

Archaeological assessment of
Indigenous Heritage values in the
Central Precinct of the St Marys Development Site, St Marys

April 2009



Report to Maryland Development Company

Executive summary

The Central Precinct comprises c.133 ha of land within the St Marys Development site. The Central Precinct's eastern boundary is formed by a 40h Regional Open Space (ROS) zone. Both the Central Precinct and ROS have been deemed as developable land under the SREP 30.

When the central part of the St Marys Site is considered, there is a significant conservation outcome with respect to Indigenous archaeological cultural heritage. More than 51% of the land here falls within the Regional Park, and of this land almost 33% has high conservation value (i.e. is zone 1) and another 54% has archaeological sensitivity (zones 2 and 3).

Of the Zone 1 land identified between South Creek and its major tributary, 97% falls within the Regional Park.

Five salvage locations within Central Precinct (including the boundary fence impact) and another two locations within the ROS have been identified as locations which fulfil the representativeness criteria of the SMM. A further location has been identified as requiring salvage if a proposed water detention basin is located at the northern end of the Precinct (Figures 20, 21; Table 9). Salvage of these seven/eight landscapes will add fundamentally to our understanding of Aboriginal occupation of this area throughout its human occupation.

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1. INTRODUCTION AND BACKGROUND

1.1 Background

The former Australian Defence Industries (ADI) site at St Marys, now known as the St Marys Development site, was endorsed by the NSW Government for inclusion on the Urban Development Program (UDP) in 1993. The site was seen to present an opportunity to provide housing for Sydney's growing population within an environmentally sustainable framework.

The St Marys site is located approximately 45km west of the Sydney CBD, 5km north-east of the Penrith City Centre and 12km west of the Blacktown City Centre. The main western railway is located approximately 2.5km south of the site. The Great Western Highway is located another 1 km south and the M4 Motorway a further 1.5km south.

The overall Site had an area of 1,545ha. It stretches approximately 7 kilometres from east to west and 2 kilometres from north to south, from Forrester Road, St Marys in the east to The Northern Road, Cranebrook in the west. It is bounded by Llandilo and Wilmott in the north and Cambridge Gardens/ Werrington County and the Dunheved Industrial Area in the south (see Figure 1).

Given that the site straddles the boundary between two local government areas (Blacktown and Penrith); the Government decided that a regional environmental plan should be prepared for the site. Technical investigations into the environmental values and development capability of the land were commenced in 1994, and the Regional Environmental Plan for St Marys [Sydney Regional Environmental Plan No. 30 (SREP 30)] was gazetted in January, 2001. It zoned the land for a combination of 'urban', 'employment', 'regional open space', 'regional park', 'road and road widening' and 'drainage' uses (Figure 2).

In view of the original scale of the residential and employment uses, a package of documents was prepared to guide and control development. It comprised the REP (maps and written instrument), and an Environmental Planning Strategy (EPS) which sets out performance objectives and strategies to address key aspects associated with the site, including: conservation, cultural heritage, water and soils, transport, urban form, energy and waste, human services, employment, and land contamination.

A Deed of Agreement was entered into in December 2002, between the landowner and developers of the land (a Joint Venture comprising ComLand and Lend Lease Development) and the NSW Government. This sets out the developer's and State Government's responsibilities in providing services and infrastructure.

SREP 30 identified 6 development "precincts", known as the Western Precinct, Central Precinct, North and South Dunheved Precincts, Ropes Creek Precinct and Eastern Precinct. SREP30 requires that a Precinct Plan be adopted by Council prior to any development taking place. Planning for any precinct is to address all of the issues in SREP30 and the EPS, including preparation of management plans for a range of key issues.

In March 2002 the Australian Heritage Commission (AHC) declared that additional areas of the site should be included on the Register of the National Estate (RNE) and be set aside for Regional Park, on the grounds of their environmental value. This had the effect of changing the boundaries of the areas to be set aside for conservation, and areas available for residential and employment development (see Figure 3). In April 2006, the precinct boundaries in SREP 30 were amended to reflect the RNE boundaries.

Initial planning for the St Marys site suggested that development would commence with the Western Precinct adjacent to The Northern Road, progressing eastwards through the site. However, the listing of additional lands on the Register of the National Estate changed this. The Joint Venture decided that the focus of initial development should commence with the Eastern Precinct, while boundary adjustments were resolved. Since then the Ropes Creek Precinct and Dunheved Precincts have similarly progressed through the Precinct Planning stages.

In September 2006 the Minister for Planning declared the Central Precinct a Release Area, paving the way for the preparation of a Precinct Plan for this area. The Western Precinct Plan is being prepared concurrently with the Central Precinct Plan (JMcD CHM 2008b).

In December 2007, the Minister for Planning directed the preparation of a draft amendment to consolidate and rationalise the employment lands on the St Marys development site. This is proposed to entail a relocation of the Employment zone from the Western Precinct to the Central Precinct.

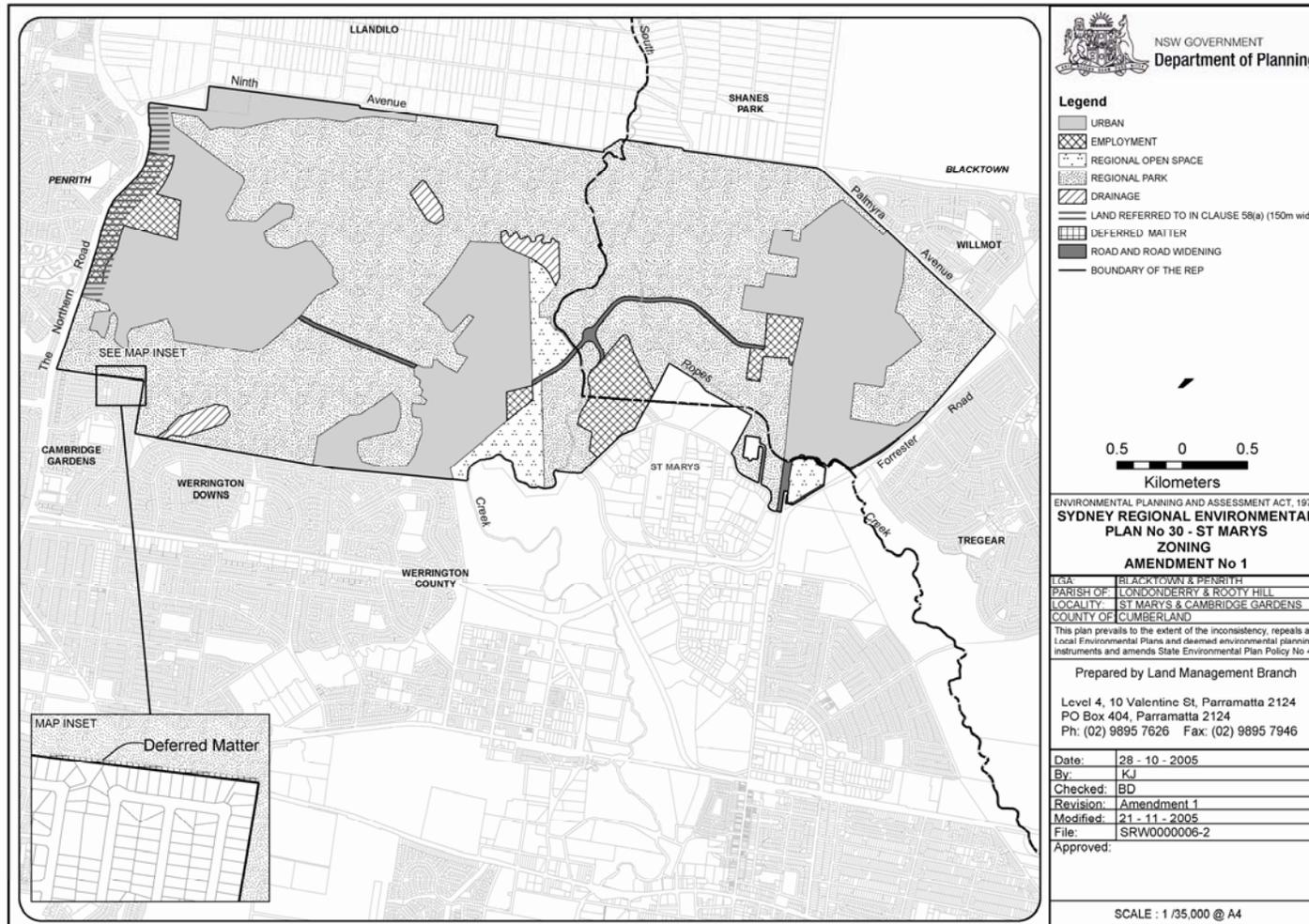
Figure 1: Aerial photograph of the St Marys site.



The Central Precinct is proposed to be developed for residential uses, employment land with related uses including retail/commercial, community uses, open space, drainage infrastructure and roads.

This report has been prepared in accordance with the requirements of SREP 30 and the St Marys EPS, and addresses all relevant legislation. It is also written in accordance with the Principles defined in the Penrith City Council's *Sustainability Blueprint for Urban Release Areas* (PCC 2005) - specifically Principles 1 and 2. It supports the draft Precinct Plan for the Central Precinct. While the report's focus is on the Central Precinct specifically, the investigations carried out have taken into account the implications of planning for the nearby Western Precinct, the installation of a fauna

Figure 2: The St Marys Precinct boundaries as defined in the SREP 30 (subject to amendment under a current draft SREP30 amendment). The Central Precinct is west of South Creek and east of the Western Precinct.



fence around the Regional Park and in particular the conservation outcome achieved in this central part of the St Marys Project.

1.2 Introduction to Indigenous cultural heritage management issues

The Sydney Regional Environmental Plan No. 30 – St Marys (SREP) and the St Marys Environmental Planning Strategy (EPS) were gazetted in January 2001. These documents outline the processes, guidelines and objectives to be adopted for Precinct Planning following the declaration by the Minister for Urban Affairs and Planning of a Release Area on the site. This report relates to the Central Precinct (Figure 4). This Indigenous archaeological assessment forms part of a suite of investigations being undertaken as part of the Precinct planning process.

The Interim Heritage Management Report, ADI Site, St Marys classified the site into four management zones based on archaeological sensitivity (Figure 5). Management strategies were recommended for each of these (JMcD CHM 1997a). The Section 22 Committee concluded (Draft Report of the Section 22 Advisory Committee for the ADI Site St Marys July 1997) that:

- ☉ The Committee supports ... and accepts that the Core Conservation Zone (i.e. within the Regional Park) which has been proposed forms a suitable basis for the conservation of Aboriginal Heritage on the site;
- ☉ there is a suitable information base to make decisions about planning of the site; and,
- ☉ the outline of an appropriate set of strategies and protocols for controlling future development has been identified.

Previous work (JMcD CHM 1997a) and the EPS defined a conservation outcome for the majority of lands with Indigenous cultural heritage values in the Central Precinct. Following on from the logic and methodology of the previous work (and see JMcD CHM 2003, 2004, 2006d) and the planning outcome, the Central Precinct is assumed to be all developable land. The conservation of archaeological sites/Indigenous cultural heritage features within this area is not envisaged and therefore it is assumed that the management of any identified features which are assessed as having potential

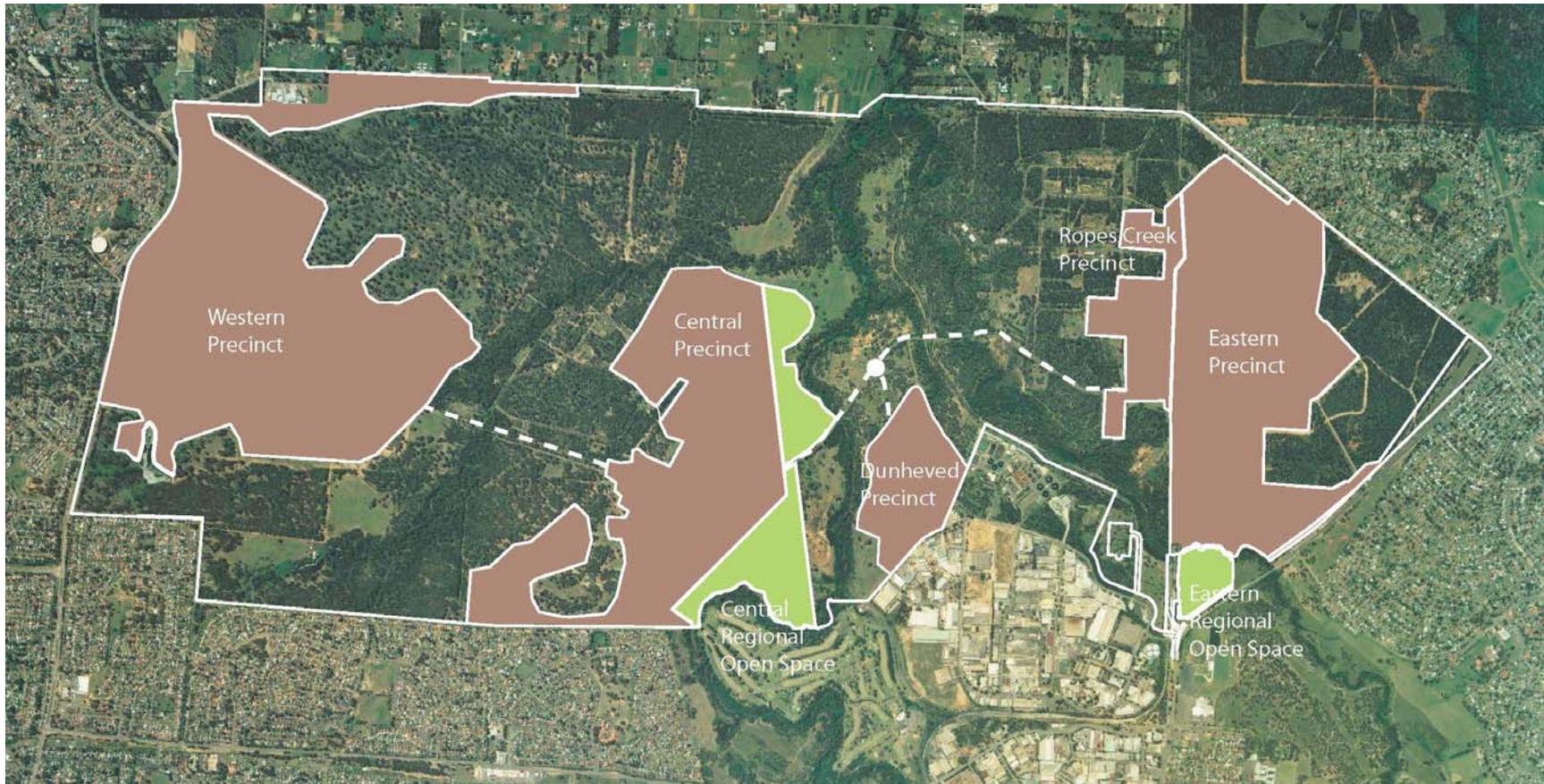
and/or significance within this area would be managed by way of mitigation (i.e. salvage excavation). Given this assumption, the methodology for undertaking the archaeological component of this work has been as follows:

- ☉ Identify what lands within the Central Precinct fall within Archaeological Zones 1, 2 and 3 (i.e. those which may require further archaeological investigation);
- ☉ Overlay the management zones with topography and landscapes to identify the representative range of landscapes and proportions of these in the four archaeological zones (i.e. identify management options for potentially intact Aboriginal heritage landscapes);
- ☉ Consult with the Deerubbin Local Aboriginal Land Council and other Indigenous stakeholder groups, i.e. Darug Custodians Aboriginal Corporation Darug Tribal Aboriginal Corporation, Darug Aboriginal Cultural Heritage Assessments and Darug Land Observations;
- ☉ Confirm by field inspection locations with limited previous land-use disturbance (from Zones 1, 2 and 3) within the Central Precinct. This would include ground-truthing of existing levels of disturbance, the presence of surface evidence of archaeological sites and the identification of likely locations to undertake future site investigations;
- ☉ Document the available information and results of field survey, making appropriate management recommendations in relation to this development Precinct; and,
- ☉ Write a report detailing the results of these investigations, identifying any development constraints and opportunities. An appraisal of the strategic management model's utility, in terms of dealing with Indigenous archaeological features across the Central Precinct, will be made.

1.3 Summary of current assessment and recommendations

The Central Precinct comprises c.133 ha of land within the St Marys Development site. The Central Precinct's eastern boundary is formed by a 40h Regional Open Space (ROS) zone.

Figure 3: The St Marys Development site showing development Precincts. The Central Precinct is in the middle of the former ADI Site, to the west of South Creek.



When the central part of the St Marys Site is considered, there is a significant conservation outcome with respect to Indigenous archaeological cultural heritage. More than 51% of the land here falls within the Regional Park, and of this land almost 33% has high conservation value (i.e. is zone 1) and another 54% has archaeological sensitivity (zones 2 and 3).

Of the Zone 1 land identified between South Creek and its major tributary, 97% falls within the Regional Park.

Five salvage locations within Central Precinct (including the boundary fence impact) and another two locations within the ROS have been identified as locations which fulfil the representativeness criteria of the SMM. A further location has been identified as requiring salvage if a proposed water detention basin is located at the northern end of the Precinct (Figures 20, 21; Table 9). Salvage of these seven/eight landscapes will add fundamentally to our understanding of Aboriginal occupation of this area throughout its human occupation.

It is recommended that:

1. There is a significant conservation outcome in this central part of the St Marys Site, with more than 51% of the total land area and almost 97% of the land with high archaeological sensitivity being excluded from the developable lands.
2. The basic precepts of the strategic management model are achieved by the planning process.
3. Eight target areas within the developable lands (including the ROS and proposed water basin) are identified as requiring archaeological salvage prior to development taking place (Table 9).
4. It is recommended that precinct-wide s90 consent should be sought for the Central Precinct. Depending on the timing of the proposed works programme, the Proponent should apply to the DECC NSW for either a s87 Permit or a s87/s90 Consent with Salvage to undertake these salvage works. In either case, the research design presented here should direct the nature and scope of the archaeological works undertaken.

2. ABORIGINAL CONSULTATION

The St Marys Development falls within the boundaries of the Deerubbin Local Aboriginal Land Council (DLALC). The study area also falls within the area of interest to the Darug Tribal Aboriginal Corporation (DTAC) the Darug Custodial Aboriginal Corporation (DCAC), Darug Aboriginal Cultural Heritage Assessments (DACHA) and Darug Land Observation's (DLO). These last two groups have resulted from splits within the DTAC group.

Fieldwork was done around the Central Precinct in 2004, with the survey of the initial fauna fence proposal. This was undertaken between Monday 7th June and Friday 11th June, and the archaeologist (Mark Rawson) was accompanied by Steve Randall (DLALC) on the 7th and 10th June, Jamie Eastwood (DCAC) on the 8th June, Justine Copeland (DCAC) on the 10th June, Celestine Everingham (DTAC) on the afternoon of 8th June, and Leanne Wright (DCAC) on the 11th June 2004.

Survey of the proposed realignment to the fauna fence route was undertaken on Thursday 8th December and Friday 9th December 2005. This time, the archaeologists (Amy Stevens and Andrea Ward) were accompanied by Phil Khan (DLALC) on the 8th December and by Justine Copeland (DCAC) and Gordon Morton (DTAC) on 9th December.

In 2007 the consultative process has involved a survey of the Central Precinct. As with previous phases of the St Marys Project, the Deerubbin LALC, DTAC, DCAC, DACHA have been consulted with. Representatives of all four groups were briefed at the commencement of the Precinct Planning phase. All four groups have participated in the field survey of the Central Precinct (NB. Gordon Workman who represented DTAC during his participation in the survey is now with DLO). This was undertaken in October and November, and the archaeologists (Fran Scully, Andrea Ward and Sam Higgs) were accompanied by Steve Randall (DLALC) on the 29th and 30th October and Justine Copeland (DCAC), Gordon Morton (DACHA) and Gordon Workman (DTAC/DLO) on the 5th and 6th November 2007. The draft of this report was circulated to all groups for further discussion of the salvage options on the 23rd May 2008. All groups have indicated that they will produce reports on the cultural values of the Central Precinct lands (Appendix 5 contains those reports received at this time of this report's production).

3. ADI SITE: STRATEGIC MANAGEMENT MODEL

3.1 Strategies for managing Indigenous Archaeological Sites

Background

The former ADI Site at St Marys included approximately 1,500ha of land which have been the subject of planning studies since the early eighties (Koettig 1980, Smith 1989). In 1994 a Regional Environmental Study was undertaken (Kinhill 1994) as were more intensive studies for the section 22 committee process (McDonald and Mitchell 1994). These studies resulted in more than 45% (670ha) of the Site being identified as having high conservation value – for both Indigenous heritage and biodiversity. This land with high conservation value was recommended to be included in a Regional Park. A subsequent Australian Heritage Commission listing added 273ha (with mixed archaeological sensitivity) to the conservation outcome, and the Regional Park will now comprise approximately 900ha.

The early planning work was targeted at providing a conservation outcome for Indigenous cultural heritage generally across the Site, and at facilitating the systematic management of Indigenous cultural heritage in the resultant development Precincts. A strategic management model (SMM) was devised, the overriding aim of which was the preservation of a representative sample of intact landscapes across the St Marys Project (McDonald & Mitchell 1994, Jo McDonald CHM 1997a, 2003, 2005, 2006). Previous land use disturbance and a predictive model were used to identify areas with high conservation potential (i.e. the least disturbance), and representative landscapes where a variety of different types of archaeological sites are predicted to occur. The SMM was seen as a meaningful management outcome which could be refined throughout the life of the Project.

The SMM for the St Marys Project is predicated on a landscape-based philosophy. Rather than targeting only sites of known surface extent or known significance (e.g. through sub-surface investigation) landscape parameters are defined. The management of these landscapes is based on their conservation potential.

Most archaeological sites in western Sydney are open stone artefact scatters. Different site types (base camps, quarries, etc.) provide information on the different ways that the

Plain landscapes were used by Aboriginal people. It is the variety of site types which have the potential, through their content and distribution across the region, to enhance our general model of prehistoric human occupation on the Cumberland Plain. Various types of evidence are likely to be present across the St Mary Project because of the range of landscapes present. Conservation potential here was high because a large proportion of this land has remained relatively undisturbed.

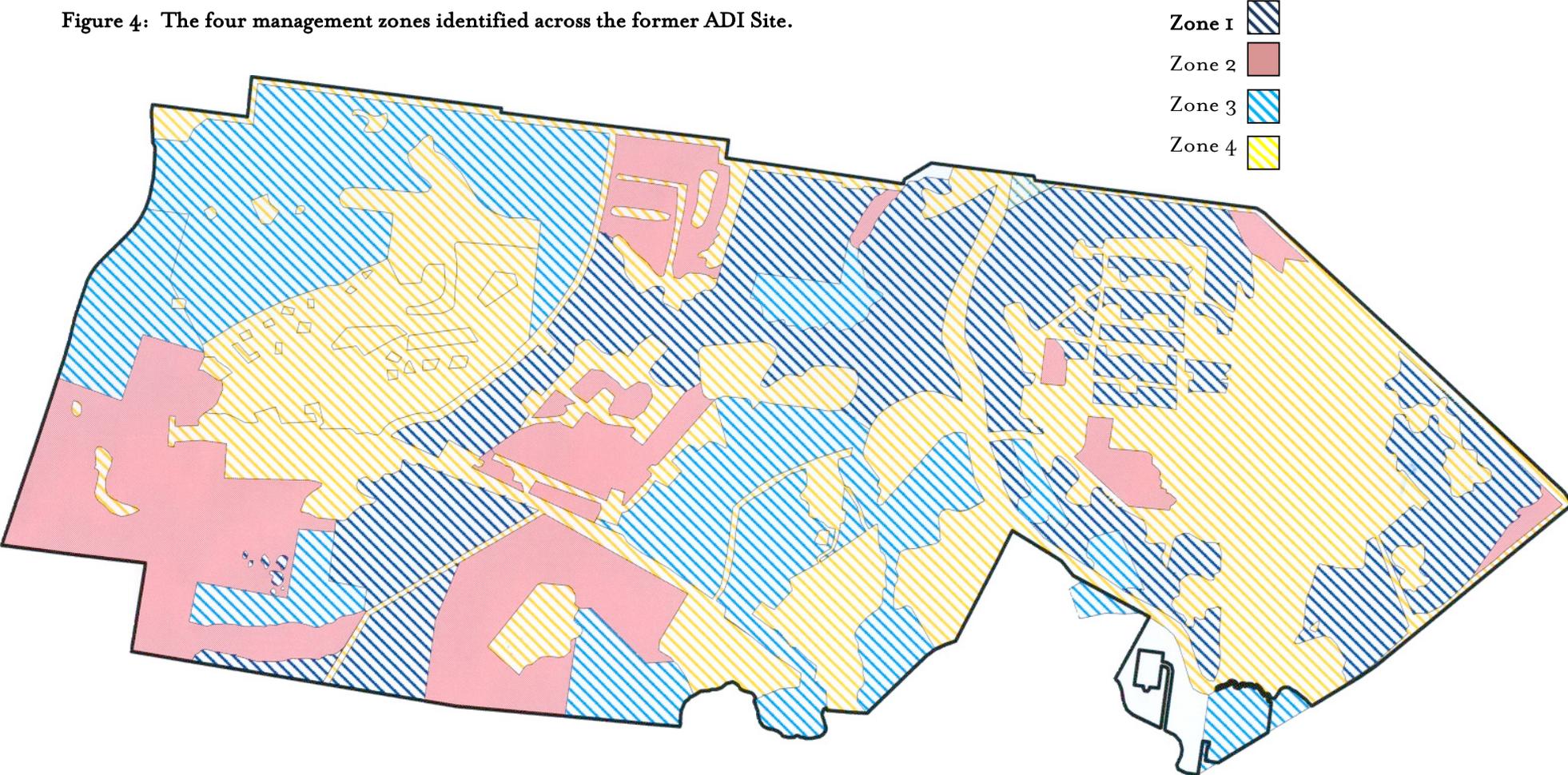
The SMM principles are summarised as follows:

- ☉ The primary selection criterion for the conservation strategy was the selection of landforms which have been minimally disturbed by land-use practises over the last 200+ years;
- ☉ A similarly important criterion for the selection of conservation areas was that these must provide, and be representative of, the range of landscapes present across the St Marys Project;
- ☉ Regionally threatened landscapes, sites of recognised regional significance (i.e. rarity) and areas of significance to the Aboriginal community should also be included in the conservation area, as long as these are in good condition;
- ☉ A predictive model of Aboriginal site occupation on the Cumberland Plain has been devised, since some landscapes contain archaeological sites of higher significance than others;
- ☉ Landscapes which have been comprehensively disturbed by soil removal and/or rearrangement (which includes much of the Central Precinct) are of limited potential for archaeological sites. These require no further archaeological investigation and pose no constraint for development.

Four zones were devised with different designated management outcomes (Figure 5).

- ☉ Zone 1 – Very high potential for intact archaeological evidence; potential conservation zone
- ☉ Zone 2 – High potential for intact archaeological evidence;
- ☉ Zone 3 – Moderate potential for intact archaeological evidence;
- ☉ Zone 4 – Low-no potential for intact archaeological evidence. no further work required

Figure 4: The four management zones identified across the former ADI Site.



Zone 1 was identified initially as the potential conservation zone. From this, based on a number of criteria, the Core Conservation Zone was selected (JMcD CHM 1997a: Figure 7). The CCZ falls within the defined Regional Park. The Regional Park includes areas identified with varying archaeological values - both high conservation potential (i.e. the CCZ) along with other areas which have lesser potential for intact archaeological sites but which have other conservation values (e.g. flora and fauna biodiversity). It was envisaged that no development would take place within the CCZ and that this would be managed into the future on the basis of its Aboriginal heritage values. It was also proposed that no archaeological investigations - these being inherently destructive - would take place within the CCZ.

Protocols and strategies in a Management Plan are currently being developed by DECC (formerly NPWS NSW) for the Aboriginal (archaeological) Conservation Areas within the Regional Park (Katie Littlejohn DECC, pers. comm., 2007). The nature and range of impacts which are likely to be acceptable within the archaeological CCZ will be limited.

The Central Precinct is the developable land of interest to the current planning activity. There is no constraint to development in this Zone. Around 30% of the Central Precinct is Zone 4 (see below), with minimal or no archaeological potential. There is a very small area of Zone 1 (2.4ha; 1.8%) but quite large areas of Zones 2 and 3.

The SMM presumes that once the conservation zone had been designated and the Regional Park finalised that the remaining lands (the Precincts) would be developable and that the archaeology here would be affected by a range of development impacts. It was also envisaged that landscapes with sensitivity in the Precincts would provide the archaeological evidence (through salvage) documenting both the areas to be impacted by the Precinct and likely to be conserved within the adjacent Regional Park.

3.2 Management Protocols

Strategies and protocols have been developed to guide ongoing Aboriginal heritage work in the development precincts. These have needed to be flexible and to develop robust compliance/validation procedures. The aim of the SMM was to streamline the

development process and minimise undue procedural delay. It was also desirable to increase the usefulness of archaeological investigations undertaken.

These protocols have already been applied in the Eastern, Ropes Creek and Dunheved Precincts. Continuing consultation with the DECC and the Aboriginal community has been undertaken in all of these Precinct Planning works and regulatory changes have meant that some aspects of the SMM have now been refined. The current approach has been endorsed in the previous Precincts (see Figure 6):

1. All archaeological works are undertaken according to a research design that encompasses the entire St Marys Project and targets specific landscapes within the development Precincts for further investigation. This work is completed prior to development commencing and entire development precincts are investigated at one time. The research design, while broadly inclusive for the St Marys Project recognises development phasing and prioritises impact investigations.
2. The targeting phase in each precinct will identify which lands from each of the zones will require further investigations and which will require no further archaeological work.

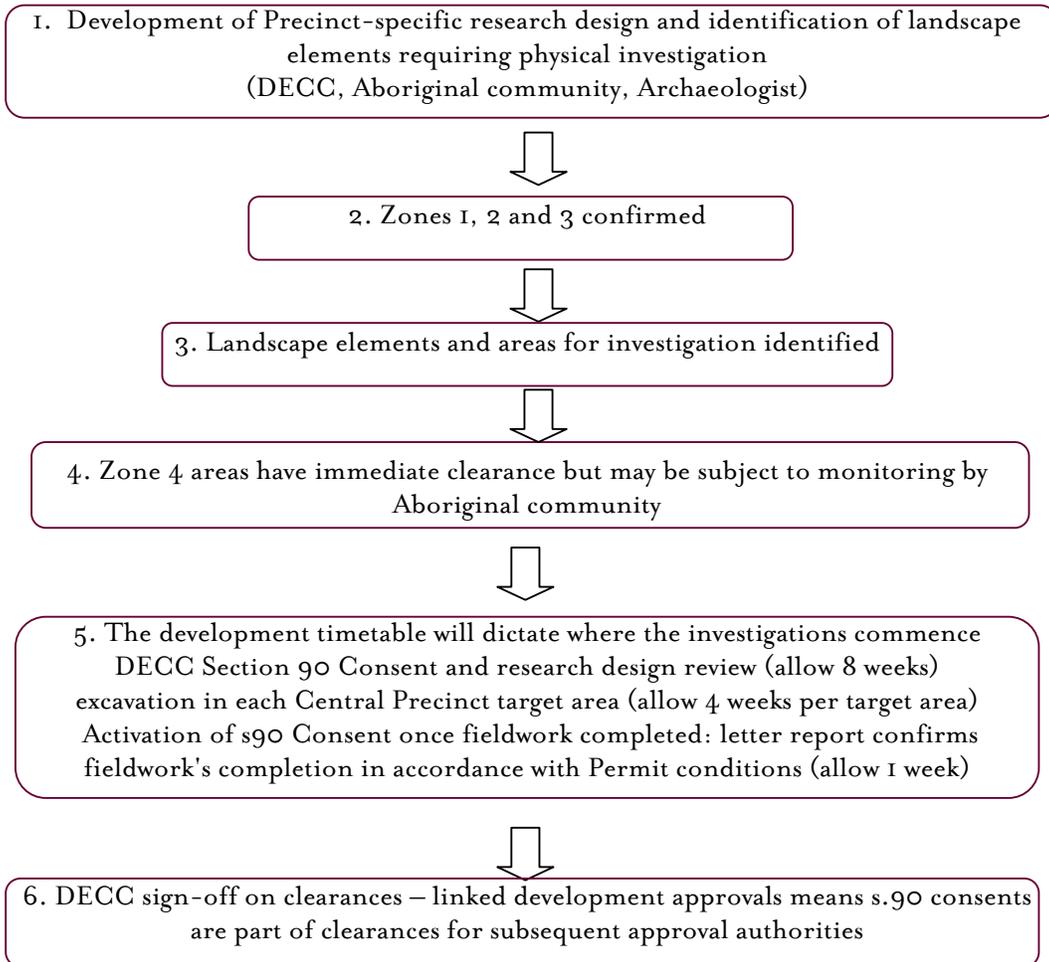
Zones 1, 2 and 3 in the developable lands have high, good and moderate archaeological potential. A range of representative landscapes from these zones should be targeted for investigation as per the overarching research design. All investigations include a testing phase and an open area excavation phase (of features/sites within landscapes to ensure statistically viable assemblage samples).

Zone 4 lands have had such high levels of previous land-use disturbance that they have no archaeological potential. No further archaeological work is required in Zone 4.

3. The selection procedure and consultation process forms part of the regulatory process. Once selection of target areas is complete, the proponent applies to DECC NSW for a whole of Precinct s.90 consent. This is granted on the condition that salvage excavation is completed in the designated target areas. Development is allowed to proceed in those parts of the developable land not affected by further archaeological investigation;
4. Upon completion of fieldwork in each target area, a clearance report is submitted to DECC, allowing the proponent to activate the s90 consent in that target area to allow construction to proceed. Full reporting on the excavation and analyses phases will be completed in due course and will be subject to review by DECC. The Aboriginal community may wish to monitor construction activity - but at this stage the archaeological requirements of the regulatory authority would be deemed complete.

There is a normal time limit of two years on s90 Consents. It has been general practise with the preceding Precincts to apply for a longer (generally 5 year) time period to ensure that all works associated with the Precinct development are covered by this s90;

Figure 5: Central Precinct - Protocols and strategies flow chart.



The Strategic Management Model has the following advantages:

- ☉ The cultural heritage process is predicated on a conservation outcome which has been endorsed by the s.22 Committee. The conservation outcome is in lands now designated Regional Park.
- ☉ The SMM enables planning and development of the St Marys Project to proceed with certainty and clarity. The Precincts are designated developable lands but with varying levels of archaeological sensitivity. Salvage from these sensitive areas

provides the archaeological evidence upon which management of the Conservation Area will be based, and by which an understanding of the cultural heritage resource can continue to be developed. It also provides for the mitigation of impacts on archaeologically sensitive landscapes.

4. THE STUDY AREA - THE CENTRAL PRECINCT

The Central Precinct is located at the centre of the St Marys Development (Figure 4). It covers an area of c.132.9ha. It is to the west of South Creek and the east of the tributary creek line which separates this from the Western Precinct. The Regional Park surrounds the Precinct, and along the eastern side of the Precinct, adjacent to South Creek, is an area of Regional Open Space (40ha). The preliminary concept plan for the Central Precinct is shown (Figure 7).

4.1 Geology

The three main landscapes identified within the former ADI Site are shale hillslopes (42%), Tertiary Terrace (28.5%) and Quaternary floodplain (30%: Table 1). Their proportions and levels of disturbance were mapped and calculated during the 1997 investigations (JMcD CHM 1997b: see Table 15). Quaternary alluvium is the dominant landscapes in this Precinct covering over half of the area followed by shale hillslopes (Table 2). A small amount of Tertiary Terrace is also located here. Active creek channels/floodplains account for the remaining land area.

Table 1: Proportions of landscape types within the St Marys Development.

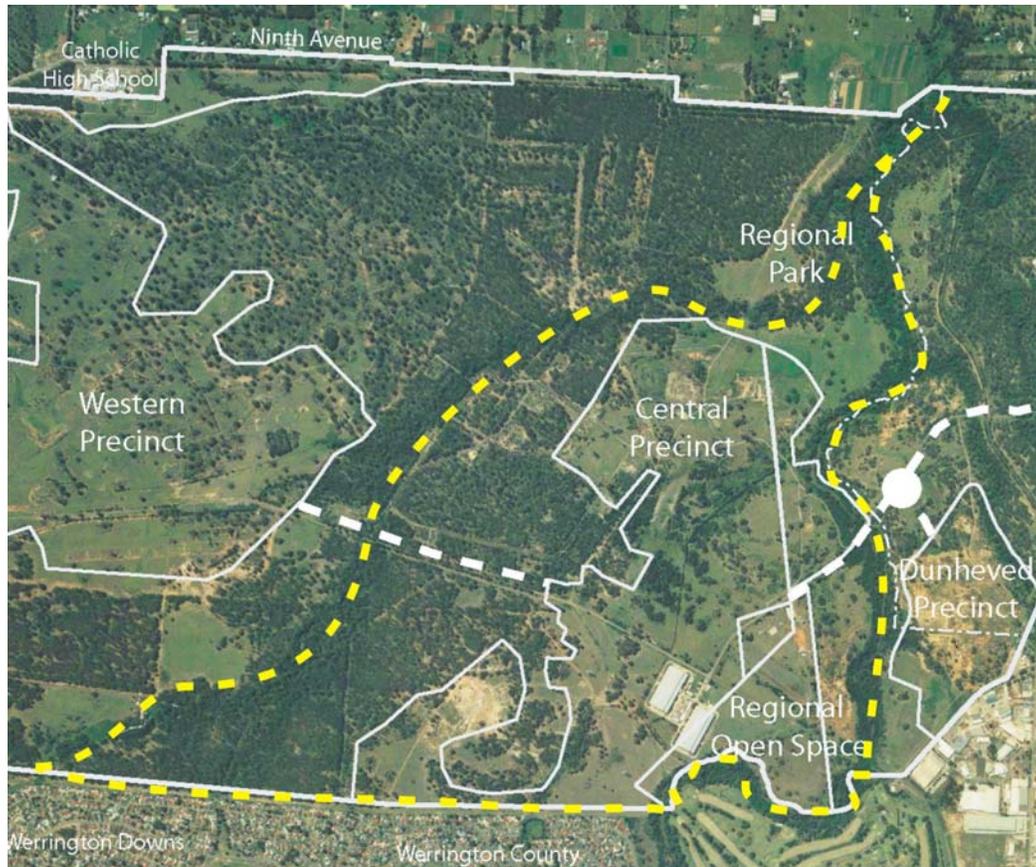
Landscape	Hectares	%f
Shale uplands	624	41.6
Tertiary terraces	427	28.5
Quaternary alluvium (including channels)	448	29.9
	1,499	100

Table 2: Proportions of landscape types in the Central Precinct.

Landscape	Hectares	%f
Active creek channels	6.0	4.5
Tertiary terrace	8.2	6.2
Shale uplands	49.5	37.2
Quaternary alluvium	69.2	52.1
	132.9	100.0

Of particular interest to the current analysis is both the proportion of these landscapes within the Regional Park (RP) and those within the Central Precinct (CP: Table 3, Figure 8). The proportions of these representative landscapes in good condition (both in the RP and the CP) needs review when the conservation outcome at this part of the St Marys Development Site is considered.

Figure 6: Air photo showing the Central Precinct within the area assessed in this report as 'central St Marys Project' (i.e. yellow dashed outline).



The conservation outcome in this central part of the former St Marys Project is significant. The centre of St Marys Project covers approximately 377ha (taking the westerly tributary creek line and South Creek as the boundaries). As the Central Precinct is 132.9 hectares and the Regional Open Space 40 hectares, the conservation outcome in the Regional Park represents more than 54% of the overall land area.

The conservation outcome for the different landscapes in this central part of the Regional Park can also be considered. Almost 70% of the shale hillslope landscape falls within the Regional Park, although lower proportions of the Quaternary alluvium

(27%) will be in the Park. Almost half of the Tertiary terrace in this central part of the Site will be within Regional Park (Table 3). Active creek channels are omitted from this discussion as these landscapes do not preserve *in situ* archaeological evidence.

In terms of the representativeness of landscapes being conserved within the Regional Park (see Table 3) all landscape types will be conserved - although less than a third of the dominant landscape (Qal) will be protected. An excellent proportion (70%) of the Shale hillslope will be preserved - as will almost half of the Tertiary terrace. This is a substantial conservation outcome - which is more significant when both the proportions of archaeologically sensitive lands within the Regional Park and regionally sensitive landscapes are considered (see below).

Figure 7: The Central Precinct framework plan.

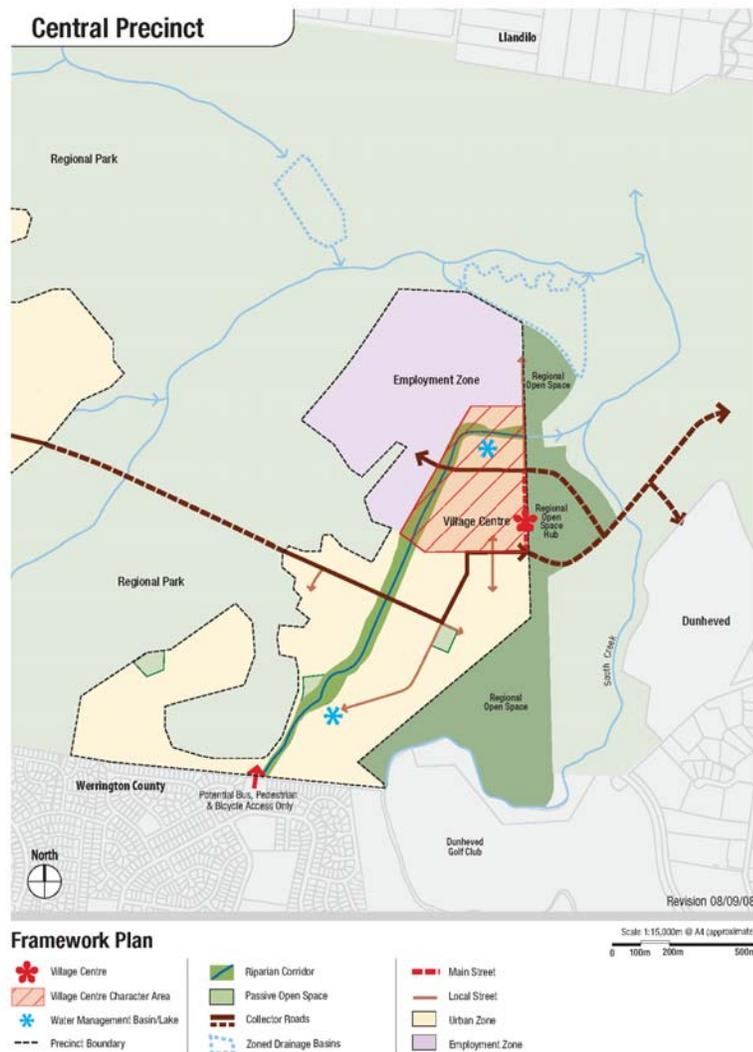


Figure 8: The different landscapes in the central part of the St Marys Project, Central Precinct (pink hatched) and Regional Open Space (green) boundaries also shown.

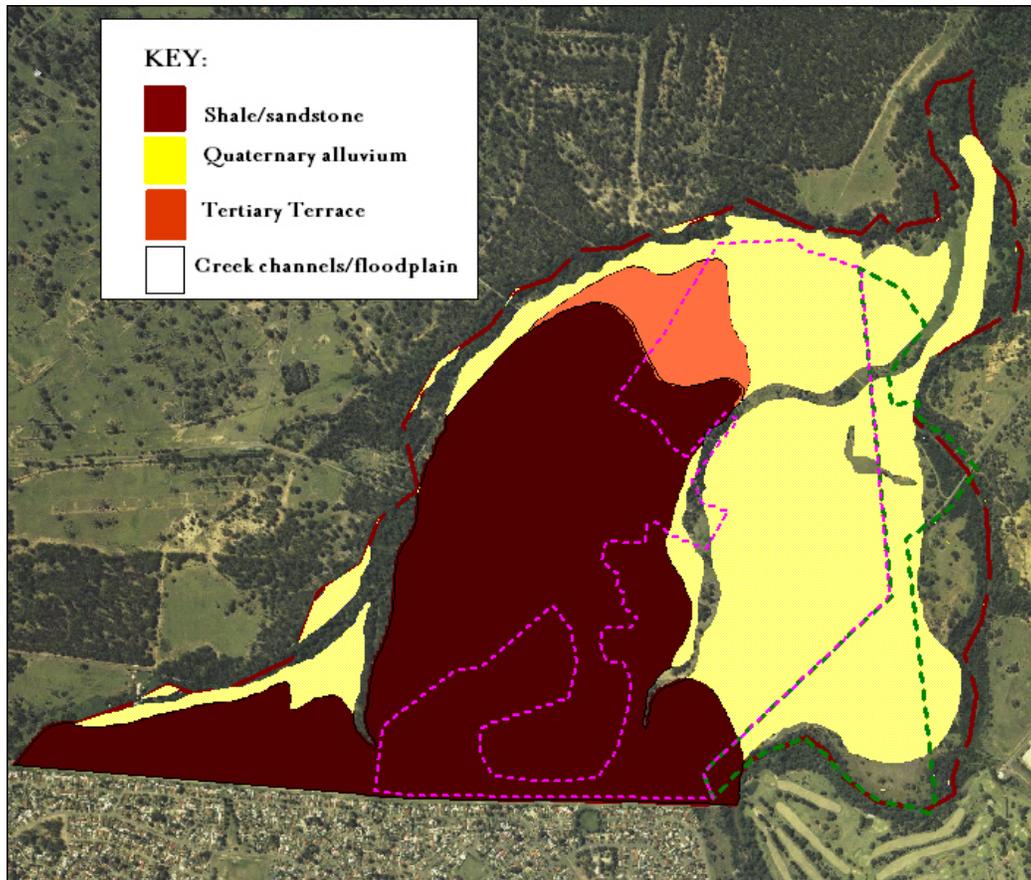


Table 3: Proportions of landscape types in the Central Precinct, the ROS and Regional Park (RP)- west of South Creek.

Landscape	Central Precinct (ha)	Centre of ADI (ha)	Regional Park (ha)	ROS (ha)	% Landscape in RP
Active creek channels	6.0	62.1	45.7	10.4	73.6
Tertiary terrace	8.2	14.1	5.9	0	41.8
Shale hillslopes	49.5	167.8	117.1	1.2	69.8
Quaternary alluvium	69.2	133.3	35.7	28.4	26.8
Total Area	132.9	377.3	204.4	40.0	54.2

4.2 Topography

The Central Precinct is characterised by generally flatter terrain in the more low-lying centre of the St Marys Site. The land generally slopes gently down from south to north. There is a range in elevation between c.40m (AHD) at a high point along the boundary fenceline with Werrington Downs in the south to c.12m AHD where the western tributary creek line meets South Creek. South Creek flows out of the St Marys Site at c.10m AHD.

4.3 Landscape elements

Landscape parameters were applied to the Site when regional comparisons were made and the SMM devised (JMcD CHM 1997b). This approach has since been used extensively in the Rouse Hill Development Area in the ongoing assessment of Aboriginal sites during Stages 2 and 3 of the ongoing Infrastructure Project (JMcD CHM 1999, 2002a, 2005d). A similar approach has been applied here.

The following topographic categories (and definitions) have been used in these analyses (these continue to be refined). These categories have been analysed within both the Central Precinct and in the central part of the St Marys Site. The codes used on Table 4 are shown in brackets.

- ☉ Creek bank (CB#) <50m to stream channel - number indicates stream order i.e. CBI is a first order creek bank.
- ☉ Flood Plain (FP) >50m to water, flat land to slightly sloping
- ☉ Lower Hill Slope (LS) <200m to water
- ☉ Tributary headwaters (TH) sloping land <50m to water course
- ☉ Upper Hill Slope (US) >200m to water
- ☉ Flat plain (PL) >500m to water (many are alluvial terraces)
- ☉ Low Ridge (LR) <200m to water, <10m elevation above creek
- ☉ Low Ridge Top (LRT) >200m from water, <10m elevation above ck
- ☉ Ridge Top (RT) >200m to water, >10m elevation above creek

Table 4: Landscape elements in the centre of the St Marys Site, indicating those which occur within the Central Precinct, the Regional Open Space (ROS) and Regional Park.

Topographic elements	Geology	Centre (ha)	%f	Geology	Central Precinct (ha)	%f	ROS (ha) (all Qal)	%f	Regional Park (ha)	%f in Regional Park
RT	Shale/s'stone	4.8	1.3	Shale/s'stone	4.2	3.2			0.6	12.5
LRT	44.5%	31.4	8.3	48.0%	13.6	10.2			17.8	56.7
US		17.3	4.6		0.9	0.7			16.4	94.8
LS	T. terrace	138.1	36.6	T. terrace	49.5	37.2	3.5	9.0	85.1	61.6
PL	3.7%	68.3	18.1	8.3%	41.6	31.3	21.9	65.1	4.8	7.0
FP		61.3	16.2		12.0	9.0	8.1	12.0	41.2	67.2
TH		1.3	0.3		0.7	0.5	0.5	4.7	0.1	7.7
CB1	Qu'al	20.9	5.5	Qu'al	10.4	7.8			10.5	50.2
CB2	35.0%	1.3	0.3	68.6%					1.3	100.0
CB3		5.0	1.3						5	100.0
CB4		9.6	2.5						9.6	100.0
CB6		18.0	4.8				6.0	18.2	12	66.7
		377.3	100.0		132.9	100.0	40.0	100.0	204.4	54.2

The range of landscape elements within the Central Precinct is smaller than found in the central part of the Site generally, largely because both the major tributary creek line and South Creek are within the Regional Park (Table 4).

Good proportions of most landscapes will be conserved within the Regional Park, with the exception of Ridgetops, plains and headwater tributaries. Around or less than 10% of each of these is to be conserved within the Regional Park. These landscape need to be emphasized in the selection of areas for targeted salvage. Upper slopes and all stream orders are well preserved within the regional park, and these landscapes need only be targeted as an important record of the landscape types to be located within the Regional Park.

Stream Order

The St Marys Project contains three major stream conjunctions on South Creek with a representative set of nodes from first to fourth order streams on the western side of South Creek. There are a number of modern channel features through the centre of the Site, and also a number of palaeochannels (i.e. former meandering routes of this major stream).

This central part of the St Marys Project is at the confluence of the major tributary creek and South Creek. All stream orders found within the central part of the Site are conserved within this part of the Regional Park.

4.4 Stone Raw Material Sources

Silcrete was the raw material used extensively by Aboriginal people over the last 5,000 years. This material is found within the St Marys Formation, first identified in the railway cutting near St Marys railway station (Byrnes 1980, McDonald & Mitchell 1994, Corkill 1999). In 1997, targeted archaeological survey was undertaken across the Tertiary Terraces of the Site to determine the distribution of naturally outcropping silcrete locations and/or silcrete extraction sites (i.e. quarries). At this time, a survey of old trees (as suitable habitats for different fauna) was also undertaken (by Gunninah Environmental Consultants and Phil Khan: DLALC), with the dual purpose of identifying trees with possible scarred or carved components (i.e. of likely Aboriginal origin). The high levels of tree clearing prior to the industrial use of this land meant

that few suitable trees were found and no trees with scars of probable Aboriginal origin were identified.

This targeted survey determined that the Tertiary terrace at the eastern end of the Site had several small silcrete outcrops along the margins of Ropes Creek and a major cobble and boulder outcrop at a break-of-slope of the Tertiary Terrace. At the major silcrete outcrop (ADI-57: in the Regional Park) there is extensive evidence that this material was tested and flaked on-site. Salvage work in the Eastern Precinct (at ADI-EP1) subsequently demonstrated that evidence for quarrying extended beyond the obvious surface manifestations (JMcD CHM 2006b). More recent salvage along the fauna fence in the Eastern Precinct has similarly documented quarrying activity closer to Ropes Creek (JMcD CHM 2008a) at another documented surface silcrete outcrop.

The Tertiary Terrace in the centre of the Project Area did not reveal surface outcrops of silcrete (JMcD CHM 1997b: Map 7) and there is no expectation of quarry sites being located here.

4.5 Vegetation

The vegetation across the study area is dependent on the soil associations - which are related to the underlying geology. The variability in the soils would have provided a resource rich interface (i.e. an ecotone). Seven different vegetation communities have been encountered during our previous surveys of the central part of the Project Area. These are:

Cleared open woodland - trees 10-30m height; 10% canopy cover; *Eucalyptus moluccana* (Grey Box), *Eucalyptus tereticornis* (Forest Red Gum), and grasses maintained by grazing and mowing;

Woodland (some areas significantly disturbed) – trees 10-30m height; 10-30% canopy cover; *Eucalyptus moluccana* (Grey Box), *Eucalyptus tereticornis* (Forest Red Gum), *Eucalyptus amplifolia* (Cabbage Gum), *Bursaria spinosa* (Blackthorn), *Acacia implexa* (Hickory), *Themeda australis* (Kangaroo Grass);

Cleared grassland – flood prone land, some areas of marshes; drainage significantly altered by channelization; *Eucalyptus moluccana* (Grey Box), *Casuarina glauca* (Swamp Oak) are dominant, grazed grassland understorey;

Creeks and watercourses – *Casuarina glauca* (Swamp Oak) dominant species, weed impacted e.g. Privet (*Ligustrum lucidum*). South Creek has been severely impacted from upstream development. Large introduced trees include willows (*Salix babylonica*);

Closed Forest - trees 10-30m height; 70-100% canopy cover; *Casuarina glauca* (Swamp Oak) along original creek lines;

Cleared Open Woodland – trees 10-30m height; 10% canopy cover, *Eucalyptus fibrosa* (Broad-leaved Ironbark), *Eucalyptus sclerophylla* (Scribbly gum), *Eucalyptus moluccana* (Grey Box), *Eucalyptus crebra* (Narrow-leaved Ironbark) and grasses;

Open Forest – (some areas significantly disturbed) – trees 10-30m height; 30-70% canopy cover; *Eucalyptus fibrosa* (Broad-Leaved Ironbark), *Eucalyptus moluccana* (Grey Box), *Eucalyptus crebra* (Narrow-leaved Ironbark), thick understorey.

4.6 Existing disturbance

The current study area has suffered a variety of previous land use disturbance impacts. These have affected the ground surface and sub-soil, and would have resulted in the damage or destruction of potential Aboriginal sites. The entire St Marys Project was utilised for grazing and farming for approximately 150 years before the construction of the early factory and munitions storage complexes in the mid 1940s. In the Central Precinct, most damage was created in the 1950s by the construction of the storage bunkers, road access and bridges in this part of the former ADI Site.

To quantify the previous land use impacts across the study area, aerial photo interpretation and analysis was undertaken (McDonald & Mitchell 1994, JMcD CHM 1997b). The land use mapping undertaken in 1994 and 1997 involved several stages and levels of analysis. Data sources for this assessment task included the following:

- ⊗ Stereo pairs of air photographs taken in December 1946 by Aadastra and labelled 'Landsphoto';
- ⊗ Oblique low altitude photographs of parts of the site taken in August 1955 and October 1956 by RAAF 22 Squadron;
- ⊗ Stereo pairs of air photographs taken in August 1965 by the Department of Lands;
- ⊗ Enlarged colour air photo taken early in 1994;

- ⊙ Orthophotomaps at 1:4,000 scale produced by the Central Mapping Authority of New South Wales;

St Marys U7360-1, U7360-2 and U7360-3; with 2m contour intervals based on air photographs taken in May 1982;

Llandilo U7367-7 and U7367-8; with 1m contour intervals based on air photographs taken in October 1980.

This mapping process identified initially five zones [subsequently amalgamated into four sensitivity (and management) zones (see Table 5)]. These zones have formed the basis for the strategic management model used here.

The disturbance mapping for the centre of the Site is shown (Figure 11). Calculations of land-use disturbance proportions across this, the Central Precinct and this part of the Regional Park have been made (Table 6).

Table 5: Correlation of archaeological sensitivity zones with degrees of land use impact.

Archaeological Sensitivity/ Management Zone	1994/1997 impact code	Land use impact
4	E	Extremely disturbed - land which has been subject to total vegetation clearance and soil disturbance by bulldozing; shallow soil removal for construction of earthen blast walls; tips and rubbish dumps; quarrying; and the construction of drains, roads, railway lines and buildings, creek channelisation and severe soil erosion. There is virtually no chance of any Aboriginal sites remaining intact in these areas.
4	H	Highly disturbed - land which has been almost totally cleared and has scattered buildings with blast walls, multiple tracks, roads tramlines, and extensive soil conservation earthworks.
3	M	Moderately disturbed - land which has been cleared and grazed, and on which there is evidence of at least one phase of ploughing. Aboriginal sites may be found in these areas but they will have been disturbed to a depth of about 20 to 30 cm.
2	L	Lightly disturbed - land which has been cleared and grazed but probably never ploughed. These areas often carry regrowth forest or woodland.
1	U	Relatively undisturbed - forest and woodland areas which have remained intact since 1946 and which were probably never cleared. Vegetation cover in these areas varies with the composition of the woodland/forest.

These figures reveal there is a significant conservation outcome in this central part of the Site. Not only is more than 54% of the total area to be conserved within the Regional Park - but this includes a significant proportion of the land with conservation value in this area. Of the 69.8 hectares of Zone 1 land identified, 67.4 hectares (97%) falls within the Regional Park. Similarly, most (81%) of the Zone 2 lands falls within the Regional Park and will therefore be unaffected by development within the Central Precinct.

Table 6: Centre of St Marys Development and Central Precinct: Proportions of management zones (in ha).

Landscape	Zone 1	Zone 2	Zone 3	Zone 4	Total Area (ha)
Central St Marys Project	69.8	100.5	121.7	84.3	376.3
Central Precinct	2.4	18.8	71.8	39.9	132.9
Regional Open Space	0.0	0.0	22.7	17.3	40.0
Regional Park	67.4	81.7	27.2	27.1	203.4
<i>% in Regional Park</i>	<i>96.6</i>	<i>81.3</i>	<i>22.4</i>	<i>32.2</i>	<i>54.1</i>

Figure 9: The central part of the St Marys Project, showing Management Zones, and the location of the Central Precinct (pink hatched line).

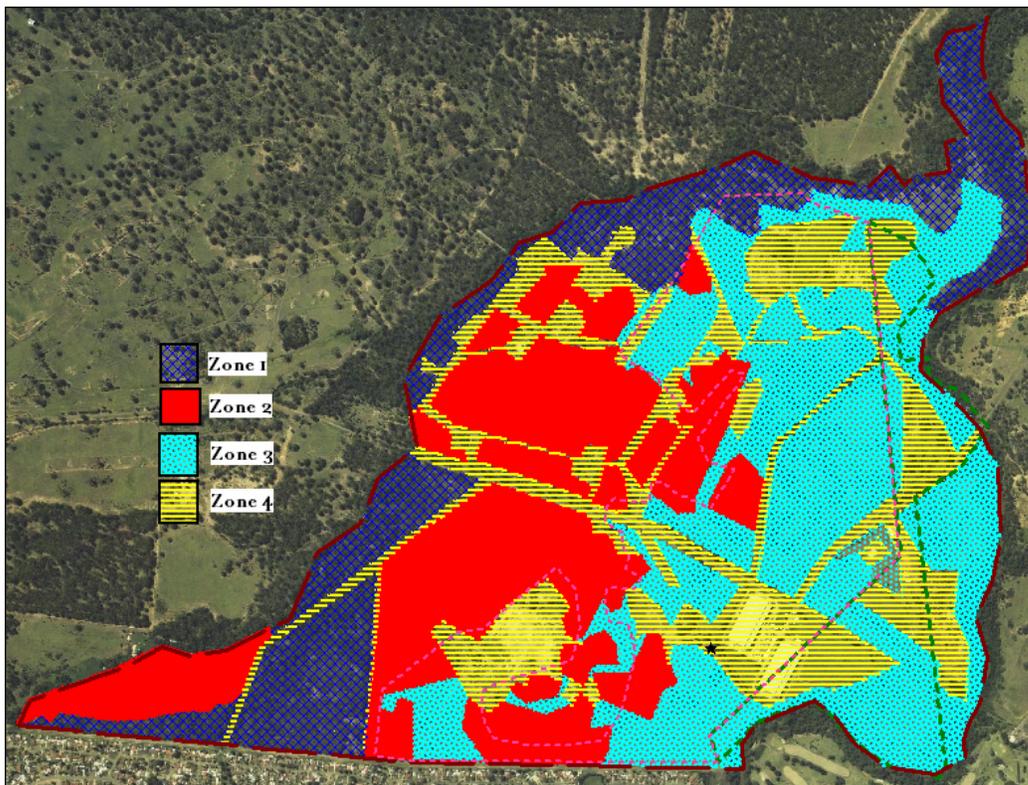
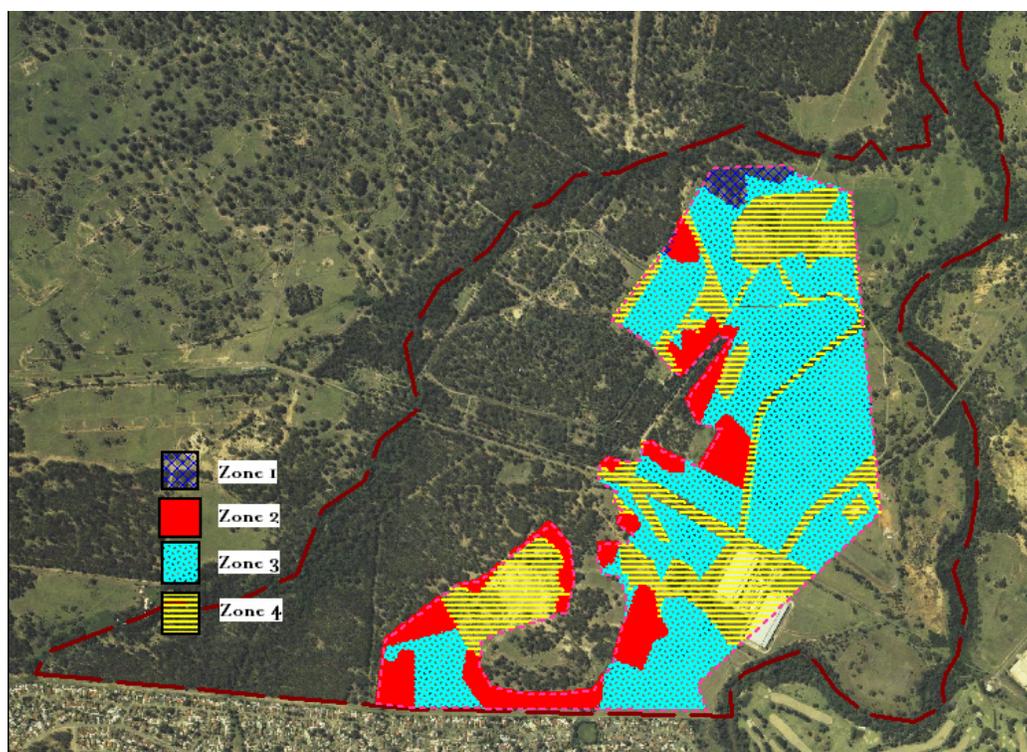


Table 7: Central Precinct: Proportions of land use impact zones (n.b. active channels excluded from area calculations).

Landscape	Zone 1	Zone 2	Zone 3	Zone 4	Total Area (ha)
Tertiary Terrace	0.3	1.0	5.6	1.3	8.2
Shale	0	13.2	21.6	14.7	49.5
Quaternary alluvium	2.1	3.7	40.5	22.9	69.2
Total	2.4	18.7	67.7	39.8	126.9
% of Zone in Central Precinct	1.8	14.1	54.1	30.0	

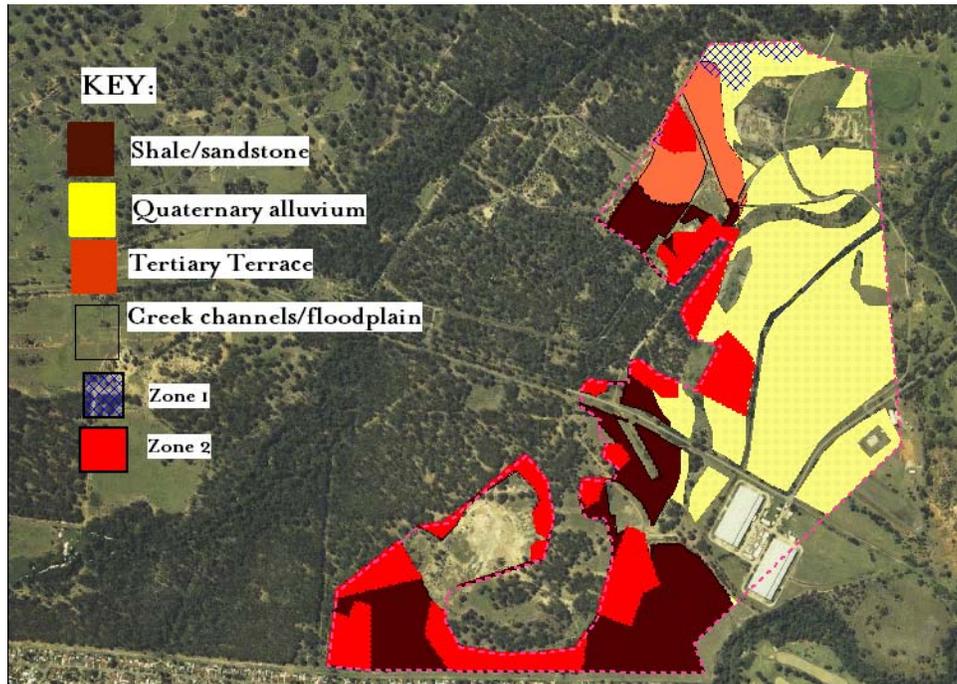
Figure 10: The central part of the St Marys Site showing the Central Precinct and archaeological management zones, overlain on aerial photo.

4.7 Effective survey coverage

Previous survey of the subject land has indicated that visibility across the study area depends mostly upon the amount of vegetation present and on existing degrees of sub-surface disturbance (JMcD CHM 1997a, 2006c). Almost without exception, effective survey coverage was extremely low. This is due mainly to very low surface visibility except where there has been some form of previous land use disturbance.

During the fenceline surveys total of 43 exposures with varying degrees of surface visibility were recorded in detail using the same procedures as the 1996 survey of the Western Precinct (JMcD CHM 2006c: Appendix 3). These exposures covered an area totalling of 35,365 m². This equates to 17.9% sample of that survey corridor (i.e. 196,980m² = 19,698 km long x 10m wide). Archaeological evidence was recorded on just over half (23) of these exposures. Visibility along the proposed route was mostly low (zero-20%), limited by grass cover and leaf litter. On vehicle tracks and sheet erosion features, visibility was up to 50-80%, limited by grass, leaf litter and ironstone gravels. The most common forms of surface exposure were vehicle tracks and sheet erosion. This was followed by animal trails and excavated drains.

Figure II: Central Precinct: Sensitive shale, Tertiary and alluvium landscapes (i.e. all zones except Zone 4) with Zones 1 and 2 highlighted.

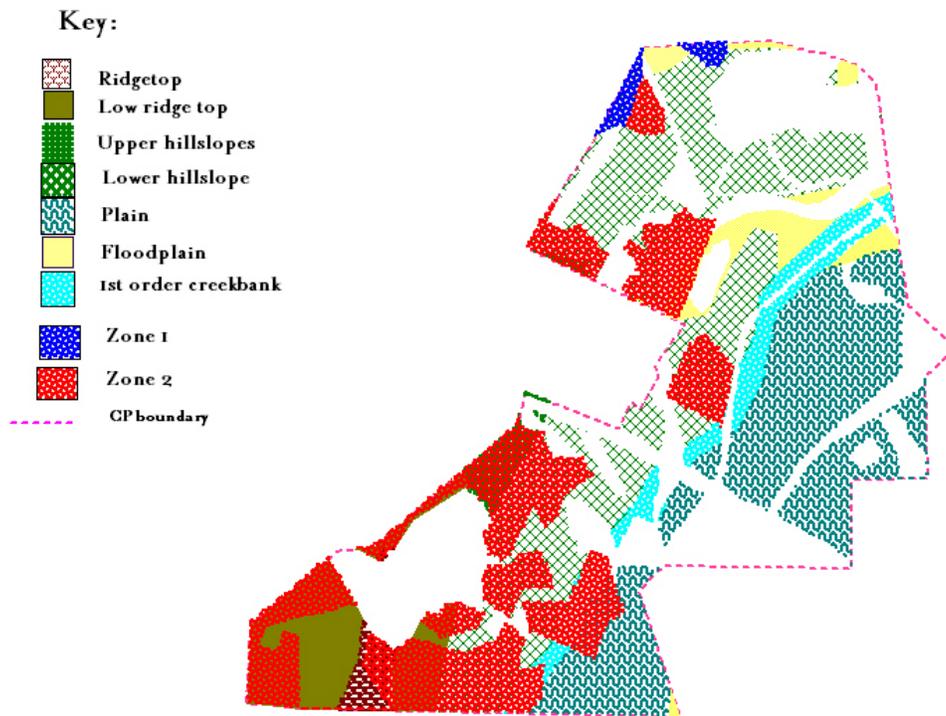


5. PREVIOUS FIELDWORK

In 1997 a series of test excavations were done across the St Marys Development Site to groundtruth the SMM (JMcD CHM 1997b). This was done in support of the S22 Committee report - which ultimately defined the SREP and EPS that this Project is being developed under. Five test excavations were spread across various landscapes, with

one (SA3) being excavated in the central part of the Site. Sample Area3 was located on a high terrace and slope above South Creek. This sample area retrieved a surprisingly small assemblage (given its landscape context); possibly because of high levels of disturbance here (this area had been previously decontaminated because of its use as a rifle testing location). This test excavation was done with the involvement of the Deerubbin LALC: Daruk Link members inspected the excavations on several occasions. This excavated sample area is within Central Precinct ROS.

Figure 12: Central Precinct showing sensitive topographic landscapes (all zones except Zone 4). Zone 1 and 2 landscapes are highlighted.



As part of the macro fauna management strategy, the construction of a fauna-proof fence around the Regional Park (in the Central and Western Precincts) was assessed for its likely impacts (JMcD CHM 2006c). In 2004 a survey route of 12.7km was inspected using mostly pedestrian survey. Realigned sections of the proposed fauna fence route, covering the total distance of 8.9km, were surveyed on foot in 2005 (JMcD CHM 2006c: Figure 5, see numbers 1-9). As this development proposal had a narrow linear impact, inspection focused on the centreline, but extended c.5 metres on either side. All areas of surface exposure along the 10m wide corridor were closely inspected for artefacts. Old growth and dead trees were inspected for scars of possible Aboriginal origin. Notes were taken describing exposures, surface visibility and extent of artefact

scatters within exposures, landform, stream order, soil intactness, vegetation, previous land use disturbance, and other information.

For the current assessment process the Deerubbin LALC and three Darug groups (DTAC, DCAC and DACHA) were involved in a site inspection of the Central Precinct (current boundaries) and the results of the 2004 and 2005 surveys were revisited.

5.1 Previous results

Several previous surveys have been undertaken within this part of the former ADI Site (Koettig 1980, Smith 1989, Kinhill 1995, JMcD CHM 1997). Smith (1989, 1991) identified 14 open camp sites and four isolated finds, all exposed on tracks, in the “Werrington Downs” area near the southern boundary. All areas of exposure were found to reveal artefacts. Twenty one sites, (ADI-1 to -21), were recorded in sample areas on different landforms across the former ADI Site by the Kinhill team (Kinhill Engineers Pty Ltd 1995). Many of these were relocated by the surveys of the proposed fauna-proof fence, which will run around the interface between the Regional Park and the development precincts (Figure 14). The sections of this fauna fence survey relevant to the Central Precinct are discussed here.

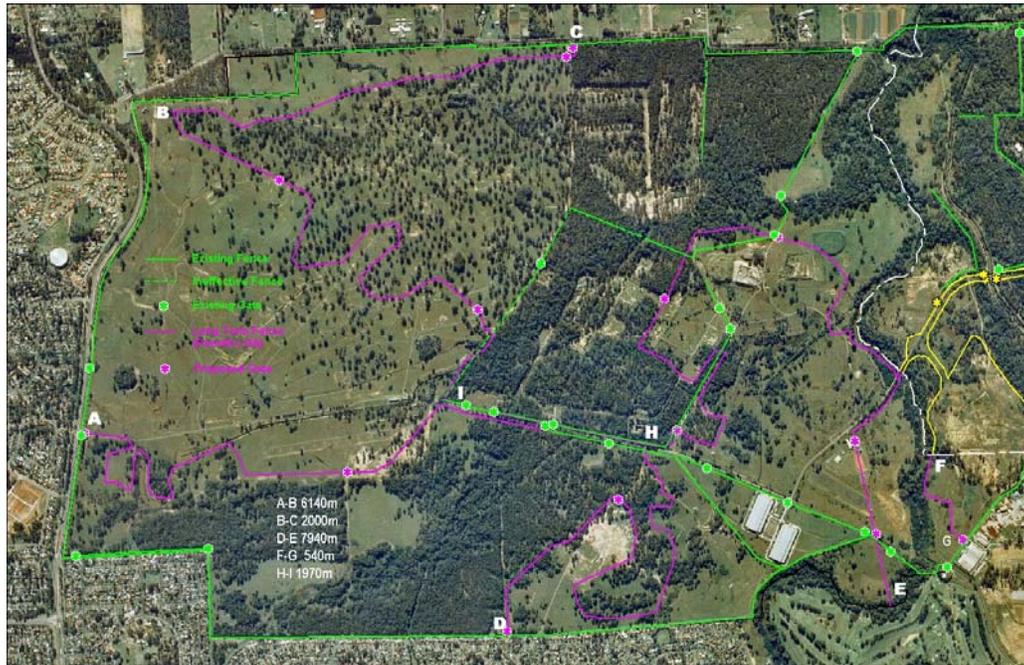
Section D-E

This section crosses land formerly known as “Werrington Downs” which was first surveyed almost 20 years ago (Smith 1989, 1991). Smith found that densities for the area surveyed were high - about 1 site/0.2ha. Artefacts were found on every exposure of bare ground encountered during the survey (Smith 1991:9, 10). All of Smith's identified surface sites, except WD-72 (*AHIMS #45-5-0711*) and possibly WD-73 (*AHIMS #45-5-0712*) and WD-74 (*AHIMS #45-5-0713*), appeared to have associated undisturbed deposit.

Smith found artefacts made on a range of raw materials, including silcrete, chert, ‘indurated mudstone’ (now known as silicified tuff), basalt, quartz and quartzite. Silcrete dominated at all but two sites (WD-72 and -73) which were mostly ‘indurated mudstone’ and chert (Smith 1991:10). At other sites, Smith found some rare artefact types, including ground stone axes at WD-69 (*AHIMS #45-5-0708*), and a grindstone

and pieces of ground stone at WD-70. Notwithstanding these rare types, Smith found most sites were dominated by debitage (Smith 1991:10).

Figure 13: Route of the surveyed fauna fence (2004).



WD-72, IF-25, and WD-71 (*NPWS#45-5-0710*), were recorded along the vehicle track north of point 'D' of the current proposed fence route. After the proposed fence route deviates off this track to the north east, it runs in the vicinity of Smith's site WD-65 (*NPWS#45-5-0704*). Smith recorded four artefacts here. On the dirt road to the east of the proposed fence route, Smith recorded five artefacts at site WD/73 and isolated finds 26 & 27 (Smith 1991: Figure 4).

Section K-L

This section runs to the north of WD-63 (*NPWS# 45-5-0702*) the open campsite test-excavated as SA 4 (see below) (Jo McDonald CHM 1997c: Fig 8).

Sections F-G, H-I

No previously recorded sites were previously known along these proposed sections. Within 500 metres of point 'F', the Kinhill survey team found open campsites on the

Quaternary floodplain and western bank of South Creek, south and east of these proposed fence sections, in 1995. These include ADI-8 (*AHIMS #45-5-2299*). Five silcrete debitage pieces and one quartz bipolar core was found here, on Quaternary FP/terrace landform, 400 metres north-east of the two storage sheds and point F. Five artefacts were found at ADI-9 (*#45-5-999*) on the west bank of South Creek, 400 metres south east of Point "F". Four artefacts were found at ADI-10 (*#45-5-1000*), including two quartz cores (one bipolar) and two silcrete debitage. Around 400 metres south of section H-I, seven artefacts were found on the west bank at ADI-11 (*#45-5-1001*), 300m south east of H-I south-east corner of east shed.

During the initial fauna fence survey (in 2004) around the boundary of the Central Precinct, open artefact scatters and isolated finds were found on 11 exposures recorded along the proposed fenceline route. Thirteen sites previously recorded were relocated and 131 lithic artefacts were recorded at the new site locations (JMCD CHM 2006c: Table 5, Figures 7, 8). All recorded features are open campsites or isolated finds.

The subsequent survey of fence realignments (Figure 15) identified a further four open artefact scatters and two isolated finds along the realignments. These realignments, however, avoid seven previously identified sites (ADI-12, ADI-23, ADI-FF4, ADI-FF5, ADIFF-14, ADIFF-15, ADIFF-16 and ADIFF-17). All of these sites were fully described in the earlier reports.

Previous sub-surface investigations

In 1997, a test excavation programme was undertaken across the former ADI Site for the initial ground-truthing of the SMM. Five sample areas were tested (JMCD CHM 1997b, 1997c, 1997d), and sub-surface artefacts were found in all tested areas. A total of 3,461 stone artefacts were recovered from a combined 113 (1m x 1m) test squares.

A range of artefact types were encountered, with most relating to microblade and microlith production (JMCD CHM 1997a:3-4). Sample Areas 3 (SA3) was in an area of floodplain on Quaternary alluvium on South Creek - in the designated central Regional Open Space. Sample area 4 (SA4) was located on shale hillslopes and alluvium across the tributary which separates the western and central portions of the former ADI Site. It is now located within the Regional Park (JMCD CHM 1997b: 81-82).

Excavations at SA4 were in the vicinity of the previously recorded sites WD-63 (*NPWS # 45-5-702*) which is close to the proposed fauna fence (section K-L) which will run between the Western and the Central Precincts.

6. CURRENT SURVEY RESULTS

Systematic survey of the Central Precinct was completed in October and November 2007 by archaeologists Fran Scully, Andrea Ward and Sam Higgs (Jo McDonald CHM). They were accompanied by Steve Randall (DLALC) on the 29th and 30th October and Justine Copeland (DCAC), Gordon Morton (DACHA) and Gordon Workman (DTAC) on the 5th and 6th November. This survey aimed at ground-truthing the management zones as well as identifying surface evidence for archaeological sites where these could be observed.

A total of nine new locations with surface stone artefacts were recorded during this survey, most of these being found on areas where there had been some form of previous disturbance. As expected, well grassed and intact areas where the surface visibility was low revealed very few surface finds. These newly recorded sites have been called ADI-CP# to distinguish them from the sites recorded by previous surveys. Descriptions of previously reported sites have not been repeated (see Smith 1989, JMcD CHM 2006). All sites are shown on Figure 17.

ADI-CP1 Open artefact scatter AMG ²9I334 E ⁶²6443I N

A total of 44 artefacts were recorded here (the site was initially recorded as two separate sites -CP1 and CP2), but was eventually found to be continuous over a relatively short distance). It is on the gentle low hill slopes adjacent to a 1st order tributary. A constructed bund runs through this area. Visibility was up to 90% on the bund and on adjacent areas of sheet wash; but less than 50% in the adjacent grassed areas.



Plate 1: View of constructed bund near creek channel. Artefacts were found on the bund and in areas of sheet wash erosion.



Plate 2: Sample of the artefacts found at ADI-CP1.

Artefacts recorded here included (see Plate 2):

- ⊗ 7 red silcrete flakes (1-3cm);
- ⊗ 2 red silcrete flake (3-5cm);
- ⊗ 7 red silcrete flaked pieces (incl. broken flakes) 1-3cm;
- ⊗ 2 red silcrete flaked pieces (3-5cm); 1 red silcrete flaked pieces (<1cm);
- ⊗ 2 quartz bipolar fragments (1-3cm);
- ⊗ 2 grey silicified tuff flakes (1-3cm);
- ⊗ 1 grey banded silicified tuff flake 1-3cm
- ⊗ 1 red silcrete multi-platformed core (>5cm)

Potential for intact deposit along the bund is low due to past land use disturbance and subsequent sheet erosion but is good in the adjacent areas. This site is on land designated archaeological management **zone 2**, but is on the edge of zone 4 land. It **will be impacted** by development in the urban zone.

ADI-CP3

Open artefact scatter

AMG ²91475 E ⁶²64729 N

This site consists of a sparse surface scatter on a partly cleared, east-facing gentle lower hillslope. It is about 80m west of the first order tributary stream, and has part of the constructed bund running through the site (Plate 3). Surface visibility was up to 90% on the bund and on adjacent areas of sheet wash; but less than 50% in the adjacent grassed areas. A total of 25 artefacts were recorded here, most of these undiagnostic

silcrete debitage (Plate 4). One of these was a broken piece of coarse-grained silcrete cobble (maximum dimension 12 cm) with 50% cortical cover. Other artefacts included:

- ⊗ 5 red silcrete flakes (1-3cm);
- ⊗ 1 red silcrete flake (3-5cm), 1 red silcrete flakes <1cm;
- ⊗ 9 red silcrete flaked pieces (incl. broken flakes) 1-3cm;
- ⊗ 3 red silcrete flaked pieces (3-5cm);
- ⊗ 4 quartz bipolar fragments (2 - 1-3cm; 2 <1cm);
- ⊗ 2 grey silicified tuff broken flakes (1-3cm);
- ⊗ 1 grey silicified tuff flake <1cm

Potential for intact deposit along the bund is low (zone 4) due to past land use disturbance and subsequent sheet erosion but is good in the adjacent areas. This site is on land designated archaeological management **zone 3** and **will be impacted** by development in the urban zone.



Plate 3: ADI-CP3. View of constructed bund which runs through this site. Artefacts were found on the bund and in areas of adjacent sheet wash erosion.



Plate 4: Sample of the silcrete artefacts found at ADI-CP3.

ADI-CP4

Open artefact scatter

AMG ²9I428 E ⁶²64759 N

This site consists of a sparse surface scatter on a partly cleared, east-facing gentle lower hillslope (Plate 5), around 70m west of site CP3. It is about 150m west of the first order tributary stream. Surface visibility was generally zero in areas with grass cover but

up to 70% on areas of sheet wash. A total of 46 artefacts were recorded herein a mixture of raw materials (Plates 6-8).



Plate 5: ADI-CP4 view to the north. Artefacts were found on areas of sheet wash erosion.

Plate 7: Sample of the silcrete artefacts found at ADI-CP4.

Plate 6: ADI-CP4. Silicified tuff artefacts found at this site.

Plate 8: Basalt piece with flaked facets and possible ground surface found at ADI-CP4.

Recorded artefacts included:

- ☉ 14 red silcrete flakes (1-3cm);
- ☉ 1 red/grey silcrete core - multi-platformed (3.5cm max dimension), has heat shattered face,
- ☉ 4 red silcrete flake (3-5cm), 1 red silcrete flakes <1cm; 1 piece basalt; flaked facets, could have small area of residual grinding at one end (5 x 3.5 x 2.3cm)
- ☉ 6 red silcrete flaked pieces (incl. broken flakes) 1-3cm;
- ☉ 5 red silcrete flaked pieces (3-5cm);

- ☉ 4 quartz bipolar fragments (2 - 1-3cm; 2 <1cm);
- ☉ 2 grey silicified tuff broken flakes (1-3cm);
- ☉ 1 grey silicified tuff flake <1cm;
- ☉ 5 cream/pink silicified tuff flakes or broken flakes (3-5cm).

Potential for intact deposit is good in areas adjacent to the erosion scours. This site is on land designated archaeological management **zone 3** and **will be impacted** by development in the urban zone.

ADI-CP5

Open artefact scatter

AMG ²91527 E ⁶²64837 N

This site consists of a sparse surface scatter on a lower hillslope, around 30m west of the first order tributary stream. Surface visibility was generally zero in areas with grass cover but up to 70% on areas of sheet wash. A total of 11 artefacts were recorded here in a mixture of raw materials (Plate 9). The site is located on cleared ground close to the existing east-west access route through the former ADI Site.

Recorded artefacts included:

- ☉ 1 red silcrete flakes (1-3cm);
- ☉ 1 red silcrete flake (>5cm);
- ☉ 3 red silcrete flaked pieces (incl. broken flakes)-1 <1cm; 2 x 1-3cm;
- ☉ 2 red silcrete flaked pieces (3-5cm);
- ☉ 1 quartz bipolar core (3-5cm);
- ☉ 1 red silicified tuff broken flake (1-3cm);
- ☉ 1 yellow silicified tuff broken flake (1-3cm);
- ☉ 1 white silicified tuff broken flake (1-3cm).

Potential for intact deposit in immediate vicinity adjacent to the site is poor (Zone 4). These surface find were found adjacent to land designated archaeological management **zone 3** and **will be impacted** by development in the urban zone.



Plate 9: ADI-CP5. Artefacts found on the eroded areas adjacent to the east-west link road. Note the mixed raw materials and the background of road base gravels.

ADI-CP6

Open artefact scatter

AMG ²91544 E ⁶²64762 N

This site consists of a sparse surface scatter on a lower hillslope (Plate 10), adjacent to the west bank of the first order tributary stream. The Bulk Warehouses are further to the east, approximately 140m east of this same creek line, on the other side of a fence. The artefacts were found along a dirt track where surface visibility was up to 70%. Visibility in the adjacent grassed areas was very low (Plates 11-13). A total of 21 artefacts, including several very large items, were recorded here in a mixture of raw materials.





Plate 10: ADI-CP6 view of the track along which the artefacts were found.

Plate 12: ADI-CP6. Silcrete cobble found at this site.

Plate 11: Sample of the silicified tuff and quartz artefacts found at ADI-CP6.

Plate 13: ADI-CP6: Basalt pebble with large flake on one edge and possible anvil evidence on its flat surface.

Recorded artefacts included:

- ⊗ 3 red silcrete flakes (1-3cm);
- ⊗ 2 red silcrete flakes (3-5cm);
- ⊗ 6 red silcrete flaked pieces (incl. broken flakes) 5 x 1-3cm; 1 x 3-5cm;
- ⊗ 1 quartz multi-platformed core (>5cm);
- ⊗ 1 quartz flaked piece (1-3cm);
- ⊗ 1 white silicified tuff core (>5cm);
- ⊗ 5 white/yellow silicified tuff flakes (1-3cm);
- ⊗ 1 basalt pebble with a large flake removed from one long edge - 11cm maximum dimension; possible anvilling on one face;
- ⊗ 1 yellow silcrete cobble, 15cm maximum dimension, 50% cortex.

Potential for intact deposit is good in areas adjacent to the track. This site is on land designated archaeological management **zone 3** and **will be impacted** by development in the urban zone.

ADI-CP7

Open artefact scatter

AMG ²91446E ⁶²65020N

This site was recorded on a gentle north east facing mid slopes (Plate 14). It is located 320 metres west of the first order tributary. Visibility was 20%, limited by leaf litter, ironstone gravels, native grasses. The surrounding bushland has some large forest red gums, grey box and ironbarks with a dense native shrub understorey - e.g. Bursaria, Daviesia, Acacia, and grasses - which limits ground surface visibility. A total of 30 artefacts were recorded here (Plate 14):



Plate 14: ADI-CP7: view of the exposure upon which the artefacts were found. More intact vegetation is visible in the background past the temporary fauna fence.

Plate 15: Sample of the silcrete artefacts found at ADI-CP7.

- ⊗ 6 red silcrete flakes (1-3cm);
- ⊗ 1 red silcrete flakes (3-5cm) and 2 red silcrete flakes (<1cm);
- ⊗ 11 red silcrete flaked pieces (incl. broken flakes- 1 x <1cm; 7 x 1-3cm; 3 x 3-5cm);
- ⊗ 3 red silcrete broken flakes (3-5cm);
- ⊗ 1 quartz flake (1-3cm);
- ⊗ 2 white/yellow silicified tuff flakes (1-3cm);
- ⊗ 4 grey silcrete broken flakes (1-3cm).

This area is considered to have moderate to high potential for intact deposit. This site **will be impacted** by the development in the urban zone and is on land designated archaeological management **zone 2**.

ADI-CP8

Isolated find

AMG ²92208E ⁶²65715N

One artefact - a possible anvil/hammerstone (Plate 16, 17) - was found on a cleared, graded and sheet eroded exposure west of the main South Creek channel and fairly close to the 'Concrete Hill'. It is on a gentle rise which slopes down to the South Creek floodplain. It is within land mapped as Quaternary terraces and floodplain. Visibility here was 50-70%. Potential is moderate for intact deposit, due to disturbance from previous clearing and topsoil loss from sheet erosion. Most trees are young regrowth with a few larger Ironbarks.

ADI-CP8 is within Regional Open Space and **may be impacted** by recreational facility development. This area is within archaeological management **zone 3**.



Plate 16: ADI-CP8: Detail of possible anvil/hammerstone found between the Concrete Hill and South Creek.



Plate 17: ADI-CP8: Reverse side anvil/hammerstone found between the Concrete Hill and South Creek.

ADI-CP9

Open artefact scatter

AMG ²90909E ⁶²64677N

Two artefacts were found 10m apart on a vehicle track exposure (Plate 18) on the western edge of a north-south low ridgeline. It is on the gentle slopes facing west c. 100 metres east of headwaters of a 1st order tributary - and around 40m north of site ADI-FF14. The vehicle track exposure here measures 55 x 4 m. Visibility was up to 50%. The silcrete pebble is broken (flaked?) but around 50% of the piece is still covered in cortex. Another small piece of red silcrete (flake, 1-3cm) was found nearby.

Potential for intact deposit within the Precinct here is low (**Zone 4**), due to past land use disturbance. There are exposed ironstone concretions and patches of subsoil on the exposures at large areas of stripping in the area immediately to the east. There is minimal understorey to prevent sheet erosion, with a bare surface only covered by leaf litter. This site is close to archaeological management **zone 2** (in the Regional Park) but is on zone 4 land. It **will be impacted** by development in the urban zone.



Plate 18: ADI-CP9: Location where the silcrete pebble was found in the south-west of the Precinct.

Plate 19: ADI-CP9: Detail of the silcrete pebble found in this location.

ADI-CP10

Open artefact scatter

AMG ² 91694E ⁶² 64917N

This site consists of a sparse surface scatter on lower hillslope, about 50m west of the west bank of the first order tributary stream. The Bulk Warehouses are to the south, on the other side of the east-west link road. The artefacts were found along a dirt track where surface visibility was up to 70%. Visibility in the adjacent grassed areas was very low. A total of three artefacts were recorded here in silcrete and silicified tuff (see Plate 21).

This area is considered to have moderate to high potential for intact deposit. This site **will be impacted** by the proposed development and is on land designated archaeological management **zone 2**.



Plate 20: ADI-CPI0: Exposed area where the artefacts were found north of the east-west link road. The intact vegetation in the background indicates the presence of Zone 2 landscape.



Plate 21: ADI-CPI0: The three artefacts found in this location.

6.1 Summary of findings in the Central Precinct

As a result of the current and previous surveys (JMcD CHM 1997a Appendix 3; 2006c: 26-47 and Appendices; Kinhill 1994; Smith 1989) a total of 40 surface sites have been recorded within the central part of the St Marys Development Site - of which 25 fall within the Central Precinct or ROS (Table 8). Three sites are located along the proposed fauna fence which will border the east-west link road between the Western and Central Precincts. Four areas of specific PAD have been defined along the fauna fenceline, but these could be extended to a number of locations in Management Zones 1-3. The distributions of all previously recorded sites in the Central Precinct are shown (Figures 16, 17). These have been located largely on surface exposures, in a variety of landscape settings and management zones (Table 8).

Figure 15: Results of the 2006 Fauna Fence Survey.

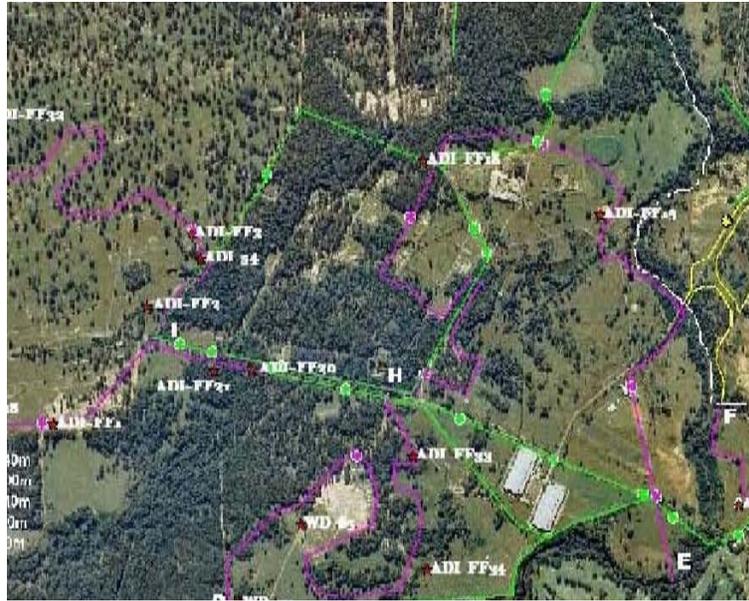


Figure 16: Surface sites recorded during the current and previous surveys of the Central Precinct and the central part of the St Marys Project Site.

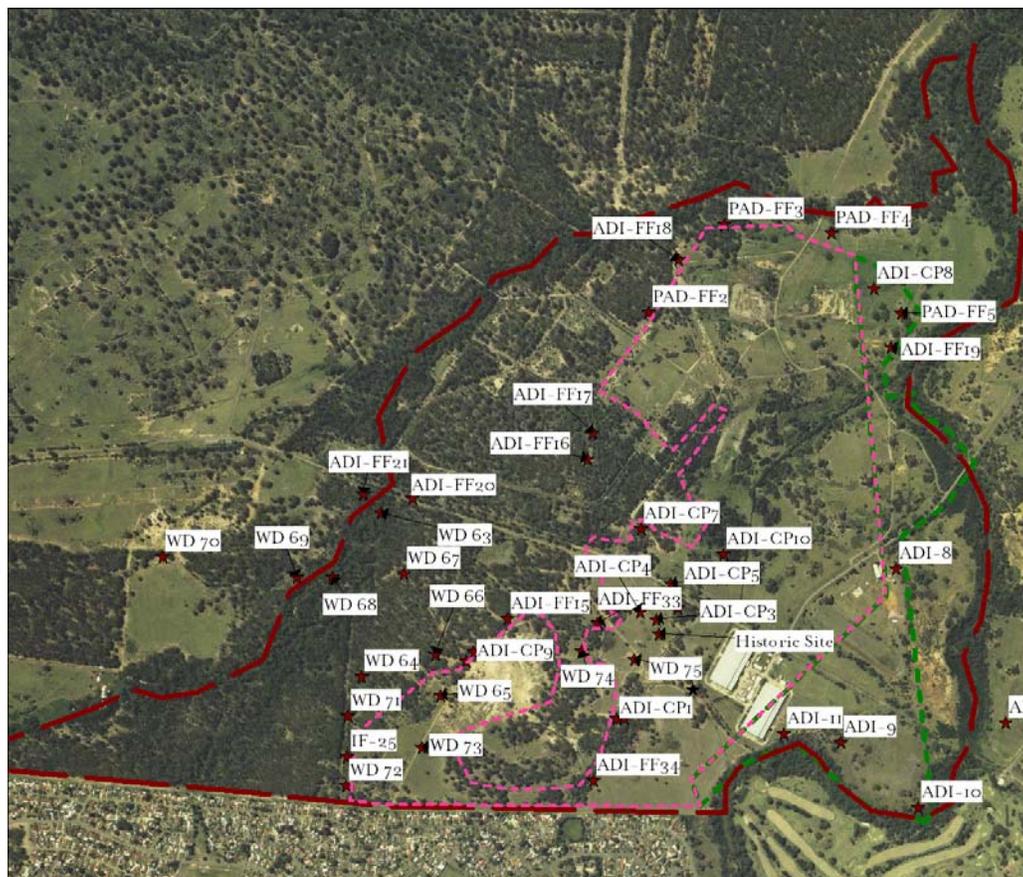


Table 8: Recorded surface features in the Central Precinct and central ROS.

Site name	Easting	Northing	No. of artefacts	Landscape	Topo	Management Zone
ADI-CP1	291334	6264431	44	Shale	CB1	2
ADI-CP3	291475	6264729	25	Shale	LHS	3
ADI-CP4	291428	6264759	46	Shale	LHS	3
ADI-CP5	291527	6264837	11	Shale	LHS	3
ADI-CP6	291544	6264762	21	Shale	CB1	3
ADI-CP7	291446	6265020	30	Shale	LHS	3
ADI-CP8	292208	6265715	1	Qal	LHS	3
ADI-CP9	290909	6264677	3	Shale	LRT	1
ADI-CP10	291694	6264917	4	Qal	LHS	1
ADI-FF14	290884	6264650	1	Shale	LRT	
ADI-FF15	291018	6264772	10	Shale	LRT	2
ADI-FF18	291612	6265859	8	Tert T	PL/CB5	4
ADI-FF19	292248	6265526	3	Qal	PL/CB6	3
ADI-FF33	291296	6264733	6	Shale	LHS	
ADI-FF34	291251	6264241	3	Shale	CB1	3
IF-25	290500	6264380	1	Shale	LRT	
WD 65	290799	6264550	4	Shale	LRT	2
WD 72	290490	6264290	8	Shale	LRT	2
WD 73	290730	6264390	5	Shale	LRT	4
WD 74	291240	6264650	12	Shale	LHS	4
WD 75	291400	6264610	18	Shale	CB1	2
ADI-8	292222	6264827	6	Qal	FP	4
ADI-9	292018	6264295	5	Qal	FP	3
ADI-10	292243	6264067	4	Qal	FP	3
ADI-11	291845	6264338	7	Qal	FP	4
Sites on road						
ADI-FF20	290749	6265178	1	Shale	PL	4
ADI-FF21	290600	6265203	7	Qal	CB1	4
WD 63	290650	6265140	600	Qal	CB1/PL	1
PADs						
PAD-FF2	291510	6265700	PAD	Ter T	LHS	1
PAD-FF3	291760	6265955	PAD	Qal	PL/CB5	1
PAD-FF4	292302	6265898	PAD	Qal	PL/CB5	1
PAD-FF5	290400	6265780	PAD	Qal	LHS	1

6.1 Previous recommendations

The survey of the Fauna Fence covered lands beyond the current Precinct boundaries (i.e. it also included the Western Precinct and the roadway joining these two precincts). That report made a number of recommendations (JMcD CHM 2006c:53-55), some of which are relevant to the current Precinct planning process. These are reiterated here:

1. The proposed route crosses land of both high to very high archaeological sensitivity and areas of lesser significance (JMcD CHM 2006c: Figure 10; Table 10);
2. The proposed fauna fence would impact on 24 archaeological (surface) sites (9 within the Central Precinct and three along the road access between this and the Western Precinct: JMcD CHM 2006c: Table 11);
3. The proponent should apply to the Director-General, DECC (NSW) for a section 90 Consent to Destroy (with Salvage) for the full extent of the proposed impacts for the fenceline development to cover all surface sites that have been identified as being impacted by the proposed development;
4. Fenceline routes (surrounding the Central Precinct) were identified as requiring further archaeological investigation. A number of locations were chosen to sample the range of landform units present. It was envisaged that this work should be done under a section 90 (with Salvage) Impact Permit;
5. Some rare artefacts types i.e. ground edge hatchet heads, have been identified as of scientific significance. These were found at the following sites:

☉ Section K-L: site ADI/FF21

☉ Section D-E: site ADI/FF33

These should be collected under the Section 90 (with salvage) Permit.

The following areas around the boundary of the Central Precinct were identified as having particular sensitivity and as candidates for subsurface sampling:

☉ Bomb I¹ facility north of the main east–west road, on a low hill: **Zone 2** (256m);

☉ Bomb I facility north of the main east–west road, on lower shale hillslope overlooking floodplain landform: **Zone 1** (191m);

☉ Floodplain north of Bomb I: **Zone 1** (332m);

¹ The area north of the east west road was original defined as the Bomb facility, a reference to the munitions history of the former ADI Site.

☉ Creekbank north of Bomb I: **Zone I** (240m).

It was envisaged that salvage along these sensitive sections would take the form of spaced pits along the centreline, with impacts being confined to the developable lands,

The recommendations of this previous report (particularly where this advocates areas of particular sensitivity or representativeness) are considered in this analysis of the various landscapes within the Central Precinct and management requirements of the SMM.

6.2 Landscape elements and areas for investigation

The previous recommendations are considered here in light of the analyses that have been done for this Central Precinct planning process. The following findings are fundamental to the selection process:

- ☉ Archaeological evidence has been found across the Precinct wherever surface exposure has allowed its discovery;
- ☉ 93 hectares of land has been identified as having archaeological sensitivity (Zones 1, 2 and 3) within this Precinct (Table 6);
- ☉ There are a range of landscape and topographic characteristics across this Precinct;
- ☉ Ridge tops, low ridge tops, headwater and 1st order creek lines and upper hillslopes are shale hillslope landscapes particular to this part of the Site: these landscapes will be significantly impacted by development here;
- ☉ The Regional Park will retain a representative proportion of all of these except low ridge tops, plains and headwater tributaries (Table 4).

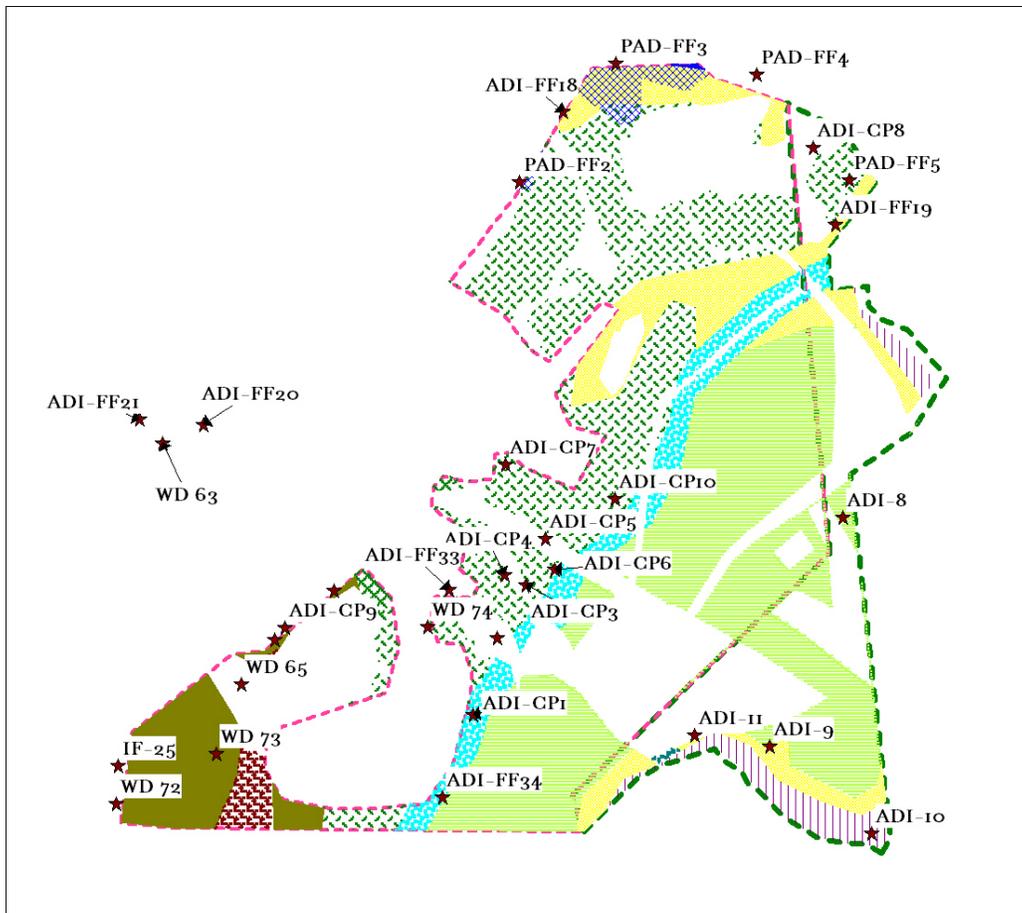
There are three major landscape bases and a total of 12 topographic landscape elements across this Precinct (see Figures 18 and 19).

When the three relevant sensitivity zones are combined with the amalgamated landscape parameters there are more than 40 combinations of potential targets for salvage. Based on representativeness criteria and the fact that there is such a substantial conservation

outcome in this central part of the Site, it is considered that 40 salvage excavations would be unwarranted – particularly given the excellent conservation outcome afforded by the central part of the Regional Park.

Instead, it is proposed that open area salvage excavation be undertaken in eight target areas (Table 9, Figure 20). Five of these will be within the Central Precinct, two within the ROS and the last in an area where there is a proposed drainage basin in the regional park.

Figure 17: The locations of all identified surface features, showing background of sensitive topography (Zones I, 2 and 3).



These target areas cover the representative range of landscape elements. The average size of each target (or sample) area would be around 2ha, from which a goal of around 150 square metres of excavated deposit would be retrieved. The excavated sample would represent c.0.75% sample of each Sample Area; the eight Sample Areas represent will

represent a 15% sample of the developable lands within Zones 1-3 of the Central Precinct.

Table 9: Suggested salvage locations in the Central Precinct, adjoining ROS and proposed drainage basin.

No.	(near)	Catchment	Landscape	Topo	Location	SMM Zone
1	ADI-45, ADI-FF11, ADI-12	1	Shale	PL	CP	3
2	ADI-34	1_2	Shale	LHS	CP	3
3	ADI-32, ADI-56	2	Shale	PL CB6	CP	3
4	ADI-41, ADI/FF-30	2	Shale	LHS	CP	2
5	ADI-22, ADI-28	2	Shale	LRT	CP	2
6	ADI-54, ADI-FF3	2	Qal	LHS	ROS	1
7	ADI/FF20, 21; SA-4	3	Qal	PL CB6	ROS	1
8	PADFF4, ADI-CP8	3	Qal	FP CB5	RP	3

The eight identified locations fulfil the necessary criteria of the SMM, both by testing a range of Management zones (1-3) and the range of representative landscape characteristics of the Central Precinct, ROS and an impact within the Regional Park (Table 9, Figure 17, 18).

Figure 18: Sensitive (Zones 1-3) landscapes overlain with identified surface sites.

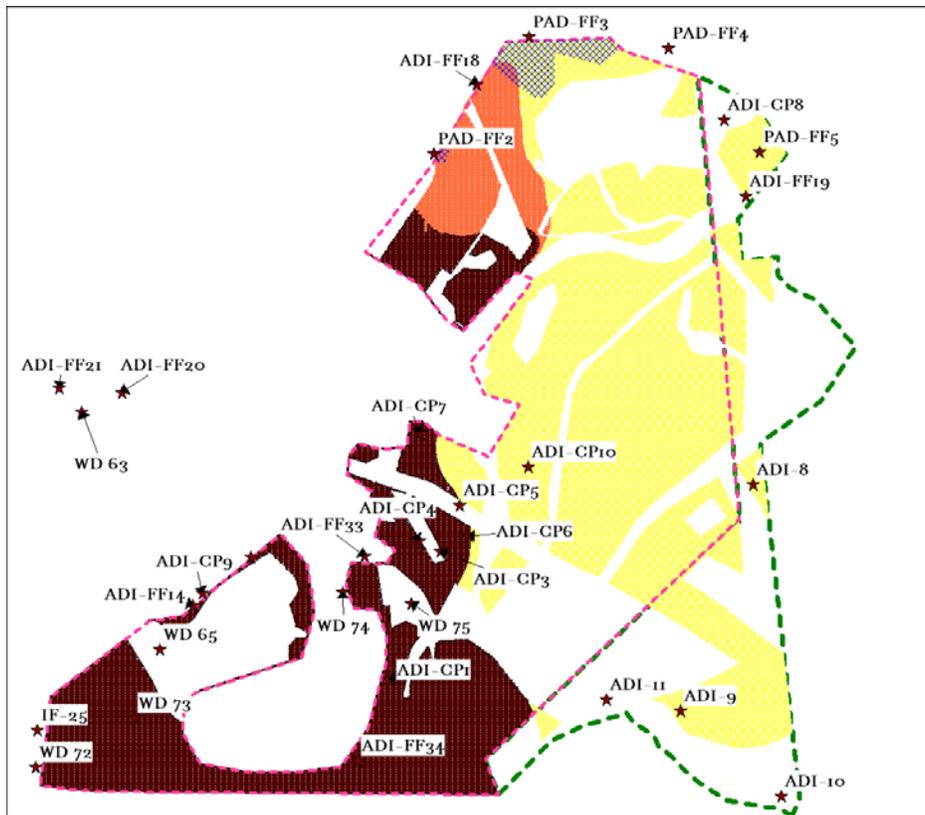
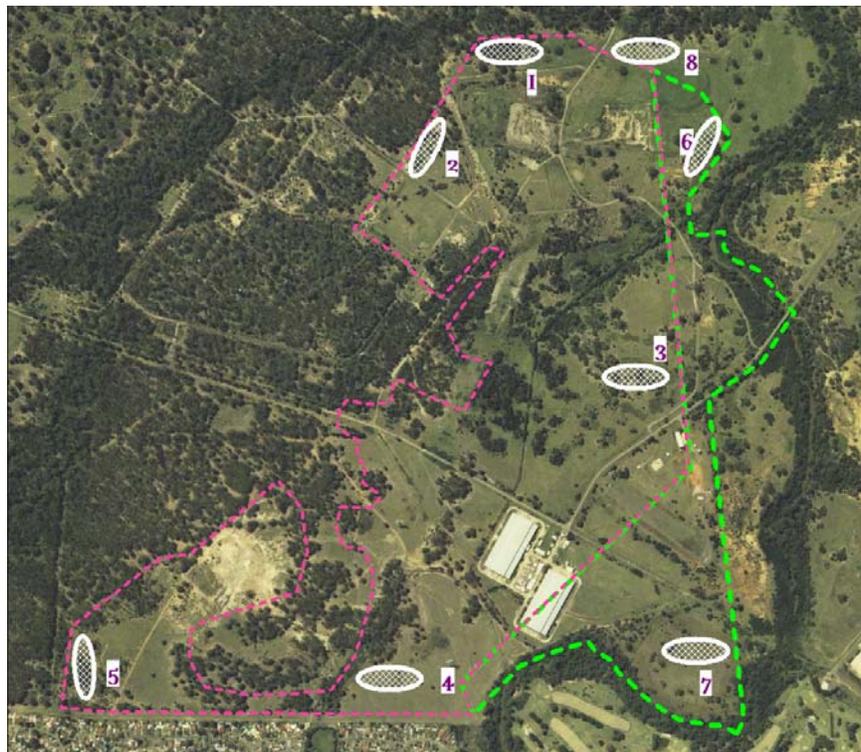


Figure 19: Sensitive topographic zones and suggested salvage locations.



Figure 20: Aerial photo of Central Precinct showing locations of suggested salvage locations (numbered as per Table 9).



7. DISCUSSION

7.1 The Central Precinct

The current investigation included 132.9 ha of developable land in the Central Precinct, and an additional 40ha of Regional Open Space which is zoned 'Active Recreation' uses. When the central part of the St Marys Development Site is considered, there is a significant conservation outcome with respect to Indigenous archaeological cultural heritage. More than 51% of the land here falls within the Regional Park, and of this land almost 33% has high conservation value (i.e. is zone 1) and another 54% has archaeological sensitivity (zones 2 and 3). Of the Zone 1 land identified between South Creek and its major tributary, 97% falls within the Regional Park.

This investigation has identified that the developable lands within the Central Precinct contain a fair proportion (30%) of lands which have already been highly disturbed (i.e. Zone 4).

The Central Precinct will impact on 2.4ha of land which has conservation potential (i.e. Zone 1). It also impacts on c.91 hectares of land with archaeological sensitivity (Zones 2 and 3).

In keeping with the precepts of the SMM, the investigation of a representative set of landscapes (in good condition) from the Central Precinct is required to assist in the mitigation of development impact in the Central Precinct and more broadly the interpretation and management of the archaeological resources in Regional Park.

Five salvage locations within Central Precinct (including the boundary fence impact) and another two locations within the ROS have been identified as locations which fulfil the representativeness criteria of the SMM. A further location has been identified as requiring salvage if a proposed water detention basin is located at the northern end of the Precinct (Figures 20, 21; Table 9). Salvage of these seven/eight landscapes will add fundamentally to our understanding of Aboriginal occupation of this area throughout its human occupation. A research design, adapted from the overall Project Research aims has been developed to guide the investigation of these seven/eight locations

(section 7.3). These proposed outcomes now require discussion with the Aboriginal community and DECC Archaeologists.

7.2 Management Processes: applying the protocols

The management protocols (section 3.2; Figure 6) devised in 1997 have directed the works undertaken for this study, and those completed in the previous development Precincts. In terms of the protocols and strategies flow chart, the planning process for the Central Precinct is progressing well.

An Indigenous heritage conservation outcome was determined by the REP, and the current work has completed stages 1-3 of the protocols (Figure 6). The Zone 4 areas within the developable lands can now be cleared for development. Once this approach has been validated by DECC and the procedures agreed, early development/construction works within the Zone 4 lands (and other zoned lands unconstrained by salvage locations) could proceed.

Once the Precinct Plan has been lodged with Council, the proponent should apply to DECC NSW a section 87/90 application for Consent with salvage. This application should be accompanied by this report.

The DECC NSW guarantee of service for processing Consent applications is 8 weeks. Given their familiarity with the Project and the processes involved, this length of time may not be required. It should, however, be factored into the schedule.

Once the Consent is granted, the fieldwork would commence. A four week excavation period at each of the seven locations is envisaged.

Once the salvage excavation is completed, a preliminary report documenting the methods used and preliminary results of the excavation can be lodged with DECC - and the proponent can then seek to activate the Consent for the remaining portions of the Central Precinct.

Once the analysis and reporting of the excavation is completed, DECC NSW will then be able to sign off to all approval authorities on clearances for all subsequent works within the Central Precinct.

7.3 Salvage Research Design

This research design develops the overarching archaeological research aims defined previously for the St Marys Development Site, and specifically defines the works programme for the Central Precinct at the seven/eight identified salvage locations.

A total of 25 surface sites with almost 300 artefacts have been recorded within the Central Precinct and ROS. Over 115 hectares of land with Potential Archaeological Deposit (Zones 1-3) have been identified in these two developable areas.

Study Area

The St Marys Development Site is located on the northern Cumberland Plain to the east of Northern Road. The Project Area comprised c. 15 square kilometres straddling South Creek, at its confluence with Ropes Creek.

Impact of the proposed development

The proposed Central Precinct involves zoning for Urban and Employment purposes to the west of South Creek (see Figure 5). A combination of housing, employment uses, roads, open space and related infrastructure impacts will destroy any indigenous cultural heritage remaining here. The location of this Precinct has been defined by SREP30 and heritage commission constraints. It is assumed that the entire area is developable. There is a major conservation outcome achieved by the broader management strategy in place for the St Marys Site: 97% of the central Project lands identified as having conservation potential are to be conserved in the Regional Park.

It can be assumed that all artefact-bearing topsoil across this developable area will be impacted by the Central Precinct's development. Any sites/objects located here would be destroyed. This research design reflects the need to salvage information from this central part of the St Marys Site, to ensure appropriate mitigation prior to development and to provide interpretation of the archaeological resources within the Regional Park.

Archaeological Background

By far the single most numerous site type on the Cumberland Plain is the stone artefact scatter or 'open camp site'. Most open sites are comprised of shallow surface scatters and do not possess stratified deposits. Most open sites, however, have been subject to soil formation processes and most are, at least partially, buried.

To date the most extensive subsurface investigation carried out on the Cumberland Plain have been the Rouse Hill Test and Salvage Excavation Programmes Stages 1-3 (McDonald *et al.* 1994, JMcD CHM 2001, 2005a, 2005b). Stage 2 involved the open area excavation of six sites with more than 500 square metres of excavation while the 3rd Stage explored eight landscapes and resulted in more than 1300 square meters of excavation. The RHIP (Stage 1 - 3) results (as well as several other substantial excavation programmes completed on the Cumberland Plain over the last decade (e.g. Bonhomme Craib 1999, JMcD CHM 2004, 2005, 2006, 2008a), have established some important base line indicators for site location, preservation and consequently cultural heritage management:

- ☉ most areas - even those with sparse or no surface manifestations - contain sub-surface archaeological deposits;
- ☉ where open sites are found in aggrading and stable landscapes, some are intact and have the potential for internal structural integrity. Sites in alluvium possess potential for stratification;
- ☉ while ploughing occurs in many areas of the Plain, this only affects the deposit up to c.30cm depth, and even then ploughed knapping floors have been located which are still relatively intact;
- ☉ contrary to earlier models for open sites, many sites contain extremely high artefact densities, with variability appearing to depend on the range of activity areas and site types present;
- ☉ the complexity of the archaeological record is ; far greater than was previously identified on the basis of surface recording and by limited test excavation;
- ☉ gross site patterning is identifiable on the basis of environmental factors: sites on permanent water are more complex than sites on ephemeral or temporary water lines (McDonald 1996:115).

Aims

Given the extremely poor surface visibility across the St Marys Project generally (Jo McDonald CHM Pty Ltd 1997, 1996, 2001a, 2006) and the fact that surface evidence is not a good indicator for the nature of the archaeological resource, salvage in each target

area will commence with an intensive programme of random sub-surface testing. Testing will locate suitable assemblage(s) for salvage – in a manner which comparable with other recent excavations on the Cumberland Plain (particularly the RHIP Stage 2 and 3 works, Xavier College, St Marys Eastern Precinct, Greystanes Estate and Plumpton Ridge).

The over-riding research aim of this salvage project is to investigate the archaeology in relation to landscape. Subsidiary aims include:

- ⊕ Characterising the locations investigated via artefact distribution and assemblage characteristics.

How do the assemblages at the various sites compare given the differences in stream order and other landscape characteristics?

The retrieval of assemblages from specific activities (including knapping floors) will investigate how technology was organised.
The identification of assemblage 'signatures' - tentatively identified during the earlier work and further explored in a range of subsequent investigations (e.g. across the St Marys Site, at Regentville, at Richmond and in the RHDA - will be part of these analyses.
- ⊕ The retrieval of statistically viable samples of artefacts will allow comparison with other similar salvage excavation.
- ⊕ The comparison of the results of the present investigations with results from other projects elsewhere on the Cumberland Plain, to identify intra- and inter-regional variation and to establish significance values.

Research framework

The project seeks to investigate Aboriginal use of this part of the Cumberland Plain.

Management investigations across the Cumberland Plain over the last 10 years have focussed on archaeological landscapes. This is in contrast arguably ineffective and inappropriate site-based approach to management. Archaeological landscapes are based on a combination of geomorphological and topographic criteria.

Technological organisation involves studying artefacts to explore how people used landscapes in the past. It is concerned with the production, use, transport and discard of tools and the materials needed for their manufacture and maintenance (e.g. Nelson 1991). Many factors influenced the particular strategies that were adopted by people - including the raw materials that were available (their physical properties) the particular kinds of jobs that tools were needed for (e.g. heavy duty chopping, wood shaving, fine

cutting), whether tools could be made and used in the same place or whether they had to be carried over long distances. Sometimes tools also had to code social information. More commonly understood strategies included curation, expediency, specialisation, and stone rationing (e.g. in response to great distance from stone sources).

Technological organisation and particular technological strategies are manifest in the archaeological record through people's stone discard actions. Previous analysis on the Cumberland Plain has already identified a variety of activities, including the procurement of raw materials, initial testing and reduction of stone, transport, heat treatment, systematic core reduction and production of formal tools (including backed artefacts), expedient reduction to produce unshaped tools, hafting, tool use, tool maintenance, storage and recycling or reuse.

Field methods

The salvage of the seven identified landscapes in the Central Precinct will target areas with no (or minimal) surface archaeological manifestation. The approach being advocated is a combination of systematic testing and salvage excavation: the methodology includes both the discovery of buried features across a landscape and then the salvage of features encountered. It is important that this is done in a way which is comparable to other salvage excavations done in a range of landscapes across the Cumberland Plain.

- ④ Open-plan excavation: Salvage will target features/locations that intercept a number of activities. If the archaeological evidence is found to be dispersed and localised (i.e. activities were spatially discrete), more than one open plan excavation area may be needed. It is proposed that open plan excavation would proceed either until a statistically viable sample has been obtained – or until the edge/boundaries of the feature(s) are reached (whichever is smaller). The outer limits of a knapping feature are defined as either sterile deposit and/or a sufficiently low artefact density to signify the absence of interpretable artefactual material e.g. <10 small artefacts not including tools and/or retouched items.

- ④ Statistically viable sample: >2,000 artefacts/assemblage but preferably more, if possible. Sufficient artefacts need to be recovered so that assemblages can be described in terms of raw materials types, artefact types, artefact size, and so on.

Some artefact types such as cores, backed artefacts and retouched and/or used tools may each make up <1-2% of the assemblage. In an assemblage of 2,000 artefacts there might therefore be only 10-80 artefacts of these types: the minimum number, statistically speaking, required to analyse these types further. To calculate a statistically significant result (e.g. for a chi-square test) it must be possible to calculate an expected value of at least five artefacts in each cell of a data table (Clegg 1990:176). If one wanted to compare the size of artefacts of silicified tuff and silcrete, and silicified tuff made up only 20% of an assemblage of 2,000 artefacts, then there would be only 400 artefacts of this raw material. If only 1% of those artefacts were >4cm in size then there might be only 4 silicified tuff artefacts >4cm in size.

- ⊕ Moderate and high density locations: Moderate and high artefact density locations are needed to achieve statistically viable samples economically. If artefact density is only 20/m² then 100 square metres would need to be excavated to recover 2,000 artefacts. If densities were c. 50/m² then 40m square metres would need to be excavated to recover 2,000 artefacts. As artefact density may vary in relation to the kind of activity (systematic core reduction and backed artefact production may result in high artefact densities while casual reduction to produce unshaped tools may result in moderate or low densities) excavation areas ought not be restricted only to high density locations, unless a range of activities are indicated. Entire features should be retrieved where possible to ensure that the assemblage can be properly characterised.
- ⊕ Range of activities: Different activities indicated by different artefact types, including backed artefacts, partly made backed artefacts and backing debitage, tool retouching debitage, debitage with dorsal grinding, and retouched and/or used tools. Different activities also indicated by different and/or distinctive raw materials.

The proposed methodology is as follows:

Sub-surface testing will be conducted across seven/eight defined PAD locations.

Dispersed test pits measuring 1m x 1m will be excavated at 10m - 20m intervals across a grid centred over the proposed impact area/target PAD. The testing will aim to locate

high and/or moderate density pits and/or interesting assemblages. Approximately 40-45 test pits will be excavated per sample area.

General

It is intended open area excavation will be undertaken where features are encountered. A 'feature' would include a high density of artefacts in a square metre or a pit which contains unusual/diagnostic artefact types. Open area excavation aims to salvage an entire assemblage – or where this appears to be extensive and/or continuous a large enough sample of artefacts to be statistically viable (see above). The aim would be to retrieve a statistically viable sample from this site/landscape to facilitate valid comparison with other sites/landscapes.

The size of the area to be open area excavated will depend on the retrieved artefact densities. A target of 100m² is generally required to yield the necessary artefact assemblage. An excavation area of this dimension will ensure comparability with other salvage projects undertaken recently on the Cumberland Plain.

Test pits will be excavated in bulk, down to the base of the A₂ deposit. All the deposit will be wet sieved on site using a water truck and nested 8mm and 3.5mm sieves. The sieving location will be positioned in an area where there will ultimately be site disturbance (i.e. in developable land). Appropriate sediment controls will be used.

The site will be mapped to scale and the location of the excavated test pits clearly identified and logged using handheld (differential) GPS. Stratigraphic sections detailing the stratigraphy and features within the excavated deposit will be drawn and the excavation area (including any features encountered) will be photographed.

Artefacts will be analysed on a comparable level with previous analyses of excavated assemblages on the Cumberland Plain (e.g. Jo McDonald CHM Pty Ltd 1997b, 1997c, 1999b, 2001, 2004, 2005, 2006, 2008a; McDonald and Rich 1993). This will ensure comparability with others in the St Marys Project and Cumberland Plain generally.

The analysis will provide information on the kinds of activities carried out, what stone materials were used and in what quantities, how stone tools were made, used and maintained, and how they and the materials from which they were made were

transported around the landscape. By comparing different investigation areas it will be possible to determine whether there were differences in the kinds of activities carried out and the way that stone technologies were organised across the landscape.

The following processes will be followed:

- ☉ Flaking quality and whether stone was heat treated or not will be recorded to provide additional information on stone selection.
- ☉ Raw material type will be recorded to document what stone materials were used.
- ☉ Artefact size and weight will be recorded.
- ☉ Tool production, use and maintenance will be analysed, identifying formal tools, tools which were maintained, and tool retouching debitage.
- ☉ To document how stone was reduced and tools were made, flaking pattern will be recorded for cores and conjoin sets.
- ☉ Where features of previously reported generalised reduction sequences or strategies are observed, these will be noted as relevant.
- ☉ To document the form of transported items and nature of activities, the types of artefacts reconstructed through conjoining will be recorded.
- ☉ Various types of evidence will be used to determine the kinds of activities that were carried out.

A full description of the recording methods will be made in the archaeological report.

Aboriginal Consultation

Consultation with the Deerubbin Local Aboriginal Land Council (DLALC) and the other four Aboriginal community groups (Darug Tribal Aboriginal Corporation, Darug Custodian Aboriginal Corporation, Darug Aboriginal Cultural Heritage Assessments and Darug Land Observations) will continue. Aboriginal representatives/fieldworkers will be part of the field team. Representatives will be involved in discussions during sub-surface testing and prior to management recommendations being made.

In accordance with DECC Community Consultation Guidelines, and advertisement will also be lodged in the local print media to determine whether further Indigenous stakeholders self-identify for this area. If so, based on whether these people can meet

the appropriate criteria, these people will also be involved in the consultation process regarding cultural values in the St Marys Project.

7.4 Impact from the proposed development

Within the Central Precinct it can be assumed that development impact will be total, and that any remaining archaeological sites/features/objects (previously 'relics') or landscapes will be totally destroyed. The appropriate management of the defined areas with archaeological potential to be affected by this development proposal is dealt with by this investigation.

Within the ROS the land is zoned for Active Recreation uses and it is assumed there will be a number of possible impacts constructed here (playing fields, recreational facilities, etc.). The proposed drainage basin within the Regional Park will similarly have an impact on the ground surface, and given this will be located within the Regional Park in a sensitive landscape, this too requires archaeological mitigation.

The aim of the strategic management model (JMcD CHM 1997b) was to establish a significant conservation outcome for the St Marys Site. This has arguably been achieved. A total of c.900ha is to be included in the Regional Park. The majority of the lands identified as having high archaeological significance and/or potential (Zone 1) fall within the Regional Park, and the appropriate management of these will be provided for by a Plan of Management being devised by the DECC NSW.

7.5 Conclusions

At this point in the planning process, the strategic management model has directed the further investigation of Indigenous heritage values. The outcomes achieved are in line with the principles defined in the EPS. There a significant conservation outcome achieved by the designation of the Regional Park and further investigation of archaeological evidence at seven target locations in the developable land will achieve the other designated goal of the EPS, i.e. the further investigation and interpretation of Indigenous archaeological values from the St Marys Development Site.

8. RECOMMENDATIONS

The following recommendations are made on the basis of:

- ☉ legal requirements of the National Parks and Wildlife Act NSW 1974 (as amended) whereby it is illegal to damage, deface or destroy an Aboriginal object without the prior written consent of the Director, DECC NSW;
- ☉ the interests of the Deerubbin Local Aboriginal Land Council, the Darug Tribal Aboriginal Corporation, Darug Custodian Aboriginal Corporation, Darug Aboriginal Cultural Heritage Assessments and Darug Land Observations;
- ☉ the Strategic Management Model and the processes as defined in the EPS;
- ☉ the findings of the current and previous field surveys done within the Central Precinct and ROS;
- ☉ the assessed potential of the landscapes and archaeological features identified within the Central Precinct and ROS; and,
- ☉ the Precinct Planning stage of the development process.

It is recommended that:

1. There is a significant conservation outcome in this central part of the St Marys Site, with more than 51% of the total land area and almost 97% of the land with high archaeological sensitivity being excluded from the developable lands.
2. The basic precepts of the strategic management model are achieved by the planning process.
3. Eight target areas within the developable lands (including the ROS and proposed water basin) are identified as requiring archaeological salvage prior to development taking place (Table 9):
4. Depending on the timing of the proposed works programme, the Proponent should apply to the DECC NSW for either a s87 Permit or a s87/s90 Consent with Salvage to undertake these works. In either case, the research design presented here should directed the nature and scope of the archaeological excavations undertaken;
5. One copy of this report (each) should be sent to:

Mr. Frank Vincent
Chairperson
Deerubbin LALC
PO BOX V184
MT DRUITT VILLAGE NSW 2770.

Mrs. Leanne Watson
Darug Custodian Aboriginal Corporation
PO Box 36
KELLYVILLE NSW 2155

Ms Sandra Lee
Darug Tribal Aboriginal Corporation
PO Box 441
BLACKTOWN NSW 2148

Mr Gordon Morton
Darug Cultural Heritage Assessments
28 Calala St
MT DRUITT NSW 2770

Mr. Gordon Workman
Darug Land Observations
PO Box 571
PLUMPTON NSW 2761

6. Three copies of this report should be sent to:

Ms Lou Ewins
Manager Cultural Heritage Division
Sydney Zone DECC
PO Box 668
PARRAMATTA NSW 2124.

9. REFERENCES

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Appendix I

Indigenous Cultural Values Reports

from DLALC, DTAC, DCAC, DACHA and DLO

(those received by 18th July 2008)



Darug Tribal Aboriginal Corporation

PO Box 441 Blacktown NSW 2148

PH: (02) 9622 4081

Mobile 0431 343 021

Fax: (02) 9622 4081

Email: darug_tribal@live.com.au

ABN: 77 184 151 969

Wednesday, June 25, 2008

Dear Jo Mc Donald

Re: Archaeological assessment of Indigenous Heritage values in the Central Precinct of the St Marys Development Site, St Marys

After reading the draft and doing the survey we at DTAC who are representing the local Darug community and are the Traditional Custodians believe this area has a very high heritage and cultural significance to our members and we would like to have a representative for the Darug community involved in all aspects of this project.

We are also pleased with the preparation draft report in all aspects would support the application for an s90 or s87.

Hys & Smiles
Sandra Lee
Secretary DTAC

Darugs
The Traditional & Spiritual Custodians of Darug Land

**DARUG CUSTODIAN ABORIGINAL
CORPORATION**

PO BOX 81 WINDSOR 2756
PH: 45775181 FAX: 45775098 MOB: 0415770163
ABN: 81935722930
mulgokw@.aol.com

30th June 2008.

Attention: Sandra Wallace.

SUBJECT: Archacological Assessment of Indigenous Heritage values in the Central precinct of St Marys Development site.

Dear Sandra,

The Darug Custodian Aboriginal Corporation have received and read the draft report for the Central precinct in the St Marys Development site. We support the Archacological recommendations and the application for s90 for this development, we are pleased with the conservation outcomes within the St Marys Development site. Or group is concerned with the long term conservation within the reginal park and would like further consultation on the management plan for this area, as playing fields and places of this nature destroy Aboriginal sites. We would also recommend signage on Darug history of this area be displayed within the reginal park.

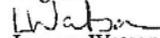
Our group would like to recommend that materials from the excavation works be dated in an appropriate area that would give us the most accurate dates. We also recommend that when the comparable study is carried out that a plain English report appropriate for local schools and libraries be written about the Darug history and the Archaeological findings, with input from the traditional owners.

All assessment for Cultural Heritage should have a traditional owner present to identify sites, trees and all other Darug areas. Our group would like to participate in all works carried out in regards to Cultural Heritage as these are Darug sites and it is culturally appropriate for experienced Darug people to carry out these works.

We recommend that the earthworks in the areas that are zone 1, 2 and 3 be monitored and the correct permits are requested for collection of Aboriginal cultural Heritage materials to be relocated on site after works in a conservation area or in an area as a display for educational purposes.

We look forward to working with you on this project.

Regards


Leanne Watson

Darug Aboriginal Cultural Heritage Assessments

ABN 51734106483

Gordon Morton & Associates
28 Calala St., Mt. Druitt, 2770
Ph. 9625 0005
Mob: 0432 865 831
Fax: 45 677 421

Celestine Everingham
90 Hermitage Rd., Kurrajong Hills, 2758
Ph/Fax: 45677 421
Mob: 0432 528 896

2.7.08

Attention

Jo. McDonald

re Central and Western Precincts of the
St Mary's Development Site - Daring Land.

As within the Western Precinct the development
impact will totally destroy any Daring sites
DACHA support extensive sub-surface investigations.
We wish to be involved in all discussions held
before any sub-surface testing and prior to
management recommendations being made.
When earthworks start at a later date we also
wish to monitor so as to salvage Daring artefacts
before they are destroyed. This area is well
known to the Daring people and my own family
has had a long association over time. I am
a Native Title Claimant and this region has
been recognised as part of our base claim.
Yours Sincerely,
Gordon Morton

Cultural Heritage - Building respect for the past and Conservation for the future

DARUG LAND OBSERVATIONS

ABN 87239202455

E-MAIL: gordow51@bigpond.net.au

PO BOX: 571 Plumpton: NSW 2761

PHONE 029831 8868 OR 0415 663 763

16th July 2008

Ms. Sandra Wallace

Project Archaeologist

Re: Central & Western precinct in the ADI site.

As in your report about theses recommendations for both Central
& Western areas we are in agreement.

But we all know the whole of ADI is one great big heritage pad.

With Thanks

Gordon Workman



D.L.O
Site's Officer
0415 663 763