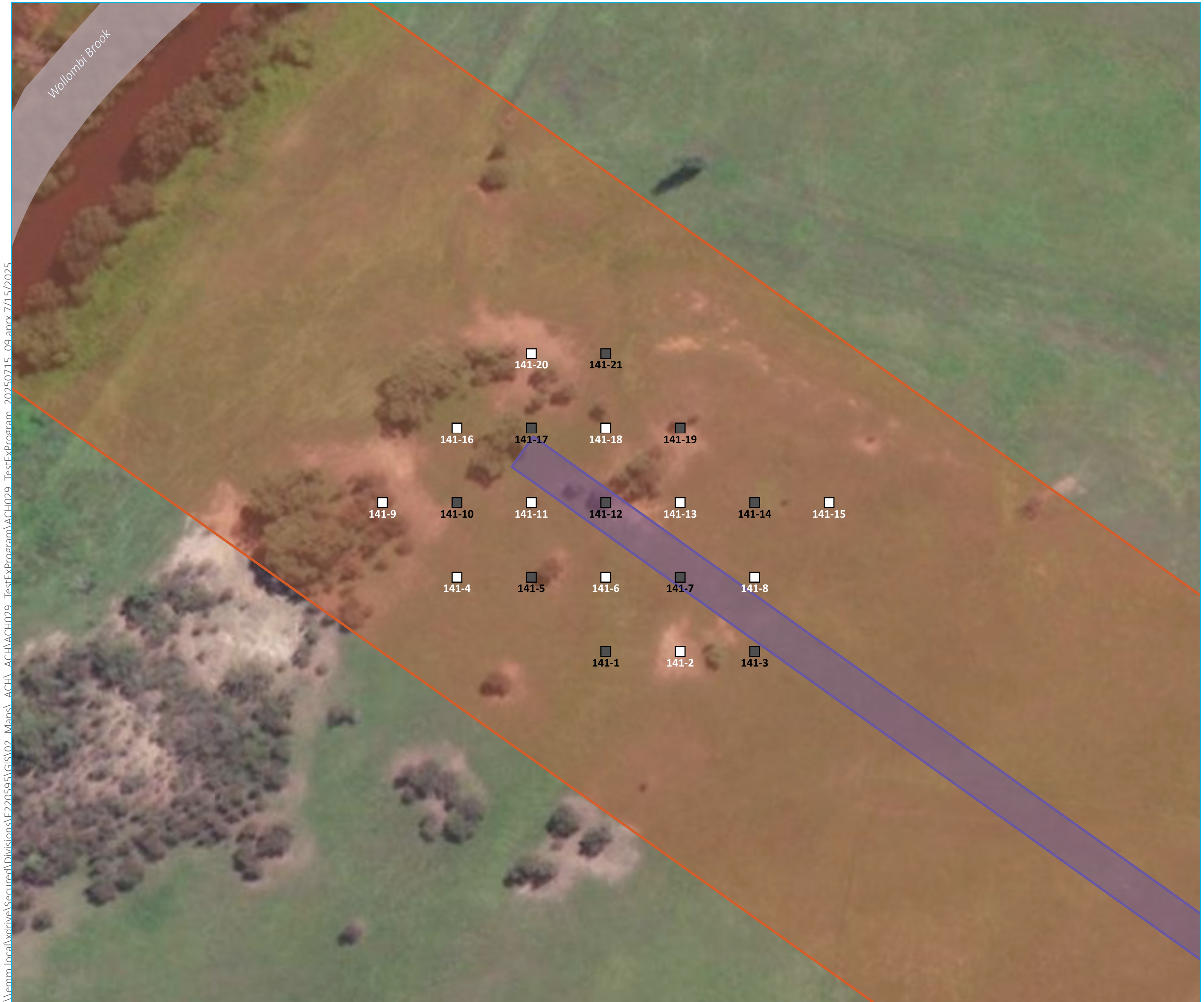
Map 10 of 38

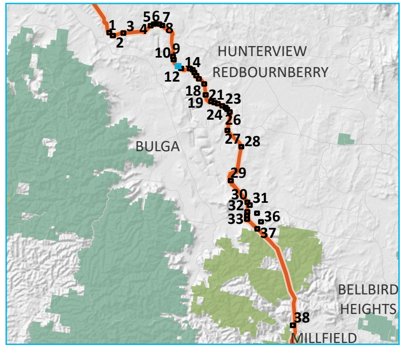
Hunter Transmission Project

Aboriginal Cultural Heritage Assessment

Figure F.1

EMM creating opportunities





KEY

Proposed test pit

- Phase 1
- Phase 2

Project impact area

- HTP corridor
- Access track

Existing environment

- Vehicular track
- Named watercourse
- Named waterbody

INSET KEY

- Major road
- HTP corridor
- NPWS reserve
- State forest

Source: EMM (2025); ABS (2021); DCSSS (2024); ESRI (2025); GA (2009)

0 50 100 m

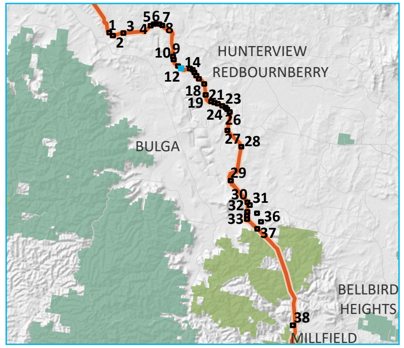
GDA2020 MGA Zone 56

N

Proposed test excavation program
Map 11 of 38

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure F.1

EMM
creating opportunities



KEY

Proposed test pit
- Phase 1
- Phase 2

Project impact area
- HTP corridor
- Access track

Existing environment
- Vehicular track

INSET KEY
- Major road
- HTP corridor
- NPWS reserve
- State forest

Proposed test excavation program
Map 12 of 38

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure F.1

EMM
creating opportunities

Source: EMM (2025); ABS (2021); DCSSS (2024); ESRI (2025); GA (2009)

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GDA2020 MGA Zone 56
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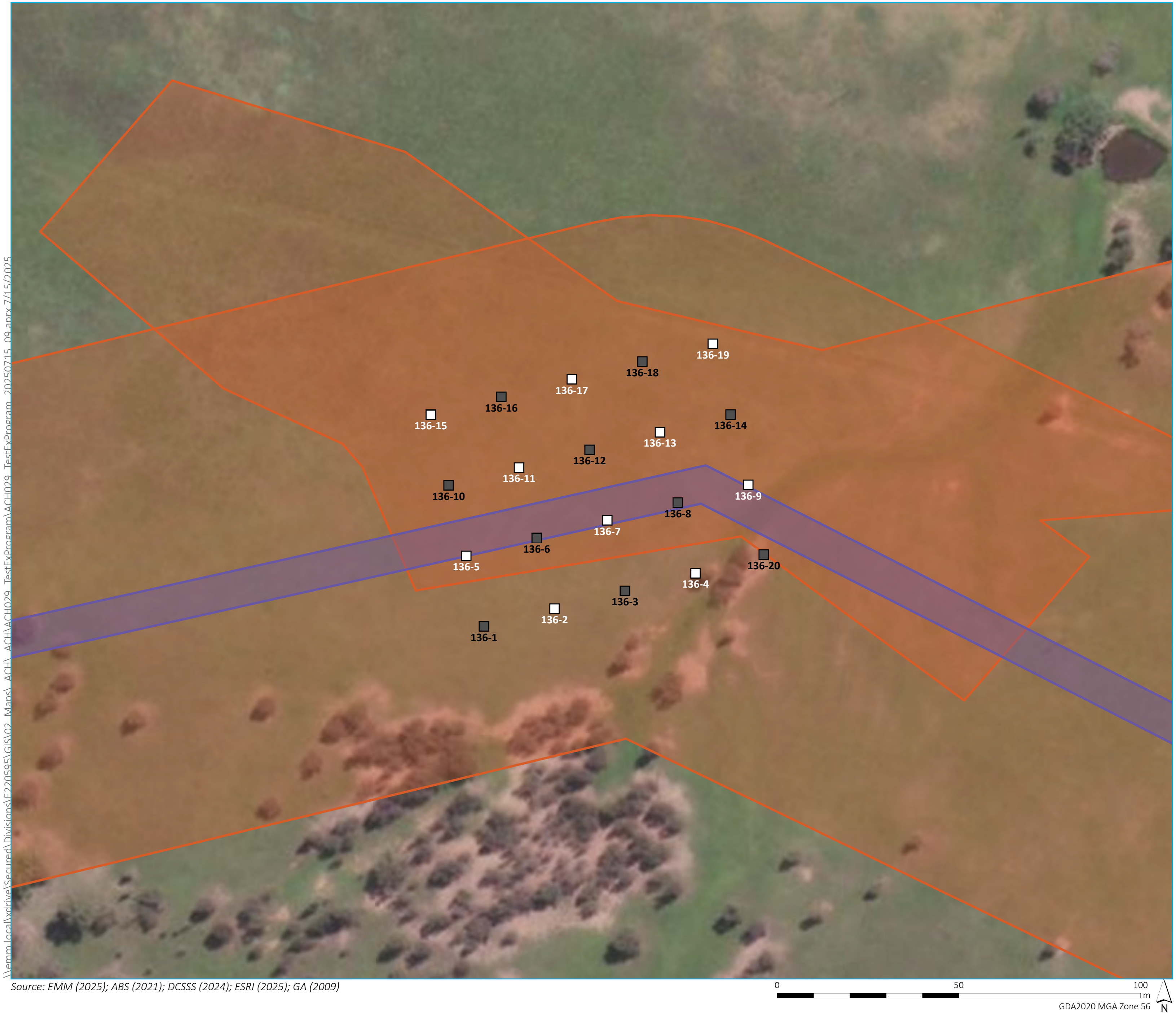
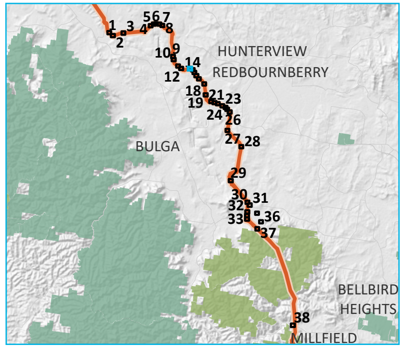




KEY

Proposed test pit

- Phase 1
- Phase 2

Project impact area

- HTP corridor
- Access track

Existing environment

- Vehicular track

INSET KEY

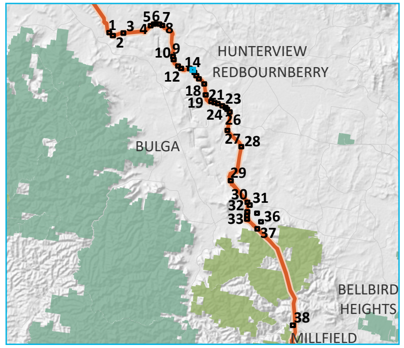
- Major road
- HTP corridor
- NPWS reserve
- State forest

Proposed test excavation program
Map 13 of 38

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure F.1

EMM
creating opportunities

Source: EMM (2025); ABS (2021); DCSSS (2024); ESRI (2025); GA (2009)



Source: EMM (2025); ABS (2021); DCSSS (2024); ESRI (2025); GA (2009)

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m
GDA2020 MGA Zone 56
N

KEY

Proposed test pit
- Phase 1
- Phase 2

Project impact area
- HTP corridor
- Access track

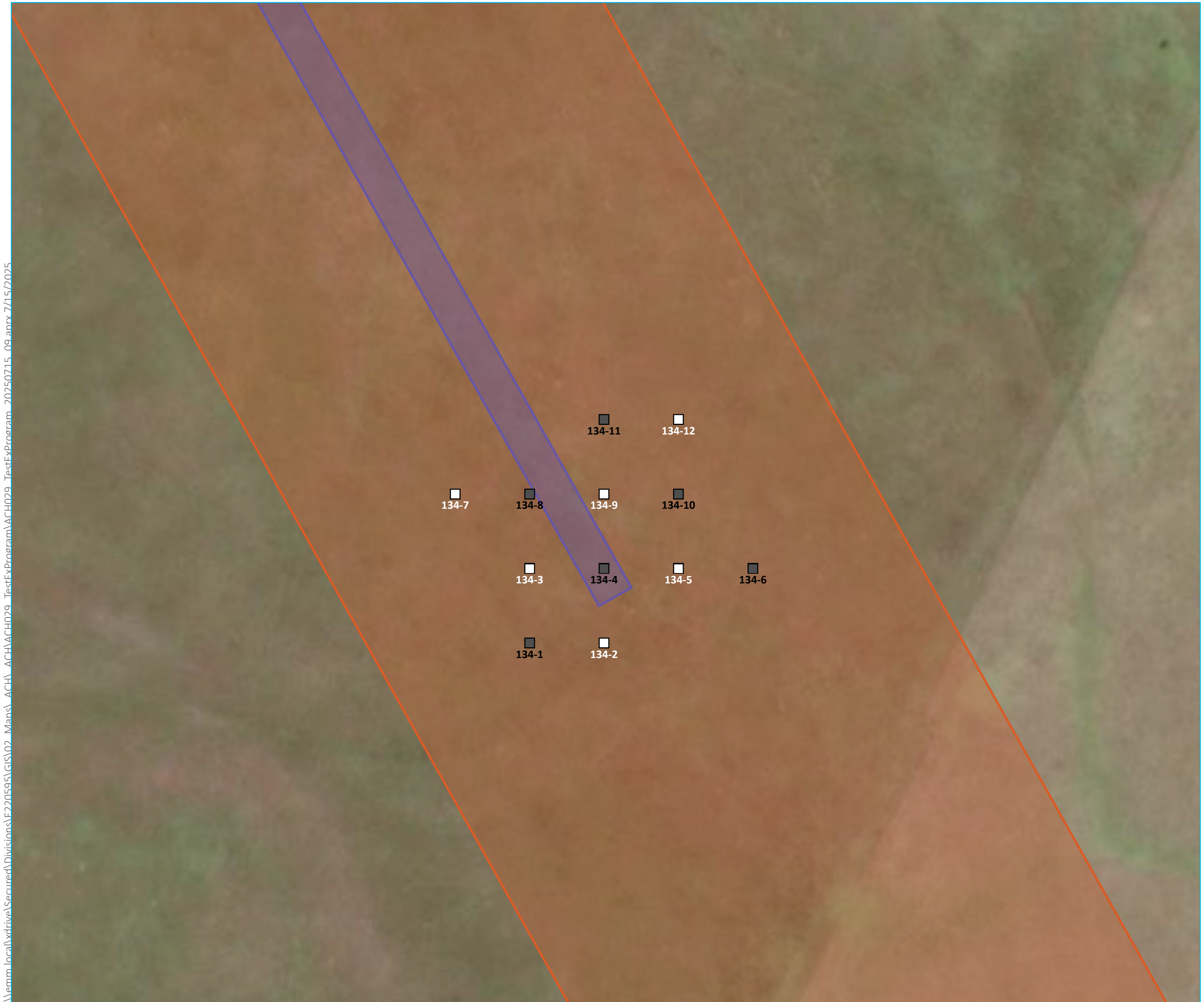
Existing environment
- Vehicular track

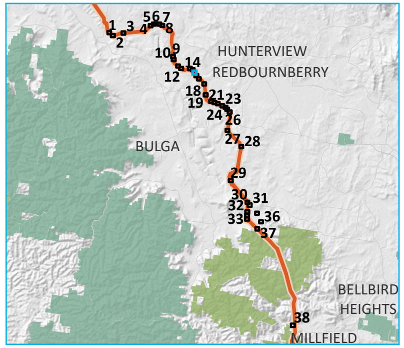
INSET KEY
- Major road
- HTP corridor
- NPWS reserve
- State forest

Proposed test excavation program
Map 14 of 38

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure F.1

EMM
creating opportunities





KEY

Proposed test pit
- Phase 1
- Phase 2

Project impact area
- HTP corridor
- Access track

Existing environment
- Minor road
- Named watercourse

INSET KEY

- Major road
- HTP corridor
- NPWS reserve
- State forest

Proposed test excavation program
Map 15 of 38

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure F.1

EMM creating opportunities

Source: EMM (2025); ABS (2021); DCSSS (2024); ESRI (2025); GA (2009)

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GDA2020 MGA Zone 56
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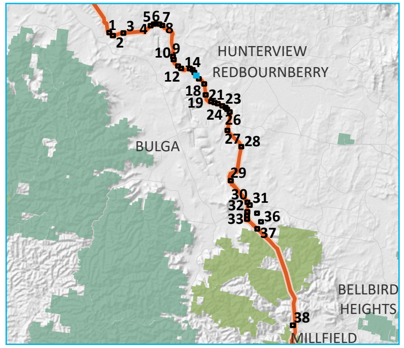


KEY

Proposed test pit

- Phase 1
- Phase 2

Project impact area

- HTP corridor
- Access track

Existing environment

- Named watercourse

INSET KEY

- Major road
- HTP corridor
- NPWS reserve
- State forest

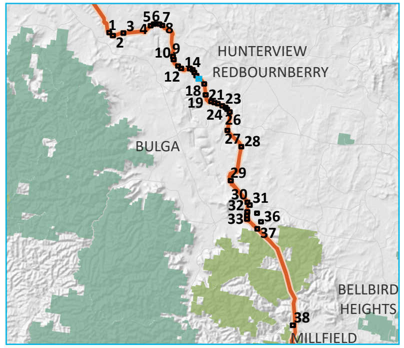
Proposed test excavation program
Map 16 of 38

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure F.1

Source: EMM (2025); ABS (2021); DCSSS (2024); ESRI (2025); GA (2009)

0 50 100 m
GDA2020 MGA Zone 56
N

creating opportunities



KEY

Proposed test pit

- Phase 1
- Phase 2

Project impact area

- HTP corridor
- Access track

Existing environment

- Minor road
- Vehicular track

INSET KEY

- Major road
- HTP corridor
- NPWS reserve
- State forest

Proposed test excavation program
Map 17 of 38

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure F.1

EMM creating opportunities

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Source: EMM (2025); ABS (2021); DCSSS (2024); ESRI (2025); GA (2009)

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GDA2020 MGA Zone 56

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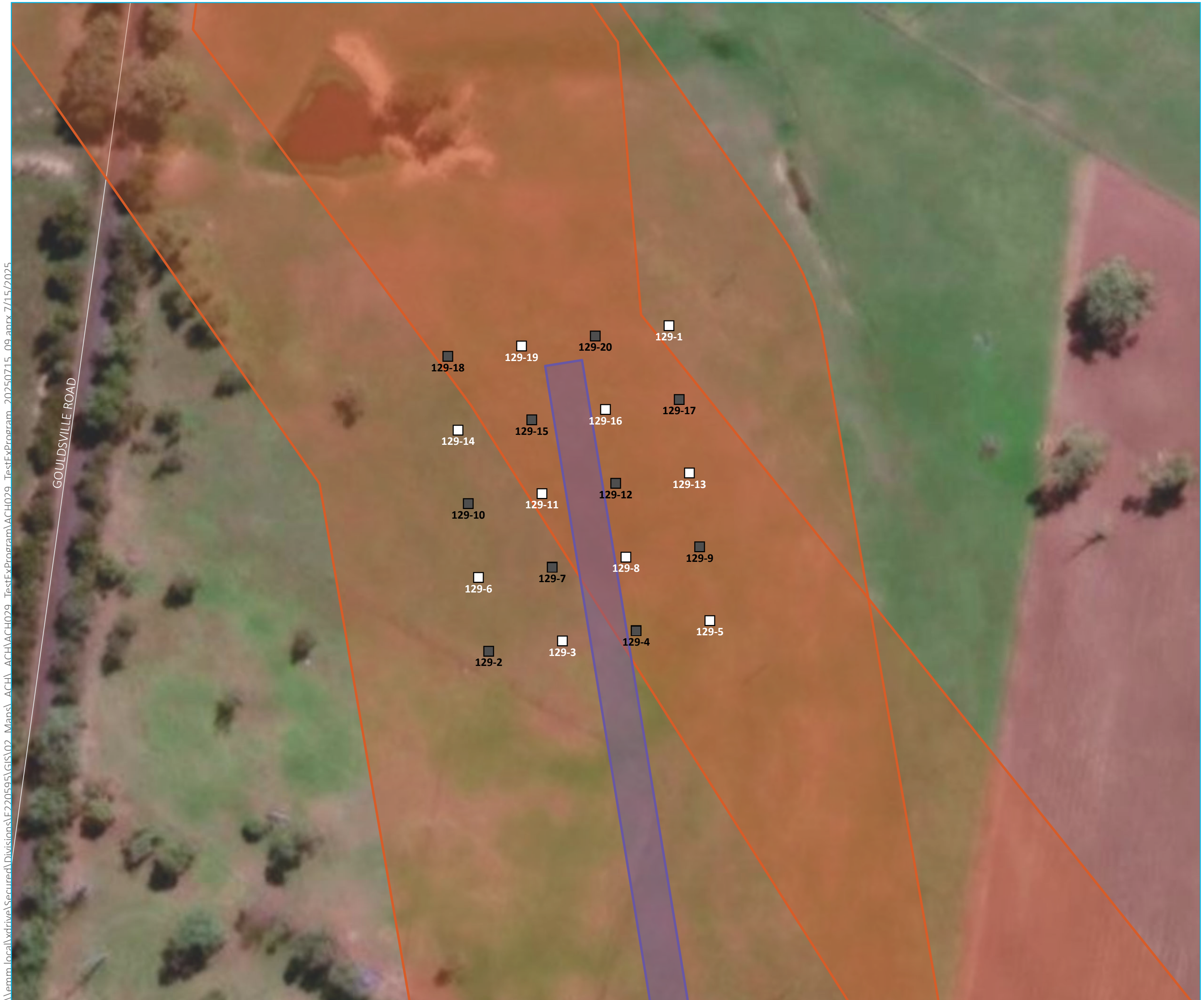

Source: EMM (2025); ABS (2021); DCSSS (2024); ESRI (2025); GA (2009)

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GDA2020 MGA Zone 56
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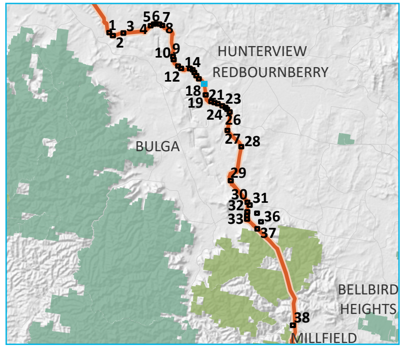

KEY

Proposed test pit

- Phase 1
- Phase 2

Project impact area

- HTP corridor
- Access track

Existing environment

- Minor road

INSET KEY

- Major road
- HTP corridor
- NPWS reserve
- State forest

Proposed test excavation program
Map 18 of 38

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure F.1

EMM
creating opportunities

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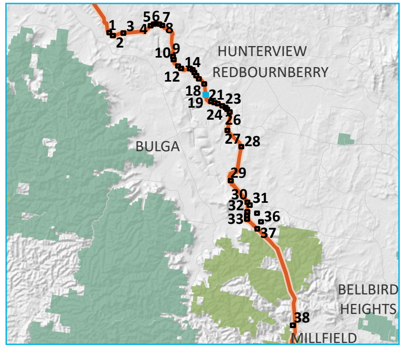

KEY

Proposed test pit

- Phase 1
- Phase 2

Project impact area

- HTP corridor
- Access track

Existing environment

- Major road

INSET KEY

- Major road
- HTP corridor
- NPWS reserve
- State forest

Source: EMM (2025); ABS (2021); DCSSS (2024); ESRI (2025); GA (2009)

0 50 100 m

GDA2020 MGA Zone 56

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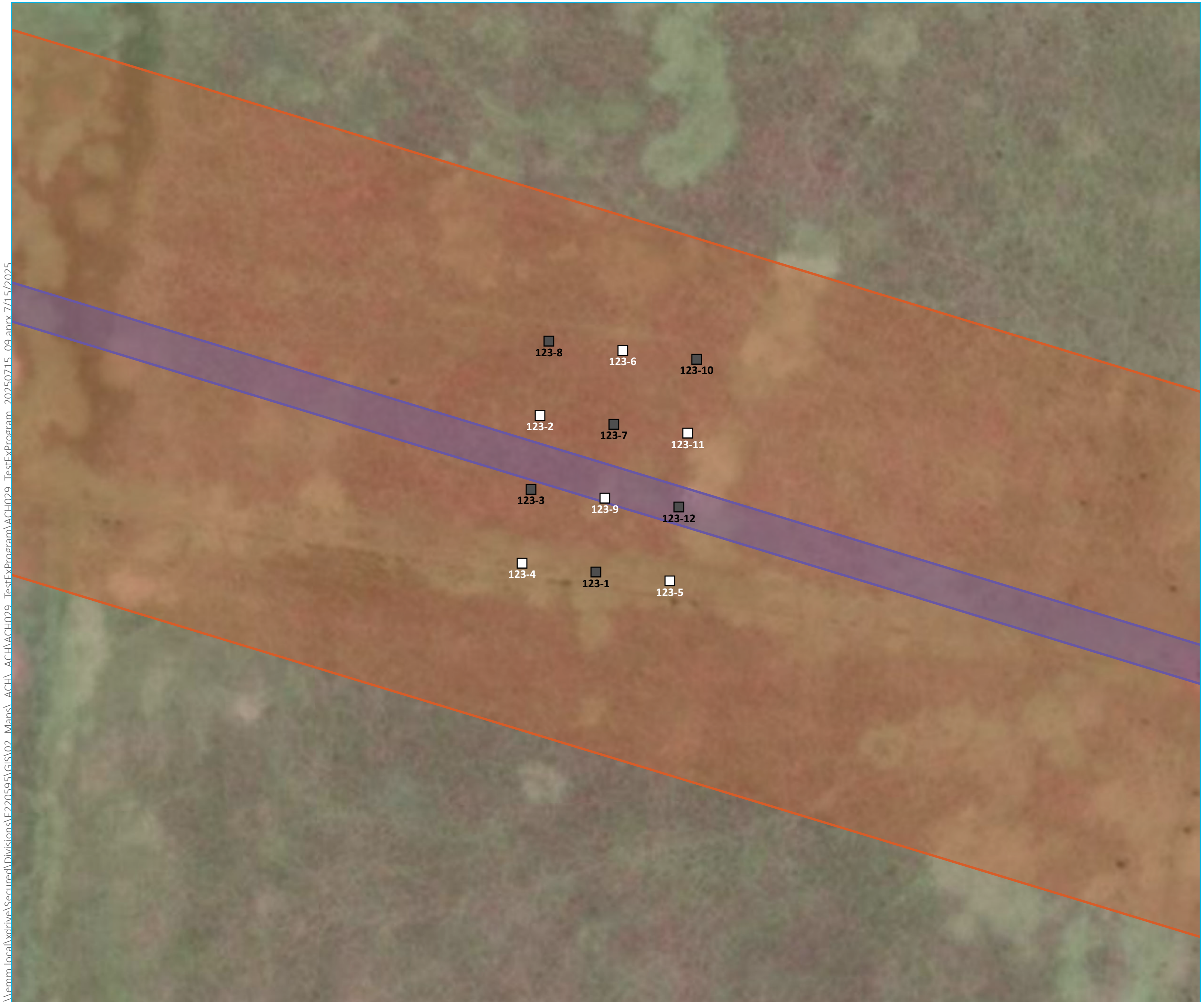
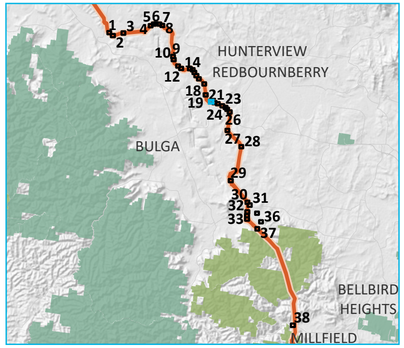
Proposed test excavation program
Map 19 of 38

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure F.1

EMM creating opportunities





KEY

Proposed test pit

Phase 1

Phase 2

Project impact area

HTP corridor

Access track

INSET KEY

Major road

HTP corridor

NPWS reserve

State forest

Proposed test excavation program
Map 20 of 38

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure F.1

EMM creating opportunities

Source: EMM (2025); ABS (2021); DCSSS (2024); ESRI (2025); GA (2009)

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GDA2020 MGA Zone 56

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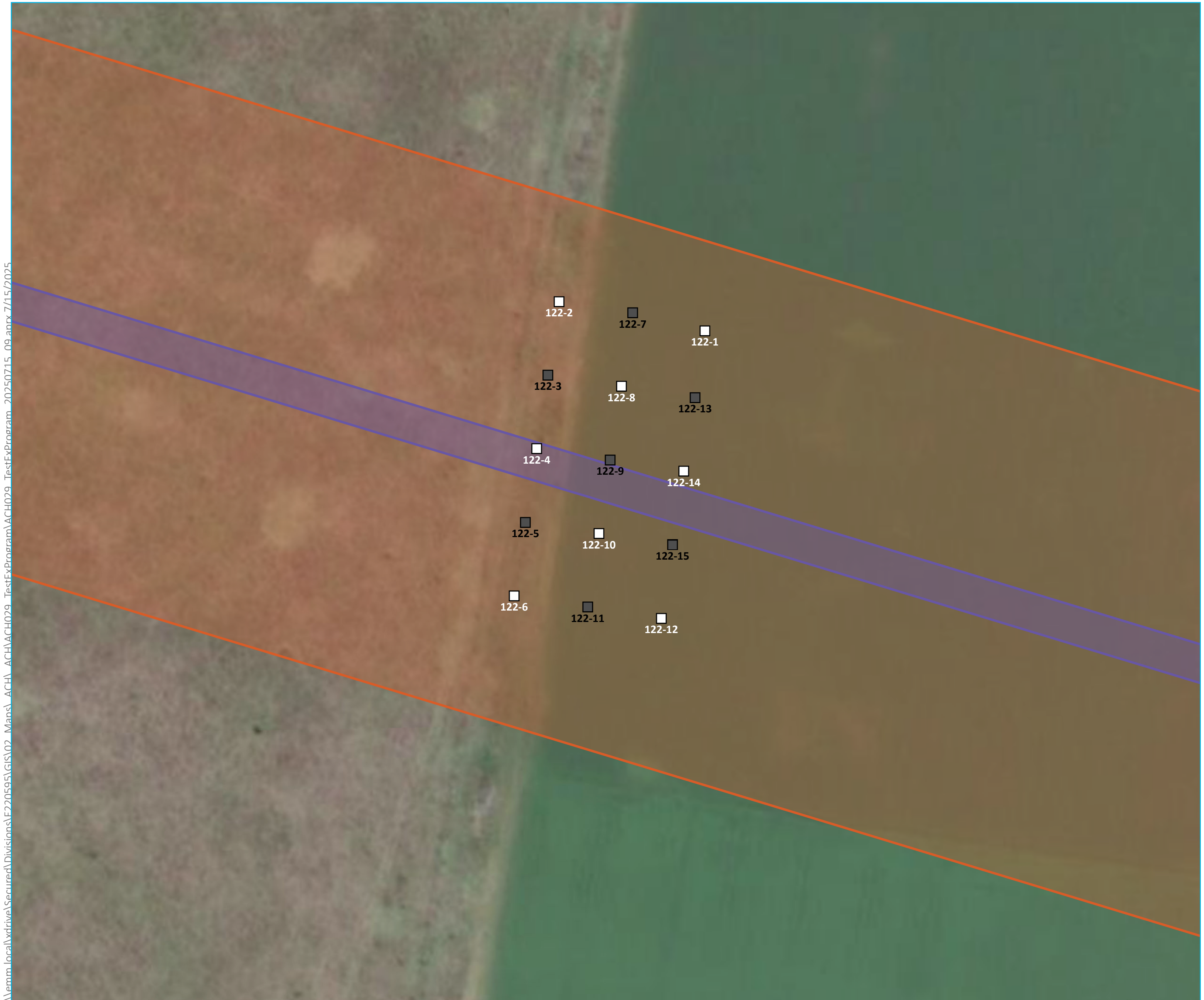

Source: EMM (2025); ABS (2021); DCSSS (2024); ESRI (2025); GA (2009)

0 50 100 m

GDA2020 MGA Zone 56

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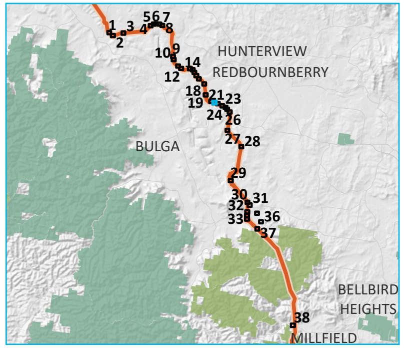

KEY

Proposed test pit

- Phase 1
- Phase 2

Project impact area

- HTP corridor
- Access track

INSET KEY

- Major road
- HTP corridor
- NPWS reserve
- State forest

Proposed test excavation program
Map 21 of 38

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure F.1

EMM
creating opportunities

Source: EMM (2025); ABS (2021); DCSSS (2024); ESRI (2025); GA (2009)

KEY

Proposed test pit

- Phase 1
- Phase 2

Project impact area

- HTP corridor
- Access track

Existing environment

- Vehicular track
- Named waterbody

INSET KEY

- Major road
- HTP corridor
- NPWS reserve
- State forest

Proposed test excavation program
Map 22 of 38

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure F.1

EMM creating opportunities

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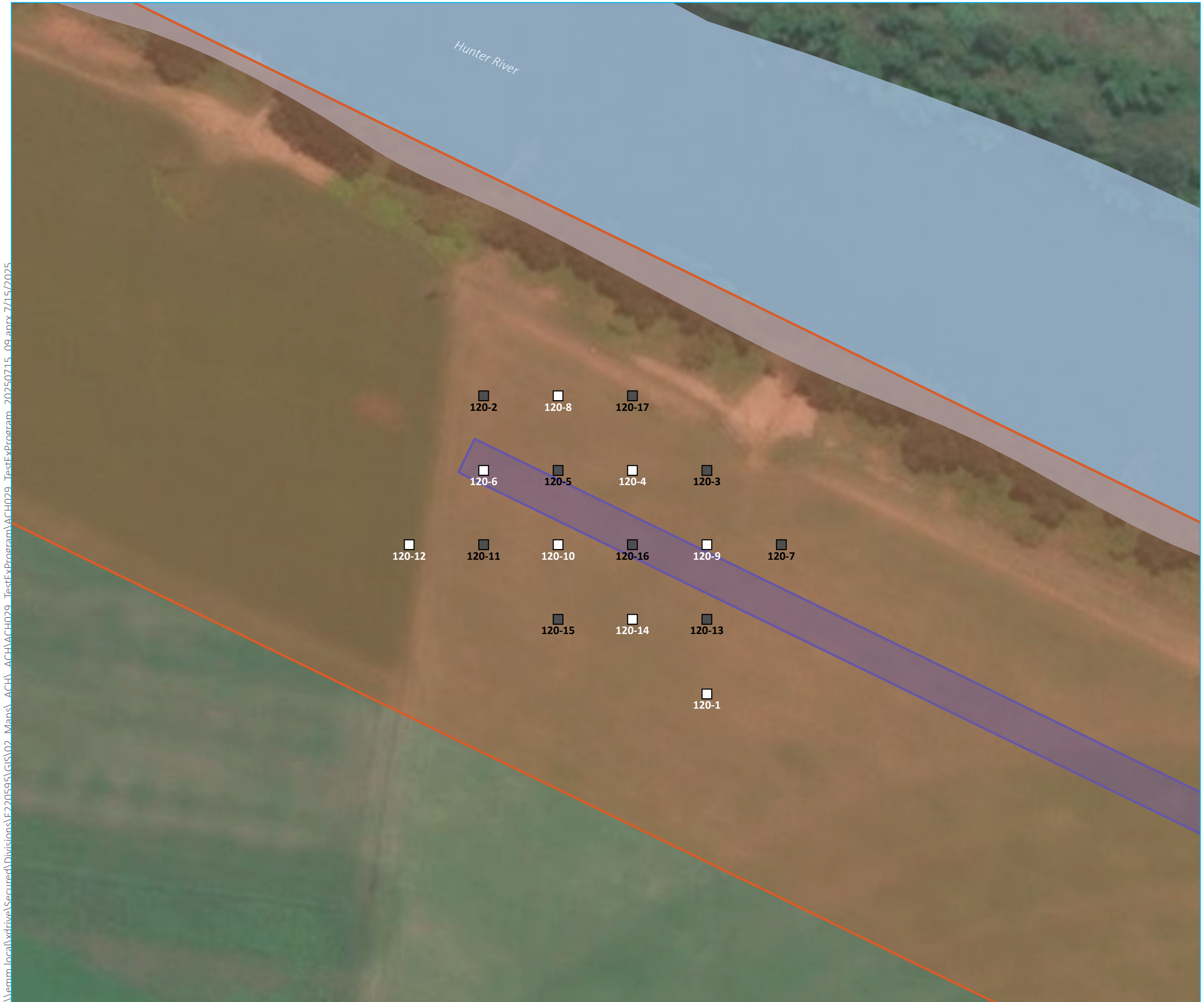

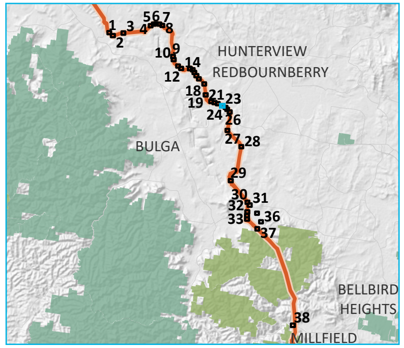

KEY

Proposed test pit

- Phase 1
- Phase 2

Project impact area

- HTP corridor
- Access track

Existing environment

- Named waterbody

INSET KEY

- Major road
- HTP corridor
- NPWS reserve
- State forest

Source: EMM (2025); ABS (2021); DCSSS (2024); ESRI (2025); GA (2009)

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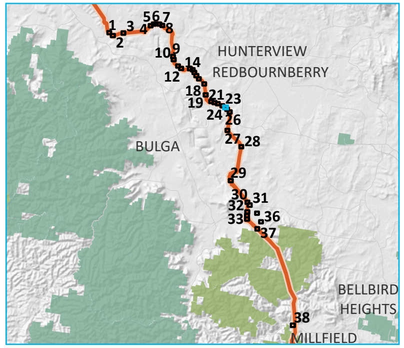
Proposed test excavation program
Map 23 of 38

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure F.1

EMM
creating opportunities



Source: EMM (2025); ABS (2021); DCSSS (2024); ESRI (2025); GA (2009)

0 50 100 m

GDA2020 MGA Zone 56

N

KEY

Proposed test pit

- Phase 1
- Phase 2

Project impact area

- HTP corridor
- Access track

Existing environment

- Named waterbody

INSET KEY

- Major road
- HTP corridor
- NPWS reserve
- State forest

Proposed test excavation program
Map 24 of 38

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure F.1

EMM
creating opportunities

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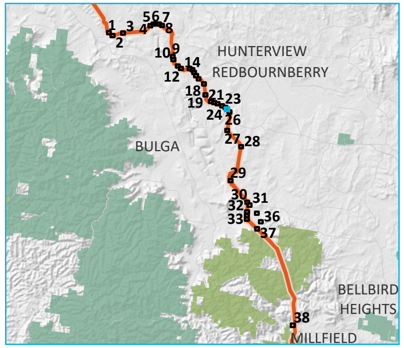

KEY

Proposed test pit

Phase 1

Phase 2

Project impact area

HTP corridor

Access track

Existing environment

Named watercourse

Named waterbody

INSET KEY

Major road

HTP corridor

NPWS reserve

State forest

Proposed test excavation program
Map 25 of 38

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure F.1

EMM creating opportunities

Source: EMM (2025); ABS (2021); DCSSS (2024); ESRI (2025); GA (2009)

0 50 100 m

GDA2020 MGA Zone 56

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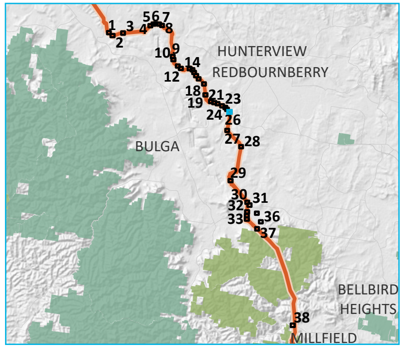

KEY

Proposed test pit

- Phase 1
- Phase 2

Project impact area

- HTP corridor
- Access track

Existing environment

- Vehicular track
- Named watercourse

INSET KEY

- Major road
- HTP corridor
- NPWS reserve
- State forest

Source: EMM (2025); ABS (2021); DCSSS (2024); ESRI (2025); GA (2009)

0 50 100 m

GDA2020 MGA Zone 56

Proposed test excavation program
Map 26 of 38

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure F.1

EMM creating opportunities

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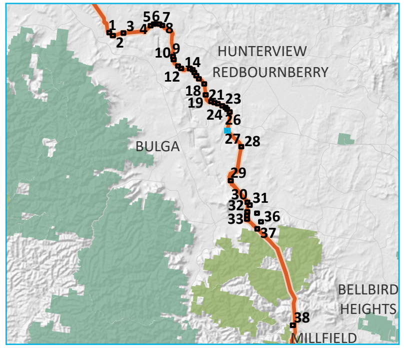


KEY

Proposed test pit

- Phase 1
- Phase 2

Project impact area

- HTP corridor
- Access track

Existing environment

- Major road
- Vehicular track

INSET KEY

- Major road
- HTP corridor
- NPWS reserve
- State forest

Source: EMM (2025); ABS (2021); DCSSS (2024); ESRI (2025); GA (2009)

0 50 100 m

GDA2020 MGA Zone 56

N

Proposed test excavation program

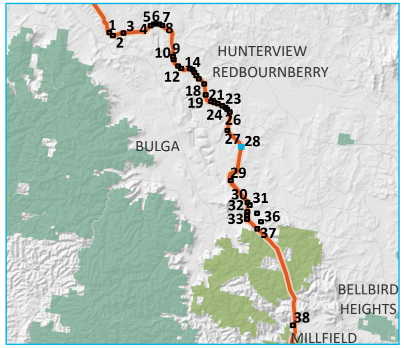
Map 27 of 38

Hunter Transmission Project

Aboriginal Cultural Heritage Assessment

Figure F.1

EMM creating opportunities



KEY

Proposed test pit

- Phase 1
- Phase 2

Project impact area

- HTP corridor
- Access track

Existing environment

- Vehicular track

INSET KEY

- Major road
- HTP corridor
- NPWS reserve
- State forest

Source: EMM (2025); ABS (2021); DCSSS (2024); ESRI (2025); GA (2009)

0 50 100 m

GDA2020 MGA Zone 56

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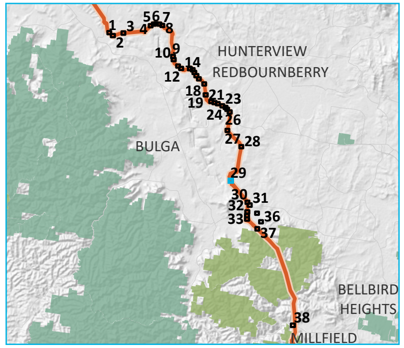
Proposed test excavation program
Map 28 of 38

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure F.1

EMM
creating opportunities



KEY

Proposed test pit

- Phase 1
- Phase 2

Project impact area

- HTP corridor
- Adjustment to existing transmission line (line 81)
- Access track

Existing environment

- Named watercourse

INSET KEY

- Major road
- HTP corridor
- NPWS reserve
- State forest

Proposed test excavation program
Map 29 of 38

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure F.1

EMM
creating opportunities

Source: EMM (2025); ABS (2021); DCSSS (2024); ESRI (2025); GA (2009)

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GDA2020 MGA Zone 56

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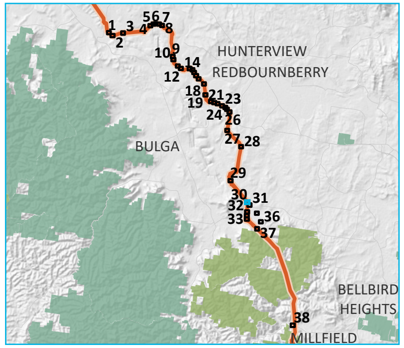

KEY

Proposed test pit

- Phase 1
- Phase 2

Project impact area

- HTP corridor
- Access track

Existing environment

- Vehicular track

INSET KEY

- Major road
- HTP corridor
- NPWS reserve
- State forest

Source: EMM (2025); ABS (2021); DCSSS (2024); ESRI (2025); GA (2009)

0 50 100 m

GDA2020 MGA Zone 56

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Proposed test excavation program
Map 30 of 38

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure F.1

EMM creating opportunities

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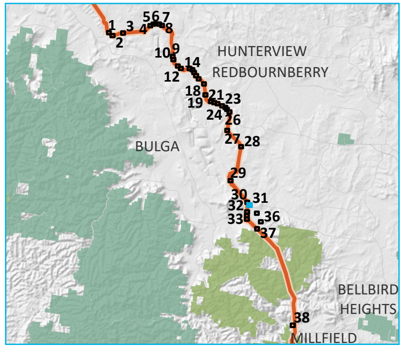

KEY

Proposed test pit

Phase 1

Phase 2

Existing environment

Vehicular track

INSET KEY

Major road

HTP corridor

NPWS reserve

State forest

Proposed test excavation program
Map 31 of 38

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure F.1

EMM creating opportunities

Source: EMM (2025); ABS (2021); DCSSS (2024); ESRI (2025); GA (2009)

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GDA2020 MGA Zone 56

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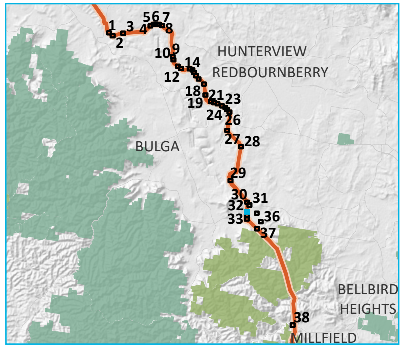

KEY

Proposed test pit

- Phase 1
- Phase 2

Project impact area

- HTP corridor
- Access track

Existing environment

- Major road
- Named watercourse

INSET KEY

- Major road
- HTP corridor
- NPWS reserve
- State forest

Source: EMM (2025); ABS (2021); DCSSS (2024); ESRI (2025); GA (2009)

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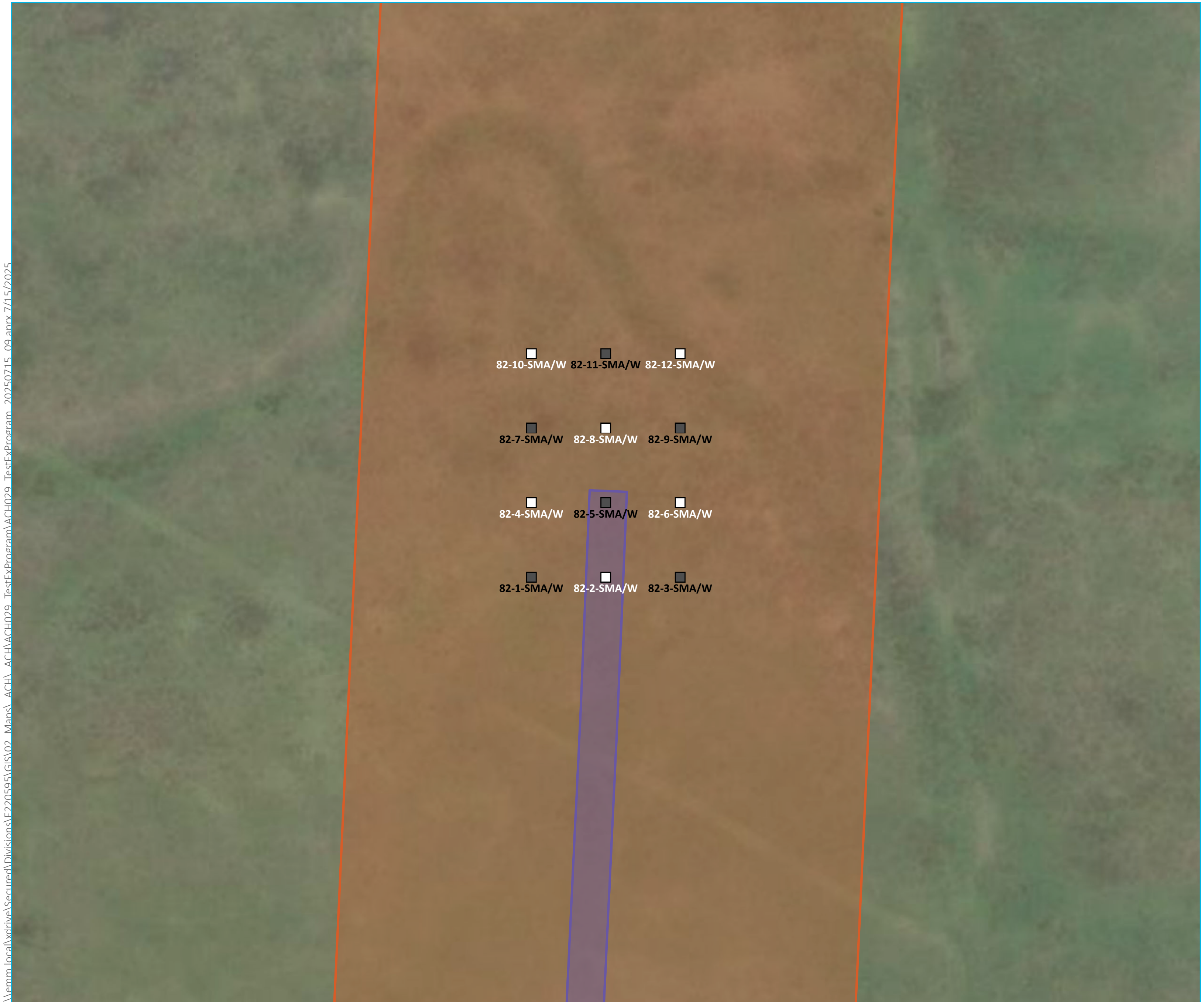
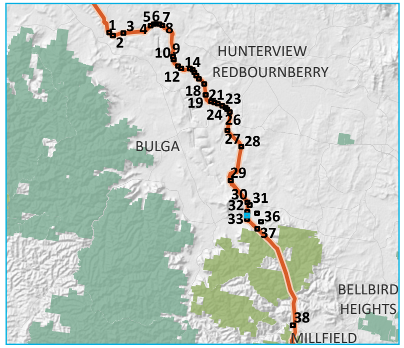
Proposed test excavation program
Map 32 of 38

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure F.1

EMM
creating opportunities





KEY

Proposed test pit

- Phase 1
- Phase 2

Project impact area

- HTP corridor
- Access track

Existing environment

- Vehicular track

INSET KEY

- Major road
- HTP corridor
- NPWS reserve
- State forest

Source: EMM (2025); ABS (2021); DCSSS (2024); ESRI (2025); GA (2009)

0 50 100 m

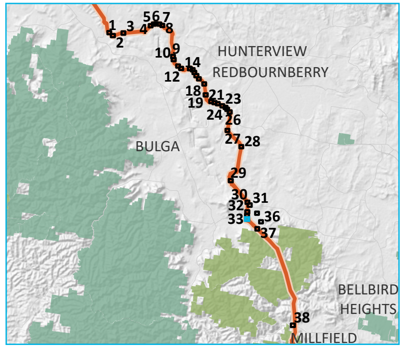
GDA2020 MGA Zone 56

N

Proposed test excavation program
Map 33 of 38

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure F.1

EMM creating opportunities



KEY

Proposed test pit

- Phase 1
- Phase 2

Project impact area

- HTP corridor
- Access track

Existing environment

- Vehicular track

INSET KEY

- Major road
- HTP corridor
- NPWS reserve
- State forest

Source: EMM (2025); ABS (2021); DCSSS (2024); ESRI (2025); GA (2009)

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GDA2020 MGA Zone 56
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Proposed test excavation program
Map 34 of 38

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure F.1

EMM
creating opportunities

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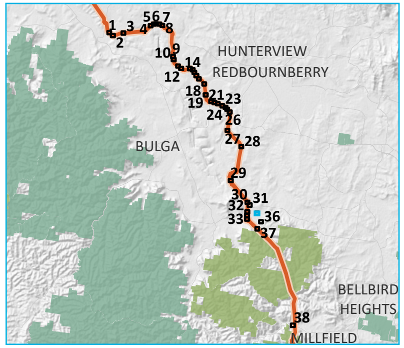

KEY

Proposed test pit

- Phase 1
- Phase 2

Existing environment

- Minor road
- Vehicular track

INSET KEY

- Major road
- HTP corridor
- NPWS reserve
- State forest

Source: EMM (2025); ABS (2021); DCSSS (2024); ESRI (2025); GA (2009)

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GDA2020 MGA Zone 56
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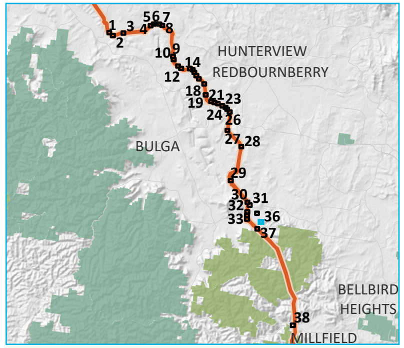
Proposed test excavation program
Map 35 of 38

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure F.1

EMM creating opportunities



KEY

Proposed test pit

- Phase 1
- Phase 2

Existing environment

- Minor road
- Vehicular track
- Named watercourse

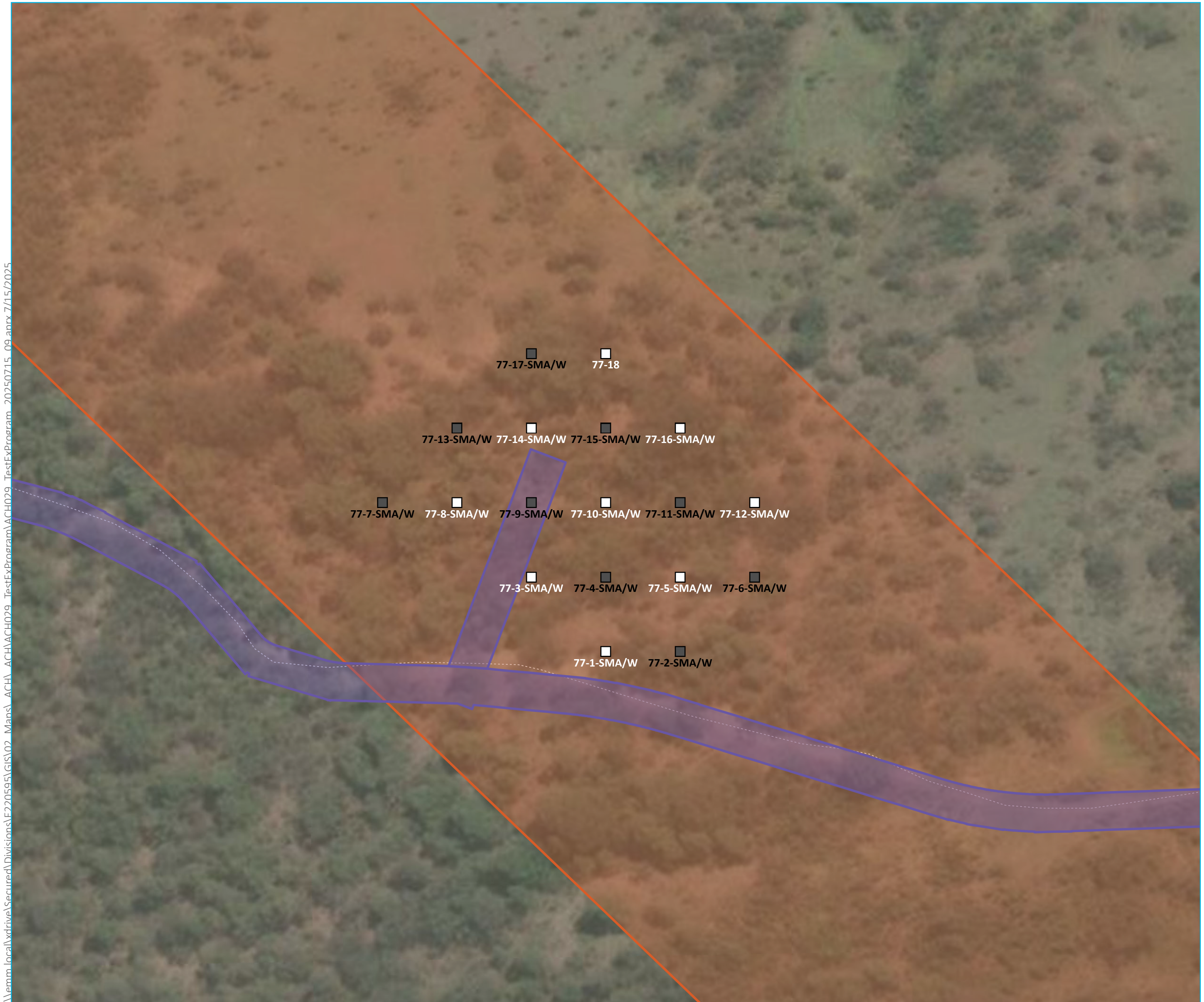
INSET KEY

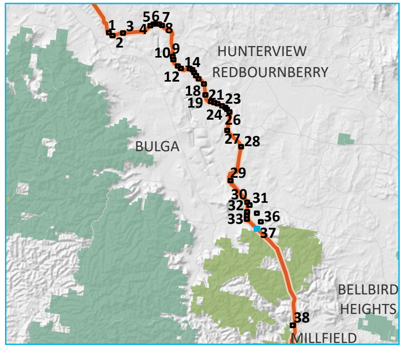
- Major road
- HTP corridor
- NPWS reserve
- State forest

Source: EMM (2025); ABS (2021); DCSSS (2024); ESRI (2025); GA (2009)

Proposed test excavation program
Map 36 of 38

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure F.1





KEY

Proposed test pit

- Phase 1
- Phase 2

Project impact area

- HTP corridor
- Access track

Existing environment

- Vehicular track

INSET KEY

- Major road
- HTP corridor
- NPWS reserve
- State forest

Source: EMM (2025); ABS (2021); DCSSS (2024); ESRI (2025); GA (2009)

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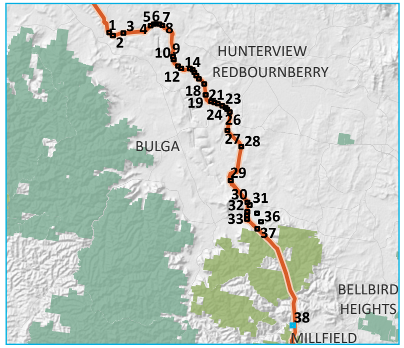
Proposed test excavation program
Map 37 of 38

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure F.1

creating opportunities



Source: EMM (2025); ABS (2021); DCSSS (2024); ESRI (2025); GA (2009)

KEY

Proposed test pit
- Phase 1
- Phase 2

Project impact area
- HTP corridor
- Construction support site
- Access track

Existing environment
- Major road
- Vehicular track
- Named watercourse
- Named waterbody

INSET KEY
- Major road
- HTP corridor
- NPWS reserve
- State forest

Proposed test excavation program
Map 38 of 38

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure F.1

EMM
creating opportunities

F.8 Test excavation – Test pit information

Table F.4 Summary of proposed and excavated test pits

Test pit #	Phase	Proximity to project impact area (m)	Easting	Northing	Distance from the nearest named watercourse (m)	Strahler order	Nearest named watercourse (m)	Status	Depth below ground surface (m)	Size (m^2)	Artefact count	Extrapolated artefact count ($/m^2$)
77-10-SMA/W	1	Within project impact area	328186	6374002	781	5	Monkey Place Creek	Excavated	0.3	0.25	0	0
77-11-SMA/W	2	Within project impact area	328206	6374002	762	5	Monkey Place Creek	Not implemented				
77-12-SMA/W	1	Within project impact area	328226	6374002	742	5	Monkey Place Creek	Not implemented				
77-13-SMA/W	2	Within project impact area	328146	6374022	818	5	Monkey Place Creek	Not implemented				
77-14-SMA/W	1	Within project impact area	328166	6374022	798	5	Monkey Place Creek	Excavated	0.3	0.25	1	4
77-15-SMA/W	2	Within project impact area	328186	6374022	778	5	Monkey Place Creek	Not implemented				
77-16-SMA/W	1	Within project impact area	328206	6374022	759	5	Monkey Place Creek	Not implemented				
77-17-SMA/W	2	Within project impact area	328166	6374042	796	5	Monkey Place Creek	Not implemented				
77-18-SMA/W	1	Within project impact area	328186	6374042	776	5	Monkey Place Creek	Excavated	0.8	0.25	0	0
77-1-SMA/W	1	Within project impact area	328186	6373962	789	5	Monkey Place Creek	Excavated	0.3	0.25	0	0
77-2-SMA/W	2	Within project impact area	328206	6373962	769	5	Monkey Place Creek	Not implemented				

Test pit #	Phase	Proximity to project impact area (m)	Easting	Northing	Distance from the nearest named watercourse (m)	Strahler order	Nearest named watercourse (m)	Status	Depth below ground surface (m)	Size (m^2)	Artefact count	Extrapolated artefact count ($/m^2$)
77-3-SMA/W	1	Within project impact area	328166	6373982	805	5	Monkey Place Creek	Excavated	0.3	0.25	0	0
77-4-SMA/W	2	Within project impact area	328186	6373982	785	5	Monkey Place Creek	Not implemented				
77-5-SMA/W	1	Within project impact area	328206	6373982	765	5	Monkey Place Creek	Not implemented				
77-6-SMA/W	2	Within project impact area	328226	6373982	746	5	Monkey Place Creek	Not implemented				
77-7-SMA/W	2	Within project impact area	328126	6374002	841	5	Monkey Place Creek	Not implemented				
77-8-SMA/W	1	Within project impact area	328146	6374002	821	5	Monkey Place Creek	Excavated	0.3	0.25	0	0
77-9-SMA/W	2	Within project impact area	328166	6374002	801	5	Monkey Place Creek	Not implemented				
80-10-SMA/C	1	1007	328686	6375002	99	5	Monkey Place Creek	Excavated	0.5	0.25	0	0
80-11-SMA/C	2	1021	328706	6375002	115	5	Monkey Place Creek	Not implemented				
80-1-SMA/C	1	950	328666	6374942	59	5	Monkey Place Creek	Not implemented				
80-2-SMA/C	2	964	328686	6374942	79	5	Monkey Place Creek	Not implemented				
80-3-SMA/C	1	973	328706	6374942	99	5	Monkey Place Creek	Excavated	0.3	0.25	0	0

Test pit #	Phase	Proximity to project impact area (m)	Easting	Northing	Distance from the nearest named watercourse (m)	Strahler order	Nearest named watercourse (m)	Status	Depth below ground surface (m)	Size (m²)	Artefact count	Extrapolated artefact count (/m²)
80-4-SMA/C	2	964	328666	6374962	63	5	Monkey Place Creek	Not implemented				
80-5-SMA/C	1	978	328686	6374962	82	5	Monkey Place Creek	Excavated	0.4	0.25	0	0
80-6-SMA/C	2	992	328706	6374962	102	5	Monkey Place Creek	Not implemented				
80-7-SMA/C	2	993	328686	6374982	89	5	Monkey Place Creek	Not implemented				
80-8-SMA/C	1	1007	328706	6374982	107	5	Monkey Place Creek	Excavated	0.4	0.25	0	0
80-9-SMA/C	2	1015	328726	6374982	126	5	Monkey Place Creek	Not implemented				
81-1-SMA/W	2	Within project impact area	326726	6375342	727	5	Monkey Place Creek	Not implemented				
81-2-SMA/W	1	Within project impact area	326746	6375342	725	5	Monkey Place Creek	Excavated	0.4	0.25	0	0
81-3-SMA/W	2	Within project impact area	326766	6375342	724	5	Monkey Place Creek	Not implemented				
81-4-SMA/W	2	Within project impact area	326746	6375362	705	5	Monkey Place Creek	Not implemented				
81-5-SMA/W	1	Within project impact area	326766	6375362	704	5	Monkey Place Creek	Excavated	0.35	0.25	0	0
81-6-SMA/W	2	Within project impact area	326786	6375362	703	5	Monkey Place Creek	Not implemented				

Test pit #	Phase	Proximity to project impact area (m)	Easting	Northing	Distance from the nearest named watercourse (m)	Strahler order	Nearest named watercourse (m)	Status	Depth below ground surface (m)	Size (m^2)	Artefact count	Extrapolated artefact count ($/m^2$)
81-7-SMA/W	1	Within project impact area	326746	6375382	685	5	Monkey Place Creek	Excavated	0.5	0.25	0	0
81-8-SMA/W	2	Within project impact area	326766	6375382	684	5	Monkey Place Creek	Not implemented				
81-9-SMA/W	1	Within project impact area	326786	6375382	683	5	Monkey Place Creek	Excavated	0.6	0.25	0	0
82-10-SMA/W	1	Within project impact area	326746	6375862	210	5	Monkey Place Creek	Excavated	0.6	0.25	1	4
82-11-SMA/W	2	Within project impact area	326766	6375862	206	5	Monkey Place Creek	Not implemented				
82-12-SMA/W	1	Within project impact area	326786	6375862	203	5	Monkey Place Creek	Excavated	0.4	0.25	0	0
82-1-SMA/W	2	Within project impact area	326746	6375802	269	5	Monkey Place Creek	Not implemented				
82-2-SMA/W	1	Within project impact area	326766	6375802	265	5	Monkey Place Creek	Excavated	0.85	0.25	2	8
82-3-SMA/W	2	Within project impact area	326786	6375802	263	5	Monkey Place Creek	Proposed				
82-4-SMA/W	1	Within project impact area	326746	6375822	249	5	Monkey Place Creek	Excavated	0.8	0.25	1	4
82-5-SMA/W	2	Within project impact area	326766	6375822	246	5	Monkey Place Creek	Not implemented				
82-6-SMA/W	1	Within project impact area	326786	6375822	243	5	Monkey Place Creek	Excavated	0.8	0.25	2	8

Test pit #	Phase	Proximity to project impact area (m)	Easting	Northing	Distance from the nearest named watercourse (m)	Strahler order	Nearest named watercourse (m)	Status	Depth below ground surface (m)	Size (m^2)	Artefact count	Extrapolated artefact count ($/m^2$)
82-7-SMA/W	2	Within project impact area	326746	6375842	229	5	Monkey Place Creek	Not implemented				
82-8-SMA/W	1	Within project impact area	326766	6375842	226	5	Monkey Place Creek	Excavated	0.75	0.25	1	4
82-9-SMA/W	2	Within project impact area	326786	6375842	223	5	Monkey Place Creek	Not implemented				
83-10-SMA/C	2	921	328126	6376162	474	5	Monkey Place Creek	Not implemented				
83-11-SMA/C	1	932	328146	6376162	484	5	Monkey Place Creek	Excavated	0.25	1	21	21
83-12-SMA/C	2	943	328166	6376162	495	5	Monkey Place Creek	Not implemented				
83-13-SMA/C	2	915	328146	6376182	501	5	Monkey Place Creek	Not implemented				
83-1-SMA/C	2	982	328146	6376102	434	5	Monkey Place Creek	Not implemented				
83-1-SMA/W	1	Within project impact area	326786	6376322	142	5	Monkey Place Creek	Not implemented				
83-2-SMA/C	2	955	328126	6376122	439	5	Monkey Place Creek	Not implemented				
83-2-SMA/W	2	Within project impact area	326806	6376322	158	5	Monkey Place Creek	Not implemented				
83-3-SMA/C	1	965	328146	6376122	450	5	Monkey Place Creek	Excavated	0.2	0.25	0	0

Test pit #	Phase	Proximity to project impact area (m)	Easting	Northing	Distance from the nearest named watercourse (m)	Strahler order	Nearest named watercourse (m)	Status	Depth below ground surface (m)	Size (m^2)	Artefact count	Extrapolated artefact count ($/m^2$)
83-3-SMA/W	1	Within project impact area	326826	6376322	175	5	Monkey Place Creek	Excavated	0.5	0.25	0	0
83-4-SMA/C	2	976	328166	6376122	461	5	Monkey Place Creek	Not implemented				
83-4-SMA/W	2	Within project impact area	326786	6376342	156	5	Monkey Place Creek	Not implemented				
83-5-SMA/C	2	928	328106	6376142	447	5	Monkey Place Creek	Not implemented				
83-5-SMA/W	1	Within project impact area	326806	6376342	171	5	Monkey Place Creek	Excavated	0.75	0.25	0	0
83-6-SMA/C	1	938	328126	6376142	457	5	Monkey Place Creek	Excavated	0.2	1	63	63
83-6-SMA/W	2	Within project impact area	326826	6376342	186	5	Monkey Place Creek	Not implemented				
83-7-SMA/C	2	948	328146	6376142	467	5	Monkey Place Creek	Not implemented				
83-7-SMA/W	1	Within project impact area	326786	6376362	171	5	Monkey Place Creek	Excavated	0.85	0.25	1	4
83-8-SMA/C	1	959	328166	6376142	478	5	Monkey Place Creek	Not implemented				
83-8-SMA/W	2	Within project impact area	326806	6376362	184	5	Monkey Place Creek	Excavated	1.2	1	5	5
83-9-SMA/C	2	971	328186	6376142	489	5	Monkey Place Creek	Not implemented				

Test pit #	Phase	Proximity to project impact area (m)	Easting	Northing	Distance from the nearest named watercourse (m)	Strahler order	Nearest named watercourse (m)	Status	Depth below ground surface (m)	Size (m^2)	Artefact count	Extrapolated artefact count ($/m^2$)
83-9-SMA/W	1	Within project impact area	326826	6376362	199	5	Monkey Place Creek	Excavated	0.8	0.25	0	0
86-10-SMA/C	2	235	327146	6377322	1,184	2	Mudies Creek	Not implemented				
86-10-SMA/W	1	Within project impact area	326886	6377622	952	2	Mudies Creek	Excavated	0.25	0.25	0	0
86-11-SMA/W	2	Within project impact area	326906	6377622	959	2	Mudies Creek	Not implemented				
86-12-SMA/W	2	Within project impact area	326846	6377642	920	2	Mudies Creek	Not implemented				
86-13-SMA/W	1	Within project impact area	326866	6377642	926	2	Mudies Creek	Excavated	0.2	0.25	0	0
86-14-SMA/W	2	Within project impact area	326886	6377642	933	2	Mudies Creek	Not implemented				
86-15-SMA/W	2	Within project impact area	326866	6377662	907	2	Mudies Creek	Not implemented				
86-1-SMA/C	2	190	327126	6377262	1,122	2	Mudies Creek	Not implemented				
86-1-SMA/W	1	Within project impact area	326846	6377582	977	2	Mudies Creek	Excavated	0.2	0.25	0	0
86-2-SMA/C	1	180	327146	6377262	1,130	2	Mudies Creek	Excavated	0.3	0.25	0	0
86-2-SMA/W	2	Within project impact area	326866	6377582	983	2	Mudies Creek	Not implemented				

Test pit #	Phase	Proximity to project impact area (m)	Easting	Northing	Distance from the nearest named watercourse (m)	Strahler order	Nearest named watercourse (m)	Status	Depth below ground surface (m)	Size (m^2)	Artefact count	Extrapolated artefact count ($/m^2$)
86-3-SMA/C	2	199	327106	6377282	1,132	2	Mudies Creek	Not implemented				
86-3-SMA/W	1	Within project impact area	326826	6377602	952	2	Mudies Creek	Excavated	0.25	0.25	0	0
86-4-SMA/C	1	207	327126	6377282	1,140	2	Mudies Creek	Excavated	0.2	0.25	0	0
86-4-SMA/W	2	Within project impact area	326846	6377602	958	2	Mudies Creek	Not implemented				
86-5-SMA/C	2	198	327146	6377282	1,148	2	Mudies Creek	Not implemented				
86-5-SMA/W	1	Within project impact area	326866	6377602	964	2	Mudies Creek	Excavated	0.2	0.25	0	0
86-6-SMA/C	1	191	327166	6377282	1,157	2	Mudies Creek	Excavated	0.2	0.25	0	0
86-6-SMA/W	2	Within project impact area	326886	6377602	971	2	Mudies Creek	Not implemented				
86-7-SMA/C	2	218	327126	6377302	1,158	2	Mudies Creek	Not implemented				
86-7-SMA/W	2	Within project impact area	326826	6377622	933	2	Mudies Creek	Not implemented				
86-8-SMA/C	1	216	327146	6377302	1,166	2	Mudies Creek	Excavated	0.1	0.25	0	0
86-8-SMA/W	1	Within project impact area	326846	6377622	939	2	Mudies Creek	Excavated	0.25	0.25	0	0

Test pit #	Phase	Proximity to project impact area (m)	Easting	Northing	Distance from the nearest named watercourse (m)	Strahler order	Nearest named watercourse (m)	Status	Depth below ground surface (m)	Size (m^2)	Artefact count	Extrapolated artefact count ($/m^2$)
86-9-SMA/C	2	210	327166	6377302	1,175	2	Mudies Creek	Not implemented				
86-9-SMA/W	2	Within project impact area	326866	6377622	945	2	Mudies Creek	Not implemented				
87-10-SMA/C	1	Within project impact area	326826	6377702	857	2	Mudies Creek	Excavated	0.3	0.25	0	0
87-11-SMA/C	1	Within project impact area	326766	6377722	821	2	Mudies Creek	Excavated	0.25	0.25	0	0
87-12-SMA/C	2	Within project impact area	326786	6377722	826	2	Mudies Creek	Not implemented				
87-1-SMA/C	2	Within project impact area	326766	6377662	879	2	Mudies Creek	Not implemented				
87-2-SMA/C	1	Within project impact area	326786	6377662	884	2	Mudies Creek	Excavated	0.15	0.25	0	0
87-3-SMA/C	2	Within project impact area	326746	6377682	855	2	Mudies Creek	Not implemented				
87-4-SMA/C	1	Within project impact area	326766	6377682	860	2	Mudies Creek	Excavated	0.3	0.25	0	0
87-5-SMA/C	2	Within project impact area	326786	6377682	865	2	Mudies Creek	Not implemented				
87-6-SMA/C	1	Within project impact area	326806	6377682	870	2	Mudies Creek	Excavated	0.3	0.25	0	0
87-7-SMA/C	2	Within project impact area	326766	6377702	840	2	Mudies Creek	Not implemented				

Test pit #	Phase	Proximity to project impact area (m)	Easting	Northing	Distance from the nearest named watercourse (m)	Strahler order	Nearest named watercourse (m)	Status	Depth below ground surface (m)	Size (m^2)	Artefact count	Extrapolated artefact count ($/m^2$)
87-8-SMA/C	1	Within project impact area	326786	6377702	845	2	Mudies Creek	Excavated	0.25	0.25	0	0
87-9-SMA/C	2	Within project impact area	326806	6377702	851	2	Mudies Creek	Not implemented				
94-1	2	Within project impact area	324526	6380602	69	2	Nine Mile Creek	Not implemented				
94-10	1	Within project impact area	324526	6380662	32	2	Nine Mile Creek	Excavated	0.2	0.25	1	4
94-2	2	Within project impact area	324506	6380622	72	2	Nine Mile Creek	Not implemented				
94-3	1	Within project impact area	324526	6380622	57	2	Nine Mile Creek	Excavated	0.2	0.25	0	0
94-4	2	Within project impact area	324546	6380622	41	2	Nine Mile Creek	Not implemented				
94-5	1	Within project impact area	324506	6380642	60	2	Nine Mile Creek	Excavated	0.2	0.25	1	4
94-6	2	Within project impact area	324526	6380642	44	2	Nine Mile Creek	Not implemented				
94-7	1	Within project impact area	324546	6380642	29	2	Nine Mile Creek	Excavated	0.1	0.25	0	0
94-8	2	Within project impact area	324566	6380642	13	2	Nine Mile Creek	Not implemented				
94-9	2	Within project impact area	324506	6380662	48	2	Nine Mile Creek	Not implemented				

Test pit #	Phase	Proximity to project impact area (m)	Easting	Northing	Distance from the nearest named watercourse (m)	Strahler order	Nearest named watercourse (m)	Status	Depth below ground surface (m)	Size (m^2)	Artefact count	Extrapolated artefact count ($/m^2$)
CSS-1	2	Within project impact area	332926	6360602	194	6	Congewai Creek	Not implemented				
CSS-2	1	Within project impact area	332954	6360599	201	6	Congewai Creek	Excavated	0.75	1	19	19
CSS-3	2	Within project impact area	332986	6360622	188	6	Congewai Creek	Not implemented				
CSS-7	2	Within project impact area	333266	6360622	198	6	Congewai Creek	Not implemented				
CSS-8	1	Within project impact area	333286	6360622	197	6	Congewai Creek	Not implemented				
CSS-9	2	Within project impact area	333306	6360622	195	6	Congewai Creek	Not implemented				
CSS-10	1	Within project impact area	333326	6360622	191	6	Congewai Creek	Excavated	0.45	0.25	6	24
CSS-12	2	Within project impact area	333006	6360642	177	6	Congewai Creek	Not implemented				
CSS-13	1	Within project impact area	333026	6360642	185	6	Congewai Creek	Excavated	0.7	0.25	0	0
CSS-14	2	Within project impact area	333046	6360642	193	6	Congewai Creek	Not implemented				
CSS-15	1	Within project impact area	333106	6360642	196	6	Congewai Creek	Excavated	0.35	0.25	0	0
CSS-16	2	Within project impact area	333126	6360642	193	6	Congewai Creek	Not implemented				

Test pit #	Phase	Proximity to project impact area (m)	Easting	Northing	Distance from the nearest named watercourse (m)	Strahler order	Nearest named watercourse (m)	Status	Depth below ground surface (m)	Size (m^2)	Artefact count	Extrapolated artefact count (/m^2)
CSS-17	1	Within project impact area	333146	6360642	189	6	Congewai Creek	Excavated	0.7	0.25	1	4
CSS-18	2	Within project impact area	333166	6360642	186	6	Congewai Creek	Not implemented				
CSS-19	1	Within project impact area	333186	6360642	184	6	Congewai Creek	Excavated	0.4	0.25	0	0
CSS-20	2	Within project impact area	333206	6360642	181	6	Congewai Creek	Not implemented				
CSS-22	2	Within project impact area	333246	6360642	178	6	Congewai Creek	Not implemented				
CSS-23	1	Within project impact area	333266	6360642	178	6	Congewai Creek	Excavated	0.35	0.25	2	8
CSS-24	2	Within project impact area	333286	6360642	177	6	Congewai Creek	Not implemented				
CSS-25	1	Within project impact area	333306	6360642	175	6	Congewai Creek	Excavated	0.55	0.25	0	0
CSS-26	2	Within project impact area	333326	6360642	171	6	Congewai Creek	Not implemented				
CSS-27	2	Within project impact area	332986	6360662	151	6	Congewai Creek	Not implemented				
CSS-28	1	Within project impact area	333006	6360662	159	6	Congewai Creek	Excavated	0.4	0.25	0	0
CSS-29	2	Within project impact area	333026	6360662	167	6	Congewai Creek	Not implemented				

Test pit #	Phase	Proximity to project impact area (m)	Easting	Northing	Distance from the nearest named watercourse (m)	Strahler order	Nearest named watercourse (m)	Status	Depth below ground surface (m)	Size (m^2)	Artefact count	Extrapolated artefact count (/m^2)
CSS-30	1	Within project impact area	333046	6360662	175	6	Congewai Creek	Excavated	0.8	0.25	1	4
CSS-31	2	Within project impact area	333066	6360662	184	6	Congewai Creek	Not implemented				
CSS-32	1	Within project impact area	333086	6360662	181	6	Congewai Creek	Excavated	0.8	0.25	0	0
CSS-33	2	Within project impact area	333106	6360662	176	6	Congewai Creek	Not implemented				
CSS-34	1	Within project impact area	333126	6360662	173	6	Congewai Creek	Excavated	0.65	0.25	0	0
CSS-35	2	Within project impact area	333146	6360662	169	6	Congewai Creek	Not implemented				
CSS-36	1	Within project impact area	333166	6360662	166	6	Congewai Creek	Excavated	0.5	0.25	3	12
CSS-37	2	Within project impact area	333186	6360662	164	6	Congewai Creek	Not implemented				
CSS-38	1	Within project impact area	333206	6360662	161	6	Congewai Creek	Excavated	0.35	0.25	2	8
CSS-39	2	Within project impact area	333226	6360662	159	6	Congewai Creek	Not implemented				
CSS-40	1	Within project impact area	333246	6360662	158	6	Congewai Creek	Excavated	0.5	0.25	0	0
CSS-41	2	Within project impact area	333266	6360662	158	6	Congewai Creek	Not implemented				

Test pit #	Phase	Proximity to project impact area (m)	Easting	Northing	Distance from the nearest named watercourse (m)	Strahler order	Nearest named watercourse (m)	Status	Depth below ground surface (m)	Size (m^2)	Artefact count	Extrapolated artefact count ($/m^2$)
CSS-42	1	Within project impact area	333286	6360662	158	6	Congewai Creek	Excavated	0.45	0.25	2	8
CSS-43	2	Within project impact area	333306	6360662	155	6	Congewai Creek	Not implemented				
CSS-44	1	Within project impact area	333326	6360662	152	6	Congewai Creek	Excavated	0.35	0.25	2	8
CSS-45	2	Within project impact area	333006	6360682	141	6	Congewai Creek	Not implemented				
CSS-46	1	Within project impact area	333026	6360682	148	6	Congewai Creek	Excavated	0.8	0.25	0	0
CSS-47	2	Within project impact area	333046	6360682	157	6	Congewai Creek	Not implemented				
CSS-48	1	Within project impact area	333066	6360682	167	6	Congewai Creek	Excavated	0.8	0.25	1	4
CSS-49	2	Within project impact area	333086	6360682	162	6	Congewai Creek	Not implemented				
CSS-50	1	Within project impact area	333106	6360682	157	6	Congewai Creek	Excavated	0.65	0.25	0	0
CSS-51	2	Within project impact area	333126	6360682	153	6	Congewai Creek	Not implemented				
CSS-52	1	Within project impact area	333146	6360682	150	6	Congewai Creek	Excavated	0.25	0.25	0	0
CSS-53	2	Within project impact area	333166	6360682	146	6	Congewai Creek	Not implemented				

Test pit #	Phase	Proximity to project impact area (m)	Easting	Northing	Distance from the nearest named watercourse (m)	Strahler order	Nearest named watercourse (m)	Status	Depth below ground surface (m)	Size (m^2)	Artefact count	Extrapolated artefact count ($/m^2$)
CSS-54	1	Within project impact area	333186	6360682	144	6	Congewai Creek	Excavated	0.4	0.25	2	8
CSS-55	2	Within project impact area	333206	6360682	142	6	Congewai Creek	Not implemented				
CSS-56	1	Within project impact area	333226	6360682	139	6	Congewai Creek	Excavated	0.4	0.25	6	24
CSS-57	2	Within project impact area	333246	6360682	138	6	Congewai Creek	Not implemented				
CSS-58	1	Within project impact area	333266	6360682	138	6	Congewai Creek	Excavated	0.8	0.25	7	28
CSS-59	2	Within project impact area	333286	6360682	138	6	Congewai Creek	Not implemented				
CSS-60	1	Within project impact area	333306	6360682	135	6	Congewai Creek	Excavated	0.5	0.25	3	12
CSS-61	2	Within project impact area	333326	6360682	132	6	Congewai Creek	Not implemented				
CSS-62	1	Within project impact area	333006	6360702	122	6	Congewai Creek	Excavated	0.75	0.25	0	0
CSS-63	2	Within project impact area	333026	6360702	130	6	Congewai Creek	Not implemented				
CSS-64	1	Within project impact area	333046	6360702	140	6	Congewai Creek	Not implemented				
CSS-65	2	Within project impact area	333066	6360702	150	6	Congewai Creek	Not implemented				

Test pit #	Phase	Proximity to project impact area (m)	Easting	Northing	Distance from the nearest named watercourse (m)	Strahler order	Nearest named watercourse (m)	Status	Depth below ground surface (m)	Size (m^2)	Artefact count	Extrapolated artefact count ($/m^2$)
CSS-66	1	Within project impact area	333086	6360702	144	6	Congewai Creek	Not implemented				
CSS-67	2	Within project impact area	333106	6360702	137	6	Congewai Creek	Not implemented				
CSS-68	1	Within project impact area	333126	6360702	133	6	Congewai Creek	Excavated	0.5	0.25	0	0
CSS-69	2	Within project impact area	333146	6360702	130	6	Congewai Creek	Not implemented				
CSS-70	1	Within project impact area	333166	6360702	126	6	Congewai Creek	Excavated	0.65	0.25	1	4
CSS-71	2	Within project impact area	333186	6360702	124	6	Congewai Creek	Not implemented				
CSS-72	1	Within project impact area	333206	6360702	122	6	Congewai Creek	Excavated	0.6	0.25	8	32
CSS-73	2	Within project impact area	333226	6360702	119	6	Congewai Creek	Not implemented				
CSS-74	1	Within project impact area	333246	6360702	118	6	Congewai Creek	Excavated	0.5	0.25	0	0
CSS-75	2	Within project impact area	333266	6360702	118	6	Congewai Creek	Not implemented				
CSS-76	1	Within project impact area	333286	6360702	118	6	Congewai Creek	Excavated	0.65	0.25	5	20
CSS-77	2	Within project impact area	333306	6360702	115	6	Congewai Creek	Not implemented				

Test pit #	Phase	Proximity to project impact area (m)	Easting	Northing	Distance from the nearest named watercourse (m)	Strahler order	Nearest named watercourse (m)	Status	Depth below ground surface (m)	Size (m^2)	Artefact count	Extrapolated artefact count ($/m^2$)
CSS-78	1	Within project impact area	333326	6360702	113	6	Congewai Creek	Excavated	0.6	0.25	1	4
CSS-79	2	Within project impact area	333006	6360722	103	6	Congewai Creek	Not implemented				
CSS-80	1	Within project impact area	333026	6360722	112	6	Congewai Creek	Excavated	0.5	0.25	5	20
CSS-81	2	Within project impact area	333046	6360722	123	6	Congewai Creek	Not implemented				
CSS-82	1	Within project impact area	333066	6360722	134	6	Congewai Creek	Excavated	0.8	0.25	0	0
CSS-83	2	Within project impact area	333086	6360722	125	6	Congewai Creek	Not implemented				
CSS-84	1	Within project impact area	333106	6360722	118	6	Congewai Creek	Excavated	0.6	0.25	0	0
CSS-85	2	Within project impact area	333126	6360722	114	6	Congewai Creek	Not implemented				
CSS-86	1	Within project impact area	333146	6360722	110	6	Congewai Creek	Excavated	0.3	0.25	3	12
CSS-87	2	Within project impact area	333166	6360722	107	6	Congewai Creek	Not implemented				
CSS-88	1	Within project impact area	333186	6360722	104	6	Congewai Creek	Excavated	0.75	0.25	4	16
CSS-89	2	Within project impact area	333206	6360722	102	6	Congewai Creek	Not implemented				

Test pit #	Phase	Proximity to project impact area (m)	Easting	Northing	Distance from the nearest named watercourse (m)	Strahler order	Nearest named watercourse (m)	Status	Depth below ground surface (m)	Size (m^2)	Artefact count	Extrapolated artefact count ($/m^2$)
CSS-90	1	Within project impact area	333226	6360722	100	6	Congewai Creek	Excavated	0.5	0.25	3	12
CSS-91	2	Within project impact area	333246	6360722	98	6	Congewai Creek	Not implemented				
CSS-92	1	Within project impact area	333266	6360722	98	6	Congewai Creek	Excavated	0.45	0.25	1	4
CSS-93	2	Within project impact area	333286	6360722	98	6	Congewai Creek	Not implemented				
CSS-94	1	Within project impact area	333306	6360722	95	6	Congewai Creek	Excavated	0.3	0.25	0	0
CSS-95	2	Within project impact area	333326	6360722	93	6	Congewai Creek	Not implemented				
CSS-96	1	Within project impact area	332966	6360742	70	6	Congewai Creek	Excavated	0.55	0.25	6	24
CSS-97	2	Within project impact area	332986	6360742	77	6	Congewai Creek	Not implemented				
CSS-98	1	Within project impact area	333006	6360742	85	6	Congewai Creek	Excavated	0.7	0.25	0	0
CSS-99	2	Within project impact area	333026	6360742	95	6	Congewai Creek	Not implemented				
CSS-100	1	Within project impact area	333046	6360742	106	6	Congewai Creek	Excavated	0.45	0.25	0	0
CSS-101	2	Within project impact area	333066	6360742	118	6	Congewai Creek	Not implemented				

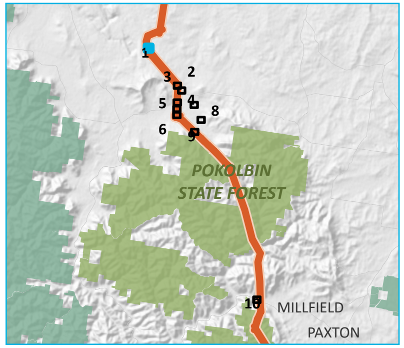
Test pit #	Phase	Proximity to project impact area (m)	Easting	Northing	Distance from the nearest named watercourse (m)	Strahler order	Nearest named watercourse (m)	Status	Depth below ground surface (m)	Size (m^2)	Artefact count	Extrapolated artefact count ($/m^2$)
CSS-102	1	Within project impact area	333086	6360742	108	6	Congewai Creek	Excavated	0.5	0.25	0	0
CSS-103	2	Within project impact area	333106	6360742	99	6	Congewai Creek	Not implemented				
CSS-104	1	Within project impact area	333126	6360742	94	6	Congewai Creek	Excavated	0.6	0.25	0	0
CSS-105	2	Within project impact area	333146	6360742	91	6	Congewai Creek	Not implemented				
CSS-106	1	Within project impact area	333166	6360742	87	6	Congewai Creek	Excavated	0.5	0.25	1	4
CSS-107	2	Within project impact area	333186	6360742	84	6	Congewai Creek	Not implemented				
CSS-108	1	Within project impact area	333206	6360742	82	6	Congewai Creek	Excavated	0.4	0.25	1	4
CSS-109	2	Within project impact area	333226	6360742	80	6	Congewai Creek	Not implemented				
CSS-110	1	Within project impact area	333246	6360742	78	6	Congewai Creek	Not implemented				
CSS-111	2	Within project impact area	332906	6360762	33	6	Congewai Creek	Not implemented				
CSS-113	1	Within project impact area	332946	6360762	43	6	Congewai Creek	Excavated	0.65	0.25	0	0
CSS-114	2	Within project impact area	332966	6360762	51	6	Congewai Creek	Not implemented				

Test pit #	Phase	Proximity to project impact area (m)	Easting	Northing	Distance from the nearest named watercourse (m)	Strahler order	Nearest named watercourse (m)	Status	Depth below ground surface (m)	Size (m^2)	Artefact count	Extrapolated artefact count ($/m^2$)
CSS-115	1	Within project impact area	332986	6360762	59	6	Congewai Creek	Excavated	0.8	0.25	0	0
CSS-116	2	Within project impact area	333006	6360762	68	6	Congewai Creek	Not implemented				
CSS-117	1	Within project impact area	333026	6360762	78	6	Congewai Creek	Excavated	1	0.25	0	0
CSS-118	2	Within project impact area	333046	6360762	90	6	Congewai Creek	Not implemented				
CSS-119	1	Within project impact area	333066	6360762	101	6	Congewai Creek	Excavated	0.6	0.25	0	0
CSS-120	2	Within project impact area	333126	6360762	74	6	Congewai Creek	Not implemented				
CSS-121	1	Within project impact area	333146	6360762	71	6	Congewai Creek	Excavated	0.2	0.25	0	0
CSS-123	2	Within project impact area	332946	6360782	25	6	Congewai Creek	Not implemented				
CSS-124	1	Within project impact area	332966	6360782	33	6	Congewai Creek	Excavated	0.35	0.25	0	0
CSS-125	2	Within project impact area	332986	6360782	40	6	Congewai Creek	Not implemented				
CSS-126	1	Within project impact area	333006	6360782	51	6	Congewai Creek	Excavated	0.5	0.25	0	0

F.9 Test excavation – Photograph catalogue

Source: EMM (2025); ABS (2021); DCSSS (2024); ESRI (2025); GA (2009)

0 25 50
m
GDA2020 MGA Zone 56
N



KEY

Photographic record

Project impact area

HTP corridor

Access track

Existing environment

Named watercourse

INSET KEY

HTP corridor

NPWS reserve

State forest

Text excavation photo log

Map 1 of 10

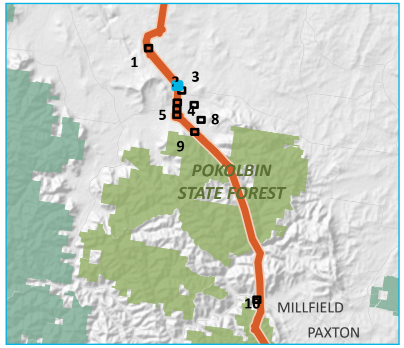
Hunter Transmission Project

Aboriginal Cultural Heritage Assessment

Figure Appendix

EMM

creating opportunities



KEY

○ Photographic record

Project impact area

HTP corridor

Access track

Existing environment

Vehicular track

INSET KEY

HTP corridor

NPWS reserve

State forest

Source: EMM (2025); ABS (2021); DCSSS (2024); ESRI (2025); GA (2009)

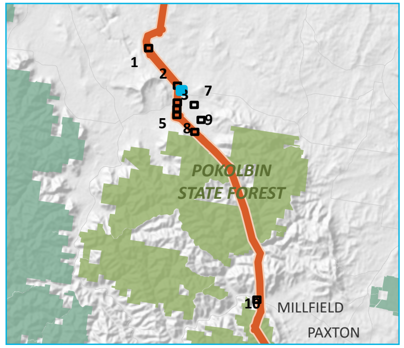
Text excavation photo log
Map 2 of 10

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure Appendix

EMM
creating opportunities

Source: *EMM (2025); ABS (2021); DCSSS (2024); ESRI (2025); GA (2009)*

0 25 50 m
GDA2020 MGA Zone 56
N



KEY

Photographic record

Existing environment

Vehicular track

INSET KEY

HTP corridor

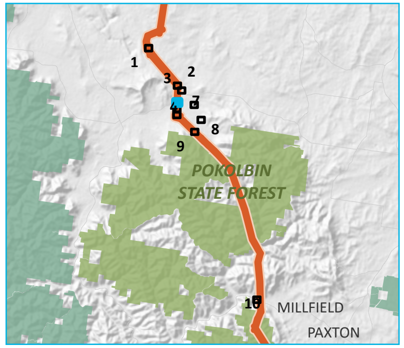
NPWS reserve

State forest

Text excavation photo log
Map 3 of 10

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure Appendix

EMM
creating opportunities



KEY

Photographic record

Project impact area

HTP corridor

Access track

INSET KEY

HTP corridor

NPWS reserve

State forest

Text excavation photo log

Map 4 of 10

Hunter Transmission Project

Aboriginal Cultural Heritage Assessment

Figure Appendix

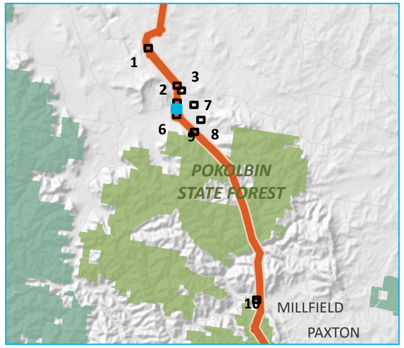
EMM creating opportunities

Source: EMM (2025); ABS (2021); DCSSS (2024); ESRI (2025); GA (2009)

0 25 50 m

GDA2020 MGA Zone 56

N



KEY

Photographic record

Project impact area

HTP corridor

Access track

INSET KEY

HTP corridor

NPWS reserve

State forest

Text excavation photo log
Map 5 of 10

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure Appendix

EMM creating opportunities

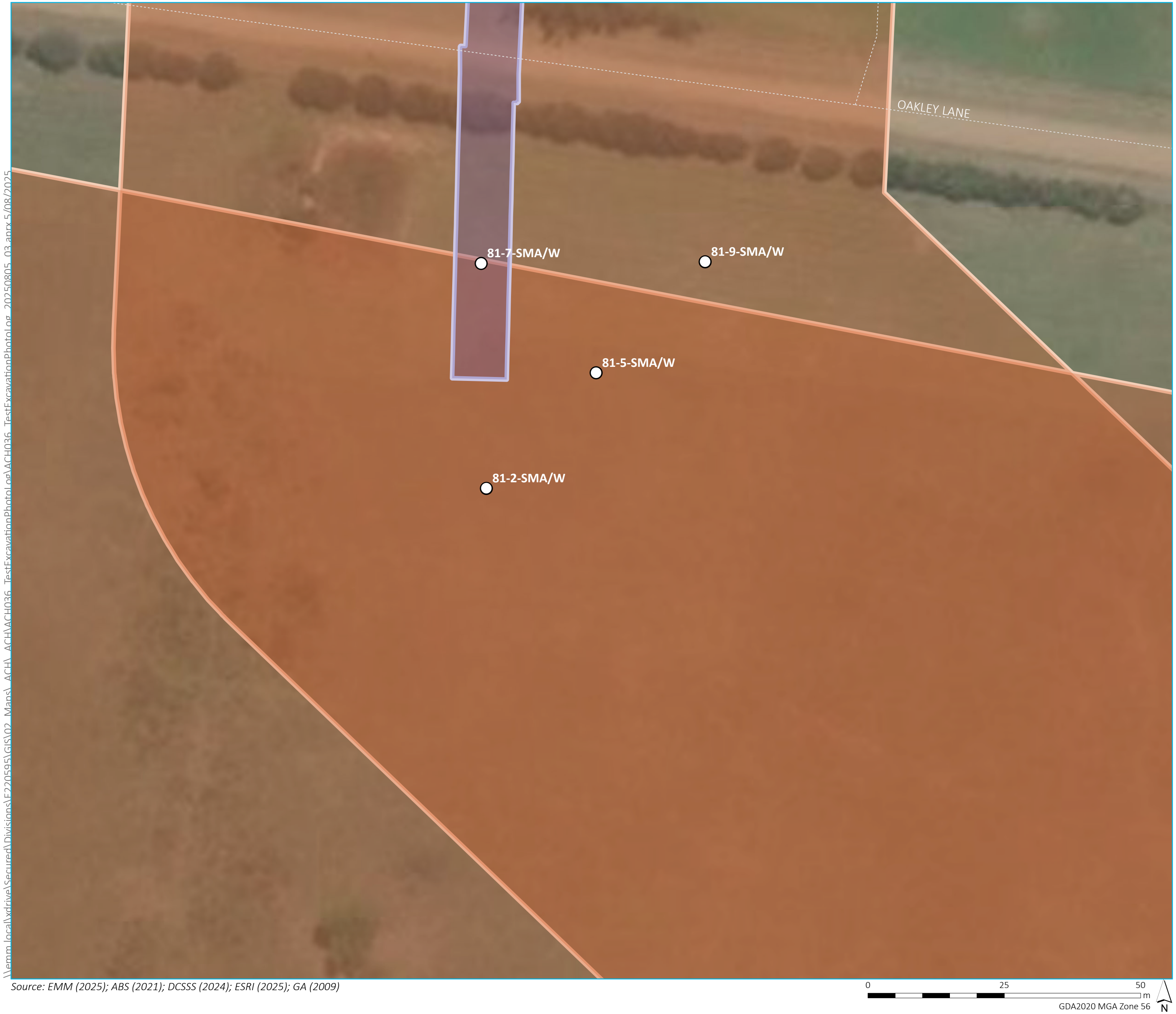
Source: EMM (2025); ABS (2021); DCSSS (2024); ESRI (2025); GA (2009)

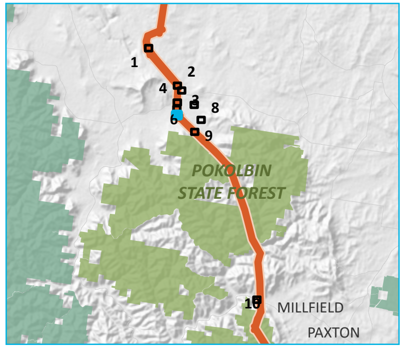
0 25 50 m

GDA2020 MGA Zone 56

N

\\emm.local\vdrive\Secured\Divisions\E220595\GIS\02_Maps_ACH_ACHACH036_TestExcavationPhotoLog\ACH036_TestExcavationPhotoLog_20250805_03.aprx 5/08/2025





KEY

Photographic record

Project impact area

HTP corridor

Access track

Existing environment

Vehicular track

INSET KEY

HTP corridor

NPWS reserve

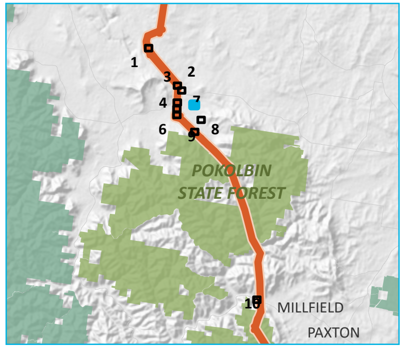
State forest

Text excavation photo log
Map 6 of 10

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure Appendix

EMM
creating opportunities

Source: EMM (2025); ABS (2021); DCSSS (2024); ESRI (2025); GA (2009)



KEY

○ Photographic record

Existing environment

Vehicular track

INSET KEY

HTP corridor

NPWS reserve

State forest

Text excavation photo log

Map 7 of 10

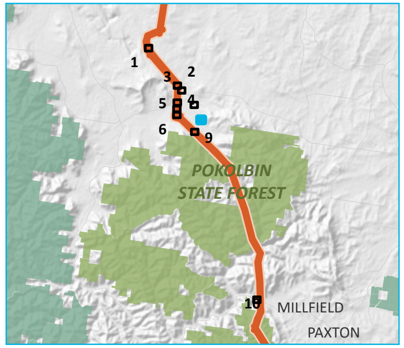
Hunter Transmission Project

Aboriginal Cultural Heritage Assessment

Figure Appendix

EMM creating opportunities

Source: EMM (2025); ABS (2021); DCSSS (2024); ESRI (2025); GA (2009)



KEY

Photographic record

Existing environment

Minor road

Named watercourse

INSET KEY

HTP corridor

NPWS reserve

State forest

Text excavation photo log
Map 8 of 10

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure Appendix

EMM
creating opportunities

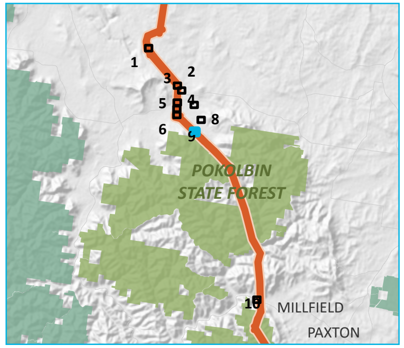
Source: EMM (2025); ABS (2021); DCSSS (2024); ESRI (2025); GA (2009)

0 25 50 m

GDA2020 MGA Zone 56

N

\\emm.local\xdrive\Secured\Divisions\E220595\GIS\02_Maps_ACH_ACH\ACH036_TestExcavationPhotoLog\ACH036_TestExcavationPhotoLog_20250805_03.aprx 5/08/2025



KEY

Photographic record

Project impact area

HTP corridor

Access track

Existing environment

Vehicular track

INSET KEY

HTP corridor

NPWS reserve

State forest

Text excavation photo log

Map 9 of 10

Hunter Transmission Project

Aboriginal Cultural Heritage Assessment

Figure Appendix

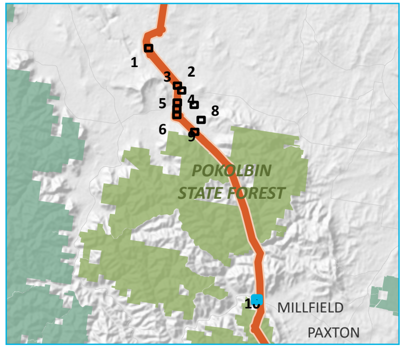
Source: EMM (2025); ABS (2021); DCSSS (2024); ESRI (2025); GA (2009)

0 25 50 m

GDA2020 MGA Zone 56

N

EMM creating opportunities



KEY

- Photographic record

Project impact area

- HTP corridor
- Construction support site
- Access track

Existing environment

- Major road
- Vehicular track
- Named watercourse
- Named waterbody

INSET KEY

- HTP corridor
- NPWS reserve
- State forest

Source: EMM (2025); ABS (2021); DCSSS (2024); ESRI (2025); GA (2009)

Text excavation photo log
Map 10 of 10

Hunter Transmission Project
Aboriginal Cultural Heritage Assessment
Figure Appendix

EMM
creating opportunities

F.10 Test excavation – Lithics analysis report

ARTEFACT ANALYSIS OF HTP-WOLLOMBI & HT-SMA TRANSECTS

Hunter Transmission Project (HTP)

UPPER HUNTER VALLEY

Dr Trudy Doelman

Introduction

The analysis of the Hunter Transmission Project (HTP) transmission line follows a series of research questions which can broadly be divided into seven main categories:

1. **Site occupation/chronology**. When was the area occupied? Was the assemblage the product of repeated occupations or a single event? Do the characteristics of the excavated assemblage change with time? How intensive was the occupation? Is there evidence of a Pleistocene occupation?
2. **Lithic Source Procurement**. Which raw material resources were used? What types of raw material sources were used (primary and secondary)? Does a preference for a raw material occur? Can we infer the distance from the sources based on artefact size and the frequency and amount of cortex?
3. **Stone reduction technology**. How were cores prepared and worked? Were systematic core reduction strategies employed? The analysis will be broken down into descriptions of the:
   a. Core attributes
   b. Flake attributes
   c. Tools
4. **Site Function**. What types of activities occurred on-site/s? Do discrete areas of stone working occur? Can site function be related to environmental factors i.e. distance to sources? This analysis includes comparisons of the artefact density by location, the assemblage composition (number of cores, complete flakes, split flakes, broken flakes, tools and other artefact types e.g., grinding stone, axes, hammerstones) and frequencies of artefact types.
5. **Regional Comparisons**. How does this assemblage compare with others in the surrounding region?
6. **Spatial patterning** Data from the technological analysis allows a spatial analysis of the artefact attributes.
7. **Site Disturbance**. A further analysis was undertaken on the excavated assemblage to assess the nature and integrity of the sub-surface deposit. What post-depositional influences have impacted on the assemblage (e.g. size-sorting, burning, historical disturbance)?

Analysis Methodology

The selection of the artefact attributes addresses the above research questions. The analysis will follow those relevant to a technological and/or spatial analysis (Table 1).

The attributes recorded for each artefact are dependent on the technological class (i.e., if a complete flake, core or tool etc). Artefacts such as cores and tool generally represent a small fraction of an assemblage but can offer the greatest amount of information. These additional attributes provide further information to examine the types of technological strategies used to prepare and reduce cores, the intensity of core reduction (curation) and can contribute to an understanding of the product/s manufactured, patterns of mobility and the transportation of artefacts (Table 1).

Artefacts were cleaned, sorted, individually analysed and entered into the software program E4 loaded with a configuration file written for this specific purpose. This program prompts the user to record all relevant attributes through a series of menus based on the artefact type (e.g. core, complete flake, complete tool etc) which is then stored in a Microsoft Access database. In this way a comprehensive typological, technological and metrical analysis of the excavated assemblage was undertaken. The location of the excavated artefacts was also recorded by spit/depth and test pit. Analysis was aided by the use of a 15x hand lens and a standard digital vernier calliper. Measurements were made in millimetres to one decimal place. Individual weights of each artefact were also recorded to two decimal places.

Attributes	
Technological class	Artefact type (e.g. core, complete flake, longitudinal split, flake fragmentation, retouch, angular fragments/lithic fragments, other (axe, grindstone etc)
Material	Raw Material type (silcrete, indurated mudstone, chert, quartz, quartzite etc)
Colour	Raw material colour
Cortex	Percentage of cortex (if on a flake – amount on the dorsal surface of a flake)
Cortex Type	Type of cortex (rough/terrestrial, water-rolled/tabular)
Platform Type	unifacial, crushing/missing, Flaked (>2 flake scars), Facetted (3 or more small, systematic flake removals), Cortical (with cortex), n/a
Termination Type	Feather, hinge, step, plunge, step, cortical, platform, abrupt
Tool Type	Select the type of tool – usewear, concave scraper, convex scraper, straight scraper, elouera (backed artefact), notched scraper, endscraper, saw, stepped scraper, drill, backed (generic), bondi point, thumbnail scraper, denticulate, burin, geometric microlith, nosed scraper
Maximum Dimension	All artefacts (in size groupings)
Length Complete Flake	Axial length of the complete flake/complete tool (in mm to 1 dp)
Weight	Weight of the artefact in grams to 1dp
Complete and Broken Flakes	
Form	Form of the flake – Indeterminate, Expanding, Block (angular Fragment), Blade, N/A, Platform Rejuvenation Flake (tablet), Bipolar, Errailure, Ridge straightening flake, elongated flake. These attributes reflect core reduction strategies.
Complete Flakes	Showing intensity of retouch or systematic core preparation
Overhang removal	Exterior platform preparation indicates systematic core reduction (complete flakes and proximal flakes)
Scar Direction	The direction of the dorsal flake scars – 1 (initiated from the platform only), 90 (initiated at right angles to the platform), 180 (initiated at the distal end of the flake), radial (initiated from 90 and 270 degrees from the platform)
Complete Tools	(examines measures of curation)
Retouch Edge	The number of retouched quadrants (on complete tools only)
Retouch Type 1, 2, 3, 4	Select the retouch type for quadrants 1, 2, 3 and 4

Cores	Identifying technological strategies and intensity of reduction
Core Type	Uni-, bi-, and multi-platform, prismatic, burin-blade core, test, bipolar, bifacial
Core Body	Core body form – block, flake, nodule, non-diagnostic
Scar Form	Primary scar form? – elongated, expanding, blade, mixed
Core Platform No.	Number of platforms on the core
Step Termination	Number of step terminations on the core
Hinge Termination	Number of hinge terminations on the core
Core scar Length	Length of the longest core scar
Core scar Width	Width of the longest core scar at maximum
Number of Core Scars	Number of core scars
Metrical Attributes	(in mm to 1 dp)
Maximum length	All artefacts
Length Complete Flake	Axial length of the complete flake/complete tool
Width	Maximum width of the complete flake/tool/core
Thickness	Maximum thickness of the complete flake/tool/core at mid-point
Core Length	Maximum length from the working platform
Platform width	Platform width – proximal and complete flakes and tools
Platform Thickness	Platform thickness – proximal and complete flakes and tools (and complete splits)
Weight (g)	Weight of the artefact in grams to 1dp

Table 1 Artefact Attributes recorded for the Lakeside assemblage

Assemblage Distribution

The archaeological assessment of the Hunter Transmission Project (HTP) was divided geographically into HTP-Wollombi and HTP-SMA. A series of 54 test pits were excavated at HTP-Wollombi while 50 test pits were excavated from ten locations at HTP-SMA, associated with the proposed western and central routes of the transmission line.

HTP-Wollombi Transect

A total of 98 artefacts were recovered from HTP-Wollombi with an artefact density of 0.6 per metre squared (Table 2). Most of the artefacts were from TP2 (n=19, 19.4%). A small concentration of artefacts also occurs in and around TP56, TP58 and TP72 (Table 2). In general, the assemblage was widely dispersed with 21 test pits (38.8%) having five or less artefacts and only seven (13.0%) having five or more artefacts. Half of the test pits (n=27) have no artefacts. The artefact size is typically small with only nine test pits having artefacts with a mean length greater than 20 mm.

Test Pit	*Count*	*%*	*Total Weight (mm)*	*%*	*Mean Maximum Length (mm)*	*Std Dev.*
2	19	19.4	12.68	8.8	14.3	6.9
10	6	6.1	1.53	1.1	11.9	3.6
17	1	1.0	1.26	0.9	18.1	
23	2	2.0	8.44	5.8	27.1	8.0
30	1	1.0	1.22	0.8	32.5	
36	3	3.1	0.54	0.4	9.9	1.9
38	2	2.0	0.87	0.6	13.8	3.7
42	2	2.0	5.19	3.6	20.4	4.2
44	2	2.0	6	4.1	26.1	7.4
48	1	1.0	0.15	0.1	11.2	
54	2	2.0	2.03	1.4	21.3	1.5
56	6	6.1	0.98	0.7	9.4	2.5
58	7	7.1	5.13	3.5	15.4	8.3
60	3	3.1	46.62	32.2	34.0	27.2
70	1	1.0	0.09	0.1	9.2	
71	2	2.0	1.23	0.9	13.2	1.9
72	8	8.2	8.62	6.0	15.5	8.0
76	5	5.1	4.48	3.1	18.2	5.9
78	1	1.0	0.33	0.2	12.3	
80	5	5.1	7.2	5.0	18.2	8.8
86	3	3.1	0.39	0.3	9.1	0.9
88	4	4.1	9.62	6.7	17.6	10.3
90	3	3.1	0.87	0.6	12.1	2.5
92	1	1.0	1.79	1.2	21.0	
96	6	6.1	13.77	9.5	21.7	6.6
106	1	1.0	0.37	0.3	13.2	
108	1	1.0	3.18	2.2	30.0	
Total	98		144.58		16.3	8.8

Table 2 Distribution of Artefacts in the excavated tests pits on the HTP-Wollombi assemblage

Artefacts were excavated in 10 cm spits. Most of the artefacts fall within spit 2 (n=38, 39.6%, Figure 1).

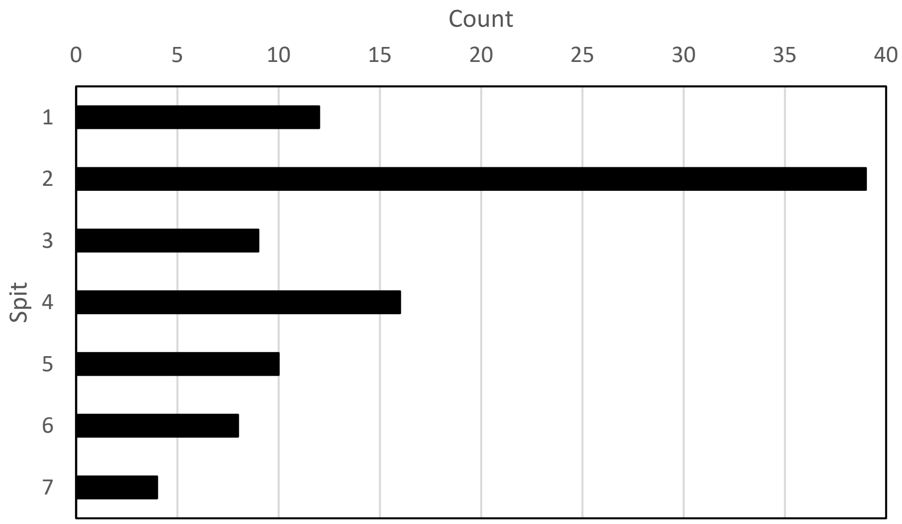


Figure 1 Artefact counts by spit in the HTP-Wollombi assemblage

Table 3 shows the mean maximum lengths of the artefacts in the HTP-Wollombi assemblage. The differences in total weight below spit 2 suggests a downwards movement or size-sorting occurred within the stratigraphy. However, the number of artefacts does increase in spit 4 (n=16). A comparison of the raw material types in spit 1 & 2 with those in spits 3 & 4 shows a shift in frequency from silcrete to cryptocrystalline quartzes (Figure 2). This difference hints at the possibility of two occupations. However, the sample sizes are small with most of the silcrete artefacts found in TP2 (n=9).

Spits	*Count*	*%*	*Mean Maximum Length (mm)*	*Std Dev.*	*Sum of Weight (g)*
1	12	12.2	14.5	4.0	8.0
2	39	39.8	16.7	16.7	84.9
3	9	9.2	17.3	8.9	12.0
4	16	16.3	14.7	5.5	9.4
5	10	10.2	17.5	7.1	12.0
6	8	8.2	15.4	8.8	13.2
7	4	4.1	21.9	12.8	5.01

Table 3 Artefact counts by unit and maximum length of all artefacts in the HTP-Wollombi assemblage

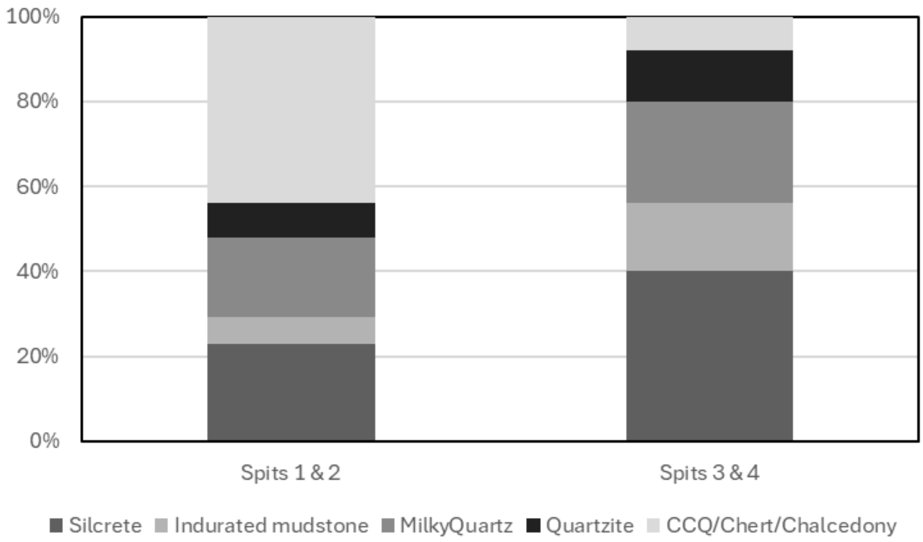


Figure 2 Comparison of raw material types by depth in the HTP-Wollombi assemblage

HTP-SMA

A series of 50 test pits were excavated along the HTP-SMA section of the HTP transect (Table 4). Two alternate routes were surveyed, the central route (C) and the western route (W). A total of 101 artefacts were recovered with an artefact density of 1.1 per metre squared. Most of the artefacts were from TP83-11/C (n=21, 21.0%) and TP83-6/C (n=63, 63.0%). These locations account for 84% of the artefacts and 92.5% by weight of the assemblage. All other test pits had either no artefacts and or five or less artefacts (n=10). The artefact size is small with only four test pits having artefacts with a mean length greater than 20 mm.

Test Pit	*Count*	*%*	*Total Weight (mm)*	*%*	*Mean Maximum Length (mm)*	*Std Dev.*
77-14/W	1	0.99	0.4	0.2	21.4	
82-10/W	1	0.99	0.4	0.2	17.8	
82-2/W	2	1.98	1.3	0.5	19.3	12.1
82-4/W	1	0.99	0	0.0	8.6	
82-6/W	2	1.98	1.3	0.5	16.1	0.8
82-8/W	1	0.99	13.88	5.7	39.3	
83-11/C	21	20.79	56.4	23.3	20.5	10.3
83-6/C	63	62.38	154.9	63.9	24.2	9.7
83-6/W	1	0.99	0.2	0.1	14.6	
83-7/W	1	0.99	0.4	0.2	13.8	
83-8/W	5	4.95	8	3.3	19.7	6.4
94-10	1	0.99	0.6	0.2	17.1	
94-5	1	0.99	4.6	1.9	37.0	
Total	101		242.38		22.7	9.8

Table 4 Distribution of Artefacts in the excavated tests pits on the HTP-SMA assemblage

Artefacts were again excavated in 10 cm spits. Most of the artefacts fall within spit 2 (n=58, 58.0%, Figure 3). The artefacts in spits 1 and 2 account for 86.5% of the assemblage.

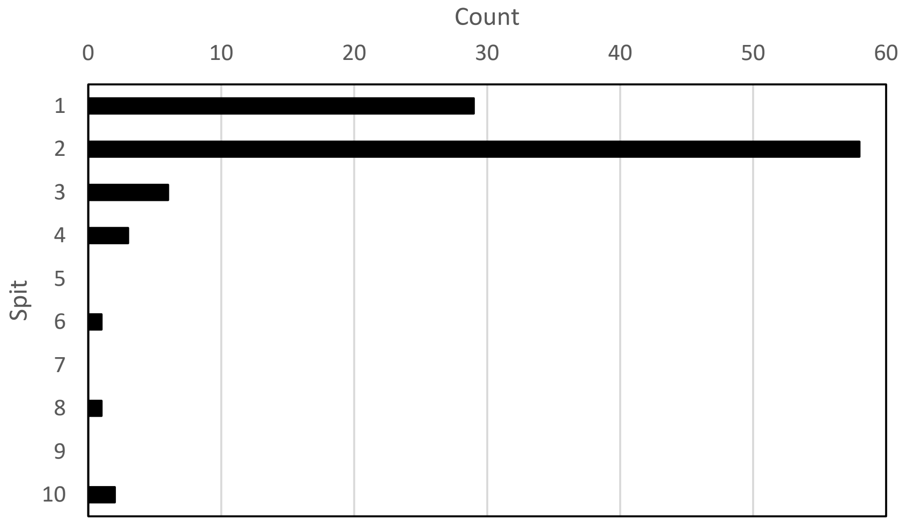


Figure 3 Artefact counts by spit in the HTP-SMA assemblage

Table 5 shows the mean maximum lengths of the artefacts in the HTP-SMA assemblage. The differences in size and weight below spit 2 suggests a downwards movement or size-sorting occurred within the stratigraphy. There is one large artefact found in 6 of TP 82-2/W. This is an elongated complete flake made from chert.

Spits	*Count*	*%*	*Mean Maximum Length (mm)*	*Std Dev.*	*Sum of weight (g)*
1	29	29.0	21.7	10.5	60.03
2	58	58.0	23.7	9.5	145.21
3	6	6.0	22.3	12.8	27.45
4	3	3.0	21.1	8.2	5.92
5					
6	1	1.0	27.9		1.11
7					
8	1	1.0	15.7		0.32
9					
10	2	2.0	18.8	3.5	2.08

Table 5 Artefact counts by unit and maximum length of all artefacts in the HTP-SMA assemblage

Site Chronology/Occupation

The timing of the occupation needs to be assessed prior to the technological analysis. A useful guide for assessing site age is the presence or absence of backed artefacts. These artefacts are typically only found in mid to late Holocene sites (<5000 years BP) throughout most of eastern Australia (Attenbrow 2002: 115-159*,* Hiscock 2008). The presence of backed artefacts is compared with depth to establish the timing of occupation in the project area. Only one backed artefact was found in the assemblage of spit 1 in TP3 of HTP-Wollombi and another in spit 1 of TP83-6/C in HTP-SMA.

There are quartz artefacts in both assemblages. These are typically found in higher numbers in the Late Holocene. Most of the milky quartz artefacts in the HTP-Wollombi assemblage were found in spit 2 (n=9). Three quartz artefacts were found in spits 1 and 2 of HTP-SMA.

Stone Procurement

Available Stone Sources

A variety of raw materials can be seen in the assemblages (Table 6). Individual material types were further classified by colour to potentially distinguish sources and/or individual cobbles. Hughes and Hiscock (2000) note that extensive supplies of both indurated mudstone (indurated mudstone/tuff) and silcrete cobbles in the gravel bed of the Hunter River and its tributaries. Other raw materials include varieties of microcrystalline quartz (chert, CCQ, chalcedony) and macrocrystalline quartz (e.g. milky quartz). Descriptions of each raw material are provided below.

Material	*Count*	*%*	*Mean Maximum Length (mm)*	*Std Dev.*	*Sum of Weight (g)*
HTP-Wollombi					
CCQ	8	8.2	18.8	8.6	10.0
Chalcedony	9	9.2	15.5	8.7	15.0
Chert	9	9.2	15.1	6.7	6.0
Fine-grained silcrete	19	19.4	13.0	5.4	9.9
Matrix-dominated silcrete	7	7.1	17.6	8.1	7.9
Sub-total	26	26.5			17.2
Milky Quartz	22	22.4	15.0	6.8	21.4
Indurated mudstone	11	11.2	18.3	8.4	11.2
Quartzite	12	12.2	17.3	7.8	18.9
Volcanic	1	1.0	65.2		44.3
HTP-SMA					
CCQ	1	1.0	21.2		1.5
Chalcedony	5	5.0	16.3	7.3	5.6
Chert	6	5.9	19.9	10.4	6.9
Fine-grained silcrete	38	37.6	24.6	9.0	107.2
Medium-grained silcrete	3	3.0	22.6	12.2	5.9
Coarse-grained silcrete	1	1.0	24.1		2.1
Matrix-dominated silcrete	27	26.7	21.1	9.6	48.6
Sub-total	69	68.3			163.8
Milky Quartz	3	3.0	19.0	11.8	6.3
Indurated mudstone	14	13.9	23.7	12.7	47.6
Quartzite	2	2.0	32.8	0.3	10.2
Silicified Wood	1	1.0	21.4		0.4

Table 6 Raw material types in the HTP-Wollombi and HTP-SMA assemblages

Silcrete

Silcrete is a brittle, very strongly cemented rock containing at least 85% SiO2 (by weight). Silcrete forms by surface or near-surface low-temperature silicification of soil or unconsolidated sediments sometimes associated with basalts. It takes on the characteristics of the parent rock which may be a claystone, siltstone, sandstone, or conglomerate/breccia (Doelman et al. 2015), and dictates the physical properties of silcrete and its classification. Silcrete is classified into four types according to the relative proportions of detrital quartz grains, quartz cement, and microcrystalline matrix: grain-supported, matrix-supported, microcrystalline, and conglomeratic/breccia (Webb et al. 2013).

The colour can vary at a source or even in an individual cobble. Silcrete sources can also be influenced by controlled heating (heat treatment) or uncontrolled heat (e.g. bush fires). Colour was also analysed to distinguish possible sources of silcrete and heat treatment. During heat treatment silcrete can change from yellow to red (Corkill 1999; Domanski et al. 1994; Flenniken and White 1985). It is unlikely that the colours of the silcrete artefacts represent individual sources as these colours have been observed together, although in different frequencies, in many sources (Doelman et al. 2015; Doelman 2008).

Indurated Mudstone

Mudstone is a sedimentary rock composed primarily of clay- or silt-sized particles (less than 0.063 mm in diameter) whereas a siltstone must contain over 50% silt-sized material. Silt is any particle smaller than sand, 0.06 mm, and larger than clay, > 0.0039 mm. A simple test to determine whether a rock is a mudstone is to if it feels gritty or chalky. In the HVO assemblage the indurated mudstone graded to a highly silicified cryptocrystalline quartz depending on the amount of induration from silica. These artefacts are also subject to chemical weathering. A red/brown patina can form on the exterior surface of the artefacts. Depending on the amount of silica the artefacts become chalky and fragment.

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Quartz

Quartz is a mineral composed of silicon dioxide (SiO_2) and is the second most abundant mineral in the Earth's crust (after feldspar); it is common in igneous, metamorphic, and sedimentary rocks (Lapidius 1990:429). Due to its abundance, hardness and often excellent flaking properties, quartz varieties are frequently found in archaeological sites throughout the world (Seong 2004:76-77).

Microcrystalline or cryptocrystalline quartz scatters more light and has a dull or sub-vitreous lustre. Microcrystalline quartz can be divided into a number of varieties distinguished by colour, banding or degree of translucency. Chalcedony is a term used collectively to distinguish translucent, monochromatic varieties of microcrystalline quartz. As already noted, indurated mudstone grades to an almost cryptocrystalline appearance, depending on grain size and degree of induration, this material was called CCQ (cryptocrystalline quartz).

Microcrystalline quartz artefacts (milky quartz) were often manufactured from small highly water-rolled nodules. These are typically flaked using a bipolar technique. The resulting flakes usually have a crushed platform and termination, lack a bulb of percussion and create a hackly fracture (Doelman & Webb 2024).

HTP-Wollombi

Seven raw material types were found in this transect. Here, silcrete accounts for only 26.5% (n=26) of the assemblage. High numbers of quartzite artefacts were also found. This material is usually associated with a contact metamorphic zone adjacent to volcanic activity. Likewise milky quartz, CCQ and chalcedony form as molten silica precipitates into cracks to form veins and this process is also associated with volcanic activity (Doelman & Webb 2024). It is predicted that outcrops of these material types are found in the headwaters of the Congewai Creek. Two artefacts of macrocrystalline (milky quartz) have the distinctive appearance of being extracted from a primary source of outcropping vein (Figure 4). These artefacts were both found in spit 5 of TP96.

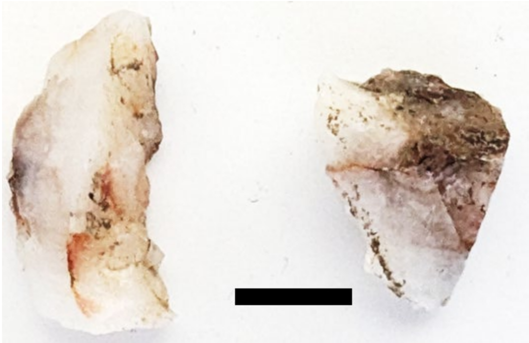

Figure 4 Milky quartz artefacts in the HTP-Wollombi assemblage (scale=1cm)

In the assemblage six colour varieties of silcrete (grey, grey/pink, light grey, pink, red/yellow, red) were found throughout the stratigraphic units (Table 7). The most common colours were pink (n=7) and red (n=9). The variety of silcrete colours indicates that artefacts were acquired from multiple cores. The dominance of pink and red silcrete in the assemblage can indicate heat treatment.

HTP-SMA

This assemblage was dominated by silcrete artefacts which account for 68.3% of the assemblage. The silcrete grades from sorted to poorly sorted. The higher quality, matrix-dominated and fine-grained silcrete, were preferred for manufacture. The presence of yellow and light-yellow artefacts indicates that these artefacts were not heat treated. Most of the assemblage appears to have undergone heat-treatment shown by the high numbers of pink and red artefacts.

Colour	*HTP-Wollombi*	*HTP-SMA*
Grey	2	
Grey/pink	3	3
Grey/red		3
Light grey	3	4
Pink	9	18
Red	7	28
Light yellow		4
Yellow		8
Yellow/Red	1	1

Table 7 Colours of silcrete in the assemblages

Assemblage Characteristics of Procurement

The cortex (or weathered exterior of the parent rock) provides information about the type of stone sources used (i.e. a primary or secondary source). Artefacts with a rough (also called terrestrial) cortex were acquired from a primary source (or an *in-situ* outcrop). Artefacts with a smooth or water-rolled cortex originate from a secondary source (e.g. a cobble from a waterway, having a smoothed surface). In addition, primary silcrete sources were affected by bush fires which have split cobbles and created crazed surfaces and these surfaces at times have subsequently been flaked. Post-depositional burning, also from bush fires or hearths, can damage artefacts. Lastly, the controlled use of heat treatment, using fire, is sometimes used to improve the fracture properties of silcrete (Flenniken and White 1985; Webb et al. 2008; Domanski et al. 1994; 2007). A cortex category, crazed, was used to assess whether cobbles/cores were burnt prior to flaking. The location of burning, i.e. if on the ventral/internal surfaces of flakes, was also recorded.

The amount of cortex on an artefact often indicates the distance artefacts were transported from the source (Hiscock and Mitchell 1993:12-17, Table 8). A high percentage of cortex on an artefact indicates that the source of stone was nearby while artefacts with less cortex or no cortex were typically transported further from the source. Equally, as cores are transported away from the source they are reduced further and the resulting flakes are also smaller. The amount of cortex can also reflect the type of core reduction with more systematic core preparation producing flakes that are smaller with less cortex e.g. burin-blade technology.

Material	*Cortex*	*Count*	*Count*
		HTP-Wollombi	HTP-SMA
CCQ	0%	4	
	Weather	2	
	Water-Rolled	2	1
Chalcedony	0%	2	2
	Weather	1	
	Water-Rolled	6	3
Chert	0%	8	3
	Water-Rolled	1	3
Fine-grained silcrete	0%	16	19
	Water-Rolled	2	12
	Weather		4
	Crazed	1	3
Indurated mudstone	0%	10	5
	Water-Rolled	1	9
Coarse-grained silcrete	Water-Rolled		1
	Water-Rolled	1	
Matrix-dominated silcrete	0%	6	17
	Crazed	1	1
	Weather		7
	Water-rolled		2
Medium-silcrete	0%		2
	Water-rolled		1
Milky Quartz	0%	10	
	Weather	1	1
	Water-Rolled	11	2
Quartzite	0%	5	
	Water-Rolled	7	2
Silicified wood			1
Volcanic	Rough	1	

Table 8 Cortex amount and types on the artefacts in the assemblages

HTP-Wollombi
Sources were compared by cortex type to identify whether differences occur in the place of procurement (Table 8). All raw material types were acquired from a secondary source. Artefacts made from chalcedony and CCQ have a weathered cortex and were acquired from a primary source. One silcrete artefact also has a crazed cortex formed during heat-treatment. However, most of the indurated mudstone and silcrete artefacts have no cortex. In the assemblage 62.2% (n=61) of the artefacts have no cortex.

HTP-SMA
In the HTP-SMA assemblage 48.5% (n=49) of the artefacts have no cortex. All raw material types were acquired from a secondary source (Table 8). However, silcrete was also obtained from both primary and secondary sources. Four silcrete artefacts have a crazed cortex indicating heat treatment. The high frequency of cortex on artefacts indicates that stone sources were nearby.

Stone Reduction Technology

The types of artefacts and their characteristics are used to establish how sources were worked, used and discarded on-site. Artefacts were classified as cores or flakes, broken or complete and retouched (tools) or non-retouched (Table 9). Artefacts that were shattered through extreme heat and could not be identified by type but had a flaked surface were called a heat-fractured artefact (HSA). Heat shattered fragments (HSF) had no identifiable artefact features and cannot be considered artefacts but were typically made from silcrete or indurated mudstone. Fragmentation of indurated mudstone artefacts due to chemical weathering is common. HSF was included in the analysis as they represent post-depositional influences on the assemblage. By-products of flaking include angular fragments (blocks). The composition of the assemblage will firstly be compared followed by an analysis of the cores, flakes and tools.

Assemblage Composition
HTP-Wollombi
The excavated assemblage is dominated singularly by broken flakes (Table 9). Broken flakes (including proximal, broken and distal flakes) account for 50.0% (n=49) of the assemblage. Using a MNF (Minimum Number of Flakes) Index (Hiscock 2002: 254) which takes into account the number of proximal fragments, complete flakes and complete splits a MNF of 26 complete flakes occurs in the assemblage. Seven (7.1%) tools were found in the assemblage, and these were mostly made from on broken or complete flakes. A high number of angular fragments were present (n=18) in the assemblage. These are a common biproduct of quartz reduction (Doelman & Webb 2024). Some evidence for burning/heat treatment was seen in the presence of the heat/weathered shattered artefacts. Two heat-shattered fragments (HSF) were also found in TP108 and TP58. One of these fragments is made from a volcanic material and the other from fine-grained silcrete.

HTP-SMA
The excavated assemblage is dominated singularly by complete flakes (Table 9). Broken flakes (including proximal, broken and distal flakes) account for 40.6% (n=41) of the assemblage. The MNF

(Minimum Number of Flakes) is 53 flakes. Seven (6.9%) tools were found in the assemblage, and these were mostly made from on complete flakes. A low number of angular fragments were present (n=6) in the assemblage. Again, some evidence for burning/heat treatment was seen in the presence of the heat/weathered shattered artefacts. Three heat-shattered fragments of red silcrete (HSF) were found in TP83-6/C. These fragments may be associated with heat-treatment.

Artefact Type	*Count*	*%*	*Count*	*%*
	HTP-Wollombi		*HTP-SMA*	
Core	1	1.0	1	1.0
Core Fragment	1	1.0	2	2.0
Complete Flake	16	15.3	38	37.6
Complete Split	4	4.1	2	2.0
Proximal Flake	5	5.1	9	8.9
Broken Flake	24	24.5	16	15.8
Distal Flake	20	20.4	17	16.8
Sub-total broken flakes	49	50.0	41	40.6
Complete Tool	2	2.0	3	3.0
Proximal Tool	1	1.0	2	2.0
Broken Tool	2	2.0		0.0
Distal Tool	2	2.0	1	1.0
Core tool		0.0	1	1.0
Sub-total tool	7	7.1	7	6.9
Angular Fragments	18	18.4	6	5.9
Heat Shattered artefact (HAS)	2	2.0	3	3.0

Table 9 Types of artefacts in the assemblages

The presence of complete split flakes also shows that core reduction occurred on-site (Table 9). These types of flakes usually occur early in core reduction when the aim is to remove a large flake and can be considered a flaking error produced when the force used to strike the core is too great and it is hit at an incorrect angle. Table 9 shows the frequency of complete splits. The frequency is higher in HTP-Wollombi (n=4) but these were found in four test pits (TPs 44, 71, 88 & 96). Two complete splits were found in TP83-6/C of the HTP-SMA transect.

Cores

Only two cores and three core fragments were found in both assemblages (Table 9). The only core (id=27) found in HTP-Wollombi (TP60) was made on a large angular block (65 mm) of volcanic material obtained from a primary source. It had two expanding flakes removed bifacially. Id=94 was found in TP83-11/C of HTP-SMA (Figure 5). This core was made on a flake from high quality matrix-dominated silcrete and has elongated flake scars. It was heavily reduced (19.7 mm) using a bipolar technique and exhausted.

Id=89 is a core fragment of yellow, fine-grained silcrete found in spit 2 of TP83-6C of HTP-SMA. This artefact has two parallel blade scars showing some evidence of systematic core preparation. In addition, a coretool was also identified in TP83-11C of HTP-SMA (Figure 5). This core was used as a step-scraper and an atypical-burin blade core. The arrow shows the removal of an elongated flake down a lateral margin (Figure 5).

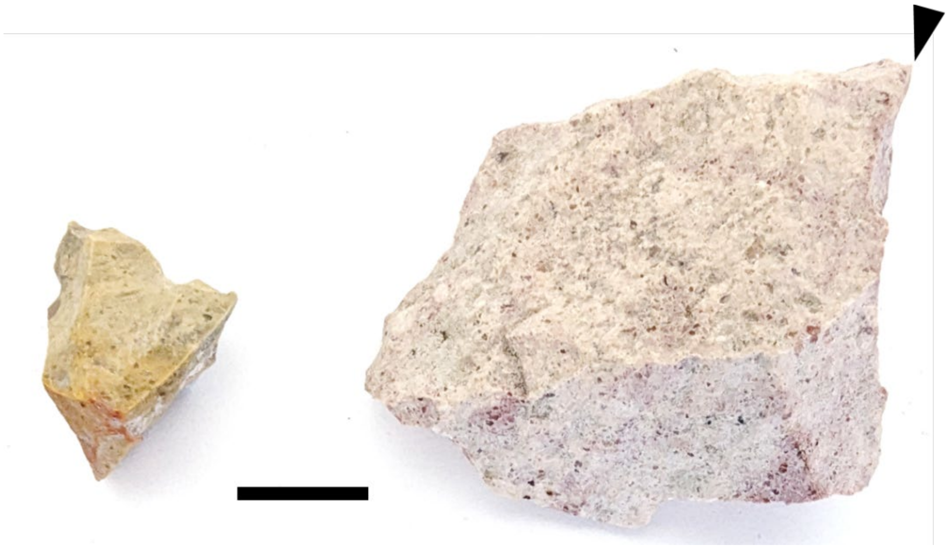

Figure 5 Core and coretool found in TP83-11C of HTP-SMA. Left to right, Id=2I & d=46 (scale= 1cm)

Flakes

The characteristics of the complete flakes are used to support and further enhance the results of the core analysis. The form of the complete flakes is used to determine how cores were reduced and what was manufactured on site.

HTP-Wollombi

Most of the flakes in HTP-Wollombi are expanding in form, only two flakes are elongated, and none have facetted platforms (Table 10). One complete tool and three broken flakes (medial & proximal) have a blade form. Cores were generally flaked in one direction from a cortical platform.

HTP-SMA

Platform rejuvenation and evidence of systematic core preparation is seen in HTP-SMA (Table 10). Platform rejuvenation flakes (also known as a core rejuvenation flake) were used to both create a new platform and to limit flaking mistakes by reducing the angle of the striking platform thereby extending the life of a core (Odell 2003: 121). Ridge-straightening flakes (n=3, complete and broken), overhang removal (n=3) and facetted platforms (n=4) are associated with blade manufacture (Figure 6). More core rotation is also seen in the assemblage seen in the presence of flaked platforms and dorsal scars (90^{o} rotation). Three broken flakes (medial & proximal) are blades, and five complete flakes have an elongated flake form.

Material	*HTP-Wollombi*	*HTP-SMA*
CCQ	3	
Chalcedony	2	3
Chert	1	4
Fine-grained silcrete	4	10
Medium-silcrete		1
Milky quartz	1	1
Indurated mudstone	2	6
Matrix-dominated silcrete	1	11
Quartzite	2	1
Silicified wood		1
Form		
Block		5
Elongated	2	5
Expanding	8	14
Indeterminate	6	13
Platform rejuvenation		3
Ridge-straightening		2
Platform		
Cortical	1	7
Crushed	1	4
Flaked	1	4
Facetted		4
Missing	2	5
Unifacial	7	14
Termination		
Abrupt	1	1
Crushed		1
Feather	11	32
Hinge	2	1
Platform		1
Plunge		1
Step	2	1
Flake Scars (ºs)		
0	13	20
180		2
90	2	13
N/a	1	3

Table 10 Characteristics of the complete flakes in the assemblages.

Figure 6 Ridge-straightening flakes in TP88-11/C and TP94-5 of HTP-SMA. Left to right ids=29 & 60 (Scale=1cm)

Tools

HTP-Wollombi

Only five tools were found in the HTP-Wollombi assemblage (Table 11). One backed artefact was found in TP80. This artefact is a small geometric microlith (14.4 mm) made on a blade of matrix-dominated silcrete. This tool was only backed in quadrant 1 and 3. Processing tools (scrapers, utilised and denticulate tools were also seen in the assemblage (Figure 6).

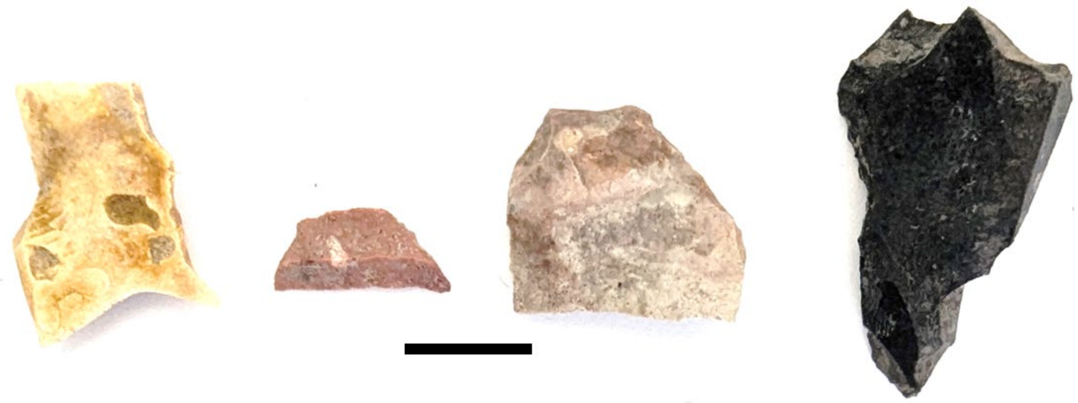

Figure 6 Tools in the HTP-Wollombi assemblage. Left to right id=58, id=4, id=8 id=scale=1cm)

HTP-SMA

Seven tools were found in the HTP-SMA transect (Figure 7, Table 11). Five of these tools were found in 83-6/C and two in TP83-11/C. These tools include one very small, backed artefact, two scrapers, a denticulate and three flakes with use wear damage. Four tools were made from silcrete. The backed artefact (9.2 mm) was a very small geometric microlith of matrix-dominated silcrete (Figure 7).

Figure 7 Tools in the HTP-SMA assemblage. Left to right id=2, id=99, id18 (scale=1cm)

Id	*Test Pit*	*Fragmentation*	*Material*	*Tool Type*	*No. of Retouched Edges*	*Length (mm)*	*Weight (g)*
	HTP-Wollombi						
4	54	Proximal	Matrix-Dominated Silcrete	Scraper	2	22.4	1.44
14	56	Medial	Milky Quartz	Scraper	1	9.2	0.27
31	58	Complete	CCQ	Utilised	1	30.5	2.2
58	72	Distal	Indurated Mudstone	Denticulate	1	21.8	1.68
78	80	Complete	Matrix-Dominated Silcrete	Geometric Microlith	2	14.4	0.24
	HTP-SMA						
20	83-11/C	Proximal	Matrix-Dominated Silcrete	Utilised	1	38.5	7.97
98	83-6/C	Proximal	Fine-grained silcrete	Utilised	1	33.6	7.54
34	83-6/C	Distal	Chalcedony	Utilised	1	28.1	4.2
46	83-11/C	Coretool	Fine-grained silcrete	Step-scraper	2	41.5	18.88
2	83-6/C	Complete	Matrix-Dominated Silcrete	Geometric microlith	3	9.2	0.11
18	83-6/C	Complete	Indurated mudstone	End-scraper	1	25.4	1.29
99	83-6/C	Complete	Indurated mudstone	Denticulate	1	42.2	6.7

Table 11 Tools found in the assemblages

Post Depositional Influences

Many processes affect archaeological remains after their initial discard. In this report the influence of heat damage and vertical displacement through conjoin analysis are considered.

Heat Damage

A total of four artefacts in HTP-SMA have heat damaged (e.g. blackening, cracking, pot-lidding, crazing). Three of these artefacts are considered heat-shattered artefacts (HSA). In contrast, in HTP-Wollombi three artefacts have heat damage including pot lids and fracturing. Heat fractures were also seen in each transect. In HTP-SMA these fragments are probably related to heat treatment.

Heat damaged can influence an assemblage in two ways. 1. Heat was responsible for shattering unworked cobbles/blocky fragments. Crazed platforms and heat damage on the dorsal surfaces of flakes (in association flake scars) also suggests that burning occurred prior to flaking. 2. Artefacts were also burnt after manufacture. The type of damage generally indicates an uncontrolled, post-depositional burning possibly the result of bush fires or from hearths. This can be seen in the presence of artefacts with pot-lids on their ventral surface and also heat-shattered artefacts (pot-lids, crazing, colour change) on the ventral or dorsal characteristics.

It seems likely that heat-treatment, shown by the numbers of pink and red silcrete artefacts, and post-depositional accidental burning has influenced the assemblages.

Chemical Weathering

A process which may account for the fragmentation of indurated mudstone artefacts is chemical weathering which is caused by rainwater reacting with the mineral grains in rocks to cause fractures in the rock and subsequently breaks them apart (Allaby 2013). Smaller rocks (i.e. artefacts) found in humid climatic conditions are more susceptible to this process. During the analysis internal fracturing was observed on the surface of the larger indurated mudstone artefacts and other artefacts were already fractured or had spalls on their ventral and/or dorsal surfaces (n=2). Figure 6 shows an example of a weathered indurated mudstone artefact (id=58).

Conjoin Analysis (Refitting)

Conjoining (or refitting artefacts) was not systematically undertaken across the assemblage but sometimes recognised during the analysis. This analysis can be used to assess a downward movement of artefacts or reconstruct core reduction. Two sets of conjoining artefacts in spits 1 and 2 were observed in TP83-6C of the HTP-SMA assemblage (Table 12). If conjoins are present in the same spit, then there is little evidence of for the downward movement of larger artefacts. Conjoining sets are post-depositional breakages. Two additional artefacts, same material type, colour and red cortex, were also considered part of the conjoining set (Figure 8).

Conjoin Locations	*Material*	*Artefact Type*
TP83-6C, spit 2	Yellow fine-grained silcrete	Proximal (id=95)/distal flakes (id=93 & 94) (post-depositional break)
TP83-6C, spit 1	Red indurated mudstone	Proximal (id=39)/distal flake (id=36) (post-depositional break)

Table 12 Conjoining artefacts by raw material in the HVO-2 assemblage

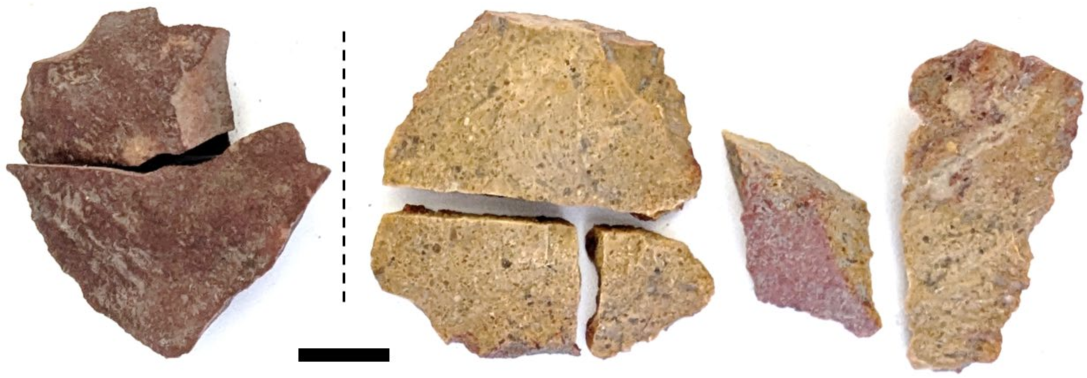

Figure 8 Examples of conjoining artefacts in TP83-6C. Left ids=93 & 94. Right ids=91-94. *(scale=1cm)*

Spatial Distribution and Site Occupation

To examine whether spatial differences in reduction activities occur in the transects the location of the cores, tools, raw material and size were compared.

HTP-Wollombi

Only one test pit had a relatively high density of artefacts. The artefacts in TP2 account for 19.4% of the assemblage. It was predicted that a variety of stone sources associated with volcanics occur in the upper margins of Congewai Creek. In this test pit seven raw material types were found. Many of the artefacts were broken or angular fragments and no tools were found in this location. Only two broken blades and two elongated flakes were found indicating some systematic core reduction. Figure 9 shows a basalt outcrop found near the transect and possibly the origin of the raw materials in the area, including primary (as veins) and secondary sources.

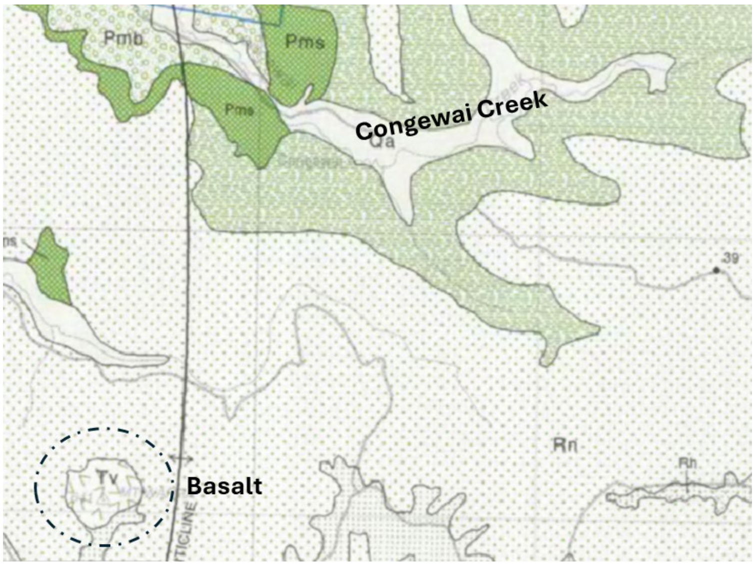

Figure 9 Location of Congewai Creek and basalt (adapted from Hawley et al. 1995).

HTP-SMA

Two test pits in the HTP-SMA transect have the highest number of artefacts TP83-11/C (n=21) and TP83-6/C (n=63). Silcrete is readily available in this location. Heat treated and non-heat-treated artefacts were found. Most of the artefacts were heat treated. Conjoins were also found showing an in-situ deposit. Core preparation and rejuvenation is seen in the assemblage associated with blade manufacture. Processing tools are also seen in the assemblage.

Archaeological Potential and Comparative Analysis

Considerable archaeological fieldwork has focused on the Hunter Valley resulting in the excavation of numerous archaeological assemblages typically dated to the mid-late Holocene (e.g., Hiscock 1993, Moore 2000). These assemblages share a number of key characteristics which include the procurement of silcrete and indurated mudstone cobbles from waterways, heat treatment, systematic core reduction (e.g. Redbank A/burin-blade core reduction strategy), blade manufacture and backed artefact production (i.e. Bondi points and geometric microliths). The HTP-SMA assemblage also has some of these key characteristics which concentrate in TP83-6/C.

In other locations in the Hunter Valley (e.g. Betty's Creek, Hiscock 1993, Koetting 1994) where silcrete cobbles are larger flakes up to 30 cm in length are manufactured. The complete silcrete flakes in the HTP-SMA assemblage have a mean length of 23.7±10.3 mm with a maximum size of 42.4 mm. In contrast in HTP-Wollombi the mean length of the complete silcrete artefacts is 18.4±9.7 mm with a maximum size of 32.4 mm. For the Carrington sites the distribution and frequency of raw materials was depended on the distance from the silcrete sources (Mitchell and McCotter 1999). This observation is also a feature of the HTP transects. Table 13 compares data from sites in the Hunter Valley. The frequency of silcrete artefacts differs considerably between sites. These differences reflect the distance to the sources and the types of sources nearby, the on-site activities and the duration of occupation.

Kuskie and Kamminga's (2000) developed a model relating the assemblage composition to differing site types ranging from short-term, transitory to longer-term occupation, typically shown by higher numbers of processing tools. In comparison to other sites in the Hunter Valley the HTP transects have a high frequency of tools (Table 13). HTP-SMA and HTP-Wollombi have the highest frequency of retouched artefacts which may be associated with a longer occupation in two locations, TP83-11/C (n=21) and TP83-6/C (n=63) of HTP-SMA and TP2 of HTP-Wollombi. Other tests pits are more indicative of a short-term area of transitory movement.

	Narama	*Mt Owen*	*Lemington*	*Mt Thorley*	*Bolwarra Heights*	*Cheshunt (Excavated)*	*Howick*	*HVO-2*	*HTP-SMA*	*HTP-Wollombi*
Material type (% of silcrete)	29.4	59.4	26.8	68.5	85.1	14.3	35	31.5	68.3	26.5
Ratio of complete flakes:cores	4.9:1	19.8:1	16.5:1	28.0:1	51.6:1	36.3:1	6.3:1	17:1	38:1	16:1
% of Backed tools	0.5	2.4	2	1.7	2.6	0.5	1.2	3.3	1	1
% of Retouched Tools	0	0.7	2.9	0.4	0.6	2.3	0	2.7	7.1	6.9
Cores	38	12	30	56	5	3	27	14	1	1
Complete flakes	188	238	494	1567	258	109	171	178	38	16
Total	1010	869	906	6730	823	217	644	564	101	98

Table 13 Comparison of sites in the Hunter Valley

Summary

It is now possible to return to the questions posed in the research design.

Site chronology. When was the site occupied? Was the assemblage the product of repeated occupations or a single event? Does any spatial patterning occur in the assemblage? Was there a Pleistocene occupation?

The HTP transects were occupied between the mid to late Holocene based the raw material, core and tool types i.e. the presence of burin-blade cores and backed artefacts. Concentrations of artefacts were found in both transects. Processing tools (scrapers, usewear, notched) were found in the assemblage that are typically more indicative of a longer-term occupation at TP83-6/C of HTP-SMA and TP2 of HTP-Wollombi. No evidence of a Pleistocene occupation was seen in the assemblages.

A comparison of the raw material types in spit 1 & 2 with those in spits 3 & 4 of the HTP-Wollombi shows a shift in frequency from silcrete to cryptocrystalline quartzes. This difference hints at the possibility of two occupations.

Source Information. Which raw material resources were used?

The assemblage was dominated by silcrete artefacts and to a lesser extent indurated mudstone in the HTP-SMA transect. Two types of raw material sources were used - primary, exposures of outcrops (rough) and secondary from a waterway (smooth and rounded). It is likely the secondary source is the nearby upper reaches of the Hunter River.

In contrast, while small silcrete artefacts are present in the HTP-Wollombi transect, a variety of cryptocrystalline quartzes and macrocrystalline quartz (milky quartz) dominant. Quartzite artefacts were also common in the transect. It is likely that the nearby Congewai Creek is the source of the water-rolled cobbles/pebbles. It is predicted that outcropping veins of quartz are associated with the basaltic outcrops. These sources were also procured.

***Stone reduction technology*.** How was the stone worked and used? Can the function of the site be inferred from the artefact assemblage?

Some evidence for 'systematic' reduction of cores occurred on site (i.e. the manufacture of elongated/blade flakes from prepared cores). The presence of atypical burin-blade cores represents a systematic core reduction similar to the Redbank A strategy observed by Hiscock (1993) in the Hunter Valley. This strategy was also indicated by a number of other artefact characteristics e.g. facetted platforms, overhang removal and flakes with a blade/elongated form. A smaller core found in TP83-11/C of HTP-SMA represent a late-stage exhaustion and discard. Some evidence of core preparation was seen in the assemblage. It is likely that cores were used to make geometric microliths and Bondi points. However, only one finished geometric microlith was found in the HTP-SMA assemblage. Processing tools were mostly found in TP83-6/C and made on large flakes or a discarded core.

In HTP-Wollombi more quartz artefacts were found. This material type is typically associated with a bipolar technique, coupled with a higher frequency of broken artefacts and angular fragments. Smaller silcrete artefacts were found and associated with distance from the source. Little evidence of systematic core preparation or rejuvenation was seen in the assemblage.

Site Function. What types of activities occurred on-site/s? Do discrete areas of stone working occur? Can site function be related to environmental factors i.e. distance to sources?

The results of the test excavations hints at the concentration of activities in two locations. The higher frequency of other processing tool types (e.g. usewear, notched and scraper) suggests that TP83-6/C was primarily associated with more camp site activity. The location was also used to "gear-up" i.e. an area used for the manufacture of backed artefacts. These tools were made, transported and used when necessary to maintain and replace broken parts of weaponry. It was also important to make time, prior to hunting, to have operational equipment. This also involved heat-treating silcrete.

At TP2 of HTP-Wollombi processing tools were also observed in the assemblage. This was coupled with a high diversity of raw material types also suggests more time at place and/or a repeated occupation.

***Regional Comparative Analysis*.** How does this site compare with others in the surrounding region?

Mid-late Holocene sites are abundant in the Hunter Valley (Hughes et al. 2014). These sites are typified by systematic core reduction, blade production and backed artefact manufacture (Hiscock 1998; Moore 2000). The technological, metrical and typological characteristics of the HTP-SMA assemblage are commonly seen in assemblages from the region. In the Hunter Valley ample raw material, in the form of water-rolled cobbles, are readily available in region thereby placing no restrictions on artefact manufacture. However, the distance from the source and type of raw material available has influenced the frequency of raw material types in the assemblage. A preference for silcrete was seen in the HTP-SMA assemblage and the resulting artefacts are larger than those found in HTP-Wollombi. A similar pattern is seen in other locations in the Hunter Valley (e.g. Betty's Creek) with large silcrete cobbles capable of producing larger flakes up to 30 cm in length (Hiscock 1993, Koetting 1994). The distance from silcrete sources and the availability of other sources is seen in the artefacts found in HTP-Wollombi transect. The frequency of silcrete in this assemblage is similar to Narama and Lemington.

***Conjoins & Post-depositional influences*.** What post-depositional influences have impacted on the assemblage?

Some evidence of size sorting which may be due to post-depositional processes, such as bioturbation, resulting in smaller artefacts found at depth within the excavated assemblage below spit 2 of HTP-SMA. Two sets of conjoins was found in TP83-6/C indicating an in-situ deposit in the upper spits.

Other post-depositional impacts on the assemblage include heat damage and chemical weathering. These impacts were seen on artefacts in both transects.

Conclusion

The characteristics of the cores, flakes and tools in the assemblage indicates that cores were procured and worked from a nearby silcrete source in HTP-SMA. A secondary source of water-rolled cobbles (e.g. silcrete and indurated mudstone), were used to manufacture large flakes, some used as tools or cores. A nearby primary source of silcrete was also used. Some evidence for systematic core preparation and backed artefact manufacture was also found in and around TP83-6/C. The presence of processing tools (e.g. usewear, notched and scarper) also suggests that this location was used for a longer-term occupation. TP2 of HTP-Wollombi may also have been used for a longer-term occupation. Differences in raw materials, artefact size and assemblage composition between the two transects are associated with a changing geological landscape.

This report provides some understanding of site chronology, raw material selection, core preparation and reduction strategies and tool manufacture that contributes to understanding the archaeology of the upper Hunter region.

Future research opportunities

1. *Understanding the Stone Sources*

This project would benefit from a source survey for primary and secondary sources along the Hunter River and Congewai Creek to assess variability in the availability of raw materials and more fully.

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F.11 Test excavation – Lithics catalogue

Id	Site	Test Pit	Spit	Depth	Class	Material	Colour
1	HTP-SMA	83-6/C	1		DISTFLAKE	CHERT	R/G
10	HTP-SMA	83-6/C	1		MEDFLAKE	MAXSILCRETE	Pink
100	HTP-SMA	83-6/C	2		ANGULARFRAG	FSILCRETE	Pink
11	HTP-SMA	83-6/C	1		CompFlake	Quartzite	Cream
12	HTP-SMA	83-6/C	1		CompFlake	MAXSILCRETE	Pink
13	HTP-SMA	83-6/C	1		CompFlake	FSILCRETE	yellow
14	HTP-SMA	83-6/C	1		CompFlake	MAXSILCRETE	Red
15	HTP-SMA	83-6/C	1		MEDFLAKE	FSILCRETE	Red
16	HTP-SMA	83-6/C	1		MEDFLAKE	MilkyQuartz	Pink
17	HTP-SMA	83-6/C	1		DISTFLAKE	MilkyQuartz	Pink
18	HTP-SMA	83-6/C	1		COMPTOOL	induratedmud	Red
19	HTP-SMA	83-11/C	2	10-20	CompFlake	FSILCRETE	Pink
2	HTP-SMA	83-6/C	1		COMPTOOL	MAXSILCRETE	Red
20	HTP-SMA	83-11/C	2	10-20	PROXTOOL	MAXSILCRETE	yellow
21	HTP-SMA	83-11/C	2	10-20	MEDFLAKE	induratedmud	Brown
22	HTP-SMA	83-11/C	2	10-20	CompFlake	FSILCRETE	Red
23	HTP-SMA	83-11/C	2	10-20	CompFlake	FSILCRETE	R/G
24	HTP-SMA	83-11/C	2	10-20	DISTFLAKE	MAXSILCRETE	lyellow
25	HTP-SMA	83-11/C	2	10-20	MEDFLAKE	MSILCRETE	Pink
26	HTP-SMA	83-11/C	2	10-20	ANGULARFRAG	FSILCRETE	R/G
27	HTP-SMA	83-11/C	2	10-20	CORE	MAXSILCRETE	lyellow
28	HTP-SMA	83-11/C	2	10-20	ANGULARFRAG	FSILCRETE	Pink
29	HTP-SMA	83-11/C	2	10-20	CompFlake	CHERT	lyellow
3	HTP-SMA	83-6/C	1		PROXFLAKE	MAXSILCRETE	Red
30	HTP-SMA	83-11/C	2	10-20	DISTFLAKE	Chalcedony	Cream
31	HTP-SMA	82-4/W	2	10-20	CompFlake	induratedmud	R/G
32	HTP-SMA	82-2/W	CLEAN		MEDFLAKE	induratedmud	Red
33	HTP-SMA	83-6/C	1		CompFlake	Chalcedony	lgrey
34	HTP-SMA	83-6/C	1		DISTTOOL	Chalcedony	black
35	HTP-SMA	83-6/C	1		DISTFLAKE	CHERT	Brown
36	HTP-SMA	83-6/C	1		DISTFLAKE	induratedmud	Red
37	HTP-SMA	94-10	1		CompFlake	induratedmud	Red

38	HTP-SMA	83-6/C	1		PROXFLAKE	MAXSILCRETE	Red
39	HTP-SMA	83-6/C	1		PROXFLAKE	induratedmud	Red
4	HTP-SMA	83-6/C	1		PROXFLAKE	MAXSILCRETE	Red
40	HTP-SMA	83-6/C	2		HSA	FSILCRETE	Red
41	HTP-SMA	83-6/C	2		CompFlake	induratedmud	Red
42	HTP-SMA	83-6/C	2		CompFlake	CHERT	Red
43	HTP-SMA	83-11/C	3		DISTFLAKE	MAXSILCRETE	yellow
44	HTP-SMA	83-11/C	3		CompFlake	induratedmud	lyellow
45	HTP-SMA	83-11/C	3		CompFlake	MAXSILCRETE	Pink
46	HTP-SMA	83-11/C	3		CORETOOL	FSILCRETE	g/p
47	HTP-SMA	83-7/W	2		CompFlake	MilkyQuartz	White
48	HTP-SMA	82-2/W	6		CompFlake	CHERT	yellow
49	HTP-SMA	83-8/W	4		PROXFLAKE	FSILCRETE	Pink
5	HTP-SMA	83-6/C	1		CompFlake	MSILCRETE	Red
50	HTP-SMA	83-8/W	4		CompFlake	induratedmud	Red
51	HTP-SMA	82-6/W	3		MEDFLAKE	FSILCRETE	g/p
52	HTP-SMA	82-6/W	3		DISTFLAKE	FSILCRETE	lgrey
53	HTP-SMA	83-6/W	1		MEDFLAKE	FSILCRETE	g/p
54	HTP-SMA	82-10/W	4		MEDFLAKE	FSILCRETE	lyellow
55	HTP-SMA	83-8/W	10		T	CCQ	black
56	HTP-SMA	83-8/W	10		CompFlake	Chalcedony	White
57	HTP-SMA	83-11/C	1		DISTFLAKE	MSILCRETE	Pink
58	HTP-SMA	77-14/W	1		CompFlake	SilicifiedWood	Red
59	HTP-SMA	83-8/W	8		CompFlake	Chalcedony	black
6	HTP-SMA	83-6/C	1		MEDFLAKE	MAXSILCRETE	Pink
60	HTP-SMA	94-5	1		CompFlake	CHERT	Cream
61	HTP-SMA	83-11/C	2		DISTFLAKE	FSILCRETE	lgrey
62	HTP-SMA	83-11/C	2		CompFlake	FSILCRETE	R/G
63	HTP-SMA	83-11/C	2		CompFlake	induratedmud	Red
64	HTP-SMA	83-11/C	2		HSA	induratedmud	Red
65	HTP-SMA	83-6/C	2		PROXFLAKE	FSILCRETE	Red
66	HTP-SMA	83-6/C	2		ANGULARFRAG	FSILCRETE	Red
67	HTP-SMA	83-6/C	2		CompFlake	FSILCRETE	Red
68	HTP-SMA	83-6/C	2		DISTFLAKE	FSILCRETE	Red
69	HTP-SMA	83-6/C	2		CompFlake	MAXSILCRETE	Pink
7	HTP-SMA	83-6/C	1		CompFlake	MAXSILCRETE	lyellow
70	HTP-SMA	83-6/C	2		MEDFLAKE	FSILCRETE	Pink
71	HTP-SMA	83-6/C	2		CompFlake	MAXSILCRETE	Red
72	HTP-SMA	83-6/C	2		DISTFLAKE	FSILCRETE	Red

73	HTP-SMA	83-6/C	2		MEDFLAKE	MAXSILCRETE	Red
74	HTP-SMA	83-6/C	2		CompFlake	MAXSILCRETE	Pink
75	HTP-SMA	83-6/C	2		ANGULARFRAG	MAXSILCRETE	Red
76	HTP-SMA	83-6/C	2		PROXFLAKE	MAXSILCRETE	lgrey
77	HTP-SMA	83-6/C	2		COMPSPLIT	FSILCRETE	Red
78	HTP-SMA	83-6/C	2		MEDFLAKE	FSILCRETE	Red
79	HTP-SMA	83-6/C	2		COMPSPLIT	FSILCRETE	Red
8	HTP-SMA	83-6/C	1		CompFlake	MAXSILCRETE	Pink
80	HTP-SMA	83-6/C	2		MEDFLAKE	FSILCRETE	Red
81	HTP-SMA	83-6/C	2		DISTFLAKE	CSILCRETE	lgrey
82	HTP-SMA	83-6/C	2		PROXFLAKE	MAXSILCRETE	Pink
83	HTP-SMA	83-6/C	2		DISTFLAKE	MAXSILCRETE	Red
84	HTP-SMA	83-6/C	2		CompFlake	FSILCRETE	Red
85	HTP-SMA	83-6/C	2		CompFlake	MAXSILCRETE	Pink
86	HTP-SMA	83-6/C	2		CompFlake	MAXSILCRETE	Pink
87	HTP-SMA	83-6/C	2		CompFlake	FSILCRETE	Red
88	HTP-SMA	83-6/C	2		HSA	MAXSILCRETE	Red
89	HTP-SMA	83-6/C	2		T	FSILCRETE	yellow
9	HTP-SMA	83-6/C	1		MEDFLAKE	FSILCRETE	Red
90	HTP-SMA	83-6/C	2		CompFlake	FSILCRETE	Red
91	HTP-SMA	83-6/C	2		CompFlake	FSILCRETE	Y/R
92	HTP-SMA	83-6/C	2		DISTFLAKE	FSILCRETE	yellow
93	HTP-SMA	83-6/C	2		DISTFLAKE	FSILCRETE	yellow
94	HTP-SMA	83-6/C	2		DISTFLAKE	FSILCRETE	yellow
95	HTP-SMA	83-6/C	2		PROXFLAKE	FSILCRETE	yellow
96	HTP-SMA	83-6/C	2		CompFlake	MAXSILCRETE	Pink
97	HTP-SMA	83-6/C	2		ANGULARFRAG	Quartzite	lgrey
98	HTP-SMA	83-6/C	2		PROXTOOL	FSILCRETE	Red
101	HTP-SMA	82-8/W	2		DISTFLAKE	induratedmud	lgrey
99	HTP-SMA	83-6/C	2		COMPTOOL	induratedmud	Red
1	HTP-Woll	80	2		CompFlake	MAXSILCRETE	Y/R
10	HTP-Woll	76	5		CompFlake	Quartzite	lgrey
11	HTP-Woll	78	5		CompFlake	FSILCRETE	Pink
12	HTP-Woll	56	3		MEDFLAKE	MilkyQuartz	lgrey
13	HTP-Woll	56	3		MEDFLAKE	MilkyQuartz	yellow
14	HTP-Woll	56	3		MEDTOOL	MilkyQuartz	White
15	HTP-Woll	2	2b		PROXFLAKE	FSILCRETE	lgrey
16	HTP-Woll	2	2c		PROXFLAKE	FSILCRETE	Pink

17	HTP-Woll	10	2		MEDFLAKE	CHERT	Brown
18	HTP-Woll	10	2		MEDFLAKE	CHERT	Grey
19	HTP-Woll	10	2		DISTFLAKE	FSILCRETE	lgrey
2	HTP-Woll	80	2		CompFlake	CCQ	Grey
20	HTP-Woll	10	2		MEDFLAKE	CHERT	lgrey
21	HTP-Woll	48	5		DISTFLAKE	induratedmud	lyellow
22	HTP-Woll	96	5		ANGULARFRAG	MilkyQuartz	White
23	HTP-Woll	96	5		COMPSPLIT	MilkyQuartz	White
24	HTP-Woll	23	2		T	Chalcedony	R/G
25	HTP-Woll	96	2		ANGULARFRAG	MilkyQuartz	White
26	HTP-Woll	96	2		CompFlake	Chalcedony	Red
27	HTP-Woll	2	5d		ANGULARFRAG	MilkyQuartz	White
28	HTP-Woll	2	5d		CompFlake	Quartzite	Pink
29	HTP-Woll	58	2		CompFlake	CCQ	lgrey
3	HTP-Woll	58	4		DISTFLAKE	FSILCRETE	Grey
30	HTP-Woll	58	2		ANGULARFRAG	MilkyQuartz	White
31	HTP-Woll	58	2		COMPTOOL	CCQ	lgrey
32	HTP-Woll	58	2		MEDFLAKE	CCQ	Red
33	HTP-Woll	58	2		MEDFLAKE	Quartzite	Grey
34	HTP-Woll	58	2		MEDFLAKE	MilkyQuartz	White
35	HTP-Woll	36	2		DISTFLAKE	MilkyQuartz	White
36	HTP-Woll	36	2		DISTFLAKE	FSILCRETE	Pink
37	HTP-Woll	36	2		ANGULARFRAG	CCQ	Red
38	HTP-Woll	76	3		ANGULARFRAG	Quartzite	Grey
39	HTP-Woll	2	2		ANGULARFRAG	Chalcedony	Grey
4	HTP-Woll	54	2		PROXTOOL	MAXSILCRETE	g/p
40	HTP-Woll	2	2		MEDFLAKE	MilkyQuartz	White
41	HTP-Woll	106	1		ANGULARFRAG	FSILCRETE	Red
42	HTP-Woll	88	6		COMPSPLIT	Quartzite	yellow
43	HTP-Woll	88	6		DISTFLAKE	Quartzite	yellow
44	HTP-Woll	88	6		MEDFLAKE	Quartzite	yellow
45	HTP-Woll	2	4		CompFlake	FSILCRETE	Red
46	HTP-Woll	2	4		MEDFLAKE	Quartzite	dgry
47	HTP-Woll	2	4		DISTFLAKE	MAXSILCRETE	Red
48	HTP-Woll	2	4		PROXFLAKE	CHERT	lgrey
49	HTP-Woll	2	4		MEDFLAKE	FSILCRETE	R/G
5	HTP-Woll	54	3		DISTFLAKE	MAXSILCRETE	g/p
50	HTP-Woll	2	4		MEDFLAKE	FSILCRETE	lgrey
51	HTP-Woll	2	4		DISTFLAKE	MilkyQuartz	White

52	HTP-Woll	2	4		CompFlake	FSILCRETE	Pink
53	HTP-Woll	2	4		ANGULARFRAG	Chalcedony	Pink
54	HTP-Woll	2	6		CompFlake	CCQ	lgrey
55	HTP-Woll	2	6		DISTFLAKE	FSILCRETE	Red
56	HTP-Woll	70	7		DISTFLAKE	Chalcedony	Pink
57	HTP-Woll	72	4		DISTFLAKE	MilkyQuartz	White
58	HTP-Woll	72	4		DISTTOOL	induratedmud	lgrey
59	HTP-Woll	72	4		DISTFLAKE	induratedmud	lgrey
6	HTP-Woll	88	5		CompFlake	induratedmud	Cream
60	HTP-Woll	72	4		MEDFLAKE	induratedmud	lgrey
61	HTP-Woll	72	4		MEDFLAKE	MAXSILCRETE	Pink
62	HTP-Woll	72	4		DISTFLAKE	MilkyQuartz	White
63	HTP-Woll	38	1		PROXFLAKE	CHERT	lgrey
64	HTP-Woll	38	1		DISTTOOL	CHERT	lgrey
65	HTP-Woll	96	6		ANGULARFRAG	MilkyQuartz	White
66	HTP-Woll	96	6		DISTFLAKE	induratedmud	Brown
67	HTP-Woll	10	1		MEDFLAKE	FSILCRETE	Pink
68	HTP-Woll	10	1		HSA	CHERT	Red
69	HTP-Woll	44	3		COMPSPLIT	Quartzite	Brown
7	HTP-Woll	72	1		ANGULARFRAG	induratedmud	Brown
70	HTP-Woll	17	1		CompFlake	Chalcedony	g/p
71	HTP-Woll	2	6c		ANGULARFRAG	MAXSILCRETE	Red
72	HTP-Woll	90	2		CompFlake	CHERT	Brown
73	HTP-Woll	90	2		MEDFLAKE	FSILCRETE	g/p
74	HTP-Woll	90	2		ANGULARFRAG	FSILCRETE	Red
75	HTP-Woll	71	1		COMPSPLIT	Quartzite	Grey
76	HTP-Woll	71	1		ANGULARFRAG	Chalcedony	dgry
77	HTP-Woll	80	3		DISTFLAKE	FSILCRETE	Red
78	HTP-Woll	80	3		COMPTOOL	MAXSILCRETE	Pink
79	HTP-Woll	72	3		MEDFLAKE	induratedmud	lgrey
8	HTP-Woll	108	2		MEDTOOL	CHERT	black
80	HTP-Woll	80	1		DISTFLAKE	Quartzite	Grey
81	HTP-Woll	23	1		PROXFLAKE	CCQ	White
82	HTP-Woll	42	2		ANGULARFRAG	MilkyQuartz	Pink
83	HTP-Woll	42	2		DISTFLAKE	FSILCRETE	Grey
84	HTP-Woll	86	2		MEDFLAKE	induratedmud	Red
85	HTP-Woll	86	2		MEDFLAKE	Chalcedony	Brown
86	HTP-Woll	86	2		ANGULARFRAG	MilkyQuartz	Pink
87	HTP-Woll	92	5		MEDFLAKE	MilkyQuartz	lgrey

88	HTP-Woll	2	7		ANGULARFRAG	MilkyQuartz	Pink
89	HTP-Woll	56	2		ANGULARFRAG	Chalcedony	Cream
9	HTP-Woll	76	5		HSA	CCQ	Red
90	HTP-Woll	56	2		MEDFLAKE	induratedmud	Brown
91	HTP-Woll	56	2		DISTFLAKE	FSILCRETE	Pink
92	HTP-Woll	60	2		MEDFLAKE	MilkyQuartz	White
93	HTP-Woll	60	2		DISTFLAKE	MilkyQuartz	White
94	HTP-Woll	60	2		CORE	Volcanic	Brown
95	HTP-Woll	30	7		CompFlake	induratedmud	Red
96	HTP-Woll	44	1		MEDFLAKE	Quartzite	dgry
97	HTP-Woll	76	7	7		CompFlake	tz
98	HTP-Woll	76	2	2		CompFlake	FSILCRETE

Heat Damage	Distial end	Cortex %	Cortex type	Form	Ex. Platform	Platform type	Dorsal scars
N	FEATHER	0%		Indeterminate			
N		0%		Elongated			
N		0%					
N	FEATHER	26-50%	WRSmooth	Block	NA	Uni	0
N	FEATHER	1-25%	Weather	Expanding	NA	Cortical	90
N	FEATHER	1-25%	WRSmooth	Indeterminate	NA	Uni	0
N	FEATHER	1-25%	Weather	Indeterminate	NA	Cortical	0
N		100%	WRSmooth	Indeterminate			
N		1-25%	WRSmooth	Indeterminate			
N	FEATHER	1-25%	Weather	Indeterminate			
N	N/A	1-25%	WRSmooth	Elongated	NA	Missing	0
N	STEP	0%		Expanding	NA	Uni	0
N	N/A	0%		Elongated	NA	N/A	0
N		0%		Indeterminate	NA	Uni	
N		0%		Indeterminate			
N	FEATHER	1-25%	craze	Elongated	NA	Uni	0
N	FEATHER	1-25%	Weather	Expanding	NA	Cortical	90
N	FEATHER	0%		Indeterminate			
N		0%		Indeterminate			
N		0%					
Y		1-25%	Weather				
N		0%					
N	FEATHER	0%		RidgeStriaghtening	NA	Facetted	90
N		0%		Elongated	NA	Uni	
N	FEATHER	1-25%	WRSmooth	Indeterminate			
N	FEATHER	0%		Indeterminate	NA	Crush	0
N		26-50%	WRSmooth	Indeterminate			
N	FEATHER	0%		Expanding	NA	Facetted	90
N	FEATHER	100%	WRSmooth	Indeterminate			
N	FEATHER	26-50%	WRSmooth	Indeterminate			
N	FEATHER	0%		Expanding			
N	HINGE	0%		Indeterminate	NA	Missing	0

N		51-99%	WRSmooth	PlatformRejuvenation	NA	Uni	
N		0%		Expanding	NA	Missing	
N		1-25%	CHALKYRIND	Expanding	NA	Uni	
N		0%		N/A			
Y	FEATHER	26-50%	WRSmooth	Expanding	NA	Flaked	0
N	FEATHER	100%	WRSmooth	Indeterminate	NA	Missing	N/a
N	FEATHER	0%		Elongated			
N	FEATHER	1-25%	WRSmooth	Expanding	NA	Cortical	0
N	FEATHER	0%		Expanding	NA	Uni	0
N		0%					
N	FEATHER	1-25%	WRSmooth	Expanding	NA	Crush	90
N	FEATHER	1-25%	WRSmooth	Elongated	G	Cortical	0
N		0%		Elongated	NA	Uni	
N	FEATHER	1-25%	WRSmooth	Indeterminate	NA	Cortical	0
N	FEATHER	51-99%	WRSmooth	Expanding	NA	Uni	0
N		0%		Elongated			
N	HINGE	0%		Indeterminate			
N		0%		Indeterminate			
N		0%		Blade			
N		26-50%	WRSmooth				
N	FEATHER	0%		PlatformRejuvenation	NA	Crush	90
N	FEATHER	0%		Indeterminate			
N	CRUSH	0%		Elongated	NA	Missing	0
N	FEATHER	100%	WRSmooth	Elongated	NA	Uni	N/a
N		100%	Weather	Indeterminate			
N	FEATHER	0%		RidgeStriaghtening	NA	Uni	90
N	FEATHER	0%		Blade			
N	FEATHER	0%		Indeterminate	G	Uni	90
Y	FEATHER	1-25%	WRSmooth	Indeterminate	NA	Flaked	N/a
N		26-50%	WRSmooth	N/A			
Y		1-25%	WRSmooth	Expanding	NA	Uni	
N		1-25%	WRSmooth				
N	FEATHER	1-25%	CHALKYRIND	Expanding	NA	Flaked	0
N	FEATHER	1-25%	WRSmooth	Expanding			
N	FEATHER	0%		Indeterminate	NA	Uni	90
N	FEATHER	0%		Expanding	G	Uni	90
N		0%		Blade			
N	FEATHER	0%		Expanding	NA	Uni	0
N	FEATHER	26-50%	WRSmooth	Indeterminate			

N		0%		Indeterminate			
N	FEATHER	0%		Indeterminate	NA	Missing	0
N		26-50%	Weather				
N		0%		Elongated	NA	Flaked	
N	FEATHER	1-25%	WRSmooth	Block	NA	Uni	
N		0%		Indeterminate			
N	FEATHER	100%	CHALKYRIND	Indeterminate	NA	Uni	
N	FEATHER	0%		PlatformRejuvenation	NA	Flaked	90
N		0%		Indeterminate			
N	CORTICAL	1-25%	WRSmooth	Indeterminate			
N		1-25%	craze	Indeterminate	NA	Uni	
N	FEATHER	0%		RidgeStriaghtening			
N	PLUNGE	0%		Indeterminate	STEP	Missing	0
N	FEATHER	1-25%	Weather	Expanding	NA	Cortical	0
N	ABRUPT	51-99%	WRSmooth	Indeterminate	NA	Facetted	0
N	FEATHER	1-25%	craze	Expanding	NA	Facetted	90
N		0%		N/A			
N		1-25%	craze				
N		100%	WRSmooth	Indeterminate			
N	FEATHER	26-50%	WRSmooth	Indeterminate	NA	Uni	90
N	FEATHER	51-99%	CHALKYRIND	Elongated	NA	Uni	180
N	FEATHER	51-99%	WRSmooth	Indeterminate			
N	FEATHER	0%		Expanding			
N	FEATHER	100%	WRSmooth	Expanding			
N		100%	WRSmooth	Expanding	NA	Uni	
N	M	0%		PlatformRejuvenation	NA	Crush	180
N		1-25%	WRSmooth				
N		0%		Indeterminate	NA	Flaked	
N	CORTICAL	1-25%	WRSmooth	Indeterminate			
N	CORTICAL	1-25%	WRSmooth	Indeterminate	NA	Uni	0
N	STEP	0%		Indeterminate	NA	Flaked	90
N	FEATHER	0%		Expanding	NA	Uni	0
N	FEATHER	0%		Expanding	NA	Uni	0
N		1-25%	WRSmooth	Indeterminate			
N		0%		Indeterminate			
N		0%		Indeterminate			
N		0%		Blade	NA	Uni	
N		0%		Blade	NA	Missing	

N		26-50%	WRSmooth	Indeterminate			
N		0%		Indeterminate			
N	FEATHER	0%		Elongated			
Y	FEATHER	0%		Expanding	NA	Crush	90
N		0%		Blade			
N	FEATHER	0%		Indeterminate			
N		0%					
N	ABRUPT	0%		Indeterminate	NA	Uni	
N		26-50%	WRSmooth				
N		1-25%	WRSmooth				
N	ABRUPT	26-50%	WRSmooth	Expanding	NA	Uni	0
N		26-50%	WRSmooth				
N	FEATHER	1-25%	WRSmooth	Expanding	NA	Cortical	0
N	FEATHER	1-25%	Weather	Indeterminate	G	Cortical	0
N	FEATHER	0%		Indeterminate			
N		0%					
N	FEATHER	0%		PlatformRejuvenation	NA	Flaked	90
N		0%		Indeterminate			
N		100%	WRSmooth	Indeterminate			
N		100%	WRSmooth	Indeterminate			
N	FEATHER	0%		Expanding			
N	FEATHER	0%		Indeterminate			
N		26-50%	WRSmooth				
N		0%					
N		0%					
N		0%		Indeterminate	NA	Uni	
N		100%	WRSmooth	Expanding			
N		0%					
N	CORTICAL	100%	WRSmooth	Block	NA	Uni	
Y	FEATHER	1-25%	WRSmooth	Indeterminate			
N		1-25%	WRSmooth	Indeterminate			
N	FEATHER	0%		Indeterminate	NA	Uni	0
Y		0%		Indeterminate			
N	FEATHER	0%		Indeterminate			
N		0%		Elongated	NA	Uni	
Y		100%	WRSmooth	Indeterminate			
N	FEATHER	100%	craze	Expanding			
N		0%		Indeterminate			
N	FEATHER	1-25%	Weather	Indeterminate			

N	FEATHER	0%		Indeterminate	NA	Uni	0
N		1-25%	WRSmooth				
N	FEATHER	1-25%	Weather	Indeterminate	NA	Cortical	0
N	FEATHER	0%		Indeterminate			
N	FEATHER	100%	WRSmooth	Expanding			
N	FEATHER	100%	WRSmooth	Indeterminate			
N	FEATHER	0%		Indeterminate			
N	FEATHER	0%		Expanding			
N	HINGE	0%		Expanding	NA	Missing	0
N		0%		Indeterminate			
N		0%		Indeterminate			
N	FEATHER	26-50%	WRSmooth	Indeterminate			
N		0%		Elongated	NA	Missing	
N	FEATHER	0%		Indeterminate			
N		26-50%	WRSmooth				
N	FEATHER	0%		Expanding			
N		0%		Indeterminate			
N		0%		N/A			
N	STEP	1-25%	WRSmooth	Expanding	NA	Cortical	
N		0%					
Y	STEP	100%	WRSmooth	Indeterminate	NA	Cortical	N/a
Y		0%					
N	HINGE	0%		Expanding	NA	Missing	0
N		0%		Indeterminate			
N		0%					
N	FEATHER	0%		Expanding	NA	Uni	
Y		26-50%	Weather				
N	FEATHER	0%		Indeterminate			
N	N/A	0%		Blade	NA	N/A	0
N		0%		Indeterminate			
N		0%		Indeterminate			
N	FEATHER	0%		Indeterminate			
N		26-50%	WRSmooth	Elongated	NA	Facetted	
N		0%					
N	M	0%		PlatformRejuvenation			
N		0%		Elongated			
N		0%		Indeterminate			
N		0%					
N		0%		Indeterminate			

N		1-25%	WRSmooth				
N		100%	WRSmooth				
N		0%		N/A			
N		1-25%	WRSmooth	Indeterminate			
N	FEATHER	1-25%	WRSmooth	Indeterminate			
N		1-25%	WRSmooth	Indeterminate			
N	FEATHER	0%		Expanding			
N		51-99%	Rough				
N	FEATHER	0%		Elongated	NA	Uni	0
N		26-50%	WRSmooth	Indeterminate			
White	N	FEATHER	1-25%	WRSmooth	Expanding	NA	Cortical
Red	Y	FEATHER	1-25%	craze	Elongated	NA	Uni

Tool type	No. Retouched edges	Retouch 1	Edge shape 1	Retouch 2	Edge shape 2	Retouch 3	Edge shape 3	Retouch 4
	0							
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r	1	N/A	N/A	N/A	N/A	SCRAPER	straight	N/A
	0							
microlith	3	BACKING	N/A	BACKING	N/A	BACKING	N/A	N/A
Utilised	1							
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Utilised	1							
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Utilised	1							
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e	1	N/A	N/A	N/A	N/A	N/A	N/A	ATE
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Scraper	1							
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Utilised	1	N/A	N/A	UTILISED	straight	N/A	N/A	N/A
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Scraper	2							
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	0							
microlith	2	BACKING	straight	N/A	N/A	BACKING	straight	N/A
	0							
stscraper	1							
	0							
	0							
	0							
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0		0						
0		0						

Edge shape 4	Core type	Core body	Scar form	Core platfrom no.	Step terminations	Hinge terminations	Max. length	Axial length (mm)
				0			13.3	0
				0			19.4	0
				0			10.6	0
				0			32.6	24.9
				0			16.7	7.9
				0			42.4	41.5
				0			9.4	6.4
				0			30.9	0
				0			10.6	0
				0			32.5	0
N/A				0			25.4	24.8
				0			27	15
N/A				0			9.2	9.2
				0			38.5	0
				0			9.9	0
				0			27.7	26.4
				0			13.1	7.3
				0			10.3	0
				0			16.7	0
				0			16.3	0
	Bipolar	Flake	Elongated	1	<5	0	19.7	0
				0			13.5	0
				0			15.1	15.1
				0			24.1	0
				0			8.5	0
				0			8.6	8.3
				0			10.8	0
				0			13.1	11.2
				0			28.1	0
				0			9.4	0
				0			35.8	0
				0			17.1	16.4

				0			31	0
				0			28.2	0
				0			12.3	0
				0			24.6	0
				0			35.9	31.4
				0			16.5	12.5
				0			35	0
				0			9	5.9
				0			16.4	12.4
	ABBC	Flake	Elongated	1	<5	0	41.5	0
				0			13.8	11.1
				0			27.9	26
				0			30.4	0
				0			36.7	30
				0			15	12.1
				0			16.6	0
				0			15.5	0
				0			14.6	0
				0			17.8	0
				0			21.2	0
				0			16.3	16.3
				0			14.5	0
				0			21.4	20.9
				0			15.7	15.4
				0			13.1	0
				0			37	34.7
				0			19	0
				0			23.4	16.4
				0			38.6	27
				0			16	0
				0			23.2	0
				0			21.8	0
				0			20.5	16.7
				0			22.3	0
				0			26.4	21
				0			33.3	14.9
				0			22.2	0
				0			14.9	13.9
				0			16.7	0

				0			10.6	0
				0			25.4	24
				0			21.3	0
				0			25.1	0
				0			28	25.9
				0			19	0
				0			26.6	22.9
				0			7.6	7.1
				0			15.8	0
				0			24.1	0
				0			29.1	0
				0			30.8	0
				0			41.2	39.1
				0			19.4	14.4
				0			18.4	15
				0			30.3	17.8
				0			41.3	0
				0			37.5	0
				0			10.6	0
				0			37.4	35.1
				0			35.7	34.7
				0			28.6	0
				0			26.7	0
				0			16.1	0
				0			35.1	0
				0			11.5	7.1
				0			33	0
				0			33.6	0
				0			39.3	0
straight				0			42.2	33.2
				0			32.4	26.2
				0			14.3	7.6
				0			12.3	8.7
				0			14.2	0
				0			8.1	0
				0			9.2	0
				0			14.2	0
				0			7.4	0

				0			8.9	0
				0			9.8	0
				0			16.2	0
				0			20.4	20.2
				0			16.7	0
				0			11.2	0
				0			22.6	0
				0			28.9	27.5
				0			32.7	0
				0			13.3	0
				0			26.3	19.7
				0			10.3	0
				0			10.1	7.4
				0			22.9	22.8
				0			13.2	0
				0			10	0
N/A				0			30.5	30.5
				0			7.7	0
				0			13.5	0
				0			10.1	0
				0			11.3	0
				0			7.7	0
				0			10.7	0
				0			16.4	0
				0			11.9	0
				0			22.4	0
				0			12.2	0
				0			13.2	0
				0			32.5	27
				0			11	0
				0			10.5	0
				0			6.7	6.1
				0			21.5	0
				0			9.6	0
				0			19.3	0
				0			23	0
				0			20.3	0
				0			12.6	0
				0			18.5	0

				0			20.2	20.2
				0			10.4	0
				0			9.3	8.7
				0			6.5	0
				0			9.2	0
				0			9	0
				0			21.8	0
				0			18.6	0
				0			16.4	7.5
				0			11.1	0
				0			10.1	0
				0			9.4	0
				0			11.2	0
				0			16.4	0
				0			14	0
				0			25	0
				0			9.7	0
				0			10	0
				0			31.3	23.4
				0			12.7	0
				0			18.1	17.8
				0			14.2	0
				0			13.6	8.9
				0			9.2	0
				0			13.6	0
				0			11.8	9.3
				0			14.5	0
				0			9.9	0
N/A				0			14.4	14.4
				0			31.6	0
				0			30	0
				0			13.7	0
				0			21.4	0
				0			17.5	0
				0			23.4	0
				0			10.2	0
				0			8.5	0
				0			8.7	0
				0			21	0

				0			33.4	0
				0			7.6	0
				0			27.5	0
				0			10	0
				0			7.6	0
				0			21.8	0
				0			15	0
	Bifacial	Block	Expanding	2	0	<5	65.2	0
				0			32.5	32.5
				0			20.9	0
					0			12.6
					0			20.2

Width (mm)	Thickness (mm)	Platform width (mm)	Platform thickness (mm)	Core scar length (mm)	Core scar width (mm)	Core scar no.	Weight (g)	Modify
0	0	0	0	0	0		0.27	N/A
0	0	0	0	0	0		1.07	HT
0	0	0	0	0	0		0.09	HT
22.4	11	18.3	13	0	0		7.18	N/A
15.7	1.2	7.9	1.8	0	0		0.32	HT
29.4	7.4	16	9.9	0	0		9.5	N/A
6.4	0.8	5.4	1.3	0	0		0.13	HT
0	0	0	0	0	0		2.25	HT
0	0	0	0	0	0		0.11	N/A
0	0	0	0	0	0		5.84	N/A
12.9	3.4	0	0	0	0		1.29	N/A
23.7	5.6	17.7	5.9	0	0		3.06	HT
5	1.4	0	0	0	0		0.11	HT
0	0	7.4	2.5	0	0		7.97	N/A
0	0	0	0	0	0		0.17	N/A
13.3	5.1	8.2	2	0	0		2.29	HT
13.1	3.6	9.1	1.3	0	0		0.26	HT
0	0	0	0	0	0		0.14	N/A
0	0	0	0	0	0		0.78	HT
0	0	0	0	0	0		0.6	HT
15.5	9.9	0	0	9.1	7.4	1-2	2.01	HANGE
0	0	0	0	0	0		0.59	HT
4	2.3	3.5	1.6	0	0		0.22	N/A
0	0	9.3	1.9	0	0		0.8	HT
0	0	0	0	0	0		0.12	N/A
4.4	1	0	0	0	0		0.04	N/A
0	0	0	0	0	0		0.23	N/A
11.4	1.7	8.3	2.6	0	0		0.37	N/A
0	0	0	0	0	0		4.2	N/A
0	0	0	0	0	0		0.06	N/A
0	0	0	0	0	0		4.98	N/A
13.7	2.2	0	0	0	0		0.6	N/A

0	0	7.4	4.8	0	0		2.72	HT	
0	0	0	0	0	0		2.76	N/A	
0	0	3.2	0.8	0	0		0.29	HT	
0	0	0	0	0	0		1.36	HT	
29	6.9	16.1	3.7	0	0		6.14	HANGE	
8.7	3.3	0	0	0	0		0.68	N/A	
0	0	0	0	0	0		6.38	N/A	
8.5	0.4	7.1	0.7	0	0		0.09	N/A	
14.5	4.1	8.1	4.8	0	0		0.76	HT	
0	0	0	0	23	12.2	1-2	18.88	HT	
12.3	1.8	0	0	0	0		0.36	N/A	
12	2.3	10.8	1.1	0	0		1.11	N/A	
0	0	23.2	11.5	0	0		5.02	HT	
24.3	5.1	18.3	2.8	0	0		4.76	HT	
12.6	2.2	6	1.5	0	0		0.54	N/A	
0	0	0	0	0	0		0.82	HT	
0	0	0	0	0	0		0.52	N/A	
0	0	0	0	0	0		0.21	HT	
0	0	0	0	0	0		0.36	N/A	
0	0	0	0	0	0		1.49	N/A	
8.3	3.7	0	0	0	0		0.59	N/A	
0	0	0	0	0	0		0.34	HT	
8.8	2.5	0	0	0	0		0.45	N/A	
6.3	2	4.1	2.6	0	0		0.32	N/A	
0	0	0	0	0	0		0.3	HT	
15.1	7.8	8.2	6.2	0	0		4.57	N/A	
0	0	0	0	0	0		0.53	N/A	
16.8	2.6	9.8	1.7	0	0		0.98	N/A	
30.8	9	14.4	5.4	0	0		9.58	potliding	
0	0	0	0	0	0		0.62	N/A	
0	0	17.1	5.3	0	0		1.66	HT	
0	0	0	0	0	0		1.77	HT	
17.6	4.1	16.4	5.1	0	0		1.43	HT	
0	0	0	0	0	0		0.99	HT	
18.8	4.5	10.4	4.2	0	0		2.4	HT	
27	8	19.1	6.1	0	0		4.36	N/A	
0	0	0	0	0	0		1.06	HT	
12.6	1.5	5.6	2	0	0		0.29	HT	
0	0	0	0	0	0		1.45	HT	

0	0	0	0	0	0		0.12	HT
14.5	4.9	0	0	0	0		1.74	HT
0	0	0	0	0	0		1.07	HT
0	0	14.8	4.3	0	0		1.62	HT
0	9.8	0	0	0	0		4.43	HT
0	0	0	0	0	0		0.8	HT
0	8.7	0	0	0	0		3.47	HT
4.7	1.1	2.6	0.7	0	0		0.05	HT
0	0	0	0	0	0		0.66	HT
0	0	0	0	0	0		2.08	N/A
0	0	19	3.6	0	0		3.77	HT
0	0	0	0	0	0		1.72	HT
15.8	11.1	0	0	0	0		6.23	HT
19.3	3.5	11.9	5.2	0	0		1.27	HT
15.3	4.3	11.7	3.9	0	0		1.22	HT
28.2	5	24.5	12	0	0		4.22	HT
0	0	0	0	0	0		5.64	HT
0	0	0	0	0	0		5.85	HT
0	0	0	0	0	0		0.14	HT
19.5	6	7.6	3	0	0		3.49	HT
18.1	6	8.2	3.2	0	0		3.6	N/A
0	0	0	0	0	0		1.88	N/A
0	0	0	0	0	0		2.17	N/A
0	0	0	0	0	0		0.8	N/A
0	0	22	7.3	0	0		6.26	N/A
11.5	5.4	0	0	0	0		0.34	HT
0	0	0	0	0	0		3	N/A
0	0	16.1	8.1	0	0		7.54	HT
0	0	0	0	0	0		13.88	HT
24.2	5.1	12.7	6.7	0	0		6.7	N/A
23.2	5	11.6	3.3	0	0		4.19	N/A
14	1.5	11	2.6	0	0		0.26	N/A
11.1	3	4.8	1.7	0	0		0.33	HT
0	0	0	0	0	0		0.43	N/A
0	0	0	0	0	0		0.04	N/A
0	0	0	0	0	0		0.27	N/A
0	0	5.5	3.6	0	0		0.4	N/A
0	0	0	0	0	0		0.05	HT

0	0	0	0	0	0		0.11	N/A
0	0	0	0	0	0		0.22	N/A
0	0	0	0	0	0		0.25	N/A
19.6	5.8	0	0	0	0		2.35	heat
0	0	0	0	0	0		0.35	N/A
0	0	0	0	0	0		0.15	N/A
0	0	0	0	0	0		2.83	N/A
0	9	0	0	0	0		3.31	N/A
0	0	0	0	0	0		7.4	N/A
0	0	0	0	0	0		0.69	N/A
20.1	7.6	18.1	6.6	0	0		4.42	N/A
0	0	0	0	0	0		0.32	N/A
9.5	2.7	7.3	3.2	0	0		0.25	N/A
16.1	3.9	5.2	2	0	0		1.58	N/A
0	0	0	0	0	0		0.35	N/A
0	0	0	0	0	0		0.31	N/A
10.6	6.6	6.4	5.3	0	0		2.2	N/A
0	0	0	0	0	0		0.1	N/A
0	0	0	0	0	0		0.47	N/A
0	0	0	0	0	0		0.12	N/A
0	0	0	0	0	0		0.24	N/A
0	0	0	0	0	0		0.07	HT
0	0	0	0	0	0		0.23	N/A
0	0	0	0	0	0		0.84	N/A
0	0	0	0	0	0		0.29	N/A
0	0	8.7	3.8	0	0		1.44	HT
0	0	0	0	0	0		0.39	N/A
0	0	0	0	0	0		0.37	HT
0	10.7	0	0	0	0		8.95	N/A
0	0	0	0	0	0		0.27	N/A
0	0	0	0	0	0		0.17	N/A
5.5	1.1	4.6	1.2	0	0		0.05	HT
0	0	0	0	0	0		0.98	N/A
0	0	0	0	0	0		0.07	HT
0	0	4.2	1.2	0	0		0.51	N/A
0	0	0	0	0	0		1.63	HT
0	0	0	0	0	0		0.59	HT
0	0	0	0	0	0		0.33	N/A
0	0	0	0	0	0		1.45	N/A

12.5	3.4	11.6	3.5	0	0		0.73	HT
0	0	0	0	0	0		0.51	N/A
5.8	1.3	5	0.9	0	0		0.06	N/A
0	0	0	0	0	0		0.05	HT
0	0	0	0	0	0		0.09	N/A
0	0	0	0	0	0		0.16	N/A
0	0	0	0	0	0		1.68	d
0	0	0	0	0	0		0.58	N/A
16.3	1.7	0	0	0	0		0.23	N/A
0	0	0	0	0	0		0.11	N/A
0	0	0	0	0	0		0.11	HT
0	0	0	0	0	0		0.11	N/A
0	0	0	0	0	0		0.22	N/A
0	0	0	0	0	0		0.65	N/A
0	0	0	0	0	0		1.36	N/A
0	0	0	0	0	0		1.16	N/A
0	0	0	0	0	0		0.17	HT
0	0	0	0	0	0		0.43	N/A
0	5.1	0	0	0	0		4.08	N/A
0	0	0	0	0	0		0.42	d
14.4	4.8	6.6	2.5	0	0		1.26	N/A
0	0	0	0	0	0		1.23	HT
10.7	2.1	0	0	0	0		0.29	N/A
0	0	0	0	0	0		0.25	HT
0	0	0	0	0	0		0.33	HT
0	3	0	0	0	0		0.34	N/A
0	0	0	0	0	0		0.89	N/A
0	0	0	0	0	0		0.09	HT
6.4	2.1	0	0	0	0		0.24	HT
0	0	0	0	0	0		5.45	N/A
0	0	0	0	0	0		3.18	N/A
0	0	0	0	0	0		0.33	N/A
0	0	4.3	3.8	0	0		1.04	N/A
0	0	0	0	0	0		1.34	N/A
0	0	0	0	0	0		3.85	N/A
0	0	0	0	0	0		0.1	N/A
0	0	0	0	0	0		0.12	N/A
0	0	0	0	0	0		0.17	N/A
0	0	0	0	0	0		1.79	N/A

0	0	0	0	0	0		3.38	N/A
0	0	0	0	0	0		0.06	N/A
0	0	0	0	0	0		2.49	heat
0	0	0	0	0	0		0.13	N/A
0	0	0	0	0	0		0.05	HT
0	0	0	0	0	0		1.66	N/A
0	0	0	0	0	0		0.68	N/A
45.1	17.8	0	0	27.9	29.6	1-2	44.28	N/A
6.6	4.3	6.2	2.2	0	0		1.22	N/A
0	0	0	0	0	0		1.92	N/A
10.4	12.2	1.9	6.7	1.4	0	0		0.32
19.7	8.3	2.6	6.6	2.5	0	0		0.57

Comments
poorly sorted
BRECCIA poorly sorted
PLAT/CORT
poorly sorted
CHERTY
poorly sorted
CHERTY
poorly sorted
poorly sorted
poorly sorted
poorly sorted
poorly sorted
poorly sorted
poorly sorted
CHERTY

CONJOIN 36
POT LID
ROUNDED
poorly sorted
poorly sorted
FLAKED ACROSS BREAK
poorly sorted
CHERTY
BIPOLAR
poorly sorted
BRECCIA poorly sorted
POT LID DORSAL
FRACTURED
poorly sorted
poorly sorted
poorly sorted

poorly sorted
poorly sorted
poorly sorted
GRADES TO MAX
poorly sorted
POT LID
FRACT X2 BLADES
poorly sorted
CONJOIN 93 94
poorly sorted
CHERTY

fractured
down ridge abbc
cracks
hq
strat scraper
poorly sorted

poorly sorted
pots

fractured	
N/A	
HT	

F.12 Test excavation – OSL report

OSL dating of six sediment samples collected from the Singleton Military Area (SMA) and six samples from the Wollombi test excavation areas on behalf of EMM

3 February 2025

Zenobia Jacobs
ChronOZ

OSL sample preparation and measurement conducted by University of Wollongong Optical Dating Facility

Sample analysis, age determination and reporting conducted by ChronOZ

Introduction

Twelve sediment samples were collected from the Singleton Military Area (SMA) and Wollombi test excavation areas in the Hunter Valley region of New South Wales and submitted for single-grain optically stimulated luminescence (OSL) dating by EMM. Sample preparation and measurements were carried out in the Optical Dating Facility at the University of Wollongong (UOW) and all data analyses and reporting was carried out by ChronOZ. Samples were prepared and measured using conventional standards and approaches adopted in the Optical Dating Facility. This report documents the specific procedures and results and provide the final age estimates for the samples.

Sample locations

Twelve sediment samples were collected from the Singleton Military Area (SMA) and Wollombi test excavation areas for OSL dating. The SMA test excavation was undertaken north and south of Cessnock Road in 10 separate locations. Samples were collected within 200 m north (TP83-8/W) and south (TP82-2/W) from Monkey Place Creek. TP83-8/W is a level terrace landform in close proximity to Monkey Place Creek. Three samples were collected, one each from the brown loose sandy loam topsoil (OSL1), the brown orange sand (OSL2) and the brown orange sand with clay content increasing with depth from 100 cm (OSL5). TP82-2/W has a very gently inclined terrace landform also in close proximity to Monkey Place Creek. Three samples were collected, one each from the brown loose sandy loam topsoil (OSL1), brown orange sand (OSL2) and orange sand (OSL 3).

Table 1: *Field and laboratory codes, together with contextual information and present-day average depths below surface for all samples.*

Field code	Laboratory code	Site	Square	Depth (cm)
TP83-8_OSL1	LC314	HTP SMA TP83-8/W	TP83-8/W	10
TP83-8_OSL2	LC315	HTP SMA TP83-8/W	TP83-8/W	60
TP83-8_OSL5	LC316	HTP SMA TP83-8/W	TP83-8/W	115
TP82-2_OSL1	LC317	HTP SMA TP82-2/W	TP82-2/W	10
TP82-2_OSL2	LC318	HTP SMA TP82-2/W	TP82-2/W	30
TP82-2_OSL3	LC319	HTP SMA TP82-2/W	TP82-2/W	65
TP2_OSL1	LC320	HTP Wollombi TP2	TP2	15
TP2_OSL2	LC321	HTP Wollombi TP2	TP2	40
TP2_OSL3	LC322	HTP Wollombi TP2	TP2	60
TP117_OSL1	LC323	HTP Wollombi TP117	TP117	15
TP117_OSL3	LC324	HTP Wollombi TP117	TP117	84
TP117_OSL4	LC325	HTP Wollombi TP117	TP117	150-160

Wollombi test excavations were undertaken along Wollombi Road within 200 m south of Congewai Creek. TP2 is a spurcrest landform in close proximity to Congewai Creek. Three samples were collected, one each from the dark brown loose sandy loam (OSL1), brown sandy loam (OSL2) and orange clayey sand (OSL3). TP117 is also a terrace landform in close proximity to Congewai Creek. Three samples were collected, one each from the black brown loose sandy loam (OSL1), black wet silty sand (OSL3) and a 60 cm deep vertical sample (OSL4) into the base of the test pit.

Table 1 summarises the contextual information of the twelve samples collected for OSL dating.

OSL dating

OSL dating provides a means of determining burial ages for sediments and associated artefacts and fossils (Huntley et al., 1985; Aitken, 1998; Duller, 2004; Jacobs and Roberts, 2007; Wintle, 2014; Roberts et al., 2015; Athanassas and Wagner, 2016). The method is based on the time-dependent increase in the number of trapped electrons induced in mineral grains—such as quartz—by low levels of ionising radiation from the decay of naturally occurring uranium, thorium and potassium in the surrounding deposits, and from cosmic rays. The time elapsed since the light-sensitive electron traps were emptied can be determined from measurements of the luminescence signals from quartz (OSL) from which the equivalent dose (D_e) is estimated, together with determinations of the radioactivity of the sample and the material surrounding it to a distance of ~30 cm (the environmental dose rate). The luminescence 'clock' is reset by just a few seconds (quartz) of exposure to sunlight. The D_e divided by the environmental dose rate gives the burial time of the grains in calendar years ago. Here, we exploited the inherent benefits of single-grain dating, which include the identification and elimination of individual grains that exhibit aberrant luminescence characteristics (Jacobs et al., 2006; Jacobs and Roberts, 2007; Duller, 2008) and the use of D_e distributions to investigate the potential impact that depositional and post-depositional processes, such as sediment mixing or insufficient exposure to sunlight (partial bleaching), may have on age determination.

Sample preparation and analytical facilities

All samples were prepared using routine optical dating procedures (Aitken, 1998). Samples were first treated with HCl acid and H_2O_2 solution to remove carbonates and organic matter, respectively. The remaining sediment was then dried and sieved to obtain a range of sand-sized grain fractions. Grains of 180–212 µm in diameter were used for dating. The grains were etched using 40% HF acid for 45 min to dissolve any feldspar grains that may be present, and to remove the alpha-irradiated layer around the surface of each grain. The HF-etched grains were then rinsed in HCl acid to remove any precipitated fluorides and sieved again.

Single-grain OSL measurements of D_e were made for all quartz samples. OSL measurements were made on an automated Risø TL-DA-20 luminescence reader equipped with a focused green (532 nm) laser for single-grain stimulation (Bøtter-Jensen et al., 2003). Luminescence emissions were detected using an Electron Tubes Ltd 9235QA photomultiplier tube. The OSL signals were detected through Hoya U-340 filters. Single-grain measurements were made using aluminium discs drilled with 100 holes, each 300 µm in diameter and 300 µm deep (Bøtter-Jensen et al., 2003). Irradiations were carried out inside the luminescence reader using a $^{90}Sr/^{90}Y$ beta source that has been calibrated using a range of known gamma-irradiated quartz. Spatial variations in beta dose rate to individual grain positions were taken into account for D_e determination (Ballarini et al., 2006).

D_e determination and results

All single-grain quartz measurements were made using the single-aliquot regenerative-dose (SAR) procedure (Galbraith et al., 1999; Murray and Wintle, 2000). The SAR procedure involves measuring the OSL signals from the natural (burial) dose (L_n) and from a series of regenerative doses (L_x) that adequately bracket the D_e value (given in the laboratory by means of the calibrated $^{90}Sr/^{90}Y$ beta source). Grains were preheated at 260°C for 10 s prior to optical stimulation by an intense, green (532 nm) laser beam for 2 s at 125°C. A fixed test dose (~10 Gy, preheated at 160°C for 5 s) was given after each natural and regenerative dose, and the induced OSL signals (T_n and T_x) were used to correct for any sensitivity changes during the SAR sequence. A duplicate regenerative dose was included in the sequence to check the adequacy of this sensitivity correction, and a 'zero regenerative dose' (0 Gy) measurement cycle was included to monitor the extent of any 'recuperation' induced by the preheat treatment. As a check for possible contamination of the acid-etched quartz grains by other mineral inclusions, we also applied the OSL IR depletion ratio test (Duller, 2003) to each grain at the end of the SAR sequence, using an infrared exposure of 40 s at 50°C.

A total of 6,000 individual quartz grains (500 grains for each sample) were measured, but not every quartz grain that is measured is useful as a chronometer. Most grains are unsuitable because they have inherent luminescence properties that may give rise to inaccurate estimates of D_e. These unsuitable grains are identified based on known characteristics and the outcomes of tests built into the measurement sequences (e.g., the recycling ratio test, OSL IR depletion ratio test and recuperation ratio test). A series of quality-assurance criteria (Jacobs et al., 2006; Li et al., 2017) have been developed to objectively identify and reject such grains.

Table 2: *Number of individual quartz grains measured, rejected and accepted for each sample, together with the reasons for their rejection (see text for reference to numbers).*

Sample	No. of measured grains	Rejection criteria (see text)						Sum of rejected grains	No. of accepted grains	Negative D_e values
		1	2	3	4	5	6			
TP83-8_OSL1	500	373	16	13	15	41	1	459	41	8
TP83-8_OSL2	500	393	15	2	20	32	0	462	38	0
TP83-8_OSL5	500	414	18	5	18	15	1	471	29	0
TP82-2_OSL1	500	302	41	16	28	52	5	444	56	8
TP82-2_OSL2	500	327	35	4	27	47	2	442	58	5
TP82-2_OSL3	500	353	23	2	25	29	20	452	48	1
TP2_OSL1	500	273	46	21	32	80	2	454	46	4
TP2_OSL2	500	251	52	10	32	66	4	415	85	2
TP2_OSL3	500	283	45	5	15	59	28	435	65	1
TP117_OSL1	500	353	54	7	8	51	2	475	25	3
TP117_OSL3	500	310	20	2	26	42	9	409	91	0
TP117_OSL4	500	354	38	3	24	31	1	451	49	0

Grains were rejected for the following reasons:

1. Initial T_n signal is less than 3σ above the corresponding background count, or the relative error on T_n is >25%.
2. Recycling ratio (i.e., the ratio of L_x/T_x values for the duplicate regenerative doses) is not consistent with unity at 2σ.
3. Recuperation ratio (i.e., the ratio of the L_x/T_x values for the 0 Gy and maximum regenerative doses) is >5%.
4. OSL IR depletion ratio is greater than 2σ less than unity (Duller, 2003).
5. L_x/T_x ratios are too scattered to be reliably fitted with a curve, have a large figure-of-merit (FOM) value with an upper limit of 10% or a have a reduced chi-squared value of >5.
6. L_n/T_n ratio is statistically consistent with, or higher than, the saturation level of the corresponding dose-response curve (DRC), so that a finite D_e value and error estimate could not be obtained, or the D_e value is obtained by extrapolation of the fitted DRC, rather than interpolation among the regenerative-dose signals.

Table 2 lists the numbers of individual grains measured, rejected and accepted for D_e determination for each of the samples, and the reasons for their rejection. Between 16% and 32% of grains were accepted for each sample; all accepted grains provide reliable estimates of D_e.

L_n, L_x, T_n and T_x values were estimated from the first 0.22 s of OSL decay, with the mean count recorded over the last 0.3 s subtracted as background. Sensitivity-corrected (L_x/T_x) dose response curves were then constructed from the L_x and T_x OSL signals, using a general-order kinetic (GOK) function (Guralnik et al., 2015), and the sensitivity-corrected natural OSL signal (L_n/T_n) was projected onto the fitted DRC to estimate the D_e value by interpolation (Fig. 1). All data analyses, including curve fitting, D_e determination and error estimations, were achieved using the functions implemented in the R-package 'numOSL' (Peng et al., 2013).

Fig. 1 (left) shows the natural and regenerative dose OSL decay curves for a bright quartz grain from one sample from each excavation area and test pit, following a preheat of 260°C for 10 s. The OSL decay curves exhibit a range of shapes but are generally quite reproducible and decay rapidly to instrumental background, with less than ~5% of the initial signal remaining after 0.3 s of optical stimulation. Fig. 1 (right) shows the corresponding DRC for the same representative grain. Most DRCs have very similar shapes up to ~30 Gy and continue to grow beyond ~100 Gy.

The performance of the single-grain OSL procedure was tested using a dose recovery test (Galbraith et al., 1999) on one sample from each excavation area and test pit. The OSL signals for grains from each sample were first bleached and then given a known dose of ~25 Gy to act as a surrogate 'natural' dose. Five-hundred grains were measured using the procedure outlined above. The dose recovery ratios (i.e., the ratio of measured dose to given dose) of 0.94 ± 0.03 (TP83-8_OSL5), 1.01 ± 0.02 (TP82-2_OSL1), 1.01 ± 0.02 (TP2_OSL1) and 0.94 ± 0.03 (TP117_OSL1) are consistent with unity at 2σ, demonstrating that the single-grain OSL procedure can produce reliable estimates of measured dose for the samples in this study. The dose recovery results for all accepted grains are shown in Fig. 2, where the measured/given dose ratios are presented as radial plots. The overdispersion (OD) value are 11 ± 3% (TP83-8_OSL5 and TP117_OSL1), 13 ± 2% (TP82-2_OSL1) and 18 ± 3% (TP2_OSL1).

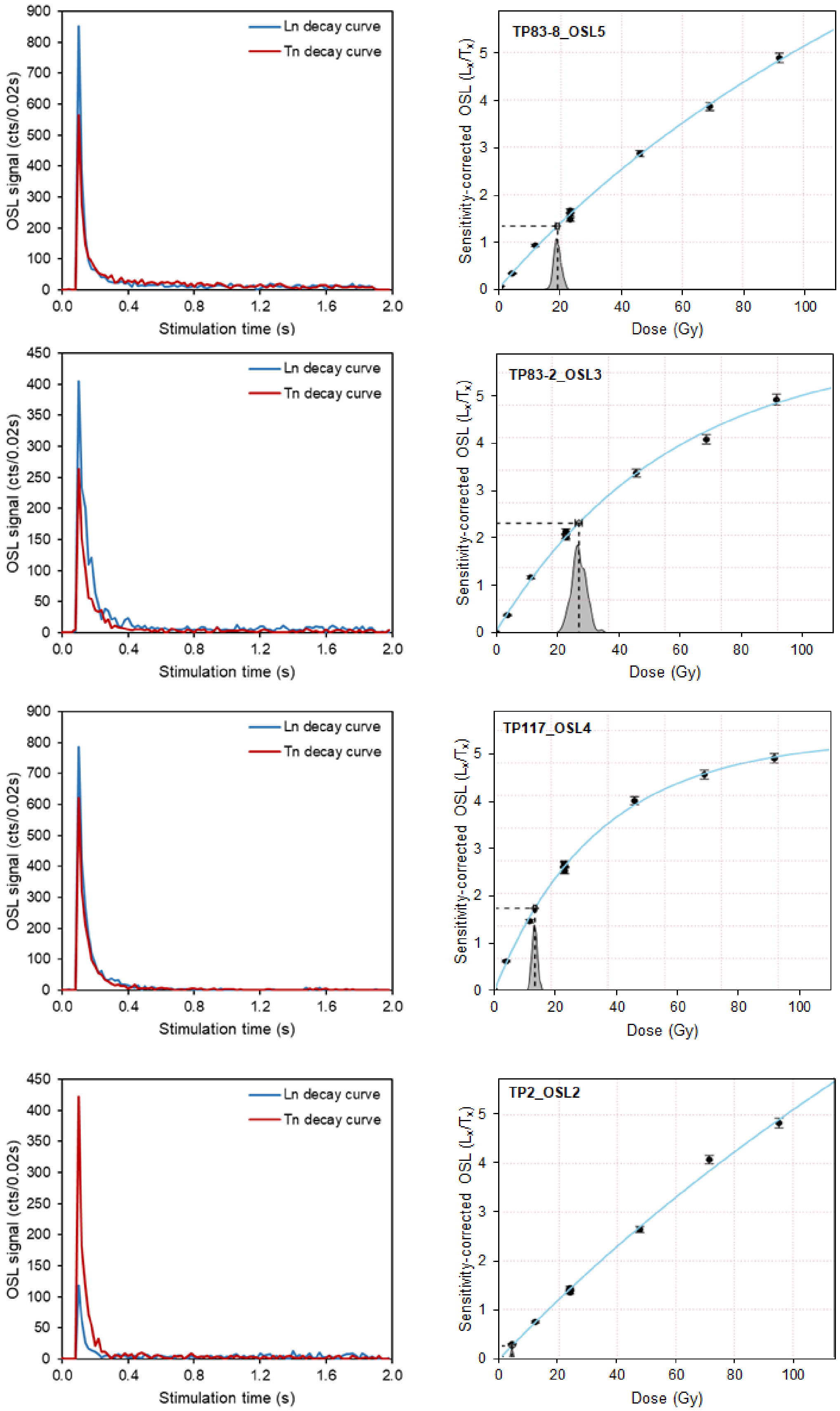


Figure 1: *Representative OSL decay curves (left-hand column) for the natural dose (blue) and test dose (~10 Gy; red) OSL signals and corresponding full DRCs (right-hand column) for one bright grain from* one sample from each excavation area.

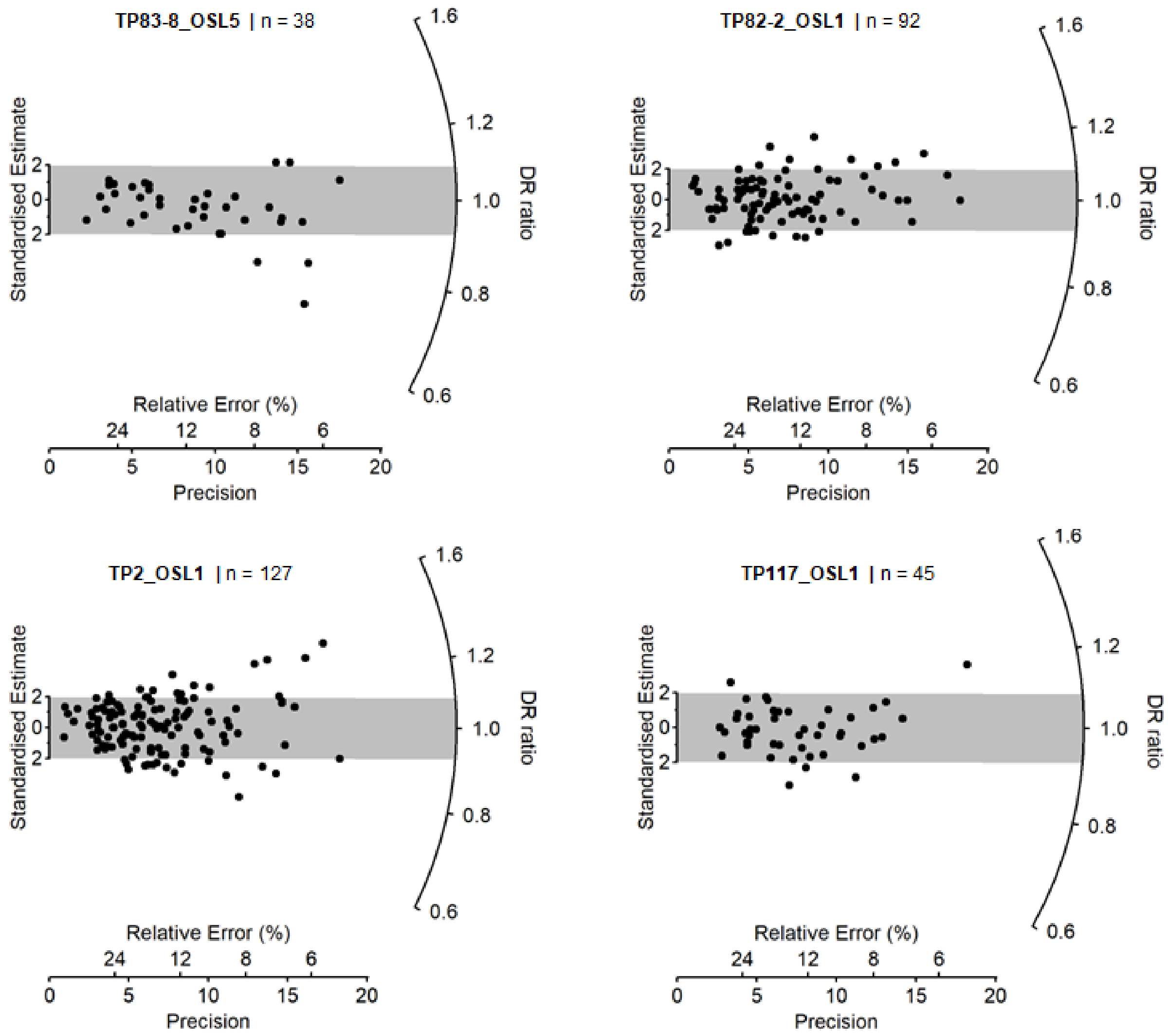


Figure 2: *Measured/given dose ratios for individual grains from one sample from each excavation area and test pit. All grains consistent with the given dose fall within the grey band that is centred on a value of unity.*

Information about the numbers of grains measured and used for D_e determination are provided in Table 3.

It is commonplace in single-grain OSL dating for there to be some spread in the data due to natural variability and other complicating factors. To quantify the degree of spread, we routinely calculate OD values for the D_e distributions of each sample. OD represents the relative standard deviation (i.e., the coefficient of variation) of the D_e distribution after accounting for the various measurement uncertainties (Galbraith et al., 2005; Galbraith and Roberts, 2012). Even for samples that have been well-bleached (zeroed by sunlight) prior to deposition and that remained undisturbed since burial, some degree of OD is present (Table 3).

Information about potential reasons for OD are usually obtained by looking at the shape and patterns of the D_e distributions for each sample when plotted as radial plots, such as those shown in Fig. 3. In radial plots, each point represents a single grain, for which the D_e can be read by extending a line from the 'standardised estimate' axis on the left-hand side to intersect the radial axis on the right;

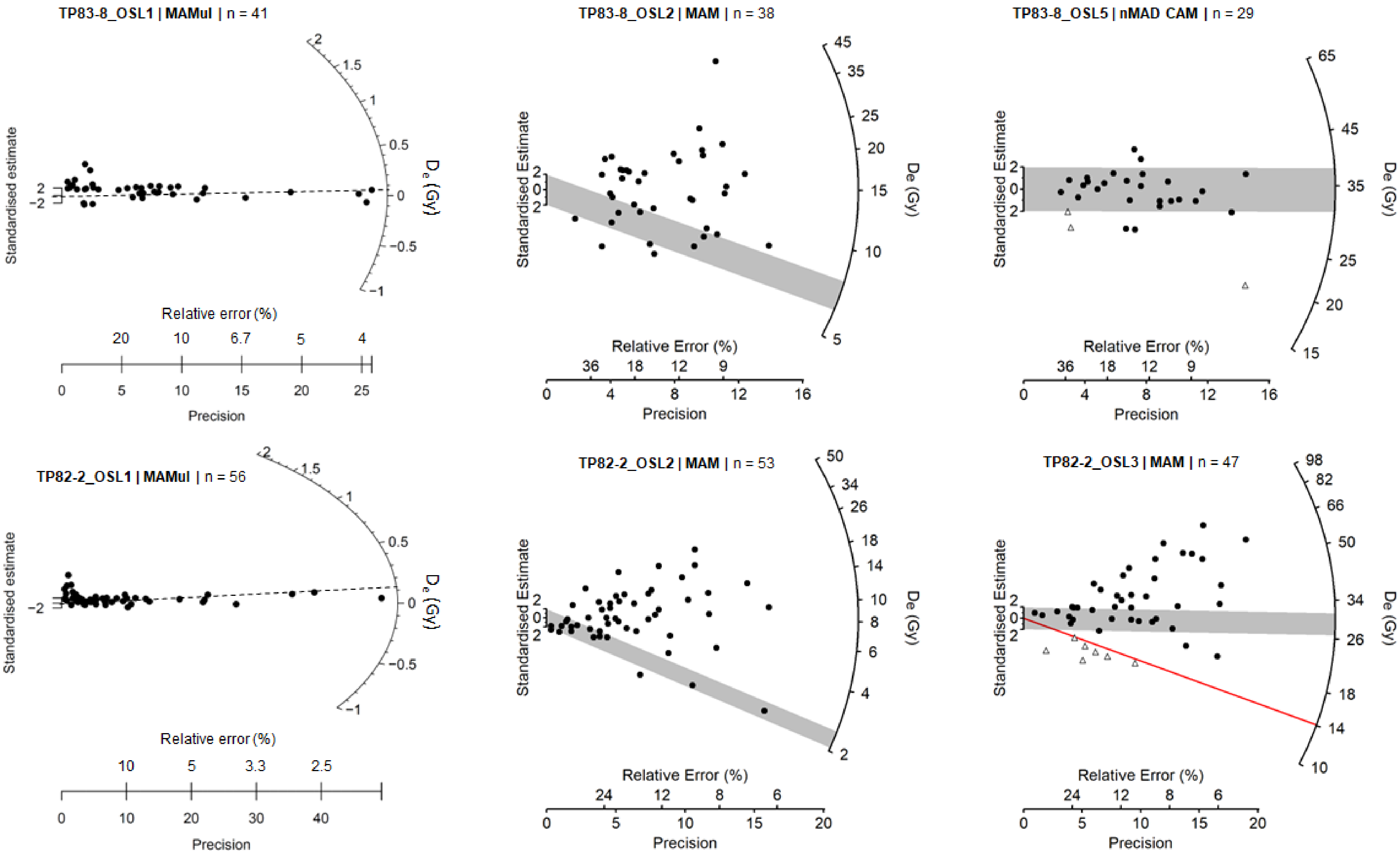
the point of intersection is the D_e. The uncertainty on this estimate can be read by extending a line vertically from the data point to intersect the horizontal axis running along the bottom of the plot. This axis shows the relative standard error in % (i.e., the standard error, in Gy, divided by the D_e estimate, in Gy, multiplied by 100) and its reciprocal (the 'precision'). In such plots, the most precise estimates fall to the right and the least precise to the left. If the D_e values are consistent with statistical expectation, then 95% of the points will scatter within any chosen band of width ±2 units projecting from the left-hand axis (see grey band in Fig. 2), and 0% overdispersion will be obtained.

Three different D_e distribution patterns were observed for the twelve samples from SMA and Wollombi. The first is represented by the uppermost samples from all four test excavation areas (TP82, TP83, TP2 and TP117) that contain between 9% and 20% of grains with negative D_e values and the majority close to or consistent with zero. The grains with negative D_e values form part of the D_e distribution. Negative D_e values cannot be logarithmically transformed, so we display the D_e values for these four samples as radial plots on a linear scale in Fig. 3. Taking into account the shape of the distribution as well as its fluvial context, we calculated the minimum D_e value using the unlogged version of the minimum age model (MAMul) to determine the depositional dose. The MAM and MAMul assumes that the individual D_e values are derived from a truncated normal distribution, with the lower truncation point corresponding to the mean D_e value of the population of grains associated with the target event (Galbraith and Roberts, 2012). For these samples, the latter corresponds to the population of most fully bleached grains in the distribution. Grains with higher D_e values, therefore, contain a greater residual dose.

The second type of distribution is represented by samples TP83-8_OSL2, TP82-2_OSL2, TP82-2_OSL3, TP2_OSL2, TP117_OSL3 and TP117_OSL4. Their D_e distributions show significant OD and forms a continuum of D_e values. We assume that the grains with the smallest D_e values corresponds to the most fully bleached grains and applied the MAM to these samples to obtain a final weighted mean D_e value. We assumed an underlying OD of 20% that we propagated through the uncertainty of each grain prior to running the model. We calculated the MAM for TP82-2_OSL3 in two different ways. This sample has a cluster (15% of values) of smaller D_e values centred on ~10-14 Gy (shown as open triangles) that are quite different from the rest of the D_e values. For first calculated the MAM including all of the values (including those shown as triangles). The MAM (all) D_e is shown as a red line on the radial plot. We then excluded the values shown as open triangles and recalculated the MAM including only those grains shown as filled circles in the radial plot. If the grains shown as open triangles are post-depositional intrusions, then the MAM using the remaining 85% of the values are the most appropriate. Both values are provided in Table 3.

The third type of D_e distribution is represented by a single sample TP83-8_OSL5. Most of the grains in this sample is statistically consistent with each other, suggesting that the grains were adequately reset by sunlight prior to deposition, but it contains three statistical outliers. We identified the outliers using the normalised median absolute deviation (nMAD) method to identify any statistically significant outliers using 1.4826 as the appropriate correction factor for a normal distribution and a cut-off value of 2. After outliers have been removed, the remaining values were then combined using the central age model (CAM) of Galbraith et al. (1999).

The D_e values for all samples and each of the D_e components obtained from the FMM outlined above are provided in Table 3.


TP83-8_OSL1 | MAMul | n = 41
Standardised estimate
Relative error (%)
Precision
De (Gy)
TP83-8_OSL2 | MAM | n = 38
Standardised Estimate
Relative Error (%)
Precision
De (Gy)
TP83-8_OSL5 | nMAD CAM | n = 29
Standardised Estimate
Relative Error (%)
Precision
De (Gy)
TP82-2_OSL1 | MAMul | n = 56
Standardised estimate
Relative error (%)
Precision
De (Gy)
TP82-2_OSL2 | MAM | n = 53
Standardised Estimate
Relative Error (%)
Precision
De (Gy)
TP82-2_OSL3 | MAM | n = 47
Standardised Estimate
Relative Error (%)
Precision
De (Gy)

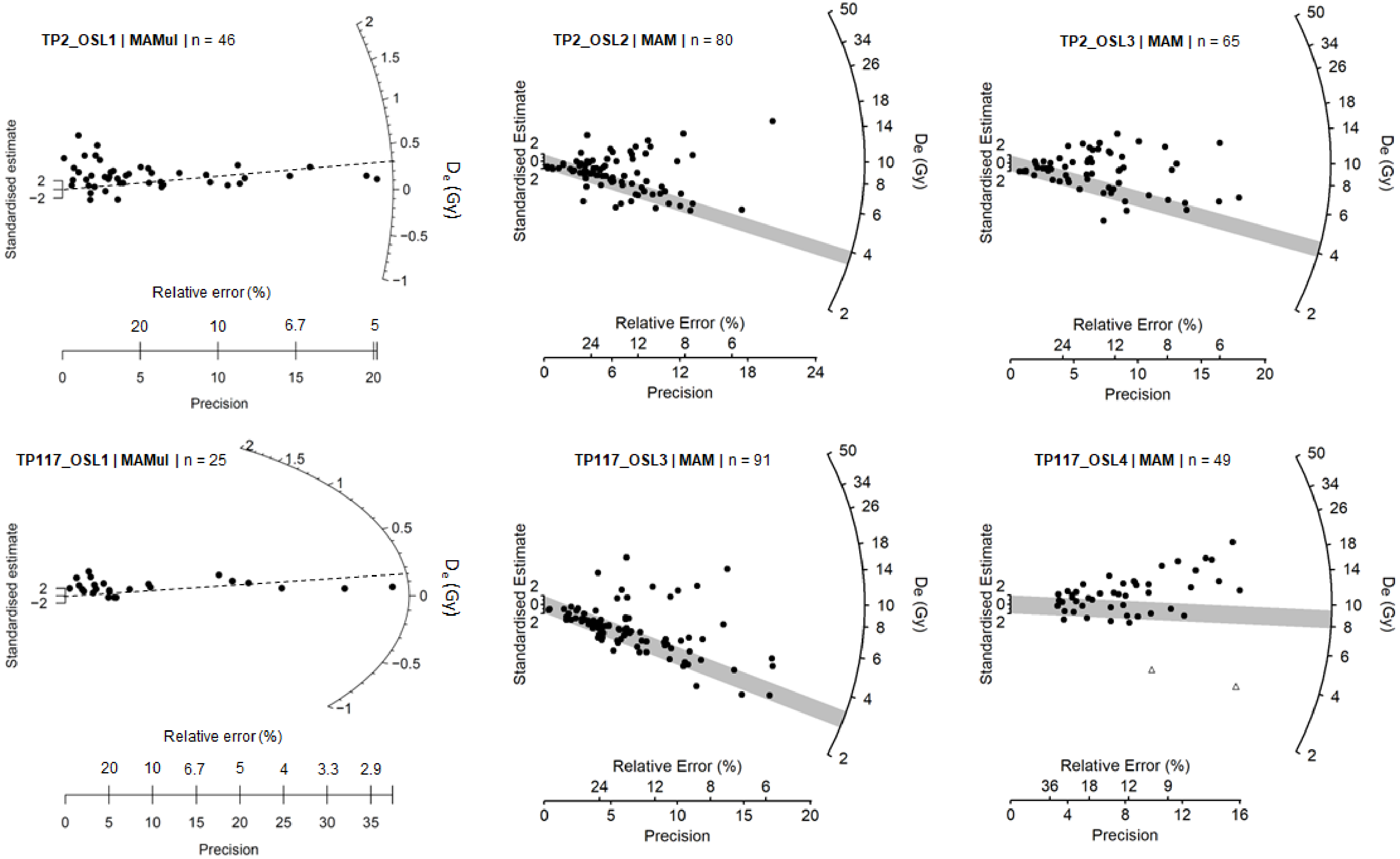


Figure 3: *Radial plots for all samples. Stippled lines are centred on the MAMul D_e value for samples with radial plots plotted on a linear scale. Grey bands are centred on the MAM or CAM D_e value after rejection of outliers (open triangles). The red line in sample T82-2_OSL5 is centred on the MAM D_e if all grains (including those identified as outliers and shown as open triangles) are included.*

Environmental dose rate determination and results

The total environmental dose rate consists of contributions from beta, gamma and cosmic radiation external to the sand-sized quartz grains used for optical dating, as well as a small alpha dose rate due to the radioactive decay of uranium and thorium inclusions inside the grains. To calculate the OSL ages, we have assumed that the present-day radionuclide activities and dose rates have prevailed throughout the period of sample burial.

We estimated the beta and gamma dose rates by measuring the K, Th and U concentrations of dried, homogenised and powdered sediment samples using inductively coupled plasma optical emission spectrometry (ICP-OES; for K) and inductively coupled plasma mass spectrometry (ICP-MS; for Th and U). These analyses were performed externally at a commercial laboratory (Intertek Genalysis) in Perth, Western Australia. The K, Th and U concentrations were converted into beta and gamma dose rates using the dose rate conversion factors of Guèrin et al. (2011). For beta dose rates, allowance was made for the impact of sample water content (Nathan and Mauz, 2008), grain size (Brennan, 2003) and HF acid etching (Bell and Zimmerman, 1978) on beta-dose attenuation. Gamma dose rates were also corrected for water content. In addition, we assumed an effective internal alpha dose rate of 0.031 ± 0.011 Gy/ka.

The cosmic dose rates were calculated following Prescott and Hutton (1994) and corrected for the angular distribution of cosmic-rays.

Present-day water contents of ~1–15% were measured (shown in brackets in Table 3). We used values similar to those measured as indicative of the long-term average water contents of these samples. The relative uncertainty of 25% is sufficient to accommodate the likely range of water contents experienced by these deposits over the burial period; the OSL age estimates increase by about 1% for each 1% increase in water content. The dose rates for each of the samples are provided in Table 3.

OSL age estimates

The OSL age estimates are presented for all samples in Table 3. Uncertainties on the estimates are given at 1σ (the standard error on the mean) and were estimated by combining, in quadrature, all known and estimated sources of random and systematic error. Ages shown in bold are thought to be best represent the depositional age of the sediment.

Three samples were collected from TP83-8/W in the Singleton Military Area to the north of Monkey Place Creek. The deepest sample (OSL5) collected from 115 cm depth below surface gave an age of 14,055 ± 740 years, consistent with deposition at the start of the Holocene. This was the only sample that showed no evidence for partial bleaching in this fluvial context. OSL2 collected from 60 cm depth in the brown orange unit displayed a very broad and partially bleached D_e distribution and a minimum D_e value gave an age of 3,200 ± 535 years. The uppermost samples (OSL1) from 10 cm depth in the topsoil gave an age of 42 ± 14 years.

Three samples were also collected from TP82-2/W in the Singleton Military Area to the south of Monkey Place Creek. Here, the deepest sample (OSL3) collected from the orange sand at a depth of 65 cm gave an age of 12,360 ± 1,665 years, but also contain a small proportion (15%) of grains that, if included in the calculation of the MAM D_e would give an age of 6,085 ± 1,005 years. We assume that the early Holocene age is more appropriate and that the cluster of younger age may represent grains that were mixed into the older deposit post-depositionally. OSL2 collected from the brown orange sand at a depth of 30 cm gave an age of 995 ± 180 years. This sample show a very broad distribution interpreted to show partial bleaching of the grains. The uppermost samples (OSL1) from the topsoil at a depth of 10 cm gave an age of 55 ± 14 years, statistically consistent with that also obtained from TP83-8/W. Both deposits sampled from the north and south of Monkey Place Creek, therefore, represent deposits dating to the Holocene period.

Three samples were also collected from TP2 at Wollombi, about 200 m south of Congewai Creek. The deepest sample (OSL3) collected from the orange clayey sand at a depth of 60 cm gave an age of 2,960 ± 400 years. OSL2 collected from the brown loamy soil at a depth of 40 cm gave an age of 3,040 ± 415 years, consistent with OSL3 and deposition during the late Holocene. The uppermost sample (OSL1) collected from 15 cm depth in the dark brown loose sandy loam gave an age of 169 ± 58 years. This is consistent with the uppermost sample (OSL1) collected from TP117 that gave an age of 110 ± 26 years. At this location, the deepest sample (OSL4) that was collected into the base of the unexcavated deposit at a depth of ~150-160 cm gave an age of 5,030 ± 660 years and OSL3 from a depth of 84 cm in the black wet silty sand gave an age of 2,420 ± 145 years. Together, both deposits south of Congewai Creek, therefore, represent sediment deposition during the late Pleistocene, with the unexcavated portion at the base of TP117 dating to the mid-Holocene.

Table 3: *Dose rate data, equivalent dose (D_e) and overdispersion (OD) values, and ages.*

Sample	Water (%)	External dose rate (Gy/ka)			Total	D_e (Gy)	Model	OD (%)	Age (years)
		Beta	Gamma	Cosmic					
TP83-8_OSL1	5 ± 1 (4)	1.25 ± 0.05	0.61 ± 0.03	0.26	2.15 ± 0.07	0.09 ± 0.03	MAMul	128 ± 20 (10)	**42 ± 14**
TP83-8_OSL2	10 ± 3 (9)	1.25 ± 0.05	0.75 ± 0.03	0.18	2.22 ± 0.07	7.1 ± 1.2	MAM	73 ± 9 (20)	**3,200 ± 535**
TP83-8_OSL5	15 ± 4 (15)	1.36 ± 0.07	0.90 ± 0.05	0.16	2.22 ± 0.07	34.5 ± 1.1	nMAD CAM	25 ± 5 (9)	**14,055 ± 740**
TP82-2_OSL1	5 ± 1 (2)	1.28 ± 0.05	0.60 ± 0.03	0.26	2.17 ± 0.07	0.12 ± 0.03	MAMul	142 ± 18 (10)	**55 ± 14**
TP82-2_OSL2	5 ± 1 (1)	1.31 ± 0.05	0.76 ± 0.03	0.22	2.32 ± 0.07	2.3 ± 0.4	MAM	93 ± 10 (20)	**995 ± 180**
TP82-2_OSL3	5 ± 1 (4)	1.32 ± 0.05	0.78 ± 0.03	0.19	2.32 ± 0.06	28.7 ± 3.7 14.1 ± 2.3	MAM (85%) MAM (all)	93 ± 10 (20)	**12,360 ± 1,665** 6,085 ± 1,005
TP2_OSL1	5 ± 1 (3)	0.48 ± 0.02	0.33 ± 0.02	0.25	1.08 ± 0.05	0.18 ± 0.06	MAMul	134 ± 16 (10)	**169 ± 58**
TP2_OSL2	8 ± 2 (7)	0.55 ± 0.02	0.46 ± 0.02	0.20	1.24 ± 0.04	3.77 ± 0.49	MAM	69 ± 6 (20)	**3,040 ± 415**
TP2_OSL3	10 ± 3 (9)	0.64 ± 0.03	0.56 ± 0.03	0.18	1.41 ± 0.05	4.18 ± 0.54	MAM	62 ± 6 (20)	**2,960 ± 400**
TP117_OSL1	5 ± 1 (3)	0.79 ± 0.03	0.48 ± 0.02	0.25	1.55 ± 0.05	0.12 ± 0.03	MAMul	115 ± 20 (10)	**110 ± 26**
TP117_OSL3	5 ± 1 (3)	0.62 ± 0.02	0.45 ± 0.02	0.18	1.28 ± 0.04	3.10 ± 0.15	MAM	68 ± 6 (20)	**2,420 ± 145**
TP117_OSL4	15 ± 4 (15)	0.87 ± 0.04	0.65 ± 0.03	0.15	1.71 ± 0.06	8.6 ± 1.1	MAM	51 ± 6 (20)	**5,030 ± 660**

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