Additional Water Related Infrastructure for the North West Growth Centre - First Release Precincts

Aboriginal Heritage Impact Assessment

for Sydney Water

17 February 2012

AHMS

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GLOSSARY

Aboriginal Heritage Impact Assessment (AHIA)	Assessment of the archaeological and cultural values of an area, generally required as part of an Environmental Assessment (EA).
Aboriginal Heritage Impact Permit (AHIP)	The statutory instrument that the Director General of DECCW issues under Section 87 and/or 90 of the *National Parks and Wildlife Act 1974* to allow the impact and/or destruction of Aboriginal objects. AHIPs are not required for a project seeking approval under Part 3A of the *Environmental Planning and Assessment Act 1979.*
Aboriginal object	A statutory term defined under the *National Parks and Wildlife Act 1974*, meaning 'any deposit, object or material evidence (not being handicraft made for sale) relating to Aboriginal habitation of the area comprising NSW, being habitation before or concurrent with (or both) the occupation of that area by persons of non-Aboriginal extraction, and includes Aboriginal remains'.
Archaeological predictive model	A model that uses known archaeological patterns and environmental data to predict where archaeological material will occur within a given area.
AHMS 2009 model	A model encompassing both the North West and South West Desktop Assessment Areas developed by AHMS in 2009 on behalf of Sydney Water as part of the initial stages of the AHIA and based on desktop assessment only. Due to the archaeological and environmental differences between the North West and South West Desktop Assessment Areas, two different models were developed, but both are referred to as the AHMS 2009 model in this document.
AHMS 2010 model	A model based on the AHMS 2009 model that has been revised following further desktop assessment and archaeological research on the North West and South West Desktop Assessment Areas. As with the AHMS 2009 model, this model has two different components for the two assessment areas due to environmental and archaeological differences.
Department of Environment, Climate Change and Water (DECCW)	A State government agency now called the Office of Environment & Heritage.
Department of Planning (DoP)	The Consent Authority for Environmental Assessments (EA) considered under applications made in accordance with Part 3A of the *Environment Planning and Assessment Act 1979.*
Effective Coverage	A measure of the area of ground surface that could actually be seen within a particular survey unit. The effective coverage

	area is determined by multiplying the survey unit area by visibility percentage and exposure percentage. The effective coverage percentage is determined by dividing the effective coverage area by the survey unit area, and multiplying by 100.
Environmental Assessment (EA)	A document summarising the assessment of environmental impacts of a development which supports an application for approval under Part 3A of the *Environmental Planning and Assessment Act 1979.*
Environmental Planning and Assessment Act 1979 (EP&A Act)	A statutory instrument that provides planning controls and requirements for environmental assessment in the development approval process. The Act is administered by DoP.
Isolated Find	An isolated find is usually considered a single artefact or stone tool, but can relate to any product of prehistoric Aboriginal societies. The term "object" is used in the AHIA, to reflect the definitions of Aboriginal stone tools or other products in the *National Parks and Wildlife Act 1974.*
National Parks and Wildlife Act 1974	The primary piece of legislation for the protection of Aboriginal cultural heritage in NSW. Part 6 of this Act outlines the protection afforded to and offences relating to disturbance of Aboriginal objects. The Act is administered by DECCW.
North West Growth Centre (NWGC)	An area of northwest Sydney designated by the NSW State government as a focus of future development. The NWGC comprises some 10,000 hectares located within the local government area boundaries of Baulkham Hills, Blacktown and Hawkesbury. It is made up of 16 discrete 'Precincts', which are in various stages of planning, assessment and development.
North West (NW) Desktop Assessment Area	An area that has been defined based on the context and extent of the Proposal. This area incorporates the NWGC, but also extends into the surrounding suburbs, including Box Hill, Oakhurst, Plumpton, and Hassell Grove. This area includes all of the North West Assessment Area as previously referenced. The desktop assessment was undertaken for all components of the Proposal.
North West (NW) Field Assessment Area	That part of the overall NW Desktop Assessment area in which field assessments in 2010 and 2011 were conducted. The Field Assessment Area focused on land subject to specific components of the Proposal and does not encompass the entire NW Desktop Assessment Area.

Office of Environment & Heritage (OEH)	A State government agency, formerly known as Department of Environment and Climate Change (DECC), that manages and regulates Aboriginal heritage under Part 5 and 6 of the *Environment Planning and Assessment Act 1979.* It is also involved in providing technical support to the Department of Planning for projects considered under Part 3A of the *Environmental Planning and Assessment Act 1979.*
Potential Archaeological Deposit (PAD)	An area assessed as having the potential to contain Aboriginal objects. PADs are commonly identified on the basis of landform types, surface expressions of Aboriginal objects, surrounding archaeological material, disturbance, and a range of other factors. While not defined in the *National Parks and Wildlife Act 1974*, PADs are generally considered to retain Aboriginal objects and are therefore protected and managed in accordance with that Act.
Project	Water Related Services for North West Growth Centre in the First and Second Release Precincts and all associated activities.
Proponent	A corporate entity, Government agency or an individual in the private sector that proposes to undertake a development project. The proponent for this Proposal is Sydney Water.
Registered Aboriginal Party (RAP)	Aboriginal people or organisations who registered an interest in being consulted about the AHIA.
Site-based asset	Reservoirs and pumping stations.
Stream Order	An integral part of Aboriginal heritage model predictions is the consideration of creekline or stream size. For the purposes of this AHIA, Strahler's (1952, 1957) model has been adopted, whereby small creeks or streams are considered *first order* and larger creeks or streams are considered of a higher order (generally third or fourth order in the Cumberland Plain).
Water Related Services	Pipelines, reservoirs and pumping stations.
Water Related Services for the North West Growth Centre (NWGC) First Release Precincts (the Proposal)	Rising Main 3, Sewer Main L4-L6, Edmund and Crown Street Drinking Mains, the SP1154 pumping station site-based asset and all associated activities are the specific water related services addressed by this AHIA.

ABBREVIATIONS

AHIA	Aboriginal Heritage Impact Assessment
AHIMS	Aboriginal Heritage Information Management System
AHIP	Aboriginal Heritage Impact Permit
AHMS	Archaeological and Heritage Management Solutions Pty Ltd
ASL	Above Sea Level
BP	Before Present
DECCW	Department of Environment, Climate Change and Water, now OEH
DoP	Department of Planning
EA	Environmental Assessment
GIS	Geographical Information System
LGA	Local Government Area
OEH	Office of Environment and Heritage
PAD	Potential Archaeological Deposit
PEA	Preliminary Environmental Assessment
NW	North West
NWGC	North West Growth Centre
RAP	Registered Aboriginal Party
SW	South West
SWGC	South West Growth Centre
WWTP	Wastewater Treatment Plant

EXECUTIVE SUMMARY

Background

- This report documents an Aboriginal Heritage Impact Assessment (AHIA) of proposed additional Water Related Infrastructure (hereafter 'the Proposal') in the North West Growth Centre.
- The proposed additional infrastructure was not included in the North West Growth Centre water related services for first release precincts Project (hereafter 'the Project'), approved in November 2008 under Part 3A of the *Environmental Planning and Assessment Act 1979*;
- The Proposal includes specific water-related infrastructure that will be constructed within an area that was subject to a large Aboriginal heritage impact assessment of the North West Growth Centre undertaken in 2010 and 2011 by AHMS on behalf of Sydney Water (AHMS, 2009, 2010, 2011, 2011a). For this reason, this report frequently includes and refers to earlier assessments and findings to provide context and information about the Proposal;
- This AHIA has been developed following the recommendations of a preliminary assessment of the additional Water-Related Infrastructure in mid-2011 (AHMS, 2011a). The Preliminary Assessment identified that there was potential for the revised/additional infrastructure to impact Aboriginal objects and/or sites, and recommended further assessment and consultation;
- The AHIA has been undertaken to inform the further design of the Proposal, identify potential heritage impacts and recommend ways to manage and mitigate potential impacts to Aboriginal archaeological resources.

Aboriginal Consultation

- The combined NWGC and SWGC assessment was initially undertaken in compliance with the Office of Environment and Heritage's (OEH) (formerly the Department of Environment, Climate Change & Water's) *Interim Community Consultation Requirements for Applicants 2004.* In April 2010, OEH released new consultation requirements, *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010,* and these were adopted for the remainder of the assessment. Consultation has been maintained using these guidelines through the various assessments and investigations completed throughout 2010 and 2011 by AHMS;
- The following Registered Aboriginal Parties (RAPs) were involved with the NWGC and SWGC AHIA:

- *Darug Tribal Aboriginal Corporation;*
- *Darug Custodian Aboriginal Corporation;*
- *Darug Land Observations;*
- *Darug Aboriginal Cultural Heritage Assessments;*
- *Deerubbin LALC;*
- *Gandangara LALC;*
- *Tharawal LALC;*
- *Tocomwall;*
- *Northern Illawarra Aboriginal Corporation;*
- *Peter Falk Consulting;*
- *Virginia Falk Consulting;*
- *Konanggo Aboriginal Cultural Heritage Services;*
- *Ngunawal Heritage Aboriginal Corporation;*
- *Cubbitch Barta Native Title Claimants; and*
- *Botany Bay La Perouse Aboriginal Corporation;*
- *Korewal Eloura Jerrunguruh Tribe Elders Aboriginal Corporation; and*

- RAPs were consulted in accordance with Sections 4.2, 4.3 and 4.4 of the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* and the majority also participated in some parts of the 2010 eight week field survey program.
- All RAPs were advised of the Proposal, and as a result six RAPs participated in the field assessments.

Archaeological Predictive Model

- An archaeological predictive model was developed as part of the NWGC and SWGC AHIA and to inform the concept design of the Project. The model was developed in 2009 (AHMS, 2009), refined in 2010 (AHMS, 2010) and further tested by field assessment in 2010 and March 2011 and again for this AHIA;
- The model sought to predict the probability or likelihood of an Aboriginal site occurring in a given location, such as near water sources. Following the testing, it was demonstrated that the model could also be used to predict the likely occurrence of significant sites in a given location. This is probably the result of more complex sites (that are generally more significant) occurring adjacent to larger water sources, which were a key focus of the model.
- Testing indicated the model over-represented those areas that would have a high and very high probability of retaining Aboriginal objects, sites and places. This was most likely because detailed land use disturbance maps were not available for much of the assessment area and many areas that

appeared by their tree cover to be undisturbed, may actually have been be subject to re-growth.

The AHIA

- This AHIA reports on the potential archaeological impact of the Proposal. It utilises desktop and predictive modelling information from previous assessments of the area (AHMS, 2009, 2010, 2011, 2011a) and field assessments of the Proposal components; and
- The field assessment was undertaken on foot by archaeologists and Aboriginal representatives.

Key Findings

- The NW Desktop Assessment (AHMS, 2009) identified that 179 Aboriginal objects, sites and places had been previously registered within the NW Desktop Assessment Area;
- Later, the NW Field Assessment (2010 and 2011) identified 36 Aboriginal objects, sites and places. Some of these newly identified sites were duplicates of the original 179 identified by the Desktop Assessment. Overall, it was found that 208 Aboriginal objects, sites and places were within the NW Desktop Assessment Area;
- Of these 208 sites, six were on land potentially impacted by the Proposal. The six sites include one artefact scatter and PAD, four artefact scatters and one isolated find;
- No new Aboriginal sites, objects or places were identified during the Field Assessment survey for the Proposal. During the survey the six known sites were also re-assessed. The results of the Field Assessment showed that one artefact scatter (45-5-0582) was not within the Field Assessment Area; one artefact scatter (45-5-3634) had been erroneously recorded and was not within the Assessment Area; one artefact scatter (45-5-2838) was found to be in a disturbed area to the west of a proposed infrastructure location; one artefact scatter (45-5-2839) and one isolated artefact (45-5-2840) were considered unlikely to remain in their registered locations close to land potentially impacted by the Proposal; and one artefact scatter and PAD (45-5-2526) was found to be on land potentially impacted by the Proposal;
- This resulted in a total of three sites on land potentially impacted by the Proposal;
- The sites within the Assessment Area were subject to a significance assessment and were all found to be of low scientific significance.

General Recommendations

To ensure consistency and best practice management of Aboriginal cultural heritage, the following general recommendations are made. They are consistent with those in the previous archaeological assessments for Water Related Infrastructure in the NWGC and SWGC (AHMS, 2009, 2010, 2011 and 2011a) and follow the approved mitigation measures in the Environmental Assessment for the First Release Precincts (Sydney Water 2008).

- Consultation between Sydney Water and relevant Registered Aboriginal Parties should be maintained as appropriate throughout the design and construction of the Project;
- Where possible, Sydney Water should aim to avoid impacting any known Aboriginal heritage objects, sites or places and places that have potential Aboriginal heritage or cultural values, throughout the life of the Project;
- Where impact cannot be avoided, Sydney Water should choose partial impact rather than complete impact wherever possible and ensure that appropriate measures to mitigate impacts are developed and implemented as required and as appropriate during design, construction and operation of the Project;
- If re-location of the pipeline outside the overall Field Assessment Areas is proposed, further assessment of these areas should be undertaken to identify and appropriately manage Aboriginal objects/sites/places that may be in these areas;
- Sydney Water should advise all relevant personnel and contractors involved in the design, construction and operation of the Project of the relevant heritage issues, legislative requirements and recommendations identified in any Aboriginal heritage impact assessments undertaken for the Proposal;
- Sydney Water should maintain ongoing liaison with relevant State agencies throughout the Project to ensure holistic management of Aboriginal heritage objects/sites/places. Most notably, this should include information sharing regarding Aboriginal objects/sites/place locations (including impact buffers/curtilages);
- In the event that previously undiscovered Aboriginal objects, sites or places (or potential Aboriginal objects, sites or places) are discovered during construction, all works in the vicinity of the find should cease and Sydney Water should determine the subsequent course of action in consultation with a heritage professional, relevant Registered Aboriginal Parties and/or the relevant State government agency as appropriate;
- Should suspected Aboriginal skeletal material be identified, all works should cease and the NSW Police and the NSW Coroner's office contacted. Should the burial prove to be archaeological, consultation with a heritage professional, relevant Registered Aboriginal Parties and/or the relevant State government agency, should be undertaken by Sydney Water;

- Sydney Water should ensure that the removal of any Aboriginal object or the disturbance or destruction of any Aboriginal site or place, is undertaken professionally, in consultation with relevant Registered Aboriginal Parties, according to applicable heritage statutory requirements and is documented, as appropriate to the level of significance;
- Regardless of the significance of any Aboriginal object, site or place, Sydney Water should ensure all recovered Aboriginal objects and/or archaeological material is temporarily stored in a suitable lockable container at a secure indoor venue until the completion of the relevant phase of works;
- At the completion of the relevant phase of works, Sydney Water should consult with relevant Registered Aboriginal Parties about the final storage location for the objects/material and if appropriate, develop a care and control agreement for the storage and/or repatriation of all recovered Aboriginal archaeological objects/material; and
- Sydney Water should ensure that any reports or documents for the Project concerning Aboriginal heritage comply with applicable statutory requirements, are prepared in accordance with best practice professional standards and, where appropriate, ensure findings are provided to OEH AHIMS Registrar and the relevant Registered Aboriginal Parties; and
- During construction, all personnel and contractors should be provided with information to ensure appropriate management of known and unknown Aboriginal objects/sites/places. Sites that are to be retained and are in close proximity to the construction activities should be fenced and clearly identified as 'keep clear' or 'no go' zones as works proceed. The specific identification of these sites as having Aboriginal cultural heritage value should remain confidential for their protection.

Specific Recommendations

Specific recommendations have been developed for managing the potential impacts of the Proposal on site 45-5-2526. Recommendations have also been developed to manage the land subject to the Proposal according to its level of land use disturbance (levels of land use disturbance indicate the potential for places to contain unidentified Aboriginal objects, sites and places) when Sydney Water is selecting options for the placement of a particular asset. In order to ensure consistency and best practice management of Aboriginal cultural heritage, the following specific recommendations conform to those made in the existing archaeological assessments for Water Related Infrastructure in the NWGC and SWGC (AHMS, 2009, 2010, 2011 and 2011a) and follow the approved mitigation measures in the Environmental Assessment for the First Release Precincts (Sydney Water 2008).

1. All options to avoid adversely impacting site 45-5-2526, 45-5-2839 and 45-5-2840 should be employed during design and construction of the Proposal.

   Preferably, no works should occur near this site unless they are directly related to, and for the express purpose of its conservation, care and maintenance.

   If works have the potential to impact this site, they should be limited to micro-tunnelling and/or under-boring techniques or similar, that wholly takes place beneath significant soil layers and material and/or avoids material of significance. If that is not possible, mitigation measures in accordance with the General Recommendations and Specific Recommendation (2) below should be implemented.

2. Where avoiding Aboriginal objects, sites or places proves not feasible, appropriate impact mitigation measures should be developed in consultation with a heritage professional and relevant Registered Aboriginal Parties. Mitigation measures should correlate with the extent of the proposed impact and the significance of the Aboriginal objects, sites and places.

   These measures may include:

   a. For surface sites or sites with a surface expression – spatial recording, using a differential GPS or Total Station (with sub-metre accuracy), followed by collection of the Aboriginal objects;
   b. For subsurface sites or sites with a subsurface expression – a program of testing and/or salvage excavations, using current archaeological practices. Archaeological monitoring may also be appropriate in certain circumstances;
   c. Appropriately recording all cultural materials and impacts using photographs, sketches and written description before, during and after the mitigation activities; and
   d. Undertaking an appropriate level of post-excavation analysis and reporting, in accordance with the General Recommendations.

3. Where no archaeological objects, sites or places have been recorded, but the Proposal is likely to impact areas or land identified as having 'moderate disturbance' in **Figures 4** and **22**, the potential for un-identified/un-discovered Aboriginal objects is considered moderate.

   If archaeological sites are identified or discovered in these areas prior to or during works, the General Recommendations and Specific Recommendations (1) and (2) above should be employed, depending on significance.

4. Where no archaeological objects, sites or places have been recorded and in areas identified as of 'high disturbance' in **Figures 4** and **22**, no further Aboriginal archaeological considerations or mitigation options are required. If archaeological sites are identified or discovered within these areas the General Recommendations and Specific Recommendations (1) and (2) above should be employed, depending on significance;

5. An updated AHIMS site card should be prepared for site 45-5-3634 and sent to the OEH outlining the error in spatial recording of the site;

6. Site 45-5-2838 is located to the west of the proposed location of Sewer Main L4-L6 and not in the direct path of impact. Sydney Water should proceed with caution in this area and adhere the General Recommendations made in Section 8.2 and in particular to Specific Recommendation (4);

7. Based on levels of ground disturbance observed and distance from Killarney Chain of Ponds Creek, Sydney Water should consider positioning asset SP1154 either in Area A within the area previously disturbed by vegetation clearance and rubbish dumping (near the fence of the child care facility) or in Area C near the area previously disturbed by earth works associated with dam construction. RAPs identified Area D as their least preferred option for the position of SP1154 because it is the closest to Killarney Chain of Ponds Creek. As no Aboriginal object, site or place has been identified, there are no Aboriginal Heritage constraints regarding the position of SP1154 within Areas A-D. In choosing the position of SP1154 (Areas A-D inclusive) Sydney Water should proceed with caution and adhere to the General Recommendations made in Section 8.2 and in particular to Specific Recommendation (4).

1. INTRODUCTION

This report is an Aboriginal Heritage Impact Assessment (AHIA) of proposed Additional Water Related Infrastructure in the North West Growth Centre – First Release Precincts (hereafter 'the Proposal'). It is the most recent part of a sequence of Aboriginal assessments and reports associated with the North West Growth Centre – First Release Precincts Project (hereafter 'the Project'). The Project was approved in 2008 under Part 3A of the *Environmental Planning and Assessment Act 1979.* The Proposal involves the installation of water related services at certain locations in the suburbs of Riverstone and Vineyard, which are in the Blacktown and Hawkesbury Local Government Areas.

The Proposal was initially investigated in mid-2011 during a preliminary assessment (AHMS, 2011a) undertaken in accordance with the Office of Environment & Heritage's (OEH) codes of practice. The Preliminary Assessment determined that the Proposal had potential to impact to Aboriginal objects and/or sites, and a more detailed assessment was recommended. The Preliminary Assessment is provided in **Appendix 1**. This report presents the findings of further assessment and consultation.

The AHIA was undertaken in accordance with the OEH's (formerly the Department of Environment, Climate Change and Water) *Aboriginal Cultural Heritage Standards and Guidelines Kit* (1997), *Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (2005), *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales* (2010), *Interim Community Consultation Requirements for Applicants* (2004), and *Aboriginal Cultural Heritage Consultation Requirements for Proponents* (2010).

The AHIA includes and builds on work undertaken in 2010 for an Aboriginal Heritage Impact Assessment for proposed Water Related Services for the North West and South West Growth Centres (NWGC and SWGC) (AHMS, 2009, 2010) and work undertaken in 2011 for the *Water Related Services for the North West Growth Centre - Second Release Precincts Aboriginal Heritage Impact Assessment* (AHMS, 2011).

1.1 Assessment Aims

The AHIA was undertaken to assess the potential impacts of design amendments and additional infrastructure identified in the Preliminary Assessment undertaken by AHMS in August 2011 (**Appendix 1**), to recommend ways to manage Aboriginal archaeological resources and mitigate any adverse heritage impacts.

Key tasks of the AHIA were to:

- Undertake Aboriginal consultation to identify Aboriginal objects, sites or places and cultural values;
- Identify the type, nature and extent of Aboriginal objects, sites or places;
- Map the location of the identified known and potential Aboriginal objects, sites or places;
- Assess the archaeological (scientific), public and Aboriginal (social) significance of the identified Aboriginal objects, sites or places;
- Assess and identify the heritage constraints, opportunities and potential impacts of the additional water related infrastructure; and
- Identify and recommend measures to mitigate any adverse heritage impacts and risks to the Project.

1.2 Report Structure

The structure of the report is as follows:

- Section 1.0: Introduction;
- Section 2.0: Description of the assessment areas, the Proposal and the scope of the AHIA including a summary of the previous heritage assessments;
- Section 3.0: Applicable Legislation, which identifies the Commonwealth and State legislation relevant to Aboriginal heritage;
- Section 4.0: Aboriginal Community Consultation, which was undertaken as part of the AHIA;
- Section 5.0: The North West Growth Centre, which includes existing environment information, background information, previous studies, field investigation, identified Aboriginal objects, sites and places, significance assessment and potential impacts;
- Section 6.0: Conclusions and Recommendations.

Appendices to the report include:

- Registered Aboriginal Party (RAP) Consultation Log, documentation provided to RAPs and any comments/feedback received from RAPs during investigation of the Proposal. For previous consultation for the NWGC see the previous AHIA (AHMS, 2010).

1.3 Authorship

This report was written by Lisa Murray, Fenella Atkinson and Laura Matarese (AHMS). GIS mapping and figure production was undertaken by Laura Matarese (AHMS) and Julie Leslie

(Business Latitude). The report content was technically reviewed by Alan Williams (AHMS) and Lisa Newell (AHMS) reviewed the final report. Joanne Craig and Kris Gallen (AHMS) provided assistance with compiling the AHIA.

1.4 Acknowledgements

The assistance provided by Gillian Fowler, Elissa Howie and Diane Black (Sydney Water) throughout the development of the AHIA is greatly appreciated.

The assistance of the various Registered Aboriginal Parties (RAPs) who participated in the field assessment and with other aspects of the AHIA, is also greatly appreciated. Section 4 details RAP involvement with the AHIA.

1.5 Limitations

The AHIA is based on existing and publically available environmental and archaeological information and reports, and results obtained during the 2010/11 field assessments. The findings and conclusions of existing reports were not verified or scrutinised, except where there appeared to be inconsistencies between data, or where the field assessments undertaken for the AHIA indicated that further scrutiny was appropriate.

The AHIA includes some predictions about the probability of subsurface archaeological materials occurring in certain landforms, environmental contexts and landscapes. The predictions were based on surface indications noted during the field assessments and the characteristics of the particular landform, environmental context or landscape. It is acknowledged, however, that sub-surface materials may survive despite surface and environmental indicators that may suggest that they do not. The converse also applies.

The DECCW Aboriginal Heritage Information Management System (AHIMS) information used to inform the AHIA was provided to AHMS by Sydney Water. Information in the AHIA reflects the scope and the accuracy of the AHIMS site data, which in some instances is limited or inconsistent. The AHIA addresses and reports on AHIMS data inaccuracies and inconsistencies where possible.

The dense grass cover over much of the land potentially impacted by the Proposal compromised the effectiveness of the field assessment. Ground visibility was generally low (approximately 7%). Consequently, there has been a heavy reliance throughout the preparation of the AHIA on general landform analysis and regional cultural heritage information.

2. PROJECT DESCRIPTION AND SUMMARY

2.1 The Assessment Area

Sydney Water is planning to provide water related services to the North West Growth Centres (NWGC). The Growth Centre is a key component of Sydney's Metropolitan Plan and is being planned to provide residential and employment land for approximately half a million people over the next three decades. The NWGC is intended to contain about 66,000 new dwellings and 600 hectares of employment land.

This AHIA relates to the construction and operation of additional water related infrastructure (encompassing drinking water and wastewater) for the First Release Precincts of Sydney's North West Growth Centre (the Project). There are six First Release Precincts, namely North Kellyville, Riverstone, Riverstone West, Alex Avenue, Area 20 and Colebee (**Figure 1**).

The Project components include:

- new drinking and recycled water trunk and major reticulation pipelines;
- new wastewater gravity and rising pipelines;
- a new sewage pumping station (SPS);
- upgrade of the existing SPS 564;
- new water pumping stations (WPSs) for drinking and recycled water;
- new surface and elevated reservoirs for drinking water and recycled water;
- upgrade and amplification of the existing Riverstone Wastewater Treatment Plant (WWTP); and
- new recycled water treatment facilities at the existing Quakers Hill Water Recycling Plant (WRP).

Field assessment included approximately 20 - 50 metre wide buffers along the proposed pipeline corridors and the land identified for the site-based assets. Additionally, previously registered Aboriginal objects, sites and places located up to 250m from land potentially impacted by the Project were also identified and noted in background sections of the AHIA. Their inclusion contributes to the understanding of the archaeological context of the overall area of the Project.

This AHIA considers the worst-case scenario for direct impact on Aboriginal heritage by assuming:

- for all proposed site-based assets (e.g. pumping stations), that the entire site would be impacted; and

- for pipeline corridors, that 20 metre-wide corridors may be impacted, depending on location.

2.2 The Proposal

The specific works covered by this AHIA are:

- SP1154 site location options;
- Rising main 3;
- Sewer main L4-L6;
- Edmund Street drinking main;
- Lead-in pipeline from Killarney Chain of Ponds carrier to SP1154 (two options);
- Crown Street drinking main; and
- Riverstone wastewater treatment plant.

SP1154 site options, Rising main 3, Sewer main L4-L6 and the Edmund Street drinking main, (along with a proposed Sydney Street main which is not included in this AHIA), were subject to a preliminary assessment conducted by AHMS in March 2011 (AHMS, 2011a). The assessment identified that that all the proposed works except for those along a revised route in Sydney Street) had potential to impact Aboriginal objects (if present). It was therefore recommended that these works be subject to an AHIA (documented in this report). The design of the proposed work was also amended to ensure that the Sydney Street main avoided impacting nay sites or areas. Therefore, the Sydney Street main is not covered by this AHIA.

The preliminary assessment (March 2011a) also assessed the following proposed works:

- Killarney Chain of Ponds Realignment A;
- Killarney Chain of Ponds Realignment B;
- Killarney Chain of Ponds Realignment C;
- Killarney Chain of Ponds Realignment D;
- Rising Pipeline 4;
- Wastewater Lead-in Main L7; and
- Hamilton Street Main.

It was found that the potential for the proposed works listed above to cause harm to Aboriginal objects was unlikely. Therefore, the proposed works listed above are not included in this AHIA.

Pipelines

The Proposal includes trunk pipelines for drinking water and wastewater. These will generally be installed below ground but will include some surface facilities such as valves, scour chambers, ventilation shafts and access manholes. Installation of the pipelines will involve the excavation of trenches or boring.

Pumping stations

The Proposal includes a pumping station which is to be located on Chapman Road, Riverstone. The footprint of the pumping station will depend on the size of the facility which would include both above and below ground structures such as small buildings, access holes, chambers, control kiosks and booster stations.

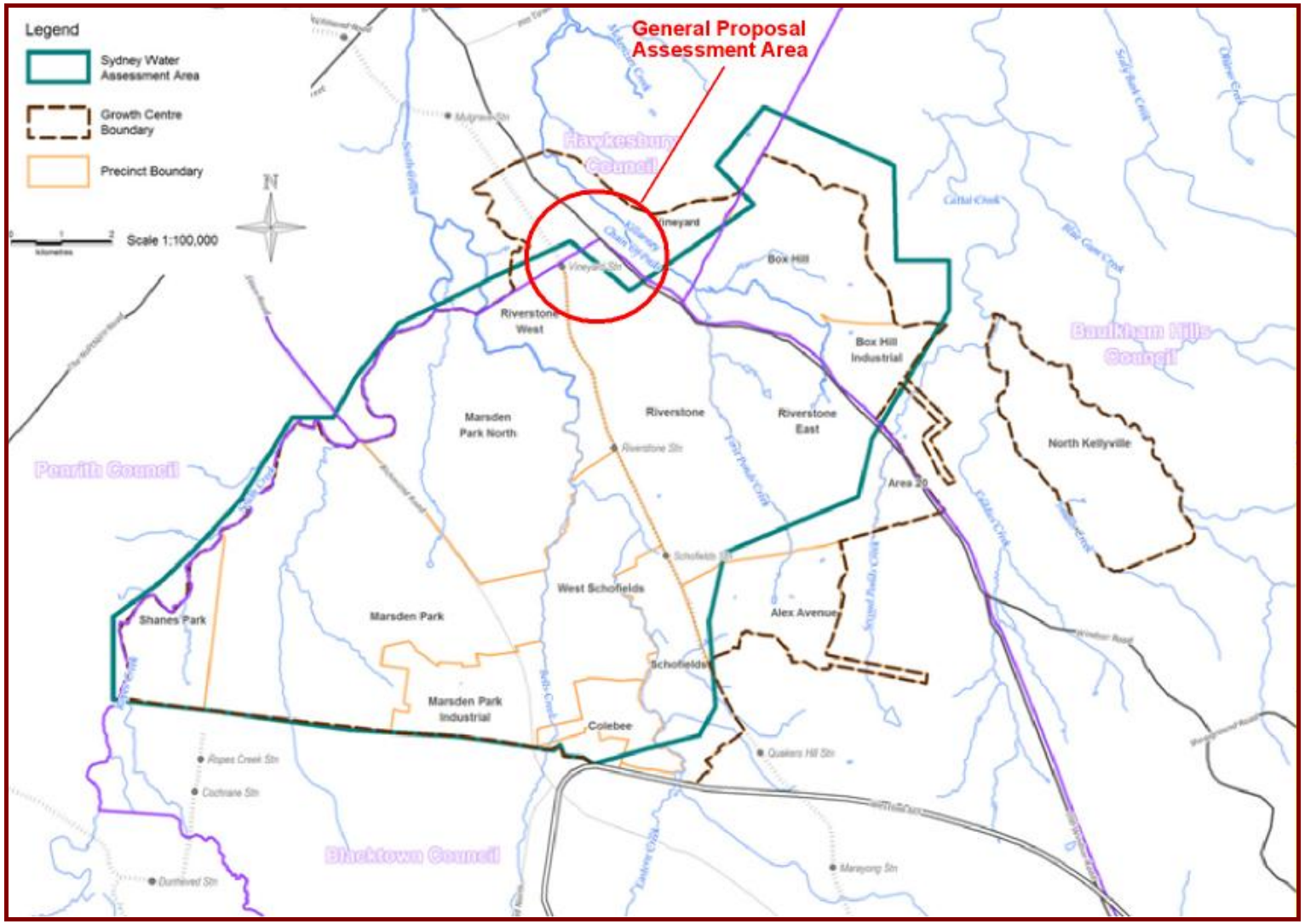

Figure 1. NWGC, Precincts and the Proposal area

2.3 The AHIA

2.3.1 Assessment Approach

The AHIA has been developed using extensive material from the last three years of assessment and investigation undertaken by AHMS on behalf of Sydney Water (AHMS, 2009, 2010, 2011, 2011a). During this earlier work, extensive desktop assessment, predictive modelling and field assessment was undertaken of the NWGC, and this previous work encompassed the land subject to the current Proposal. This data has been incorporated into the AHIA to further understand the Aboriginal heritage issues associated with the project and the Proposal.

While much of the data presented here has been re-used from earlier studies, the aims and approaches of the AHIA remain the same. They are to:

- provide broad, landscape-based Aboriginal heritage 'sensitivity' information about the land in the NWGC and potentially impacted by the Project from background information and archaeological predictive models;
- identify Aboriginal objects, sites and places potentially impacted by the Project, both those in the AHIMS Register and those identified during field assessment;
- assess the Aboriginal heritage significance of any Aboriginal objects, sites or places that may be impacted by the Project;
- complete an impact assessment of the Project in consultation with Registered Aboriginal Parties;
- provide specific impact mitigation recommendations for the Project;
- provide general information and impact mitigation recommendations for land that may not be potentially impacted by the Project where relevant; and
- use the field assessment findings to inform the effectiveness of the predictive models and update the models where relevant.

2.3.2 Desktop Assessment Methodology

Prior to commencing the 2010 AHIA, AHMS was engaged by Sydney Water to undertake an Aboriginal heritage desktop assessment and to prepare Aboriginal heritage probability maps. The aim of the desktop assessment was to identify areas of very high, high, moderate, low and very low Aboriginal archaeological probability.

The desktop assessment included a review of archaeological literature relevant to the assessment areas to identify general Aboriginal archaeological spatial and locational patterns (i.e. places where Aboriginal objects and sites had previously been recorded). Using a Geographic Information System (GIS) map framework, the archaeological patterns

were then superimposed onto a series of maps of environmental variables (including hydrology, elevation, landform, soils and vegetation) to create archaeological predictive models ('AHMS 2009 model', AHMS 2009).

The model was revised in 2010, based on an updated desktop review and the most recent GIS-based archaeological information, to produce the 'AHMS 2010 model' (AHMS, 2010). **Figure 2** presents the AHMS 2010 model for the NW Desktop Assessment Area.

The review of the AHMS 2009 NWGC model demonstrated that the model could also be used to predict the likely occurrence of significant sites in a given location. This is probably the result of more complex sites (that are generally more significant) occurring adjacent to larger water sources, which were a key focus of the model.

Review and testing also found that the model was on average 69.5% effective at predicting the likely location of Aboriginal objects, sites and places and 75% effective at predicting the likely location of archaeological sites of high and very high significance. The reason it was only 69.5% effective at predicting the likely location of Aboriginal objects, sites and places was because the model over-represented those areas that would have a high and very high probability of retaining Aboriginal objects, sites and places. This was most likely because detailed land use disturbance maps were not available for much of the assessment area and many areas that appeared by their tree cover to be undisturbed, may actually have been be subject to re-growth.

Using the AHMS 2010 model, and in consultation with Registered Aboriginal Parties, locations and landscapes that are likely to have Aboriginal objects, sites and/or places have been identified. This includes locations and landscapes both within and outside land likely to be impacted by the Proposal. Management strategies and mitigation measures have been identified to assist in minimising impacts in areas with Aboriginal archaeological potential.

2.3.3 Field Assessment Methodology

In addition to a desktop assessment, detailed field assessment was undertaken on land potentially impacted by the Proposal in consultation with the relevant Registered Aboriginal Parties (RAPs).

The aim of the field assessment was to identify and map Aboriginal objects, sites and places within the proposed works locations. A secondary aim of the field assessment was to identify landscape integrity and land-use disturbance to both inform and test the AHMS 2010 model (**Section 2.3.1**) – an aim of all assessments undertaken since 2010. Assessment would also provide information that would assist to identify management strategies for areas of high, moderate and low land-use disturbance.

The field assessment covered all proposed pipeline alignments and all SP1154 site options that were identified during the Preliminary Assessment (**Appendix 1**) as having potential to impact upon Aboriginal heritage. These areas are shown in **Figure 3**.

The field assessment investigated corridors along the proposed pipeline alignments to allow for accommodation of any Aboriginal heritage objects, sites or places during the design process. Specifically, the field assessment covered:

- 25 m either side of any RTA road edge where pipe locations were proposed;
- 10 m either side of any non-RTA road edge where the pipe locations were proposed;
- 25 m either side of all other pipe locations, including along waterways;
- Land within the proposed pumping station site boundaries.

As noted above (**Section 2.1**), the construction of Proposal components would require an actual disturbance area considerably less than the corridors surveyed.

Aboriginal consultation, participation and the findings of the field assessment have been documented in detail in this report along with appropriate management strategies for those Aboriginal objects, sites and places.

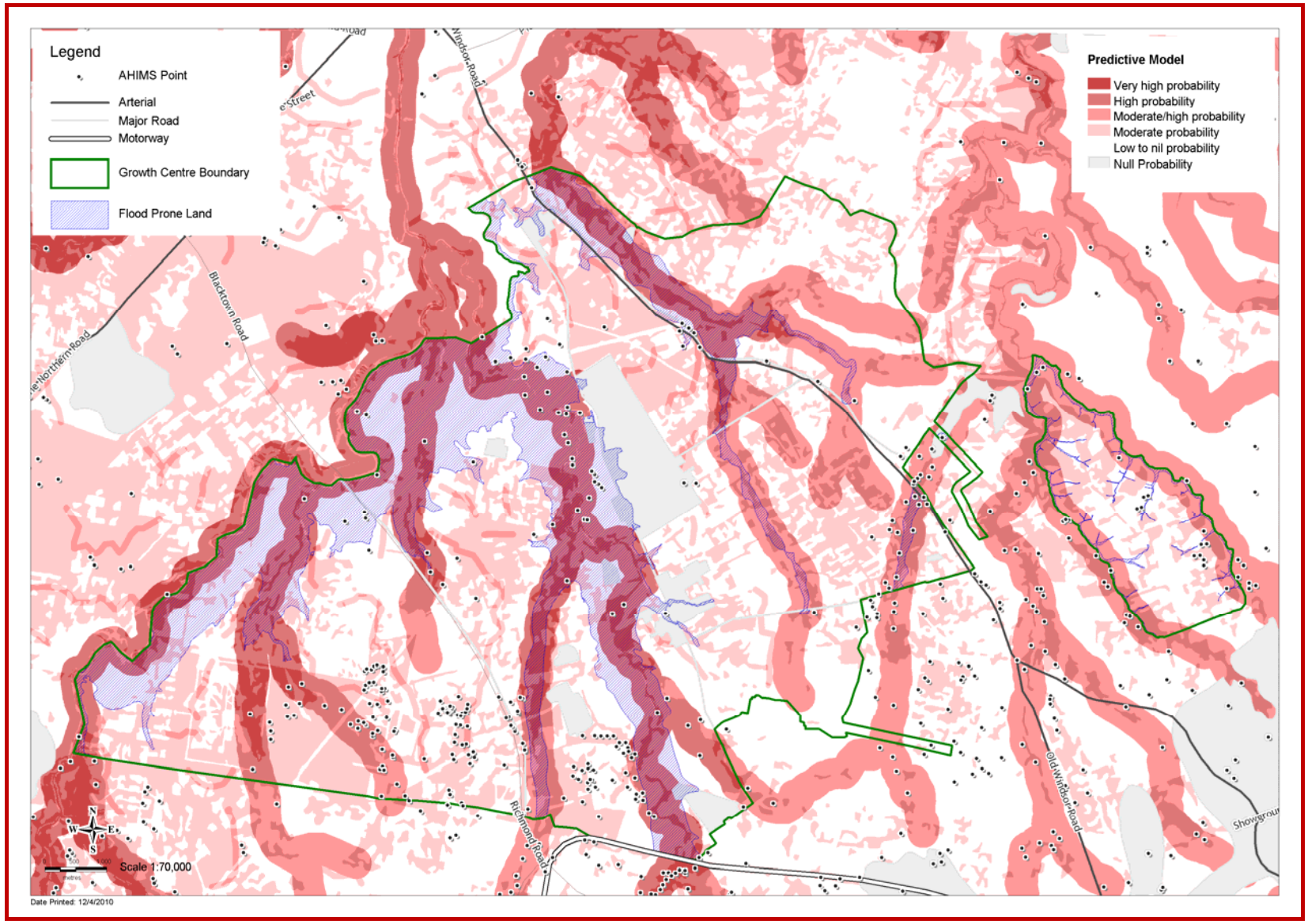

Figure 2. AHMS 2010 model for the NWGC (source: AHMS, 2010). (AHIMS data provided by DECCW, Licence Agreement No. 116, 22 June 2010).

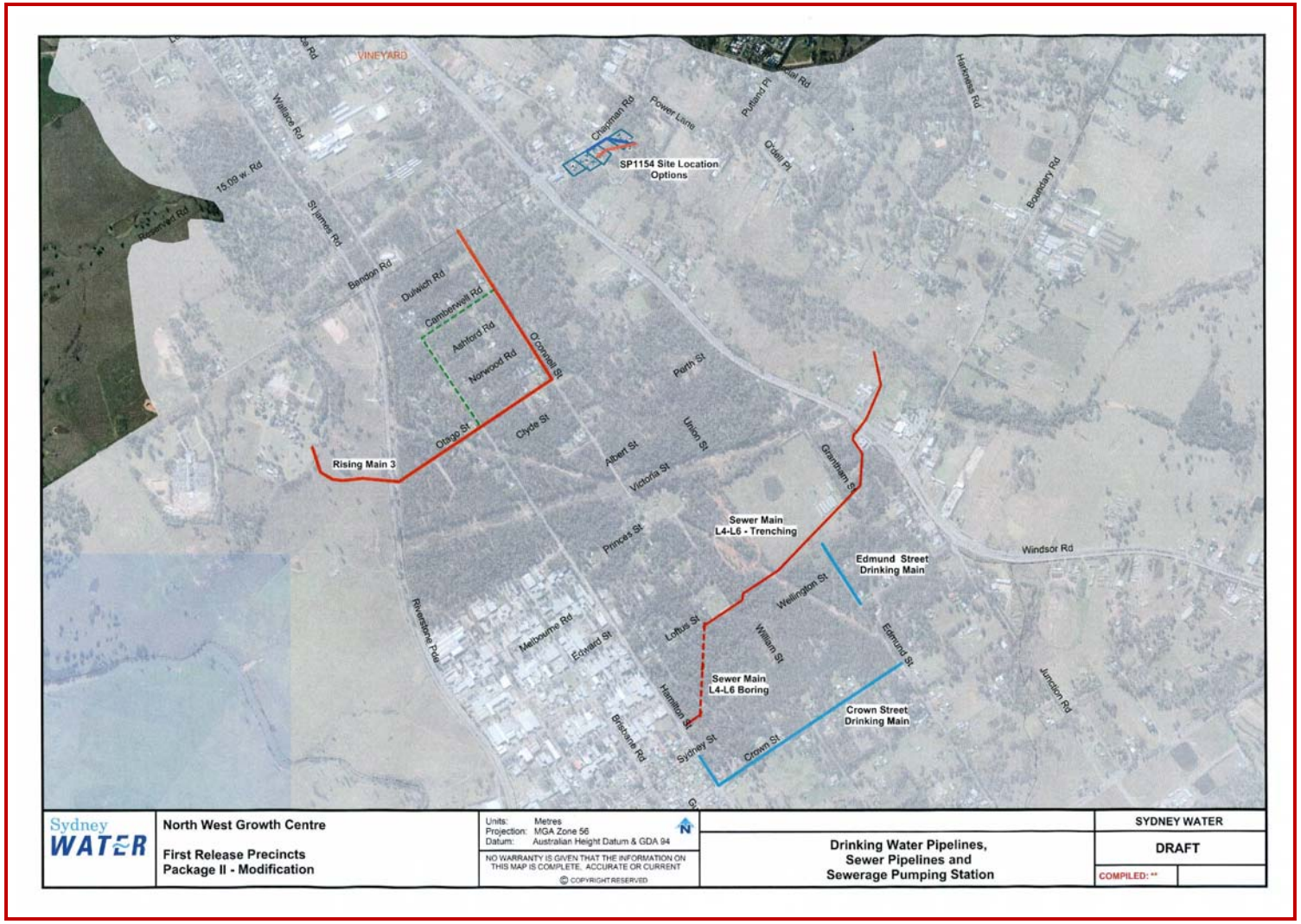

Figure 3. The proposed Water Related Services for NWGC First Release Precincts.

3. APPLICABLE LEGISLATION

3.1 Commonwealth Legislation

3.1.1 Environment Protection & Biodiversity Conservation Act (1999) (EPBC)

The Environment Protection & Biodiversity Conservation Act (1999) (Commonwealth) provides for the protection of natural and cultural heritage places. The Act establishes (amongst other things) a Commonwealth Heritage List (CHL) and a National Heritage List (NHL). Places on the NHL are of natural or cultural significance at a national level and can be in public or private ownership. The CHL is limited to places owned or occupied by the Commonwealth which are of heritage significance for certain specified reasons.

The EPBC Act also applies to Commonwealth Land that is not included on either the NHL or CHL.

The Proposal does not impact on any site or place included on the NHL or CHL for its Aboriginal cultural heritage values.

3.1.2 Aboriginal and Torres Strait Islander Heritage Protection Act (1984)

The *Aboriginal and Torres Strait Islander Heritage Protection Act (1984)* preserves and protects areas (particularly sacred sites) and objects of particular significance to Aboriginal Australians from damage or desecration. Steps necessary for the protection of a threatened place are outlined in a gazetted *Ministerial Declaration* (*Sections 9* and *10*).

As well as providing protection to areas, the Act can also protect objects through a Declaration, which can also apply to Aboriginal skeletal remains (*Section 12*). While a Commonwealth Act, it can be applied at a State level if the State is unwilling or unable to provide protection for sites or objects.

The Proposal does not impact on any site or place currently subject to a Declaration.

3.1.3 Native Title Act (1993)

The *Native Title Act 1993* was enacted as a result of the decision made by the High Court of Australia in *Mabo v Queensland* (No.2) 1992. It gives recognition through Australian law that some Aboriginal rights and interest come from traditional law and customs. Such recognition can exist concurrently with non-Aboriginal rights and interests.

The Act is managed by the Native Title Tribunal who determines claims and determinations made by the Federal Court of Australia. Generally, a claim can only be made on Crown Land and/or when land is re-zoned.

While there have been several claims made in the LGAs none have been successful. Currently, two Native Title Claims for the region are active, specifically the Darug Tribal Aboriginal Corporation (ref: NC 97/8) and the Gundungurra Tribal Council Aboriginal Corporation #6 (ref: 97/7). Neither has been approved or finalised.

3.2 NSW Legislation

3.2.1 Environmental Planning & Assessment Act, 1979 (NSW) (EP&A Act)

The *EP&A Act* establishes the statutory framework for plan making and planning approvals in NSW. The assessment and determination of the Proposal is to occur pursuant to Part 3A of the Act, which was established to provide a streamlined development assessment and approval process for major and critical developments for the State.

Part 3A provides for *Concept Approvals* and *Project Approvals*. Some aspects of otherwise applicable heritage statute are suspended in Project Approvals contexts. This means that separate approvals, normally required under certain pieces of NSW heritage legislation (including the *National Parks & wildlife Act 1974* and *Heritage Act 1977*), are not required in addition to a Part 3A *Project Approval*.

Aboriginal community consultation is still required under the Part 3A process as outlined in *Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (DECC, 2005). The guidelines refer to the *Interim Community Consultation Requirements for Applicants* (DECC, 2004), which have now been superseded by the *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010).

3.2.2 National Parks & Wildlife Act, 1974 (NPW Act)

Unless otherwise suspended or constrained (such as in Part 3A Approval contexts), the NPW Act 1974 provides blanket protection for Aboriginal objects (material evidence of Indigenous occupation) and Aboriginal places (areas of cultural significance to the Aboriginal community). While the application of Part 3A of the EP&A Act has suspended the heritage permit provisions of the NPW Act for the Proposal, the following key NPW Act permit and processes is provided in the event that -

- Aboriginal objects or sites are located and require investigation. Should this occur a similar process of archaeological investigation/ salvage/ analysis, as

prescribed by the NPW Act, can be outlined in the Statement of Commitments for the Proposal

Of particular relevance are the following sections of the NPW Act:

- Section 84 makes provision for protection of 'Aboriginal Places' or locations declared in the NSW Government Gazette which in the opinion of the Minister are or were of special significance to Aboriginal culture;
- Section 86 and 87 state that it is an offence to collect or disturb objects, excavate, or in any way disturb land for the purpose of discovering objects without a permit authorised by the Director-General DECCW;
- Section 89 permits the Director-General DECCW to give ownership of certain Aboriginal objects to individuals/organisations/etc. Such ownership is currently permitted through the development and endorsement of a 'Care and Control Agreement';
- Section 90 states that it is an offence to destroy, deface, damage or desecrate, or cause or permit the destruction, defacement, damage or desecration of, an Aboriginal object or Aboriginal place without a permit authorised by the Director-General DECCW; and
- Section 91 states that anyone who discovers an Aboriginal object is obliged to report the discovery to the DECCW.

In practical terms, the provisions of the Act require archaeological assessment of any land where there is potential for Aboriginal objects to be disturbed by development. The *Code of Practice for Archaeological Investigation of Aboriginal Objects in New South Wales (*DECCW, 2010*)* defines the format of Aboriginal archaeological assessments. These guidelines require full consultation with Aboriginal communities and relevant representative bodies such as Local Aboriginal Land Councils (LALC) and Traditional Owner's groups. Aboriginal community participation in all archaeological survey and excavation work and consideration of the Aboriginal cultural significance of sites and places is also required.

The DECCW 2010 guidelines require a series of formal Aboriginal community consultation and notification procedures for assessments and sites that require permits under the NPW Act 1974.

ABORIGINAL CONSULTATION

As outlined in **Section 1,** the previous AHIA was commenced in 2010 in accordance with relevant guidelines. The AHIA for the Proposal forms a sub-set of the original scope of water related services for NWGC and SWGC. Consultation and involvement of the RAPs who expressed interest in 2010 has been ongoing since the release of the AHMS 2011 assessment through a range of further project components, approvals, and other issues. For this AHIA, consultation continued in this form to ensure that interests and concerns of the RAPs continue to be considered. This section summarises all consultation that was undertaken for both the previous AHIA (AHMS, 2011) and this report.

Communications to, and responses from, Aboriginal parties directly related to the Proposal are provided in **Appendices 2- 4**. Consultation documentation for the previous AHIA (AHMS, 2011) is available in that report and has not been reproduced in this document.

3.3 Background

At the commencement of the previous AHIA (AHMS, 2011), Aboriginal consultation was initiated in accordance with the draft *Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (DECCW, 2005), which, in turn, refer to the *Interim Community Consultation Requirements for Applicants* (DECCW, 2004).

In April 2010, DECCW released new consultation requirements entitled *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, 2010). The AHIA subsequently adopted these requirements and undertook a transition from the DECCW 2004 guidelines in accordance with Fact Sheets 1-5 and a series of specified transitional arrangements.

The DECCW 2010 Requirements include the following tasks:

1. Pre-notification – identification of the relevant Aboriginal parties through contacting various State government agencies;
2. Notification – contacting identified Aboriginal parties to seek interest and advertising in the local media;
3. Presentation of Proposal – advising the registered Aboriginal parties (RAP) of the Proposal;
4. Methodology – providing the RAPs with the proposed field methodology and information on obtaining cultural knowledge;
5. Impacts and Mitigation Options – discussion of potential impacts to heritage and appropriate mitigation options prior to developing the report; and

6. Report review – review of the final report.

Requirements (1) and (2) were completed according to the DECCW 2004 guidelines.

The NSW Growth Centres protocols for assessing Aboriginal heritage *Appendix A: Protocol for Aboriginal Stakeholder Involvement in the Assessment of Aboriginal Heritage in the Sydney Growth Centres (NSW Growth Centres Commission, 2006*) were not employed in the development of the AHIA. Those protocols were developed for the Growth Centres Commission (now the NSW Department of Planning) and their application is limited to strategic land use planning projects undertaken as part of specific Growth Centre Precinct Planning processes.

3.4 Pre-/Notification Process

The notification process for the previous AHIA (AHMS, 2011) was undertaken in accordance with the DECCW 2004 guidelines. Specifically, the notification process included the following:

- Between 9 and 15 February 2010, requests for RAP information were sent to the Native Title Tribunal; Office of Registrar; DECCW; Deerubbin Local Aboriginal Land Council (LALC); Gandangara LALC; Tharawal LALC; Baulkham Hills Shire Council; Blacktown City Council; Camden Council; Campbelltown City Council; Fairfield Council; Hawkesbury City Council; Liverpool City Council; and Penrith City Council;

- On 10 February 2010, the following organisations known to be involved in cultural heritage were contacted (via phone, letter and/or e-mail): Cubbitch Barta Native Title Claimants (CBNTC); Darug Aboriginal Cultural Heritage Assessments (DACHA); Darug Tribal Aboriginal Corporation (DTAC); Darug Custodian Aboriginal Corporation (DCAC); Tocomwall; Deerubbin LALC, Gandangara LALC and Tharawal LALC. Two further groups were identified early in this process and were contacted: Darug Land Observations (DLO) and Tharawal Aboriginal Medical Services (also known as TAC Tharawal Aboriginal Co-op);

- Between 16 and 24 February 2010 advertising in the following newspapers was undertaken: *Blacktown Sun; Hills Shire Times; MacArthur Chronicle; Penrith Press; Blacktown Advocate; Camden Advertiser; Campbelltown McArthur Advertiser; Fairfield Advance; Fairfield Champion; Liverpool Champion; Liverpool Leader; Rouse Hill Times; South Western Rural Advertiser; National Indigenous Times; Penrith City Star*; and *Koori Mail* .

Following the pre-notification/notification process outlined above, further organisations were identified or responded to the newspaper advertisement, and ultimately a letter

seeking their interest in the Proposal was distributed to the following individuals/organisations:

- Deerubbin LALC;
- DACHA;
- CBNTC;
- Gandangara LALC;
- Tharawal LALC;
- Tocomwall;
- Konanggo Aboriginal Cultural Heritage Services;
- Northern Illawarra Aboriginal Corporation (NIAC);
- DCAC;
- DTAC;
- Peter Falk Consulting;
- Virginia Falk Consulting;
- DLO;
- D'harawal Traditional Knowledge-holders and Descendants Circle and Native Title Group (DTKDCNTG);
- Ngunawal Heritage Aboriginal Corporation; and
- Tharawal Aboriginal Medical Service (also known as TAC; Tharawal Aboriginal Co-operative)

Between 10 February and 13 March 2010, all of these individuals/organisations registered an interest in the Proposal. In addition, the Korewal Eloura Jerrunguruh Tribal Elders Aboriginal Corporation (who registered in June 2010 for information only) and Botany Bay La Perouse Aboriginal Corporation (who were part of NIAC until May 2010), subsequently identified their interest (see AHMS, 2011).

3.5 Presentation of Information

On 20 April 2010, in accordance with Section 4.2 and 4.3 of the DECCW 2010 Requirements, a cover letter, detailed Proposal background and proposed methodology for the previous AHIA were distributed to RAPs (AHMS, 2011).

The cover letter and report provided information about the overall NWGC and SWGC Water Related Services, the proponent, assessment approaches and processes, the (then) timeframes and the proposed Field Assessment. In addition, the letter sought information from the RAPs about how they wished to be consulted, how they wished cultural information to be managed and other relevant matters. No meetings were undertaken during this process, although all RAPs were advised that meetings could be arranged if required. A period of 28 days was provided for comments in accordance with the DECCW 2010 requirements. Generally, responses endorsed the proposed AHIA

methodology or identified minor points of concern that were integrated into the field assessment where possible (see AHMS, 2011).

In accordance with Section 4.1.6 of the DECCW 2010 Requirements, information about the RAPs, the information provided to them and copies of the newspaper advertisements seeking interested parties was sent to DECCW on 30 May 2010 (AHMS, 2011).

Information regarding the Proposal and a proposed assessment methodology was provided to the RAPs on 15 November 2011. This included information about modifications or additions to the Project and advice that an AHIA for this additional infrastructure (the Proposal) for only the NWGC First Release Precincts (the Project) would be undertaken (**Appendix 3**). A period of 28 days was provided for comments in accordance with the OEH 2010 requirements. All responses received have been included in **Appendix 4**. Generally, responses endorsed the proposed AHIA methodology or identified minor points of concern that were integrated into the field assessment where possible.

3.6 Field Assessment Participation

In addition to the information provided, as outlined in **Section 4.3**, all RAPs who had registered prior to field assessment commencing, were afforded the opportunity to participate in the 2010 Field Assessments and also in the field assessment for this AHIA. Documentation and discussion surrounding the involvement of the RAPs has been included in the previous AHIA (AHMS, 2011) and in **Appendices 2 - 4**.

Field assessment for the previous AHIA was undertaken for a period of 30 working days between 25 May 2010 and 21 July 2010 and for three days between 24 – 27 January 2011. On average, four RAPs attended field assessment at any time.

Field assessment for this AHIA was undertaken on Thursday 1 December 2011. A total of six RAPs attended the field assessment. An additional component of field survey was undertaken on Thursday 14 December, because access to all areas was not possible on 1 December.

Table 1 presents a summary of the RAPs present during the field assessments for the Proposal. Some RAPs chose not to participate in the field assessments or were ineligible to do so due to safety and insurance requirements. However, all RAPs have been consulted during the preparation of the AHIA. Information regarding RAPs who attended previous field assessments can be found in the relevant report (AHMS, 2011).

Table 1. RAP field assessment involvement for the Proposal

Registered Aboriginal Party (RAP)	Personnel
DACHA	Gordon Morton
Tocomwall/Yarrawalk	Danny Franks

Registered Aboriginal Party (RAP)	Personnel
DCAC	Leanne Watson Rhiannon Wright Libby Coplin
DTAC	John Reilly
DLO	Gordon Workman Gary Marshall
Ngunawal Heritage Aboriginal Corporation	Dean Delponte

3.7 Impacts and Mitigation Options

Section 4.3.6 of the DECCW 2010 Requirements specifies that RAPs must be involved with the development of impact mitigation management options identified in an AHIA.

A preliminary version of the summary and recommendations of the NWGC Second Release Precincts AHIA, was distributed to each of the RAPs on 9 September 2010 for consideration and comment (AHMS, 2011). A period of two weeks was provided for RAPs to provide written comment. In addition, phone calls seeking perspectives and views on the recommendations and seeking any changes required were also made. Written responses received from the RAPs are included in this report (AHMS, 2011).

While this AHIA is specific to the Proposal, its impact mitigation recommendations and options are the same as those developed for the NWGC Second Release Precincts AHIA (AHMS, 2011).

3.8 Report Review

This draft AHIA for the Proposal was provided to all RAPs for a period of 28 days between 17 January 2012 and 15 February 2012. All comments received were supportive of the report and its findings. It was requested that RAPs continue to be consulted about, and involved in, the project. All comments received from the RAPs are provided in **Appendix 4**.

4. EXISTING ENVIRONMENT

4.1 General

- The NW Desktop Assessment Area is located within the Cumberland Plain bioregion;
- The landscape of the western Cumberland Plain is generally gently undulating to low hilly landscapes with dissected plateaus in the south. The average altitude for the Cumberland Plain is less than 100 m ASL (Morgan and Terry 2002:22);
- The NW Desktop Assessment Area is largely within the lower South Creek catchment (which includes First and Second Ponds Creeks) all of which are higher order streams which flow from south to north and variously join each other to enter the Hawkesbury River just north of the Assessment Area.
- The characteristics of the overall creek system in the north west reflect its lower catchment location – water courses are relatively broad and meander through gently undulating terraces in a floodplain landscape. Flood prone areas are broad and subject to very high water volumes from upstream accumulation and back-flooding from the Hawkesbury (and other sources) during peak flood events. The flatter landforms further encourage secondary flooding events which result from the backwash of water from higher order streams back up the river systems to create broad flooding events (Connell Wagner (A. Clausen). 2002 9: 112-115).
- The dominant geology is the Triassic Wianamatta shales which form the undulating to low hilly landscapes that characterize the subregion. There are minor proportions of Triassic sandstones, Cainozoic sedimentary deposits and Quaternary alluvials (Morgan and Terry 2002:10);
- The soil profiles can be broadly described as red acidic texture contrast and acidic yellow mottled duplex. The Assessment Area is characterised by two soil landscapes: fluvial and residual. The soil landscape data available for the Assessment Areas further supports the results indicated by the hydrology, i.e. that the NW Desktop Assessment Area contains considerable areas of 'flood prone' or fluvial land. Such soil landscapes indicate that the complexity of the archaeological resource distribution is likely to be high in the NW Desktop Assessment Area, since flooding, erosion and re-working of sediments is likely to have occurred.
- Currently there are about 53 known potential sources of stone raw materials (for stone tool manufacture) identified within the broader Sydney region[1]. A review of

[1] *The Sydney Region referred to here is bounded by the Hawkesbury Plateau in the North, Woronora Plateau in the South and the Blue Mountains in the West. These sources have been*

their locations with reference to the NW Desktop Assessment Area (with the divider between north and south as the M4 Motorway) clearly shows the majority (71.7%, n=38) of these stone deposits are located in the northwest and north of the Sydney region;

- Clearing of native vegetation in the Cumberland Plain region has been extensive since European settlement. It has been estimated that only 13% of native vegetation remains intact with another 12% remaining as scattered trees with some native vegetation understorey (NSW NPWS 2000). Where vegetation does remain it is likely to be broad-leaved ironbark (*Eucalyptus fibrosa*), narrow-leaved apple (*Angophora bakeri*) and scribbly gum (*E. Sclerophylla*) (Murphy 1973). Along creek edges and other swampy areas, broad-leaved apple (*Angophora subvelutina*), cabbage gum (*Eucalyptus amplifolia*), swamp oak (*Casuarina glauca*) with still-water species such as tall spike rush (*Eliocharis sphacelata, Juncus usitatus* and *Polygonum spp.*) may also be found; and
- Historically, the NW Desktop Assessment Area has been dominated by market gardens and pastoral activities, although more recently extensive urban development has occurred.

4.2 Desktop Assessment

A summary of the regional and local archaeological context of the NW Desktop Assessment Area is provided below. A detailed analysis of the following information may be found in reports previously prepared for water related infrastructure for the NWGC and SWGC (AHMS, 2009, 2010, 2011).

4.2.1 Archaeological Context

A number of observations can be made regarding Aboriginal archaeological site patterning in the north western Cumberland Plain from archaeological studies undertaken in the Riverstone, Kellyville, Rouse Hill, Vineyard, Horsley Park and Stanhope Gardens areas and the investigation of sites along Caddies, Second Ponds, Smalls, Eastern and Cattai Creeks. The studies indicate that:

- Archaeological investigation of the NW Desktop Assessment Area has been extensive and includes site surveys, excavations and salvage works. From these studies, numerous archaeological models have been developed as pioneered by Dr. Jim Kohen and Dr. Jo McDonald;
- A trend in the site patterning of the area indicates that regardless of landform type, stream order is of primary importance in determining the scale and

identified by Corkill (1999) and through additional discussion with Tessa Corkill, John Byrne (pers com. F. Barry 2008) and Leanne Watson (pers com F. Barry 2008).

complexity of the sites. Sites with higher artefact densities occur near high order (larger) drainage lines, while low densities occur near low order (smaller) drainage lines. The scale and assemblages that result from excavations in the vicinity of higher order drainage lines have been interpreted as representing sites of more frequent and complex occupation. The stone assemblages in these areas have shown evidence of a variety of activities and tools and repeated occupation, whereas sites near low order drainage have shown evidence of more transient and casual occupation. The frequency and complexity of occupation near high order drainage lines has been attributed to the greater number of available resources in these areas. Excavations have also shown that the scale and complexity in stone assemblages decreases away from a water source;

- High densities of artefacts have been principally found on lower slopes, alluvial floodplains next to high order streams and on middle to upper ridges. Some of these high density sites show evidence of knapping activities. However, low density artefact scatters have been found on the surface of all landforms including creek banks, creek terraces, flats, lower and upper slopes, elevated spurs, crests and ridge tops. These results are indicative of a 'background scatter' of occupation occurring across the Cumberland Plain, with sporadic areas of extensive or repeat usage;
- Assemblages have shown how people used and carried the material around the landscape from a series of known raw material sources (most notably silcrete, quartzite, tuff and indurated mudstone). Several completed excavations indicate that the use of raw materials from a known quarry (such as the outcroppings of silcrete at Plumpton Ridge and Riverstone) was preferred over local river/creek gravels. Analysis also suggests that the relatively small size[2] of the stone artefact assemblages indicates increased curation and the movement of raw material significant distances from the known quarry sites, a number of quarries have been identified in the area (AHMS, 2009). Assemblages in the vicinity of raw material sources have been interpreted as showing evidence of the durability and usefulness of the raw material being tested prior to leaving the vicinity of these resources;
- Analysis indicates that local availability of raw materials is also a key factor in Aboriginal occupation site occurrence and distribution. Raw materials, especially stone, were key for survival (in the form of tools) and trade. Therefore, sites are commonly found near raw material sources;
- The dominant raw material used in the north western Cumberland Plain is silcrete. Local variation in the use of raw material types can be found in the area, for example an excavation in Riverstone found indurated mudstone was the preferred stone type in the north of the Assessment Area and silcrete to the

[2] The term 'relatively small' in this statement indicates the overall size of artefacts. Generally, the size of an artefact will be larger the closer it is to a quarry or extraction site, as it moves away from these areas and continues to get used, modified, sharpened, it reduces in size.

south. Other material types include basalt, chert, quartz and quartzite tuff, volcanic rock and petrified wood;

- Following the trend of the archaeology of the Sydney Basin, the majority of sites in the north west Cumberland Plain have been typologically dated to the late Holocene (4,000 to 1,000 BP). The area has the potential for evidence of Pleistocene occupation, with excavations at Second Ponds Creek revealing intact Pleistocene deposits, although no artefactual material was recovered.

4.2.2 AHIMS Data

NW Desktop Assessment Area

The AHIMS database, which is maintained by the Office of Environment and Heritage (OEH), was consulted to identify the known and registered Aboriginal sites. A total of 179 sites were recorded in the NW Desktop Assessment Area (see AHMS, 2009 for more information).

The AHIMS database revealed that the majority of the recorded sites in the NW Desktop Assessment Area were artefacts (77.65%), either isolated finds or open camp sites. The second most recorded site type is a Potential Archaeological Deposit (PAD) (15.64%). Other site types recorded in minimal quantities in the NW Desktop Assessment Area include an Aboriginal Ceremony and Dreaming Site, artefact(s) associated with a modified (scarred or carved) tree, grinding grooves (<1%) and modified (scarred or carved) trees (<1%). One recorded Aboriginal Ceremony and Dreaming Site is recorded (the Blacktown Native Institute AHIMS #45-5-0398, see AHMS, 2009).

Several other site types have been recorded in the area and all site types and quantities are listed in **Table 2** below.

Table 2. AHIMS Data for NW Desktop Assessment Area[3]

Site Type	Count (n)	Proportion (%)
Artefact(s)	139	77.65
PAD	28	15.64
Modified Tree (Scarred or Carved)	2	1.12
Aboriginal Resource and Gathering	1	0.56
Artefact(s) and Modified Tree (Scarred or Carved)	1	0.56
Aboriginal Ceremony and Dreaming	1	0.56
Artefact and Stone Quarry	7	3.91
Total	**179**	**100**

[3] *AHIMS data provided by DECCW. Licence Agreement No. 116, 22 June 2010.*

The Proposal

A more specific search of the AHIMS database was completed on the 14 November 2011 for the Proposal, as shown in Figure 5. A search area of 5 x 5 kilometres was centred on the Assessment Area. The results of this search indicated that there are five registered sites within the Assessment Area. These sites include one PAD, three artefact scatters, and one isolated find. The five registered sites that have been identified as being within or close proximity to the current Assessment Area are summarised below:

- #45-5-0582: Artefact scatter. This consists of at least three artefacts. The site is likely to be a duplicate recording, or a partial recording, of an open campsite recorded as AHIMS #45-5-0313.

  The recorded location of #45-5-0582 is not within the Field Assessment Area. However, this site is one of several recorded surface artefacts in close proximity to each other, which may together form one large site, possibly including a silcrete quarry. These sites are in the vicinity of the proposed rising main 3.

- #45-5-2526: Potential archaeological deposit (PAD) and artefact scatter. The site extends along an alluvial creek terrace, adjacent flat plain and low hillslope areas, and is thought to be a silcrete quarry. There is a concentration of artefacts that appears to be associated with the banks of a tributary of Killarney Chain of Ponds. The site is thought to be at least 350 x 100 m in extent, and to extend at least 50 m to the east of Loftus Street.

  #45-5-2526 is a large site, the exact boundaries of which are presently undefined. The proposed sewer main L4-L6 and the Edmund Street drinking main cross this area.

- #45-5-2838: Artefact scatter. This consists of four artefacts and is described by Therin (2002) as being situated on the edge of Woodland Street eighty metres west of the junction with Windsor Road. Comparison between the AHIMS site card description, the description of the site in Therin's (2002) report and the mapped location of this site (**Figure 5**) indicate that the recorded location of this site is accurate. Analysis of the proposed location of sewer main L4-L6 and the mapped location of the site shows that site 45-5-2838 is located to the west of the proposed infrastructure and not directly in its path.

- #45-5-2839: Artefact scatter. This consists of three artefacts, eroding out of a driveway fill deposit on the northern side of Windsor Road recorded by Therin (2002). Analysis of the proposed location of sewer main L4-L6 suggests that 45-5-2839 is located close to the south east of the proposed point where the sewer main L4-L6 crosses Windsor Road. It is probable that the site was removed during an upgrade of Windsor Road. Consent to Destroy under Section 90 of the *National Parks and Wildlife Act* (1974) was listed as a recommendation on the site cards for these sites and on 05/03/2004 a Section 90 Consent to Destroy (partial) AHIP

#1844 was issued4. The AHIMS database has not been updated with the outcome of this AHIP and a report outlining the results of the AHIP has not been catalogued with AHIMS. It is therefore unclear whether these sites remain, although this is unlikely.

- #45-5-2840: Isolated artefact. This consists of a single artefact, located on the northern side of Windsor Road within road gravel recorded by Therin (2002). Analysis of the proposed location of sewer main L4-L6 suggests that 45-5-2840 is located close to the north east of the point where the sewer main L4-L6 crosses Windsor Road. It is probable that the site was removed during an upgrade of Windsor Road. Consent to Destroy under Section 90 of the *National Parks and Wildlife Act* (1974) was listed as a recommendation on the site cards for these sites and on 05/03/2004 a Section 90 Consent to Destroy (partial) AHIP #1844 was issued5. The AHIMS database has not been updated with the outcome of this AHIP and a report outlining the results of the AHIP has not been catalogued with AHIMS. It is therefore unclear whether these sites remain, although this is unlikely.

- #45-5-3634: Artefact Scatter. This consists of several artefacts, located near treatment ponds within the Riverstone WWTP.

Where available, a copy of the AHIMS site cards relating to each of the sites outlined above is included in **Appendix 5**.

4.2.3 Predictive Modelling

As outlined in **Section 2.3**, an archaeological predictive model was developed to inform the EA process. The AHMS 2010 model was developed using archaeological information, and environmental variables (**Section 5.1, 5.2.1,** also AHMS, 2009 and AHMS, 2010). The model is shown in **Figure 4**.

Overlaying the Project on the model indicates that a number of areas of high and very high archaeological probability may be impacted (**Figure 4**). Specifically, areas in the vicinity of the Proposal in East Riverstone near Killarney Chain of Ponds Creek have been identified as having moderate, high and/or very high archaeological probability.

4.2.4 Summary

A review of the environment and archaeological context of the NW Desktop Assessment Area, combined with the predictive modelling, indicates that:

[4] Fran Scully (OEH) pers com. L. Murray (AHMS) 11/01/2011.

[5] Fran Scully (OEH) pers com. L. Murray (AHMS) 11/01/2011.

- The majority of recorded sites in the NW Desktop Assessment Area are artefactual (either artefact scatters or isolated finds) and PADs;
- Stream order is of primary importance in determining the distribution frequency and scale (extent, artefact densities and complexity) of sites;
- Sites with low artefact densities have been identified on all landform types near low order streams. The landforms include floodplains, creek banks, elevated spurs, lower slopes, mid slopes and upper slopes. The sites demonstrate evidence of short term or transient use and ephemeral occupation;
- Sites with high artefact densities and which demonstrate a variety of tool types, frequent or repeated occupation and use, and complex assemblages most frequently occur in lower slopes, floodplains and ridges near high order streams;
- Natural rock outcroppings and/or Aboriginal stone tool quarries are the preferred source of raw materials (rather than local river or creek gravels) for artefact production. Proximity to raw material sources is a key factor in site distribution;
- Areas of historical and/or modern disturbance (such as buildings, roads, services, market gardens etc) severely compromise Aboriginal archaeological preservation and survival. Accordingly, where this type of disturbance is high, intact archaeological material is considered less likely to occur;
- The Proposal has the potential to impact some areas of moderate, high and very high archaeological probability as identified in the predictive model (AHMS, 2009, 2010). These areas are generally along the larger creeklines, most notably Eastern Creek and Killarney Chain of Ponds;
- Analysis of the above information places five registered Aboriginal objects, sites and/or places in land potentially impacted by the Proposal. These are predominantly isolated finds, artefact scatters or PADs and appear to be focused adjacent to Eastern Creek and along the nearby Killarney Chain of Ponds and associated tributaries; and
- In several cases, most notably within the Windsor Road corridor, the AHIMS sites are likely to have been destroyed during recent road widening and associated underground service provision works. The AHIMS information for these sites (**Appendix 5**) indicates that several Aboriginal Heritage Impact Permits (AHIP) were sought for these sites, but verification about their overall investigation and/or destruction could not be determined for this AHIA.

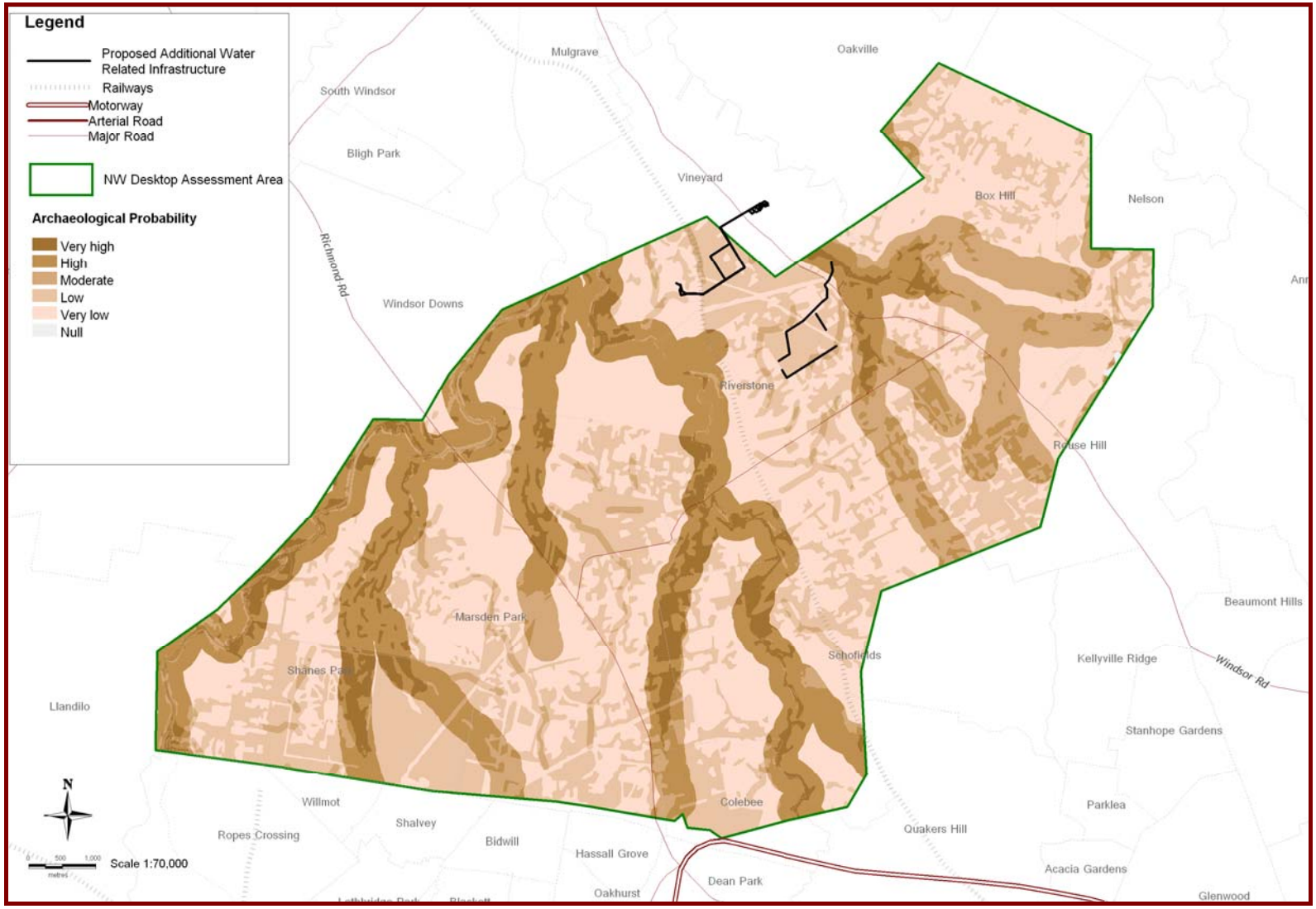

Figure 4. AHMS 2010 model for the NW Desktop Assessment Area. (AHIMS data provided by DECCW, Licence Agreement No. 116, 22 June 2010 and Extensive AHIMS search undertaken in the Riverstone Area, 14 November 2011).

This page of the assessment contains culturally sensitive information.
Sydney Water has removed the contents to protect and manage culturally sensitive information, out of respect to the Aboriginal Community.

Figure 5. Map showing the location of sites recorded on the AHIMS register in the vicinity of the Assessment Area (AHIMS data provided by DECCW, Licence Agreement No. 116, 22 June 2010 and Extensive AHIMS search undertaken in the Riverstone Area, 14 November 2011).

4.3 Field Assessment

As outlined in **Section 2**, the AHIA includes and builds on previous work, including field assessment, undertaken in 2010 (AHMS, 2011).

The 2010 field assessment included land potentially impacted by the Project and other areas in the NWGC and SWGC. The December 2011 field assessment was limited to land potentially impacted by the Proposal.

4.3.1 Assessment Method

As outlined in **Section 2.3.3 and 4.3.1,** land potentially impacted by the Project was subject to field assessment by AHMS archaeologists and RAPs in 2010 and 2011.

Field assessment for the Proposal was undertaken on 1 December 2011 with six RAPs, and a second brief one hour field assessment was undertaken with one archaeologist and 3 RAPs on 14 December 2011. The second field assessment visit was undertaken because access to all areas was not possible on 1 December.

The approach generally involved dividing the field assessment area into transects based upon the proposed works areas. Transect information and results are presented in Table 3. Archaeologists and Registered Aboriginal Parties (RAPs) who were participating in the field assessment were spread 5-10 m apart from each other and they walked from one end of the transect to the other. The aim of the field assessment was to observe landscape conditions (including landform type, exposure, visibility, geology, soil type, vegetation, etc), existing disturbance and any Aboriginal objects, sites or places that may be present. All environmental variables were documented in accordance with descriptions outlined in McDonald et al (1998) *Australian Soil and Land Survey: Field Handbook.*

AHMS personnel acted as logistical support (notifying landowners of our activities, moving vehicles, collecting people, etc), undertook general documentation of the transects (i.e. landscape condition, existing disturbance, etc) and documented in detail any Aboriginal objects, sites or places that were identified.

All documentation included recording site locations with a hand held GPS (with a specified accuracy of <10 m 95% typical), photographing general landscape and transects and Aboriginal objects, sites and places, and describing each site in an inventory schedule pro-forma. A series of high resolution aerial photographs were also used to document and record landscape features and Aboriginal objects, sites and places.

A system for numbering any Aboriginal objects, sites or places identified was also in place (AHMS 2011). However, as no new sites were identified this was not required for this AHIA.

The level of ground disturbance assessed and recorded as high, medium or low, was based on the current land use and any apparent evidence of previous land uses.

4.3.2 Results

General

The field assessment for the Proposal included land adjacent to and within the Riverstone WWTP and several streets in Riverstone and Vineyard. Field assessment was also undertaken at the proposed SP1154 location options.

The field assessment area was largely within road corridors, which in almost all instances were considered to be highly disturbed or modified with little potential for surviving surface or sub-surface archaeological materials. Effective survey coverage across the Assessment Area was generally low (approximately 7%) due to the dense nature of grass cover over most parts of the field assessment area.

Landforms identified during the field assessment included gentle undulating slopes and hills near the Riverstone WWTP with lower slopes, flats and alluvial terraces being present in the Riverstone and Vineyard areas, especially near the SP1154 option along the Killarney Chain of Ponds. The land assessed for the SP1154 options has been previously cleared of vegetation and is currently used for residential purposes. The land was in general low lying and water logged, which were considered to have low archaeological potential. Two areas of high disturbance were observed in this area. Within Option A there is an area near the boundary of the child care facility that has been heavily disturbed by vegetation clearance and rubbish dumping. Within Option C earth works associated with the construction of a dam were observed. Either Option A or Option C within these disturbed footprints would be suitable locations for the SP1154 facility. RAPs identified in the field that Option D was their least preferred because it was closer to Killarney Chain of Ponds Creek.

Land assessed alongside road and street verges had been subject to higher levels of disturbance and modification than lands used for pastoral or residential purposes. Land assessed along streets for the Crown Street drinking main, the southern extent of the Edmund Street drinking main (between Hobart Street and Wellington Street) and rising main 3 (sections east of the rail line) had been significantly modified in the process of road works, drainage excavations, driveway construction and general residential activity (gardening, lawns, mowing etc). The western section of rising main 3 and the location of the RMC5 borehole were located in a grassed pasture on undulating hills. The pasture had been subject to previous disturbance from agricultural activities and vegetation clearance. In particular, the location of the RMC5 borehole had also been subject to erosion, possibly caused by disturbance associated with construction of the nearby rail line. These areas were considered to have low potential for archaeological sites to remain.

The proposed sewer main L4-L6 generally follows disturbed alignments. Land along Hobart and Loftus Streets areas has been disturbed by erosion, grading of the unsealed roads and vegetation clearance. The proposed section of boring between Hobart and Loftus Street also follows a disturbed alignment along the path of an unformed track which is used currently as an unofficial scrap metal storage yard. The trenching section of sewer main L4-L6 also passes through a pasture which has been modified by agricultural use, through a residential area and alongside a disturbed boundary of a petrol station. The proposed alignment of sewer main L4-L6 then crosses Windsor Road and passes alongside a modern drainage canal and into a modified pasture. These portions of the Field Assessment Area have all been subject to significant land use disturbance or modification. These areas were considered to have low potential for archaeological sites to remain.

The section of sewer main L4-L6 situated between the proposed trenching/boring section interchange and the point opposite Edmund Street to the north also passes through land which had been subject to erosion caused by vegetation clearance and the establishment/maintenance of an unsealed road. However, this section of the main also passes in close proximity to a registered Aboriginal site (RL3 - 45-5-2526). RL3 is a large artefact scatter and PAD. The northern extent of the proposed Edmund Street main passes through this site. The current condition of the RL3 site could not be assessed due to dense vegetation cover although several artefacts were noted on the western road verge south of Wellington Street. It was concluded that these artefacts represented an extension of RL3 rather than a new site. The presence of these artefacts indicates that the registered site is likely to extend beyond currently recorded site boundaries.

Soil and vegetation data were also found to be typical of the region. Where observed, soil profiles revealed a shallow duplex soil (topsoil overlying clay). Observations also indicated that the topsoil was generally absent on the upper slopes, hill tops and ridge lines of the area and along areas subject to erosion such as unsealed roads and tracks. Observations of lower slopes and alluvial flood plain profiles suggested a deeper soil profile. Previous studies by AHMS in the Riverstone West Precinct indicate soil profiles of up to 1 m can be expected in these alluvial floodplains. Vegetation comprised pasture grasses, endemic species re-growth or re-introduced species with no evidence of remnant or old growth trees.

Landscape disturbance and integrity (undisturbed) is presented in **Figure 22**.

Identified Sites

No new Aboriginal objects, sites or places were recorded during the field assessment for the Proposal. The following sites which were known to be within / near the Assessment Area were visited during the field survey, as discussed below.

- #45-5-0582: Artefact scatter. This consists of at least three artefacts. The site is likely to be a duplicate recording, or a partial recording, of an open campsite recorded as AHIMS #45-5-0313. The recorded location of #45-5-0582 is not within the Field Assessment Area. The location of rising main 3 and borehole RMC5 were visited. No Aboriginal sites or objects were identified in this area. The area was heavily grassed which reduced survey visibility. The area was observed to be disturbed from vegetation clearance and associated erosion, an access track and ground disturbance likely from the construction of the nearby rail corridor (evidenced by uneven hillocky ground surfaces). The potential for archaeological sites to remain was determined to be low.

- #45-5-2526: Potential archaeological deposit (PAD) and artefact scatter. The proposed sewer main L4-L6 and the Edmund Street drinking main cross this area. The vicinity of the site was visited, although the entire site was not visible due to dense vegetation cover. Several artefacts were identified on the Edmund Street road verge, which were attributed to the RL3 site. The site was determined to be likely to still exist below the current vegetation as no recent activities have recently occurred that would affect the presence of the site.

- #45-5-2838: Artefact scatter. This consists of four artefacts. This site was not relocated during survey. Comparison of the proposed location of sewer main L4-L6, the mapped location of this site and the described location of the site on the AHIMS site card and Therin's (2002) report show that it is not directly in the path of proposed infrastructure.

- #45-5-2839: Artefact scatter. This consists of three artefacts close to the south east of the proposed point where sewer main L4-L6 crosses Windsor Road. This site was not relocated during survey. It is probable that the site was removed during an upgrade of Windsor Road under AHIP #1844.

- #45-5-2840: Isolated artefact. This consists of a single artefact, located close to the north east of the proposed point where sewer main L4-L6 crosses Windsor Road. This site was not relocated during survey. It is probable that the site was removed during an upgrade of Windsor Road under AHIP #1844.

- #45-5-3634: Artefact Scatter. The site card records that this site consists of several artefacts, located within the Riverstone Meatworks Complex. However, the coordinates for the site locate it within the Riverstone WWTP. The apparent location of the site within the WWTP was visited during the survey. It appears from the site inspection that the coordinates for the site are incorrect. No Aboriginal artefacts were located at this position, however several pieces of machine broken and naturally broken silcrete were found. The area has been heavily disturbed by erosion, road construction and landscaping within the WWTP. Careful inspection of this area indicated that it was not an Aboriginal site.

A total of 3 sites were found to be on land potentially impacted by the Proposal.

The majority of the land within the Field Assessment Area has been subject to extensive historical land use impacts including road building, clearing, and industrial, rural and residential development. These had significantly reduced the number of available intact areas (natural ground surfaces and/or soil profiles) that may contain the tangible remains of traditional Aboriginal subsistence activities. Of particular note was the extensive vegetation clearing that had occurred across the area, which limited the potential for the number and significance of remaining scarred trees.

Table 3. Transect data for the Assessment Area[6]

Transect Number	GPS Co-ordinates*	Description	Landform Type	Disturbance	Transect Area (m^2)	Exposure/ Visibility (%)	Effective Coverage % (m^2)†
1 (Crown Street Drinking Main)	Start: E 302858 N 6273075 Mid: E 302516 N 6272834 End: E 302057 N 6272710	This transect ran from the corner of Crown and Edmund Streets south west to the corner of Crown and Hamilton Streets and north west along Hamilton Street to the corner of Sydney Street. This area comprised road side verges which had been largely modified by urban development. Typical disturbances included gardening and works associated with road construction and drainage trenches (**Figure 6**). Visibility along this transect was generally low and obscured heavily by turf and leaf litter. Some exposures were noted along roadside erosion scours and on tracks or driveways. Soils were observed to be exposed to clay subsoil, with gravel pans containing ironstone and occasional natural silcrete pieces **(Figure 7).**	Slightly undulating plain Maximum slope of: 10 degrees	Landscaping, gardening, drainage cuts, road works, trampling, cut and fill, power poles, subsurface services	25,000	25/10	2.5 (625)

[6] *AHIMS data provided by DECCW. Licence Agreement No. 116, 22 June 2010.*

Transect Number	GPS Co-ordinates*	Description	Landform Type	Disturbance	Transect Area (m^2)	Exposure/ Visibility (%)	Effective Coverage % (m^2) †
2 (Sewer Main L4-L6: Boring Section)	Start: E 301981 N 6272840 End: E 302106 N 6273266	This transect ran from the corner of Hamilton and Hobart streets on a north east direction through re-growth vegetation. This area was generally low lying and flat and passed to the west of a first order drainage line of Killarney Chain of ponds Creek. The area had been heavily disturbed and generally followed the line of an unsealed unofficial road through the re-growth bush land. The area is currently used as a dumping/storage ground for scrap metal and old cars (**Figure 8**). The movement of such large pieces of rubbish through this area has caused significant disturbance to the upper soil units and accelerated subsequent erosion . Exposed soils were observed to be a re-deposited silt erosion layer overlying clay sub soils (**Figure 9**).	Low lying flats Maximum slope of: 2 degrees	Trampling, erosion, unsealed road, scrap yard, dumping.	11,625	75/35	26 (3,051)
3 (Sewer Main L4-L6: trenching section west of Windsor	Start: E 302102 N 6273250 End:	This transect mostly followed Loftus Street which is an unsealed road and part of an electricity easement. This section of road runs parallel to and approximately 150 meters from a first order tributary of Killarney Chain of Ponds Creek. Sewer main	Lower Slope Maximum slope of 20 degrees.	Road cut and grading, erosion, power easement, power poles, farming, trampling	18,625	80/7	5.6 (1,043)

Transect Number	GPS Co-ordinates*	Description	Landform Type	Disturbance	Transect Area (m^2)	Exposure/ Visibility (%)	Effective Coverage % (m^2) †
Road)	E 302700 N 6273653	L4-L6 then passes into an area currently under pasture and used for grazing livestock. The road section of this transect has been heavily disturbed by erosion and road grading, with the clay sub soil exposed (**Figure 10**). The pasture section of the transect was heavily grassed and visibility almost nil (**Figure 11**).					
4 (Sewer Main L4-L6: trenching section east of Windsor Road)	Start: E 302685 N 6274050 End: E 302760 N 6274170	This transect ran parallel to a drainage canal to the east of Windsor Road. The canal is a modern realignment of a second order tributary of Killarney Chain of Ponds (**Figure 12**). Accessibility to this transect was limited by the canal and also by very dense pasture grasses. The transect was observed to be water logged and disturbed by rural activity such as ploughing, live stick grazing and vegetation clearance (**Figure 13**). The entire length of the proposed works was not surveyed due to lack of visibility and accessibility.	Low lying flats Maximum slope of: 2 degrees	Grazing, ploughing, vegetation clearance, canal cut	1,250	45/5	2.25 (28.12)
5 (Rising Main 3: west of	Start: E 300819	This transect crossed a pasture across a hill towards the Riverstone WWTP (**Figure 14**). Visibility was generally low except for	Rolling hills. Maximum slope of 15	Ploughing, vegetation clearance, grazing,	8,000	75/8	6 (480)

Transect Number	GPS Co-ordinates*	Description	Landform Type	Disturbance	Transect Area (m^2)	Exposure/ Visibility (%)	Effective Coverage % (m^2) †
Riverstone Parade)	N 6273800 End: E 300530 N 6273968	occasional un-grassed sections of the transect. The eastern most section of the transect near the rail line was observed to be highly disturbed possibly due to works associated with the construction of the rail line (**Figure 15**).	degrees.	earth movement associated with the rail line.			
6 (Rising Main 3: east of Riverstone Parade)	Start: E 301101 N 6274799 Mid: E 301186 N 6274014 End: E 300869 N 6273803	This transect followed the road alignment along O'Connell Street to the corner of Otago Street and along Otago Street west to Riverstone Parade. The transect also followed Hamilton Street from Otago Street to the corner of Camberwell Street and along Camberwell Street to the corner of O'Connell Street. This area comprised road side verges which had been largely modified by urban development. Typical disturbances included gardening and works associated with road construction and drainage trenches (**Figure 16**). Visibility along this transect was generally low and obscured heavily by turf and leaf litter. Some exposures were noted along roadside erosion scours and on tracks or driveways. Soils were observed to be exposed to clay	Slightly undulating plain Maximum slope of: 10 degrees	Landscaping, gardening, drainage cuts, road works, trampling, cut and fill, power poles, subsurface services	54,175	83/8	6.64 (3,597)

Transect Number	GPS Co-ordinates*	Description	Landform Type	Disturbance	Transect Area (m^2)	Exposure/ Visibility (%)	Effective Coverage % (m^2) †
		subsoil, with gravel pans containing ironstone and occasional natural silcrete pieces (**Figure 17**).					
7 (SP1154 Options A-D)	Start: E 301503. N 627504 End: E 30159 N 6275114	This transect comprised the four options for the SP1154 plant. The land assessed for the SP1154 options has been previously cleared of vegetation and is currently used for residential purposes (**Figure 18**). The land was in general low lying and water logged, which were considered to have low archaeological potential (**Figure 19**). Two areas of high disturbance were observed in this area. Within Option A (**Figure 20**) there is an area near the boundary of the child care facility that has been heavily disturbed by vegetation clearance and rubbish dumping. Within Option C earth works associated with the construction of a dam were observed (**Figure 21**). Either Option A or Option C within these disturbed footprints would be suitable locations for the SP1154 facility. RAPs identified in the field that Option D was their least preferred because it was closer to Killarney Chain of Ponds Creek.	Low lying flats Maximum slope of: 2 degrees	Grazing, ploughing, vegetation clearance, dam cut and fill	6,800	75/10	7.5 (510)

Transect Number	GPS Co-ordinates*	Description	Landform Type	Disturbance	Transect Area (m^2)	Exposure/ Visibility (%)	Effective Coverage % (m^2) †
				Average	*17,925*	*65/13*	*7.2 (1,333)*
				Total	**125,475**	**-**	**(9,334)**

* All co-ordinates are presented as MGA employing the GDA 94 datum.

† Effective coverage is a relationship of the visibility and exposure, specifically it is the percentage of *visible exposed* area, and can be worked out through area divided by visible percentage and then by exposure percentage.

Figure 6. Example of disturbance along roadside verges, Crown Street facing west.

Figure 7. Example of exposed clay soils and ironstone, Crown Street facing east.

Figure 8. Scrap meta and/car dumping on Transect 2, facing north east.

Figure 9. Erosion accelerated by rubbish/vehicle movement on transect 2, facing south.

Figure 10. Heavy disturbance from erosion along the unsealed road, transect 3 facing north west.

Figure 11. Heavy grass and low visibility, transect 3 facing north east..

Figure 12. Disturbance from excavated drainage canal, transect 4 facing north east.

Figure 13. Agricultural disturbances and heavy grass obscuring visibility, transect 4 facing north

Figure 14. View across transect 5, facing east.

Figure 15. Erosion and hillocky disturbance along fence near rail corridor in transect 5.

Figure 16. Disturbance from drainage culverts along O'Connell Street, transect 6. .

Figure 17. Exposed clay soils with ironstone and natural silcrete on Clyde Street, transect 6. .

Figure 18. View across Option B showing vegetation clearance and rural residential use, facing east.

Figure 19. View across Option D showing ow lying water logged flats, facing south east.

Figure 20. Disturbed area, Option A facing south

Figure 21. Disturbed area around dam, Option C facing south east.

4.4 Overall findings

4.4.1 Comparison of Desktop and Field Assessment

Based on the findings of the desktop assessment 208 Aboriginal objects, sites and/or places are within the NW Desktop Assessment Area. Of these, three sites (45-5-2526, 45-5-2839 and 45-5-2840) are located within land potentially impacted by the Proposal. These sites are shown on **Figure 5**.

4.4.2 Testing the Predictive Model

The field assessment for the Proposal found that the predictive model for the wider NW Desktop Assessment Area was generally effective in identifying areas of archaeological probability. However, once these areas were inspected during the field survey it was found that the model was over-predicting the presence and survival of Aboriginal objects, sites and places, because accurate land-use disturbance data was generally unavailable. Using the observations regarding disturbance obtained through the field assessment, this can now be clearly demonstrated, with several areas of high and very high archaeological probability actually being in areas of high disturbance (**Figure 4** and **22**). Until detailed disturbance data is available, the model will over-represent those areas considered to be of high or very high archaeological probability. However, for the purposes of development, this over-representation automatically integrates a precautionary principle into the cultural heritage management of the Assessment Areas, since the models represent an ideal or pristine archaeological landscape without existing disturbance or development.

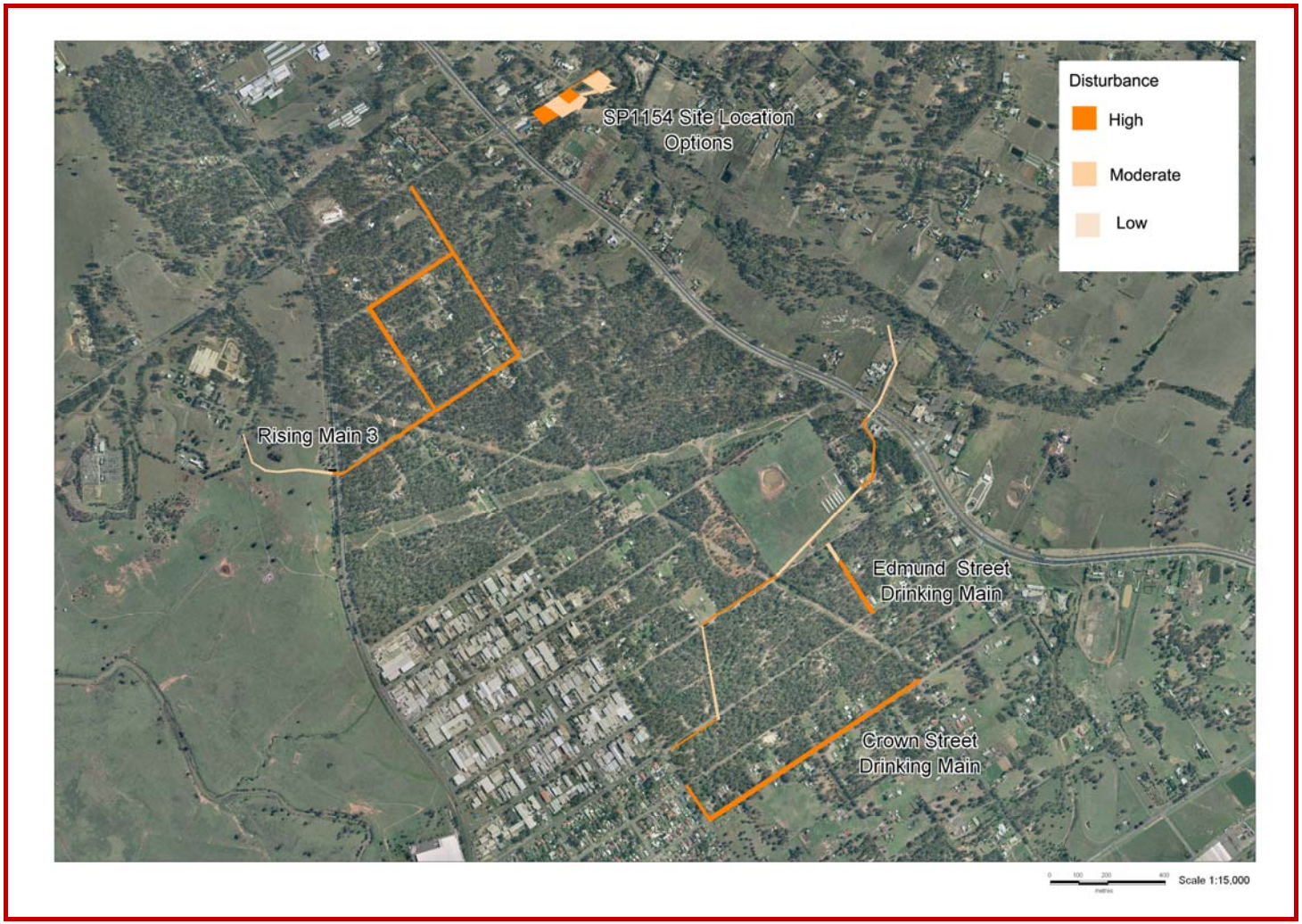

Figure 22. Land disturbance and integrity for the proposed area for Water Related Services for the NWGC First Release Precincts AHIA based on Field Assessment observations.

5. SIGNIFICANCE ASSESSMENT

5.1 General

The significance of Aboriginal archaeological sites is assessed using two criteria: Aboriginal (cultural) and archaeological (scientific) significance. These criteria recognise that Aboriginal sites are valuable in a number of ways, namely:

- To the Aboriginal community as an aspect of their cultural heritage and as part of continuing traditions;
- To the broader community, for educational, historical and cultural enrichment values; and
- To the scientific community for potential research value.

The guidelines outlined in the NSW National Parks and Wildlife (now OEH) *Aboriginal Cultural Heritage: Standards and Guidelines Kit* (1997) provide the basis and background for the evaluation of site significance.

5.2 Cultural Significance

This area of assessment concerns the relationship and importance of sites to the Aboriginal community. Aspects of cultural significance include people's traditional and contemporary links with a given site or landscape as well as an overall concern by Aboriginal people for sites and their continued protection.

Unmodified natural features in the landscape can signify sacred sites or places of significance. As such, they are archaeologically invisible and can only be identified with the aid of Aboriginal interpretation. If such sites are known, they hold particular cultural significance to contemporary Aboriginal people. Furthermore, sites of significance are not restricted to the period prior to contact with Europeans. Often events related to the Contact-period, and at times to the period since European settlement, may be important to the local Aboriginal communities. If these events relate to a specific place in the landscape, then that place (i.e. the site) may become sacred or highly significant to the local Aboriginal communities.

The RAPS did not indicate during the field survey that any of the areas or sites visited specifically retained cultural values. No specific areas of cultural significance were identified in feedback received regarding this report, however it was expressed by NHAC that:

> *"All cultural heritage sites are considered significant to Aboriginal people, because they are proof of occupancy by our past traditional owners (ancestors), and they are an inheritance to our descendants. Those sites,*

which remain, require recognition and protection to preserve the Aboriginal Heritage of the region.

It is important that Aboriginal stakeholder's are involved during construction in areas where there is the potential for Aboriginal objects, sites or places being discovered as this will provide us with the opportunity to further protect and preserve cultural material should it be discovered instead of being destroyed."

Copies of feedback provided by the RAPs is provided in **Appendix 4.**

5.3 Scientific Significance

Scientific value is associated with the research potential of a site. Rarity and representativeness are also related concepts that are taken into account. Research potential or demonstrated research importance, is considered according to the contribution that a heritage site can make to present understanding of human society and the human past. Heritage sites, objects or places of high scientific significance are those which provide an uncommon opportunity to provide information about the specific age of people in an area, or a rare glimpse of artistic endeavour or a chronological record of changing life through deep archaeological stratigraphy.

The comparative rarity of a site is a consideration in assessing scientific significance. A certain site type may be "one of a kind" in one region, but very common in another. Artefacts of a particular type may be common in one region, but outside the known distribution in another.

The integrity of a site is also a consideration in determining scientific significance. While disturbance of a topsoil deposit with artefacts does not entirely diminish research value, it may limit the types of questions that may be addressed. A heavily cultivated paddock may be unsuited to addressing research questions of small-scale site structure, but it may still be suitable for answering more general questions of implement distribution in a region and raw material logistics.

The capacity of a site to address research questions is predicated on a definition of what the key research issues are for a region. In the region including the NW Desktop Assessment Area the key research issues revolve around the chronology of Aboriginal occupation and variability in stone artefact manufacturing technology. Sites with certain backed implements from the Holocene are very common, but sites with definite Pleistocene evidence are extremely rare, and hence of extremely high significance if found.

Once a site's cultural significance and scientific significance has been identified, they are combined to form an overall significance ranking for the site (**Table 3**). In accordance with precautionary principles, the higher significance value from either of the criterion (cultural/scientific) is assigned to the site in question.

5.4 Assessment

The land potentially impacted by the Proposal is located between three extensively studied areas for Aboriginal heritage, namely Killarney Chain of Ponds, First Ponds Creek and Eastern Creek (see **Section 5.3**). These areas include some of the most extensive archaeological deposits discovered in the Cumberland Plains and the wider Sydney region. Other studies at Plumpton Ridge, Marsden Park, Riverstone meatworks and other parts of Rouse Hill Development Area have also identified significant archaeological remains in the general area.

The 6 sites identified in land potentially impacted by the Proposal included four artefact scatters, one artefact scatters with PAD and one isolated find. Of these, one artefact scatter was found to be outside the Assessment Area (45-5-0582), one artefact scatter was found to have been erroneously recorded and not located within the Assessment Area (45-5-3634). The archaeological significance of the Aboriginal sites remaining within the Assessment Area is discussed below.

Sites 45-5-2839 and 45-5-2840, both artefact scatters, were first recorded by Michael Therin (Therin, 2002). Both sites were assessed as having low archaeological significance due to the sites being located within eroding fill deposits which had been transported to the site from elsewhere (Therin, 2002:22). As discussed previously in this report, it is unlikely that these sites are still present. However, should these sites still exist, the assessment of these sites as being of low archaeological significance remains valid due to the lack of site integrity.

Site 45-5-2838 was also recorded by Therin and was assessed as having moderate archaeological significance (Therin, 2002:22-23). This assessment was based on the site being in a relatively undisturbed area and potentially being associated with site PAD 5 recorded by Robynne Mills in 1998 (Therin, 2002:22-23). Observations made during the Field Assessment suggest that this area has been further disturbed since Therin's recording in 2002. Erosion and use of Woodland Street would have disturbed the context of the site and lessened the significance of archaeological information that could be obtained from it. As such, site 45-5-2838 is assessed as having low archaeological significance.

Site 45-5-2526 covers an extensive area along an unnamed tributary of Killarney Chain of Ponds Creek. Since the area was heavily vegetated, the current condition of the site could not be assessed during the field survey. The site was originally recorded by Robynne Mills in 1998. Mills described that site as being at least 300

metres long by 150 metres wide with in excess of 500 artefacts visible along the then exposed track and creek bank. Mills notes that the site appeared to have been relatively undisturbed and should be considered for conservation. Later, the site was revisited by Williams and Baker (ENSR 2008). The site was determined to be a natural occurrence of the St Mary Formation silcrete. Williams and Baker assessed the site as having cultural significance since it was a source of raw material that may have been used in the past. However, the site was assessed as having low scientific significance due to that lack of research potential and poor condition of the site (ENSR 2008 p 68).

Observations made in the field during this assessment generally support the 2008 assessment of site 45-5-2526. Examples of naturally occurring silcrete were observed along Edmund Street near the intersection with Hobart Street. Disturbances near the site include an unsealed road, erosion, vegetation clearance and rural residential use. Therefore, based upon previous observations made by Williams and Baker in 2008 and the current Field Assessment results, this site maintains its previous low scientific significance grading.

6. IMPACT ASSESSMENT

Details of the Proposal, which include pipelines and a pumping station, are provided in **Section 2.2**. At this stage, the Proposal component locations are yet to be finalised. Accordingly it is possible to assess only the potential, rather than actual, impact of the Proposal on Aboriginal objects, sites and places. As noted previously, this impact assessment considers the worst-case scenario for direct impact on Aboriginal heritage by assuming:

- for all site-based assets, that the entire site will be impacted; and/or
- for pipelines, any or all sites within the field assessment corridor could be impacted, depending on the preferred location of the 10 metre-wide pipeline corridor.

A summary of the potential impacts is presented in **Table 4.** Based on data in **Sections 5.1 – 5.5**, it can be concluded that one Aboriginal site is within land subject to the Proposal and has potential to be impacted depending on the final location of the Proposal components.

Table 4. Impact assessment for sites potentially impacted by the Proposal

AHIMS Site Number7	Site Type	Scientific Significance	Potential Impacts
45-5-0582	Artefact Scatter	N/A	This site is not within the Field Assessment Area and not within the path of proposed water infrastructure. There is nil chance of impact to this site from the proposed works.
45-5-2526	Artefact Scatter PAD	Low	This site is located within the path of proposed Edmund Street Drinking Main and Sewer Main L4-L6. This site will potentially be impacted by proposed water infrastructure works.
45-5-2838	Artefact Scatter	Low	This site is mapped as being to the west of the proposed path of Sewer Main L4-L6 and There is a very low to nil chance of impact because the site is not directly in the path of proposed water infrastructure works.
45-5-2839	Artefact Scatter	Low	This site is mapped as being close to the south east of the point where the proposed path of Sewer Main L-4-L6 crosses Windsor Road. There is a low chance of impact because it is probable that this site no longer exists and it is not directly in the path of proposed water infrastructure works.
45-5-2840	Isolated Artefact	Low	This site is mapped as being close to the north east of the point where the proposed path of Sewer Main L4-L6 crosses Windsor Road. There is a low chance of impact because it is probable that this site no longer exists and it is not directly in the path of proposed water infrastructure works.

[7] AHIMS data provided by DECCW, Licence Agreement No. 116, 22 June 2010 and an Extensive AHIMS Search undertaken on 31 January 2011 of the Box Hill area.

AHIMS Site Number7	Site Type	Scientific Significance	Potential Impacts
45-5-3634	Artefact Scatter	N/A	This site has been erroneously recorded previously and is not located within the Field Assessment Area and not within the path of proposed water infrastructure. There is nil chance of impact to this site from the proposed works.

7. KEY FINDINGS & RECOMMENDATIONS

7.1 Key Findings

Key findings of the AHIA for the Proposal included:

- The NW Desktop Assessment (AHMS, 2009) identified that 179 Aboriginal objects, sites and places had been previously registered within the NW Desktop Assessment Area;
- Later, the NW Field Assessment (2010 and 2011) identified 36 Aboriginal objects, sites and places. Some of these newly identified sites were duplicates of the original 179 identified by the Desktop Assessment. Overall, it was found that 208 Aboriginal objects, sites and places were within the NW Desktop Assessment Area;
- Of these 208 sites, six were on land potentially impacted by the Proposal. The six sites include one artefact scatter and PAD, four artefact scatters and one isolated find;
- No new Aboriginal sites, objects or places were identified during the Field Assessment survey for the Proposal. During the survey the six known sites were also re-assessed. The results of the Field Assessment showed that one artefact scatter (45-5-0582) was not within the Field Assessment Area; one artefact scatter (45-5-3634) had been erroneously recorded and was not within the Assessment Area; one artefact scatter (45-5-2838) was found to be in a disturbed area to the west of a proposed infrastructure location; one artefact scatter (45-5-2839) and one isolated artefact (45-5-2840) were considered unlikely to remain in their registered locations close to land potentially impacted by the Proposal; and one artefact scatter and PAD (45-5-2526) was found to be on land potentially impacted by the Proposal;
- This resulted in a total of three sites on land potentially impacted by the Proposal;
- The sites within the Assessment Area were subject to a significance assessment and were all found to be of low scientific significance.

7.2 General Recommendations

To ensure consistency and best practice management of Aboriginal cultural heritage, the following general recommendations are made. They are consistent with those in the previous archaeological assessments for Water Related Infrastructure in the NWGC and SWGC (AHMS, 2009, 2010, 2011 and 2011a) and follow the approved mitigation measures in the Environmental Assessment for the First Release Precincts (Sydney Water 2008).

- Consultation between Sydney Water and relevant Registered Aboriginal Parties should be maintained as appropriate throughout the design and construction of the Project;
- Where possible, Sydney Water should aim to avoid impacting any known Aboriginal heritage objects, sites or places and places that have potential Aboriginal heritage or cultural values, throughout the life of the Project;
- Where impact cannot be avoided, Sydney Water should choose partial impact rather than complete impact wherever possible and ensure that appropriate measures to mitigate impacts are developed and implemented as required and as appropriate during design, construction and operation of the Project;
- If re-location of the pipeline outside the overall Field Assessment Areas is proposed, further assessment of these areas should be undertaken to identify and appropriately manage Aboriginal objects/sites/places that may be in these areas;
- Sydney Water should advise all relevant personnel and contractors involved in the design, construction and operation of the Project of the relevant heritage issues, legislative requirements and recommendations identified in any Aboriginal heritage impact assessments undertaken for the Proposal;
- Sydney Water should maintain ongoing liaison with relevant State agencies throughout the Project to ensure holistic management of Aboriginal heritage objects/sites/places. Most notably, this should include information sharing regarding Aboriginal objects/sites/place locations (including impact buffers/curtilages);
- In the event that previously undiscovered Aboriginal objects, sites or places (or potential Aboriginal objects, sites or places) are discovered during construction, all works in the vicinity of the find should cease and Sydney Water should determine the subsequent course of action in consultation with a heritage professional, relevant Registered Aboriginal Parties and/or the relevant State government agency as appropriate;
- Should suspected Aboriginal skeletal material be identified, all works should cease and the NSW Police and the NSW Coroner's office contacted. Should the burial prove to be archaeological, consultation with a heritage professional, relevant Registered Aboriginal Parties and/or the relevant State government agency, should be undertaken by Sydney Water;
- Sydney Water should ensure that the removal of any Aboriginal object or the disturbance or destruction of any Aboriginal site or place, is undertaken professionally, in consultation with relevant Registered Aboriginal Parties, according to applicable heritage statutory requirements and is documented, as appropriate to the level of significance;
- Regardless of the significance of any Aboriginal object, site or place, Sydney Water should ensure all recovered Aboriginal objects and/or archaeological

material is temporarily stored in a suitable lockable container at a secure indoor venue until the completion of the relevant phase of works;

- At the completion of the relevant phase of works, Sydney Water should consult with relevant Registered Aboriginal Parties about the final storage location for the objects/material and if appropriate, develop a care and control agreement for the storage and/or repatriation of all recovered Aboriginal archaeological objects/material; and
- Sydney Water should ensure that any reports or documents for the Project concerning Aboriginal heritage comply with applicable statutory requirements, are prepared in accordance with best practice professional standards and, where appropriate, ensure findings are provided to OEH AHIMS Registrar and the relevant Registered Aboriginal Parties; and
- During construction, all personnel and contractors should be provided with information to ensure appropriate management of known and unknown Aboriginal objects/sites/places. Sites that are to be retained and are in close proximity to the construction activities should be fenced and clearly identified as 'keep clear' or 'no go' zones as works proceed. The specific identification of these sites as having Aboriginal cultural heritage value should remain confidential for their protection.

7.3 Specific Recommendations

Specific recommendations have been developed for managing the potential impacts of the Proposal on site 45-5-2526. Recommendations have also been developed to manage the land subject to the Proposal according to its level of land use disturbance (levels of land use disturbance indicate the potential for places to contain unidentified Aboriginal objects, sites and places) when Sydney Water is selecting options for the placement of a particular asset. In order to ensure consistency and best practice management of Aboriginal cultural heritage, the following specific recommendations conform to those made in the existing archaeological assessments for Water Related Infrastructure in the NWGC and SWGC (AHMS, 2009, 2010, 2011 and 2011a) and follow the approved mitigation measures in the Environmental Assessment for the First Release Precincts (Sydney Water 2008).

7.3.1 Recommendations

1. All options to avoid adversely impacting site 45-5-2526, 45-5-2839 and 45-5-2840 should be employed during design and construction of the Proposal.

   Preferably, no works should occur near this site unless they are directly related to, and for the express purpose of its conservation, care and maintenance.

If works have the potential to impact this site, they should be limited to micro-tunnelling and/or under-boring techniques or similar, that wholly takes place beneath significant soil layers and material and/or avoids material of significance. If that is not possible, mitigation measures in accordance with the General Recommendations and Specific Recommendation (2) below should be implemented.

2. Where avoiding Aboriginal objects, sites or places proves not feasible, appropriate impact mitigation measures should be developed in consultation with a heritage professional and relevant Registered Aboriginal Parties. Mitigation measures should correlate with the extent of the proposed impact and the significance of the Aboriginal objects, sites and places.

   These measures may include:

   a. For surface sites or sites with a surface expression – spatial recording, using a differential GPS or Total Station (with sub-metre accuracy), followed by collection of the Aboriginal objects;
   b. For subsurface sites or sites with a subsurface expression – a program of testing and/or salvage excavations, using current archaeological practices. Archaeological monitoring may also be appropriate in certain circumstances;
   c. Appropriately recording all cultural materials and impacts using photographs, sketches and written description before, during and after the mitigation activities; and
   d. Undertaking an appropriate level of post-excavation analysis and reporting, in accordance with the General Recommendations.

3. Where no archaeological objects, sites or places have been recorded, but the Proposal is likely to impact areas or land identified as having 'moderate disturbance' in **Figures 4** and **22**, the potential for un-identified/un-discovered Aboriginal objects is considered moderate.

   If archaeological sites are identified or discovered in these areas prior to or during works, the General Recommendations and Specific Recommendations (1) and (2) above should be employed, depending on significance.

4. Where no archaeological objects, sites or places have been recorded and in areas identified as of 'high disturbance' in **Figures 4** and **22**, no further Aboriginal archaeological considerations or mitigation options are required. If archaeological sites are identified or discovered within these areas the General Recommendations and Specific Recommendations (1) and (2) above should be employed, depending on significance;

5. An updated AHIMS site card should be prepared for site 45-5-3634 and sent to the OEH outlining the error in spatial recording of the site;

6. Site 45-5-2838 is located to the west of the proposed location of Sewer Main L4-L6 and not in the direct path of impact. Sydney Water should proceed with caution in this area and adhere the General Recommendations made in Section 8.2 and in particular to Specific Recommendation (4); and

7. Based on levels of ground disturbance observed and distance from Killarney Chain of Ponds Creek, Sydney Water should consider positioning asset SP1154 either in Area A within the area previously disturbed by vegetation clearance and rubbish dumping (near the fence of the child care facility) or in Area C near the area previously disturbed by earth works associated with dam construction. RAPs identified Area D as their least preferred option for the position of SP1154 because it is the closest to Killarney Chain of Ponds Creek. As no Aboriginal object, site or place has been identified, there are no Aboriginal Heritage constraints regarding the position of SP1154 within Areas A-D. In choosing the position of SP1154 (Areas A-D inclusive) Sydney Water should proceed with caution and adhere to the General Recommendations made in Section 8.2 and in particular to Specific Recommendation (4).

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APPENDIX 1

AHMS. 2011. Aboriginal Heritage Part 3A Preliminary Assessment or Due Diligence Advice – Riverstone Additional Options. *AHMS Report for Sydney Water.*

AHMS

ARCHAEOLOGICAL & HERITAGE MANAGEMENT SOLUTIONS

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19 August 2011

Our ref: 110502-1

Ms Gillian Fowler,
Sydney Water,
Level 10, 1 Smith Street,
Parramatta, NSW 2150

Re: Aboriginal Heritage Part 3A Preliminary Assessment or Due Diligence Advice – Riverstone Additional Options

Dear Ms Fowler,

Introduction

This document provides Aboriginal heritage preliminary assessment or due diligence advice about the proposed installation of water related services at certain locations in the suburbs of Riverstone and Vineyard, which are in the Blacktown and Hawkesbury Local Government Areas (**Figure 1**, **Figure 2**). This document has been prepared in accordance with the draft Part 3A Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation (DEC, July 2005; hereafter the 'draft Part 3A Guidelines'), and the NSW Office of Environment and Heritage (OEH) *Due Diligence Code of Practice for the Protection of Aboriginal Objects in New South Wales* (DECCW, 2010; hereafter the 'Code'), as the Code provides a useful checklist for preliminary assessments

The advice has two objectives:

1. To identify whether or not Aboriginal objects and values are, or are likely to be, present in the proposed development area; and
2. To determine whether or not the proposed activities are likely to harm Aboriginal objects (if present).

Please be advised that the preliminary / due diligence advice is **not** a comprehensive Aboriginal heritage assessment and cannot be used as one in approvals contexts. Instead, it provides a **guide** to Aboriginal cultural heritage issues that may be encountered during proposed development, in addition to providing our opinion regarding whether or not further and more detailed Aboriginal heritage assessment is warranted to inform a proposal and/or to assess its impacts.

The report presented here may be summarised within and/or appended to Environmental Assessments when the advice concludes that an Aboriginal heritage assessment is not warranted.

Assessment

General

The draft Part 3A Guidelines and the Code have specific questions or inclusion requirements to identify the presence of and potential harm to Aboriginal objects within a development area (**Figure 3**). The questions and requirements are addressed below, then summarised in the Results section, together with recommendations for any further investigation required.

Will the activity disturb the ground surface or any culturally modified trees? (Code)
Description of the location and nature of the proposed development. (Draft Part 3A Guidelines)

The proposed activity includes the installation of wastewater and drinking water pipelines, and the construction of a sewage pumping station. Installation of the pipelines will require the excavation of trenches or boring. Construction of the sewage pumping station will require excavation to install below ground storage tanks.

The study area passes through a locality that has been almost entirely cleared of vegetation for agricultural, residential and industrial uses, as well as the installation of services. While the proposed development would include the removal of vegetation from areas to be excavated, this vegetation is unlikely to be old growth, and therefore also unlikely to include culturally modified trees. A search of the Aboriginal Heritage Information Management System (AHIMS) database (see below) found no culturally modified trees recorded in the study area.

Are there any relevant confirmed site records, or additional landscape or other contextual information, recorded on AHIMS? (Code)
Assessment of which of the Aboriginal cultural heritage values that are known or likely to occur are likely to be directly or indirectly affected by the proposal. (Draft Part 3A Guidelines)

A search of the Aboriginal Heritage Information Management System (AHIMS) database, maintained by the Office of Environment and Heritage (OEH), was undertaken on 6 June 2011. The search area consisted of a 5 x 5 km square, centred on the study area (**Appendix 1**). **Table 2**, **Figure 4** and **Figure 5** provide a summary of the AHIMS sites in relation to the study area.

Based on the location information recorded in AHIMS, five registered sites appear to be within or in close proximity to the study area:

- #45-5-0582: Artefact scatter. This consists of at least three artefacts. The site is likely to be a duplicate recording, or a partial recording, of an open campsite recorded as AHIMS #45-5-0313.

  The recorded location of #45-5-0582 is not within the study area. However, this site is one of several recorded surface artefacts in close proximity to each other, which may together form one large site, possibly including a silcrete quarry. These sites are in the vicinity of the proposed Rising Pipeline 3 (**Figure 5**).

- #45-5-2526: Potential archaeological deposit (PAD) and artefact scatter. The site extends along an alluvial creek terrace, adjacent flat plain and low hillslope areas, and is thought to be a silcrete quarry. There is a concentration of artefacts that appears to be associated with the banks of a tributary of Killarney Chain of Ponds. The site is thought to be at least 350 x 100 m in extent, and to extend at least 50 m to the east of Loftus Street.

  #45-5-2526 is a large site, the exact boundaries of which are presently undefined. The proposed Wastewater Lead-in Mains L4-6 and the Edmund Street Main cross this area.

- #45-5-2838: Artefact scatter. This consists of four artefacts. It is probable that the site was removed during an upgrade of Windsor Road.

- #45-5-2839: Artefact scatter. This consists of three artefacts, probably eroding out of a fill deposit. It is probable that the site was removed during an upgrade of Windsor Road.

- #45-5-2840: Isolated artefact. This consists of a single artefact, located within road gravel. It is probable that the site was removed during an upgrade of Windsor Road.

Are there any other sources of information of which a person is already aware, which can be used to identify whether or not Aboriginal objects are likely to be present in the area? (Code)
Description of any social and cultural values including the spiritual, traditional, historical or contemporary associations and attachments which the place or area has for the present-day Aboriginal community. (Draft Part 3A Guidelines)

Two previous archaeological assessments of the vicinity of the study area have been undertaken on behalf of Sydney Water, in order to inform the Environmental Assessment of the proposed installation of water related services for the First Release Precincts of the North

West Growth Centre (ENSR AECOM, January 2008; ENSR AECOM, June 2008). A third assessment has been undertaken on behalf of Sydney Water, for the Second Release Precincts of the North West Growth Centre (AHMS, March 2011). These studies partly overlap with the study area.

The following sites have been identified within or in close proximity to the study area (**Figure 6**, **Figure 7**, **Figure 8**):

- RL3: This is believed to relate to AHIMS #45-5-2526, discussed above. The proposed Wastewater Lead-in Mains L4-6 and the Edmund Street Main cross the area of this site.

- RL5: Artefact scatter and archaeological deposit. The proposed Sydney Street Main runs immediately past this site.

- A4: Isolated find and archaeological deposit. This was located on the north-east edge of a well-preserved section of First Ponds Creek, about 200 m south-west of Windsor Road. The site was assessed as of moderate archaeological significance (ENSR AECOM, January 2008). The location of this site does not appear to be within the study area.

- RV18: Background scatter. This site consisted of <10 artefacts over an area of about 10 m^2, probably located on the edge of a dam. It was assessed as of low archaeological significance (ENSR AECOM, January 2008). The location of this site does not appear to be within the study area.

- RV19: Background scatter. This site consisted of three artefacts in a heavily disturbed context. It was assessed as of low archaeological significance (ENSR AECOM, January 2008). The location of this site does not appear to be within the study area.

- 1002-6: Potential archaeological deposit (PAD). This consists of an area of flat, slightly elevated dry ground situated directly to the east of a low lying swampy area at the western end of Hobart Street. It was identified as a PAD due to the relatively low levels of disturbance and the proximity to the resource area of the swamp. The site was assessed as of moderate scientific significance (AHMS, March 2011). The site is in close proximity to RL5, and may form part of the same PAD. The site is in the vicinity of the Sydney Street Main, and may extend to within the study area (**Figure 8**).

Are there any landscape features that are likely to indicate the presence of Aboriginal objects? (Code)

The Code defines a series of landscape features that are known to have high potential to retain Aboriginal objects/sites. These consist of land in the following situations:

- within 200 m of waters,
- within a sand dune system,
- on a ridge top, ridge line or headland,
- within 200 m below or above a cliff face,
- within 20 m of or in a cave, rock shelter, or a cave mouth.

Modelling of archaeological probability was undertaken as part of the AHMS assessment (March 2011, see **Figure 9**). This modelling was based largely on landform features, and known disturbance. The model indicates that most of the study area is within areas of low and very low archaeological probability. However, those components in proximity to Killarney Chain of Ponds are within areas of high and very high archaeological probability. These are; the proposed realignments of Killarney Chain of Ponds Carrier, Wastewater Lead-in Main L7, the eastern end of Wastewater Lead-in Mains L4-6, and the northern two of the three alternative sites for the Sewage Pumping Station SP 1154. The third option for SP 1154 is within an area of moderate archaeological probability.

Can harm to the Aboriginal objects listed on AHIMS or identified by other sources of information and/or can the carrying out the activity at the relevant landscape features be avoided? (Code)

It may be possible to avoid harm to the known Aboriginal objects and potential archaeological sites, through alteration to the location of the proposed infrastructure and/or use of boring rather than trenching for the installation of pipes.

Does a desktop assessment and visual inspection confirm that there are Aboriginal objects or that they are likely? (Code)

A site inspection was undertaken by Fenella Atkinson and Laura Matarese, AHMS archaeologists, on 20 June 2011. The inspection found that most of the study area has been disturbed through previous and current land uses. No sites or areas of potential were identified in addition to those identified through the background research.

Following are the results of the site inspection with reference to the areas of potential sensitivity identified through the background research.

AHIMS #45-5-0582 The study area in the vicinity of this site consists of grassed pasture, with sparse trees (**Figure 10**). Although the area has been disturbed through clearing and agricultural use, the presence of several registered sites indicates that this disturbance has not removed the archaeological potential of the area.

AHIMS #45-5-2526 / RL3 To the north of Loftus Street, in the vicinity of this site, the property consists of grassed pasture, which has been used for market gardening (**Figure 11**). Loftus Street itself is a dirt track, which has been heavily eroded in places. To the south of Loftus Street, the property is heavily vegetated, with what appears to be regrowth native vegetation (**Figure 12**). The level of disturbance does not appear to be substantially greater than when the site AHIMS #45-5-2526 / RL3 was identified, and it is likely that the site remains in the study area.

RL5 and 1002-6 The study area runs along Sydney Street, to the south of the two identified PADs (**Figure 13**). The land to either side is heavily vegetated, with what appears to be regrowth native vegetation. Sydney Street is a meandering narrow dirt track. The identification of the two PADs appears to have been based at least partly on the proposed area of impact at the time of the previous assessments, and it is possible that the PADs extend across the study area. Although the creation and use of Sydney Street is likely to have resulted in at least some impact, this impact is unlikely to have extended across the whole of the road reserve.

Killarney Chain of Ponds The inspection found that substantial disturbance has occurred along Killarney Chain of Ponds in the vicinity of the study area. Earthworks have been carried out along much of the creek to dam and control the flow of water (**Figure 14**). In the vicinity of the proposed realignments of Killarney Chain of Ponds Carrier, Wastewater Lead-in Main L7, and the eastern end of Wastewater Lead-in Mains L4-6, it is likely that the existing disturbance has significantly reduced the archaeological potential identified in the probability modelling. However, less disturbance is evident in the location of the three alternative sites for the Sewage Pumping Station (**Figure 15**), and it is likely that the probability modelling is valid in this location.

Results

In general, the study area is within disturbed areas with low Aboriginal archaeological potential. The potential for the proposed works to cause harm to Aboriginal objects is considered unlikely in the following cases:

- Killarney Chain of Ponds Realignment A
- Killarney Chain of Ponds Realignment B
- Killarney Chain of Ponds Realignment C
- Killarney Chain of Ponds Realignment D
- Rising Pipeline 4
- Wastewater Lead-in Main L7

- Hamilton Street Main

No further Aboriginal investigation or assessment is required for the proposed works listed above. Should Aboriginal objects be identified in the course of construction, work should cease in the vicinity, and OEH should be contacted for advice.

Known and potential Aboriginal objects and sites have been identified in three parts of the study area. The potential for the proposed works to cause harm to Aboriginal objects has been identified in the following cases:

- SP1154 Site Options
- Rising Pipeline 3
- Wastewater Lead-in Mains L4-6
- Edmund Street Main
- Sydney Street Main

Consideration should be given to avoiding the potential impact through redesigning the five components listed above. Should this not be possible, further investigation and assessment should be undertaken in accordance with the draft Part 3A Guidelines.

If you have any further questions or enquiries, please contact Alan Williams or Fenella Atkinson on 02 9555 4000.

Yours sincerely,

Lisa Newell

Lisa Newell

Associate Director, AHMS

References

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HLA ENSR, January 2008, 'Aboriginal Heritage Assessment: Sydney Water Infrastructure in the Northwest Growth Centres of Riverstone and Alex Avenue', for Sydney Water.

Appendix 1: Background Information

Table 1. Summary of the due diligence process outlined in OEH's (2010) guidelines to determine whether or not further investigation and/or impact assessment is required.

Question #	Response for the project	Requirement
1	Yes	Continue to Question 2.
	~~No~~	~~AHIP not required. Proceed with caution. If any Aboriginal objects are found, stop work and notify DECCW. If human skeletal remains are found, stop work, secure the site and notify the NSW Police and DECCW.~~
2	Yes	Continue to Question 3.
	~~No~~	~~AHIP not required. Proceed with caution. If any Aboriginal objects are found, stop work and notify DECCW. If human skeletal remains are found, stop work, secure the site and notify the NSW Police and DECCW.~~
3	~~Yes~~	~~AHIP not required. Proceed with caution. If any Aboriginal objects are found, stop work and notify DECCW. If human skeletal remains are found, stop work, secure the site and notify the NSW Police and DECCW.~~
	No	Continue to Question 4.
4	Yes	Continue to Question 5.
	~~No~~	~~AHIP not required. Proceed with caution. If any Aboriginal objects are found, stop work and notify DECCW. If human skeletal remains are found, stop work, secure the site and notify the NSW Police and DECCW.~~
5	Further investigation and impact assessment required	

Table 2. Details of AHIMS sites in the vicinity of the study area.

Site ID	Site Name	Site Features	Within Study Area
45-5-0210	Eastern Creek	Artefact	No
45-5-0312	QH 6; Quakers Hill	Artefact	No
45-5-0313	QH 7; Quakers Hill	Artefact	No
45-5-0359	QH 3 Quakers Hill	Artefact	No
45-5-0360	QH 4 Quakers Hill	Artefact	No
45-5-0361	QH 5 Quakers Hill	Artefact	No
45-5-0573	Blacktown Northwest 2 Riverstone Meatworks	Artefact	No
45-5-0574	Blacktown Northwest 3 Riverstone Meatworks	Artefact	No
45-5-0575	Blacktown Northwest 4 Riverstone Meatworks	Artefact	No
45-5-0579	Vineyard 1 Riverstone Meatworks	Artefact	No
45-5-0580	Vineyard 2 Riverstone Meatworks	Artefact	No
45-5-0581	Vineyard 3 Riverstone Meatworks	Artefact	No
45-5-0582	Vineyard 4 Riverstone Meatworks	Artefact	In proximity
45-5-0586	Meatworks 1 Riverstone Meatworks	Artefact	No
45-5-0587	Meatworks 2 Riverstone Meatworks	Artefact	No
45-5-2525	EC-OS-2	Artefact	No
45-5-2526	LL-OS-1	Artefact	Yes
45-5-2527	EC-OS-5	Artefact	No
45-5-2530	EC-OS-3	Artefact	No
45-5-2531	EC-OS-6	Artefact	No
45-5-2532	EC-OS-4	Artefact	No
45-5-2533	EC-IF-2	Artefact	No
45-5-2590	CCS1	Artefact	No
45-5-2838	WBH9	Artefact	No
45-5-2839	WBH2	Artefact	No
45-5-2840	WBH3	Artefact	No
45-5-2841	WBH4	Artefact	No
45-5-2845	WBH8	Artefact	No
45-5-2846	WBH1	Artefact	No
45-5-2870	WMB4	Artefact	No
45-5-2871	WMB5	Artefact	No

Site ID	Site Name	Site Features	Within Study Area
45-5-2902	PAD WBH	Potential Archaeological Deposit	No
45-5-3632	ISF3 Riverstone Meatworks	Artefact	No
45-5-3633	ISF4 Riverstone Meatworks	Artefact	No
45-5-3634	Pole Site 9 & 10 Riverstone	Artefact	No
45-5-3635	RM Campsite 1	Artefact	No
45-5-3636	RV11 (Riverstone)	Artefact	No
45-5-3637	Vineyard 1	Artefact	No
45-5-3640	RWP1 Riverstone	Artefact	No
45-5-3641	RWP2 Riverstone	Artefact	No
45-5-3642	A1 PAD	Potential Archaeological Deposit	No
45-5-3821	BH 4	Artefact	No
45-5-3822	BH 5	Artefact	No
45-5-3823	BH 6	Artefact	No
45-5-3824	BH 7	Artefact	No
45-5-3825	BH 8	Artefact	No
45-5-3826	BH 9	Artefact	No
45-5-3827	BH 10	Artefact	No
45-5-3828	BH 11	Artefact	No
45-5-3829	BH 12	Artefact	No
45-5-3830	BH PAD 1	Potential Archaeological Deposit	No
45-5-3831	BH PAD 2	Potential Archaeological Deposit	No
45-5-3832	BH PAD 3	Potential Archaeological Deposit	No
45-5-3833	BH PAD 4	Potential Archaeological Deposit	No
45-5-3834	BH PAD 5	Potential Archaeological Deposit	No
45-5-3835	BH PAD 6	Potential Archaeological Deposit	No
45-5-3836	BH PAD 7	Potential Archaeological Deposit	No
45-5-3837	BH PAD 8	Potential Archaeological Deposit	No
45-5-3838	BH PAD 9	Potential Archaeological Deposit	No
45-5-3839	BH PAD 10	Potential Archaeological Deposit	No
45-5-3840	BH PAD 11	Potential Archaeological Deposit	No
45-5-3977	BH AS5	Artefact	No
45-5-3979	BH AS7	Artefact	No
45-5-3980	BH AS8	Artefact	No
45-5-3981	BH AS9	Artefact	No

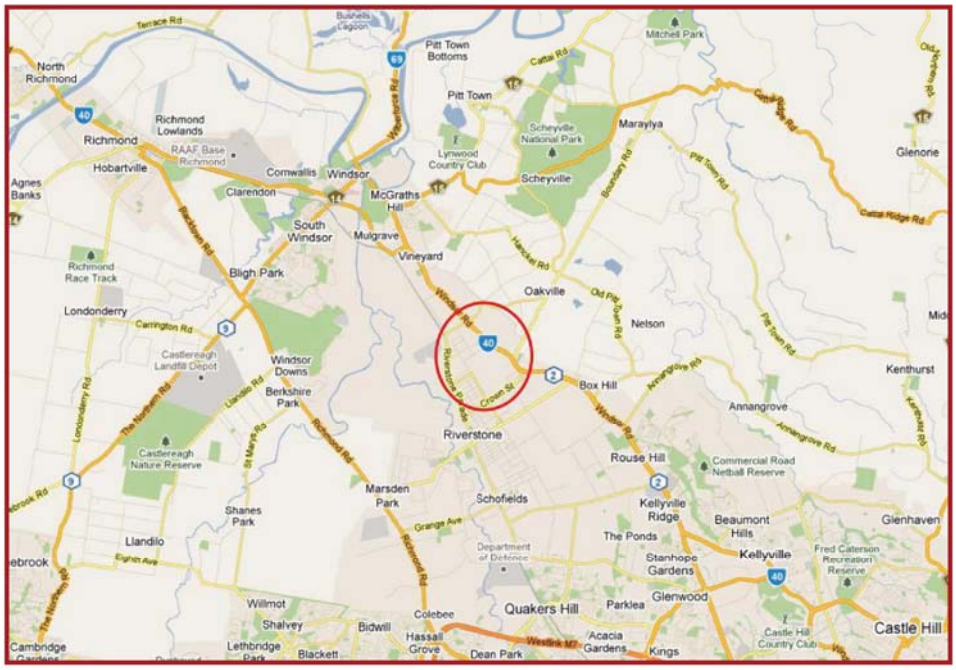

Figure 1. The general location of the proposed works, circled in red (source of base map: Google Maps).

Figure 2. The locations of the proposed works (source of base map: Google Maps).

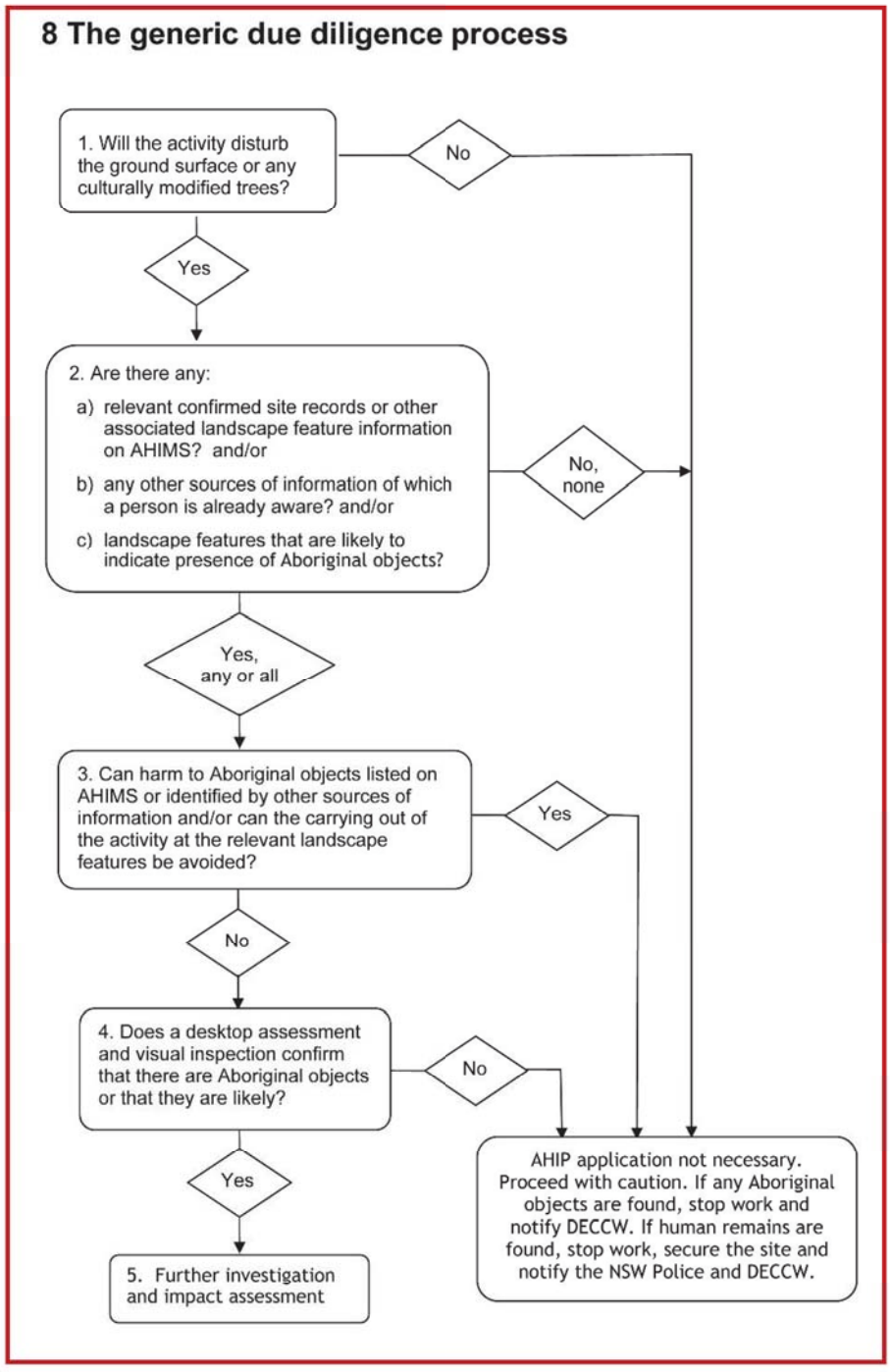

Figure 3. The generic due diligence process as outlined in the Code (Source: DECCW, 2010).

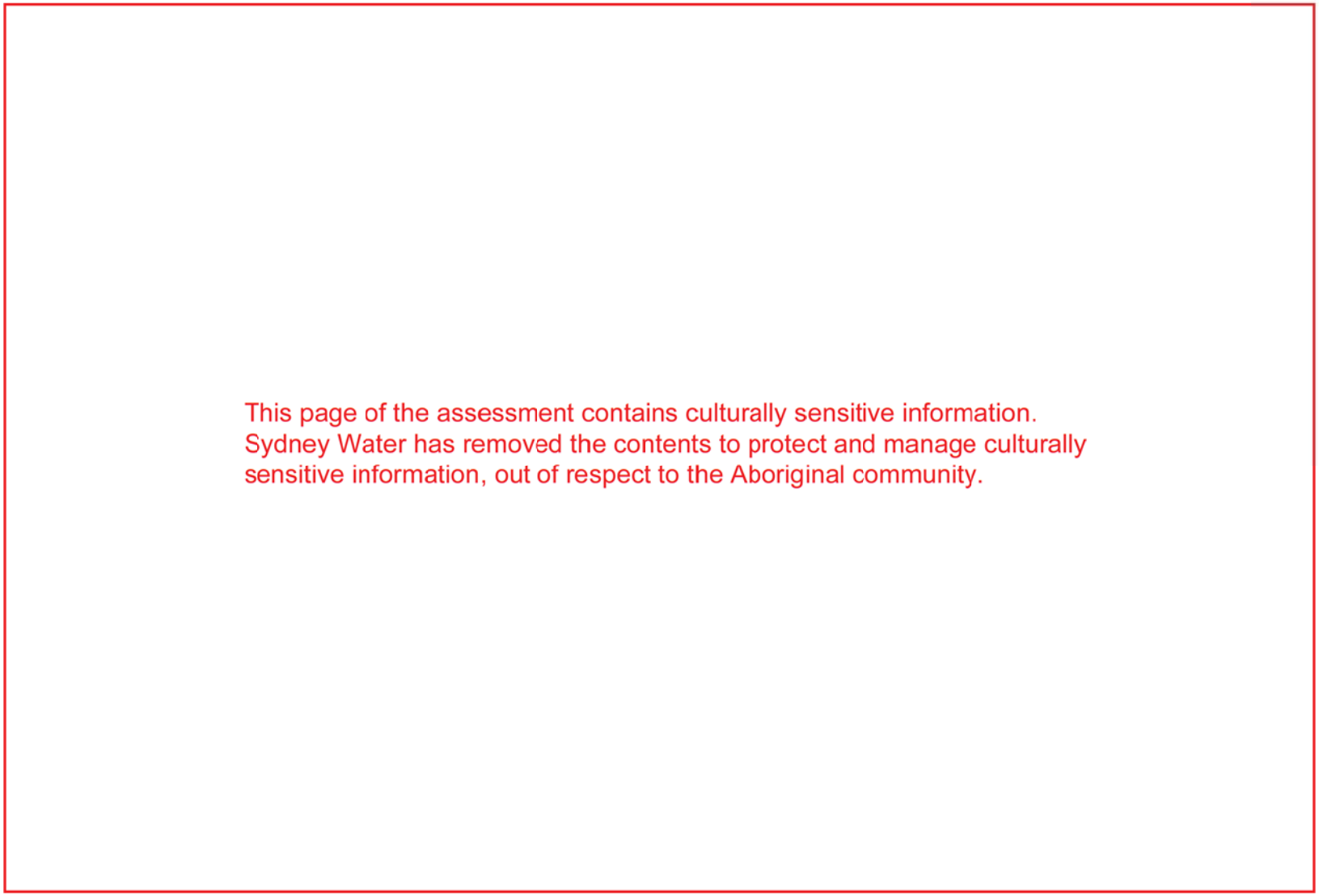

Figure 4. Map of AHIMS sites within a 5 km square centred on the study area.

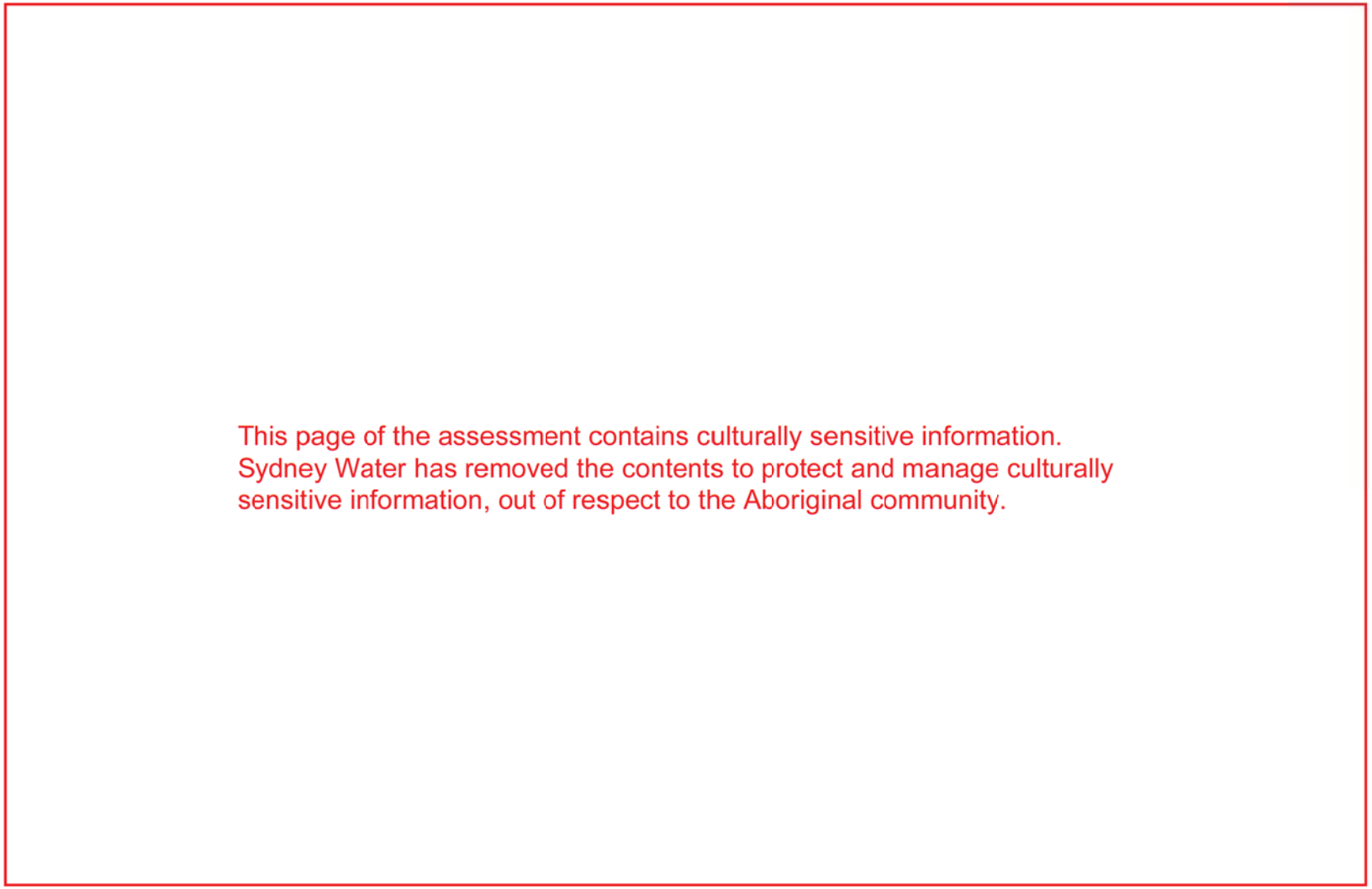

Figure 5. Detailed map showing the AHIMS sites in the vicinity of the study area.

Figure 6. The study area in relation to previously identified sites (source of base map: HLA ENSR, 2008, Figure 2).

Figure 7. The study area in relation to previously identified sites (source of base map: HLA ENSR, January 2008, Figure 9).

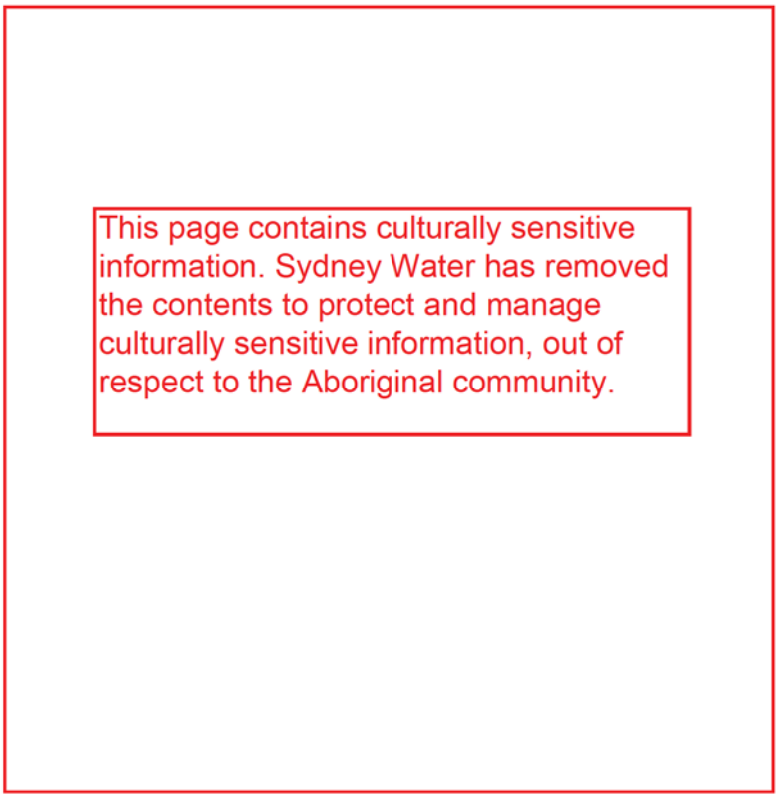

Figure 8. The study area in the vicinity of PAD 1002-6 (source of base map: AHMS, March 2011).

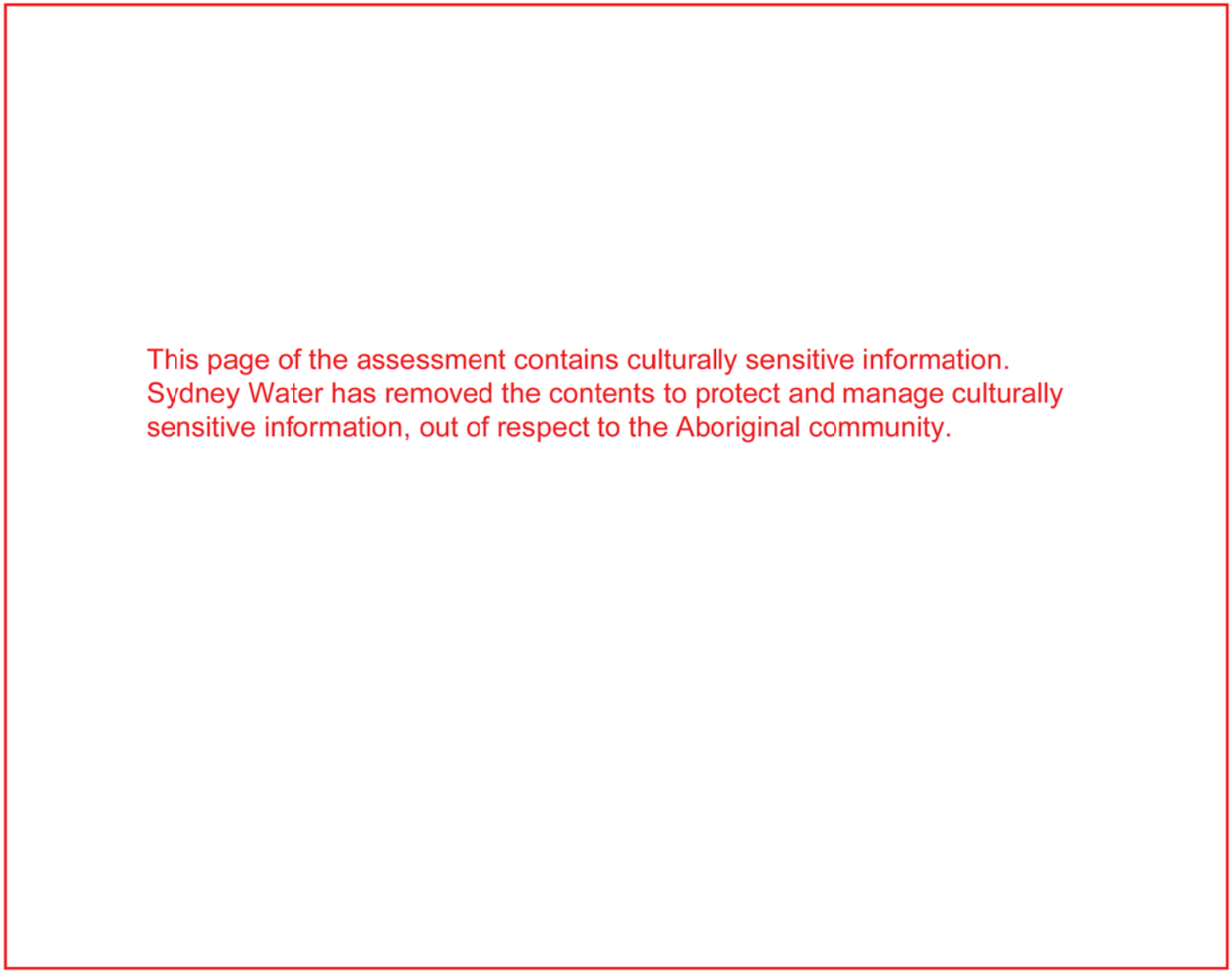

Figure 9. The study area in relation to modelling of archaeological probability (source of map: AHMS, March 2011).

Figure 10. Looking west across Riverstone Parade, towards the vicinity of proposed Rising Pipeline 3 and AHIMS #45-5-0582.

Figure 11. The property to the north of Loftus Street, in the vicinity of AHIMS #45-5-2526 / RL3.

Figure 12. To the south of Loftus Street, in the vicinity of AHIMS #45-5-2526 / RL3.

Figure 13. Sydney Street, in the vicinity of PADs RL5 and 1002-6.

Figure 14. The study area in the vicinity of Killarney Chain of Ponds, showing disturbance due to earthworks.

Figure 15. The study area, off Chapman Road.

APPENDIX 2

Aboriginal Community Consultation Log

This appendi□has been removed from the assessment as it may contain culturally sensitive information

APPENDIX 3

Aboriginal Community Consultation - Information Provided by AHMS

This appendi□has been removed from the assessment as it may contain culturally sensitive information

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15 November 2011 Our Ref.: 110920-2

RAP
Address Line 1
Address Line 2
Address Line 3

Aboriginal Cultural Heritage Impact Assessment

Water Related Infrastructure for the North West Growth Centre First Release Precincts: Riverstone Additional Options

Project Information and Proposed Assessment Methodology

Dear RAP,

On behalf of Sydney Water, Archaeological and Heritage Management Solutions (AHMS) is undertaking an Aboriginal Cultural Heritage Impact Assessment (ACHIA) of proposed infrastructure in Riverstone. The general location of the proposed infrastructure is shown in Figure 1.

Konganggo Cultural Heritage Services is a Registered Aboriginal Party in the cultural heritage assessment of Sydney Water's proposed infrastructure in the North West and South West Growth Centres. I am therefore writing to provide you with project information, and the proposed assessment methodology for your review.

Could you please let me know if you wish to be consulted regarding the assessment of this particular subject area (Figure 1)? If so, I would appreciate your response to the following points:

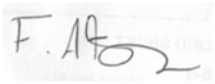
1. Comments on the proposed assessment methodology enclosed;
2. Details of any protocols that you would like adopted during this project to obtain and/or use cultural information;
3. Identification of any Aboriginal objects and/or places of cultural value that you are aware of within the subject areas;
4. Whether you require any further information prior to AHMS proceeding with the assessment.
5. Whether your organisation would like to have a representative involved in the survey.

Please provide your response in writing by **28 November 2011**. All correspondence should be sent to:

Anna Biggs
AHMS
Postal address: 349 Annandale Street,
ANNANDALE, NSW 2038.
Email address: abiggs@ahms.com.au
Fax no.: (02) 9555 7005

Thank you for your interest and participation in this project. I look forward to receiving your response. If you have any questions, please contact me or Anna Biggs on (02) 9555 4000.

Yours faithfully,



Fenella Atkinson.

Project Background

Sydney Water proposes to install water related infrastructure for the North West Growth Centre First Release Precincts. The proposed infrastructure has been approved under Part 3A of the *Environmental Planning and Assessment Act 1979*. Further planning and design has resulted in several changes to the original proposal, in Riverstone (Figure 1).

A preliminary assessment of the proposed changes was undertaken by AHMS in August 2011. The assessment identified the potential for the proposed works to cause harm to Aboriginal objects in a number of cases. Where possible, Sydney Water has redesigned components to avoid the potential harm. However, the potential for impact remains in the following cases (see Figure 2):

- Sewage Pumping Station 1154 (SP1154) Site Options,
- Rising Main Pipeline 3,
- Wastewater Lead-in Mains L4-6,
- Edmund Street Main.

Further design amendments have since been made and will also require assessment:

- Lead-in pipeline from Killarney Chain of Ponds Carrier to SP1154,
- Crown Street Main.

Sydney Water has therefore commissioned AHMS to undertake an Aboriginal cultural heritage impact assessment of the above components of the proposed infrastructure. In addition, Sydney Water has requested that the assessment address any potential for impact on an identified heritage site within the boundaries of the Riverstone Waste Water Treatment Plant (WWTP).

Community Consultation

With regard to Aboriginal community consultation, the guidelines for the assessment of Part 3A projects refer to the *Interim Aboriginal Community Consultation Guidelines*. These have now been superseded by *Aboriginal Cultural Heritage Consultation Requirements for Proponents 2010* (DECCW, April 2010).

It is therefore proposed to use the more recent *Consultation Requirements* as a general guide for the present assessment. The consultation process will follow on from the initial stages undertaken by AHMS for the assessment of the North West and South West Growth Centres Second Release Precinct infrastructure. The next stages in the consultation process are:

1) *Review of the proposed assessment methodology.* The methodology is outlined in the following section, for your review. A form for your response is enclosed. This form is simply for your convenience and you are under no obligation to use it. Please provide comments in writing by **28 November 2011**.

2) *Survey of subject area.* Representatives of all Registered Aboriginal Parties will be invited to visit the subject area. However, due to insurance requirements and the large number of registrations of interest, it may not be possible to offer every Registered Aboriginal Party a paid position on the survey team.

3) *Review of draft Aboriginal Cultural Heritage Impact Assessment.* Following the survey, the assessment will be completed to draft stage. A copy of the draft will be provided to **all** Registered Aboriginal Parties. We will request a written response on the cultural heritage values of the subject area, the draft assessment, and the recommendations for the management of Aboriginal cultural heritage in the subject area.

Proposed Methodology

The Aboriginal Cultural Heritage Impact Assessment (ACHIA) will be undertaken according to the draft *Guidelines for Aboriginal Cultural Heritage Impact Assessment and Community Consultation* (DEC, July 2005).

The ACHIA will include the following:

- A review of the archaeology, ethno-history, landscape and land-use history of the subject area and surrounding region.
- A predictive model of the archaeological potential of the subject area.
- Details and results of a survey of the subject area (undertaken as outlined below).
- Details of the process and results of the Aboriginal cultural heritage consultation process undertaken for the project.
- Assessment of the significance, both cultural and archaeological, of any Aboriginal sites, objects and/or places identified within the study area.
- Assessment of the potential Aboriginal cultural heritage impact of the proposed development, and recommendations to manage and/or mitigate this potential impact.

The ACHIA will be submitted as a draft for review to all the Registered Aboriginal Parties. Comments and recommendations received from the Registered Aboriginal Parties will be included in the final version of the ACHIA.

Survey

AHMS proposes to undertake a survey of the subject area, according to the *Code of Practice for Archaeological Investigation of Aboriginal Objects in NSW* (DECCW, September 2010). Our proposed survey team will include two AHMS archaeologists, and representatives of the Registered Aboriginal Parties. We have allowed one day for the survey. The survey will cover the following areas:

- A 20-metre wide corridor for the proposed pipeline locations,
- The area of the various options for the location of SP1154,

- The location of the identified heritage site within the boundaries of the Riverstone WWTP.

Ground visibility in the subject area is generally low, because of vegetation cover and hard surfaces. The survey will therefore be designed to target the following:

- Any AHIMS sites within the subject area;
- Areas with exposed soil, such as around dams, along tracks and in cuttings;
- Areas identified in the predictive modelling as having higher potential, such as along creek lines;
- Mature native trees.

The survey will involve the recording of Aboriginal objects and/or sites identified, as well as other relevant information including landform types, disturbance, and ground exposure and visibility. The information will be recorded using photographs, sketches, written descriptions, and co-ordinates (using a hand-held non-differential GPS). Any new sites recorded will be registered with the OEH Aboriginal Heritage Information Management System (AHIMS).

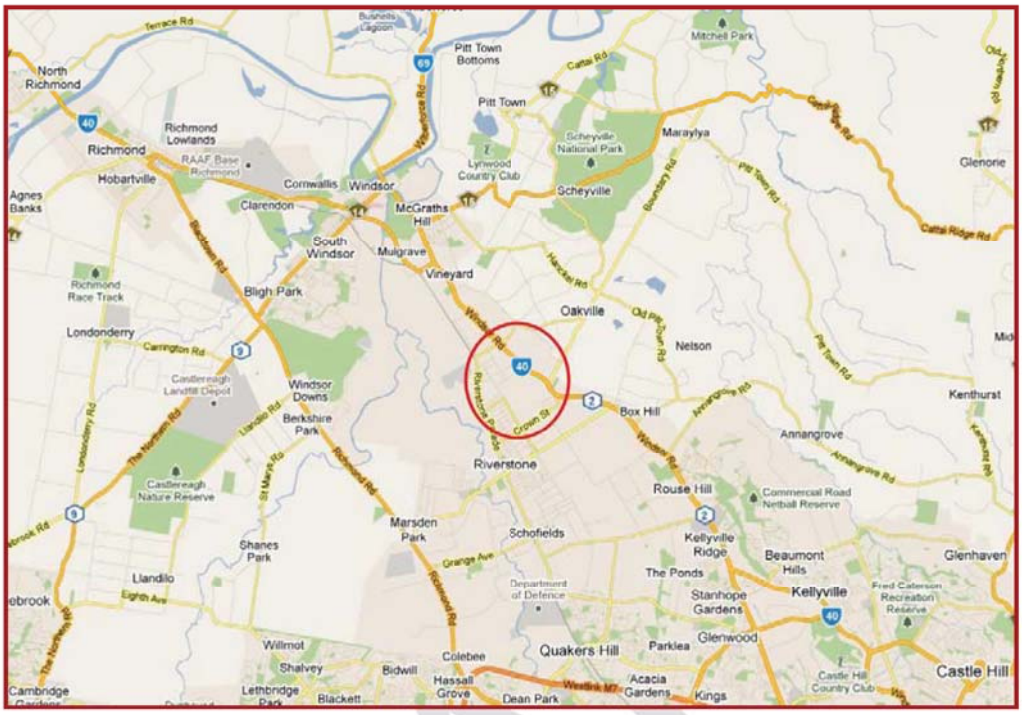


Figure 1. The general location of the proposed infrastructure, circled in red.

Figure 2. The location of the proposed infrastructure.

Review of Proposed Methodology

I have been sent information on the proposed methodology for the Aboriginal cultural heritage impact assessment of the proposed water related infrastructure in Riverstone. I endorse the proposed methodology, unless otherwise stated below, or with the following amendments:

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Name.....

Organisation.....

Signature.....

Send to: AHMS
349 Annandale Street,
Annandale, NSW 2038

Ph (02) 9555 4000
Fax (02) 9555 7005
Email: abiggs@ahms.com.au

APPENDIX 4

Aboriginal Community Consultation - Responses/Comments on AHMS Methodology from the Registered Aboriginal Parties

NOT FOR PUBLIC EXHIBITION

APPENDIX 5

Aboriginal Heritage Information Management Systems – Site Cards for Previously Documented Sites within/near the Proposal Field Assessment Area

NOT FOR PUBLIC EXHIBITION