

Kings Hill Water and Wastewater Infrastructure

Statement of Heritage Impact

Report to Arcadis
October 2019

Report for:



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EXECUTIVE SUMMARY

Kings Hill Development Pty Ltd (KHD) is seeking approval for the development of a water and waste water supply pipeline and a waste water pumping station (the Proposal) to support the development of the Kings Hill Urban Release Area (Kings Hill URA).

Approval for the Proposal is being sought as a Designated Development under Part 4 of the *Environmental Planning and Assessment 1979* (EP&A Act). As such, the Planning Secretary's Environmental Assessment Requirements (SEARs) (1291) have been issued for the project. It is a requirement of the SEARs (1291) that a non-Aboriginal cultural heritage report is prepared for the project. This Statement of Heritage Impact (SoHI) report satisfies this requirement.

Overview of findings

There are three heritage items in the Proposal Site: Irrawang Pottery Site (LEP A4 / ID127) and Grahamstown Dam (which includes the Irrawang and Grahamstown spillways) (ID60/SHI# 3630054) and Boomerang Park (LEP I45). There are four heritage items and one conservation area located within a 30 metre buffer of the Proposed Pipeline Alignment:

- I46, I47 and I81 as part of the Brigid's Church complex
- I44 timber cottage (former mounted police barracks)
- C2 the Raymond Terrace Conservation Area C2

There is potential for impact to significant archaeological remains associated with King's Irrawang House, Winery and Barn complex (Irrawang Pottery Site Archaeological Area A4).

An archaeological test excavation program under a s139 exception issued by Heritage NSW, Department of Premier and Cabinet will be required to identify the location, nature and significance of any archaeological remains located within the proposed pipeline alignment. The purpose of the s139 exception is for investigative purposes and not for impacts to relics. Depending on the results of that program of archaeological test excavation, the pipeline alignment the proponent will be shift the pipeline alignment within the Proposal Site in an attempt to avoid any substantially intact and/or significant archaeological remains.

Examples of substantially intact remains that may be identified within the Proposed site during archaeological test excavation include the footings and intact underfloor deposits associated with Kings House, intact wells and cisterns, and rubbish dumps/ yard scatters consisting of significant archaeological remains dating to the construction and occupation of King's Irrawang House, Winery and Barn complex.

Following the completion of the s139 exception archaeological test excavation program, finalisation of the pipeline alignment, and final archaeological impact assessment, a s140 permit may be required for any impacts to significant archaeological remains that will result from archaeological salvage excavation (if required) and pipeline construction works. The s140 permit, if required, must be sought from NSW Heritage in advance of proposed impacts.

The pipeline installation has the potential to impact the fabric and structure of the Irrawang and Grahamstown spillways. It is recommended that methods used for installation of the pipeline across the Irrawang and Grahamstown spillways ensure that these works do not impact the stability of these structures and minimise impact to the fabric. Vegetation clearance is to be undertaken with caution so as not to impact the fabric of these structures.

Built heritage items I44, I46, I47 and I81 and the conservation area C2 will have a temporary visual impact during construction. As these impacts will be temporary in nature no mitigation has been proposed.

The root zones of mature trees in Boomerang Park (I45) have the potential to be impacted by the earthworks and installation of the pipeline. A qualified arborist is to provide a report (as part of Detailed Design, post approval, as relevant) on whether there will be negative health outcomes for the trees as a result of the Proposal and the arborist is to advise on any additional mitigation measures required.

Recommendations

- A program of archaeological test excavation must be undertaken within the area where significant archaeological remains associated with King's Irrawang House, Winder and Barn complex may occur within the Proposal Site
- The archaeological test excavation program must be conducted in accordance with a Section 139 exception issued by NSW Heritage (Department of Premier and Cabinet) under the *Heritage Act 1977*. The application for the s139 exception should be supported by this document and a standalone excavation methodology (Archaeological Research Design [ARD]). The excavation methodology should include detailed assessment of potential archaeological remains, archaeological potential mapping, and detailed significance assessment
- Based on the results of the Section 139 exception archaeological testing a preferred final alignment is to be selected within the Proposal Site. The final alignment will seek to avoid as much impact as possible to significant archaeological remains identified during the archaeological test excavation program
- An updated impact assessment should be prepared that provides a final assessment of impacts to significant archaeological remains that may result from installation of the pipeline. The updated impact assessment will provide recommendations for further approvals and archaeological investigation that may be required
- Where there will be impacts to relics as a result of installation of the pipeline, a Section 140 permit issued by NSW Heritage under the *Heritage Act 1977* must be in place prior to commencement of works. Archaeological salvage excavation may also be required under the s140 permit prior to commencement of pipeline installation works
- Any archaeological remains identified through background research and the s139 archaeological test excavation program in the immediate vicinity of the works area must be identified and mapped in the Construction Environment Management Plan (CEMP) and physically cordoned off during works to prevent any inadvertent impacts.
- Detailed design should consider methods for installation of the pipeline across Irrawang and Grahamstown spillways that will not impact the stability of these structures and with minimal impact to the fabric. Vibration impacts to heritage items must not exceed the recommended screening level of 7.5 millimetres per second. It is recommended that vibration monitoring occurs during works in the vicinity of heritage items. Vibration monitoring and inspection by a structural

engineer who is familiar with heritage structures should be undertaken where required if the predicted ground-borne vibration levels exceed the anticipated rating and/or cause impacts to significant fabric.

- A qualified Arborist is to prepare a report (as part of Detailed Design, post approval, as relevant) on whether there will be impacts to the root zones of the heritage listed trees in Boomerang Park (I45) and additional mitigation measures to be implemented as required.
- A heritage induction is to be provided to all onsite personnel so that they are aware of their obligations under the *NSW Heritage Act 1977*.
- The CEMP for the Proposal is to include a stop work procedure for unexpected heritage finds. This procedure is to ensure the appropriate management of historic finds, in the unlikely event that relics, or suspected relics (historic material) is encountered during onsite works. The stop work procedure would involve an obligation to stop ground disturbing works in the area of the find, to contact the project heritage consultant, to implement management strategies as directed by the heritage consultant and/or Heritage Division of the Office of Environment and Heritage and to commence works in that area only once clearance has been obtained from the heritage consultant and/or the Office of Environment and Heritage.

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1.0 INTRODUCTION

1.1 Project Background

Kings Hill Development Pty Ltd (KHD) is seeking approval for the development of a water and waste water supply pipeline and a waste water pumping station (the Proposal) to support the development of the Kings Hill Urban Release Area (Kings Hill URA).

The Kings Hill URA was rezoned in 2010 to support a mix of general residential, mixed use and local centre land uses. It is expected to comprise in excess of 3,500 residential dwellings developed over a twenty-five-year period. Key development features of the Kings Hill URA will also include the provision of utilities and supporting infrastructure, including a Pacific Highway grade separated interchange, stormwater channel and water and wastewater infrastructure. There is currently no water and wastewater infrastructure present with the capacity to service Kings Hill URA.

1.2 Key Terms

The key terms are outlined in Table 1

Table 1: Terminology

Term	Definition
Kings Hill URA	Kings Hill Urban Release Area
Proposal	Water and waste water supply pipeline and a waste water pumping station to support the Kings Hill URA
Proposal Site	The Proposal stretches about 6.7 kilometres between Raymond Terrace in the south and Kings Hill Urban Residential Area in the north. The Proposal Site encompasses the total construction footprint which includes the footprints of the wastewater pumping station, water pipeline and wastewater pipeline, in addition to buffer areas and temporary construction compounds.
Proposed Pipeline Alignment	This is the proposed route of the pipeline (including water and wastewater) it will typically be 1 metre in width.

1.3 Proposal Site

The Proposal is located within Port Stephens Local Government Area (LGA), approximately 4 kilometres north of Raymond Terrace, 25 kilometres north of Newcastle and 135 kilometres north of Sydney. The Proposal stretches approximately 6.7 kilometres (the Proposal Site) between Raymond Terrace in the south, and Kings Hill URA in the north. The location of the Proposal site is shown in Figure 1.

Figure 1: Proposal Location



The Proposal site includes the footprints of the wastewater pumping station, water pipeline and wastewater pipeline, in addition to buffer areas and temporary construction compounds.

The Proposed Pipeline Alignment includes the proposed route for the water and wastewater pipelines.

1.4 Proposal Description

This study forms part of the investigations needed for the wider Environmental Impact Statement (EIS) for the project.

An EIS is to be prepared for the Proposal seeking approval as Designated Development under Part 4 of the *Environmental Planning and Assessment 1979* (EP&A Act).

The key components of the Proposal would include:

- Installation of a water and wastewater pipelines, approximately 6.7km and 4.2km in length, respectively. These pipelines would be located within a joint corridor. This would require vegetation clearing, trenching and underboring for the pipes to be laid.
- Construction of a wastewater pumping station (WWPS) within the eastern catchment of Kings Hill URA, including installation of electrical components, mechanical installation of pumps, valves and fittings, and construction of adjacent hardstand areas.
- Restoration of area upon completion of pipe laying, including backfilling the trench and restoring all surfaces to their pre-construction condition where practicable.
- Connection of the proposed infrastructure to existing Hunter Water services.

The Key components of the Proposal which relate to this heritage assessment are:

- Earthworks - Trenching, underboring, back filling and restoration works
- Vegetation Clearance
- Construction of the WWPS

The water pipeline would connect to existing Hunter Water infrastructure in the south and the Kings Hill URA in the north, while the wastewater pipeline would connect to the proposed WWPS in Kings Hill URA and existing Hunter Water infrastructure in the south.

1.5 Report methodology

This Statement of Heritage Impact (SoHI) has been prepared using the document Statement of Heritage Impact (2002), prepared by the NSW Heritage Office (former), contained within the NSW Heritage Manual, as a guideline and includes:

- Desktop searches of relevant heritage registers.
- Review of Proposal drawings and concept design reports.
- Background research into the historical development of Raymond Terrace in the vicinity of the Proposal site using the historic plans, historical photographs, newspapers and other primary and secondary historical sources as relevant as referenced.

- A site inspection conducted on 30 and 31 July 2019 by Tessa Boer-Mah, Senior Heritage Consultant and Jennifer Norfolk, Heritage Consultant at Artefact Heritage. Note: all photographs within this report were taken by Artefact during these site inspections unless otherwise stated.
- Assessment of the Proposal against the heritage significance of the Proposal site. The assessment has been undertaken in light of the conservation processes and principles found in *The Burra Charter: The Australian ICOMOS Charter for Places of Cultural Significance* (2013). The Burra Charter is considered to be the pre-eminent guidance document for the management of change for places of heritage significance within Australia.

1.6 Report limitations

The purpose of this report is to identify and assess historic heritage and archaeological potential which might be impacted by the Proposal. Predictions have been made within this report about the probability of subsurface archaeological materials occurring within the site, based on surface indications and environmental contexts. This report is limited to these observations along with the relevant historical information.

2.0 STATUTORY CONTEXT

2.1 Commonwealth legislation

The *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides a legislative framework for the protection and management of matters of national environmental significance, that is, flora, fauna, ecological communities and heritage places of national and international importance. Heritage items are protected through their inscription on the World Heritage List, National Heritage List or the Commonwealth Heritage List.

The EPBC Act stipulates that a person who has proposed an action that will, or is likely to have; a significant impact on a World, National or Commonwealth Heritage site must refer the action to the Minister for the Environment (hereafter the Minister). The Minister would then determine if the action requires approval under the EPBC Act. If approval is required, an environmental assessment would need to be prepared. The Minister would approve or decline the action based on this assessment.

There are no heritage items in the Proposal site which are registered on the World, National or Commonwealth Heritage Lists, the heritage provisions of this act do not apply and project works for the Proposal do not require referral to the Minister.

2.2 State legislation

2.2.1 Heritage Act 1977

The *NSW Heritage Act 1977* (Heritage Act) is the primary piece of State legislation affording protection to heritage items (natural and cultural) in NSW. Under the Heritage Act, 'items of environmental heritage' include places, buildings, works, relics, moveable objects and precincts identified as significant. Significance is based on historical, scientific, cultural, social, archaeological, architectural, natural or aesthetic values. State significant items can be listed on the NSW State Heritage Register (SHR) and are given automatic protection under the Heritage Act against any activities that may damage an item or affect its heritage significance.

Under the Heritage Act, all government agencies are required to identify, conserve and manage heritage items in their ownership or control. Section 170 requires all government agencies to maintain a Heritage and Conservation Register that lists all heritage assets and an assessment of the significance of each asset. They must also ensure that all items inscribed on its list are maintained with due diligence in accordance with State Owned Heritage Management Principles approved by the Government on advice of the NSW Heritage Council. These principles serve to protect and conserve the heritage significance of items and are based on NSW heritage legislation and guidelines.

The Heritage Act also provides protection for 'relics', which includes archaeological material, features or deposits. Section 4 (1) of the Heritage Act (as amended in 2009) defines a relic as:

"...any deposit, artefact, object or material evidence that:

- (a) relates to the settlement of the area that comprises New South Wales, not being Aboriginal settlement, and
- (b) is of State or local heritage significance"

Sections 139 to 145 of the Heritage Act prevent the excavation or disturbance of land known or likely to contain relics, unless under an excavation permit. Section 139 (1) states:

A person must not disturb or excavate any land knowingly or having reasonable cause to suspect that the disturbance or excavation will or is likely to result in a relic being discovered, exposed, damaged or destroyed unless the disturbance is carried out in accordance with an excavation permit.

Excavation permits are issued by the Heritage Council of NSW, or its Delegate, under Section 140 of the Heritage Act for relics not within SHR curtilages, or under Section 60 for significant archaeological remains within SHR curtilages.

There are two items listed on the Hunter Water s170 register: Irrawang Pottery Site (SHI#3630109) and Grahamstown Dam (which includes the spillways) (SHI# 3630054). The curtilage of the Irrawang Pottery Site is the same as the *Port Stephens Local Environmental Plan 2013* (Port Stephens LEP) listing for the same item (see Section 2.3.2).

2.2.2 Environmental Planning and Assessment Act 1979

The *Environmental Planning and Assessment Act 1979* (EP&A Act) establishes the framework for cultural heritage values to be formally assessed in the land use planning and development consent process. The EP&A Act requires that environmental impacts are considered prior to land development; this includes impacts on cultural heritage items and places as well as archaeological sites and deposits. The current proposal is subject to assessment under Part 4 of the EP&A Act.

The EP&A Act also requires that local governments prepare planning instruments (such as LEPs and Development Control Plans [DCPs]) in accordance with the EP&A Act to provide guidance on the level of environmental assessment required. The Proposal site is located within the Port Stephens LGA. Schedule 5 of the Port Stephens LEP includes a list of items/sites of heritage significance within this LGA and are further detailed in Section 2.3.2.

Approval for the Proposal is being sought as a Designated Development under Part 4 of the EP&A Act. As such, the Planning Secretary's Environmental Assessment Requirements (SEARs) (1291) have been issued for the project. It is a requirement of the SEARs (1291) that a non-Aboriginal cultural heritage report is prepared for the project. This SoHI report satisfies this requirement.

2.3 Local government

2.3.1 Port Stephens Local Environmental Plan 2013

Part 5, Section 5.10 of the Port Stephens LEP provides guidelines and requirements for heritage conservation within the Port Stephens LGA. The Port Stephens LEP states:

(1) Objectives

The objectives of this clause are as follows:

- a. *to conserve the environmental heritage of Port Stephens,*
- b. *to conserve the heritage significance of heritage items and heritage conservation areas, including associated fabric, settings and views,*
- c. *to conserve archaeological sites,*
- d. *to conserve Aboriginal objects and Aboriginal places of heritage significance.*

(2) Requirement for consent

Development consent is required for any of the following:

- a. *demolishing or moving any of the following or altering the exterior of any of the following (including, in the case of a building, making changes to its detail, fabric, finish or appearance):*
 - i. *a heritage item,*
 - ii. *an Aboriginal object,*
 - iii. *a building, work, relic or tree within a heritage conservation area,*
- b. *altering a heritage item that is a building by making structural changes to its interior or by making changes to anything inside the item that is specified in Schedule 5 in relation to the item,*
- c. *disturbing or excavating an archaeological site while knowing, or having reasonable cause to suspect, that the disturbance or excavation will or is likely to result in a relic being discovered, exposed, moved, damaged or destroyed,*
- d. *disturbing or excavating an Aboriginal place of heritage significance,*
- e. *erecting a building on land:*
 - i. *on which a heritage item is located or that is within a heritage conservation area,*
or
 - ii. *on which an Aboriginal object is located or that is within an Aboriginal place of heritage significance,*
- f. *subdividing land:*
 - i. *on which a heritage item is located or that is within a heritage conservation area,*
or
 - ii. *on which an Aboriginal object is located or that is within an Aboriginal place of heritage significance.*

2.3.2 Heritage Items in the Port Stephens LEP

There are two heritage items within the Proposal site: the Irrawang Pottery Site Archaeological Area A4 and the Boomerang Park I45 (Figure 2). The Proposed Pipeline Alignment crosses 800 metres of the Archaeological Area A4. A small portion of the Proposal Site overlaps Boomerang Park (I45) in the vicinity of the existing Water Pump Station.

There are four heritage items and one conservation area that abut the Proposal site. All are located in the southern portion of the Proposal site on either side of Irrawang Street in the Raymond Terrace township (Figure 2). These identified items have been compiled from Schedule 5 of the Port Stephens LEP, as there were inconsistencies in the naming conventions of heritage items in the associated LEP map (002C). The map provided in Figure 2 uses the Lot and DPs from Schedule 5 to identify the heritage items.

Figure 2: Heritage Items in or abutting the Proposal Site



2.4 Summary of Heritage Listings

There are three heritage items in the vicinity of the Proposal site: Irrawang Pottery Site (LEP A4 / ID127) and Grahamstown Dam (which includes the Irrawang and Grahamstown spillways) (SHI# 3630054) and Boomerang Park (LEP I45) (Table 2). It should be noted that the Irrawang and the Grahamstown spillways are located in two separate locations in the Proposal site, but they form part of the same heritage listing. Boomerang Park mainly abuts the Proposal site, but there is a very small portion of the Boomerang Park which is inside the Proposal site, as the existing Water Pumping Station is located in Boomerang Park.

The Irrawang Pottery site is listed on the Port Stephens LEP as Irrawang Pottery Site Archaeological Area A4 and on the Hunter Water s170 register ID127 / SHI# 3630109. The Grahamstown and Irrawang spillways are part of the Grahamstown Dam heritage listing as part of the Hunter Water s170 register ID60 / SHI#3630109.

There are four heritage items and one conservation area that abut the Proposal site. All are located in the southern portion of the Proposal site on either side of Irrawang Street in the Raymond Terrace township (Table 3).

Table 2: Heritage Items in the Proposal site and in the Proposed Pipeline Alignment

Instrument	Listing ID	Name	Address	Lot and DP
LEP/s170	A4/ ID127	Irrawang Pottery site*	70 Rees James Road	Lot 113, DP 733181
S170	ID60	Grahamstown Dam including Grahamstown and Irrawang Spillways	Grahamstown Moor	Multiple
I45	"Boomerang Park", including former stone quarry and mature tree planting	17E Irrawang Street	Lot 1, DP 1018979	Abuts the Proposal site and is approximately 3 metres from the Proposed Pipeline Alignment

Table 3: LEP Heritage Items abutting the Proposal site

Listing Id	Name	Address	Lot and DP
I44	Timber cottage (former mounted police barracks)	11 Irrawang Street	Lot 6, DP 38088
I46	St Brigid's Catholic Church Group—St Brigid's Convent	52 and 54 Irrawang Street	Lots 13 and 14, Section 15, DP 758871
I47	St Brigid's Catholic Church Group—St Brigid's Church Hall	58 Irrawang Street	Lot 16, DP 547042

Listing Id	Name	Address	Lot and DP
I81	St Brigid's Catholic Church Group—St Brigid's Church	69 William Street	Lot 12, Section 15, DP 758871
C2	Raymond Terrace Heritage Conservation Area	Multiple	Multiple

3.0 HISTORICAL CONTEXT

3.1 History of Raymond Terrace Area

First surveyed by Europeans in 1801 (Lt. Colonel Paterson), lands laying at the junction of the Hunter and Williams river systems were made available through grants during the 1820s and would become part of the townships known as Raymond Terrace and Nelson Plains. With much of the area being characterised by floodplains, early European settlers initially used the area as a rich source of Cedar¹ before utilising the fertile lands for agriculture – notably for cattle, dairy, and lucerne. The township of Raymond terrace was gazetted in 1837 and census data four years later records 105 convicts, 259 free settlers and 47 houses².

Of the free settlers, James King was granted 1920 acres approximately 8 kilometres north of Raymond Terrace town centre. Grazing cattle and growing wheat as his primary interests, King began an experimental vineyard and pottery factory in 1831, these being detailed more fully below. The 1830s saw the arrival of steam powered paddle boats along the Hunter and Williams river systems and these encouraged a flourish of local industries utilising the town's shipping facilities to transport goods south to Hexham and Newcastle. In 1834, the establishment of 'The Cattle Protection Society', a collective under the director John Wighton formed to ensure success in the local cattle industry³. Furthermore, through the 1840s, Raymond Terrace became a significant port for the shipping of New England wool⁴. As the town grew, some significant construction using local sandstone took place, notably the Catholic and Anglican churches throughout the 1860s⁵.

Attempts at growing sugar cane and wheat were made during the latter half of the 1800s, however, regular frosts and the spread of wheat rust saw these industries abandoned in the 1870s⁶. An article from 1900 describes Raymond Terrace as being entirely dependent on the dairy industry⁷. Prior to this reports note that the whole of the area, excepting King's pottery factory, was used almost exclusively for agricultural purposes until the establishment of the butter factory at the turn of the century and became known as the Raymond Terrace Dairy Company. The federation drought became most acute in 1904-1905, with 'no rain to speak of' falling from July 1904 to September the following year⁸. Whilst the drought greatly reduced the area's ability to maintain its agricultural industries, the Raymond Terrace Dairy Company was buoyed by significant demand for butter by Sydney and Newcastle and remained a profitable venture. In 1906, The Fourth Australian Light Horse Regiment conducted military drills across the Hunter with 100 horsemen and 1000 infantry men being sighted at Raymond Terrace⁹.

The early 20th century saw a decline in Raymond Terrace's prosperity with the railway from Newcastle to Maitland bypassing the town, winegrowers moving to more suitable land in the Hunter, and the dairy factory being replaced by the facility at Hexham. A Masonite factory was established by the Pacific Highway in 1937, commencing production in 1939 and employed around 150 people at its

¹ Sydney Morning Herald. (2004, February 8). Raymond Terrace (including Tomago and Williamstown) Small town on the Hunter River with interesting historic buildings.

² Ward-Harvey, K. (2008, July). Raymond Terrace 1801-2008. Retrieved from Sketchley Cottage: <https://www.sketchleycottage.org.au/>

³ The Sydney Herald. (1834, June 18). p. 2.

⁴ Ward-Harvey *ibid*.

⁵ Maitland Mercury and Hunter River General Advertiser. (1861, January 5).

⁶ Dungog Chronicle: Durham and Gloucester Advertiser. (1947, September 16).

⁷ Newcastle Morning Herald and Miner's Advocate. (1900, May 2). p. 3.

⁸ Newcastle Morning Herald and Miner's Advocate. (1905, September 8). p. 7.

⁹ Newcastle Morning Herald and Miner's Advocate. (1906, May 10). p. 5.

peak¹⁰. On the southern side of the town, Courtaulds began making steel yarn for tires in the 1950s and built 150 houses for its primarily English immigrant workers¹¹.

With his family's fortunes failing in England during the agricultural slump following the Napoleonic Wars (1803-1815), James King emigrated to Australia (Sydney) in 1827. King was born in Colinsbough, Scotland in May 1796,¹² and worked in a glass factory in Dundee for several years.¹³ Shortly after having arrived in Sydney, King received a grant of 1920 acres of land near Raymond Terrace on the William River. King remained in Sydney pursuing merchant ventures, whilst his Raymond Terrace property, named 'Irrawang' was run by overseers primarily producing wheat and cattle¹⁴.

Throughout the early 1830s, King began spending more time at Irrawang exploring the property's potential for pottery and winemaking. It was noted that the property soils were better suited for pasture than agriculture, however the alluvial silts were appropriate for vineyards.¹⁵ The clay across the site was used for kiln furniture but was not suitable for firing at high temperatures, leading King to import clay from Stroud and Maitland for the creation of his brown and black glazed earthenwares¹⁶. The first grape vines were planted around 1832, and samples of Irrawang pottery were sent to Sydney as early as 1834. King's ceramics were produced for domestic use and were available at affordable prices.¹⁷ It should be noted that King had no previous experience or connection to pottery making, however, he had studied glassmaking and chemistry in Scotland before emigrating¹⁸. Furthermore, King identified sand deposits near to Sydney that he claimed were better suited to the manufacture of fine microscope lenses than any found in England – a discovery for which he won the London Society of Arts and Manufactures' Silver medal in 1837. With his early experiments in pottery and viticulture showing promise, King moved to Irrawang as his primary residence in 1835.

By the 1828 census, King had 2000 acres, 23 of which were cleared, and another 23 cultivated.¹⁹ King also had at least 10 workmen in his service at this time, including former convicts and a teenaged apprentice.²⁰ In 1830, King now had 80 cattle and a modest estate, including a dairy, stockyard, barn, and house, and an additional 50 acres had been cleared since 1828.²¹ By the end of the decade, Irrawang was substantial in size and several new buildings had been constructed and encompassed the main homestead. The main house itself was 60 by 45 feet with verandahs on each side, and featured cedar French doors and windows and wallpaper throughout the house.²² A separate kitchen and servants quarters had been constructed close to the house, and the carpenter

¹⁰ Harrison, D. (1988). The Masonite Factory, Raymond Terrace.

¹¹ Ward-Harvey *ibid*.

¹² Jack, R.I., and Liston, C.A., September 1982. 'A Scottish Immigrant in New South Wales – James King of Irrawang.' In the *Journal of the Royal Australian Historical Society*, 92-99.

¹³ Mrs Kings Letter, 1859.

¹⁴ Macmillan, D. S. (1967). Australian Dictionary of Biography, National Centre of Biography, Australian National University. Retrieved July 24, 2019, from 'King, James (1800-1857): <http://adb.anu.edu.au/biography/king-james-2307/text2987>

¹⁵ Gerstaecker, F., 1853. *Narrative of a Journey Round the World, comprising a winter-passage across the Andes to Chili, with a visit to the gold regions of California and Australia, the South Sea Islands, Java*, p. 291.

¹⁶ Birmingham, J. (n.d.) 'James King's Pottery at Irrawang, N.S.W.' In *The Australian Antique Collector*, p. 77.

¹⁷ Birmingham, J. (n.d.) 'James King's Pottery at Irrawang, N.S.W.' In *The Australian Antique Collector*, p. 77.

¹⁸ Birmingham, J. (1976). The Archaeological Contribution to Nineteenth-Century History: Some Australian Case Studies. *World Archaeology*, Vol.7, No.3 Archaeology and History, 306-117.

¹⁹ 1828 Census

²⁰ 1828 Census

²¹ Jack, I.R., and Liston, C.A., September 1982. 'A Scottish Immigrant in New South Wales – James King of Irrawang.' In the *Journal of the Royal Australian Historical Society*, 94.

²² Jack, I.R., and Liston, C.A., September 1982. 'A Scottish Immigrant in New South Wales – James King of Irrawang.' In the *Journal of the Royal Australian Historical Society*, 94.

also had his own separate house and workshop.²³ Additional agricultural outbuildings located close to the house included a granary, storehouse, cornhouse, and several huts to house the workmen on site. The huts were described as being 25 by 14 feet, with shingled roofs and brick fireplaces.²⁴ It is uncertain whether these workmen were current or former convicts, however the 1841 census recorded 21 ex- and current convicts in King's employ at the time. The homestead also included a 90 ft well and a large ground-level tank for the estate's water supply.²⁵

Archaeological work carried out through the second half of the 20th century identified that King's pottery manufacturing works comprised two substantial kilns, a horse works, a large workshop and several tanks²⁶. These findings exactly align with an illustration of the site made in the mid-1830s (Figure 4). The illustration shows Irrawang as being something of an Idyll – local Aboriginal children with pet dogs playing amongst the workers. However, the image should be viewed with an understanding that King was a skilled self-promoter. For example, by 1843, claims were being made that Irrawang would soon be able to manufacture for the entirety of demand for brown and yellow domestic pottery within the colony²⁷ and, a dramatic publicity stunt was carried out by King near to his early death in 1857. King very publicly sent Reverend Dean Lynch of Maitland a piece of 'The True Cross on which our blessed savior suffered death' signed for authenticity by Cardinal²⁸. In contrast to the image promoted by James King, a number of scandals at Irrawang are reported in newspapers of the time. Amongst these, a youth assigned to King, David Holloway, murdered fellow servant 'Tine', and threw his body into the Hunter River in 1836²⁹. Later, in 1847, Mary Ann King (daughter of Charles King) was abducted from Irrawang at age 14 by William Andrews³⁰.

Figure 3. Detail of map of the Parish of Thornton, 1924. Source: HLRV



²³ Jack, I.R., and Liston, C.A., 1982. 'A Scottish Immigrant in New South Wales – James King of Irrawang,' In the *Journal of the Royal Australian Historical Society*, p. 94.

²⁴ Jack, I.R., and Liston, C.A., 1982. 'A Scottish Immigrant in New South Wales – James King of Irrawang,' In the *Journal of the Royal Australian Historical Society*, p. 94.

²⁵ Jack, I.R., and Liston, C.A., 1982. 'A Scottish Immigrant in New South Wales – James King of Irrawang,' In the *Journal of the Royal Australian Historical Society*, p. 94.

²⁶ Bickford, A. (1993). *The Irrawang Pottery Site: Assessment of cultural Significance and Options for Its Future*. Anne Bickford and Associates, Heritage Consultants.

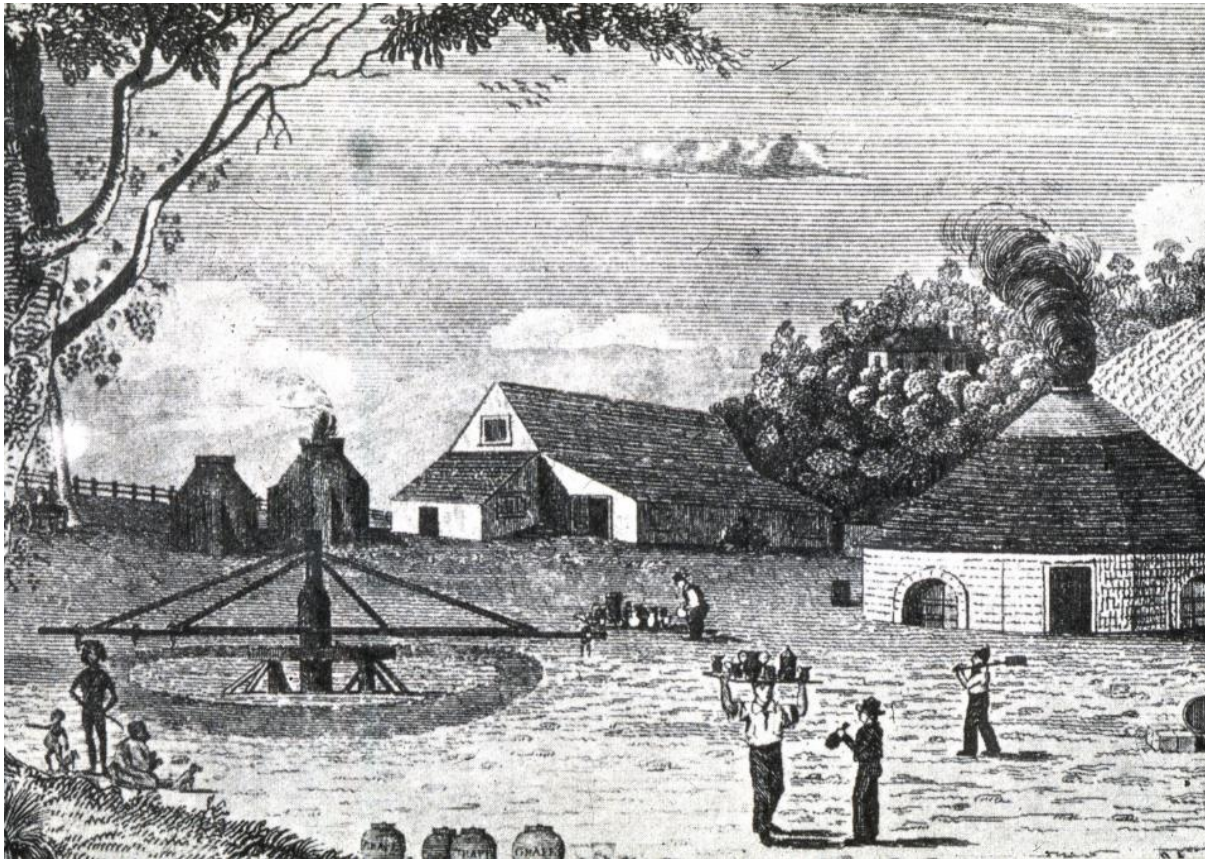
²⁷ Maitland Mercury and Hunter River General Advertiser. (1943, June 3). p. 3.

²⁸ Sydney and Sporting Reviewer. (1857, March 21). Bell's Life. p. 3.

²⁹ Sydney Monitor. (1836, November 4). p. 3.

³⁰ Sydney Chronicle. (1847, May 26). p. 4.

Figure 4: Irrawang Pottery Site c1830s engraving



King's primary focus seems to have been on establishing his wine interests, and those of the Hunter River more broadly. In 1839, King publicly petitioned New South Wales Governor, George Gipps, to allow wine growers of the Hunter to have a portion of their products be made duty free. Without this concession, he argued, 'the culture of the vine in this colony... will be checked, if not altogether destroyed'³¹. King was then critical to the founding of the Hunter River Vineyard Association in 1847³² and became its first president in 1853³³. King received much advice from renowned German Scientist, Justus Liebig, including guidance on Irrawang. Through this connection, King became central to the recruitment of German vinedressers to work in the Hunter vineyards. His efforts saw 43 vineyard workers, coopers and their families moving to New South Wales in 1848, three of these workers joined King at Irrawang³⁴³⁵.

King's pottery was a successful enterprise, producing black, brown, and yellow pottery in the form of milk coolers, jars, hand basins, dishes and more until 1851, when the loss of his workforce as men left for the goldfields saw the factory suddenly close³⁶. Judy Birmingham notes that the relatively short lifespan of Irrawang Pottery and its swift closure was typical of early colonial industries. It is likely that King's focus on his wine growing also contributed to his pottery manufacturing being allowed to decline such as it did.

³¹ Australian Chronicle. (1839, August 16). p. 6.

³² Sydney Chronicle. (1847, May 26). p. 4.

³³ Bickford, A. (1971). James King of Irrawang: A Colonial Entrepreneur. *Journal of the Royal Australian Historical Society*, 40-57. p. 52

³⁴ Macmillan, D. S. (1967). *ibid*

³⁵ McIntyre, D. J. (2015, December 11). Finding Irrawang: James King, scientific transnationalism and colonial wine heritage. Retrieved from <https://juliemcintyrewinehistory.wordpress.com/2015/12/11/finding-irrawang-james-king-scientific-transnationalism-and-colonial-wine-heritage/>

³⁶ Birmingham, J. (1976). *ibid*

Throughout the 1850s, Irrawang wines were toured by King through Europe to overwhelmingly popular reception. At the Paris Exhibition of 1855, Irrawang wines won King a medal, and some of these were served at the table of Emperor Napoleon III³⁷. On this trip his long-time correspondent Justus Liebig introduced King to Grand Duke of Nassau, who confessed that Irrawang wines were equal to the finest German Vintages. While in Europe, King's health deteriorated to the point that return to Australia was not possible, and he died in London on the 29th November 1857.

King's wife, Eliza, continued to represent Irrawang Wines at the Hunter River Vineyard Association through the 1860s, until marrying William Roberts of Penrith in May 1866. With Eliza's marriage to Roberts and James King's son being a surveyor in Sydney, records of wine production at Irrawang seem to cease in the early 1870s. Following this, property incidental information suggests the property was primarily used intermittently for general agricultural grazing and cropping.

The Irrawang Pottery Site is 400 metres south-east of the Proposed Pipeline Alignment and can be clearly seen in the 1965 aerial (Figure 5). The two tanks, horse works and clay pit can be seen in the 1965 aerial and correspond with the Bickford drawing (Figure 6). The Irrawang homestead remained under the ownership of the King family until 1928, when it was subdivided.

3.1.1 Excavation of the Irrawang Pottery Site

A portion of the Irrawang Pottery Site was excavated between 1967 and 1976 by students from the Sydney University Archaeological Society. The site was excavated during vacations in May and December for approximately two weeks³⁸. Multiple structures and contexts were excavated at the site. Of note was the Western Kiln (Structure A), the Horse works (Structure B) and Western Workshop (Structure H).

The Western Kiln comprised a circular brick built kiln. The lower brick courses were still preserved to a height of 1.2 metres and some of the fire-holes were partially preserved. Glazed pieces of yellow ware, light brown or dark brown ware were identified in this structure³⁹.

The Horse Works comprised a circular structure with a 'circular moat' in which the clay was processed, 'puddled'. Such clay puddling mills were horse drawn, as was the case at Irrawang⁴⁰.

The Western Workshop comprised a timber structure measuring 7.5 x 23 metres. There were many intact ceramic wares in this part of the site and it was suggested that it was used in part as a storage area for the pottery. The flues in the eastern part of this structure suggest it was also used as a drying room⁴¹.

The portion of the Irrawang Pottery Site excavated between 1967 and 1976 is 400 metres from south-east of the Proposal Site. The associated Horse Works, Tanks and Clay Pit can be clearly seen on the 1965 aerial (Figure 5) and correspond with the excavation plan of the site (Figure 6).

³⁷ Macmillan, D. S. (1967). *ibid*

³⁸ Bickford, A. (1993). The Irrawang Pottery Site: Assessment of cultural Significance and Options for Its Future . Anne Bickford and Associates, Heritage Consultants. P.7

³⁹ Birmingham, J. (1993). Attachments to Draft Contribution Irrawang Significance Statement. In Bickford, The Irrawang Pottery Site: Assessment of Cultural Significance and Options for its Future. p. 26-27

⁴⁰ Birmingham, J. (1993). *Ibid*. p.27

⁴¹ Birmingham, J. (1993). *Ibid*. p.28

Figure 5: Irrawang Pottery Site and Irrawang House Complex overlaid onto 1965 aerial

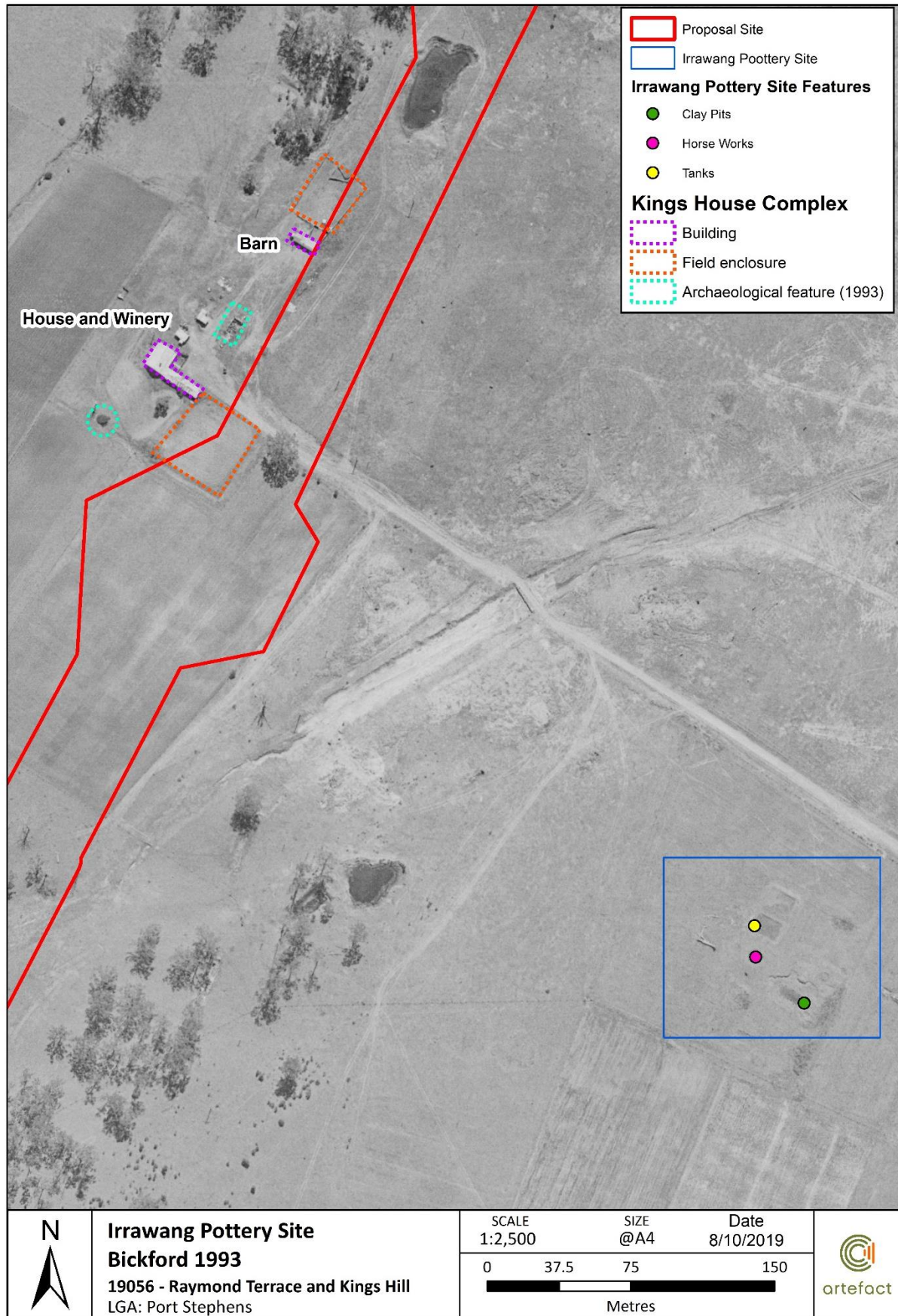
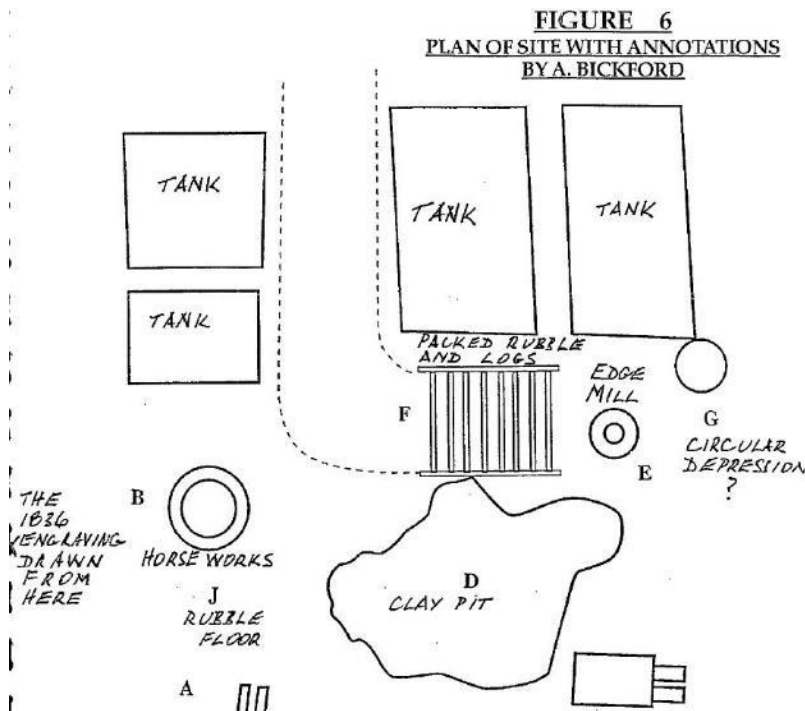


Figure 6: Irrawang Pottery Site. Source: Bickford 1993: Figure 6



3.1.2 Irrawang House and Winery

The excavations concentrated on the eastern portion of the site. The western portion of the site which contained the King's Irrawang House and Winery was not investigated as part of the excavation program. These structures were still standing until 1969 when they were demolished⁴². The King's House and Winery often referred to as Irrawang house is noted on an early sale plan (Figure 7 and Figure 8).

A description of the King's Irrawang House is provided in the secondary source by Jack and Liston 1982 who note:

*"By 1837 he had established a substantial estate. His homestead, sixty feet by forty-five feet, with verandahs on all four sides, was plastered, papered and painted throughout, with cedar French doors and windows. The kitchen and servants' were separate from the house. A granary, mill-house, press house occupied one outbuilding; another building was used to store provisions and tools. The cornhouse, ninety feet by eighteen feet, had twelve-foot skillions on each end and a grain loft with skylights. The estate carpenter, Robert Herkes, had a large workshop and a house. The other workmen were housed in huts, twenty-five feet by fourteen feet, with brick fireplaces and shingle roofs. Water was supplied from a ninety-foot well and a large ground-level tank. King's agricultural implements were worth £1,034 and included expensive thrashing and grinding machines. As well as his crops of corn and wheat there was an extensive orchard and vineyard."*⁴³

⁴² Birmingham, J. (1993). *Ibid.* p.26

⁴³ Jack, I., & Liston, C. (1982, September). A Scottish Immigrant in New South Wales - James King of Irrawang. *Journal of the Royal Australian Historical Society.* p.94

King's House and Winery can be seen in the 1965 aerial photograph of the area (Figure 9), along with what appears to be an associated field with a substantial enclosure. There is also a passing reference to King having a stone lined cellar near Irrawang House⁴⁴, but no specific location is identified.

Approximately, 75 metres northeast is another structure which is likely the stone barn which belonged to Irrawang House and was also demolished in the late 1960s⁴⁵.

The stone barn partially overlaps the Proposal site, but is not within the Proposed Pipeline Alignment. The field enclosures for Irrawang House and Winery, and the stone barn are in the Proposal site and is in the Proposed Pipeline Alignment.

In addition, between King's House and Winery and the Pottery Site, King subdivided blocks of land:

*"In April 1842, King subdivided part of the Irrawang Estate, creating seven farm blocks from 40 to 100 acres along the eastern side of the main road from Raymond Terrace to Stroud. This separated Irrawang House, on the western side of the road, from the pottery site on the eastern side."*⁴⁶

The location of the farm houses and outbuildings associated with these subdivided blocks are unknown.

The 1828 census notes James King had 2000 acres, 23 of which were cleared and 23 cultivated, one horse and 37 cattle. By 1830 he had 80 head of cattle with an additional 50 acres cleared and two miles of fencing constructed. By 1841 he had 24 men (three holding tickets of leave and 18 private assignment) and five women, as well as almost 100 horses.⁴⁷

⁴⁴ Birmingham, J., Jack, I., & Jeans, D. (1983). *Industrial Archaeology in Australia: rural industry*. Richmond: Heinemann. p.83

⁴⁵ Birmingham, J. (1993). *Ibid.* p.26

⁴⁶ Jack, I., & Liston, C. (1982, September). *Ibid.* p.95

⁴⁷ Jack, I., & Liston, C. (1982, September). *Ibid.* p. 92-95

Figure 7: Early Sale Plan, Irrawang House c.1928. (Detail in Figure 10 circled in orange).
Source: Raymond Terrace and District Historical Society

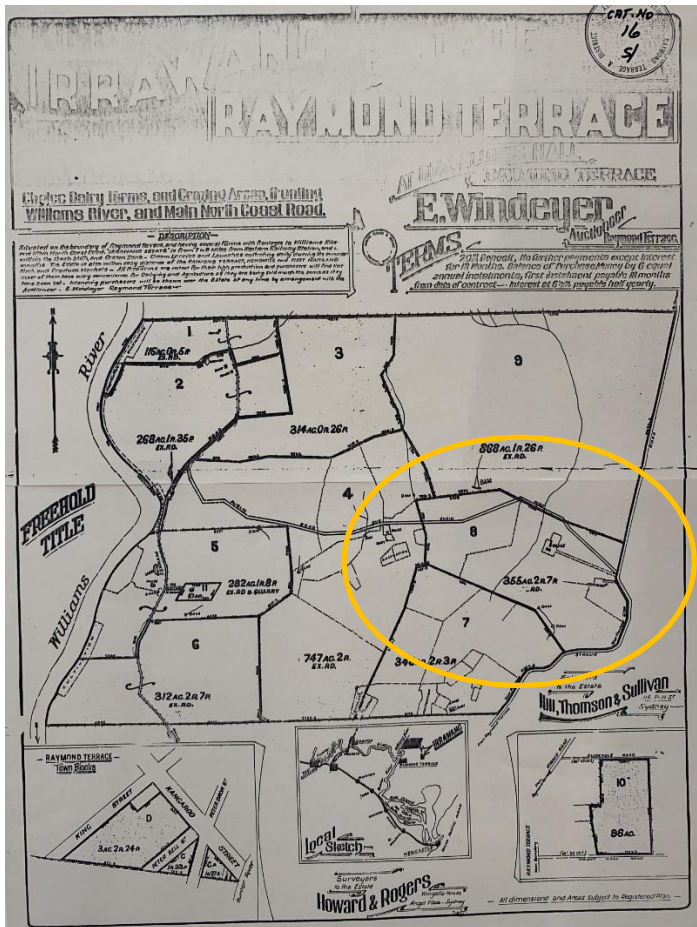


Figure 8: Detail of Early Sale Plan for Irrawang House, 1928.



Figure 9: King's Irrawang House, Winery and Barn and associated field enclosures overlaid onto 1965 aerial



Figure 10: King's Irrawang House, Winery and Barn and associated fields have been demolished, a new residence has been built in the vicinity of the stone barn overlaid onto 1976 aerial



3.1.3 Grahamstown Dam

The Hunter District Water Supply and Sewerage Board was established in 1892 tasked with supplying water and waste water services to the Hunter. The 'Board' oversaw the construction of Chichester Dam which started in 1916 to service growing demand and was filled to capacity in 1924. Additional water was supplied in 1936 by pumping water from the Tomago sandbeds which contained subsurface fresh water.

After the end of World War II, it became a priority to address future water demand for the great Newcastle area. In 1946, the Board's then President, George Schroder, raised the possibility of using the Grahamstown Moors as a new water source. Although the Grahamstown Moors covered more than 78 square kilometres and was known to hold large amounts of water, its capacity was short of what was needed to supply demand. This problem was solved in 1953 by a Swedish consulting engineering company Vattenbyggnadsbyran who proposed conveying additional water from the Williams River near Seaham via open canal and a tunnel to the Grahamstown Moors and constructing an embankment across this natural depression to form a dam⁴⁸.

Construction of Grahamstown Dam commenced in 1957 and was brought into service in 1960. In 1962 rainfalls, 45% higher than average, caused an abrupt rise in water levels in reservoir as well as inundating surrounding areas and threatening the Pacific Highway. As a result, the Irrawang Spillway was constructed to deal with such rainfall events and formed part of the Grahamstown Water Supply Scheme which officially opened 11 July 1964.

Capacity of the dam was further upgraded from 1998 into the early 2000s. The Grahamstown spillway formed part of this upgrade and was completed in 2005⁴⁹.

3.1.4 Land Use History

King's Irrawang House, Winery and barn were demolished in 1969. A photograph from the 1960s shows the winery was brick structure with a tin roof, the homestead also brick with a steeply sloping tin roof had a veranda (Figure 11). By 1976 a new residence had been constructed over the old barn (Figure 10) and this coincides with the addition of an unsealed road to the property from Rees James Drive. This residence falls into disuse with commencement of upgrades to the Grahamstown Dam including the spillway 1998.

The installation of the spillway essentially cuts road access to the residence, which already had restricted access to the north as a result of the Irrawang spillway, to the east as a result of the Pacific Highway and to the west as a result of the Williams River back swamp. As such, the area has had no further residential development.

Following the completion of excavations at Irrawang in the 1960s, photographs from 1993 showed that extensive archaeological potential was still present on the site. The dairy built by King in the 1830s was still extant. Large decorative fragments of ceramic were located on the surface, and the remains of a possible well, rubbish pit, or the stone lined cellar were located and photographed (Figure 12 and Figure 13), which may hold artefact deposits. The photographs clearly show remnant historical building materials and appear to have since been covered with new landscaping, however aerial photography of the area show dark areas of land which may align with the demolished features photographed in 1993 (and these features delineated as "archaeological feature [1993] can certainly be seen in the 1976 aerial, Figure 10). Possible remnant structures may include the stone lined cellar, the homestead, a well or tank, barns, storehouses and other outbuildings, and the huts or cottages

⁴⁸ State Heritage Inventory Listing # 3630054

⁴⁹ State Heritage Inventory *ibid*

that would have housed King's workmen. Due to the potential inaccuracies of historic plans, the exact location of these structures can not be pinpointed.

Figure 11: Irrawang before demolition, c.1960s, winery in foreground and homestead in background. Source: Birmingham, Jack and Jeans 1983

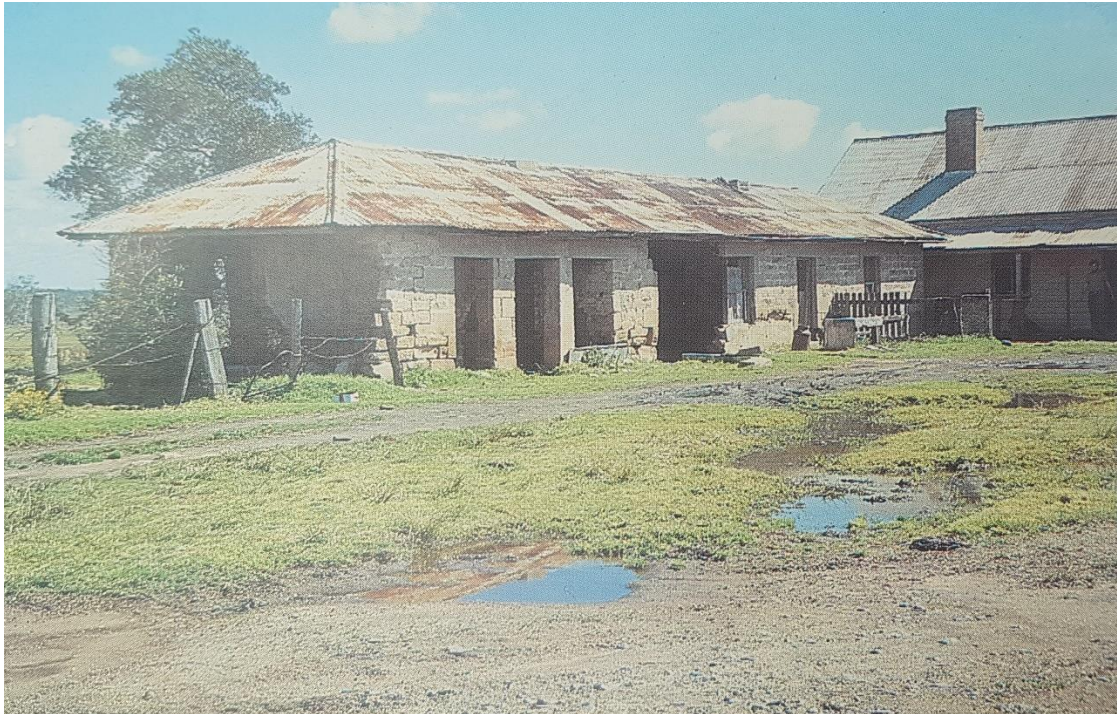


Figure 12: Remnant circular structure at Irrawang, 1993. Source: Port Stephens Library



Figure 13: Remnant historical building material at Irrawang, 1993. Source: Port Stephens Library



4.0 SITE INSPECTION AND PHYSICAL DESCRIPTION

4.1 Introduction

A site inspection was conducted on 30 and 31 July 2019 by Tessa Boer-Mah, Senior Heritage Consultant and Jennifer Norfolk, Heritage Consultant at Artefact Heritage. The whole Proposal site was surveyed and the physical description has been split into three sections:

- Archaeological Area A4
- Built heritage items along Irrawang St
- Remaining portions of the Proposal Site

4.2 Archaeological Area A4

The Proposal site within Archaeological Area A4 is covered in thick grass (Figure 14, Figure 15). The remains of the King's stone barn and field, as well as field associated with King's House and Winery were not observed. Power poles had been erected in the area and while the power easement had been regularly mown, visibility was low (Figure 15).

Figure 14: Thick grass covered Archaeological Area A4



Figure 15: Power poles within Archaeological Area A4



4.3 Built Heritage Items along Irrawang Street in Raymond Terrace

Built heritage items I44, I46, I47 and I81 and the conservation area C2 abut the Proposal site (Figure 16 and Figure 17). The water pipeline will be installed underground and on the other side of the street. There will be no visual connection between the Proposal and these heritage items.

The Proposal site is partially within Boomerang Park (I45) which contains a former stone quarry and mature trees. The portion of Boomerang Park that abuts the Proposal site comprises grass and mature tree plantings (Figure 18). As the water pipeline will be installed underground there will be no visual connection between the Proposal and this heritage item. However, it has been noted that the mature plantings which are heritage listed in Boomerang Park occur within 12 metres of the proposed works and thus a qualified arborist (as part of Detailed Design, post approval, as relevant) will need to assess whether the proposed works have the potential to impact the health of these heritage listed trees.

The Proposal site abuts the curtilage for the Timber Cottage (former mounted police barracks) (Figure 19). There will be no visual connection between the Proposal and this heritage item as the water pipeline will be installed underground.

Figure 16: View towards St Brigid's Church (I81) group items and Conservation Area



Figure 17: View towards St Brigid's Convent (I46) and Conservation Area



Figure 18: Boomerang Park (I45), note mature tree plantings



Figure 19: Timber Cottage (former Mounted Police barracks (I44)



4.4 Remaining portions of the Proposal site

The southernmost portion of the Proposal site is predominantly urban and suburban in character with roadways and established curbing along Irrawang and Adelaide Streets (Figure 20 and Figure 21). From the intersection of Rees James Road and Adelaide St north, the area takes on a more rural residential character, with the road being drained by shallow spoon drains instead of formal curbing (Figure 22). The northern portion of the Proposal site (from the end of Rees James Road to the end of the Proposed Pipeline Alignment) is predominantly rural and contains paddocks, electricity easements and rural tracks (Figure 23). No additional archaeological sites or heritage items were identified.

Figure 20: Urban character in the South along Irrawang Street



Figure 21: Suburban character in the south along Adelaide Street



Figure 22: Rural Residential character along Rees James Road



Figure 23: Rural character in northern portion of Proposal Site



4.5 Summary

No unlisted built heritage items were identified during the site inspection. Although there is potential for archaeological relics (deposit and features) to be present in the Archaeological Area A4 around the former site of King's House, Winery and Barn (see Section 5); however, no observable surface features associated with this were noted during the site inspection.

5.0 ARCHAEOLOGICAL ASSESSMENT

5.1 Introduction

There is potential for archaeological relics (subsurface artefactual and structural deposits) to be present in an area designated Archaeological Area A4. This site has been identified in the area around the former site of King's House, Winery and Barn in the northern portion of the project Proposal site. While no surface structures or visible features were identified during the site inspection, the history of the site and previous archaeological investigation in the vicinity suggests that such relics are likely to still be present.

The field enclosures associated with the King's House Winery and Barn are in the Proposed Pipeline Alignment. The stone barn appears to overlap the Proposal site but is not in the path of the Proposed Pipeline Alignment.

The following assessment outlines the likely degree of preservation of any subsurface archaeological resources in the Proposal site and describes the expected physical types and integrity of any remains. A complete discussion of the potential heritage significance of remains is discussed in Section 6.4.

5.2 Archaeological remains

The following discussion of potential archaeological remains is developed from historical research, historical plans and aerial imagery and previous archaeological research, discussed in Section 0 of this report.

No historical description of the field enclosures at King's House was identified in available historical documents, and their precise structural purpose is unknown. A northern enclosure was identified in 1965 aerial imagery near the stone barn and was possibly made of stone. A southern enclosure visible on the 1965 aerial imagery near the house is less defined than the northern enclosure and may have also been constructed with stone. Archaeological evidence of these enclosures may include stone walls and timber post holes.

Archaeological evidence of the stone barn would likely include stone foundations and possible postholes for timber posts and doors.

There is potential for additional structures and archaeological features to be present in the area. This may include undocumented out buildings, cisterns and wells, as well as bottle dumps from the winery and domestic dumps. Archaeological fabric associated with outbuildings are likely to include stone foundations, postholes for timber posts and doors and possible timber cladding. The cisterns and wells, if present, are likely to be constructed of stone if they are contemporary with the house, winery and barn, but potentially brick if added later. They may also contain ceramics (including cookware, storage containers, and chamber pots), glass (including food, cosmetic and medicine storage bottles), and other domestic items made from wood, bone and metal.

Dumps may contain ceramic bottles from the winery, as well as domestic refuse such as ceramics (including cookware, storage containers, and chamber pots), glass (including food, cosmetic and medicine storage bottles), and other domestic items made from wood, bone and metal.

5.3 Integrity of potential archaeological remains

Analysis of the land use history of the site has shown that modern development in the area appears to be a rural residence which was constructed after 1965, but before 1976. This coincides with the construction of an unsealed road to the residence from Rees James Drive. Following this, the residence falls into disuse with commencement of upgrades to the Grahamstown Dam, including the construction of the current spillway in 1998. The construction of the spillway resulted in cutting road access to the residence, which further restricted property access to the site and precluded residential development in this area. The area has been used for a powerline easement and the power poles and electrical lines were noted during the site inspection.

The main episodes of ground disturbance in the area would have been the construction of the rural residence between 1965 and 1976, the construction of an access track to the residence and isolated impacts that would have been caused by power pole installation. Impacts associated with electricity tower construction would be expected to be localised to the area of each pole's installation and would not be expected to be widely dispersed throughout the Proposal site.

Due to the relatively low level of widespread ground disturbance in the Proposal site, the integrity for expected archaeological deposits across the Proposal site is considered moderate to high.

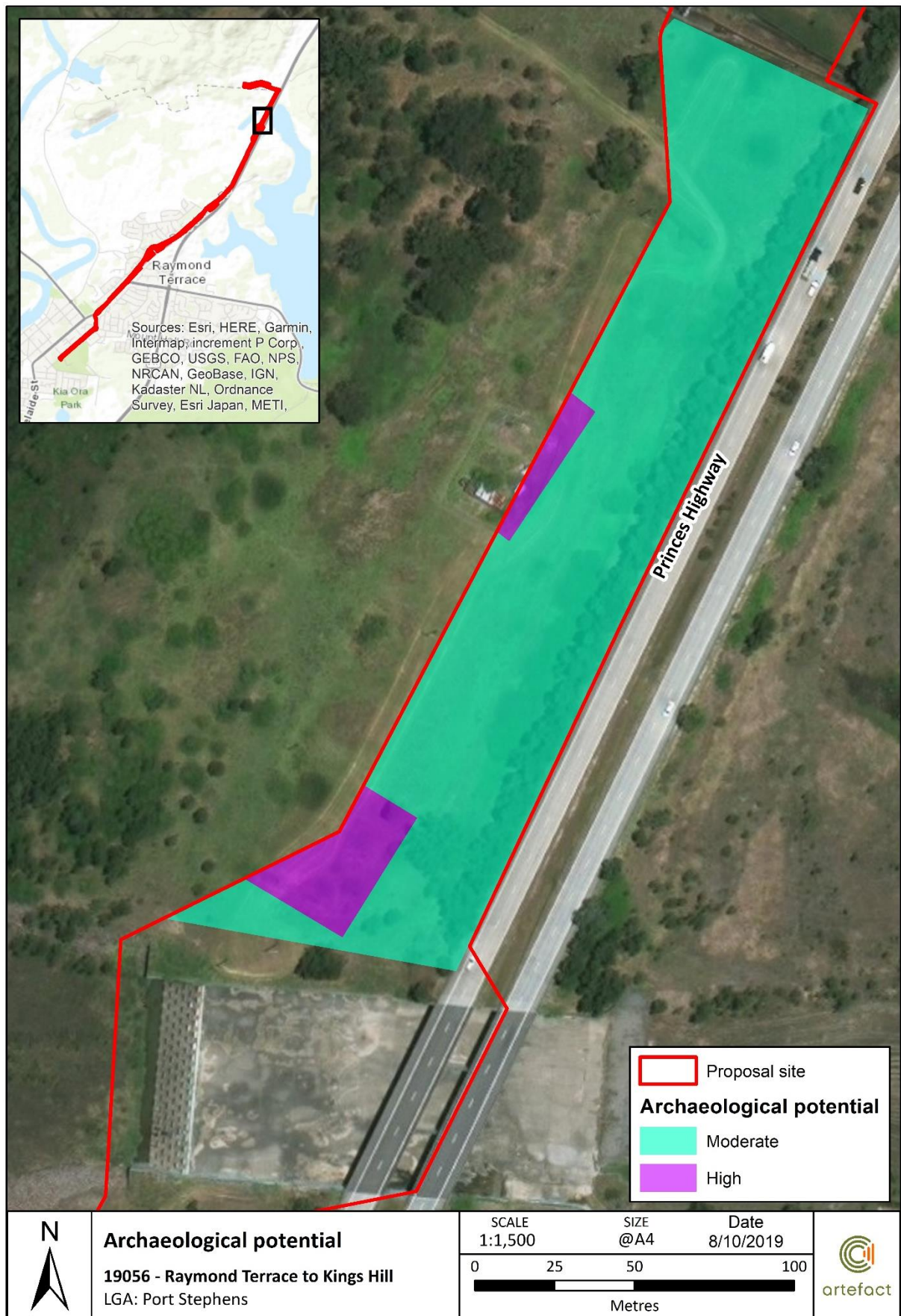
5.4 Summary of archaeological remains

In summary, there is potential for field enclosures, stone barn remains, outbuildings, cisterns and wells, and dumps to be present in the Proposal site (Table 4). Of these, the field enclosures are most likely to be impacted by the Proposal as they are in the Proposed Pipeline Alignment. There is also potential for archaeological remains associated with King's House and Winery to occur in the Proposal site (Figure 24). Although structures identified on the 1965 aerial are likely King's House and Winery, and along the western boundary of the Proposal sites, there is moderate potential that these structures were more extensive, and/or extended further into the Proposal site than anticipated. It appears King also was assigned convict labour and therefore the Proposal site may have evidence for convict occupation.

Table 4: Summary of potential relics, their associated remains and likelihood of being present in the Proposal site

Archaeological Feature	Potential Remains	Likelihood of being present in the Proposal Site
Field enclosures	Stone walls and timber post holes	High
Stone Barn	Stone foundations and potentially postholes for timber posts and doors	High
Outbuildings	Stone foundations, postholes for timber posts and doors and possible timber cladding	Moderate
Cisterns and Wells	Stone or brick construction; Ceramics (including cookware, storage containers, and chamber pots), glass (including food, cosmetic and medicine storage bottles), and other domestic items made from wood, leather, bone and metal.	Moderate
Dumps	Ceramics (including cookware, storage containers, and chamber pots), glass (including food, cosmetic and medicine storage bottles), and other domestic items made from wood, leather, bone and metal.	Moderate
King House and Winery	Stone structures, footings, cellar, underfloor deposits which may contain ceramics (including cookware, storage containers, and chamber pots), glass (including food, cosmetic and medicine storage bottles), and other domestic items made from wood, leather, bone and metal.	Moderate
Convict Evidence	Potential for evidence of convict occupation at the site, may be identified in cesspit and dump contexts.	Low-Moderate

Figure 24: Archaeological potential at the Proposal Site



6.0 SIGNIFICANCE ASSESSMENT

6.1 Introduction

Heritage significance is assessed according to criteria set out in the significance assessment guidelines provided by the Heritage Division of the Office of Environment and Heritage⁵⁰. Listed heritage items generally have existing assessments and statements of significance and this is the case for the Irrawang Pottery Site - Archaeological Area A4. However, the existing statement of significance does not make reference to the Kings House Complex (comprising house, winery, barn, outbuildings and other infrastructure. The existing significance assessment and statement of significance for Irrawang Pottery Site is reproduced in Section 6.3. Additional significance assessment has been undertaken for the Kings House Complex.

6.2 Assessment criteria

Heritage significance is assessed against criteria outlined in the significance assessment guidelines provided by the Heritage Division of the Office of Environment and Heritage⁵¹. The criteria specified by the Heritage Division encompass the values identified in the Burra Charter⁵².

The assessment criteria are outlined in Table 5.

Table 5: Significance assessment criteria

Criterion	Definition
A – Historical significance	An item is important in the course, or pattern, of NSW's cultural or natural history (or the local area).
B – Associative significance	An item has strong or special association with the life or works of a person, or group of persons, of importance in NSW's cultural or natural history (or the local area).
C – Aesthetic or technical significance	An item is important in demonstrating aesthetic characteristics and/or a high degree of creative or technical achievement in NSW (or the local area).
D – Social significance	An item has strong or special association with a particular community or cultural group in NSW for social, cultural or spiritual reasons (or the local area).
E – Research potential	An item has potential to yield information that will contribute to an understanding of NSW's cultural or natural history (or the local area).
F – Rarity	An item possesses uncommon, rare or endangered aspects of NSW's cultural or natural history (or the local area).
G – Representativeness	An item is important in demonstrating the principal characteristics of a class of NSW's cultural or natural places or cultural or natural environments (or the local area).

⁵⁰ OEH, formerly NSW Heritage Office. (2001). Assessing Heritage Significance. Heritage Office, NSW Department of Planning.

⁵¹ OEH, formerly NSW Heritage Office. (2001). *ibid*

⁵² Australia ICOMOS. (2013). The Burra Charter.

Newcastle was established as a penal settlement in 1801 and 1804 and is amongst the early convict settlements, comparable to Sydney, Parramatta and Norfolk Island (established 1788). Convict activities at Raymond Terrace could contribute additional insight into convict labour and settlement further away from Newcastle. There is no archaeological management strategy for Raymond Terrace specifically; however, there is one for Newcastle. The Newcastle Archaeological Management Strategy⁵³ highlights that material evidence relating to convict occupation in line with the assessment criteria has potential to be state significant.

6.3 Existing Significance Assessment and Statement of Significance for Irrawang Pottery Site

The below significance assessment and statement of significance for the Irrawang Pottery Site has been reproduced from the State Heritage Inventory listings.

The assessment of the Irrawang Pottery Site against the Heritage Divisions' guidelines has been adapted in Table 6 from the State Heritage Inventory listing #2280156.⁵⁴ All these criteria were assessed for local significance; the item does not meet the threshold for state significance.

Table 6: Assessment of Irrawang Pottery site against the significance assessment criteria

Criterion	Assessment
A – Historical significance	<p>The Irrawang Pottery site is the intact site of a significant early colonial pottery works.</p> <p><i>The Irrawang Pottery site is considered locally significant under this criterion</i></p>
B – Associative significance	<p>The Irrawang site is important to the local Raymond Terrace and District community as one of the most important colonial sites in the district.</p> <p><i>The Irrawang Pottery site is considered locally significant under this criterion</i></p>
C – Aesthetic or technical significance	<p>Archaeological remains related to an early 19th century pottery and agricultural complex have the potential to be technically significant, in that the site complex could provide technical information on the use and operation of the former manufactory.</p> <p><i>The Irrawang Pottery site would be considered locally significant under this criterion</i></p>

⁵³ Newcastle City Council 2015. Newcastle Archaeological Management Strategy. p. 10-13

⁵⁴ OEH 2006. SHI entry for "Irrawang Pottery Site", accessed online at <https://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=2280156>

Criterion	Assessment
D – Social significance	<p>The site is significant to the local community interested in the history of the Raymond Terrace district eg one of the high schools in Raymond Terrace is "Irrawang High". The Newcastle Regional Museum has a collection of Irrawang Pottery and sherds on permanent display.</p> <p><i>The Irrawang Pottery site is considered locally significant under this criterion</i></p>
E – Research potential	<p>The Irrawang Pottery site has research potential at a local level due to the potential for relatively intact archaeological remains. The research potential of the Irrawang Pottery site is demonstrated by the archaeological excavation program undertake between 1967 and 1976.</p> <p><i>The Irrawang Pottery site is considered locally significant under this criterion</i></p>
F – Rarity	<p>This site is rare in that the sites of the handful of other early colonial pottery works known about have not been found and are covered by the City of Sydney.</p> <p><i>The Irrawang Pottery site is considered locally significant under this criterion</i></p>
G – Representativeness	<p>The Irrawang pottery is representative of early colonial pottery works</p> <p><i>The Irrawang Pottery site is considered locally significant under this criterion</i></p>

6.3.1 Statement of Significance for the Irrawang Pottery Site

The Irrawang Pottery Site has the following Statement of Significance:⁵⁵

The Irrawang Pottery Site is the location of the earliest known pottery works in the Hunter Valley, established by colonial entrepreneur James King in 1835. Operating from the 1830s to the 1850s, the pottery works produced domestic pottery and building materials sold throughout the colony. King also established a vineyard on the site. The site has been the subject of some archaeological investigation in the 1960s and 1970s but further archaeological research significance remains at the site. Significant collections of Irrawang pottery materials exist in public collections including the Newcastle Regional Museum and the University of Sydney.

⁵⁵ OEH 2010. SHI entry for "Irrawang Pottery Site" (Archaeological Site), accessed online at <https://www.environment.nsw.gov.au/heritageapp/ViewHeritageItemDetails.aspx?ID=3630109>

6.4 Significance Assessment of Archaeological Features associated with the Irrawang Pottery Site Archaeological Area A4

The potential archaeological features contribute to the significance of the Irrawang Pottery Site Archaeological Area A4, as assessed below.

The field enclosures associated with Irrawang House, Winery and Barn would provide information on the layout, organisation and construction of the enclosures, as well as also providing information to explain the use of the enclosures. These features would contribute to the significance of the site as a whole.

The stone barn would provide information on early rural nineteenth century construction techniques. It may also provide information on the use of the barn and may have artefactual deposits, such as agricultural and winemaking working tools associated with these structure remains. Such information would provide an understanding on the agricultural and winemaking practices at the site and thus contribute to the wider significance of the Irrawang Pottery Site.

The outbuildings would contribute information on the layout of the complex as well as use of the site for agriculture and wine making. Archaeological remains would contribute to the significance of the Irrawang Pottery Site by providing valuable research information on the structural formation and change in use of the site over time.

Potential cisterns and wells would provide insight into the how water was provisioned to the site, as well as the early nineteenth century rural method of their potential construction. Discarded refuse in cisterns and wells would provide insight into the domestic and winemaking activities undertaken at the site. The cisterns and wells would contribute to the significance of the Irrawang Pottery Site by providing information on colonial construction methods, water provisioning, as well as domestic, agricultural and wine making activities.

The potential cesspits may contain stratified archaeological deposit and has the potential to provide a detailed record the domestic occupation of the site.

The potential dump sites may provide detailed insights into the domestic occupation and winemaking activities. They also have the potential to show different periods of occupation at the site, as little is known about the occupation of the site after King's death in 1857.

The potential archaeological features associated with Kings Irrawang House, Winery and Barn would provide information on colonial building practices, the layout, as well as the domestic, winemaking and agricultural activities that were undertaken there. Intact archaeological features associated with the King's pottery and winery would contribute to the local significance of the site. There is low potential for evidence of convict occupation at the site, but, if identified, may be of state significance.

Potential archaeological remains at this site would be classed as relics under the Heritage Act and thus ground surface disturbance in the area would require approval from Heritage NSW, Department of Premier and Cabinet prior to works commencing.

Table 7: Potential Significance of Archaeological Features

Archaeological Feature	Potential remains	Potential	Significance Ranking	Description of Significance
Field enclosures	Stone walls and timber post holes	High	Local	These potential remains would provide information on the layout, organisation and construction of the enclosures, as well as potentially providing information on the use of the enclosures. These features would be of local significance and would contribute to the understanding of the Irrawang Pottery Site (A4) as a whole.
Stone Barn	Stone foundations and potentially postholes for timber posts and doors	High	Local	The stone barn would provide information on early nineteenth century rural construction methods. It may also contain artefactual deposits which reflect the agricultural and winemaking activities which took place on the site. Remains of the stone barn would be of local significance and contribute to the understanding of the Irrawang Pottery Site (A4) as a whole.
Outbuildings	Stone foundations, postholes for timber posts and doors and possible timber cladding	Moderate	Local	The outbuildings would contribute information on the layout of the complex as well as use of the site for agriculture and wine making. These features would be of local significance and contribute to the understanding of the Irrawang Pottery Site (A4) as a whole.
Cisterns and Wells	Stone or brick construction; Ceramics (including cookware, storage containers, and chamber pots), glass (including food, cosmetic and medicine storage bottles), and other domestic items made from wood, leather, bone and metal.	Moderate	Local	The cisterns and wells would contribute to the local significance of the Irrawang Pottery Site by providing information on colonial construction methods, water provisioning, as well as domestic, agricultural and wine making activities.

Archaeological Feature	Potential remains	Potential	Significance Ranking	Description of Significance
Cesspits	Stone or wood construction; Ceramics (including cookware, storage containers, and chamber pots), glass (including food, cosmetic and medicine storage bottles), and other domestic items made from wood, leather, bone and metal.	Moderate	Local	These features have the potential to provide detailed insights into the domestic occupation of the site and thus contribute to the local significance of the site.
Dumps	Ceramics (including cookware, storage containers, and chamber pots), glass (including food, cosmetic and medicine storage bottles), and other domestic items made from wood, bone and metal.	Moderate	Local	The potential dump sites may provide detailed insights into the domestic occupation and winemaking activities and thus contribute to the local significance of the site.
Kings House and Winery	Stone structures, footings, cellar, underfloor deposits which may contain ceramics (including cookware, storage containers, and chamber pots), glass (including food, cosmetic and medicine storage bottles), and other domestic items made from wood, leather, bone and metal.	Moderate	Local	These features have the potential to provide detailed insights into the domestic occupation of the site and thus contribute to the local significance of the site.
Convict occupation	There is potential for evidence of convict occupation at the site, identified through analysis of remains from cesspit and dump contexts.	Low-Moderate	Potentially State Significance	Convict settlement in the region beginning in Newcastle in 1801 is amongst the early penal settlements and convict labour contributed to the development of the region. Evidence for convict occupation could have potential to be state significant.

7.0 HERITAGE IMPACT ASSESSMENT AND MITIGATION

7.1 Proposed works

The proposed works are to develop a water and waste water supply pipeline and a waste water pumping station to support the development of the Kings Hill URA. The water pipeline would connect to existing Hunter Water infrastructure in the south and the Kings Hill URA in the north, while the wastewater pipeline would connect to the proposed WWPS in Kings Hill URA and existing Hunter Water infrastructure in the south.

The key components of the Proposal which relate to this heritage assessment are:

- Trenching, underboring, back filling and restoration works
- Vegetation clearance
- Construction of the Waste Water Pumping Station (WWPS)

7.1.1 Earthworks - Trenching, Underboring, Backfilling and restoration

The trenching will involve the digging of a trench up to a metre wide in order to lay the pipes. The underboring will require trenches of up to 2-3 metres in width to achieve the depth of the underbore. The backfilling of the pipe trenches will take place after the pipe sections have been laid. Surfaces will be remediated to pre-construction conditions where practicable.

7.1.2 Vegetation Clearance

Vegetation clearance will be required to provide vehicle and plant access, as well as areas for emplacing construction materials.

7.1.3 Construction of the Waste Water Pumping Station

The proposed WWPS will be located in the northernmost portion of the Proposal site and to the north of the Riding for the Disabled. It will require a 30 x 30 metre area and will involve up to one metre of ground disturbance, as well as installation of an access track.

The WWPS is not near any built or archaeological heritage items and therefore has nil potential to impact identified heritage.

7.2 Project justification and options

The water and waste water supply pipeline, as well as, waste water pumping station are needed to supply the Kings Hill URA with water services. The route has been selected to provide the most efficient delivery of these vital water services. An option to divert the pipeline around the Irrawang Pottery Site (A4) would involve impact to wetland vegetation communities, has potential for impacting additional Aboriginal sites and would be far more costly due to the length of the pipeline. This option is not viable for the Proposal.

7.3 Heritage impact assessment

There are two heritage items in the Proposal site: Irrawang Pottery Site (LEP A4 / ID127) and Grahamstown Dam (which includes the Irrawang and Grahamstown spillways) (ID60/SHI# 3630054)

(Table 2). It should be noted that the Irrawang and the Grahamstown spillways are located in two separate locations in the Proposal site, but they form part of the same heritage listing.

Within the township of Raymond Terrace there are six heritage items abutting the Proposal site. there are: four built heritage items (I44, I46, I47 and I81), one park (I45) and a conservation area (C2).

The heritage impact assessment has been structured according to heritage type and where the heritage item is in relation to the Proposal site, as such it has been divided into: Archaeological Area A4; Spillways and Raymond Terrace heritage items.

7.3.1 Archaeological Area A4 Impact Assessment

The earthworks may impact the remains of King's homestead, field enclosures, outbuildings, cisterns and wells, as well as dumps associated with the King's Irrawang House, Winery and Barn. Vegetation clearance has the potential to disturb ground surfaces and thus may also impact these archaeological features, as well as the barn remains.

7.3.2 Archaeological Area A4 Mitigation

To mitigate the impact of the earthworks to the field enclosures, detailed design should consider moving the Proposed Pipeline Alignment away from areas of high archaeological potential (Figure 24).

A program of archaeological test excavation should be undertaken to identify if relics are within the Proposed Pipeline Alignment and to identify if there is a possibility of avoiding them by moving the pipeline. An application for a s139 exception under the *Heritage Act 1977* to undertake archaeological test excavation should be submitted to NSW Heritage and be in place prior to commencement of archaeological investigation.

Based on the results of the s139 archaeological testing a preferred final alignment is to be selected. The final alignment will seek to avoid as much impact as possible to significant archaeological remains. Depending on the results of the s139 archaeological testing a call-out procedure and/or archaeological monitoring may be required during construction works.

If there is still potential to impact relics during the construction works, despite the previous mitigation measures, then a s140 permit for salvage and impacts may be required.

Any archaeological remains identified through background research and the s139 archaeological test excavation program in the immediate vicinity of the works area must be identified and mapped in the Construction Environment Management Plan (CEMP) and physically cordoned off during works to prevent any inadvertent impacts.

7.3.3 Spillways Impact Assessment

The earthworks and pipeline installation at the Irrawang and Grahamstown spillways have the potential to impact the fabric and stability of these structures, as well as potential impacts from vibration. Vegetation clearance also has the potential to impact the fabric of these structures.

7.3.4 Spillways Mitigation

The pipeline is to be installed across the Irrawang and Grahamstown spillways using methods that will not impact the stability of these structures and with minimal impact to the fabric. Vegetation clearance is to be undertaken with caution so as not to impact the fabric of these structures.

7.3.5 Raymond Terrace Heritage Items Impact Assessment

Within the township of Raymond Terrace there are six heritage items abutting the Proposal site. there are: four built heritage items (I44, I46, I47 and I81), one park (I45) and a conservation area (C2). There is low potential for inadvertent impact to these items and there will be no permanent visual impact to these items as the pipeline is underground. There will be a temporary visual impact during construction.

The Proposed Pipeline Alignment is within the curtilage of Boomerang Park (I45) which contains a former stone quarry and mature trees. Some of these mature trees are within 12 m of the Proposed Pipeline Alignment and thus their root zones have the potential to be impacted.

7.3.6 Raymond Terrace Heritage Items Mitigation

Built heritage items I44, I46, I47 and I81 and the conservation area C2 will have a temporary visual impact during construction. As these impacts will be temporary in nature no mitigation has been proposed.

The root zones of mature trees in Boomerang Park (I45) have the potential to be impacted by the earthworks and installation of the pipeline. A qualified arborist is to provide a report (as part of Detailed Design, post approval, as relevant) on whether there will be negative health outcomes for the trees as a result of the Proposal and the arborist is to advise on any additional mitigation measures required.

7.4 Summary of heritage impacts and mitigation

As summary of heritage impacts and mitigation are detailed in Table 8.

Table 8: Summary of heritage impacts for the Proposal

Heritage Item ID	Description	Within Proposal Site Yes/No	Relationship to Proposal site	Potential Impacts	Mitigation
A4	Archaeological Area 4	Yes	Within Proposal site	Potential impacts to archaeological relics	Move Proposed Pipeline Alignment and/or s139 Exception with archaeological monitoring
60	Irrawang Spillway	Yes	Within Proposal site	Potential impact to built fabric and stability of structure	Where possible, alter design to ensure minimal impact to fabric and no impact on the stability of the structure
60	Grahamstown Spillway	Yes	Within Proposal site	Potential impact to built fabric and stability of structure	Where possible, alter design to ensure minimal impact to fabric and not impact on the stability of the structure
I44	Timber cottage	No	Abuts Proposal site	Temporary visual impact	None proposed
I46	St Brigid's Convent	No	Abuts Proposal site	Temporary visual impact	None proposed
I47	St Brigid's Church Hall	No	Abuts Proposal site	Temporary visual impact	None proposed
I81	St Brigid's Church	No	Abuts Proposal site	Temporary visual impact	None proposed
C2	Raymond Terrace Heritage Conservation Area	No	Abuts Proposal site	Temporary visual impact	None proposed
I45	Boomerang Park	Yes	Partially within Proposal site	Potential impact to root zone of heritage listed trees	Arborists report to be prepared (as part of detailed design) should these trees be impacted.

8.0 STATEMENT OF HERITAGE IMPACT

The Statement of Heritage Impact for the Proposal is detailed in Table 9.

Table 9: Statement of Heritage Impact for the Proposal

Development	Discussion
What aspects of the Proposal respect or enhance the heritage significance of the study area?	The pipeline installation as part of the Proposal will be below ground and therefore will not visually impact the built heritage items.
What aspects of the Proposal could have a detrimental impact on the heritage significance of the study area?	There is potential for impact to archaeological relics associated with King's Irrawang House, Winery and Barn complex (Irrawang Pottery site Archaeological Area A4). The pipeline installation has the potential to impact the fabric and structure of the Irrawang and Grahamstown spillways, as well as impacts from vibration.
Have more sympathetic options been considered and discounted?	The option to avoid Archaeological Area A4 by diverting the pipeline around the listed boundary would be impractical for the project and may have great impact to ecological communities and Aboriginal heritage.

9.0 CONCLUSIONS AND RECOMMENDATIONS

9.1 Conclusions

There are three heritage items in the vicinity of the Proposal site: Irrawang Pottery Site (LEP A4 / ID127) and Grahamstown Dam (which includes the Irrawang and Grahamstown spillways) (ID60/SHI# 3630054) and Boomerang Park (LEP I45). There are four heritage items and one conservation area which abut the Proposal site:

- I46, I47 and I81 as part of the Brigid's Church complex
- I44 timber cottage (former mounted police barracks)
- C2 the Raymond Terrace Conservation Area C2

9.1.1 Modifications during detailed design

Archaeological area A4 mitigation

There is potential for impact to archaeological relics associated with King's Irrawang House, Winery and Barn complex.

To mitigate the impact of the earthworks to significant archaeological remains within the Proposal Site, detailed design should consider moving the Proposed Pipeline Alignment away from these structures and in particular portions of the Proposal Site in close proximity to the Pacific Highway which *may* be more disturbed and less likely to contain relics. Archaeological testing under an s139 exception issued by NSW Heritage is to be used to identify the location, extent and significance of any archaeological remains located within the proposed pipeline alignment and to identify if there is a possibility of avoiding them by moving the pipeline.

An Archaeological Research Design (ARD) would be prepared to outline the research values of the potential archaeological remains with a detailed archaeological testing methodology provided. This ARD report would be provided as supporting documentation to the s139 application to Heritage NSW for their consideration.

Based on the results of the s139 archaeological testing a preferred final alignment is to be selected. The final alignment will seek to avoid as much impact as possible to significant archaeological remains.

If archaeological testing indicates that there are significant and intact relics within the proposed ground disturbance corridor for the construction works, further approvals from Heritage NSW under the *Heritage Act 1977* would be required, potentially involving further archaeological research and management.

Mitigating impacts to the Irrawang and Grahamstown Spillways

The pipeline installation has the potential to impact structural fabric associated with the Irrawang and Grahamstown spillways. The pipeline is to be installed across the Irrawang and Grahamstown spillways using methods that will not impact the stability of these structures and with minimal impact to the fabric. Vegetation clearance is to be undertaken with caution so as not to impact the fabric of these structures.

Vibration impacts to heritage items must not exceed the recommended screening level of 7.5 millimetres per second. It is recommended that vibration monitoring occurs during works in the vicinity

of heritage items. Vibration monitoring and inspection by a structural engineer who is familiar with heritage structures should be undertaken where required if the predicted ground-borne vibration levels exceed the anticipated rating and/or cause impacts to significant fabric.

Raymond Terrace heritage items mitigation

Built heritage items I44, I46, I47 and I81 and the conservation area C2 will have a temporary visual impact during construction. As these impacts will be temporary in nature no mitigation has been proposed.

The root zones of mature trees in Boomerang Park (I45) have the potential to be impacted by the earthworks and installation of the pipeline. A qualified arborist is to provide a report (as part of Detailed Design, post approval, as relevant) on whether there will be negative health outcomes for the trees as a result of the Proposal and the arborist is to advise on any additional mitigation measures required.

9.2 Recommendations

- A program of archaeological test excavation must be undertaken within the area where significant archaeological remains associated with King's Irrawang House, Winder and Barn complex may occur within the Proposal Site
- The archaeological test excavation program must be conducted in accordance with a Section 139 exception issued by NSW Heritage (Department of Premier and Cabinet) under the *Heritage Act 1977*. The application for the s139 exception should be supported by this document and a standalone excavation methodology (Archaeological Research Design [ARD]). The excavation methodology should include detailed assessment of potential archaeological remains, archaeological potential mapping, and detailed significance assessment
- Based on the results of the Section 139 exception archaeological testing a preferred final alignment is to be selected within the Proposal Site. The final alignment will seek to avoid as much impact as possible to significant archaeological remains identified during the archaeological test excavation program
- An updated impact assessment should be prepared that provides a final assessment of impacts to significant archaeological remains that may result from installation of the pipeline. The updated impact assessment will provide recommendations for further approvals and archaeological investigation that may be required
- Where there will be impacts to relics as a result of installation of the pipeline, a Section 140 permit issued by NSW Heritage under the *Heritage Act 1977* must be in place prior to commencement of works. Archaeological salvage excavation may also be required under the s140 permit prior to commencement of pipeline installation works
- Any archaeological remains identified through background research and the s139 archaeological test excavation program in the immediate vicinity of the works area must be identified and mapped in the Construction Environment Management Plan (CEMP) and physically cordoned off during works to prevent any inadvertent impacts.
- Detailed design should consider methods for installation of the pipeline across Irrawang and Grahamstown spillways that will not impact the stability of these structures and with minimal

impact to the fabric. Vibration impacts to heritage items must not exceed the recommended screening level of 7.5 millimetres per second. It is recommended that vibration monitoring occurs during works in the vicinity of heritage items. Vibration monitoring and inspection by a structural engineer who is familiar with heritage structures should be undertaken where required if the predicted ground-borne vibration levels exceed the anticipated rating and/or cause impacts to significant fabric.

- A qualified Arborist is to prepare a report (as part of Detailed Design, post approval, as relevant) on whether there will be impacts to the root zones of the heritage listed trees in Boomerang Park (I45) and additional mitigation measures to be implemented as required.
- A heritage induction is to be provided to all onsite personnel so that they are aware of their obligations under the *NSW Heritage Act 1977*.
- The CEMP for the Proposal is to include a stop work procedure for unexpected heritage finds. This procedure is to ensure the appropriate management of historic finds, in the unlikely event that relics, or suspected relics (historic material) is encountered during onsite works. The stop work procedure would involve an obligation to stop ground disturbing works in the area of the find, to contact the project heritage consultant, to implement management strategies as directed by the heritage consultant and/or Heritage Division of the Office of Environment and Heritage and to commence works in that area only once clearance has been obtained from the heritage consultant and/or the Office of Environment and Heritage.

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