Archaeology of the Russian Scare:

The Port Adelaide Torpedo Station

by Martin Wimmer


A thesis submitted in partial fulfilment of the requirements for the degree of Bachelor of Archaeology (Honours)

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Cover Page - aerial photograph of the Port Adelaide Torpedo Station site looking south, 16 January 1937 (Photo: D. Darian Smith, Adelaide; Jan Perry: Private Collection).
# Table of Contents

<table>
<thead>
<tr>
<th>CONTENTS</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACKNOWLEDGEMENTS</td>
<td>viii</td>
</tr>
<tr>
<td>DECLARATION OF CANDIDATE</td>
<td>ix</td>
</tr>
<tr>
<td>LIST OF ABBREVIATIONS</td>
<td>x</td>
</tr>
<tr>
<td>ABSTRACT</td>
<td>xi</td>
</tr>
<tr>
<td>TABLE OF FIGURES</td>
<td>xiii</td>
</tr>
<tr>
<td>INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>Introduction</td>
<td>1</td>
</tr>
<tr>
<td>Research questions</td>
<td>1</td>
</tr>
<tr>
<td>Summary of thesis chapters</td>
<td>3</td>
</tr>
<tr>
<td>Description of study area</td>
<td>4</td>
</tr>
<tr>
<td>CHAPTER ONE: LITERATURE REVIEW</td>
<td>5</td>
</tr>
<tr>
<td>Introduction</td>
<td>5</td>
</tr>
<tr>
<td>The archaeology of the recent past</td>
<td>5</td>
</tr>
<tr>
<td>Hybrid studies: maritime and historical archaeology</td>
<td>7</td>
</tr>
<tr>
<td>Military site archaeology</td>
<td>8</td>
</tr>
<tr>
<td>Cultural heritage management (CHM) approaches to</td>
<td>11</td>
</tr>
<tr>
<td>military site archaeology</td>
<td></td>
</tr>
<tr>
<td>Thematic models of heritage classification: Australia and England</td>
<td>12</td>
</tr>
<tr>
<td>Garden and botanical studies</td>
<td>14</td>
</tr>
<tr>
<td>Previous archaeological investigation of Australian colonial torpedo stations</td>
<td>16</td>
</tr>
</tbody>
</table>
Previous archaeological investigation of the Port
Adelaide Torpedo Station
Conclusion

CHAPTER TWO: HISTORICAL BACKGROUND
Introduction
First landfall
The naval store
The ‘Russian Scare’
The Jervois plan
The Torpedo Station
Abandonment
Conclusion

CHAPTER THREE: METHOD
Introduction
Methodological techniques employed
Historical and archival research
Expert advice
Pre-disturbance survey
Minor site disturbance
Overlaying aerial photographs
Conclusion

CHAPTER FOUR: RESULTS
Introduction
Black beacon
Artificial harbour
Magnetometer survey of artificial harbour
<table>
<thead>
<tr>
<th>Chapter Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Artificial sea wall</td>
<td>44</td>
</tr>
<tr>
<td>Main track and associated structures</td>
<td>46</td>
</tr>
<tr>
<td>Torpedo boat shed and filling shed</td>
<td>53</td>
</tr>
<tr>
<td>Perry’s Creek</td>
<td>53</td>
</tr>
<tr>
<td>Exotic vegetation</td>
<td>55</td>
</tr>
<tr>
<td>Conclusion</td>
<td>60</td>
</tr>
<tr>
<td><strong>CHAPTER FIVE: DISCUSSION</strong></td>
<td>61</td>
</tr>
<tr>
<td>Introduction</td>
<td>61</td>
</tr>
<tr>
<td>The sum of all fears</td>
<td>62</td>
</tr>
<tr>
<td>Technology and a shift in defence theory: reasons for abandonment</td>
<td>63</td>
</tr>
<tr>
<td>Defining the cultural landscape of the Torpedo Station</td>
<td>66</td>
</tr>
<tr>
<td>Specialised experiences of time and place</td>
<td>68</td>
</tr>
<tr>
<td>Mode of construction</td>
<td>69</td>
</tr>
<tr>
<td>Site formation processes: pre-abandonment</td>
<td>71</td>
</tr>
<tr>
<td>Site formation processes: post-abandonment</td>
<td>72</td>
</tr>
<tr>
<td>Botanical investigations</td>
<td>78</td>
</tr>
<tr>
<td>Further investigations</td>
<td>80</td>
</tr>
<tr>
<td>Cultural Heritage Torpedoed</td>
<td>83</td>
</tr>
<tr>
<td>Conclusion</td>
<td>83</td>
</tr>
<tr>
<td><strong>CHAPTER SIX: CONCLUSION</strong></td>
<td>85</td>
</tr>
<tr>
<td>Introduction: an embarrassment of riches</td>
<td>85</td>
</tr>
<tr>
<td>Future archaeological directions: unanswered questions</td>
<td>85</td>
</tr>
<tr>
<td>Identifying cultural significance</td>
<td>87</td>
</tr>
<tr>
<td>Interpretive potential</td>
<td>89</td>
</tr>
<tr>
<td>Conclusion: archaeology as optimism</td>
<td>89</td>
</tr>
</tbody>
</table>
REFERENCES

APPENDICES

APPENDIX ONE

Certificate of Title

(Land Titles Office Adelaide)

APPENDIX TWO

Treloar and Treloar 2000 transect shown as shaded area
and main Torpedo Station track shown as yellow line

(Mapland survey 6107: Photo 173)

APPENDIX THREE

Plan of colonial defences, October 1858 - section showing
arcs of fire from proposed forts (Torpedo Station site circled in red)

(Private Collection: Jan Perry)

APPENDIX FOUR

Winton survey: 28 April 1938 (ruins and old gun circled in red)

(Land Titles Office 1938)

APPENDIX FIVE

Total station survey of cultural material associated with the
Port Adelaide Torpedo Station

(Mapland survey 6107: Photo 173)

APPENDIX SIX

Chart of Torpedo Station showing artificial bay, jetty and moorings

(Drawing No. 4322/17: nd.)

APPENDIX SEVEN

Magnetometer survey of artificial harbour overlaid on aerial
photograph of Torpedo Station site.
APPENDIX EIGHT

Magnetometer survey of artificial harbour: overlaid transects depict collection bias of significant readings

APPENDIX NINE

1954 Aerial photograph of Torpedo Station site depicting structures in artificial harbour

APPENDIX TEN

Old bricks now a part of the artificial sea wall

APPENDIX ELEVEN

Aerial photograph showing extent of high water, 4 November 1954

APPENDIX TWELVE

Total station survey of stormwater inspection points overlaid on Aerial photograph of Perry’s Creek

APPENDIX THIRTEEN

Brief description of Torpedo Station, no date

(Private Collection: Jan Perry)
Acknowledgements

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Declaration of Candidate

I certify that this thesis does not incorporate without acknowledgement any material previously submitted for a degree or diploma in any university; and that to the best of my knowledge and belief it does not contain any material previously published or written by another person except where due reference is made in the text.

Martin Wimmer
21.10.05
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHM</td>
<td>Cultural Heritage Management</td>
</tr>
<tr>
<td>CPO</td>
<td>Chief Petty Officer</td>
</tr>
<tr>
<td>DEH</td>
<td>Department for Environment and Heritage</td>
</tr>
<tr>
<td>GPS</td>
<td>Global Positioning System</td>
</tr>
<tr>
<td>HMCS</td>
<td>Her Majesty’s Colonial Ship</td>
</tr>
<tr>
<td>HMVS</td>
<td>Her Majesty’s Victorian Ship</td>
</tr>
<tr>
<td>LMC</td>
<td>Land Management Corporation</td>
</tr>
<tr>
<td>LTO</td>
<td>Land Titles Office</td>
</tr>
<tr>
<td>LWST</td>
<td>Low Water Spring Tides</td>
</tr>
<tr>
<td>MPP</td>
<td>Monuments Protection Program</td>
</tr>
<tr>
<td>NAA</td>
<td>National Archives of Australia</td>
</tr>
<tr>
<td>NPWS</td>
<td>National Parks and Wildlife Service</td>
</tr>
<tr>
<td>OHWM</td>
<td>Ordinary High Water Mark</td>
</tr>
<tr>
<td>TB</td>
<td>Torpedo Boat</td>
</tr>
<tr>
<td>TLP</td>
<td>Thematic Listing Program</td>
</tr>
<tr>
<td>WAC</td>
<td>World Archaeological Congress</td>
</tr>
</tbody>
</table>
Abstract

This thesis examines the Port Adelaide Torpedo Station, a colonial era coastal defence facility in South Australia. It seeks to understand how the material culture of the site can reflect changing attitudes to coastal defence in South Australia between 1877 and 1924.

The Torpedo Station bridges colonial and national defence theory and practice, having been operative during both regimes, and is representative of the evanescent nature of industrial era warfare. Conceptualised at a time when theorists of coastal defence advocated investment in shore based fortifications and regarded naval vessels as no more than seaward accessories to these static structures, the Torpedo Station was very much a product of its time. By the early 20th-century, this attitude to coastal defence had changed dramatically due largely to evolving technology and Federation.

Federation brought a rationalisation of Australia's naval assets and a unified national defence strategy. Defence theory shifted from one of isolated land based military installations and a haphazard reliance on ships of the Royal Navy, to a national naval capability and deterrent. Investment in a naval fleet took precedence over expenditure on static land based defences, and sites like the Port Adelaide Torpedo Station became superfluous to this new defence policy.

The archaeology of the Torpedo Station provides a greater understanding of how the military scenarios which led to its establishment were era specific and relevant only as long as the available military hardware and related theory remained immutable.
The site, never modernised during its operational life and never reused after abandonment, presents a pristine military stratigraphy. Its material culture represents a manifestation of particular ways of seeing the world and reflects specialised experiences of time and place.

The site is now severely degraded with very little of the material fabric visible above ground, and is unrecognisable as a former military installation. Despite this degradation, a pre-disturbance survey has found the spatial integrity of the Torpedo Station to be largely intact. It contains remains relating to a discernable stage of intellectual development, which are in the same arrangement now as in a previous age. The cultural site formation processes which led to its degradation are intimately tied to rapidly evolving armaments technology and shifting attitudes towards coastal defence.

The fact that the Australian Navy transferred the site to the South Australian Harbours Board in 1924 is testament to its loss of strategic importance. The Port Adelaide Torpedo Station reflects the changing attitudes to coastal defence in South Australia and, by extension, Australia.
## Table of Figures

<table>
<thead>
<tr>
<th>FIGURE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIGURE ONE</td>
<td>20</td>
</tr>
</tbody>
</table>
| Infrastructure of naval store, overwritten in red in the late 1920s.  
Black beacon circled in blue. (Admiralty Chart 1876) |      |
| FIGURE TWO      | 22   |
| A Type II torpedo boat with torpedo dropping gear on its sides.  
(Armstrong 1896: 203) |      |
| FIGURE THREE    | 30   |
| C.1911 site plan of Torpedo Station (not to scale).  
(NAA: MP472, 18/11/2562) |      |
| FIGURE FOUR     | 32   |
| Matt Schlitz conducting a total station survey of the Torpedo Station.  
(Photo: Debra Shefi, 11 May 2005) |      |
| FIGURE FIVE     | 35   |
| Torpedo Station 6-inch Armstrong gun and shield.  
(Healey 1999: 6) |      |
| FIGURE SIX      | 36   |
| Magnetometer survey of artificial harbour conducted by Ian Moffat,  
Rick Bullers and Joe Flatman.  
(Photo: Martin Wimmer, 1 June 2005) |      |
| FIGURE SEVEN    | 40   |
| Remains of black beacon, north face.  
(Photo: Martin Wimmer, 5 October 2004) |      |
FIGURE EIGHT

Cell structure of Blackwood (*Acacia melanoxylon*).

(Ilic 1991: 33)

FIGURE NINE

Artificial sea wall, north face.

(Photo: Martin Wimmer, 5 October 2004)

FIGURE TEN

Cultural material churned up by the trenching process – possibly belonging to the tank stand.

(Photo: Martin Wimmer, 21 September 2005)

FIGURE ELEVEN

Brine main inspection and maintenance port, western face.

(Photo: Martin Wimmer, 21 September 2005)

FIGURE TWELVE

Gun platform remnant, north face.

(Photo: Debra Shefi, 11 May 2005)

FIGURE THIRTEEN

Imprint of tramway tracks, looking west.

(Photo: Martin Wimmer, 11 May 2005)

FIGURE FOURTEEN

Southern portion of raised walkway depicting rubble construction.

(Photo: Martin Wimmer, 11 May 2005)

FIGURE FIFTEEN

*Opuntia* sp., western edge.

(Photo: Martin Wimmer, 5 October 2004)
FIGURE SIXTEEN 58
Pig Face (Carpobrotus sp.).
(Photo: Martin Wimmer, 21 September 2005)

FIGURE SEVENTEEN 58
Pig Face (Lampranthus sp.).
(Photo: Martin Wimmer, 21 September 2005)

FIGURE EIGHTEEN 59
Rectangular mass of African Boxthorn (green and dry branches),
looking north-east.
(Photo: Martin Wimmer, 21 September 2005)

FIGURE NINETEEN 70
Fort Glanville, early 1970s.
(Colwell 1973: 73)

FIGURE TWENTY 73
Public torpedo auction.
(The Register 15 March 1912: 2)

FIGURE TWENTY ONE 84
New slip under construction September 2005 (eastern face),
56 metres east-north-east of black beacon.
(Photo: Martin Wimmer, 21 September 2005)

FIGURE TWENTY TWO 90
Torpedo reuse - post public auction?
(Milligan 1975: 17)
Introduction

As an island continent, Australia’s settlement and commerce is intimately tied to themes of seafaring. Early seafarers colonised Australia more than 40,000 years ago. In historical times, seafarers charted and raised their flag on Australian soil in the name of a foreign head of state and the imperialist designs of that state. Some of the common recurring themes of seafaring are naval warfare and coastal defence, with a more recent and overlapping facet being torpedo warfare.

This archaeological thesis investigates a colonial era torpedo station located at Port Adelaide. A relic of South Australia’s colonial Navy, the Torpedo Station is situated at the confluence of Hindmarsh Reach and the North Arm of the Port Adelaide River. The study site extends across a terrestrial and inundated landscape, blurring the boundary of maritime and historical archaeology.

It is considered that archaeological investigation and interpretation of the structures left behind at the Torpedo Station by changes in technology, defence policy and the rationalisation of related infrastructure post-Federation, will serve to broaden our understanding of colonial era military sites. Further, this thesis may serve as a model or precursor to a broader study of seafaring themes aligned with coastal defence and their impact on the Australian landscape and psyche.

Research questions

By using archaeological techniques to analyse the cultural landscape of a 19th-century coastal defence site, this thesis will investigate the following question: “How does the material culture of the Port Adelaide Torpedo Station reflect the changing attitudes to coastal defence in South Australia between 1877 and 1924?”.
decision to frame the research question within this particular date range was based on the following reasons.

At the urging of the Colonial Office in London, Lieutenant General William Jervois took up a five year residency as the Governor of South Australia in 1877, before moving on to a similar position in New Zealand in 1882. Jervois, a respected military engineer, was an expert in coastal defence theory and the construction of fortifications who used his expertise to steer South Australia’s capabilities in these areas. Previously, the Colony of South Australia was largely defenceless (Nairn et al 1972:479-480).

In 1924, ownership of the Torpedo Station was transferred from the Royal Australian Navy to the South Australian Harbours Board (Commonwealth of Australia Gazette 1924, 52:1574). This act was intimately tied to changing attitudes about coastal defence in South Australia. It demonstrated a shift in defence theory and practice, and underlined the loss of the strategic and tactical potency of the site.

This thesis will combine archaeology with the cross-disciplinary skills of geophysics and botany to address some secondary questions arising from its investigations. These concern the Torpedo Station’s conception, construction, effectiveness and abandonment. An investigation of the cultural and natural site formation processes that have acted upon it since abandonment will also be undertaken. It will be argued that the various observable site formation processes (for example, dismantling and trenching), are a direct consequence of the changing attitudes to coastal defence in South Australia.
Summary of thesis chapters

Chapter One provides a literature review and includes the following topics: the archaeology of the recent past; military site archaeology and the current English approach to this, highlighting its relevance to the Australian experience; hybrid studies of maritime and historical archaeology; cultural heritage management approaches to military site archaeology; garden and botanical studies; and previous archaeological investigation of torpedo stations in Australia. Chapter Two details the historical background of the site from earliest recorded landfall in 1831. It ties the Torpedo Station to the historical defence landscape of this section of the Port Adelaide River, and outlines its transition from military to civilian use.

Chapter Three details the methods used in the pre-disturbance survey of the site, including the interdisciplinary aspects of the study. It also documents some of the shortcomings of different aspects of the survey. Chapter Four describes the material culture of the Torpedo Station as uncovered by the pre-disturbance survey, and also describes the site formation processes that have acted upon it.

Chapter Five discusses the material culture of the Torpedo Station and the associated cultural landscape. It summarizes the results of the investigation against the main research question, demonstrating how the Torpedo Station reflects changing attitudes to coastal defence in South Australia between 1877 and 1924. This chapter also analyzes the genesis of the Torpedo Station, its mode of construction, and site formation processes both pre and post abandonment. It discusses the findings of the botanical and geophysical investigations, and also offers suggestions regarding possible future investigations of both the terrestrial and marine environments associated with the Station.
Chapter Six concludes the thesis by noting the richness of the material culture extant on the site. It also summarizes new and as yet unanswered questions arising from the study. A statement of cultural significance of the Torpedo Station is provided, as well as an argument for heritage listing. The chapter concludes with a discussion of the interpretive potential of the site and a note on the optimism of archaeology.

Description of study area

The Port Adelaide Torpedo Station, now a section of parent title: CT 5636/256 (Appendix 1), is situated in the Hundred of Port Adelaide approximately 12km north/west of the Adelaide CBD. A Department of Lands survey mark (6628/36044) is located within the south/western perimeter of the site. This has a GPS coordinate of 272777.405E/6144978.798N (site datum WGS84). Presently constituting an area of approximately 3.85 hectares (9½-acres), it has the Port Adelaide River as its western boundary and the North Arm of the same river system on its northern perimeter. The site, rhomboidal in shape and measuring approximately 250m by 300m, encompasses three easements and a right of way. The land is arid and sandy, and covered with a mix of low lying indigenous and exotic vegetation.

The area is owned by the State Government Land Management Corporation (LMC). Access can be gained via a dirt track extension of Moorhouse Road. It is not fenced, although a low earthen embankment along its northern perimeter, and a locked gate at the end of Moorhouse Road, currently restrict vehicular access. Its predominant disposition as waste land, in combination with its river frontage and the profit generating nature of its current owner, makes the area prone to redevelopment (see page 84).
Introduction

The heritage of war is as much a part of human legacy as that of the arts or sciences. Every age has cast off and abandoned the superseded theory and fabric of conflict. This is especially true of the period of industrialised warfare post 1850. Schofield et al (2002:4) observed that “the materiality of [industrialised] warfare is a vast and diverse subject, from entire landscapes whose personalities bear traces of military activity or presence to specific places – sites, structures, buildings, monuments – where events occurred or where soldiers sat, waiting for invasions that in some cases never came”.

The archaeology of the recent past

Stevenson (2001:61) argued that “the modern period with its rich contextual sources is ideal ground on which to write archaeologies…Terms such as ‘Georgian’ and ‘Victorian’ are words that the public can relate to as the recent past”. This augurs well for archaeology in Australia where, like other states in the ‘New World’ that were colonised by imperial European powers, there exists a distinct dichotomy of human occupation and an abrupt beginning to its historical period.

There is, however, a paucity of archaeological research (especially published archaeological research) in some areas of dedicated or themed studies of the recent past in Australia. Of particular note are themes relevant to this thesis. The archaeology of colonial era torpedo stations, coastal defences in colonial South Australia, and the ‘Russian Scare’ are themes largely absent in current research. As
a consequence, and despite the wealth of contextual sources available, the fabric and social context of these specific areas of human endeavour are not well understood.

One possible reason is that archaeology developed with a focus on the distant past. As a discipline, it helped establish the antiquity of humans and piece together absent ancient histories. In Australia, this is mirrored by archaeological research into the history of its Indigenous settlement and the Indigenous ties to place (see Mulvaney and Kamminga 1999; Williamson 2004). Archaeological interpretation of the recent past has typically been viewed as ancillary to this traditional role. The rich contextual material associated with the recent past (for example, good documentation and ample material culture) has meant that archaeological study of the absent present has been seen to be more closely related to the work of historians than archaeologists (Buchli & Lucas 2001:3).

Advances in archaeological theory since the 1960s (see, for example, Binford 1962; Deetz 1977; Rathje et al 1992) has led to a realisation that archaeology is actually defined by a study of material culture and its relation to human behaviour, and not by the study of particular time periods. Johnson (2000:63) qualified this by writing that archaeologies of the present are concerned with examining the link between human behaviour and material debris. In a sense, since the 1960s traditional artefact typologies have been replaced by typologies of archaeologists (Chapman 2003:13) including historical and maritime practitioners.

In light of this shift in definition, the ‘marginal’ archaeologies of the recent past are now understood as being valid areas of research. Consequently, they are becoming...
more common and more readily assimilated into the realm of mainstream archaeology. Growing archaeological interest in the remains of industrial era warfare has been ratified with sessions dedicated to the heritage of ‘recent’ armed conflict at international forums [for example, World Archaeological Congress 4 (WAC-4) in Cape Town 1999 and at World Archaeological Congress 5 (WAC-5) in Washington DC 2003].

In Australia, as in other parts of the world, this enlightenment has been particularly relevant to the archaeologies of colonisation, with many gaps in our knowledge of the recent past being slowly filled by various thematic studies. Australian archaeological studies of its recent martial past are now strongly developed in certain areas. These studies range from contact in settler societies (Murray 2004) to aircraft losses over water during World War Two (Ford 2004; Jung 1996, 2000, 2004, 2005; McCarthy 2004; Smith 2004). Despite this, and regardless of their vast acreage and reflective material culture, certain types of military facility and landscape still elude archaeological investigation and publication.

**Hybrid studies: maritime and historical archaeology**

The Port Adelaide Torpedo Station extends across a terrestrial and intertidal landscape, distorting the boundary of maritime and historical archaeology. The terrestrial component of the Station included numerous buildings, roads, tracks and a tramway, whilst the maritime segment of the site included a jetty, a slipway, at least one navigational beacon, several fixed mooring structures and an associated debris field.
In Australia, the hybrid nature of some archaeological sites has previously been explored in thematic studies such as shore based whaling operations (Lawrence & Staniforth 1998; Paterson 2004) and shipwreck survivors camps (Morse 1988; Pasveer et al 1998; Stanbury 1998; Gibbs 2003; Nash 2004). The archaeology of shore based maritime defence installations fits with Australia’s holistic approach to the duality of ‘coastal archaeology’, and would complement the existing body and method associated with the genre.

**Military site archaeology**

Present knowledge and understanding of South Australian colonial era coastal defences, defence related theory and the changing attitudes to these is derived largely from a historiography constructed around archival material. Thus far, investigation of the fabric still extant on such sites has been limited. This is especially true of the Port Adelaide Torpedo Station, but it is also true of similar sites around Australia.

In Australia, a paucity of published archaeological research on colonial defence installations, and military sites in general, indicates that such intellectual pursuit is not yet considered mainstream archaeology and, consequently, is bereft of funding. As will be discussed later in this chapter, the military site archaeology that is conducted largely takes the form of cultural heritage management reports which are required by the relevant legislation. Such reports are mainly unpublished and contribute little to a greater understanding of the past.

Industrialisation coupled the escalating scientific technologies of war with mass production to such an efficient level that successive innovations rendered previous
technologies obsolete, and enabled conflict to be waged on a global scale. English Heritage (2000:1) noted “such was the speed of change in the development of strategies during this period that some sites and structures were superceded after only a year or so of active life”. Examples of such innovation can be drawn from the introduction of self loading rifles, breach loading artillery, torpedoes and high seas fleets powered by steam turbines. The manifestation of this in the Australian Colonies and on the Australian landscape was to dramatically influence South Australia’s defence theory and defence infrastructure between 1877 and 1924.

Military installations fall into Darvill’s (1999:104) paradigm of landscape in that they are not only composed of physical and structural dimensions, but also enshrine metaphysical and social aspects. A military landscape is the embodiment of an “expression of particular ways of seeing the world – specialised experiences of time and place”. Schofield et al (2002:1) endorsed this by claiming that much can be learnt about culture, and the manner in which it develops, from how people fight. Archaeologists working on military sites do more than just fill the gaps in our knowledge about specific military encounters. They “challenge us to think about how archaeology can be used to study warfare, tactics, and strategy” (Orser & Fagan 1995:67). A military landscape seen not only as an artefact, but also as a socially constituted structure, endows it with context. Such a context allows archaeologists to link sites to one another, to the environment and to the culturally specific conceptualisation and use of space (Darvill et al 1993:564).

This concept has been further refined and adopted by the English Monuments Protection Program (MPP) to classify sites such as former military facilities as relict cultural landscapes. Darvill et al (1993:564) defined these as “pieces of natural or
artificial scenery containing remains relating to a particular form, stage or type of intellectual development…which exists now in the same pattern or arrangement as in some previous age…[S]ufficient archaeological evidence still exists to allow the study of socio-cultural patterning at a larger scale than possible from individual monuments or groups of monuments”.

The archaeological elements of a relict cultural landscape need to be connected in a logical way via articulating features. These could be natural, such as rivers or coastlines, or they could be man-made, such as roads, tracks or linear earthworks. Features like these endow a site with a framework that physically connects the elements and delimits spaces. Such landscapes are likely to have some geographical or topographical consolidation as a macro region, for instance, a river valley or a peninsula. In addition, relict cultural landscapes can be divided into two types: 1) synchronic, containing material culture belonging largely to one main period of activity; and 2) diachronic, containing material culture from a succession of different phases of use.

If one were to apply this framework to the Torpedo Station, the diachronic model would identify three successive and distinct cultural landscapes in a macro view of the site. This stratigraphy would include the original Indigenous landscape, the Torpedo Station and the site’s current disposition as wasteland. However, the research question underpinning this thesis sets parameters within which a synchronic study can also take place, and allows a micro view of a specific layer of site occupation and use – that of the Torpedo Station. The Station displays a “chronological homogeneity within and between monuments represented” and a “spatial integrity [with] clear signs of articulation between the main archaeological
elements present” which further identify it as a synchronic relict cultural landscape (Darvill et al 1993:567).

**Cultural heritage management (CHM) approaches to military site archaeology**

Site types not yet considered part of mainstream archaeology suffer from a lack of funding and, consequently, dedicated research. Most new archaeological work on coastal defences in Australia seems to have been conducted on previously surveyed and already listed heritage sites. Many of these are attached to, or part of, national parks. This ‘new’ body of work is largely generated as a stipulation of the relevant Act (for example, in South Australia see Sections 37 and 38, *National Parks and Wildlife Act*, 1972; in New South Wales see the *Heritage Act*, 1977) and enshrined in legislation to facilitate management of the cultural resource, rather than to foster any stand alone or systematic theoretical study.

The intellectual product of such contractual obligation is largely unpublished, relegated to the grey area of cognitive pursuit and generally available only to those who have conducted, or paid for, the research (Staniforth 2005, pers. comm., 11 May). Gojak (2002:170) mentions examples of the kind of contracted and unpublished management reports produced by the New South Wales (NSW) National Parks and Wildlife Service (NPWS) on defence heritage sites.

The Australian model of colonial coastal defence archaeology is vindicated by McGlade (1999:459) who detailed the two currently accepted archaeological paths that can lead through such cultural landscapes. The first is represented by “foregrounding symbolic, structural and phenomenological perspectives” of the landscape and the second is aligned with “heritage management issues”. Clearly,
the path most commonly trod in the archaeology of Australian military landscapes relevant to this study is the second.

It is also clear that this model cannot, in itself, lead to greater understanding of the past. It is concerned only with maintaining the status quo or the integrity of the fabric of sites fortunate enough to be listed on heritage registers. Canning professed that academia often criticises such non-academic archaeology for a “lack of rigor, and the production of vast quantities of useless archaeological survey data”. He also acknowledged that some of the perceived shortcomings of this data include “poor sampling methods, insufficient survey coverage, non-standardised survey methods [and] visibility constraints” (2005:6).

Despite the negative perceptions of this CHM generated data, Canning did express some optimism in using it for the predictive modelling of archaeological sensitivity. Such models, he explained, could assist in the “preservation of representative samples of the archaeological record for researchers of tomorrow” (2005:13). It follows that the more sites listed, the greater the opportunity for archaeologists in the long term, even if this amounts to no more than a management report in the short term. Additional colonial era coastal defence sites are nominated for heritage listing (from time to time). Most recently in NSW, for example, a 9.2-inch coastal gun emplacement installed in 1893 at Ben Buckler Headland has been nominated for the State Heritage Register (Heritage Council of NSW 2005).

**Thematic models of heritage classification: Australia and England**

Changes to the Australian National Heritage Register will allow for the inclusion of themes in the Register’s modified format. Examples of such themes could include...
‘Torpedo Stations in Australia’ or ‘Australia’s Colonial Coastal Defence Sites’ (Arnott 2004, pers. comm., 18 June). Thematic listings could assist in validating such ‘peripheral’ sites as mainstream, and ultimately encourage a more cognitive approach to the resource in the medium or longer term.

Such a model already exists in England, with the Thematic Listing Program (TLP) being used in conjunction with regional and site specific surveys, and targeting (!) recent military heritage (English Heritage 2004). The English model is particularly relevant to Australian colonial sites, given Australia’s early colonial dependency on England for everything from consumer goods (Staniforth 2003) to defence. Most of the defence technology in the Australian Colonies was imported from Britain, with defence tactics theorised by English military personnel attached to the Colonial Office in London (for example, Jervois and Scratchley).

Some solidarity can be expressed with England when considering Australia’s array of coastal defences for archaeological investigation (see Oppenheim (2005) for an overview of the coastal defences of Sydney Harbour, 1788-1963). England also has a wealth of coastal defence sites from this era, along with a previous reluctance to admit such recent military heritage into its archaeological mainstream. Dobinson et al (1997:288) recognized that English forts of the Roman period and 17th-century defences of the Civil War were well researched and recorded nationally. However, for recent periods (post 1660), an understanding of the monuments of war was generally poor, with the remains never being subjected to a systematic review.

This situation began to be addressed in the late 1980s through various English Heritage initiatives, including the MPP and the TLP, and led to a fuller understanding
of the recent defence heritage resource in England. The English model demonstrates that, for archaeology, the study of the heritage of war from a recent, historical period (for example, coastal defences) is as important as the study of older border fortifications such as the Great Wall of China or Hadrian’s Wall in Northumbria (Baker 1993:709).

Garden and botanical studies

Gardens and the location of various significant botanical specimens have long been acknowledged as important cultural markers: “They represent a story of social and cultural change, and a botanical nursery of traditions and experimentation” (Department for Environment, Heritage and Aboriginal Affairs 1998:2). The analysis of exotic vegetation introduced to cultural landscapes can occur on many levels. Two forms of analysis are relevant to this study. The first uses vegetation as a way of determining past cultural behaviour. The second uses vegetation to locate cultural material.

1. Using vegetation to determine past cultural behaviour:

Shackel (1996:87-109) sketched the utilitarian development of landscape and garden in an armoury town during its transition from a centre of artisans and master craftsmen to that of a military facility in early 1830s America: “Grasses were intentionally planted and indigenous vegetation was kept to a minimum. Grasses dominated the new landscape, providing an appearance of formality” (1996:96). He also found that small garden plots were often retained by households with some social standing. This model could have direct parallels with 19th-century Australian landscape theory at the Torpedo Station. Unrecorded aspects of the Station’s history may well have included a formalized landscape with possible garden plots.
Colonial era maps have depicted vegetation along this stretch of the Port Adelaide River as consisting mainly of mangroves and samphire (a general label for low lying, salt resistant vegetation). Exotic vegetation currently extant on the Torpedo Station, especially in the vicinity of the caretaker’s residence, is of interest as it may have once formed part of a garden, hedge or border.

From historical records, Starbuck (1994:115) revealed that “British armies of the late eighteenth century…were accompanied by sizeable numbers of dependents – wives, camp followers, and children”. Johnson (2002) also theorised that the presence of gardens at military sites can provide evidence for the presence of women at those sites. Women are frequently largely invisible in the historical record pertaining to military installations. Remnant vegetation belonging to the fabric of the Torpedo Station could provide information on traditional women’s duties (for example, food production and preparation or the manufacture of vegetable dyes).

2. Using vegetation to locate cultural material:

Exotic vegetation can also be used to locate extant cultural material (see Stacy et al 2005:11). Coombe (2001:93) found a correlation between extant non-indigenous plants and house sites even in severely environmentally degraded cultural locations. This has obvious application to a survey of the Torpedo Station. Pest plant specimens can also lead to the discovery of buried cultural material. This is supported by Shackel (1996:95) who observed, through archaeobotanical analysis of soils around dwellings in a formalised compound, that some aggressive, introduced weeds also invade and occupy disturbed soil. Extant clumps of exotic vegetation may be indicators of obscured structures.
Previous archaeological investigation of Australian colonial torpedo stations
An electronic mail survey of the State Maritime Heritage Officers in each of the former Australian Colonies that utilised torpedo boats and mine defences (Tasmania, Victoria, New South Wales, Queensland and Western Australia) failed to uncover any previously published or even conducted archaeological work on torpedo stations. Certain States have completed work on some of their torpedo boats, for example, HMVS *Lonsdale* in Victoria (Philippou 2005, pers. comm., 28 July). New South Wales has no remains associated with the submarine mining activity across Sydney Harbour, whilst the miscellaneous wire extant in many places is associated with commercial fishing operations (Smith 2005, pers. comm., 1 August). In Queensland, excavations at the Naval Stores at Kangaroo Point and Fort Lytton on the Brisbane River did not address the topic of this investigation (Waterson 2005, pers. comm., 3 August). Western Australia did not respond to the inquiries made.

Previous archaeological investigation of the Port Adelaide Torpedo Station
As far as can be ascertained, only one other published archaeological investigation of the Torpedo Station (erroneously referred to as the Torpedo Boat Station) has been undertaken (see Treloar & Treloar 2001). In September 2000, a group of students and staff from the Department of Archaeology, Flinders University conducted a field walk survey of the site as a practical component for a maritime archaeology topic *Underwater and Coastal Archaeology* (ARCH 3005). This involved walking along a transect roughly north to south near the western edge of the site, with GPS coordinates of the axis being recorded (Appendix 2).

Cultural material that was observed and recorded during the field walk appears to have had no relation to the colonial era infrastructure originally on the site. Instead,
it consisted largely of construction material and garbage dumped there post abandonment. The authors of the resultant report conceded that, due to the various techniques employed in measuring distances (by ten separate individuals), it may be difficult to accurately plot the cultural material or relocate it (Treloar & Treloar 2001:8). Further, there seems to be an error on Page 12 at Figure 13 in the report. A hand drawn diagram of the visual transects used in a part of the study places the power station (presumably that of Torrens Island) at the western side of Hindmarsh Reach on Lefevre Peninsula instead of on Torrens Island north of the North Arm.

Conclusion
This chapter has attempted to place the current study in the continuum of military site archaeology. Commencing with a general overview of military site archaeology and moving to the particular (torpedo stations), it has investigated cultural landscape theory as it applies to the genre, and compared the Australian and English models of classification and archaeological investigation. Both Australia and England invest heavily in heritage management studies, but generally place little emphasis on a greater understanding of the sites. It is argued that this, to some extent, explains the paucity of published archaeological material in some themes relating to recent military conflict. Further, this situation is arguably largely due to a non-acceptance of such studies into mainstream archaeology.
Introduction

The recorded history of the Colony of South Australia is punctuated with references to the Port Adelaide River. Its importance to the new Colony as a sheltered haven and its easily defended entrance made it an ideal location from which to conduct commerce.

The river bank between the River’s entrance and the North Arm has a long association with the defence of Adelaide. 19th-century Port Adelaide Harbour Regulations stated that no ship or vessel shall “whilst above the North Arm, fire or suffer to be fired, any cannon or gun” and “ships with gunpowder on board exceeding 30lbs, shall not pass ‘Lipson Reach’, North Arm, without landing such gunpowder” (Sustenance 1877:109-111). Torrens Island was used continuously as a quarantine station and during World War One it housed an internment camp. A naval store and later the Torpedo Station were situated on the opposite side of the North Arm to Torrens Island.

Existing infrastructure associated with the policing of the River may well have been one of the motivations for positioning the Torpedo Station in this area. Its genesis from first landfall is detailed below.

First landfall

The Port Adelaide River was observed as an indentation in the coastline by Captain Collett Barker from the summit of Mt. Lofty in 1831. His investigation of the area was followed by Captain Jones on the Henry in 1833 (Dutton 1960:175). On 28 September 1836, the Rapid anchored in the North Arm and adjacent land was searched for fresh water. By 7 February 1837, Colonel Light had completed
soundings well down the Port Adelaide River (Dutton 1960:178-211). By the end of 1840, the study area had been plotted by Hindmarsh and Lindsay in their original surveys of the Port Adelaide area (Land Titles Office (a), (b) and (c)). In 1865, Wellbank published what was, in effect, a virtual tour of the length of the Port Adelaide River for the aid of mariners. It listed all natural and man-made features, and provided notes on the bylaws affecting the said waterway.

The naval store
The study area frequently appears on the earliest maps of Adelaide, including a chart from October 1858 entitled Plan for the Select Committee on Colonial Defences (Perry: Private Collection) (Appendix 3). This provides a clue regarding its previous strategic value, and eventual use as part of the infrastructure relating to the Naval Reserve during which time it served as a naval store and torpedo station. It would appear that structures relating to a naval store were in place by at least 1875, and it is possible that they may have been added to the map at a later date. Original charts, such as that surveyed in 1875 (printed in 1876), seem to be used repeatedly as a template to overlay new information (Figure 1).

One of the civilian functions served by the facility as a naval store was to dispense emergency equipment for rescue vessels attending shipwrecks. An example comes from September 1905 when the Loch Vennachar was lost off West Bay, Kangaroo Island. The search ship, Governor Musgrave, “[called] at the Torpedo Station for rocket gear” on the way to Cape Willoughby (Chapman 1972:46). This was used to shoot lines across to the survivors of shipwrecks.
The ‘Russian Scare’

From an ideological perspective, the Torpedo Station is representative of Australian colonial reaction to the perceived threat of burgeoning Russian imperialism. This fear was compounded by the departure from Australia of British troops in 1870, and persistent rumours of a Russian naval squadron steaming somewhere in the Pacific Ocean (Colwell 1973:72). It instigated a flurry of coastal defence construction throughout the Colonies between the 1870s and the defeat of the Russian Navy by Japan in February 1905. This construction was often haphazard and ill advised, prompting the Colonial Office in London to dispatch Sir William Jervois and Colonel Peter Scratchley, outstanding military engineers, to the Australasian Colonies in 1877 (Nairn et al 1972:479-480; Searle & Ward 1976:98-99). Jervois and Scratchley
prepared a risk assessment for each Colony and suggested appropriate remedies to defensive shortcomings, mainly in the form of coastal defences.

**The Jervois plan**

Jervois was appointed Governor of the Colony of South Australia in 1877 and immediately began implementing his defence plan. His appointment in the Colony “coincided with good rainfall and unprecedented extension of agricultural land” (Nairn et al 1972:480). This economic boom allowed for the building of massive fortifications at Taperoo (Fort Largs) and Semaphore Park (Fort Glanville). Accessories included a military road (Military Road) connecting the forts with Glenelg, a solitary cruiser (HMCS Protector) and the Torpedo Station.

Such fortifications and their support facilities were typical of the period. English Heritage (2000:3) noted that “the enormous technological advances of the middle years of the 19th-century affected warfare radically. Steam-powered, ironclad, warships could now operate regardless of the limitations of wind and tide, and rifled artillery gave far greater range and accuracy to guns than ever before. These developments alarmed military engineers and, in part, stimulated the massive program of coastal fortification”.

**The Torpedo Station**

In two memorandums to the House of Assembly, Jervois (1882:2) regarded “the construction of land batteries, with certain other works, to be essential for the protection of the capital and chief port of the colony against hostile aggression”. He stipulated that “[t]orpedoes should be provided, to be placed across the entrance to
the Port Creek...these torpedoes would be worked from the shore, and for their manipulation it would be necessary to train specially about six or eight men”.

By 1885, the first buildings of the Torpedo Station proper had been completed and handed over (Parliamentary Papers 1886, 2(29A):16). Numerous structures pertaining to its specialized naval use were eventually erected on the site. Included were a boat shed and slipway; a jetty; various utility sheds, store rooms and a workshop; a caretaker’s residence; a 6-inch breech loading gun and a tramway. In 1905, a second class torpedo boat (TB 191) built by Thornycroft and Co. of London in 1884 was sequestered from Tasmania and stationed at the Torpedo Station (Figure 2). Decommissioned in 1911, the boat’s eventual disposition is currently unknown.

Figure 2: A Type II torpedo boat with torpedo dropping gear on its sides.

(Armstrong 1896:203)
Abandonment

The Torpedo Station survived Federation and a rationalization of naval infrastructure only to be completely dismantled by December 1917. Much of the portable fabric (iron and wood) was reused at other naval and municipal facilities around South Australia. For example, the rails and sleepers were reused as a slipway, and the galvanized iron sheets from the buildings were used on warehouses and classrooms (Perry 2004, pers. comm., 28 July).

The site is now severely degraded. Of the original built structures, little evidence remains above ground. However, ruins were still extant on the site until at least 28 April 1938 (Appendix 4), and are clearly marked on Winton’s survey (Land Titles Office 1938). Surprisingly, the same survey even provides the position of the ‘old gun’ which had been lost when the site was cleared and only rediscovered in 1961. It was located below the original high water mark (OHWM) in close proximity to where to the jetty once stood (Figure 3).

The site has also been subjected to substantial land reclamation, assisted by the dumping of a range of waste construction materials, including bricks and reinforced concrete, to create a sea wall. This adds to the background surface noise of the site and makes it more difficult to visually identify elements of the remaining colonial period Torpedo Station fabric. The history of cultural site formation processes acting on it since abandonment includes trenching and earth moving with heavy equipment. Perry’s Creek has been filled in and the north-eastern corner of the site now hosts a modern fishery wharf and car park. Remnants of colonial era cultural material extend into the intertidal zone where at least one stump, the remains of a black beacon, may be seen at low tide.
Conclusion

Constructed prior to 1901, the Torpedo Station is unique in South Australia. It constitutes one of the few (and quite possibly the only) remaining examples of terrestrial infrastructure directly associated with South Australia’s Colonial Navy. It is representative of an early type of imported military technology and defence system which positions it precisely in the continuum of rapidly evolving industrial era warfare and related defence theory. It is the manifestation of one man’s vision and embodies time specific attitudes to coastal defence in South Australia. Its abandonment signifies a shift in these attitudes.
Introduction

One of the popular myths about archaeology is that it relies heavily on excavation. This study will clearly show that this isn’t always the case. No excavation was undertaken during the course of this investigation. As Gamble (2001:50-51) explained “the past 30 years have seen a move away from excavation as the archaeologist’s main method for finding out about the past…[it] is costly and is increasingly seen as a last resort”.

Instead, methods were largely based on a pre-disturbance survey of the site. This was done to determine how much of the Torpedo Station’s material culture is currently visible, and how much of it may remain in situ. An overview of the whole site was considered of greater relevance to answering the research question than an excavation of part of it. The archaeological investigation did entail some minor site disturbance. This involved wood sampling from the remains of a colonial era beacon in the intertidal zone.

Methodological techniques employed

Methods employed to investigate the central research question included historical and archival research; liaising with expert practitioners from fields other than archaeology; a visual inspection of the site; a total station survey; photography; remote sensing with the aid of magnetometry; botanical analysis; wood sampling and analysis; and the use of ortho-rectified data to overlay aerial photographs, maps and spatial data from the pre-disturbance survey. An explanation of how each of these techniques was applied to specific areas of the investigation, why they were chosen, the difficulties encountered, and the nature and extent of information that can potentially be obtained follows.
Historical and archival research

This included informal meetings with Jan Perry, a direct descendant of the Torpedo Station’s last caretaker, Chief Petty Officer (CPO) Henry Perry who was appointed in 1895 (Healey 1999:6). Jan Perry has a significant interest in her family’s involvement at the Station. As a consequence, she has a considerable amount of archival material in her possession, including the earliest known aerial photograph of the site dated 1937 (see cover page).

Historical research encompassed ongoing searches at the Land Titles Office (LTO), the Department for Environment and Heritage (DEH), State Records Office, National Archives of Australia (NAA), the State Library, various university libraries and Mapland. Of particular interest were Parliamentary records and Parliamentary debates (especially those relating to Governor Jervois, Colonel Scratchley, public works and defence), contemporary newspaper articles, and charts, maps and aerial photographs of the site that detail the changing shoreline and infrastructure.

It was considered that 1) Parliamentary papers may detail the genesis of South Australia’s defence policy and the Torpedo Station; 2) newspapers may add an extra social dimension to the study by showcasing public opinion; and 3) early surveys may provide clues of cultural site formation processes prior to the advent of aerial photography, and also indicate the location of structures such as buildings, roads and fences. This may then have provided clues regarding the location of a garden and other significant plantings in the vicinity.
Aerial photographs

Mapland is a repository of aerial photographs and aerial surveys generally dating from 1949. A search revealed twenty one significant images of the site dating between 1949 and 2002. Eleven images over this period were selected as being of special interest due to obvious changes in the landscape, and these were purchased in digital form. The 2002 image is ortho-rectified (see pre-disturbance section below).

Land Titles Office

A number of register searches and searches of cancelled titles were conducted at the LTO. Not only do these documents show the trail of ownership of a block of land, they can also provide information on site formation processes that have acted upon it. Examples of such processes could include subdivision, the erection of fences or the construction of new tracks/roads.

State Library

The State Library has three books in its special collections directly relevant to this study. These are Wellbank (1865), Sustenance (1877) and Armstrong (1896). Wellbank (1865) and Sustenance (1877) can only be viewed in the Somerville Reading Room, and neither book is allowed to be photocopied as they form part of the Library’s historical collection of South Australiana. Published prior to 1920, they are considered to be fragile documents. Both have sections on navigating the Port Adelaide River and mention each beacon, buoy and sandbank between the entrance to the River and Port Adelaide. They also detail the harbour regulations. Despite its age and seeming rarity, Armstrong (1896) is allowed to be photocopied as it does not relate specifically to South Australia. This volume details late Victorian concepts
of torpedo warfare and technology, and was researched and published at a time when the Torpedo Station was operational.

**National Archives of Australia**

The NAA has a number of files on the Torpedo Station in its Adelaide branch; most are from the last phase of its existence. These range in date from around the time of abandonment to the site’s transfer to the South Australian Harbours Board in 1924. The earlier files of the Torpedo Station are kept interstate (Sydney and Melbourne) and are of large proportions. It was not possible to order copies of individual documents in a file, and the cost of reproduction of the whole file made it prohibitive to order the relevant copies from interstate.

**Expert advice**

Due to the multidisciplinary aspect of some elements in the pre-disturbance survey, advice from three practitioners in alternative fields was sought. These included 1) Ian Moffat, a geophysicist with Ecophyte Technologies Pty Ltd and the Australian School of Petroleum, University of Adelaide. Ian conducted a magnetometer survey of the artificial bay and advised on remote sensing techniques which could be applied to the terrestrial aspects; 2) John Sandham, the Collections Manager at the Royal Botanical Gardens, Adelaide. John offered advice on how exotic plants could invade settled areas and detailed their longevity; 3) Dave Hemmings, a Project Officer at Wittunga Homestead Botanic Gardens. Dave helped with the identification of found botanical specimens.
Pre-disturbance survey

Visual inspection

Using a c.1911 site plan of the Torpedo Station (Figure 3), a visual inspection was conducted, and the observed material culture and site formation processes were recorded. The plan chosen to guide the inspection depicted the facility’s infrastructure as it was at its greatest extent. It was hypothesised that any extant cultural material observed relating to the Torpedo Station would correlate with structures depicted on this plan. Inferences leading to this conclusion were drawn from historical documentation. For example, an 1889 Military Map (State Records 35/585/104) depicts only 3 structures and a telegraph line, whilst the c.1911 site plan shows 17 structures including 2 tracks.

It is also known that the Torpedo Station’s operations were being scaled down around 1911, with the torpedo boat (TB 191) being disposed of in that year (Gillett 1982:9) and 14 torpedoes auctioned to the general public on 18 March 1912 (The Register 1912:2). Further, by November 1912, plans were underway to transfer the Station’s workshop and boatshed to other locations around Port Adelaide (National Archives of Australia D292, 14/1/2). By 1916, dismantling of the Station had already begun with the removal of the boat shed (National Archives of Australia D292, 14/1/3), and negotiations were underway to transfer the site to the South Australian Harbours Board (National Archives of Australia A569, B1925/2573). It is therefore considered unlikely that any new structures relating to the function of the Torpedo Station were erected between 1911 and 1916.
Total station survey

A Sokkia total station was used to plot in significant points (Figure 4). Examples include the black beacon; exotic vegetation situated in proximity to the former caretaker's residence; the sea wall; the artificial harbour at low tide; the 'track' that
ran through the centre of Torpedo Station ‘village’; the location of debris which is presumed to have belonged to the original structures of the Station; and the alignment of the brine main which was considered to have been trenched through the structures on the Northern side of the track.

Modern structures such as fence lines, functioning beacons and telegraph poles were also recorded. These are able to be used as reference points when transferring data to the ortho-rectified map. Four permanent points are required on each image for best realignment. A Department of Lands survey mark (elevation 2.325m) was located adjacent to the main points of interest and was used as the reference (datum) point from which to take all other readings (see Photography, baseline/offset and GPS below for coordinates).

A major problem with the total station is that it was very difficult to set up, requiring the expertise of the Archaeology Department’s Technical Officer on each field trip. A second drawback with the total station is that data collected must be processed through various software applications before it can be represented as spatial, two dimensional information. This also required the expertise of the Technical Officer. The reformatted information was plotted onto the ortho-rectified 2002 map to show the exact spatial arrangement of these cultural markers on the landscape (Appendix 5).

Ortho-rectified digital maps display GPS coordinates as the curser is moved across the screen, thereby allowing significant points to be plotted onto the original image. The GPS coordinates of the Treloar and Treloar (2001) fieldwork were also
incorporated into this map, enabling all archaeological work conducted to be combined into one representation (Appendix 2).

Figure 4: Matt Schlitz conducting a total station survey of the Torpedo Station.

(Photo: Debra Shefi, 11 May 2005)
Photography, baseline/offset and GPS

Using digital and traditional cameras, photography (including video) of the landscape and cultural material was conducted. It was originally intended to conduct a baseline and offset survey, take bearings and record GPS coordinates in the pre-disturbance survey. However, on purchasing the ortho-rectified data, these techniques were considered to be superfluous. Total station data, combined with an ortho-rectified map, provides more accurate location data than a handheld GPS unit.

This can be demonstrated by comparing the coordinates of the Department of Lands survey mark at the site (mark number 6628/36044) with those obtained with a handheld GPS system (Garmin GPS 12 x L). The actual Easting is 272777.405 and the Northing is 6144978.798. In comparison, the handheld system recorded an Easting of 0272781 (an error of 4m) and a Northing of 6144978 (an error of .798m). Hence, the alternative survey techniques were not employed.

Remote sensing

In 1961, the old 6-inch gun which had formerly been installed at the Torpedo Station and then lost during dismantling operations was recovered from the mud in the intertidal zone. This location approximates the area where the jetty once stood in the artificial harbour and is marked on Winton's survey of 28 April 1938 (Land Titles Office 1938) (Appendix 4). A significant feature of the gun was a large metal shield that, reputedly, was not recovered during salvage operations (Perry 2005, pers. comm., 7 April). One of the myths associated with the site is that the gun shield is still in the mud of the intertidal zone. It was hoped that the use of a magnetometer would help to either prove or disprove this myth.
A Geometrics G-56 proton precession magnetometer owned by the Flinders University Department of Archaeology was used for this purpose. “Magnetometers measure the strength of the earth’s magnetic field and can detect variations in this field caused by the presence of ferrous material or objects” (Dean et al. 2000:142). Two handheld GPS units were also employed to produce a virtual grid over the search area. This maximized transect coverage when using the magnetometer, and allowed proceedings to be accurately plotted.

The site is littered with ferrous material ranging from old tins and car parts to slabs of steel reinforced concrete. A number of underground utilities, including at least three brine mains and a high pressure gas pipeline, can also be found in the vicinity (some of these are clearly marked). Further, a dolphin mooring device was originally located on each side of the jetty and it is possible that parts of these may still be in situ. All of these metallic objects may affect the results of the intended survey. Given the mass of the shield (Figure 5), it was hoped that its magnetic signature would be quite distinct from that of the other ferrous objects in the immediate vicinity to allow a positive identification. If located, the shield was to be included in the total station survey.

The survey required the use of an Avalon inflatable boat (property of the Earth Sciences Department, Flinders University), two personnel to row and a third to operate the instruments (Figure 6). Recording commenced approximately 150m north of the artificial harbour in order to establish a baseline of magnetic readings for the area. The boat was rowed north/south in transects guided by two handheld GPS systems (Garmin GPS 48; Garmin GPS 72) and then east/west using the same
method in an attempt to achieve the greatest coverage and to eliminate the need for a second survey.

Figure 5: Torpedo Station 6-inch Armstrong gun and shield.
(Healey 1999:6)

Similar to the total station data, remote sensing requires several software applications before it can be spatially depicted and analysed. The data was downloaded and processed by Ian Moffat from Ecophyte Technologies Pty Ltd. The resulting image was plotted as a colour map with contours as well as Eastings and Northing overlain. Two versions of the map were produced (see Chapter Four: Results).
It was anticipated that the magnetometer could also be used in a terrestrial survey of the area around the magazine. However, this would have proven ineffective given the amount of disturbance generated by ferrous material. Alternative remote sensing techniques that may successfully be used on this site are discussed in Chapter Five: Discussion.

**Botanical analysis**

The Torpedo Station had been built on reclaimed ground to keep the infrastructure above the original high water mark (OHWS) and occasional flooding. Exotic vegetation in close proximity to the main track was noted, and significant flora photographed and recorded with the total station. This ‘high ground’ was judged to be the most likely area to locate remnant vegetation, as it would have originally kept plantings away from the salt water of the Port Adelaide River. It was also considered
that the fill used in the colonial era earthworks may have been more nutritious than the surrounding sandy soil.

Slow growing and slow propagating species of plant were targeted as these were least likely to have invaded the site after abandonment. Plants that had clumped in unusual formations alongside the track were also recorded, as they may indicate the location of foundations or other buried structures. Photographs and general descriptions of the highlighted specimens were then examined by staff at Adelaide and Wittunga botanical gardens for identification.

**Minor site disturbance**

*Wood sampling:*

Two samples of wood from the black navigational beacon were taken for analysis at low tide to determine what tree species was preferred for use as beacons in marine environments. This involved using a chisel and hammer to collect a 2cm by 2cm by 5cm piece of wood from the exterior and one from the interior of the stump. Each sample was placed in a separate bag and labeled. Arnott (2004, pers. comm., 15 October) did not object to this procedure as the site had no protection status. It was speculated by personnel from DEH that the stump may be an Iron Bark species. However, this was disproved by the analysis (see page 41). This kind of analysis can also provide information on the timber industry of colonial times. For example, the wood may have come from an interstate source.

**Overlaying aerial photographs**

By utilizing the digital data obtained from Mapland and departmental ARCH MAP software, specifically, the Geo Referencing Wizard on the tool bar, it was possible to
overlay the aerial photographs and measure the extent of land reclamation, as well as observe the changing shape of the landscape. This was done by identifying at least four points that appear in each image and stretching one image to scale over another.

Aerial photographs have the potential to reveal man-made structures that cannot be seen from ground level, for example, foundations and tracks or walkways. Of particular interest is a small artificial harbour in the vicinity of the former jetty that may have been dredged to allow unhindered access to this structure. Another point of interest detected are the natural site formation processes that appear to have taken place on the seaward sides of the site as a result of the shifting sand, especially the sandy spit on the north-western point. A similar spit appears on the earliest charts of the area and seems to be a constant or regenerating feature. Spits were already noted as hazards to navigation in the 1860s and 1870s. Sustenance (1877:108) has indicated that “[I]t will be found as a rule, that all the small tributary creeks along the course of the main stream throw out sand or mud spits at various distances, in proportion to their size, which should be carefully guarded against”.

Conclusion
This chapter has outlined the methods employed to investigate the cultural landscape of the colonial era torpedo station. Based largely on a pre-disturbance survey of the site, it has detailed why specific methods were chosen and what some of their limitations are. The Torpedo Station is representative of colonial era defence theory, and the decay of that theory is embodied in the severe degradation of the site. The methods designed to investigate this degraded cultural landscape included historical research; liaising across multidisciplinary fields; field walking; a total station
survey; a magnetometer survey; wood analysis; a botanical investigation; photography; and overlaying a selection of historical aerial photographs and GPS coordinates.
Introduction

This chapter details the results obtained from the pre-disturbance survey. It describes the investigation of aspects of each of the structures constituting the site’s cultural remains, and reveals problems encountered during the survey (for example, other cultural material brought to the site post abandonment).

Black beacon

The remains of a black beacon were observed in the intertidal zone. This was recorded with a total station, photographed (Figure 7), sampled for timber analysis and measured. The remains are 41.5cm (16.34 inches) at the highest point and 22cm (8.66 inches) at the lowest. An anomaly was seen in the width of the stump, with the artefact being 47cm (18.50 inches) wide at the top but only 42.5cm (16.73 inches) wide at the base. This suggests that the tree trunk used may have been fixed bottom up instead of top up. Alternatively, the reduction may be the result of deterioration.

Figure 7: Remains of black beacon, north face

(Photo: Martin Wimmer, 5 October 2004)
Analysis of the cell structure in the wood sample (Figure 8) revealed that the timber selected was Blackwood (*Acacia melanoxylon*) and not an Iron Bark species as DEH had suggested. *Acacia melanoxylon* is a hardwood commonly called Wattle and is better known as a furniture wood. It does “produce a splendid fiddleback figure…often exploited by cabinet makers” (Hill 1985:113).

In the mid 19th-century, the Adelaide Plain and surrounding foothills had huge stands of Blackwood (Planning SA 2000). This legacy can still be found in the names of Adelaide suburbs such as Blackforest and Blackwood. It is possible that as the Adelaide Plain was being cleared for subdivision during colonial times, some of the timber may have been used in municipal works like the Port Adelaide River’s navigational beacons.

![Figure 8: Cell structure of Blackwood (*Acacia melanoxylon*).](Illic 1991:33)
The exterior of the stump is black and has a rough sand paper texture. It could not be ascertained if this was the original bituminous Admiralty coating or the result of exposure to weather over the last 130 years. Whereas the exterior is very hard, the interior is soft, possibly the result of dry rot. This particular beacon is clearly marked on a chart of Port Adelaide dating from 1876 (Figure 1, circled in blue) and would have been a recognisable landmark during the time of the Torpedo Station.

Beacons of this type were important navigational devices (Wellbank 1865; Sustenance 1877). Black beacons were positioned along the eastern bank of the Port Adelaide River, whilst red beacons were positioned on the western bank. The black beacon on the sandy spit of the Torpedo Station was the southern most and last beacon of this type before entering the Port.

**Artificial harbour**

An artificial harbour on the site’s western boundary extends into Hindmarsh Reach. Originally, this feature was dredged to a depth of 7.62m (25 feet) at low water spring tides (LWST) to facilitate a deep water access to the Station’s jetty (Drawing No. 3422/17, nd.) which stood at the centre of the artificial basin (Appendix 6). No trace of the mining cable tank or jetty was found, although anomalies recorded in the magnetometer survey may indicate a debris field related to these two structures. A number of stumps were observed in the intertidal zone north of this position, but were judged to be the remains of mangroves rather than cultural material.

**Magnetometer survey of artificial harbour**

A magnetometer survey of the harbour was conducted with the intention of locating submerged cultural material associated with the site (for example, the gun shield).
Two survey maps were produced. The first was the magnetometer survey scanned onto the ortho-rectified image of the site. It appears as an opaque slide over the artificial harbour (Appendix 7). The second image had the track of the boat superimposed on it (Appendix 8). Unfortunately, this revealed “a bit of a hole in the middle of the survey area” (Moffat 2005(b), pers. comm., 7 June), demonstrating one of the difficulties of operating on water.

The resulting images display a number of interesting features that appear as yellow and red contoured areas in contrast to the blue of the background magnetic intensity. It was discovered that background magnetism in this general area has a magnitude of 60,000 nanoteslas, whilst the main coloured areas of the survey range from 100 to 200 nanoteslas above the background reading, making them significant readings.

The area of greatest interest is a feature at 272666E/6144898N which returned an elevated reading of approximately 200 nanoteslas. This anomaly seems related to others trending NNW/SSE. Moffat interprets this line as being an “artefact of the collection direction of the survey” (2005(b), pers. comm., 7 June). When viewing transects, it can be seen that the coloured anomalies are in line with the track of the boat and indicate a bias in the survey (Appendix 8). It is not possible to determine if the large reading is from the gun shield or some other sizable mass of ferrous material.

The associated line of anomalies appears to be a debris field of some kind. This could be other ferrous material lost overboard with the gun, jetty fittings, and material related to the use of the mining cable. It may also indicate the presence of an underwater pipeline, of which several are known to be in the vicinity of the artificial
harbour. The worst scenario is that the readings indicate material unrelated to the Torpedo Station (for example, garbage).

Approximately 65m due south of this point at 272600E/144900N is another significant anomaly of approximately 100 nanoteslas. If the line of the jetty were projected out beyond these two large anomalies they would be approximately equidistance each side of it. Given this, the anomalies may in fact be the remains of two dolphin mooring devices placed 60.96m (200 feet) apart “to keep ships off the jetty” (Drawing No. 3422/17, nd.) (Appendix 6).

Two aerial photographs supplied with this report, 16 January 1937 (see cover page) and 8 December 1954: #153/7893 (Appendix 9), show a large triangular structure in the harbour and a smaller non-descript structure south of this point (the dolphins are depicted as triangular in shape on the chart). It is uncertain if the objects shown are the Torpedo Station era dolphins or more recent structures. Their physical size, however, seems to relate to the anomalous readings obtained in the survey.

**Artificial sea wall**

The artificial sea wall enclosing the northern and western sides of the site is composed of demolition waste, for example, slabs of reinforced concrete and bricks (Figure 9). The wall in the area of the artificial harbour was examined. This portion may well be composed of construction material from the Station mixed in with material dumped on the site. It seems logical for original material from the Station (for example, pieces of the gun platform) to have been reused on the site given its weight and the difficulty and presumed added cost of moving it from the site.
A number of diagnostic bricks were observed in the rubble, including those of ‘Hallett’, ‘Freburg’ and ‘W&W’ (Appendix 10). Freburg Brickworks operated between 1920 and 1956; its bricks could not belong to the Station’s fabric since it was dismantled by December 1917. Job Hallett and Son operated from 1889 to the 1960s when the company became Nubrik Hallett. The Hallett bricks observed in the sea wall are serrated on two sides, indicating that they probably post date 1950,
which also rules them out of being part of the fabric. Willis and Williams (W&W) were in operation from 1882 to 1956. This company's bricks cannot be discounted as being part of the original construction material (Bell 2005, pers. comm., 17 August).

**Main track and associated structures**

*Trenching as a cultural site formation process:*

At some point after the Torpedo Station was abandoned, a trench was dug through the site along the northern side of the track. The trench line is marked with star pickets bearing signs indicating a buried brine main. The pipe carries salt in solution between a processing plant on the other side of the Port Adelaide River and the salt pans at Dry Creek, and may well be the cause of some of the anomalies detected.

It is postulated that the site was purposely chosen for the pipeline because the existing track and road into the area gave easy access to the river's edge. The trenching has added to the degradation of the site by ploughing through any remaining structures (such as foundations) on the northern side of the track. Construction material debris (such as broken masonry) was observed in the area of the gunners' store complex, as well as in the region of the water tank (Figure 10). The masonry observed in the region of the water tank was typical of this type of structure and contained elements of a tank stand. It is also hypothesised that the sporadic distribution of this debris was the result of the material being churned up during the trenching process, and then being thrown back into the trench as it was backfilled. This process provided the site with a complex stratigraphy.
Figure 10: Cultural material churned up by the trenching process – possibly belonging to the tank stand. (Photo: Martin Wimmer, 21 September 2005)

Oil store:

A modern brine main inspection and maintenance port seems to be positioned directly over what was the Torpedo Station’s oil store (Figure 11). It is possible that the structure originally located here may have included a sump or pit, which was enlarged and reused to accommodate the modern utility. Old (possibly 19th-century) cultural material, including a number of ferrous objects, was noted in the dirt pile adjacent to the new structure which seemed to have been scooped out of the pit.
Figure 11: Brine main inspection and maintenance port, western face.

(Photo: Martin Wimmer, 21 September 2005)

6-inch breach loading gun:

This weapon was removed at the time of the Station’s dismantling, and is now situated adjacent to the Birkenhead Tavern car park at 3 Elder Road, Birkenhead. However, given its weight of more than 5080.25kg (5 tons), it was hypothesised that the gun would have required a robust platform from which to effectively operate. A large, curved concrete base with the gun and shield positioned on top of it is clearly visible in a contemporary photograph of the weapon in situ (Figure 5). A portion of what was presumed to have been this concrete structure was located off the SW end of the track, diagonally opposite its original position. It is suggested that this may have been blocking the brine pipe trench construction. As a consequence, it had
been broken up and rolled or dragged clear, ending up on the other side of the track (Figure 12).

![Gun platform remnant, north face](Photo: Debra Shefi, 11 May 2005)

**Figure 12: Gun platform remnant, north face**

*Tramway and main hall:*

The main avenue of the Torpedo Station ‘village’ is still used as a track through the site. It is hypothesised that the original surface is still extant on the track; this is charcoal in colour and was identified as an ash track. Ash was the most common method of surfacing a railway line in the late 19th-century and early 20th-century (Flatman 2005, pers. comm., 1 June). A tramway was originally situated along this route extending from the jetty into the main hall; this is clearly marked on the site plan (Figure 3). The dark grey colouration stopped abruptly along a straight line at what was assumed to be either the entrance or the western wall of the main hall.
Nothing remains of the hall above ground except this ‘shadow’ of its western perimeter.

Two parallel divots were observed in the track, which may well be the imprint of the tramway rails (Figure 13). Contemporary records show that the tramway consisted of “40lb second hand trailer sleepers, narrow gauge” (Drawing No. 3422/17, nd.). The gauge was measured and recorded as 640mm (2 feet and 1 inch).

Figure 13: Imprint of tramway tracks, looking west.

(Photo: Martin Wimmer, 11 May 2005)


Magazine:

The southern side of the track seems to have escaped the destructive trenching process caused by the brine main. Assuming that magazines are, by necessity, of solid construction, it is considered that the magazine’s foundation may still be largely intact, although no visible evidence of this structure was observed above ground.

Piles:

There is no sign above ground of the piles which are indicated on the c.1911 site plan by a series of dashed lines each side of the track, and also around the boat and filling sheds (Figure 3). With a predisposition to flooding (Appendix 11), the Torpedo Station and its associated infrastructure (including the causeway road leading to the site from Dry Creek) were built on reclaimed land consisting of artificially raised platforms. It may well be that the method of reclamation employed in colonial times was to enclose an area with piles, then fill it with rubble and sand to provide a solid base on which to build. The piling used may have been sheet piling, as was used along the causeway leading to the Torpedo Station and mentioned in Drawing No. 3422/17 (nd.). From the historical documentation, it could not be determined if the piles were made of wood or metal from the historical documentation.

The notes attached to Drawing No. 3422/17 (nd.) indicate that the piling was already rotten where water washed over the road along the causeway. No date is given, but the amount of infrastructure detailed places this remark at about the time of the Torpedo Station. It is little wonder, then, that a century on no sign of the piles remains. The embankment, although severely eroded, is still extant and there is an obvious step down to the rest of the site from the track.
Raised walkway:

A portion of the raised walkway was identified and photographed. It is composed of material unlike the other track surfaces, and includes compacted rocks and gravel that seems to give it a very solid, water tight surface (Figure 14).

Figure 14: Southern portion of raised walkway depicting rubble construction.

(Photo: Martin Wimmer, 11 May 2005)
The walkway was followed for a short distance and was found to end abruptly at a point just past the bend indicated on the site plan. The area north of this point and extending east and west for the width of the site has been cleared and excavated with heavy earthmoving equipment. The scrapings have been used to form an embankment between the site and the main road. This embankment is a conglomeration of local top soil and cultural material, which may be fragments of the boat shed and filling shed. This area was cleared for a gas main, which is also clearly marked by a row of warning signs. Masonry was observed slightly west of the point where the raised walkway connects with the main track. This may relate to the unidentified structure drawn on the site plan at that location.

**Torpedo boat shed and filling shed**

No trace of the location of the torpedo boat shed and slipway, or the detonators and filling shed, were found. It is thought that the remains of these two structures are under the fishery wharf car park and the associated access road. In addition to trenching, extensive land reclamation has also taken place in this area.

**Perry’s Creek**

A stormwater outlet was observed emptying into the North Arm east of the fishery jetty. This may be the remains of Perry’s Creek, which is now filled in. It is possible that the natural ‘trench’ of the creek was utilised to lay a stormwater utility instead of excavating another trench. The Creek’s old (and presumed) alignment was followed south along a series of concrete and metal inspection points.

A point of conjecture is raised here. Although no scale is indicated on the c.1911 site plan, all of the structures listed seem to fit the scheme of what was observed on
the ground. The one exception to this rule is the location of Perry’s Creek, which is shown to be very close to the raised walkway, and a long way from the line of concrete and metal inspection points noted above. One explanation is that the plan had been intentionally foreshortened to fit all of the Torpedo Station’s features into a compact format.

However, the line of the brine main trench crosses the track at a similar angle to that of Perry’s Creek and moves easterly. This is also the alignment of the old access road to the Torpedo Station. As mentioned, it was postulated that this road may have provided an easy method of trenching the brine main from the salt pans at Dry Creek to the processing plant across the Port Adelaide River. Given this, the diagram may well portray the actual location of Perry’s Creek.

The modern stormwater outlet and inspection points may then actually indicate a new alignment of Perry’s Creek, with the old outlet to the North Arm being blocked off during the land reclamation process. It is possible that a new alignment was desirable to capture stormwater runoff when the land east of the site was subdivided to form the industrial complex now situated there. The pipe and associated inspection ports may also be nothing more than a stormwater utility, with the creek disappearing completely during the reclamation process. Appendix 12 depicts the total station survey of the stormwater inspection points overlaid on a 1954 aerial photograph of Perry’s Creek. It clearly shows that Perry’s Creek is in fact 86m west of the line of the surveyed points. This supports the accuracy of the c.1911 site plan, and negates the hypothesis that the stormwater outlet represents the original alignment of Perry’s Creek.
Exotic vegetation

The Torpedo Station site today has diverse and extensive exotic vegetation; not all of it is relevant to this investigation. However, non-indigenous vegetation growing in the vicinity of the track may be significant. It was considered that if a garden or other significant plantings were part of the fabric, then the most likely location for them would have been on the raised avenue, possibly near the caretaker’s residence. This would have kept the plants above the flood plain and made them more accessible to the caretaker and his family.

Of particular note in the targeted area are two large groups of cacti identified as Prickly Pear (Opuntia sp). These (Figure 15) are growing in the vicinity of the magazine, and also on the opposite side of the track near the location of the main hall. Size would indicate that they have been there for some time. However, due to the fibrous nature of these plants (they have no hard central trunk) and their tendency to sag and collapse under their own weight, it is doubtful that they are original planted specimens.

Once a Prickly Pear has collapsed, the lower part of the stem wastes away and the upper part takes root to establish a new plant. In this manner, it slowly spreads away from the parent plant. Hence, the Prickly Pear may be a direct descendant of an original site specimen growing in a spot near to where the original was planted (Sandham 2005, pers comm., 11 August).
Figure 15: *Opuntia* sp., western edge.
(Photo: Martin Wimmer, 5 October 2004)

The cacti on the northern side of the track appear to be growing in a straight line. This linear arrangement could indicate a deliberate planting. The line also seemed to correspond with the brine trench. Prickly Pear can propagate from cuttings, and it is possible that trenching broke up the parent cactus with bits being thrown into the trench during backfilling to later take root.

*Opuntia* sp. has some association with British military sites and, by extension, British colonial sites, as it attracts the cochineal insects which produce the red dye used to colour British soldier’s redcoats. Prickly Pear was originally brought to Australia by Captain Phillip on the First Fleet, with a view to setting up a dye making industry (Tanner 2004). The fruit of the Prickly Pear is edible and can also be used in jam.
production. Domestic industries like these could suggest some level of self sufficiency at the Torpedo Station, specifically women’s domestic duties (Johnston 2002). No reference to such industry has been found in the histories of the Torpedo Station. Opuntia sp. thrives in harsh conditions; this may have also influenced its choice for the Torpedo Station environment.

Two genus of Pig Face (Carpobrotus sp. and Lampranthus sp.) were observed spreading away from the track and were photographed (Figures 16 and 17). Pig Face are possible remnants of the Torpedo Station, and fit the Shackel (1996) model of low lying ground cover being introduced at 19th-century military facilities to provide some formal delineation. Like the Prickly Pear, Pig Face thrives in harsh conditions, and the fruit of Carpobrotus sp. is also edible. In fact, this is what gave rise to the genus name “karpos meaning fruit and brota meaning edible” (Page & Olds 1998:194). Carpobrotus sp. was the more prodigious of the two genera of Pig Face found. One possible reason is that it may be indigenous. Some varieties of Carpobrotus sp. are indigenous to Australia and this may give them survival advantages over introduced varieties.

When compared to other introduced species found on the site, Prickly Pear and Pig Face seem to hug the Torpedo Station track. This may be an indication of their inability to grow and spread rapidly, and could support the hypothesis that they are part of the Station’s fabric. In comparison, species such as Tree Mallow (Lavatera arborea), Date Palm (Phoenix canariensis), Pampas Grass (Cortaderia selloana), African Box Thorn (Lycium ferocissimum), Olive Trees (Olea europaea) and Thistles (Onopordum sp.) were recorded as being randomly scattered all over the site.
Figure 16: Pig Face (*Carpobrotus* sp.)

(Photo: Martin Wimmer, 21 September 2005)

Figure 17: Pig Face (*Lampranthus* sp.)

(Photo: Martin Wimmer, 21 September 2005)
African Boxthorn has legendary pest status in Australia. Specimens that were found have, in all probability, migrated into the site with the aid of birds. They appear as single bushes in the paddocks each side of the track. However, in one spot they are represented as a large rectangular clump (Figure 18). This mass is approximately located where the magazine was situated, and may actually be growing within the confines of its foundation. It is thought that the Box Thorn may have taken advantage of the disturbed soil, backfill or foundation structure to take hold in this area. More research on African Box Thorn is required to see if this opportunism is typical of the species, and if it is in fact growing within the magazine foundations.

Figure 18: Rectangular mass of African Boxthorn (green and dry branches), looking north-east. (Photo: Martin Wimmer, 21 September 2005)
Conclusion

This chapter has detailed the results of the pre-disturbance survey of the Torpedo Station. A c.1911 site plan used in conjunction with a visual inspection of the site revealed a substantial amount of surviving material culture, which was investigated using archaeological, botanical and geophysical techniques. Problems arising during the course of the survey, such as the presence of unrelated cultural material and difficulties of working on water during the magnetometer survey, were outlined. It was also shown how such problems could influence or bias the survey results. Limitations of the current survey and future investigative directions were also identified.
How does the material culture of the Port Adelaide Torpedo Station reflect the changing attitudes to coastal defence in South Australia between 1877 and 1924?

Introduction

Torpedo warfare is a recent addition to the seafaring themes of naval warfare and coastal defence. It is an example of the rapidly evolving technology of post 1850 industrial era warfare. The first use of torpedoes in armed conflict was during the American Civil War (1861-65) (Armstrong 1896:2). By the time the virtues of this new technology were sold on to the Australian Colonies in the late 1870s by Jervois and Scratchley, the genre included static submarine mines which were tethered to cables or anchored to the sea bed, as well as the motorised warheads we identify as torpedoes today.

Torpedo schools, such as Vernon and Defiance in England (see Armstrong 1896, chapter IX), were set up to train naval personnel in torpedo use. Torpedo stations were constructed as storage and deployment facilities for this new type of weapon. These stations were often built in strategic locations, for example, at Magazine Bay, New Zealand guarding the entrance to Lyttleton (Lyttelton Torpedo Boat Museum, nd) and the Port Adelaide Torpedo Station guarding the entrance to Port Adelaide.

Former industrial era military sites such as the Port Adelaide Torpedo Station are ideal ground for writing archaeologies. They encapsulate unique cultural landscapes of evolving defence theory and technology. Information about such sites comes primarily from historiographies that often avoid dealing with the fabric. Archaeology
can interpret the reflective memory of the material culture associated with military sites and provide a greater understanding of them.

The sum of all fears: a need for coastal defence in the Colonies

The withdrawal of British Troops from Australia in 1870 coupled with the ‘Russian Scares’ of 1878 and 1885 led to a flurry of coastal defence construction throughout the Australian Colonies. This served the dual needs of placating the colonists and strategically defending Britain’s commerce by providing safe coaling stations in Australasia for the Royal Navy.

South Australia’s colonial defence fabric included a solitary cruiser (HMCS Protector), the principal fortifications at Taperoo (Fort Largs) and Semaphore Park (Fort Glanville) and ancillary features such as the Torpedo Station (Port Adelaide) and the military road (Military Road) connecting Glenelg with the forts.

The Port Adelaide Torpedo Station is an example of a synchronic relict cultural landscape (Darvill et al 1993). It owes its genesis to the arrival of Jervois, an acclaimed British military engineer, in the Colony in 1877. Jervois’ risk assessment of the coastline adjacent to Adelaide and his knowledge of fortification and ordnance led to the conceptualisation of the Colony’s defences. By 1885, construction of the Torpedo Station was well underway when “a torpedo magazine, with two rooms attached for [a] keeper, [had] been erected and handed over” (Parliamentary Papers 1886, 2(29A):16). The facility was never modernised during its period of use and never reused as a military site after December 1917, by which time it had been largely dismantled. Consequently, the Torpedo Station is the product of one main
period of activity; and the extant material culture of the site reflects this single use and the mentality of the time.

The fact that so little remains of the Torpedo Station today is testament to the changing attitudes towards coastal defence in South Australia between 1877 and 1924. The attitude in colonial South Australia seems to have been that fixed, shore based defensive structures were the lynch pin of coastal defence, and naval vessels (such as HMCS Protector) were no more than a seaward adjunct of the fortifications (Nicholls 1995:14). By the early 20th-century, this attitude had changed dramatically, due largely to evolving technology and Federation. During the time span addressed by the research question (1877 -1924), defence theory moved from investing in static coastal structures to the procurement of a highly mobile deterrent and the establishment of the Royal Australian Navy.

**Technology and a shift in defence theory: reasons for abandonment**

*Technological change and inappropriate weapons systems:*

Gould (1990:160) identifies patterning in the archaeological record relating to modern military sites as trend innovation. This concept is directly related to the industrial era arms race and the copycat tendencies of different nations in their acquisition and use of evolving military technology. The Torpedo Station was a product of 19th-century trend innovation. Consequently, it is anticipated that the information obtained from this study will prove useful in a larger comparative study of the South Australian coastal defences from the specified era, and help demonstrate the notion of direct competition between nations preparing for war in a bygone era.
The Port Adelaide Torpedo Station reflects specialised experiences of time and place with both its conception and abandonment. The military scenarios which led to its establishment were era specific and relevant only as long as the available military hardware remained immutable.

The late 19th and early 20th-centuries were, however, a time of unprecedented technological change. The engines which powered high seas fleets became more efficient, armour became thicker, guns more powerful and, by 1914, aircraft began to play a role in military strategy. When one compares the disposal of the torpedo boat and fourteen torpedoes with the careful dismantling of the portable fabric of the Torpedo Station, and the subsequent reuse of this fabric at other naval facilities, one is left in no doubt as to the antiquity and uselessness of the Station’s defence system by the early 1900s.

From the beginning, the Torpedo Station was plagued by an inappropriate choice of weaponry. At a Parliamentary inquiry in 1887, it was revealed that the submarine mines chosen would not withstand a great amount of water pressure; the submarine cable (purchased in 1885) was defective, unarmoured and condemned for submarine use; the original ten torpedoes purchased from England were virtually useless and still packed in their original cases. Further, only two people in the Colony knew anything of the torpedoes’ use and there was no launch available to train more or to even deploy the weapons (Parliamentary Papers 1887, 3(112):35).

When a Type II torpedo boat was finally procured in 1905, it proved an unstable weapons delivery platform and was unable to operate in heavy seas, “in fact, the dropping of one of the torpedoes would almost capsize the boat” (Gillett 1982:8).
Further proof of its instability at sea was demonstrated when it flipped under tow on its journey from Hobart to Adelaide. Type II torpedo boats “were to be used in protected harbours or roadsteads, or if at sea, only in very fine weather” (Armstrong 1896:165). In all probability, the boat may have been able to operate effectively in the sheltered waters of the Port Adelaide River. However, with a torpedo carrying capability of two, one would think that once enemy vessels had entered the river ‘the game was probably already up’.

The fact that the Torpedo Station was never up-gunned, but was abandoned during the course of a global war without ever coming under direct enemy attack, shows that it no longer held any strategic value as a defence installation. It also reflects a shift in attitude away from this type of coastal defence in South Australia when the Colony was absorbed by the Federation of Australian States.

_Federation:_

On 1 March 1901, the Australian States transferred their naval and military forces to the Australian Federal Government. Stevens (2004:1) describes how “the ships inherited from the previous state navies were tired, old and inadequate even for training”. Federation brought a rationalisation of Australia’s naval assets and a unified national defence strategy. Defence theory shifted from one of isolated land based military installations and a reliance on ships of the Royal Navy, to a national naval capability and deterrent. Coastal defence now looked beyond Australian territorial waters and towards the horizon rather than along its coastline. Investment in a flotilla took precedence over expenditure on static land based defences. Sites such as the Port Adelaide Torpedo Station became superfluous to this new defence policy.
Defining the cultural landscape of the Torpedo Station

The dynamics of industrial era warfare is such that it ensures a continual flux of military sites. Some, because of their strategic locations, are summarily upgraded and display a distinct stratigraphy of modernisation. Others, such as the Port Adelaide Torpedo Station, lose their strategic capability because technology has made them obsolete, and are consequently locations of single use.

Whatever the scenario, each military site representing a specific innovation (or era) provides a snapshot of evolving militarism, and each is a cultural landscape. Stratigraphic distillation of military landscapes into layers containing material culture or “materiel culture” (Schofield et al 2002) belonging largely to one main period of activity leads these layers to be understood as synchronic relict cultural landscapes (Darvill et al 1993).

The Port Adelaide Torpedo Station was a single use military facility belonging to an era of rapidly changing technology and armed capability. The term ‘single use’ is applied here to mean that the facility was never structurally modernised or upgraded beyond its late 19th-century mine laying and torpedo delivery capability, even though it retained some level of naval capacity up to the beginning of the First World War. Although not upgraded, it did, during its existence, receive out-dated military hardware. For example, in 1885 a defective, unarmoured and superceded submarine cable and from 1905 a Thornycroft Type II Torpedo Boat built in 1884, were stationed at the facility (Gillett 1982:69; Healey 1999:6).

In the near ninety years since the Torpedo Station was abandoned, the area has been subjected to various cultural and natural site formation processes. These
include the dismantling and removal of all portable and reusable infrastructure by December 1917 (NAA: D292, 14/1/3 pt.1 (b)); land reclamation along the foreshore; trenching for pipe laying; and shifting sand and infestation by exotic plants. These processes will be discussed more fully below.

The site is now severely environmentally degraded and virtually unrecognisable as a former military installation. The research question underpinning this thesis, namely, “How does the material culture of the Port Adelaide Torpedo Station reflect the changing attitudes to coastal defence in South Australia between 1877 and 1924?” helped delimit and distil the military landscape of the Torpedo Station from the more general civilian cultural landscapes preceding and post dating it. This distillation was achieved by utilising modern survey and GIS techniques, along with cross-disciplinary analysis (geophysical and botanical) in conjunction with a c.1911 site plan of the Station to conduct a pre-disturbance survey of the site (see Chapter Three: Method). The survey revealed that the Torpedo Station’s spatial integrity, defined by an ‘improved’ landscape of tracks, artificial harbour and possible foundation debris, is still partly intact despite the site’s severe degradation.

The existing material culture of the Torpedo Station contains information relating to a specific stage of technological development. It exists now in the same pattern or arrangement as it did when it was first commissioned. This defines the site as a relict cultural landscape. Further fit to the relict cultural landscape model can be derived from the site’s topographical coherence. Such coherence is demonstrated with the material culture of the Torpedo Station being contained within a distinct geographical zone, for example, on the tip of a peninsula and at the confluence of two major waterways. The geographical features of the site, such as its coastline,
tracks and linear earthworks also connect the archaeological elements in a logical way.

As a repository of cultural material and philosophies belonging to one main period of activity, the Port Adelaide Torpedo Station can be more precisely classified as a synchronic relict cultural landscape. Such landscapes were discussed at some length in Chapter One: Literature Review.

**Specialised experiences of time and place**

The Port Adelaide Torpedo Station is a site of colonial military strategy. As such, it is a reflective and tangible link in an unbroken chain of short-lived and evolving industrial technologies of warfare and defence theory through the ages. The site fits Darvill’s (1999) paradigm of a cultural landscape in that the extant material culture of the Torpedo Station not only represents the physical residue of warfare, but is also a manifestation of a particular way of seeing the world. This can be demonstrated in the genesis of the Torpedo Station which is grounded in a hierarchy of defence theory. This embodies a tactical response on two levels to the perceived threat of a naval assault by Russian cruisers roaming the Pacific Ocean in the 1870s and 1880s.

At a local level, the Torpedo Station is no more than an accessory to the coastal fortifications at Semaphore Park and Taperoo. It materialised from a need of the Colony to defend itself after the last British Regiments withdrew in 1870 (Cooper 1950:79), which was exacerbated by ‘Russian Scares’ in 1878 and 1885. The ensuing paranoia fed by these events led to the conceptualisation of South Australia’s coastal defences by Jervois (Nairn et al 1972:479-480).
At a global level, the Torpedo Station was a component of the Australia Station (Bach 1986:184-197) conceived to support British imperial policy and protect colonial trade and merchant shipping by providing safe coaling ports for the Royal Navy (Nicholls 1995:1-15). These stations were selected with reference to the trade routes (Clarke 1894:137). Consequently, a chain which included Gibraltar, Aden, Hong Kong and Australia, amongst others, were maintained within steaming distance of each other to refuel the warships of the time (Jervois 1880:18-20).

The strategic purpose of the Torpedo Station at both of these levels was to deny, or hamper, access to the port of Adelaide via the Port Adelaide River utilising the available military technology of the time. In theory, this was to be achieved variously by running a boom consisting of a cable with submarine mines attached across the River from the Torpedo Station, the deployment of torpedoes (Jervois 1882) and, from 1905, the use of a torpedo boat.

**Mode of construction**

The Torpedo Station was constructed as an accessory to the fortifications at Semaphore Park and Taperoo and was, in fact, covered by the arcs of cannon fire from these forts (NAA: AP161/1, item 1) (Appendix 3). Fort Glanville at Semaphore Park and Fort Largs at Taperoo were constructed of brick and concrete to withstand direct naval bombardment. Indeed, their fabric is still largely intact.

In contrast, very little remains of the Torpedo Station in the archaeological record. Contemporary written records show that the Torpedo Station was constructed mainly of wood and galvanised iron except for the magazine, which was built of stone and sand brick (Appendix 13). This is in striking contrast to Fort Glanville (Figure 19).
which was built of “400,000 best Melbourne hard bricks, 15,000 yards of lime concrete and over 30,000 cubic feet of assorted timber” (Colwell 1973:72).

There are two possible reasons for the Torpedo Station’s ‘light’ construction. The first is that the Station’s primary function was not to withstand direct naval bombardment, but to act as a secondary line of defence and intercept enemy forces that had made it past the forts. Its position inland and well back from the coast, coupled with the defensive range of the 10-inch guns covering it from Fort Glanville, would have placed it out of reach of enemy gunfire when it was designed in the late
1870s. Consequently, a more solid construction may not have been deemed necessary at the time.

The second possibility is based on economic constraints. The Colony had already committed itself to building the two principal coastal fortifications. These structures may well have stretched the Colony’s coffers and prohibited the construction of a third fortified facility. This was also evidenced when plans to build a fort at Glenelg were abandoned, despite its guns having already been ordered (Cooper 1950:98). An example of the costs involved comes from Fort Glanville, begun in 1878 and costing 15,000 pounds to complete by 1880 (Cooper 1950:95; Colwell 1973:72). A severe recession in the 1890s followed the colonial boom of the 1880s, further curtailing expenditure on defence (Nicholls 1995:26).

It is not within the scope of this thesis to further explore these possibilities. It is, however, important to mention them briefly in order to understand why the Torpedo Station existed, and ultimately why so little of the Torpedo Station’s fabric remains in the present. A future and more in depth study of these two possibilities could help our understanding of the rationale behind the choice of construction methods and materials used in Australian colonial coastal defences.

Site formation processes: pre-abandonment

The whole of the area bound by the North Arm, Hindmarsh Reach and the False Arm of the Port Adelaide River was prone to high tides and flooding (Appendix 11). By necessity, the Torpedo Station needed to be built on reclaimed land. Economically, this was achieved by reclaiming (or elevating) only specific points on which it was intended to place structures.
These earthworks are indicated on the c.1911 site plan as dashed lines around the torpedo boat shed and slipway, the detonators and filling shed, the main track leading through the Station to the jetty and the dotted lines of the raised walkway (Figure 3). It is suggested that the raised areas indicated by the dashed lines labelled “Piles” were engineered by shoring up sections of the site with piling and backfilling them with sand and rubble to create a solid base on which to build. These are, perhaps, the most important cultural feature of the Torpedo Station as they supported the whole of the infrastructure.

Perry’s Creek appears on colonial era maps as a small, meandering stream. However, on the c.1911 site plan and 20th-century aerial photographs, it appears quite linear. From the 20th-century depictions and images, it can be seen that the ‘straightened’ creek runs alongside the causeway road as far as the bridge over the False Arm’s flood plain, some distance south/east of the Station. Perry’s Creek may have been deepened and straightened by the Naval Reserve during the time of the Torpedo Station (Perry 2004, pers. comm., 28 July).

**Site formation processes: post abandonment**

Since abandonment, the Torpedo Station has been subjected to diverse natural and cultural site formation processes which have contributed to its severe degradation. Many of these processes were identified in the pre-disturbance survey, whilst others were determined from written records.

*Dismantling the buildings:*

The beginning of the end for the Torpedo Station was signalled by the torpedo boat’s decommissioning in 1911 (Gillett 1982:9) and the public auction of fourteen
torpedoes (Figure 20) on 18 March 1912 (*The Register* 1912:2). By November 1912, an alternative location for a Navy drill hall, office, boat shed and slip were being sought, and the possibility of re-erecting certain structures from the site in the new location was being considered (NAA: D292, 14/1/3 pt.1(a)).

Figure 20: Public torpedo auction

(*The Register* 15 March 1912:2)

The first major phase of the post abandonment cultural site formation process at the Torpedo Station was completed by 20 December 1917 when the District Naval Officer reported to the Director of Naval Works that “the whole of the buildings at the Torpedo Station had been taken down and all material removed…” (NAA: D292, 14/1/3 pt.1(b)). Sixty four sheets of galvanised iron from the Station were
subsequently reused for a Naval Guard House at Port Pirie, and approximately sixty sheets for a Naval Guard Shelter at Outer Harbour (NAA: D292, 14/1/3 pt.1(c)). Presumably, all iron, wood and machinery were removed in this process.

Of the standing structures once in place, it is postulated that only part of the foundations, hearths and chimneys may have been left extant after the dismantling process. Evidence of this material (concrete and red brick) was recorded in situ, and some may have been reused in constructing the adjacent artificial sea wall at a later date. It is further postulated that the magazine remained largely intact during the dismantling process, although its roof was probably removed at this time. The magazine is the only structure whose ruins appear on a 1938 survey of the site (Land Titles Office 1938). Being composed of stone and sand brick would have made it difficult and expensive to dismantle, yet no sign of its structural components were visible on the surface during the current survey. In all probability, the foundations of the magazine, by necessity a fairly robust structure, still survive under the top soil. Further investigation could be effected via probing, remote sensing or excavation.

Loss of cannon and associated material:

The Station’s 6-inch Armstrong cannon also appears on the 1938 Winton survey. This was ‘lost’ in the Port Adelaide River adjacent to the jetty during the dismantling process and only recovered in 1961. It’s location in the intertidal zone is clearly marked on the 1938 chart. A magnetometer survey of the artificial harbour indicated the possible presence of a debris field which may be related to the gun. An unsubstantiated rumour suggests that the gun’s shield was not recovered in 1961 and may still be on the river bed. Readings of between 100 and 200 nanoteslas
above the background intensity obtained during the magnetometer survey were significant, and further investigation by divers may be able to determine if the ferrous material detected belongs to the gun.

_Trenching the brine main:_

Some time after the Torpedo Station was abandoned, a trench was dug along the northern side of the main track. This process began east of the raised walkway and continued west at least as far as the oil store. Following the line of this trench, it was observed that it may have cut through all of the buried structures still extant on that side of the track. Pockets of churned up masonry were noted along a line connecting these two structures which may well belong to the Torpedo Station. Despite this destructive process, it is possible that the extant structures were not completely destroyed. Contemporary records show that some of the structures were of considerable size. For instance, the workshop was 45.72m (150 feet) long and 3.35m (11 feet) wide (NAA: D292, 14/1/3 pt.1(a)). It is feasible that a portion of this structure’s foundation survived the trenching process and may be rediscovered through probing, remote sensing or excavation.

Contemporary photographs show that the gun platform was a large, circular concrete base (Figure 5). This structure would have been a major obstacle during the trenching process for it lay directly in the line of the trench. Nothing now remains above ground of the platform in its original position. However, on the southern side of the track and slightly to the west of this position is a considerable concrete mass (Figure 12). It is suggested that this concrete is a portion of the gun platform, and that during the trenching process the platform was partially broken up and dragged or rolled clear of the work area. It is further postulated that other portions of the gun
platform may have been reused in the section of artificial sea wall adjacent to this area.

Recent land reclamation and construction of the sea wall:

The Torpedo Station site is bound on two sides (to the north and west) by an artificial sea wall which is the product of recent period land reclamation process. The wall is composed of building rubble such as old bricks and slabs of concrete (Figure 9). It is hypothesised that some of the material used in its construction may, in fact, be fabric belonging to the foundations, hearths and chimneys of the Torpedo Station. If material from the Torpedo Station were reused in the sea wall, it makes sense that it would have been deposited on the western face near where the jetty once stood. Much of the material in the sea wall is heavy and cumbersome. It follows that a shorter distance for deposition, such as the western face, would be favoured over the longer distance to the northern face.

Just prior to the arrival of the torpedo boat in 1905, the last structures of the site were erected. These were the torpedo boat shed and slipway (Gillett 1982:69; Healey 1999:6). However, repairs to structures at the Torpedo Station with bricks made after 1905 may have been affected up until abandonment some time before December 1917. Consequently, the years 1905-1917 represent a grey area in attempting to date construction material found on the site, and justify using 1917 as the terminal date for such investigations. Analysis of the diagnostic elements of the bricks recorded in this area may preclude them from association with the Torpedo Station fabric. For instance, the bricks may have been produced post December 1917. Those predating 1917 may well belong to hearth, chimney and foundation structures of the Torpedo Station’s buildings which were not salvaged during the
dismantling process. Bricks manufactured by Willis and Williams (W&W) and recorded in the sea wall (Appendix 10) may have formed part of the fabric of the Torpedo Station.

Recent land reclamation has pushed back the high water mark and intertidal zone around the Torpedo Station by several metres with the construction of the sea wall. A dirt road and car park border the sea wall facing the North Arm. It is possible that the Torpedo Station’s slipway may still exist under the road or car park. The landscape in this area has been altered to such an extent that it was difficult to pinpoint exactly where this structure had been.

The filling in of Perry’s Creek may have been a part of the modern land reclamation process, serving to stabilize the location by stopping flooding along its course and improve sanitation. This process of filling in a water course also means there is no need for bridges in the area to be built and maintained.

*Land clearance:*

Heavy earthmoving equipment has cleared the land north of the bend in the raised walkway and formed an embankment separating the site from the access road. It is suggested that this was done to facilitate the laying and easy maintenance of a buried high pressure gas main. The cleared land is roughly rectangular in shape, and extends east and west for the length of the site. The exact location of the boat and filling sheds could no longer be determined due to the area’s severe degradation, although it is possible that the embankment contains some of the fabric of these structures.
Rubbish dumping:
A considerable amount of garbage was observed on the site, especially in close vicinity to the raised Torpedo Station track. This track still provides easy access into the site, and its secluded nature makes it an ideal ground for dumping rubbish. Household refuse as well as construction material was observed each side of the track and also recorded on the Treloar and Treloar (2001) field walk survey. This adds to the background noise of the site, making it harder to positively identify fabric belonging to the Torpedo Station.

Natural processes:
Shifting sand and low lying vegetation (including grasses, Pig Face and African Boxthorn) have obscured much of the remaining fabric of the Station. These natural site formation processes may well act to protect any remaining fabric belonging to the Torpedo Station.

Botanical investigations
The various exotic plant species on the site add an extra dimension to the pre-disturbance survey of the Torpedo Station. Some plants such as Prickly Pear (Opuntia sp.) and Pig Face (Carpobrotus sp. and Lampranthus sp.) may be descended from original plantings. Both genera have a fibrous constitution and do not have the longevity of hardwood plants. Therefore, it is unlikely that they do represent original plantings, but they may be directly descended from them (Sandham 2005, pers. comm., 11 August). It is hypothesised that if they are representative of plantings at the Torpedo Station, they could provide an understanding of some social aspects relating to coastal military sites. Such aspects could include the presence of women (Johnson 2002); types of subsistence industry
such as food and dye production (Tanner 2004); and the availability of plant specimens or hedging techniques and garden design (Department for Environment, Heritage and Aboriginal Affairs 1988; Shackel 1996).

Conversely, Prickly Pear and Pig Face may bear no relationship to the Torpedo Station at all. Both genera easily cultivate from cuttings. Cuttings may have been dumped on each side of the track along with other household refuse (garbage is visible adjacent to the foliage) some time post abandonment and taken root.

The Torpedo Station site is arid and sandy. Given this, the track verge is probably the best location for plants to take hold. Before the era of modern land reclamation and the construction of the sea wall, the earthworks that the Torpedo Station is built on would have kept the vegetation growing above the flooding seawater of the tidal Port Adelaide River. It makes sense that original plantings would have utilised available space on this raised ground. Further, the hardened and sloping surface of the reclaimed land that the track is built on would serve to channel any run off from rain to its edges where these plants have been. By extension, lines or patches of vegetation such as those observed each side of the track have also been used to find obscured material culture in other locations (see Coombe 2001).

Other plant specimens recorded on the site such as African Box Thorn (*Lycium ferocissimum*) may also be used to help locate cultural material or provide a greater understanding of site formation processes. The normal distribution of this species over the site is as individual shrubs scattered about. It is hypothesised that a thick stand of African Box Thorn growing alongside the track in the vicinity of the magazine may actually be growing within the foundations of that structure.
Magazines of this era typically had wood and earth floors to minimise the risk of sparks and make it safe for handling live ammunition (Colwell 1973:72). It is possible that the Box Thorn is taking advantage of the earth and decomposing wood of the magazine’s floor by establishing itself in this location (Sandham 2005, pers. comm., 11 August).

**Further investigations**

The pre-disturbance survey of the Torpedo Station has shown that its spatial integrity is still largely intact, despite the numerous site formation processes that have been operating there. This augers well for a future investigation of the site.

**Terrestrial:**

Trenching on the site has churned up numerous pieces of masonry. Contemporary records suggest that some of the structures (the workshop, for example) were of considerable size, and it is possible that portions of their foundations are still intact and were only severed by the trench. Trenching only took place on the northern side of the track; this means that the foundations of the buildings on the southern side (such as the magazine) may still be complete. The existence of a large clump of African Box Thorn may indicate the location of the magazine.

The location of these structures could be further investigated with the use of probes or remote sensing. Given the limitations of a magnetometer survey of the terrestrial aspects of the site due to the large amount of ferrous material scattered about there, two alternative remote sensing devices have been suggested by Ian Moffat. These are a Geonics EM 31 for deep surveys, and a Geonics EM 38 for shallow surveys of .75m and 1.5m. The latter would be ideal for the magazine site. Both measure
changes in conductivity of the earth’s surface, with a significant change over a small area normally indicating cultural material. Unfortunately, Flinders University has neither of these devices. However, given that the foundations are, in all probability, not that far underground, a probe may be all that is required to locate them (Moffat 2005(a), pers. comm., 1 June).

The presumed intactness and solidity of the magazine’s foundations makes them an ideal subject for a future excavation. Not only would this uncover data about the structure’s dimensions, construction method and the materials used, but it may also discover how the structure was seated into the earthworks.

Earthworks and ramparts have a long association with military engineering that predates the classical period. The colonial era earthworks (reclaimed land) of the Torpedo Station are quite possibly the most important feature of the site, for it is what made the Station a viable entity. An excavation across the track would allow a scientific analysis of its construction and help gain an understanding of colonial land management theory and practice.

Marine:
The magnetometer survey of the artificial harbour returned some significant readings. Further investigation of the river bed by divers using probes may discover ferrous artefacts relating to the Torpedo Station such as the gun shield, dolphin mooring devices or a debris field associated with the Station’s jetty. Marine environments often preserve certain types of material better than terrestrial (Muckelroy 1980:178-179). This is evidenced at the Torpedo Station site with the remains of the black beacon in the intertidal zone. It is still in remarkably good
condition, despite have been exposed to the air twice a day for several hours at a time over the last 130 years. Given this, it is also possible that some of the jetty’s wooden structure (piles, beams) survive below water.

Myths:
One of the myths associated with the Torpedo Station is that the torpedo boat was formerly moored inside the hull of an abandoned ship which had one end cut off to help facilitate such a coupling. There is, indeed, an abandoned ship in the swamps of the Port Adelaide River which fits this description (Staniforth 2004, pers. comm., 29 June). The wreck is that of the Dorothy S. (WGS84 located at 34d 48m 23s S/138d 33m 53s E). The GPS coordinates of the Dorothy S. are Eastings of 277243 and Northings of 6145711 (Arnott 2005, pers. comm., 2 May) which positions it approximately 4.5km north-east of the Land Department survey mark used as the datum point for this research.

Torpedo boats of the type based at the North Arm were constructed of galvanised steel plating which was “strong…but it meant that the boat had to be stored out of water” (Lyttelton Torpedo Boat Museum, nd.). Given that a boat shed and slip was part of the Torpedo Station infrastructure, and that the torpedo boat needed a dry berth for its proper maintenance, it seems unlikely that it was ever housed inside the wreck for an extended period of time, if at all. It may be possible to further disprove the myth by rowing out to the abandoned vessel, measuring its dimensions and comparing it with those of the torpedo boat to see if, in fact, the latter could fit inside the former. If discovered to be plausible, this opportunistic technique of mooring naval vessels inside other discarded vessels will, to some extent, enhance our knowledge of a seldom recorded naval practice.
Cultural heritage torpedoed

Don’t it always seem to go
That you don’t know what you’ve got
Till it’s gone
They paved paradise
And put in a parking lot. (Mitchell 1970)

The site is currently owned by the South Australian Land Management Corporation, an entity vested with the responsibility of generating income from idle State assets. The site has river frontage on two sides and, with its current disposition as wasteland, is prone to redevelopment (Figure 21). The Port Adelaide Torpedo Station has no heritage listing, however, pending changes to the National Heritage Register may open the way for thematic listings of such sites. Possible themes could include ‘Australia’s Colonial Coastal Defence Sites’ or ‘Torpedo Stations in Australia’. A model of thematic listings of military heritage sites is already in place in England.

Conclusion
Despite the environmental degradation of the Torpedo Station, the spatial arrangement of its military design is still evident. Facets of this design were investigated and recorded with a pre-disturbance survey of the site using archaeological and cross-disciplinary techniques. This Chapter has discussed the survey’s findings and the potential of the existing material culture for future investigation. Such a study could serve as a model for similar investigations in Australia and other former British Colonies to gain a greater understanding of the
defence psychology manifested by the ‘Russian Scare’. By extension, any research on coastal defences and defence theory also contributes to a greater understanding of themes aligned to seafaring.

Figure 21: New slip under construction September 2005 (eastern face), 56m east-north-east of the black beacon. (Photo: Martin Wimmer, 21 September 2005)
Introduction: an embarrassment of riches

This thesis has explored the material (materiel) culture of the Port Adelaide Torpedo Station. It has shown, through a pre-disturbance survey of the site, that the spatial integrity is still largely intact despite its severe degradation. The reflective quality of the extant material culture represents an embarrassment of riches in terms of gaining knowledge of a little understood aspect of Victorian era colonial culture (coastal defence), and its subsequent metamorphosis with the advent of nationhood. The site bridges colonial and national defence theory, and is representative of the evanescent nature of industrial era warfare.

The pristine nature of the cultural landscape that is the Port Adelaide Torpedo Station is guaranteed by virtue of the fact that the Station was never upgraded or reused as a military installation after it was abandoned. This singular military stratigraphy makes it unusual in South Australian colonial military history. Historical documents, coupled with the archaeological theory and method employed in this investigation, has provided an understanding of the material culture of the site. Questions surrounding the Station's conception, construction, effectiveness and abandonment were addressed and answered to some extent within the limitations of an Honours thesis.

Future archaeological directions: unanswered questions

The true extent of the remains of the Torpedo Station is as yet unknown, but may be revealed with further archaeological investigation including the use of probing, remote sensing and excavation. A wider study of similar sites interstate and overseas may position the Port Adelaide site more precisely in the defence continuum, adding considerably to an understanding of this site type.
Raised track:
Earthworks and ramparts like those of the Torpedo Station have a long historical association with military sites and are often all that remains of those facilities. The raised track of the Torpedo Station is, perhaps, the most surprising and significant structure of the site. It is an example of colonial era land management theory and land reclamation practice. Built in the 19th-century to support a defence installation, it is today, rather ironically, protected by a modern era sea wall which is representative of 20th-century land management theory and practice. An excavation of this structure will reveal its method of construction and provide an understanding of how structures such as the magazine were seated onto it. It may also provide a further understanding as to why most of the structures built on it were of fairly light construction.

Magazine and other structures:
In all probability, the foundations of the magazine will be the most intact of all the structures that were erected on the site because they were avoided by the trenching event. Consequently, this structure would present the best opportunity for a successful excavation. Foundations belonging to the structures on the northern side of the track may be partially intact and could also be explored with remote sensing, probing and excavation.

Artificial bay:
It is possible that significant readings obtained during the magnetometer survey of the artificial bay are from ferrous material relating to the Torpedo Station. Diving on the site and the use of probes may reveal their identity and significance.
Botanical studies:
The plant species found present an interesting addition to the archaeology of the Torpedo Station and warrant a more extensive cross-disciplinary study which was beyond the scope of this thesis. The potential for vegetation to reveal unknown social aspects of the site, either as material culture or as markers for locating material culture, is heightened in the harsh environment of the Torpedo Station. The dry and sandy conditions seem to have dissuaded most varieties of exotic plant from invading the area. Those that are there may be remnants of original plantings, or newcomers taking advantage of the disturbed soil around building foundations. Future soil tests may also add to an understanding of plant distribution and provide a baseline for archaeological studies in other coastal locations.

Comparative studies:
The site lends itself to a comparative study of other torpedo stations. The literature search accompanying this thesis failed to uncover any other archaeological studies of similar sites in Australia. It was hypothesised that none have been undertaken, or the information is caught up in the grey literature of heritage management reports. As a consequence, there is great potential for a wider study of torpedo station sites or colonial coastal defence installations, perhaps as part of a post graduate research project. Such a study will lead to a greater understanding of Victorian era defence theory and technology in the Australian landscape and reveal even more of the changing attitudes to coastal defence between 1877 and 1924.

Identifying cultural significance
The Torpedo Station is situated close to the historical precinct of Port Adelaide, and is adjacent to the Ship’s Graveyard Heritage Trail of Garden Island, as well as a
number of theme related museums including the South Australian Maritime Museum and a military vehicles museum. Popular dolphin watching cruises along the Port Adelaide River regularly carry tourists past the site. Despite its potential for cultural tourism, the site is not well known to the community and is currently not interpreted to the public.

The remains of the Port Adelaide Torpedo Station have reflective memory to spare. If the terms of the Australia ICOMOS Burra Charter (1999) were applied to the site, its cultural significance could be assessed on historical and scientific grounds.

1) Historical significance:
The site owes its conception and existence to a historic figure - Sir William Jervois. It is associated with an historical event – the ‘Russian Scare’. It is representative of a phase of coastal defence theory and practice. It is a part of the colonial activity of constructing coastal defences. Its spatial integrity ensures that evidence of the above mentioned associations survive in situ.

2) Scientific significance:
The site is rare in Australia, and quite possibly internationally. It is representative of the site type; this is obvious from the spatial integrity of the remaining material culture and historical documents. The site has the possibility of contributing further substantial information on past military technology and policy, as well as colonial land management theory and practice.
Interpretive potential
The Port Adelaide Torpedo Station is a rare and unique reminder of the changing attitude to coastal defence in South Australia between 1877 and 1924. As such, and given the extant material culture of the site, it has significant interpretive potential. Interpretation presents the opportunity of showcasing the design of a colonial era torpedo station. Story boards placed around the site adjacent to each feature on the c.1911 site plan could lead visitors on an informed walk around the site. Further archaeological investigation could improve the quality of information presented on interpretive signage and brochures.

The Torpedo Station’s cannon could be retrieved from its present location next to the Birkenhead Tavern and repositioned on the site. For effect, the cannon could be placed right on the point, where it would be clearly visible from traffic on both Hindmarsh Reach and the North Arm.

Conclusion: archaeology as optimism
Despite the severe degradation of its cultural landscape, archaeology was able to reveal that there is still an embarrassment of extant cultural riches associated with the Torpedo Station site. The archaeology of the Port Adelaide Torpedo Station has moved an understanding of the changing attitudes toward coastal defence in South Australia between 1877 and 1924 away from the associated historiographies, and toward a rigorous scientific study of the Torpedo Station’s material culture. At the completion of this study, the archaeological potential of the site is not yet fully realised.
Figure 22: Torpedo reuse - post public auction?

(Milligan 1975:17)
Admiralty Chart 1876 (4808/90). *Port Adelaide*. Published at the Admiralty, London.


Drawing No.3422/17, nd. Plan of Torpedo Station and Road to Magazines in North Arm. Relates to MB 20/03.


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- 94 -


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Appendix 1

Certificate of Title

LANDS TITLES OFFICE ADELAIDE SOUTH AUSTRALIA
DIAGRAM FOR CERTIFICATE OF TITLE VOLUME 5906 FOLIO 437

Land Titles Office Adelaide

- 98 -
Appendix 2

Treloar and Treloar 2000 transect shown as shaded area
and main Torpedo Station track shown as yellow line

(Mapland survey 6107: Photo 173)
Appendix 3

Plan of colonial defences, October 1858 -
section showing arcs of fire from proposed forts
(Torpedo Station site circled in red)

(Jan Perry: Private collection)
Appendix 4

Winton survey: 28 April 1938

(ruins and old gun circled in red)

(Land Titles Office 1938)
Appendix 5

Total station survey of cultural material associated with
the Port Adelaide Torpedo Station

(Mapland survey 6107: Photo 173)
Appendix 6

Chart of Torpedo Station showing artificial bay, jetty and moorings

(Drawing No. 3422/17, nd.)
Appendix 7

Magnetometer survey of artificial harbour overlaid on aerial photograph of Torpedo Station site

(Image courtesy of Ian Moffat, Ecophyte Technologies Pty Ltd and Australian School of Petroleum, University of Adelaide; Mapland survey 6107: Photo 173)
Appendix 8

Magnetometer survey of artificial harbour:

overlaid transects depict collection bias of significant readings

(Image courtesy of Ian Moffat, Ecophyte Technologies Pty Ltd and Australian School of Petroleum, University of Adelaide)
Appendix 9

1954 Aerial photograph of Torpedo Station site
depicting structures in artificial harbour

(Mapland survey153: Photo 7893)
Old bricks now a part of the artificial sea wall

Figure 1: Freburg - operational 1920-1956 (approx)

(Photo: Martin Wimmer, 7 August 2005)

Figure 2: Willis and Williams - operational 1882-1956 (approx)

(Photo: Martin Wimmer, 7 August 2005)
Figure 3: Hallett - operational 1889-1960s (approx)
(Photo: Martin Wimmer, 7 August 2005)

Figure 4: Side view of Hallett showing serrations
(Photo: Martin Wimmer, 7 August 2005)
Aerial photograph showing extent of high water, 4 November 1954

(Mapland survey 149: Photo 6864)
Appendix 12

Total station survey of stormwater inspection points overlaid on an aerial photograph of Perry's Creek

(Mapland survey153: Photo 7893)
Appendix 13

Brief description of Torpedo Station, no date

The Torpedo Station is built on reclaimed ground, about four miles down the river from Port Adelaide, and consists of the following.

1. **Jetty** running into the Port river, with a tramway running to main building.
2. **Small House** for the storage of Submarine mining cable.
3. **Oil Store** for the storage of benzine for use of Motor boats.
4. **Building** constructed of Galvanized iron, divided up into a Gunner's Store room, an Air Compressing room (containing a vertical boiler for driving two "Brotherhood" Air Compressors) Torpedo room, Engineer's workshop, fitted with Motor engine for driving machine tools.
5. **Main Building** consists of a large Shed, constructed of Galvanized iron and wood, with a left, Lecture room and abutting at the end, the private quarters of the Caretaker consisting of three rooms.
6. **Magazines**. Building constructed of sand brick and divided into three compartments containing a large quantity of powder and S.A. Ammunition.
   The Gun Cotton store, built of stone contains War heads Mark IV and Mark VIII.
7. **Saltpan Shed**. Detached from Main building, in which is housed the 60" 2nd Class Torpedo Boat (which is in good condition). A Steam boiler is erected here (old and out of action) for heating up Torpedo boat, also a Hand winch (multiple power) in good order.
8. **Filling Shed**, built of wood and iron, detached from all buildings, and accessible only by boat, containing detonators &c.
9. **Water Supply**. Fresh water from the roofs of the buildings into tanks and pumped up by steam pump to a large tank erected on a high platform. Mains are laid and fire appliances fitted where required.

The Station is fitted with telephone.

(Jan Perry: Private Collection)