



**Chapter 10**  
**Historic and**  
**Cultural Heritage**



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## ABBREVIATIONS

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AAPA	Aboriginal Areas Protection Authority
CEMP	Construction Environmental Management Plan
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
MVH	Maryvale Hills
NT	Northern Territory
OEMP	Operational Environmental Management Plan
PFS	Pre-Feasibility Study
RCP	Rehabilitation Closure Plan
ToR	Terms of Reference
UNESCO	United Nations Educational, Scientific and Cultural Organization
WRH	White Rocky Hills



## 10 HISTORIC AND CULTURAL HERITAGE

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### 10.1 Introduction

This chapter provides a review of cultural heritage values that may be potentially affected by the Proposal. This chapter draws on a comprehensive cultural heritage impact assessment, which is included as Appendix S. This chapter describes the historic and archaeological heritage values at the site of the proposed Chandler Facility, Apirnta Facility and the proposed Chandler Haul Road and Henbury Access Road. The potential impacts on cultural heritage values are assessed and mitigation and management measures are identified to reduce potential impacts. A Cultural Heritage Management Plan is provided in Appendix S.

The assessment has been prepared in consultation with the NT Heritage Branch as well as with Traditional Owners. It has also been prepared in accordance with the Terms of Reference.

This chapter does not address sacred sites protected under the NT *Aboriginal Sacred Sites Act*. A number of sacred sites have been identified within the proposed development footprint by the Central Land Council and the Aboriginal Areas Protection Authority. These sites would be managed in accordance with the conditions of an Aboriginal Areas Protection Authority Certificate.

### 10.2 Methodology

The methodology for the cultural heritage impact assessment included consultation, a database and literature review, the development of predictive models, field surveys and assessments of significance.

#### 10.2.1 Consultation

Consultations were undertaken with the Central Land Council and the Aboriginal Areas Protection Authority in the course of obtaining sacred sites clearances.

Consultation was also undertaken with the NT Heritage Branch regarding previously recorded cultural heritage sites within and in the vicinity of the proposed development footprint. Consultation was undertaken with Traditional Owners regarding the cultural significance of archaeological sites recorded within the proposed development footprint during the field surveys. Consultation was undertaken over the phone, at their principal place of residence and at the site of the proposed Chandler Facility, Apirnta Facility, Chandler Haul Road and part of the Henbury Access Road. Further consultation with Traditional Owners will be completed during detailed design and prior to construction of the Proposal.



### 10.2.2 Database and literature review

A desktop assessment was undertaken to determine the nature and status of known cultural heritage sites within and in the vicinity of the proposed development footprint and to guide the field surveys.

The desktop assessment included searches of heritage registers and schedules and a review of local histories and archaeological reports. Searches were undertaken of the following heritage registers and schedules:

- NT Heritage Register (NT Heritage Council).
- National Heritage List (Australian Heritage Council).
- Register of the National Estate (Australian Heritage Council).
- Commonwealth Heritage List (Australian Heritage Council).
- World Heritage List (United Nations Educational, Scientific and Cultural Organization (UNESCO)).

The result of previous archaeological research undertaken in the region were reviewed. A comprehensive list of the literature reviewed is provided in Appendix S. This data informed the development of predictive models which were subsequently tested in the field and refined accordingly.

### 10.2.3 Development of predictive models

The cultural heritage impact assessment involved the development of predictive models (an environmental model and an ethnographic model) to predict the location of cultural heritage sites within the proposed development footprint, and to guide the field surveys.

#### *The environmental model*

Under the environmental model, the timing and pattern of land use is tied to water availability and resource abundance, reflecting an emphasis on optimal foraging strategies. Land use focusses on areas around permanent water sources and that whenever possible people will position themselves in areas where there are maximum available resources for least effort (that is, they will target areas richest in resource diversity, commonly occurring where two or more different land systems and/or landforms meet). Opportunistic land use also occurs as people position themselves within the landscape to take advantage of temporary abundances of particular resources, for example, focussing on resources in the vicinity of ephemeral water sources after rain.

Under this model, archaeological material is expected to occur most frequently and in higher densities in the vicinity of water sources (creeks, rivers, swamps, flood outs and claypans), where two or more land units/forms meet, in the ranges, and at isolated low hills and rocky outcrops suitable for raw (stone) material extraction. Away from these areas, on the sand dunes and sand plains, archaeological material is expected to occur infrequently and in low densities.



More specifically, quarries and knapping floors will occur in and around rock outcrops and in the ranges. The frequency, size and density of artefact scatters will be directly correlated with distance from water sources as well as the type of water source. For example, large high density artefact scatters will occur nearby large permanent water sources, moderate sized artefact scatters of moderate size and density may be found nearby large ephemeral water sources, while small, low density artefact scatters and background scatters may be located along small ephemeral creeks. It is expected that assemblages exhibiting a greater degree of richness and diversity will be found in close proximity to two or more land units/forms, reflecting the greater diversity of resources available in these areas.

### *The ethnographic model*

Under the ethnographic model, country such as the sand hills and mulga plains are generally subject to fleeting ephemeral use, while areas in the vicinity of permanent water sources such as springs and waterholes, which themselves tend to be found in the ranges, are subject to more or less continuous use. Small groups moved across the landscape from one permanent water source to another, periodically joining other groups for ceremonial activities and when food and water resources were abundant. In the latter circumstances camps could be established nearby ephemeral water sources. While most camps will be situated in close proximity to water sources, large camps may also occur up to 5km away these areas.

Given the absence of permanent water sources in the proposed development footprint, it is likely that the predominant type of land use in the area was based on the opportunistic exploitation of resources periodically available after large rainfall events and fleetingly while travelling through the area and/or while out hunting and gathering resources during the day and returning to a base camp located at a permanent water source outside of the proposed development footprint. The archaeological signature of this type of land use is predicted to be as follows:

- Small, low density sites, background scatters and isolated finds are likely to be the most common site types found in the sandhill and mulga country. In these areas the diversity of stone raw materials and artefact types will be low.
- Large high and moderate density sites are likely to be the most common site types found in the vicinity of permanent water sources in the ranges. Stone artefact assemblages in these areas will be richer and more diverse.
- High and moderate density sites with moderately rich and diverse assemblages may occur in the vicinity of large ephemeral water sources.
- Large sites may occur within a 5 kilometre radius of water sources.
- Generally, the most common artefacts will be those associated with wood-working such as axes, tulas and sharp flakes. Artefacts associated with seed processing are also likely to be common such as grindstones and muellers.

A refined predictive model is described in Section 10.3.6.



## 10.2.4 Field surveys

The objectives of the field surveys were to:

- Characterise the archaeological signature of the land systems and land forms of the area.
- Test the predictive models.
- Inspect those areas known to have a high probability of being impacted by the Proposal.

The field surveys were conducted over four days in November and December 2015 and over three days in March 2016. The field surveys consisted of both random and purposive pedestrian transects and slow moving vehicle transects.

A total of 83.94 kilometres was surveyed of which 55.15 kilometres were pedestrian transects, as indicated in Table 10-1. Further information on each transect including detailed mapping showing the location of each transect is provided in Appendix S.

**Table 10-1 Summary of transects surveyed**

Location <sup>1</sup>	Pedestrian transects (km)	Slow (<5km/hour) moving vehicle transects (km)	Total (km)
Chandler Facility	24.96	12.59	37.56
Chandler Haul Road	3.38	0.79	4.17
Apirtna Facility	2.65	2.18	4.83
Henbury Access Road	24.16	13.23	37.39
<b>Total</b>	<b>55.15</b>	<b>28.79</b>	<b>83.95</b>

The criteria employed for identifying flaked stone artefacts (cores, unretouched flakes, retouched flakes and flaked pieces) was based on those defined by Hiscock (1984 and 1988). Additional artefact types that were likely to be located in the area including tula flakes, backed artefacts, edge ground axes, grindstones, hammerstones and manuports were identified based on the characteristics defined by McCarthy (1976), Hiscock and Veth (1991), Hiscock and Attenbrow (1996) and Holdaway and Stern (2004).

The criteria employed for identifying site types (components) including artefact scatters, knapping floors, stone quarries, ochre quarries, art sites, rockshelter sites, stone arrangements, grinding sites, modified trees and burial sites was based on those defined by Hiscock and Mitchell (1993), Gregory (1988) and Thorley (1998).

While the NT *Heritage Act* defines Aboriginal and Macassan archaeological places and objects, archaeologists frequently employ arbitrary criteria in order to be able to distinguish between areas subject to intensive occupation and those subject to fleeting or ephemeral use and because it is not

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<sup>1</sup> Note: Not all of the proposed Chandler Haul Road or Maryvale Access Road was surveyed. This was due to uncertainties of the route at the time of the field surveys. Additional survey work would be undertaken in these areas prior to construction.



usually considered practical to record all individual artefacts as sites when undertaking consultancy work. For the purposes of this assessment, an *artefact scatter* (as opposed to a background scatter), would have three characteristics (after Thorley 1998):

- More than five artefacts within an area less than 100 square metres.
- A maximum artefact density greater than 1/20 square metres.
- Be more than 50 metres from the nearest artefact scatter.

Isolated finds usually comprised only one or two artefacts in close proximity to each other with no other artefacts within a minimum 25 metre radius. At the other end of the spectrum, site complexes contained one or more of the site types referred to above, and tended to be large and complex (hence the term), containing evidence of numerous activities, usually focussed on resource rich areas in the landscape.

### **10.2.5 Assessments of significance**

Assessments of significance were prepared for historic and archaeological sites/objects recorded in the proposed development footprint. This included an assessment of both historic places and objects and an assessment of sites recorded in the proposed development footprint.

#### *Historic significance*

The assessment of significance for historic places and objects included consideration of aesthetic, historic and social values in addition to scientific significance. These values are defined in the *Australia ICOMOS Charter for the Conservation of Places of Cultural Significance* (commonly referred to as the “Burra Charter”, Australia ICOMOS 1987) and in Section 11 of the NT *Heritage Act*, as follows:

- a) whether it is important to the course, or pattern, of the Territory's cultural or natural history;*
- b) whether it possesses uncommon, rare or endangered aspects of the Territory's cultural or natural history;*
- c) whether it has potential to yield information that will contribute to an understanding of the Territory's cultural or natural history;*
- d) whether it is important in demonstrating the principal characteristics of a class of cultural or natural places or environments;*
- e) whether it is important in exhibiting particular aesthetic characteristics;*
- f) whether it is important in demonstrating a high degree of creative or technical achievement during a particular period;*
- g) whether it has a strong or special association with a particular community or cultural group for social, cultural or spiritual reasons, including the significance of a place to Aboriginal people as part of their continuing and developing cultural traditions;*



- h) whether it has a special association with the life or works of a person, or group of persons, of importance in the Territory's history.

### *Archaeological significance*

The assessment of significance for archaeological sites included an assessment of both archaeological significance and cultural significance to Traditional Owners.

The archaeological significance of archaeological material was assessed following *Site Surveys and Significance Assessment in Australian Archaeology* (Sullivan and Bowdler 1984) and the *Burra Charter* (Australia ICOMOS 1987). Sullivan and Bowdler (1984) equate archaeological significance with scientific significance and identify two elements that should be assessed: the potential of the material to address timely and specific research questions and the representativeness of the material.

Similarly, the *Burra Charter* states that the scientific value or research potential of a place depends upon the importance of the data involved, on its rarity, quality or representativeness, and on the degree to which the place or object may contribute to further substantial information (Maquis-Kyle and Walker 1992). Accordingly, the significance of a site is related to the intactness or integrity of a site, that is, the state of preservation as well as the stratigraphic reliability of the cultural material. Secondly, the representativeness of a site is important either because a site is unusual or because the site has research potential when taken in conjunction with other sites.

The cultural significance of the site was determined based on advice from Traditional Owners.

## **10.3 Existing environment**

This section describes the landscape and cultural context of the proposed development footprint and vicinity. Previously recorded sites within and in the vicinity of the proposed development footprint are summarised and the results of the field surveys are presented. A summary of the assessments of significance is also provided.

### **10.3.1 Landscape context**

The proposed development footprint is located within the Finke Bioregion, which spans an area of approximately 73,800 square kilometres from northern South Australia into the NT. It has an arid and hot climate with very low rainfall and high evaporation. The bioregion is characterised by red sand plains and there are also areas with hills and valleys. Major rivers include the Finke River, Hugh River and Palmer River, all in the NT. The vegetation is mostly tussock grasslands, acacia shrublands (dominated by mulga) and chenopod and samphire shrublands. Land within the bioregion is predominately used for grazing cattle (Neave *et al* 2004).

The distribution of various land systems within the proposed development footprint as described in the *General Report on Lands of the Alice Springs Area, Northern Territory, 1956-57* (Perry *et al* 1960) is provided in Table 10-2. Essentially, elevated ranges, rocky hills and outliers and undulating stony country primarily occurs in the Rumbalara, Chandler and Gillen land systems and are dominant



features in the area of the proposed Chandler Facility and the western third of the Henbury Access Road (refer to Plate 10-1).

Sand plains of the Angas and Singleton land systems are characteristic of parts of the proposed Chandler Facility, the Apirnta Facility and part of the Henbury Access Road (refer to and Plate 10-2).

The Simpson land system with its characteristic spinifex and desert oak covered red sand dunes dominates the middle section of the proposed Henbury Access Road. The sandy river plains of the Finke land system occur in only a small area of the Henbury Access Road, including and immediately adjacent to, the Finke River. A small section of the Henbury Access Road also traverses part of the Renner land system, consisting of undulating limestone country.

Land systems within the proposed development footprint are shown graphically in Figure 4 and Figure 5 in Appendix S.



**Plate 10-1 Section of Rumbalara land system**



**Plate 10-2 Section of Angas land system, west of the Finke River**



**Table 10-2 Summary description and distribution of land systems within the proposed development footprint**

Land system	Description	Landforms and plant communities	Occurrence in the proposed development footprint
<b>Rumbalara (Ru)</b>	High stony plateaux, including mesas up to 100 m high formed on weathered shale in the dissected margin of the Simpson Desert.	Channels either treeless or with <i>Acacia aneura</i> (mulga) over curly windmill grass; alluvial fans and valley floors with absent or sparse low trees or mulga over short grasses and forbs; erosional slopes either bare or with sparse shrubs and low trees or mulga over saltbush, bluebush, samphire, <i>Eremophila</i> spp., or <i>A. kempeana</i> over short grasses and forbs; plateaux and mesas, stony summits, breakaways and steep hill slopes with shallow stony soils supporting no vegetation or sparse shrubs and low trees or mulga over sparse grasses and forbs.	Chandler Facility
<b>Chandlers (Cn)</b>	Flat-topped hills and broadly undulating stony lowlands, these hills may be up to around 85m high.	Channels with <i>A. aneura</i> and kangaroo grass; cuestas and mesas, stony summits and breakaways with outcrop and shallow stony soil supporting sparse shrubs and low trees (mulga) or <i>A. calcicola</i> (myall) over grasses and forbs or <i>A. kempeana</i> over short grasses and forbs; valley floors with <i>Eremophila</i> sp. over cottonbush or bluebush with <i>E. microtheca</i> in depressions with lignum; alluvial fans and small clay pans supporting no vegetation or <i>Eremophila</i> spp. over samphire, bluebush or saltbush; erosional slopes and stony surfaces with minor outcrop bands supporting no vegetation or <i>Eremophila</i> spp. over samphire, bluebush or saltbush.	Henbury Access Road
<b>Gillen (Gi)</b>	Sandstone ranges and vales running east-west with some ridges up to 300m high.	Channels with <i>Eucalyptus microtheca</i> (coolabah), <i>E. camuldensis</i> (river red gum) and <i>A. estrophiolata</i> (ironwood) over <i>Chloris acicularis</i> ; sparse low trees, grasses and forbs on floodplains and alluvial plains; colluvial and alluvial fans either treeless or with <i>A. aneura</i> (mulga) over short grasses, sparse shrubs and low trees over spinifex ( <i>Triodia basedowii</i> ); stony erosional slopes either treeless or with <i>Eremophila</i> spp., short grasses; stony gravel terraces either treeless or with mulga and spinifex or short grasses; stony soils and rock outcrop on ridges, cuestas, foothill ridges, benches and mesas with sparse shrubs and low trees typically mulga, <i>A. kempeana</i> , <i>Cassia</i> spp, over short grasses and spinifex.	Chandler Haul Road
<b>Angas (An)</b>	Sand plain and dunes, and strongly undulating stony plains. It usually adjoins the hillier Chandlers land system in its higher parts.	Channels, alluvial plains and valley floors with cottonbush; slopes of strike ridges covered with short grasses and forbs (bluebush); strike ridges, broader rises and slopes with shallow stony soils supporting no vegetation or witchetty bush over short grasses and forbs; sand plains with low dunes covered with sparse shrubs and low trees over spinifex or <i>A. aneura</i> (mulga) over short grasses and forbs.	Apirnta Facility and Henbury Access Road



Land system	Description	Landforms and plant communities	Occurrence in the proposed development footprint
<b>Singleton (Sn)</b>	Spinifex sand plain	Alluvial flats and drainage floors with <i>A. aneura</i> (mulga) or <i>E. microtheca</i> (coolabah) over short grasses; sand rises with sparse shrubs and low trees over spinifex; swales (flat floors) with mulga over short grasses; sand plains or hummocky surfaces fixed by vegetation such as sparse shrubs and low trees including <i>Casuarina decaisneana</i> (desert oak) over spinifex ( <i>Triodia</i> spp and <i>Plectrachne</i> spp).	Chandler Facility and Henbury Access Road (eastern section)
<b>Simpson (Si)</b>	Spinifex covered sand dunes	Dune crests (hummocky unstable surfaces) with <i>Zygochloa</i> spp. (desert cane grass); dune flanks with <i>C. decaisneana</i> (Desert oak) over spinifex ( <i>Triodia</i> spp and <i>Plectrachne</i> spp); swales with minor drainage channels and alluvial flats and claypans. Varied vegetation including <i>A. aneura</i> (mulga) or <i>E. microtheca</i> (coolabah) over samphire or old-man saltbush.	Chandler Facility and Henbury Access Road



### 10.3.2 Cultural context

Aboriginal occupation of the central arid zone of Australia began at least 32,000 years ago. Aboriginal occupation seems to have intensified during the Late Pleistocene, and by around 30,000 years before present, groups of highly mobile hunter-gatherers were using pockets of country across the interior of the continent (Smith 2006). Occupation of the central arid zone appears to have intensified during the Holocene as environmental conditions (particularly the availability of water) improved.

Within the vicinity of the proposed development footprint, the land was traditionally and semi-traditionally occupied by members of an Arandic-speaking people, known as Pertame or Southern Arrente. The language spoken was referred to as Twertentye. Neighbouring language groups, comprising Luritja-speaking people, namely the descendants of the Lower Southern Arrente (Alyentharrpe) and Matuntara-speaking people also retain some spiritual and residential connection to the area. These people moved opportunistically across the landscape but were tethered to base camps with more reliable water sources during times of drought, spreading out over the country after rain. Generally, groups comprised one or two families that travelled together with larger gatherings periodically held for ceremonial purposes.

The first Europeans to traverse the district were the early explorers, and later those men engaged on the construction of the Overland Telegraph Line in the early 1870s. Aboriginal encounters with explorers were fleeting during this time. Overall, the impact on traditional land use patterns was negligible compared to the arrival of European graziers and their cattle in the late 19th century. The nature of these impacts varied but generally included:

- Depopulation as a result of punitive expeditions and retaliatory killings, introduced diseases, changes in diet and drought.
- Dispossession, loss of access to land and traditional resources.
- Change from a nomadic hunting and gathering existence to a more sedentary way of life.
- Disregard for, and damage to, sacred sites.
- Changes in material culture; and changes in social organisation.

Further detail regarding the cultural context of the proposed development footprint and vicinity is provided in Appendix S.

### 10.3.3 Cultural heritage exclusion zones

Consultation with traditional owners undertaken in 2013 identified three areas of cultural sensitivity within the vicinity of the proposed Chandler Facility. Following those consultations, the proponent mapped the three areas of cultural sensitivity as areas of exclusion for the Proposal. These are shown in Figure 10-1.

**Figure 10-1**  
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### 10.3.4 Previously recorded sites

There are no sites listed on the NT Heritage Register, National Heritage List, Register of the National Estate, Commonwealth Heritage List or the World Heritage List recorded within the proposed development envelope.

Five previously recorded archaeological sites are known to occur within the vicinity of the proposed development footprint (all of which are protected under the NT *Heritage Act*): Maryvale Hills 1 through Maryvale Hills 5 (MVH1 through MVH5). Two of these sites (MVH1 and MVH4) are located within exclusion zones associated with sacred sites identified by the Central Land Council. Another (MVH5) was situated outside the proposed development footprint. MVH3 was re-located and re-recorded in the field as 'MVH3 Revised' and found to comprise a much larger area than initially recorded. MVH2 was unable to be re-located during the field surveys; it may have been washed away or otherwise destroyed in the interim, or alternatively the location data was incorrect (refer Appendix S for further detail).

### 10.3.5 Sites recorded during current survey

No historic places were recorded within or in the vicinity of the proposed development footprint during the field surveys. One historic item was, however, recorded. This was a Bells brand tin matchbox, located outside of the proposed development footprint.

A range of archaeological site types including artefact scatters, knapping floors, stone quarries and an ochre quarry were recorded during the field surveys (refer to Plate 10-3 and Plate 10-4). Fifty-one sites were recorded (of which 30 were a part of eight larger site complexes). Outside of these site complexes, nine background scatters and 26 isolated finds were also recorded. A breakdown of the archaeological material recorded within the proposed development footprint is as follows:

- **Chandler Facility.** Thirty-one sites, two background scatters and 11 isolated finds were recorded in the area of the proposed Chandler Facility (refer to Table 10-3 and Figure 10-2). Nineteen of the 31 sites were a part of six larger site complexes. Overall, the most common site type recorded were artefact scatters, followed by knapping floors and stone quarries.
- **Apirnta Facility.** A background scatter and three isolated finds were recorded in the area of the proposed Apirnta Facility (refer to Table 10-4 and Figure 10-3).
- **Chandler Haul Road.** Three sites and five isolated finds were recorded in the area along the proposed Chandler Haul Road (refer to Table 10-5 and Figure 10-4). The site types recorded included three artefact scatters and one stone quarry, in addition to background scatters.
- **Henbury Access Road.** Seventeen sites, six background scatters and seven isolated finds were recorded in the area along the proposed Henbury Access Road (refer to Table 10-6 and Figure 10-5). Eleven of the 17 sites recorded were part of two larger site complexes. Overall, the most common site type recorded were artefact scatters, followed by knapping floors. Two stone quarries and one ochre quarry was also recorded.



The distribution of archaeological material recorded within the proposed development footprint by land system and landform is described in further detail in Appendix S.



**Plate 10-3 Retouched/grinding implement, ground and pitted surface (left), other side (middle), retouch/use-wear along edges (right)**



**Plate 10-4 Broken unifacially retouched flake, possibly a broken uniface point, dorsal (left) and bulbar (right) surfaces**



**Table 10-3 Summary of archaeological material recorded within the area of the proposed Chandler Facility**

Complex name	Site name	Site type/components	Land system(s)	Landform(s)	Site size (m <sup>2</sup> )	Max. artefact density/m <sup>2</sup>
-	CS1	Artefact scatter	Singleton	Sand plain next to flood-out	20	0.25
-	CS2	Artefact scatter	Singleton	Sand plain	28	5
-	CS3	Artefact scatter	Intersection Rumbalara and Singleton	Sand plain	210	15
-	CS4	Background scatter	Singleton	Sand plain	125	1.5
-	CS5 – Desert Oak Site	Knapping floor	Simpson	Sand plain	2.25	3
-	CS6	Artefact scatter	Intersection Rumbalara, Singleton and Simpson	Creek/drainage channel and flood-out	400 (min)	5
-	IFWP41	Isolated find (1)	Intersection Rumbalara, Singleton and Simpson	Edge of flood-out next to dune	-	-
-	CS7	Isolated finds (2)	Rumbalara/Singleton	Sand plain	-	-
<b>Southern Claypan Site Complex</b>	CS8	Isolated finds (2)	Intersection Rumbalara, Singleton and Simpson	Dune slope next to claypan	-	-
	CS9	Knapping floor	Intersection Rumbalara, Singleton and Simpson	Base of dune next to claypan	3	100
	CS10	Isolated finds (2)	Intersection Rumbalara, Singleton and Simpson	Dune slope next to claypan	-	-
	CSx	Artefact scatter	Intersection Rumbalara, Singleton and Simpson	Edge of claypan	N/A	5
	IFWP42	Isolated find (1)	Intersection Rumbalara, Singleton and Simpson	Plains adjacent to claypan	-	-
-	Transect 5 BGS	Background scatter	Rumbalara	Edge of creek/drainage channel	-	-
-	T5IF	Isolated find (1)	Rumbalara	Edge of creek/drainage channel	-	-
-	CS11	Artefact scatter	Rumbalara	Dune at base of range	2,992	20



Complex name	Site name	Site type/components	Land system(s)	Landform(s)	Site size (m <sup>2</sup> )	Max. artefact density/m <sup>2</sup>
<b>Portal 2 Site Complex</b>	CS12	Isolated finds (3)	Rumbalara	Overhang/rockshelter on middle slopes	-	-
	CS13	Knapping floor	Rumbalara	Sand plains at base of range	6	20
	CS14 The Pass	Artefact scatter, quarry, background scatter	Rumbalara	Rocky saddle and lower slopes of range	3,300	20
	CS15	Knapping floors (2)	Rumbalara	Sand plains at base of range	400	10
<b>CS16 Site Complex</b>	CS16a	Artefact scatter	Rumbalara and Singleton	Dune slope next to claypan	200	10
	CS16b	Background scatter	Rumbalara and Singleton	Sand plains adjacent to claypan	-	-
	CS16c	Artefact scatter	Rumbalara and Singleton	Isolated low rocky hill and sandplains near claypan	34,000	10
-	T25IF	Isolated finds (1)	Singleton	Sand plains and flood-out	-	-
-	T26IFa	Isolated finds (1)	Singleton	Sand plains and flood-out	-	-
-	T26IFb	Isolated finds (2)	Singleton	Sand plains and flood-out	-	-
<b>Tellus Camp Site Complex</b>	Tellus Camp 1	Artefact scatter, background scatter	Rumbalara	Lower slopes of range, red sands adjacent to drainage channel	150	10
	Tellus Camp 2	Knapping floor, artefact scatter	Rumbalara	Relic dune	300	6
	Tellus Camp 3	Artefact scatter	Intersection Rumbalara and Singleton	Relic dune, sand plains	600	5
-	CS17	Artefact scatter, background scatter	Rumbalara	Lower slopes of range	25	5
-	MVH3 Revised	Stone quarry, artefact scatter	Rumbalara	Top of range, upper and lower slopes of range, valley, rocky outcrops, drainage line, sand plains	52,000	10
-	T9 Site	Artefact scatter	Intersection Rumbalara and Singleton	Dune slope	100	5
<b>CS18 and 19 Site Complex</b>	CS18a	Artefact scatter	Rumbalara	Dune	25	10
	CS18b	Knapping floor	Rumbalara	Dune	6.25	50
	CS18c	Artefact scatter	Rumbalara	Dune slope	100	30
	CS18d	Artefact scatter	Rumbalara	Sandy slopes next to rock outcrop	25	5



Complex name	Site name	Site type/components	Land system(s)	Landform(s)	Site size (m <sup>2</sup> )	Max. artefact density/m <sup>2</sup>
	CS18e	Stone Quarry	Rumbalara	Rock outcrop	540	N/A
	CS19	Stone quarry, artefact scatter	Rumbalara	Rock outcrop	16,000	100
-	T18IF	Isolated find (1)	Intersection Rumbalara and Singleton	Sand plains	-	-
-	CS21	Artefact scatter, background scatter	Intersection Rumbalara and Singleton	Sand plains	2,800	3
-	CS 20	Isolated finds (2)	Intersection Rumbalara and Singleton	Sand plain	-	-
-	CS22	Knapping floor	Intersection Rumbalara and Singleton	Sand plain	5	7
<b>WT6 Bore Site Complex</b>	WT6 BSCa	Artefact scatter	Rumbalara	Low sand dune on plain	5,625	5
	WT6 BSCb	Stone quarry, artefact scatter	Rumbalara	Low rocky outcrop at base of range	612	50
	WT6 BSCc	Knapping floor, artefact scatter	Rumbalara	Sand plain	4.5	12
-	CS23	Artefact scatter	Intersection Rumbalara and Singleton	Sand plain	88	3

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**Table 10-4 Summary of archaeological material recorded within the area of the proposed Apirnta Facility**

Complex name	Site name	Site type/component	Land system	Landform	Site size (m <sup>2</sup> )	Max. artefact density/m <sup>2</sup>
-	Railway Siding BGS	Background scatter	Angas	Sand plain with stony gibber	-	-
-	IFWP58	Isolated find	Angas	Sand plain	-	-
-	IFWP59	Isolated finds (2)	Angas	Sand plain	-	-

**Table 10-5 Summary of archaeological material recorded within the area of the proposed Chandler Haul Road**

Complex name	Site name	Site type/component	Land system	Landform	Site size (area m <sup>2</sup> )	Max. artefact density/m <sup>2</sup>
-	IFWP88	Isolated find (2)	Gillen	Stony gibber on plains adjacent to drainage channel	-	-
-	IFWP92	Isolated find (1)	Gillen	Stony gibber on plains adjacent to drainage channel	-	-
-	IFWP93	Isolated find (1)	Gillen	Stony gibber on plains adjacent to drainage channel	-	-
-	IFWP94	Isolated find (1)	Gillen	Stony gibber on plains adjacent to drainage channel	-	-
-	No.84 Bore Site 1	Artefact scatter, background scatter	Gillen	Stony gibber on plains adjacent to drainage channel	200	2
-	No.84 Bore Site 2	Artefact scatter, background scatter	Gillen	Stony gibber on stony lower slopes adjacent to drainage channel	1,200	2
-	No.84 Bore Site 3	Stone quarry, artefact scatter	Gillen	Stony gibber on stony lower slopes adjacent to drainage channel; red sands adjacent to flood-out	40,000	5

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**Table 10-6 Summary of archaeological material recorded within the area of the proposed Henbury Access Road**

Complex name	Site name	Site type/component	Land system(s)	Landform(s)	Site size (m <sup>2</sup> )	Max. artefact density/m <sup>2</sup>
-	Rocky Hills background scatter 1	Background scatter	Chandlers	Lower slopes and top of rocky hills	-	-
-	Rocky Hills background scatter 2	Background scatter	Chandlers	Lower slopes of rocky hills	-	-
-	IFAMWP	Isolated find (1)	Chandlers	Claypan on plains adjacent to creek	-	-
-	Bleak landscape scatter	Background scatter	Chandlers	Sand plain with stony gibber	-	-
-	Stony rises BGS	Background scatter	Chandlers	Low stony rises	-	-
-	WHAR 1	Artefact scatter, background scatter	Angas	Claypan adjacent to isolated low dunes with rocky outcrops on plains	2.25	-
<b>White Rocky Hills Site Complex</b>	White Rocky Hills Site 1 (WRH 1)	Artefact scatter, stone quarry	Chandlers	Lower slopes of rocky hills	94,500	30
	WRH 1b	Artefact scatter	Chandlers	Alluvial flats adjacent to creek and flood-out	85	4
	WRH 2a	Knapping floor	Chandlers	Stony gibber in eroded area of lower slopes of rocky hills	6	-
	WRH 2b	Knapping floor	Chandlers	Stony gibber in claypan on alluvial flats	15	10
	WRH 2c	Knapping floor	Chandlers	Stony gibber in claypan on alluvial flats	6	22
	WRH 2d	Artefact scatter	Chandlers	Claypan on alluvial flats adjacent to flood-out area	400	2
	WRH 3	Artefact scatter	Chandlers	Base of low rocky outcrop adjacent to alluvial flats	20	5
	WRH 4	Artefact scatter	Chandlers	Lower slopes of rocky hills adjacent to low rocky outcrop	460	5
-	T15IF	Isolated find (1)	Chandlers/Simpson	Sand plains adjacent to creek	-	-
-	Finke River scatter	Artefact scatter	Finke	Levee bank/terraces	40	2
-	T14IF	Isolated find (1)	Renners	Erosional slope/sand plain	-	-



Complex name	Site name	Site type/component	Land system(s)	Landform(s)	Site size (m <sup>2</sup> )	Max. artefact density/m <sup>2</sup>
-	Duck Swamp IFSa	Isolated finds (2)	Simpson	Edge of swamp adjacent to dune	-	-
-	Duck Swamp IFSb	Isolated find (1)	Simpson	Lower dune slope between swamp and claypan	-	-
-	Duck Swamp IFSc	Isolated find (1)	Simpson	Dune crest between swamp and claypan	-	-
-	Lone Hill Site	Stone quarry, artefact scatter	Singleton	Lower slopes of isolated hill on sand plain	6,300	4
<b>WHAR 3 Site Complex</b>	WHAR 3a	Artefact scatter	Chandlers	Rocky lower slopes of range and rock outcrops	100	2
	WHAR 3b (RS)	Rockshelter, artefact scatter	Chandlers	Rocky upper and lower slopes of range	750	10
	WHAR 3c (OQ)	Ochre quarry, artefact scatter	Chandlers	Rocky lower slopes of range and rock outcrops	4,500	10
-	Chiming Wedgebill background scatter	Background scatter	Intersection Chandlers, Angas and Singleton	Lower rocky slopes adjacent to creek	-	-
-	WHAR 2	Artefact scatter	Angas	Sand plain adjacent to low stony rise	5,000	3
-	Claypan 2 Site	Artefact scatter, background scatter	Simpson	Alluvial flats adjacent to low rocky ridge and claypan	5,000	5
-	Claypan 1 Site	Artefact scatter	Simpson	Edge of claypan and dune slope next to claypan	9,800	10
-	Chandler Jump-up background scatter	Background scatter	Chandlers	Stony gibber on top of rocky range	-	-

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### 10.3.6 Revised predictive model

A revised predictive model was developed based on the results of the field surveys.

Land systems with a high degree of archaeological sensitivity (that is, a high probability of containing archaeological material visible on the ground surface) include the Rumbalara, Chandlers and Gillen land systems. Land systems with a moderate degree of archaeological sensitivity (that is, a moderate probability of containing archaeological material visible on the ground surface) include the Singleton and Simpson land systems. Land systems with a low degree of archaeological sensitivity (that is, a low probability of containing archaeological material visible on the ground surface) include the Angas, Renners and Finke land systems.

At a finer-grained land form level, areas where there is a high probability of containing archaeological resources include:

- Areas in close proximity to two or more different landforms.
- Areas in the ranges, isolated hills and around/at rock outcrops where there are raw materials suitable for stone artefact manufacture.
- Areas with one kilometre of an ephemeral claypan.

Areas where there is a moderate probability of containing archaeological resources include:

- Areas of sandplains in relatively close proximity to ranges, rock outcrops and ephemeral water sources such as claypans. These areas also have the potential for sub-surface material to occur. Artefacts will be most visible on firmer substrates such as clays, hard compacted surfaces, areas with stony gibber, eroded scalds, and areas of disturbance along station tracks.
- Areas of dunefields up to 1 kilometre away from a water source, range or rock outcrop.
- Dunes outside of the Simpson land system. Artefacts will be most visible in deflated areas or on firmer substrates of adjoining landforms.
- Secondary terraces/levees banks and rocky surfaces along the Finke River, particularly where these occur nearby waterholes.
- Within 1 kilometre of an ephemeral creek.

Areas where there is low probability of containing archaeological resources include:

- Areas in the dunefields proper that are greater than 1 kilometre away from a water source, range or rock outcrop.
- In sandy rivers and major creek beds.
- On the river banks immediately adjacent to the Finke River.



- Areas of sandplains not in close proximity to ranges, rock outcrops or ephemeral water sources.

### 10.3.7 Assessments of significance

The historic item recorded during the field surveys (the matchbox tin) did not meet any of the heritage assessment criteria for significance.

Archaeological material recorded within the proposed development footprint was assessed for archaeological significance and individual assessments are provided in Appendix S. Materials were categorised as having:

- **Low and very low archaeological significance.** Typically consists of isolated finds, background scatters and low density artefact scatters. Individually, the diffuse, very low density background scatters and isolated finds have a limited potential to contribute substantially to our understanding of past occupation and land use patterns in the region. The types of raw materials and flaking technology evident at sites in this category are well represented elsewhere in the study area and wider region.
- **Moderate and moderate to high archaeological significance.** Typically consists of artefact scatters and may also include knapping floors and small stone quarries. These sites tend to contain a more diverse artefact assemblage than those in the preceding category. Some isolated finds are included in this category where the artefact is considered unusual, either in terms of raw material and/or manufacture and/or use. They may also occupy a particular part of the landscape not well represented elsewhere in the area. This material has some potential to contribute to debates around the timing and introduction of particular stone tool technologies (for example, grinding point industries), and can inform our understanding of raw material procurement and use strategies across the wider landscape. Sites of moderate to high significance typically include site complexes or larger sites with intra-site activity areas clearly evident in the form of at least two different site components
- **High or very high archaeological significance.** Typically includes large site complexes with moderate to high artefact densities, exhibiting a high degree of assemblage richness and diversity in terms of both stone raw materials and artefact types. Intra-site patterning is also apparent in the form of numerous and varied discrete activity areas. These sites usually contain three or more site components. These sites have considerable potential to contribute to our understanding at a broad level regarding the spatial distribution of sites in relation to resources, mobility strategies, raw material procurement and use strategies, trade, theoretical and methodological issues pertaining to landscape archaeology, as well as informing on the nature of specific stone artefact technologies, such as grinding technologies and manufacture of points. At a finer-grained level, detailed analyses of intra-site activity areas facilitate a greater in-depth understanding of how particular environmental niches were occupied.



The distribution of archaeological material of low and very low, moderate and moderate to high, and high or very high archaeological significance in the proposed development footprint is shown in Figure 10-2, Figure 10-3, Figure 10-4 and Figure 10-5.

## 10.4 Assessment of risk during construction

The historic item recorded during the field surveys (the matchbox tin) was recorded outside of the proposed development footprint and would not be impacted during construction of the Proposal.

Some of the archaeological material located within the proposed development footprint would be directly impacted during construction of the Proposal. Additional archaeological material may be vulnerable to disturbance during construction due to its close proximity to the proposed development footprint. The impact on some sites is currently uncertain as final route selections (i.e. Henbury Access Road) have yet to be made and AAPA clearances for the Henbury and Chandler Haul Roads have yet to be obtained/received. Accordingly, the impacts below are provisional and would be reviewed once sacred site clearances and decisions regarding final road alignments have been made. It is possible that the roads may be aligned in order to avoid impacting upon archaeological material. A breakdown of the archaeological material that would be impacted is as follows:

- **Chandler Facility.** One site complex, four individual sites and three isolated finds would be directly impacted during construction of the proposed Chandler Facility (Tellus Site Complex, T9 Site, CS21, CS22, CS23, T18IF, CS20). In addition, two other site complexes (WT6 Bore Site Complex, CS18 and 19) and two individual sites (MVH3 Revised and CS17) may be vulnerable to disturbance during construction given their close proximity to the proposed Chandler Facility. Depending on the route of the Chandler Haul Road as it leaves the mine site, some other isolated finds may also be impacted (T25IF, T26IFa and T26IFb).
- **Apirnta Facility.** A background scatter (Railway background scatter) and three isolated finds (IFWP58 and IFWP59) would be directly impacted during construction of the proposed Apirnta Facility.
- **Chandler Haul Road.** Two sites would be directly impacted during construction of the proposed Chandler Haul Road (No.84 Bore Sites 2 and 3). In addition, one other site (No.84 Bore Site 1) and five isolated finds (IFWP88, 92, 93 and 94) may be vulnerable to disturbance during construction given their close proximity to the proposed haul road.
- **Henbury Access Road.** Two site complexes (White Rocky Hills Site Complex and WHAR 3 Site Complex), five individual sites (Finke River Scatter, Lone Hill, WHAR 2, Claypan 1 and Claypan 2), two background scatters (Stony Rises background scatter and Chiming Wedgebill background scatter) and five isolated finds (T15IF, T14IF and Duck Swamp IFa-c) would be directly impacted during construction of the proposed Henbury Access Road. The impact on another site (WHAR 1), and three background scatters (Rocky Hills background scatters 1 and 2 and Bleak landscape background scatters) is currently uncertain, but at the very least this material is vulnerable to disturbance during construction given their close proximity to the proposed Maryvale Access Road. One isolated find (IFAMWP) may be impacted if the road deviates north along 15 Mile Creek to an alternative creek crossing.



Archaeological material that would be directly impacted or potentially vulnerable to disturbance during construction of the Proposal is shown in Figure 10-6 and Figure 10-9.

The risk of damage to archaeological material from vibrations is considered to be very low. Nevertheless, specialist engineering advice may be sought prior to construction regarding the most appropriate blasting materials and methods, in order to minimise this risk. Monitoring of sites within a 1 kilometre radius of the blast site immediately after initial blasting would allow the identification of any adverse impacts and modification of the blasting program accordingly.

No scarred trees were located during the survey (which included areas with trees that were taller than 5 metres such as bloodwoods and desert oaks). Scarred trees are an uncommon occurrence in Central Australia. Therefore, the risk of damage to any unrecorded scarred trees would be low.

Mitigation and management measures that would be implemented to avoid or reduce impacts to cultural heritage resources during construction of the Proposal are discussed further in Section 10.7

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## 10.5 Assessment of risk during operation

The risk of adverse impacts to cultural heritage would be low during operation. Rather, works to conserve sites (e.g. to stem erosion, fencing) would have a positive impact on cultural heritage values in the area. Mitigation and management measures would be implemented to avoid or reduce impacts to cultural heritage resources during operation of the Proposal are discussed in Section 10.7.

## 10.6 Assessment of risk during closure and rehabilitation

The risk of adverse impacts to cultural heritage would be low during closure and rehabilitation. Mitigation and management measures would be implemented to avoid or reduce impacts to cultural heritage resources during closure and rehabilitation of the Proposal are discussed in Section 10.7.

## 10.7 Mitigation and monitoring

Mitigation and management measures proposed to avoid and/or minimise impacts on cultural heritage resources during construction, operation and/or decommissioning of the Proposal are listed in Table 7-11. These measures would be incorporated into the CEMP, OEMP and/or RCP for the Proposal. A draft Cultural Heritage Management Plan has also been prepared for the Proposal (refer to Appendix S).

**Table 10-7 Mitigation and management measures (cultural heritage)**

ID	Outcome	Mitigation/management measure	Timing
CH.1	Reduce the risk of inadvertently disturbing archaeological material during construction.	Undertake additional surveys of areas that would be impacted but have not yet been surveyed and which have a moderate to high probability of containing archaeological material (e.g. sections of the proposed Chandler Haul Road and eastern end of the proposed Henbury Access Road).	Pre-construction
CH.2	Preservation of areas of cultural sensitivity.	Clearly mark cultural heritage exclusion zones and ensure there is no intrusion into cultural heritage exclusion zones.	Pre-construction, construction, operation, and closure and rehabilitation
CH.3	Appropriate consent obtained to impact or potentially disturb archaeological material.	Ensure that appropriate consent is obtained for all sites that would be directly impacted or vulnerable to disturbance and require protective measures. Consent would be obtained from the NT Heritage Branch under section 72 of the NT <i>Heritage Act</i> .	Pre-construction
CH.4	Mitigation and management of archaeological material within and in the vicinity of the proposed development footprint.	Undertake additional mitigative works as part of conditions associated with gaining consent to impact or disturb particular archaeological material. For example, establishing “no-go” areas, undertaking mitigative recording of sites, relocating artefacts and establishing protective fencing (refer to Table 11a through Table 11d of Cultural Heritage Management Plan, Appendix S).	Pre-construction
CH.5	Mitigation and management of archaeological material within and in the vicinity	Ensure that all cultural heritage resources within and in the vicinity of the proposed development footprint are identified on general site maps and that no-go areas (i.e. sites or parts of sites to be	Pre-construction



ID	Outcome	Mitigation/management measure	Timing
	of the proposed development footprint.	protected, restricted areas) are also shown on all construction drawings.	
<b>CH.6</b>	Facilitate the ongoing management of cultural heritage resources.	Establish a database of cultural heritage resources within and in the vicinity of the proposed development footprint.	Pre-construction
<b>CH.7</b>	Mitigation and management of archaeological material within and in the vicinity of the proposed development footprint.	Establish a cultural awareness induction program for all contractors, employees and agents working on-site. Maps and drawings showing cultural heritage resources within the proposed development footprint would be provided to all contractors and employees working on-site.	Pre-construction and construction
<b>CH.8</b>	Mitigation and management of archaeological material within and in the vicinity of the proposed development footprint.	Implement protocols for the unanticipated discovery of archaeological material and skeletal remains as per the Cultural Heritage Management Plan at Appendix S.	Pre-construction, Construction
<b>CH.9</b>	Mitigation and management of archaeological material within and in the vicinity of the proposed development footprint.	Ensure that sites identified as vulnerable to disturbance are subject to regular monitoring at monthly intervals. Implement management measures, if necessary (e.g. implementing works to stem erosion, reviewing the efficacy of site protection measures including fencing, the cultural heritage induction program and mapping).	Construction
<b>CH.10</b>	Mitigation and management of archaeological material within and in the vicinity of the proposed development footprint.	Ensure that sites identified as vulnerable to disturbance are subject to monitoring on an annual basis. Implement conservation and management measures for other sites as appropriate (e.g. detailed recording, conservation works).	Operation
<b>CH.11</b>	Mitigation and management of archaeological material within and in the vicinity of the proposed development footprint.	Ensure any new areas subject to ground disturbance in the future are assessed and surveyed in accordance with the predictive models and appropriate actions taken in relation to the NT <i>Heritage Act</i> .	Operation
<b>CH.12</b>	Mitigation and management of archaeological material within and in the vicinity of the proposed development footprint.	Ensure that the condition of all sites are recorded one last time. Remove protective fencing once all infrastructure had been dismantled and removed from site and other rehabilitation works are complete. Forward all data pertaining to each site including site records, documentation (e.g. results of monitoring), photographs, records of action taken, etc. are forwarded to the NT Heritage Branch.	Decommissioning



## 10.8 Summary of risk assessment

A summary of the risk assessment undertaken for historic and cultural heritage during construction, operation, and closure and rehabilitation of the Proposal is provided in Table 10-8.

**Table 10-8 Summary of risk assessment (historic and cultural heritage)**

Hazard	Pre-mitigated risk			Post-mitigated risks			Risk outcome
	Likelihood	Consequence	Risk ranking	Likelihood	Consequence	Risk ranking	
Physical disturbance to known sites	Likely	Moderate	High	Eliminated	Moderate	Eliminated	Risk reduced
Physical disturbance to unknown sites	Remote	Moderate	Low	Remote	Moderate	Low	Risk same
Loss of trees (>5m) of value to traditional owners	Almost certain	Moderate	High	Almost certain	Minor	High	Risk reduced
Loss of scarred trees	Unlikely	Moderate	Medium	Remote	Moderate	Low	Risk reduced
Disturbance of sensitive land at the decline entry	Eliminated	Minor	Eliminated	Eliminated	Minor	Eliminated	Risk same

## 10.9 Conclusion

No historic items would be impacted during construction or operation of the Proposal. With regards to archaeological material, at least three site complexes, 11 individual sites, three background scatters and 11 isolated finds would be directly impacted during the construction of the Proposal. In addition, at least two site complexes, four individual sites, three background scatters and six isolated finds may be vulnerable to disturbance during construction given their close proximity to the proposed development footprint.

Additional surveys of areas that would be impacted but have not yet been surveyed and which have a moderate to high probability of containing archaeological material (e.g. sections of the proposed Chandler Haul Road and eastern end of the proposed Henbury Access Road) would be undertaken prior to construction.

Appropriate consent would be obtained for all sites that would be directly impacted or vulnerable to disturbance (and requiring protective measures). Consent would be obtained from the NT Heritage Branch under Section 72 of the NT Heritage Act. Additional mitigation and management measures to preserve cultural heritage values would be included in a Cultural Heritage Management Plan as part of the CEMP, OEMP and/or RCP for the Proposal.

The risk of adverse impacts to cultural heritage would be low during operation and decommissioning of the Proposal.