

ABORIGINAL CULTURAL HERITAGE 17

17.1 INTRODUCTION

The cultural heritage of the project area has been studied since planning for the Olympic Dam project began in the late 1970s. There have followed 35 years of discussions with traditional owners, field surveys and salvage work, with a correspondingly improving appreciation of Aboriginal cultural heritage sites and places.

A number of Aboriginal groups have claimed a native title interest in the EIS Study Area. Some Aboriginal groups have asked BHP Billiton not to disclose information about places or stories of cultural significance to them in the Draft EIS.

Many sites and artefacts remain as evidence of historical Aboriginal nomadic occupation and use, and the wider Olympic Dam region is rich in surface scatters of stone artefacts and quarries. Most of the sites are considered to be of low scientific significance, with no salvage potential. At the same time, however, cultural heritage is important to contemporary Aboriginal people.

This chapter summarises the Aboriginal cultural heritage of the project area and discusses the processes that have been established to identify, record, manage and, where possible, protect archaeological sites and cultural places of significance to Aboriginal people. This draws upon experience from the existing operation and looks ahead to the provisions of the Olympic Dam Agreement, which has been negotiated between BHP Billiton and the Barngarla, Kokatha and Kuyani groups claiming an interest in the Olympic Dam region and infrastructure corridors.

17.2 ASSESSMENT METHODS

17.2.1 APPROACH

At the time of writing, there are three parallel processes applying to the assessment and management of Aboriginal cultural heritage sites and values. These are:

- the Aboriginal heritage survey work that occurs at the site of any area outside of the existing SML that may be directly disturbed by the operation
- the Olympic Dam Agreement between BHP Billiton and Aboriginal groups (see Section 17.2.2)
- heritage survey work, mitigation and consultations with Aboriginal people in accordance with the heritage management protocol included in the Olympic Dam Agreement.

The methods used to assess Aboriginal cultural heritage were:

- to describe the existing Aboriginal cultural heritage sites and values by:
 - considering available information on Aboriginal occupation of the relevant land
 - consulting with the Aboriginal group or groups claiming an interest in the relevant land
 - reviewing and summarising the results of previous Aboriginal cultural heritage assessments (both ethnographic and archaeological) within the EIS Study Area
 - assessing the significance of recorded sites to the extent permitted by confidentiality constraints
 - commenting on the potential impact of the proposed expansion on Aboriginal cultural heritage sites and values

- to describe the process for managing Aboriginal cultural heritage sites throughout the EIS Study Area by explaining:
 - how Aboriginal groups are involved in protecting and managing Aboriginal cultural heritage sites
 - the process for mitigating impacts by salvaging, protecting and managing cultural heritage sites and places
 - the process for managing sites where their destruction, damage or disturbance is unavoidable
 - how the unanticipated discovery of cultural material remains would be managed
 - the elements of proposed Aboriginal cultural heritage awareness training for BHP Billiton employees, contractors, sub-contractors and consultants.

17.2.2 CONSULTATION

BHP Billiton maintains ongoing relationships with Aboriginal groups and engaged in a comprehensive process of negotiation and consultation which led to the signing of the Olympic Dam Agreement. As an initial step to negotiating the Olympic Dam Agreement, BHP Billiton and the Kokatha, Barngarla and Kuyani groups entered into an agreement in August 2005 to discuss the implications of the proposed expansion (Olympic Dam Negotiation Agreement). The elements of the Olympic Dam Negotiation Agreement included:

- matters to be addressed in the final Olympic Dam Agreement, including a comprehensive Aboriginal cultural heritage management regime and an Indigenous Land Use Agreement (ILUA) capable of being registered under the *Native Title Act 1993*
- funding by BHP Billiton for the Aboriginal groups to participate in the negotiations, for expert legal, financial and other specialist advice and to hold community meetings to enable the representatives of the Aboriginal groups to inform their communities and obtain instructions from them in accordance with their decision making processes
- each of the Aboriginal groups and BHP Billiton appointing a negotiation team with separate legal representation for each
- appointing a lead negotiator to jointly represent the Aboriginal groups in the negotiations
- appointing representatives of the National Native Title Tribunal (NNTT) to mediate and facilitate discussions.

Each of the parties to the Olympic Dam Negotiation Agreement appointed a negotiating team and regular meetings began in September 2005. Each monthly meeting was facilitated by the NNTT. The Kokatha negotiation team included senior Aboriginal representatives of the Yankunytjatjara–Pitjantjatjara people who are culturally affiliated with the Kokatha group.

Between September 2005 and August 2006, BHP Billiton and the three Aboriginal groups also negotiated the detailed provisions of a comprehensive Aboriginal cultural heritage management agreement (the Heritage Management Protocol). The provisions of that protocol were agreed to in August 2006 and are now incorporated in the Olympic Dam Agreement.

In June 2007, meetings of each of the communities formally endorsed entering into the Olympic Dam Agreement with BHP Billiton, including the Heritage Management Protocol. Details of the Heritage Management Protocol and the Olympic Dam Agreement are described in Section 17.5.2.

The Olympic Dam Agreement was signed in January 2008.

Separate consultation with the Nukunu, Arabunna, Dieri and Adnyamathanha groups has continued as required and BHP Billiton will consult with Aboriginal groups claiming an interest in any area where land disturbance would occur during the expansion.

17.2.3 FIELD SURVEYS

Comprehensive and ongoing Aboriginal cultural heritage investigations have been undertaken over several decades within the EIS Study Area, especially around Olympic Dam. These investigations include field surveys and archaeological salvage works (see Appendix P1 for list of heritage reports held by BHP Billiton). Surveys have focused on areas that the existing operation and proposed expansion would disturb. The results of these surveys are discussed in Sections 17.3.3 and 17.3.4.

17.2.4 RISK AND IMPACT ASSESSMENT

The assessment of impacts and risks for the proposed expansion has been undertaken as two separate, but related, processes (see Section 1.6.2 of Chapter 1, Introduction, and Figure 1.11).

Impacts and benefits are the consequence of a known event. They are described in this chapter and categorised as high, moderate, low or negligible in accordance with the criteria presented in Table 1.3 (Chapter 1, Introduction).

Risk assessments describe and categorise the likelihood and consequence of an unplanned event. These are presented in Chapter 26, Hazard and Risk.

17.3 EXISTING ENVIRONMENT

17.3.1 ABORIGINAL COMMUNITIES

Historically, the Olympic Dam region was subject to nomadic occupation only, and no Aboriginal communities lived there permanently.

The Kokatha (SAD6013/98) and Barngarla (SAD6011/98) groups have made a native title determination application (i.e. a claim) in accordance with the Commonwealth *Native Title Act 1993* to most of the land within the EIS Study Area.

The Kuyani do not have a native title claim but are party to the Federal Court proceedings concerning the Kokatha and Barngarla claims and assert they hold native title rights and interests in relation to the EIS Study Area.

The Kokatha, Barngarla and Kuyani groups have informed the Federal Court that they intend to form a single combined native title claim that covers the current area of overlap between the Kokatha and Barngarla claims, including the area around the Olympic Dam mine (see Figure 17.1).

Most of the ground-disturbing activities associated with the proposed expansion would occur in the area that is the subject of the native title claims by the Kokatha and Barngarla groups and in which the Kuyani also express an interest.

Approximately 60 km of the proposed 320 km water supply pipeline, and approximately 40 km of the proposed 270 km electricity transmission line, are also within the area subject to a native title claim by the Nukunu group (SAD6012/98).

The Dieri (SAD6017/98), Adnyamathanha (SAD6001/98), Yandruwandha/Yawarrawarrka (SAD6024/98) and Arabunna (SAD6025/98) groups have made native title claims to land where sections of the gas pipeline corridor options may be established.

The Kurna People (SC00/1) have made a native title claim to land where the proposed sulphur handling facility at Outer Harbor would be located. This land is owned by a third party which has an agreement with the Kurna People. Any further development of the land would conform to that agreement.

The land at the Port of Darwin (East Arm) that would support the new infrastructure (including a storage shed and bulk materials loading facility) would be on land that has had native title extinguished. BHP Billiton would consult with the Larrakia Development Corporation to develop an Industry Participation Plan.

The boundaries of native title claims in relation to the EIS Study Area are shown in Figure 17.1.

17.3.2 CONFIDENTIALITY

The Kokatha, Barngarla and Kuyani groups have requested that BHP Billiton does not publicly disclose information about places and stories of cultural significance to them in the Draft EIS. Other groups that have participated in Aboriginal cultural heritage surveys from time to time have made similar requests. The location and cultural significance of these places has therefore been omitted from the Draft EIS. Within this constraint, reference is made to specific survey reports and to other information to demonstrate that a process has been established to identify, record, protect and otherwise manage Aboriginal cultural heritage sites and places of significance to Aboriginal people.

17.3.3 IDENTIFIED ABORIGINAL CULTURAL HERITAGE FACTORS – ETHNOGRAPHY

Places of ethnographic heritage significance to Aboriginal people have been recorded over several decades within the EIS Study Area and in particular the SML. These include mythological sites that are associated with song lines and stories of cultural significance, ceremonial sites, conception, birth and death sites.

BHP Billiton has conducted ethnographic assessments of sections of the EIS Study Area likely to be affected by the proposed infrastructure, including the rail line, airport, gas pipeline, desalination plant, water supply pipeline, electricity transmission line, Roxby Downs township, Hiltaba Village and some water exploration drilling sites.

During 2006 and 2007, representatives from each of the Barngarla, Kokatha and Kuyani groups who can speak about Aboriginal heritage inspected areas where infrastructure is proposed. The representatives were joined by an independent heritage consultant, engaged jointly by the three Aboriginal groups, and representatives from BHP Billiton.

During 2006, representatives from the Nukunu group who can speak about Aboriginal heritage inspected the areas within the Nukunu claim area where the proposed water supply pipeline and the electricity transmission line would be located. The representatives were also joined by an independent heritage consultant.

These inspections identified some sites of potential ethnographic significance within the vicinity of all infrastructure areas (i.e. within the vicinity of the proposed rail line, airport, desalination plant, gas pipeline corridor options, water supply pipeline, electricity transmission line, Roxby Downs township, Hiltaba Village and some water exploration drilling sites). The places were identified on maps during the surveys and the maps were verified by each group. It may be necessary to apply for approval to disturb one identified archaeological site and one site of ethnographic significance within the water supply pipeline route when the final pipeline alignment is determined. Should this occur, a site disturbance mitigation plan would be developed in consultation with the appropriate Aboriginal groups. Archaeological surveying of the infrastructure corridors is ongoing as the preferred locations for the various elements are determined.

Independent heritage consultants prepared reports that recorded the outcomes of the inspections. The outcomes of the inspections conducted with the Barngarla, Kokatha and Kuyani groups will be managed in accordance with the Heritage Management Protocol.

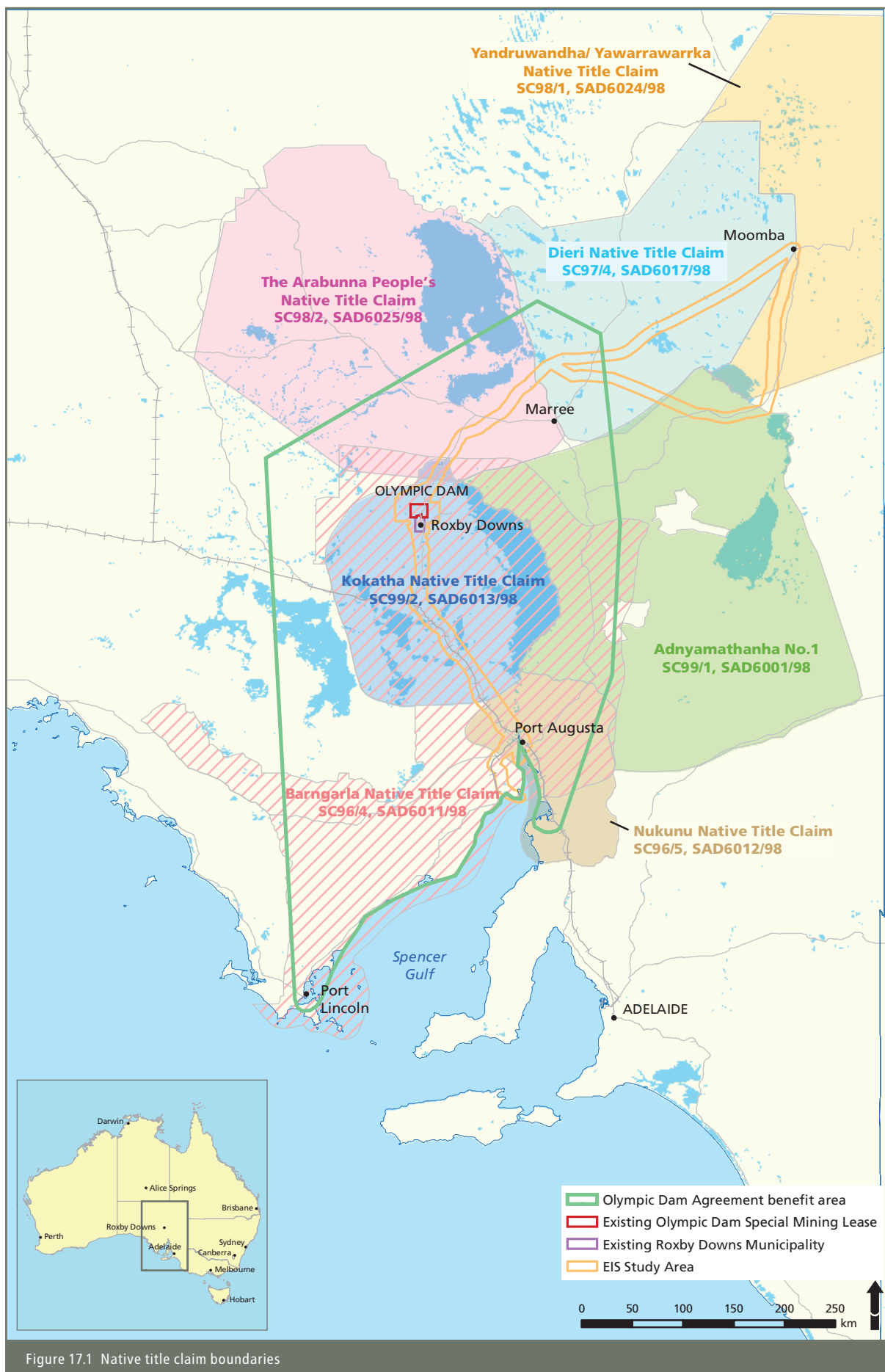


Figure 17.1 Native title claim boundaries

The current preferred corridor for the water supply pipeline and electricity transmission line avoids places of significance identified by the Nukunu group. If either the pipeline or transmission line corridor is altered and any place identified by the Nukunu group as being of significance would potentially be affected, further consultations will be undertaken with the Nukunu people.

During 2004, representatives from the Dieri, Adnyamathanha and Kuyani groups who can speak about Aboriginal heritage inspected the area where the proposed gas pipeline corridor options (Option 1 and Option 2) are located. These inspections identified sites of potential ethnographic significance within the vicinity of the proposed gas pipeline corridor options.

The proposed gas pipeline alignment options avoid places of significance identified by the Dieri, Adnyamathanha and Kuyani groups. Further consultation with these groups and with the Yandruwandha/Yawarrawarrka and Arabunna groups will be undertaken when the preferred gas pipeline corridor option is determined to ensure that there are no significant impacts to Aboriginal cultural heritage sites and values.

17.3.4 IDENTIFIED ABORIGINAL CULTURAL HERITAGE FACTORS – ARCHAEOLOGY

The Olympic Dam operation has been the subject of numerous archaeological surveys since the early 1980s, with over 1,000 archaeological sites recorded in the region to mid-2007.

Surveys for the 1982 EIS

Before the Olympic Dam operation commenced, a number of archaeological studies were undertaken in the region, as described in the 1982 EIS (Kinhill-Stearns Roger 1982) and 437 sites were recorded in the 1982 EIS surveys (see Table 17.1).

The areas surveyed are shown on Figure 17.2. The main types of archaeological sites recorded include:

- quarries from which stone for flaked artefacts (see Plate 17.1) have been extracted. Quarries occur in the swales between dunes or on the gibber plains
- surface scatters of stone artefacts, where worked stone remains in the landscape. These sites contain mainly flaked stone artefacts, grindstones (see Plate 17.2 and 17.3), hammerstones and anvils (see Plate 17.4). There are often numerous unmodified blocks of stone (called manuports) and occasionally clusters of hearthstones which are the remains of fireplaces. Most scatters of stone artefacts occur on sand dunes or sand sheets, but some occur in the swales between dunes or on the gibber plains
- knapping floors, which are discrete clusters of artefacts anywhere in the landscape (including at quarries) resulting from stone being worked at those locations. An area or site is defined as a knapping floor where the original block of stone can be largely reconstructed from the scattered pieces of flaked stone.

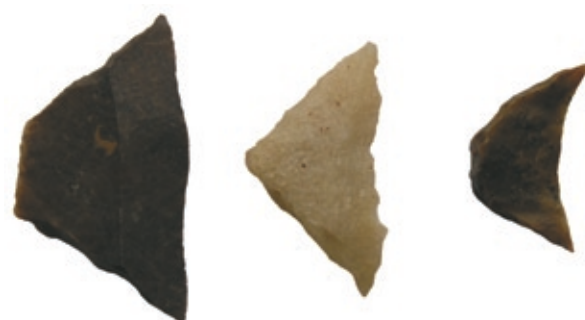
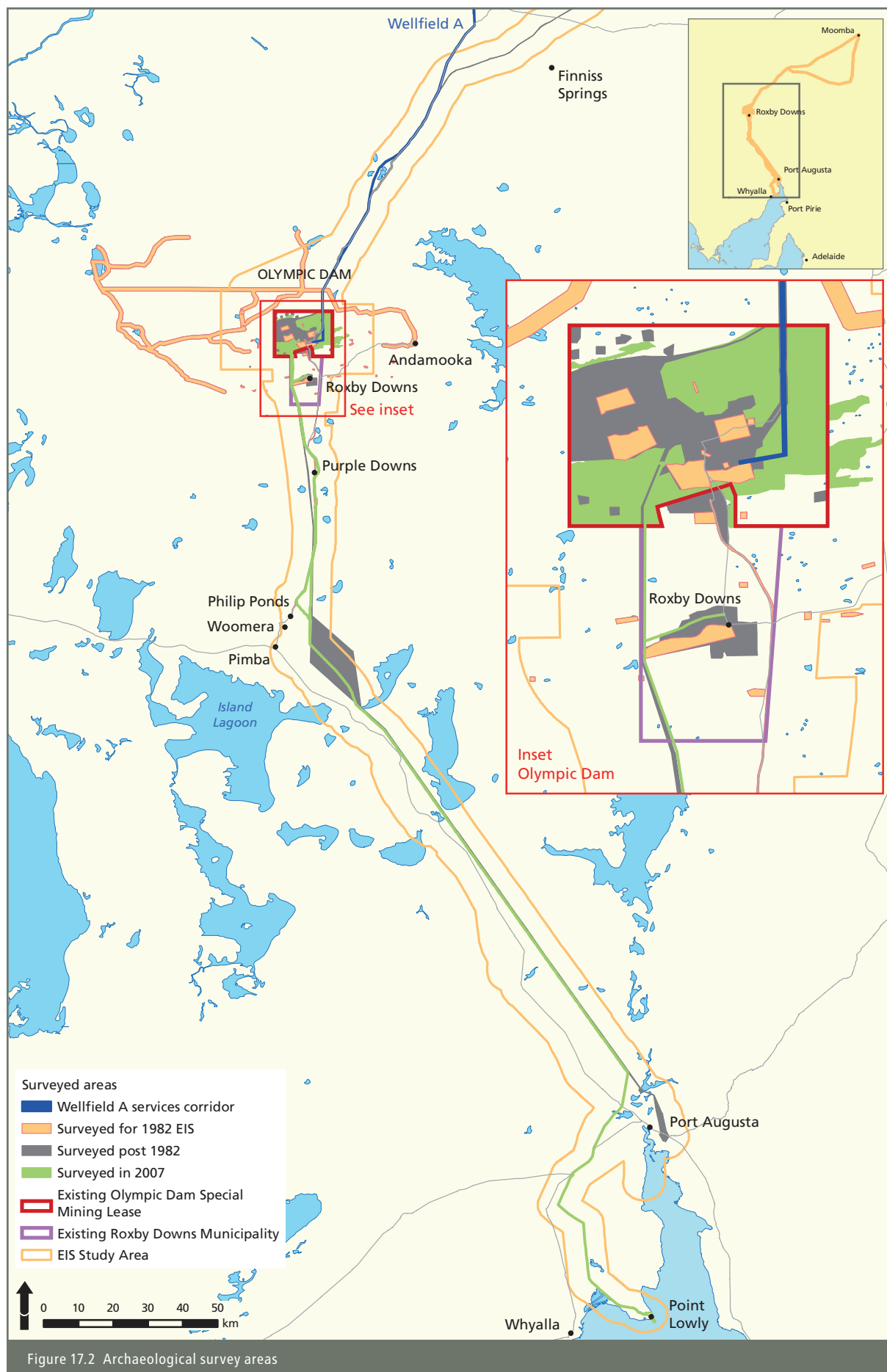


Plate 17.1 Three backed artefacts, the left and right made on oolitic chert, the centre one on silcrete

Table 17.1 Archaeological sites recorded during the 1982 EIS surveys

Survey area and Olympic Dam project site numbers	Artefact scatters (including with knapping floors)	Knapping floors only	Quarries including knapping floors	Stone cairns	Total number of sites
Road corridor, Olympic Dam to Purple Downs (Nos. H80–H124) ¹	41	1	2	1	45
Road corridor, Purple Downs to Phillip Ponds (Nos. H125–H147)	22	0	1	0	23
Baseline survey (Nos. H1–H58)	51	1	5	1	58
Housing area survey (Nos. H59–H79)	16	4	1	0	21
Regional survey (Nos. H180–H208)	27	0	2	0	29
Whenan Shaft survey (Nos. H148–H179)	28	0	4	0	32
Project Area survey, Areas A, B and C (Nos. H209–H371)	136	21	6	0	163
Town site survey, Area D (Nos. H372–H384)	11	2	0	0	13
Wellfield A services corridor survey (Nos. H385–H437)	48	0	5	0	53
Total	380	29	26	2	437

¹ All archaeological sites recorded during the 1982 EIS surveys appear with an H prefix to distinguish them from archaeological sites recorded subsequently.



Of the 437 sites recorded, 257 were recorded within the area of the SML and Roxby Downs Municipality, and the remaining 180 sites were recorded in the additional survey areas within the Olympic Dam region (see Figure 17.2 for 1982 EIS survey areas). Detailed archaeological information was collected for approximately 200 of the 437 sites, with summary records being made of the remaining sites. Artefact assemblages were salvaged from three sites along the then proposed road from Olympic Dam to Woomera (Sites H110, H112 and H116).



Plate 17.2 A grindstone dish made on sandstone



Plate 17.3 A top grindstone made on a quartzite cobble



Plate 17.4 An anvil made on a quartzite cobble

Predictive model

The archaeological surveys undertaken for the 1982 EIS covered approximately 40% of the 1982 EIS Study Area and allowed the development of a precise, environmentally based archaeological predictive model that predicted the nature and distribution of archaeological sites. The surveys demonstrated that the wider Olympic Dam region is rich in archaeological sites in the form of surface scatters of stone artefacts and quarries and that there are close relationships between the nature and distribution of archaeological sites and their environmental settings.

The predictive model was produced using terrain pattern mapping, supplemented by other environmental and geological information (see Figure 17.3). Examples of terrain pattern types which occur in the EIS Study Area are shown in Plates 17.5 to 17.7.

The model predicts that the nature and distribution of archaeological sites in the Olympic Dam region is based on the combination of landform type and geology in relation to three major factors, being proximity to:

- fresh water
- sand on which to camp
- raw materials for flaking stone artefacts.

Table 17.2 summarises the predicted nature and distribution of archaeological sites in the Olympic Dam region based on the combination of these factors.



Plate 17.5 Terrain Pattern P4 (see Figure 17.3 for description)

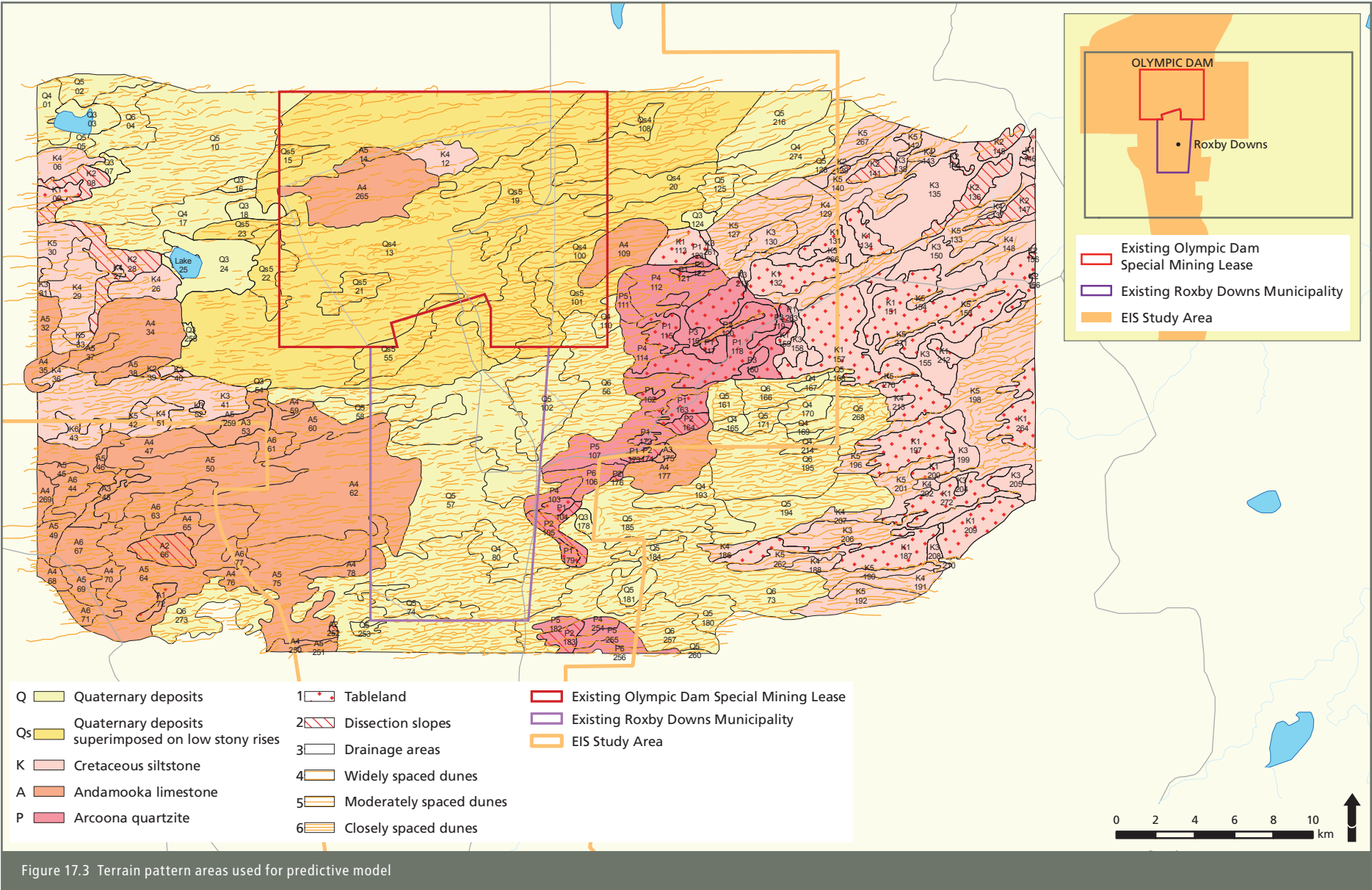


Table 17.2 Predicted nature and distribution of archaeological sites in the Olympic Dam region (modified from Table 5.6 of 1982 EIS)

Landform type	Summary statistics ¹	Geology					Predicted average for landform type
		Arcoona Quartzite (P)	Andamooka Limestone (A)	Cretaceous Siltstones (K)	Recent dunefields over silcrete (Qs)	Recent dunefields and clay pans (Q)	
Tableland	Frequency	Very low	X ²	Low	X	X	Low
	Size ³	– ⁴	X	–	X	X	–
	Density ⁵	–	X	–	X	X	–
Tableland with dissection slopes	Frequency	Very low	Low	Low	X	X	Low
	Size	–	Medium	Very large	X	X	Very large
	Density	–	Medium	Very high	X	X	Very high
Drainage Depressions	Frequency	Very low	Low	Low	X	Low	Low
	Size	–	Very large	Large	X	Very large	Very large
	Density	–	Very high	Very high	X	Low	Very high
Widely spaced dunes	Frequency	Low	Low	Medium	Very high	High	High
	Size	Large	Medium	Large	Large	Large	Large
	Density	High	Medium	Medium	High	High	High
Moderately spaced dunes	Frequency	Medium	Very low	High	Low	Low	Medium
	Size	Medium	–	Large	Large	Large	Large
	Density	High	–	High	Medium	Medium	Medium
Closely spaced dunes	Frequency	Very low	Very low	Very low	X	Low	Low
	Size	–	–	–	X	–	–
	Density	–	–	–	X	–	–

¹ Frequency of sites in each terrain pattern is based on the following subjective scale: very low, low, medium, high, very high.

² X indicates that the particular combination of geology and landform does not exist.

³ Size of sites: low (<10 m²); medium (10–99 m²); large (100–999 m²); very large (1,000 m² or greater).

⁴ – indicates insufficient information on which to base a summary statement.

⁵ Density of artefacts: low (<0.1/m²); medium (0.1–1/m²); high (1–10/m²); very high (>10/m²).



Plate 17.6 Terrain Pattern Q4 in the foreground and Q5 in the background (see Figure 17.3 for description)



Plate 17.7 Terrain Pattern Qs4 (see Figure 17.3 for description)

Surveys between 1982 and 1998

Numerous archaeological surveys were conducted between 1982 and 1998 (see Figure 17.2):

- surveys in 1986 of the 132 kV transmission line corridor from Woomera to Olympic Dam and the proposed fence lines around the perimeter of the SML identified 31 archaeological sites
- surveys during 1994 and 1995 within the SML identified 124 sites
- surveys between 1996 and 1998 within the SML and the Roxby Downs Municipality areas proposed for the 1997 expansion identified 89 sites
- surveys of the proposed 275 kV transmission line from Port Augusta to Woomera, described in the 1997 EIS and incorporating a number of alternative corridor alignments, identified 26 sites.

An analysis of the archaeological data collected during these surveys strengthened the predictive model produced for the 1982 EIS in the region extending from Spencer Gulf in the south to Lake Eyre in the north.

Salvage investigations between 1982 and 1998

The 1982 EIS recommended that nine sites of special scientific value within the SML and five sites along an area known as the Wellfield A corridor (located outside the EIS Study Area, see Figure 17.2) undergo further recording and salvage work if deemed necessary.

Detailed recording was undertaken at all 14 sites in 1985, with salvage work undertaken at two of the sites within the SML and a third site within the Wellfield A corridor as shown in Table 17.3.

In 1996, as a contribution to a large multidisciplinary investigation led by the Royal Geographical Society of South Australia (known as the Lake Eyre South Study), archaeological excavations were undertaken at a further two archaeologically important sites at Olympic Dam. One of the sites excavated was H364, identified in the 1982 EIS, and the 1985 salvage project, as a site of special scientific value (see Table 17.3). The other site, ODO2A40, had been identified in 1995 as a site with the potential to contain subsurface archaeological material.

In 1998, surface sand containing artefacts from 59 sites recorded during 1997 and 1998 in the area of the proposed expansion of the tailings storage facility (TSF) was collected and deposited in two nearby locations (see Figure 17.4 for the location of these sites). A detailed record was made of the most important archaeological site, TRSA24, before it was salvaged. This involved site mapping and a comprehensive description, analysis and interpretation of the stone artefact assemblage.

Investigations for the current Draft EIS

The following investigations were undertaken during 2006:

- A desktop review of the recorded archaeological sites in, and adjacent to, the EIS Study Area. This review identified

sites of potential special scientific value in addition to those listed in Table 17.3 that might warrant salvage if they were affected by the proposed expansion.

- Fieldwork was undertaken to examine the archaeological sites of potential special scientific importance identified in the 1982 EIS and the 2006 desktop review. The fieldwork assessed the current status of the sites and recommended 12 sites considered to be of special scientific importance for future salvage work, and/or management (see Table 17.4).

Proposed gas pipeline corridor options

A number of archaeological and ethnographic studies have been undertaken along the proposed gas pipeline corridor options since 2004 (see Figure 17.5). These studies covered the Olympic Dam to Wellfield B corridor and the corridors for Option 1 and 2 (Donovan 2005). The proposed route option from Compressor Station No. 2 to Moomba (Option 3) was not part of these previous studies.

These assessments identified a number of sites that could potentially be affected by the proposed development. Archaeological sites recorded in the vicinity of the corridors included artefact scatters, stone arrangements, quarries and a grave site. Furthermore, there are a number of potential sites in the area identified from the Aboriginal Affairs and Reconciliation Division (AARD) database. A summary of the findings of these studies is provided in Table 17.5.

Some sections of the proposed routes were realigned to avoid ethnographic and archaeological sites. Further field surveys would be required when the preferred alignment has been finalised to ensure sites are avoided and to identify any previously unrecorded sites or places of significance.

Table 17.3 Status of the archaeological sites of special scientific value investigated in 1985
(AS = stone artefact scatter, KF = knapping floors)

Site No.	Site Type	1982 recommendations	Salvage work undertaken in 1985
Project Area			
H222	AS/KF	Record and collect if desirable	Recorded
H237	AS/KF	Record and collect if desirable	Recorded and collected
H258	AS/KF	Record and collect	Recorded and collected
H259	KF	Record and collect	Recorded
H299	AS/KF	Record and collect	Recorded
H325	AS	Record	Recorded
H330	AS/KF	Record and collect	Recorded
H347	AS/KF	Record and collect if desirable	Recorded
H364	AS/KF	Record and collect	Recorded ¹
Wellfields service corridor			
H391	AS/KF	Record and collect	Recorded
H408	AS	Record and collect	Recorded
H418	AS	Record and collect	Recorded
H432	AS	Record and collect	Recorded and collected
H433	AS	Record and collect	Recorded

¹ Collected (i.e. salvaged) subsequently in 1996.

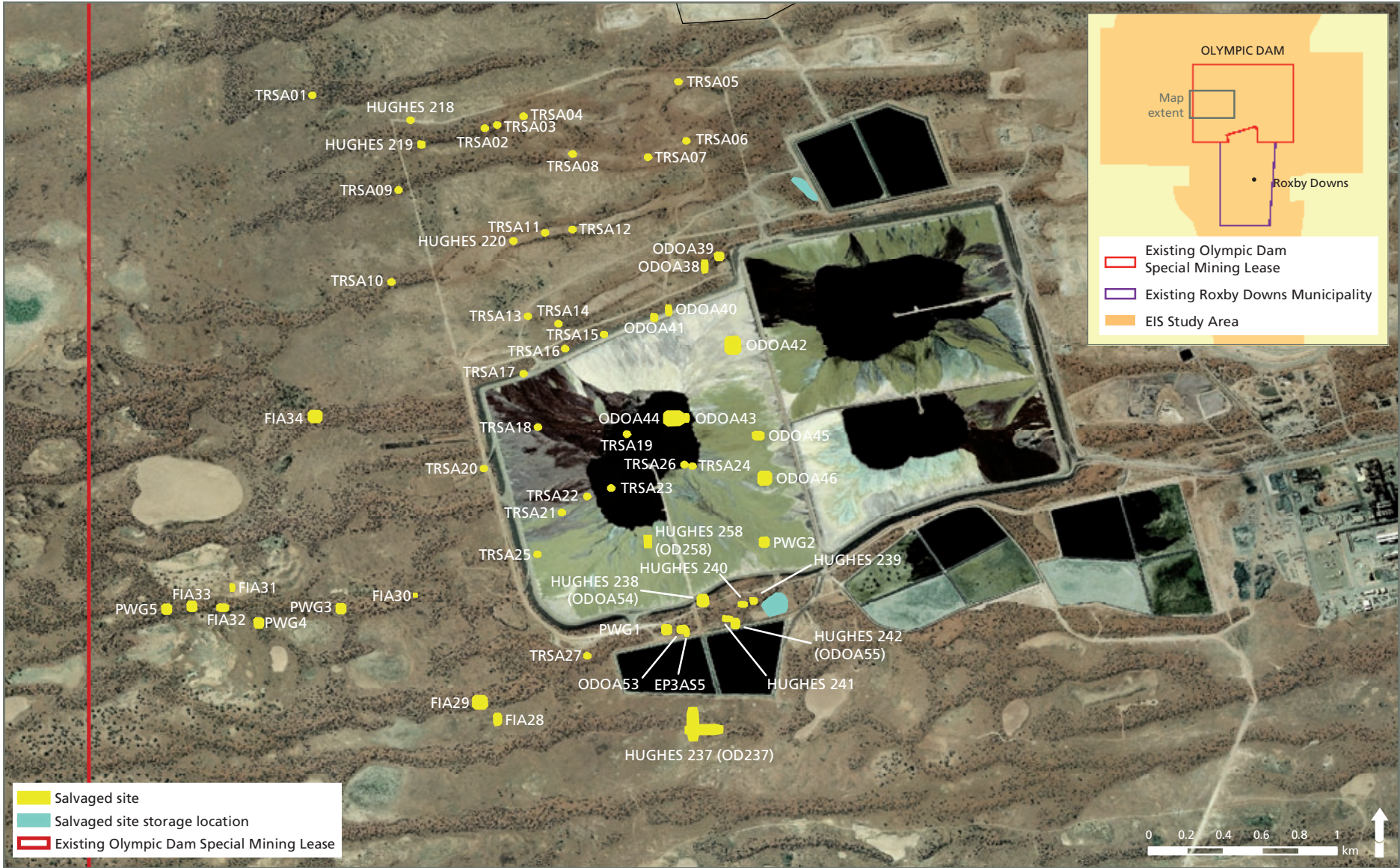


Figure 17.4 Archaeological salvaged sites

Table 17.4 Assessment of scientific value of extant archaeological sites and recommendations for salvage work (AS = stone artefact scatter, KF = knapping floors)

Site No.	Site Type	2006 assessment and recommendations
Listed sites from the 1982 EIS		
H222	AS/KF	Moderately high salvage potential
H299	AS/KF	Moderate salvage potential (knapping floors)
H330	AS/KF	High salvage potential
H347	AS/KF	High salvage potential
H408	AS	Not inspected. If it is ever threatened, relocate, reassess its scientific value and salvage if warranted
Sites identified since 1994		
FIA17	AS/KF	Very high salvage potential
FP80	AS/KF	Very high salvage potential
ODO3A23	AS	High salvage potential
TRSA28	AS	Moderate salvage potential
TRSA43	AS	Moderate salvage potential
ODOMA38	AS	Moderate salvage potential, especially Area 1
ODOMA30	AS	Lies inside Arid Recovery and not inspected. If it is ever threatened, relocate, reassess its scientific value and salvage if warranted

Table 17.5 Summary of archaeological and ethnographic sites identified in the vicinity of the proposed gas pipeline corridor options (from Donovan 2005)

Route section	Summary of report findings
Option 1 (PS6 to Moomba) ¹	Six potential ethnographic sites and 10 archaeological sites are recorded as being located within or in close proximity to the corridor. AARD identified one registered and three reported potential sites (Snake Dam Artefact Site, Coodlunga Dam Artefact Site, Dulkaninna Stone Arrangement 2 and Mount Well Mythological Site).
Option 2 (PS6 to Compressor Station No. 2) ¹	Ten potential ethnographic and 10 archaeological sites are recorded as being located within or in close proximity to the corridor. AARD listed one registered site and three reported potential sites (Snake Dam Artefact scatter, St Mary's Pool 1, Wadnhadi awi and Yarlum vari).
Wellfield B PS6 to Olympic Dam mine	Five potential ethnographic sites and 44 archaeological sites are recorded as being located within or in close proximity to the existing easements.

¹ Olympic Dam Operation (ODO) Wellfield B Site 3 is included under both Option 1 and 2 as it has a potential impact on both corridors.

Archaeological investigations in 2007

Between July and November 2007 another 100 km² (i.e. almost three times the area surveyed previously) was surveyed in varying degrees of detail. The 2007 survey was concentrated in a relatively limited number of terrain patterns, mainly within the SML (see Figure 17.2). The data collected during 2007 confirmed that the predictive model developed in 1981 has the capacity to accurately forecast a suite of important qualities about archaeological sites across the range of landscapes which characterise the EIS Study Area.

About 4,000 archaeological sites were recorded across five terrain patterns. This number of sites was entirely expected from the results of previous investigations and their nature and distribution was consistent with the predictions of the model. Furthermore, the location and density of sites recorded in 2007 was consistent with patterns of site variation within and between geological regimes and landform types, as observed

in earlier surveys and anticipated in the predictive model.

A key finding from the intensive field survey was that no new or anomalous site characteristics were observed. The similarity of sites found during this survey with those recorded in the previous decades, and their conformity with the predictive model, is because there are strongly and clearly defined archaeological patterns across the region. These archaeological patterns display a high level of 'redundancy' in the sense that they are repeated over and over in comparable environmental contexts throughout the EIS Study Area. As a consequence, a key conclusion of these investigations is that the complete range of sites that exist within the EIS Study Area has been observed and characterised.

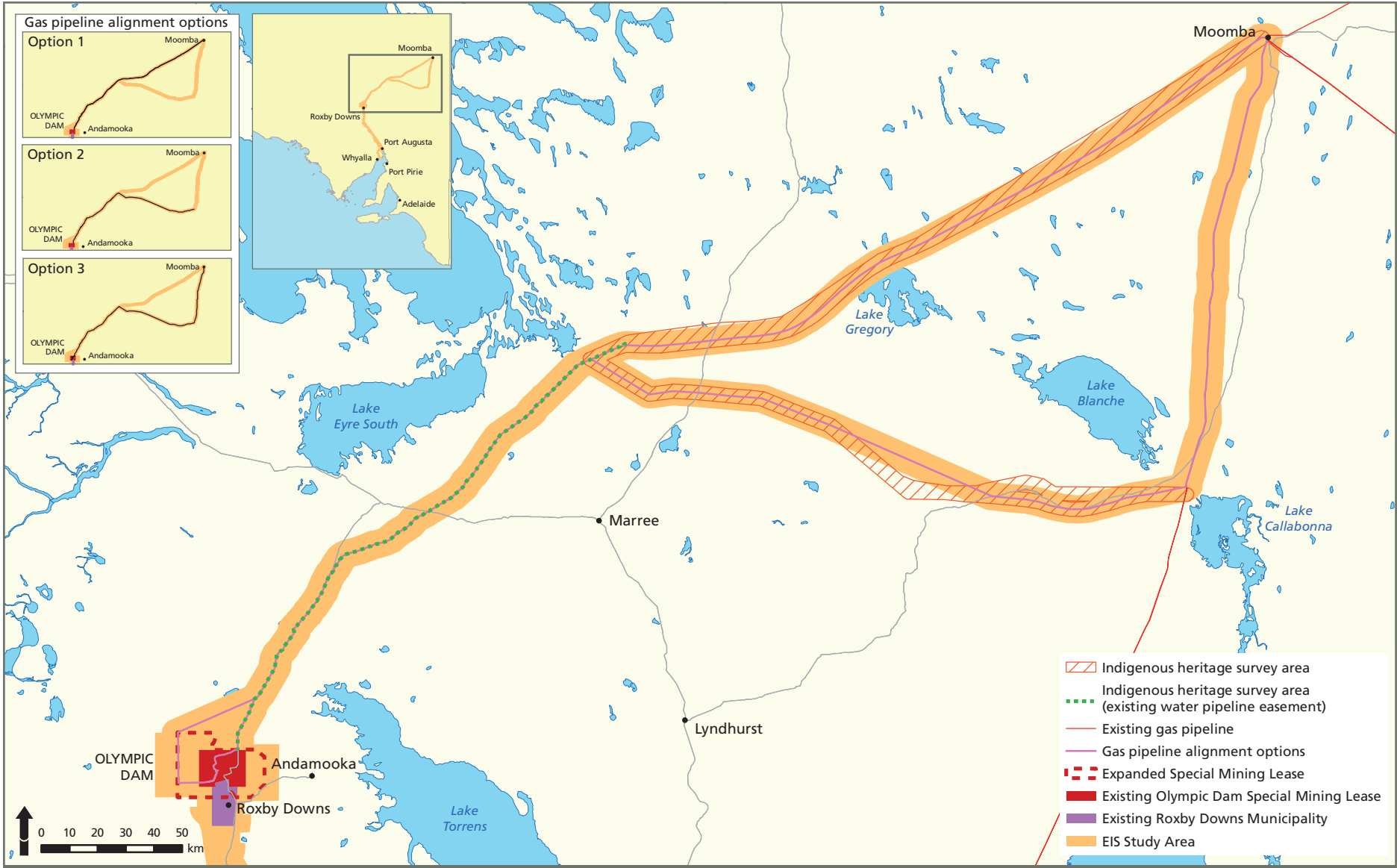


Figure 17.5 Archaeological survey areas within the gas pipeline corridor options

17.4 DESIGN MODIFICATIONS TO PROTECT ENVIRONMENTAL VALUES

17.4.1 ENVIRONMENTAL VALUES

Section 17.3 describes the places of ethnographic heritage significance to Aboriginal people within the EIS Study Area. The section also notes that over 4,000 archaeological sites have been identified, most within the Olympic Dam region, with the 2007 survey work for the expansion project confirming the accuracy of the archaeological predictive model, developed in 1981, to forecast the nature and distribution of archaeological sites. Fourteen sites have been assigned a high level of significance at the local level with moderate to very high salvage potential. Of these, five have already been salvaged.

Protecting Aboriginal cultural heritage places and sites is a project planning and management objective.

17.4.2 MAJOR ELEMENTS OF THE PROJECT DESIGN

The protection of Aboriginal places and sites typically relies on prior planning and management, where opportunities to pre-empt impacts are high. Infrastructure alignments can be moved to avoid archaeological sites where practicable; otherwise potentially affected Aboriginal places and sites are conserved by recording and, for the more significant sites, salvage. These measures and controls are part of the Olympic Dam Agreement and Heritage Management Protocol and are described in Section 17.5.

17.5 IMPACT ASSESSMENT AND MANAGEMENT

17.5.1 SIGNIFICANCE ASSESSMENT OF ARCHAEOLOGICAL SITES

An estimated 675 archaeological sites were recorded in sample surveys that covered approximately 35 km² within the SML and its surrounds. This is an average of approximately 20 archaeological sites per square kilometre. The same types of archaeological sites, in the same range of environmental settings, continue in a north-south direction from Port Augusta in the south to Lake Eyre in the north, over a distance of approximately 450 km (see Hughes and Hiscock 2005). At this density, it is likely that there are approximately 160,000 archaeological sites of the kind recorded at Olympic Dam within a radius of 50 km of the Olympic Dam operation. As a consequence, a very small proportion of sites of the same type that exist in the EIS Study Area would be affected by the proposed expansion.

When TRSA24 (a site with a rich, diverse assemblage of 10,500 stone artefacts) was investigated in 2003, it was estimated that there were probably several hundred sites with similar characteristics within a 50 km radius. During the 1981 reconnaissance survey to test the predictive model in the region, two very large and diverse sites were located: H184 with an estimated 360,000 artefacts visible on the surface and H203 with some 800,000 artefacts. Other similar sites are likely in the surrounding area.

Sites of this size are probably reasonably common in the region. Similar sites have been recorded further afield, such as the even larger Rocky Creek site near Lake Eyre South described by Hughes and Hiscock (2005).

The principles for assessing the significance of archaeological sites in the Olympic Dam region have been incorporated into the Heritage Management Protocol.

The issue of Aboriginal cultural heritage significance has been discussed extensively (see Bowdler 1983 and 1984; Pearson and Sullivan 1995 for examples). Despite differences in approaches used by heritage practitioners, there is general consensus on the basis for assigning scientific (or archaeological) significance to sites. Sites (or complexes of sites) are generally regarded as having high scientific or archaeological significance if they satisfy at least one of the following criteria:

- rare (or possibly unique) in a local, regional or national context
- a good example, which is representative of a particular site type (a criterion which is generally extended to exclude severely disturbed sites where the initial value has been compromised)
- a site with high research potential, able to provide answers to contemporary research questions
- a site with particular characteristics (including aesthetic value or visual impact) that make it a good example to use for educational or public awareness purposes.

As implied in the criteria, archaeological significance is never absolute but is, as Bowdler (1984) and many other archaeologists have noted, a 'mutable value' subject to change over time. For the Draft EIS, relative archaeological significance has been assessed at three levels – local, regional and national. In this instance:

- local is the area encompassed by the Olympic Dam operation
- regional is the area bounded by Lake Torrens in the east, Lake Gairdner in the west, Spencer Gulf in the south and Lake Eyre in the north
- national identifies sites in the context of state-wide and national significance.

The majority of sites recorded in the Olympic Dam area (corresponding to the area shown on Figure 17.2) are assessed as having low scientific significance because they do not meet any of the criteria set out above. None of the sites listed in Tables 17.3 and 17.4 as having the highest significance in the local context would have more than moderate scientific significance in the regional context.

It is likely that there are many additional archaeological sites in the Olympic Dam area with similar characteristics to those already assessed as having high local scientific significance. If further work confirms this, then sites recorded as having high local scientific significance would be assigned a lower level of scientific significance.

The Olympic Dam region is rich in archaeological sites, but most have only low scientific significance and no salvage potential. Of the archaeological sites already recorded, the 14 with the highest significance in the local context have moderate to very high salvage potential. Five of these have been salvaged already and five of the remaining nine have high to very high salvage potential. The residual impact is categorised as low.

17.5.2 ONGOING INVOLVEMENT OF ABORIGINAL COMMUNITIES

The ongoing involvement of the Kokatha, Barngarla and Kuyani groups in protecting and managing Aboriginal cultural heritage sites and values will be governed by the Heritage Management Protocol and, more generally, the Olympic Dam Agreement (as it is fully implemented). The Olympic Dam Agreement includes:

- the Heritage Management Protocol, containing an agreed process for managing the impacts of the expanded project on Aboriginal cultural heritage sites and an ongoing Aboriginal cultural heritage protection and management regime
- payments to be made by BHP Billiton arising from the expanded project over the remaining life of the Olympic Dam mine for the benefit of the Kokatha, Barngarla and Kuyani groups and for Aboriginal people living in the region shown in Figure 17.1
- a trust for administering those payments
- employing a liaison officer whose duties would include consulting with BHP Billiton and Aboriginal people about Aboriginal cultural heritage
- establishing an Aboriginal employment and training plan to facilitate opportunities to employ Aboriginal people within the expanded project
- cross-cultural awareness training for BHP Billiton employees and contractors
- a process for managing environmental issues
- the agreement of the Kokatha, Barngarla and Kuyani peoples to BHP Billiton expanding and continuing to operate the Olympic Dam operation over its remaining life.

The Heritage Management Protocol includes:

- proceeding with the Olympic Dam Expansion in a manner that is respectful of the interests and concerns of the Native Title Parties
- funding Ethnographic Mitigation Measures (e.g. ceremonies prior to disturbance of ethnographic sites)
- having areas surveyed for archaeological sites by an archaeologist using a scientifically valid predictive sampling model prior to significant ground disturbance
- providing funding for one member from each of the Kokatha, Barngarla and Kuyani to be trained to a standard sufficient for them to be engaged as a field assistant in the undertaking of field surveys

- giving the Native Title Parties copies of each Archaeological Report it commissions
- undertaking Archaeological Mitigation Measures (e.g. undertake salvage of some archaeological sites)
- taking reasonable measures to safeguard culturally sensitive information in a manner identified by the Native Title Party that provided the information.

17.5.3 PROCESS FOR THE MITIGATION OF IMPACTS THROUGH SURVEY, SALVAGE AND MANAGEMENT

Ethnographic surveys

Where it has not already done so, BHP Billiton will conduct ethnographic surveys over areas where the proposed infrastructure for the expanded project may be located in consultation with:

- the Kokatha, Barngarla and Kuyani groups in accordance with the processes agreed in the Heritage Management Protocol
- Aboriginal groups other than the Kokatha, Barngarla and Kuyani groups who are recognised as having Aboriginal cultural heritage interests to a standard necessary to comply with South Australian Aboriginal heritage laws.

Future archaeological investigations

A program of ongoing archaeological investigations has been agreed to by the Kokatha, Barngarla and Kuyani groups. The program includes the participation of Aboriginal archaeological field trainees nominated by the groups to accompany qualified archaeologists.

The program has been designed to mitigate the impact of the expanded project by undertaking:

- field survey work to record data on archaeological sites in areas not already surveyed (not all of which would be affected)
- salvage work on a selection of archaeological sites affected by necessary ground disturbance work which have special archaeological value
- identifying a similar suite of sites outside the EIS Study Area with similar values which would be protected in the long term.

The expanded project would cover a larger area than the SML and includes terrain pattern types about which there is little or no direct archaeological information. Further archaeological survey work in association with the proposed expansion would provide an opportunity to expand the database for understanding the archaeology of the Olympic Dam region. It is anticipated that the outcome of the survey program outlined below would further strengthen the predictive model and the understanding that arises from it.

In undertaking the survey work in the SML and its surrounds, two levels of field survey and recording are to be used:

- 'formal' field survey and recording where detailed records would be made of each archaeological site and its environmental setting
- 'less detailed' field survey and recording where only basic records would be made of the archaeological sites.

Field surveys and recording would also be conducted over those areas where the expanded project infrastructure corridors would be located.

'Formal' survey

Since archaeological survey work commenced at Olympic Dam in 1980 to permit assessment of the impact of the initial operation, approximately 35 km² (i.e. more than 20% of the SML) has been surveyed in detail. The ongoing program is intended to survey in detail a minimum additional 60 km² within the SML and its surrounds (i.e. at least 10% of the total area).

The formal surveys would concentrate on sample areas that target terrain patterns where there has been little recording to date and terrain patterns well away from any previously recorded areas. Sampling would occur at locations where no development works are proposed, as well as in areas that would be affected by the proposed new infrastructure.

Applying this approach in the south-eastern corner of the SML, for example, there are extensive areas of the Arcoona Quartzite terrain pattern types (see Table 17.2) that would be included in the 'formal' field survey and recording program because these types were not well covered in the 1982 EIS surveys. Conversely, less detailed survey and recording work would be undertaken in areas where there are already large numbers of archaeological site records. This includes those areas in which most of the present mine infrastructure (including the plant and tailings storage facilities) and Roxby Downs are located. Other parts of these same terrain patterns that are well away from the already well recorded areas would be included in the formal survey sample.

When archaeological sites were located in the course of the formal surveys, detailed records would be made of their environmental settings, dimensions, archaeological contents (including details of the different implement types and their raw materials) and locations with respect to sources of stone raw materials and drinking water. These records would enable predictions of the likelihood of significant sites occurring within development zones to be evaluated in detail and would help refine the identification of sites where mitigation activities would take place. They would also serve as records of those sites that eventually would be affected and/or destroyed in development areas.

'Less detailed' surveys

This method would consider the remainder of the SML and its surrounds. It would exclude areas already surveyed and/or affected by the present mine infrastructure but include areas in terrain patterns where some information already exists. Most of the categories of information recorded during formal surveys would be recorded, but in less detail.

The SML and its surrounds would be divided into survey areas corresponding to the different terrain patterns. The archaeological material located would be recorded in sufficient detail to check whether it was consistent with the predictions of the model. A basic record would be made of the locations, amounts and characteristics of such materials, which would serve as the records of those sites that eventually would be affected and/or destroyed in development areas.

Only where the archaeological material or its environmental context differs markedly from the predicted pattern would specific detailed archaeological records be made.

Field survey methods

In sand dune terrain, the field team would cover the survey areas by walking along dunes and zigzag walking across swales. On gibber plains, 'breakaway' country and drainage depressions, the field team would drive across the landscape in a series of transects. Stops would be made at features such as rock outcrops or the margins of water-holding pans to look for evidence of quarrying or for stone artefact scatters (campsites) respectively. Where gibber plains are shown to be relatively 'rich' in archaeological materials (e.g. where good flaking quality silcrete occurs prolifically), transects will be covered on foot. Isolated dunes on gibber plains will also be inspected on foot.

The detailed archaeological information from the formal survey, combined with the findings of the less detailed surveys, would increase the spatial distribution of the archaeological database to a level sufficient for BHP Billiton to assess reliably the nature, distribution and archaeological significance of the archaeological record across the EIS Study Area.

Salvage program

The Kokatha, Barngarla and Kuyani groups have agreed to a salvage program, which would involve archaeological field trainees nominated by those Aboriginal groups. The salvage program would combine field recording, collecting and excavating nominated stone artefact assemblages.

The 12 sites listed in Table 17.4 are assessed to have salvage potential and each was identified as being 'rich' in stone artefacts. That is, the sites had large numbers of artefacts at high densities, and a diverse range of artefacts made from a diverse range of raw material. The list also includes quarries with knapping floors and a few small sites with a limited number of artefacts, but with knapping floors reflecting specific kinds of stone reduction technology. The locations of the 12 archaeological sites with salvage potential are shown on Figure 17.6.

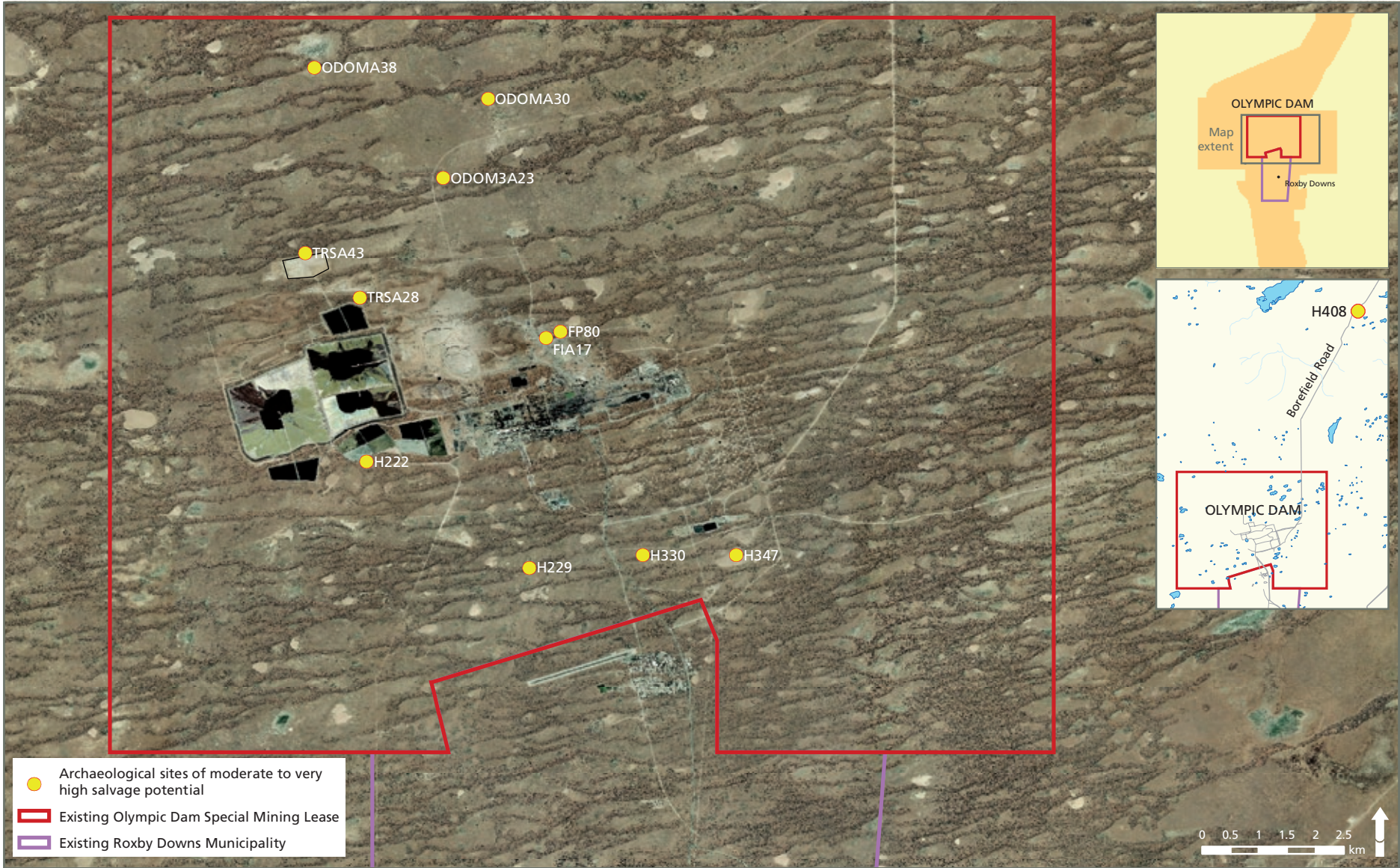


Figure 17.6 Archaeological sites of moderate to very high salvage potential

It is anticipated that the five sites considered to have high to very high salvage potential (H330, H347, FIA17, FP80 and ODO3A23, see Table 17.4) would be included in the salvage mitigation program. Any archaeological material removed during the program would be held and managed by Aboriginal people. A decision on the inclusion (if any) of the five sites considered to have moderate or moderately high salvage potential (H222, H299, TRSA28, TRSA43, ODOMA38, see Table 17.4), would be made when the archaeological survey work program was well advanced and a list of other sites with salvage mitigation potential had been prepared. The two sites that were not inspected (H408 and ODOMA30) can be assessed if they are threatened by disturbance from the proposed expansion and a decision made at that time about whether salvaging would be warranted.

It is anticipated that further archaeological sites considered to be of special scientific value would be located during future archaeological survey work. Sites that contain large, diverse artefact assemblages and/or have unusual levels of preservation and/or have materials in potentially dateable/stratified contexts would be considered to have special scientific value. Most, if not all, of these sites (including those that would be affected) would probably warrant detailed recording and/or salvage by archaeologists with expertise in the analysis of stone artefact assemblages.

Ministerial approval would be sought as required by South Australian Aboriginal heritage legislation before any salvage work commenced.

Salvage method

Sites deemed to have special scientific value and selected for further work would be recorded in greater detail. These recordings would document the spatial pattern of artefacts across the site, and the dimensions and technical features of artefacts. This would typically involve laying out a grid over the site and individually recording all the specimens within each grid square. Alternatively, sites in which the artefacts lay on stable surfaces (e.g. quarries on pans or gibber plains) might be more appropriately recorded by laser plotting each artefact prior to recording. This process of recording facilitates decisions about whether collection or excavation is required, and if so where to focus that salvage work.

Some of these sites would also be salvaged, or partially salvaged. Where the excavation potential was minimal, salvage would take the form of collecting specimens after their location within the site had been recorded. Specimens would be bagged, labelled, catalogued and packed for transportation to a laboratory where they would be measured, photographed and, where appropriate, joined back together (conjoined). Specialist studies may be able to reveal the functions of some artefacts through studies of the residues and wear left on artefact surfaces. These practices provide an accurate archival record of the specimens which would be stored as a permanent document of past human activities at the site, as well as revealing the nature of those activities. The resulting data would test and

enhance interpretations of the predictive model in terms of human settlement and landscape use. Sediment samples from beneath artefacts would also be collected to enable further analyses in the future (e.g. luminescent dating).

Where buried materials exist, limited excavations using standard archaeological techniques would be carried out. Such excavations would allow the abundance of sub-surface artefacts to be quantified, permit their stratigraphic/vertical distribution to be identified and potentially reveal when the area was occupied and the nature of change in occupation at selected sites.

Long-term management of archaeological sites

A widely adopted form of cultural heritage mitigation is to identify and record a suite of archaeological sites similar to those that would be affected, which could be permanently preserved in areas that would not be directly affected by development and, to the extent practicable, would include sites of special scientific value.

Additional survey work would be undertaken within and outside the EIS Study Area to identify this representative suite of archaeological sites. In particular, areas proposed to be set aside to provide a significant environmental benefit (SEB) as required by the *Native Vegetation Act 1991* (see Chapter 15, Terrestrial Ecology) would be surveyed to identify their archaeological value.

17.5.4 PROCESS FOR MANAGING SITES WHERE DISTURBANCE CANNOT BE AVOIDED

Ethnographic sites

The proposed expansion would involve extensive land disturbance within the SML and its surrounds over time. This would be necessary to construct and operate the new open pit mine and associated facilities, including the rock storage facility (RSF), metallurgical plant and tailings storage facilities (TSF). As a result, the impact on some places identified as having ethnographic significance would be unavoidable.

The infrastructure corridors and the proposed desalination plant would also require some ground disturbance, although, where practical, infrastructure would be located to avoid places of significance to Aboriginal people.

The potential impact of the expanded project on ethnographic sites was recognised by BHP Billiton and the Aboriginal parties from the outset of negotiations for the Olympic Dam Agreement. The need to manage impacts in an appropriate and sensitive manner was one of the issues discussed.

The Heritage Management Protocol provides a detailed regime to manage the effect of ground disturbing activities on the Aboriginal cultural heritage sites and values. Elements of that regime include:

- representatives of each of the Kokatha, Barngarla and Kuyani groups who have appropriate cultural authority would conduct an ethnographic inspection of previously identified ethnographic sites within the SML and its surrounds, accompanied by a qualified anthropologist who would report on the outcome of that inspection in collaboration with the Aboriginal groups
- the Aboriginal groups would determine a culturally appropriate schedule of mitigation measures that could include:
 - conducting ceremonies
 - further visits to and inspections of particular places of significance
 - cultural recording using appropriate media
- BHP Billiton funding the mitigation measures.

In relation to the infrastructure corridors and the proposed desalination plant, BHP Billiton would consult with Aboriginal stakeholders and endeavour to minimise or mitigate against impact. If impact could not be avoided, BHP Billiton would seek Ministerial approval to disturb those sites as required by South Australian Aboriginal heritage legislation.

Archaeological sites

All project development works requiring the surface to be cleared with heavy earth-moving machinery have the potential to affect sites in those areas. The proposed expansion would involve open pit mining and the associated RSF, the construction of roads, access tracks, buildings, plant and the expanded TSF. Because archaeological materials occur throughout the SML and its surrounds, it is impracticable to make specific recommendations as to the siting of the components of the development based on archaeological factors; it is highly likely relocating the components because of their impact on certain archaeological sites would only cause similar impacts on the newly selected locations. In any event, the residual impact of disturbance to sites has been categorised as moderate.

Where practical the infrastructure corridors and the proposed desalination plant would be located to avoid archaeological sites. If such sites could not be avoided, BHP Billiton would seek Ministerial approval to disturb them as required by South Australian Aboriginal heritage legislation, and in so doing would consult with Aboriginal stakeholders and endeavour to minimise or mitigate against impacts.

17.5.5 PROCESS FOR MANAGING THE UNANTICIPATED DISCOVERY OF CULTURAL MATERIAL REMAINS

The Heritage Management Protocol sets out the agreed process for managing the unanticipated discovery of cultural remains. This includes stopping work immediately and notifying the authorities, Aboriginal parties and site management in accordance with legal requirements. If required, BHP Billiton would facilitate the relocation or disposal of the remains in a culturally appropriate manner.

Implementing this management process throughout the planning, construction and operation phases of the proposed expansion would ensure that the residual impact was low.

17.5.6 ABORIGINAL CULTURAL HERITAGE AWARENESS TRAINING

BHP Billiton currently has an induction program for all new employees and contractors at Olympic Dam, which includes a cross cultural awareness component. As part of the Olympic Dam Agreement, cross cultural training of staff is recognised as an important means to protect the Aboriginal cultural values of the region. The aim of the training is to:

- ensure all employees, contractors, sub-contractors, and consultants are aware of Aboriginal traditions and culture
- promote a knowledge and understanding of, and respect for, Aboriginal tradition and culture
- foster good relationships between Aboriginal and non-Aboriginal people
- instil an understanding of the Olympic Dam Agreement and the Heritage Management Protocol.

17.6 FINDINGS AND CONCLUSIONS

The following summarises the findings and conclusions from the Aboriginal cultural heritage assessment:

- Aboriginal heritage sites and values in the Olympic Dam region have been extensively studied over the past 35 years and will continue to be investigated as part of the proposed expansion
- the Olympic Dam region is rich in archaeological sites, but most have low scientific significance and no salvage potential
- the Olympic Dam Agreement, signed in January 2008, sets out the terms and conditions upon which the Kokatha, Barngarla and Kuyani Aboriginal people agree to the Olympic Dam Project, and includes a regime for the ongoing protection and management of Aboriginal cultural heritage sites and values
- the Heritage Management Protocol has been developed in consultation with, and with the agreement of, the Kokatha, Barngarla and Kuyani groups. It contains a procedure for managing impacts of the proposed expansion on Aboriginal cultural heritage sites and values within the EIS Study Area

- sites of potential ethnographic significance have been identified near some of the proposed infrastructure components. For the Kokatha, Barngarla and Kuyani groups, these sites will be managed in accordance with the Heritage Management Protocol. Further consultation will be undertaken with the Nukunu, Dieri, Adnyamathanha and other groups if any identified sites are potentially affected by the expansion and to keep other groups informed at Outer Harbor and the Port of Darwin.