Stage 3 (Report Preparation)

Stage three of the project involves the production of a Draft and Final Report that includes an analysis of the data obtained from the field survey, an assessment of archaeological sensitivity and management recommendations. The report has been prepared by Stuart Huys and Shay Hannah, in consultation with Vernon Graham.

A draft copy (electronic PDF version) of the report was submitted to the proponent for review. Any comments that were received have been incorporated into the final draft report. One electronic copy (PDF version) of the final draft report has been provided to Aboriginal Heritage Tasmania (AHT) for review and comment. In addition, CHMA has provided AHT and the proponent with all site spatial data files, and mapping associated with the project (in ESRI shape file format (GDA94). A copy of the report has been provided to Vernon Graham, to assist in the Aboriginal community consultation process. The report has been sent out to a range of Tasmanian Aboriginal organisations for information purposes.

1.4 Project Limitations

Most archaeological investigations are subject to limitations that may affect the reliability of the results. The main constraint to the present investigation was restricted surface visibility due primarily to vegetation cover. At the time of the field survey, surface visibility across the proposed footprint ranged between <10% and 90%, with the estimated average being 20%. The main access track to the study area is a previously graded vehicle track, where surface visibility was <10%. There were also numerous areas where erosion scalds were present within the pastureland that provided locates of improved visibility. To offset constrained surface visibility, any areas of improved visibility were inspected in detail. The constraints in surface visibility limited the effectiveness of the survey assessment to some extent. The issue of surface visibility is further discussed in Section 6 of this report.

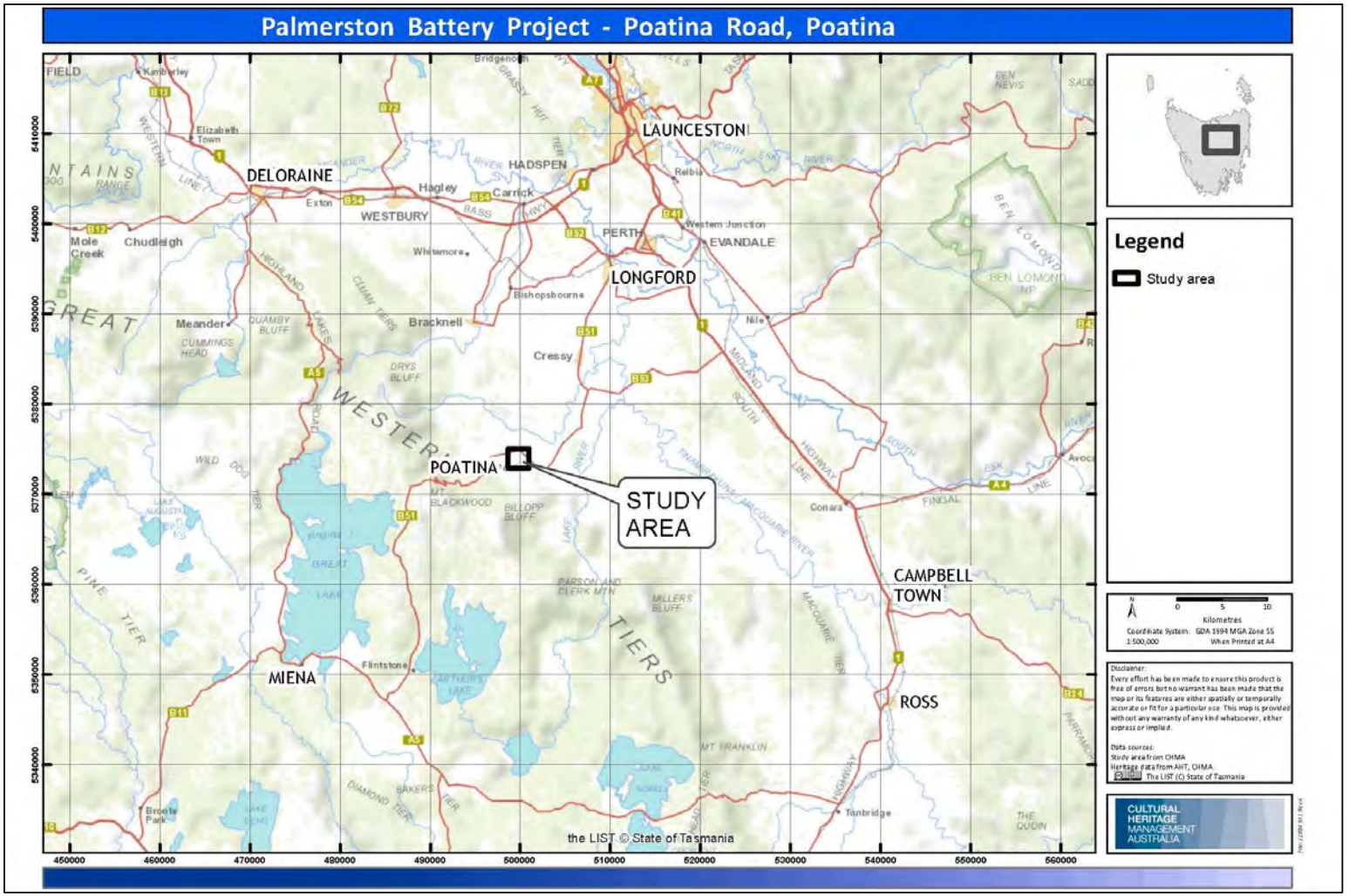

Figure 1: Topographic map showing the location of the study area at Poatina/Cressy in the Northern Region of Tasmania.

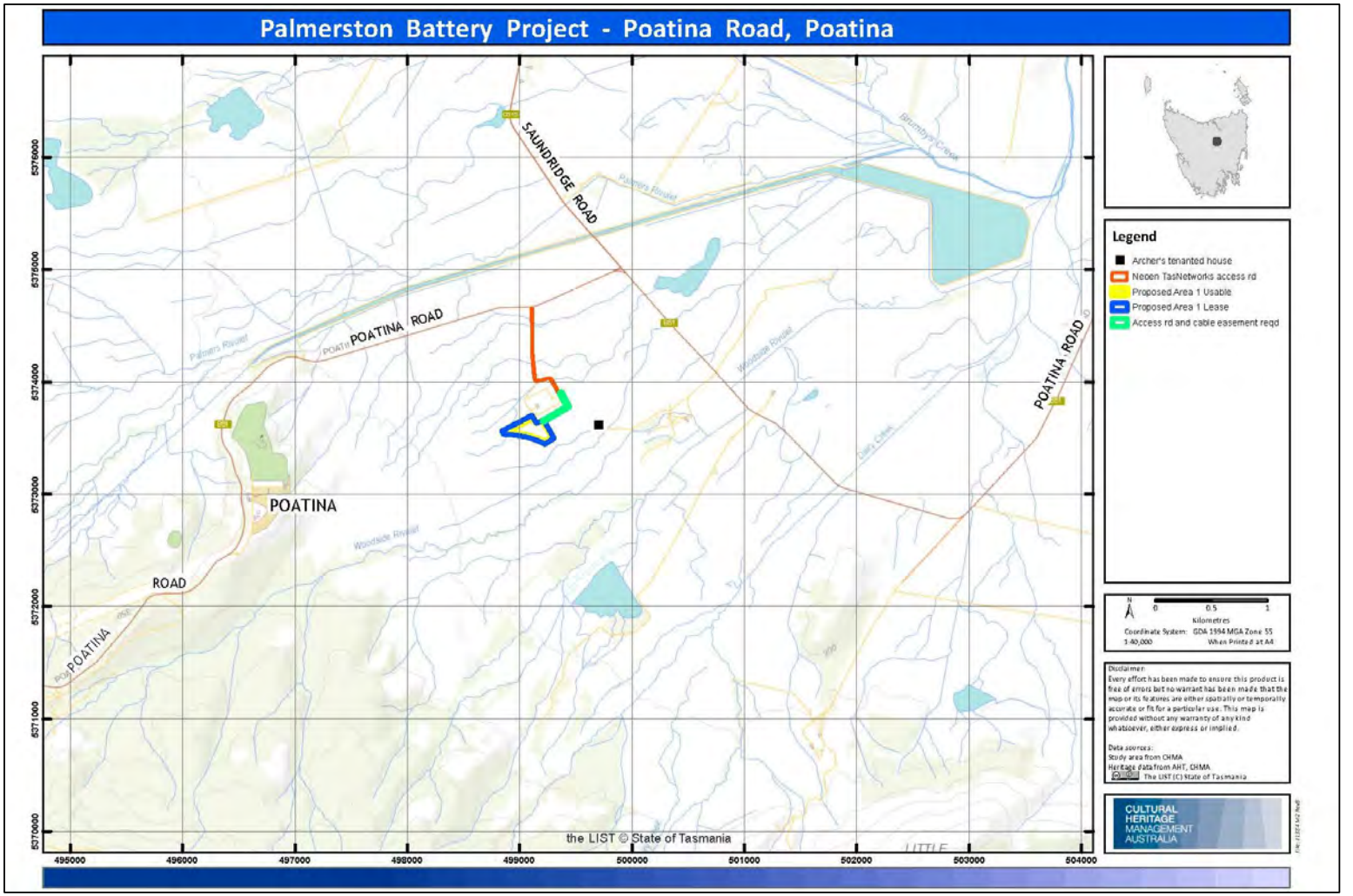

Figure 2: Topographic map showing the landscape setting of the study area.

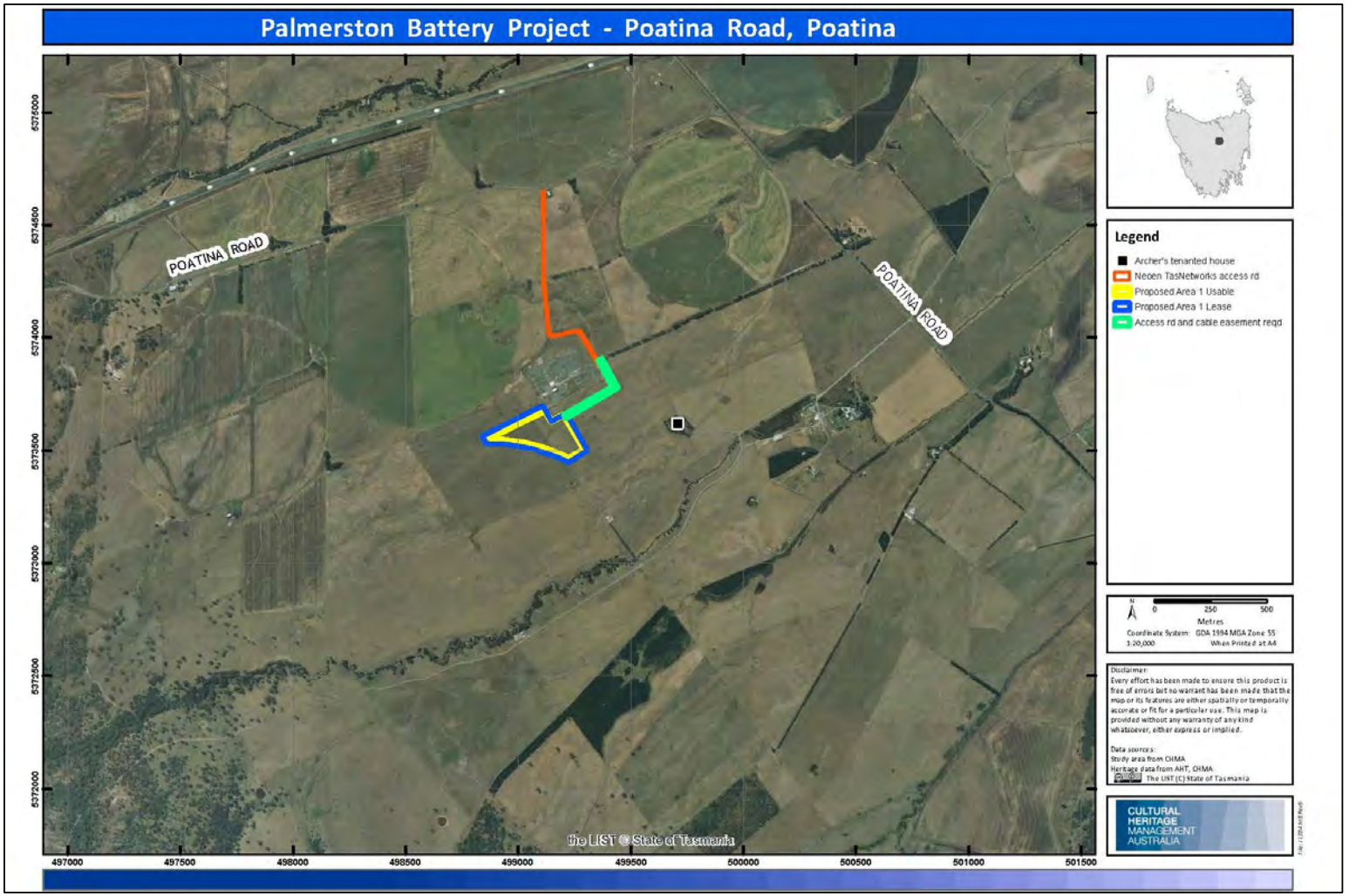

Figure 3: Aerial image showing the boundaries of the study area.

2.0 Environmental Setting of the Study Area

2.1 Introduction

Prior to undertaking an archaeological survey of the study area, it is necessary to characterise the landscape. This includes considering environmental factors such as topography, geology, climate, vegetation and past and current landscape use. An assessment of the environmental setting helps to develop an understanding of the nature of Aboriginal occupation and site patterning that might be expected to occur across the study area. In addition, it must be remembered that in Aboriginal society, the landscape extends beyond economic and technological behaviour to incorporate social geography and the embodiment of Ancestral Beings.

The archaeological context is generally only able to record the most basic aspects of Aboriginal behaviour as they relate to artefact manufacture and use and other subsistence-related activities undertaken across the landscape such as raw material procurement and resource exploitation. The distribution of these natural resources occurs intermittently across the landscape and as such, Aboriginal occupation and associated archaeological manifestations occur intermittently across space. However, the dependence of Aboriginal populations on specific resources means that an understanding of the environmental resources of an area accordingly provides valuable information for predicting the type and nature of archaeological sites that might be expected to occur within an area.
The primary environmental factors known to affect archaeological patterning include the presence or absence of water, both permanent and ephemeral, animal and plant resources, stone artefact resources and terrain.

Additionally, the effects of post-depositional processes of both natural and human agencies must also be taken into consideration. These processes have a dramatic effect on archaeological site visibility and conservation. Geomorphological processes such as soil deposition and erosion can result in the movement of archaeological sites as well as their burial or exposure. Heavily vegetated areas can restrict or prevent the detection of sites, while areas subject to high levels of disturbance may no longer retain artefacts or stratified deposits.

The following sections provide information regarding the landscape context of the study area including topography, geology, soils and vegetation.

2.2 Landscape Setting of the Study Area

The proposed Palmerston Battery Project footprint (the study area), covers approximately 1.39ha of existing graded access track and approximately 4ha of private pastureland. The study area is situated immediately adjacent to the existing Palmerston TasNetworks Substation and is 6.1km east of Poatina and 16.8km southwest of Cressy in the Northern Region of Tasmania (see Figures 1–3). The study area is situated on a flat to gently undulating floodplain which is primarily used as pastureland.

The underlying geology of the study area consists of Cenozoic cover sequences which consist of sand gravel and mud of alluvial, lacustrine and littoral origin (List 2022). Soils within the study area are light to dark red/brown sandy loam.

The Palmerston Battery Project footprint study area is surrounded by named watercourses, unnamed tributaries and numerous drainage lines. The study area is situated inland from the Woodside Rivulet which is 670m south of the study area and runs in a northeast-to-southwest direction (see Figure 2). The study area is also situated inland from Palmers Rivulet which is 655m north and runs in a northeast-to-southwest direction. Both of these watercourses are semi-permanent and tributaries associated with Brumby's Creek which is situated 4.1km northeast of the study area (see Figure 2).

The vegetation structure across the study area primarily consists of introduced grasses, most notably Prairie Grass (*Bromus wildenowie*) and White Clover (*Trifolium repens*) (NSW Department of Primary Industries 2022). Amongst the introduced grasses are weeds, such as the Scotch Thistle (*Onopordum acanthium*) and sparse stands of native rushes.

The entire study area has been intensively disturbed. The entire study area and immediate surrounds have been subject to past clearing to make way for agricultural activity. The main access track leading into the study area has been graded with bitumen to facilitate access to the Palmerston TasNetworks Substation which is immediately adjacent to the eastern border of the study area. The construction and ongoing maintenance and development of the Palmerston TasNetworks Substation has also been a source of disturbance to the study area. Any Aboriginal sites that may be present within these more highly disturbed infrastructure/agricultural areas will have been either destroyed or heavily impacted.

The study area has a cool, wet climate typical of northern Tasmania. Rainfall occurs throughout the year; with a mean annual rainfall of 589mm. Rainfall is highest in August and September (64mm – 71mm) and lower from January to February (28 – 31mm). The warmest months of the year are January and February when mean temperatures range from minimums of 10°C to maximums of about 23°C. Winter tends to be cold with mean annual temperatures in the coldest months of June and July ranging from 1.5°C mean minimum to maximum temperatures of about 11°C (BOM 2022).

Plate 1: View southeast showing the main access track leading into the study area has been graded with bitumen.

Plate 2: View southeast showing the Prairie Grass (*Bromus wildenowie*) present with the paddocks in the study area.

Plate 3: View south showing one of the drainage lines present within the study area.

Plate 4: View west showing the Palmerston TasNetworks Substation (right) and pastureland within the study area.

Plate 5: View southwest showing the border of the study area overlooking red-brown sandy loam soil.

3.0 Ethno-historic Background

3.1 Aboriginal Social Organisation in Tasmania

Ryan (2012) explains that the terms 'nation' and 'clan' are the preferred terms used by the Tasmanian Aboriginal community in place of 'tribe' and 'band' respectively. This terminology has been adopted in the following discussion.

According to Jones (1974), the social organisation of Tasmanian Aboriginal society appears to have consisted of three social units, these being the hearth group, the band (clan) and the tribe (nation). The hearth group was the basic family unit and would generally have consisted of a man and woman, their children, aged relatives and sometimes friends and other relatives. The size of hearth groups would generally range from between 2-8 individuals (Jones 1974: Plomley 1983). Plomley (1983) provides a description made by Peron of a hearth group he encountered at Port Cygnet:

> *There were nine individuals in this family, and clearly they represented a hearth group, because Peron visited their campsite with its single hut. The group comprised an older man and wife, a younger man and wife, and five children, one a daughter (Oure-Oure) of the older man and wife, and the other four the children of the younger man and wife.* (Plomley 1983:168).

The clan appears to have been the basic social unit and was comprised of a number of hearth groups (Jones 1974). Jones (1974:324-325) suggests that the clan owned a territory and that the boundaries of this territory would coincide with well-marked geographic features such as rivers and lagoons. Whilst the clan often resided within its territory, it also foraged widely within the territories of other clans. Brown (1986:21) states that the band was led by a man, usually older than the others and who had a reputation as a formidable hunter and fighter. Brown also suggests that the clan (as well as the hearth group) was ideally exogamous, with the wife usually moving to her husband's band and hearth group.

Each clan was associated with a wider political unit, the nation. Jones (1974:328-329) defines the tribe (or nation) as being:

> *…that agglomeration of bands which lived in contiguous regions, spoke the same language or dialect, shared the same cultural traits, usually intermarried, had a similar pattern of seasonal movement, habitually met together for economic and other reasons, the pattern of whose peaceful relations were within the agglomeration and of whose enmities and military adventures were directed outside it. Such a tribe had a territory, consisting of the sum of the land owned by its constituent bands…The borders of a territory ranged from a sharp well defined line associated with a prominent geographic feature to a broad transition zone*. (Jones 1974:328-329)

According to Ryan (2012:11), the Aboriginal population of Tasmania was aligned within a broad framework of nine nations, with each nation comprised of between six and fifteen clans (Ryan 2012:14). The mean population of each nation is estimated to have been between 350 and 470 people, with overall population estimates being in the order of between seven to ten thousand people prior to European occupation (Ryan 2012:14).

The current study area is located within the boundaries of the Big River Nation, close to the boundaries with the North Midlands Nation (see Figure 4). The territory of the Big River Nation ran from approximately New Norfolk through to the southwest corner of Surrey Hills to Quamby Bluff in the west and along the Western Tiers through to St Peters Pass and eventually linking up at Herdsman's Cove. In total, the Big River Nation occupied an area of approximately 8000km² and incorporated around 240km of lake shoreline (Ryan 2012:25).

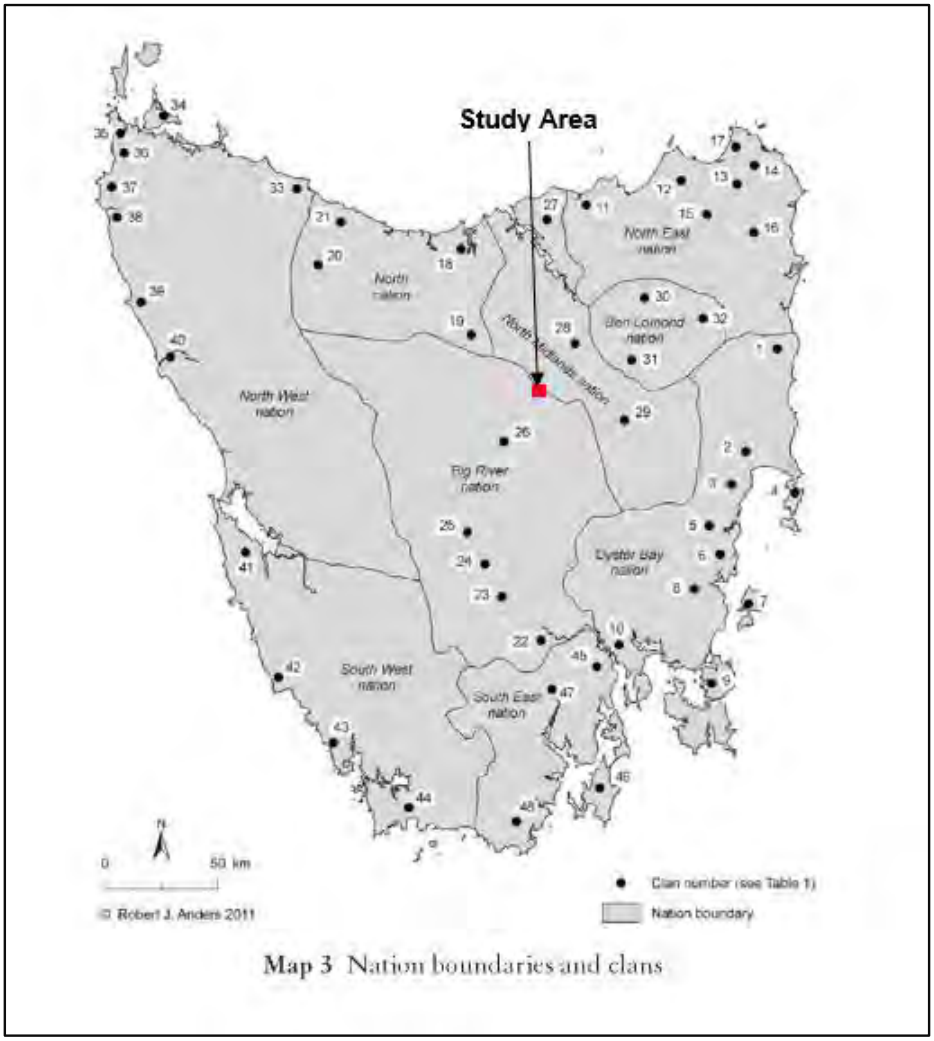

Figure 4: The Aboriginal Nations of Tasmania in relation to the study area (Ryan 2012:13).

The Big River Nation was comprised of at least five clans. These were the Leenowwenne who were located around New Norfolk, the Pangerninghe located around the Clyde-Derwent junction between the Ouse and Dee Rivers, and the Braylwunyer (located around the area as the Pangerninghe). The remaining clans were the Larmairremener who were located west of the River Dee and the Luggermairrernerpairrer who were located at the Great Lake. Each clan is thought to have been comprised of between 50 and 80 people, with the overall population of the North Midlands nation estimated at between 400 and 500 people (Ryan 2012:29). The clan most likely to have occupied the area around Poatina/Cressy (including the current study area) was the Luggermairrernerpairrer.

The Big River nations were among the first to experience British invasion in northern Tasmania in 1804, and as such, insufficient information exists as to the exact location of each clan. However, the clan most likely to have had rights over the land within which the study area is located are the Luggermairrernerpairrer clan who extensively utilized the plains areas surrounding Poatina and Cressy (Ryan 2012).

Within the Big River Nation, clans appear to have camped along lake shores and along the rivers such as the Clyde River, which provided access to bird and freshwater marine life resources, as well as kangaroo hunting grounds that these waterways opened up to. Clans of the Big River Nation regularly made seasonal migrations (see Figure 5). As such, the Big River Nation had extensive relations with neighbours of the North, North Midlands, Oyster Bay, North West, South West and South East nations (Ryan 2012:26–27). These connections in turn facilitated seasonal access of the Big River nation to the east coast at Oyster Bay through negotiations with the Oyster Bay Nation (Ryan 2012:27) and the existence of other seasonal travel routes to the east venturing into the territory of the North Nation to exchange ochre (Ryan 2012:28). Other major ochre sources in Tasmania were in the Western Tiers, in the territory of the North Nation.

The Luggermairrernerpairrer is said to have spent the winter on the shoreline of the Great Lake within their own country exploiting available freshwater marine life and birds, before migrating within or outside their own country to exploit the hunting grounds in spring (Ryan 2012:26–28).

Very few available ethnohistoric accounts exist, that relate to aspects of the material culture of the Big River Nation. Several early explorers and ethnographers have left accounts of their observations of the Big River Nation that provide an insight into the economy, material culture and social customs of the people prior to European settlement. Primary among the ethnographic sources are the diaries of George Augustus Robinson, appointed as government Protector of Aborigines who followed a policy of conciliation with the ultimate aim of removing Aboriginal people to offshore islands (Plomley 2008:515).

Around the Lake Echo area, Robinson records Aboriginal hut sites along the margins of the marshy lagoons that intercept the rugged hills (Plomley 2008:543-44). There are often large numbers of huts that Robinson describes as ‘villages’ (Plomley 2008:548). When Robinson approached the huts they were empty but showed signs of having recently been occupied. He repeatedly described the abundance of ‘kangaroo’ (Bennett’s wallaby), ‘native bread’ (a tuber, *Polyporus myllitae*) and duck and bird life that abounded in: ‘the place of resort … and their hunting grounds’ (Plomley 2008:542). There is also a reference to a plant with a red berry that the Larmairremener people call Murerleener (Plomley 2008:543). The plant was unknown to those Aboriginal people from the south that were with Robinson.
The valleys of the Big River Nation that Robinson travelled through had been burnt to facilitate access and attract game. Robinson records the evidence of this as he travels through the area around modern-day Bronte Lagoon (Plomley 2008:545). Robinson also recorded the petrified wood artefacts that he found across the southern plateau country (Plomley 2008:548). There were worn paths through the country that Robinson in some cases followed. One ran along the Dee River valley, and it seems that this was a major seasonal travel route for the Big River people (Plomley 2008:549).

There is evidence that the Big River people put ochre in their hair. In a wonderful example of culture contact, Robinson recorded that when his party passed through Campbell Town some of the Big River people pounded a brick to a fine powder and mixed it with animal grease to apply a thick coat to their hair (Plomley 2008:535).

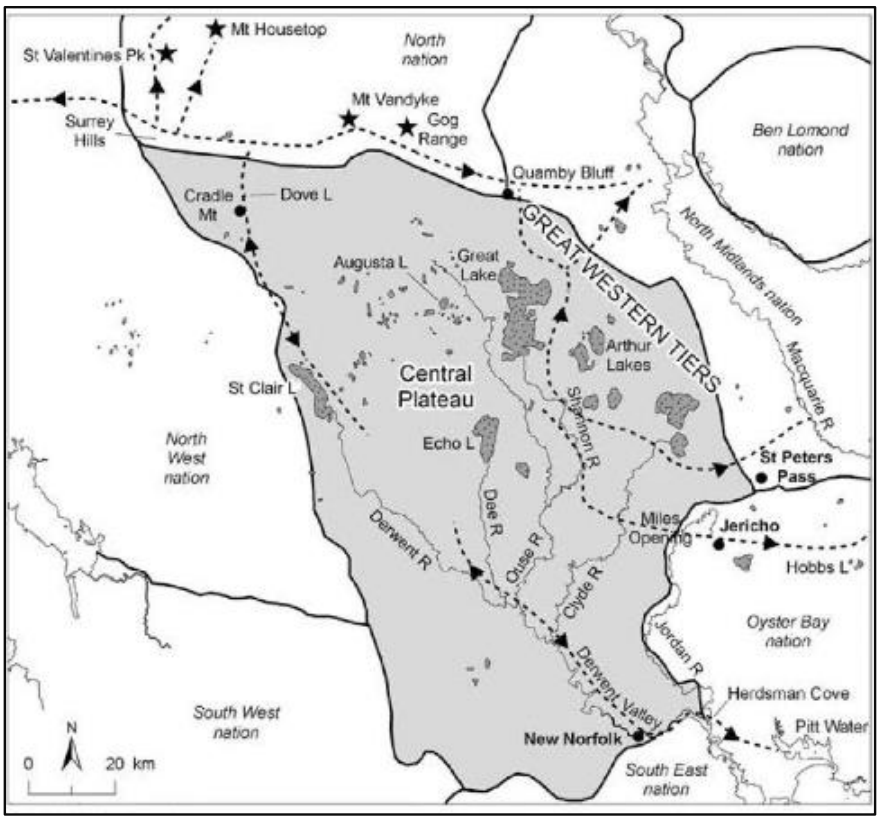

Figure 5: Settlement and movement patterns of the Big River Nation clans (Ryan 2012:27).

3.2 Culture Contact and Frontier Violence

The first Europeans to venture into the highlands with any sense of permanency were kangaroo hunters, stockkeepers and bushrangers (Jetson 1989:12). One hunter called Toombs is reported to have advanced as far as the Great Lake by 1815 (Kostoglou 1998). The notorious bushranger Michael Howe made the highlands his home, living off the bush and wearing skins until his violent death at the hands of a past accomplice near Bothwell in 1818 (Jetson 1989:16). Robinson gives a sense of the violence of these people, who were more than ready to attack the Aboriginal inhabitants of the highlands. Robinson described numerous attacks by the settlers and gives a revealing description of a typical stockkeepers hut that he observed near Lake Echo:

A formidable construction … made by piling large rolled logs horizontally upon each other, halved together at the ends, with portholes to fire out of. The roof is barked and covered with turf so as not to ignite. (Plomley 2008:541).

For the first two decades of European settlement in Van Diemen's Land the highlands provided something of a refuge for members of the Big River Nation as the plains below became settled. Robinson claimed in 1831 that in this country '[the Big River Nation] had remained undisturbed by their white enemies' (Plomley 2008:548). However, all this was about to change (CHMA 2020:27–30).

From the early 1820s European settlement of the central highlands began to have a devastating impact on the Big River Nation. Within one year from 1822 to 1823, the European population of the highlands multiplied tenfold; from a population of fewer than ten men and a few thousand sheep to over sixty settlers with their families and upwards of sixty thousand sheep (Ryan 2012:115). The Big River Nation responded to this rapid colonisation with the onset of guerrilla war (CHMA 2020:27–30).

Initial contact between the Big River Nation and European settlers had aspects of an exchange dialogue. Ryan (2012:115) records that in the autumn of 1822 Big River people visited the east coast, and on their return to their territory encountered the new wave of settlers. Ryan notes that Big River women were traded to the settlers in exchange for food (2012:115). This suggests either a very rapid adaptation to European dietary staples or the rapid devastation of traditional hunting grounds and resources (CHMA 2020:27–30).

The 1820s through to the mid-1830s saw an increased number of surveying and exploration parties entering the central highlands. These included Scott (1821-23),
Helder (1825), Sharland (1832) and Frankland (1835). The increasing shortage of food supplies in the colonies led to the dispatch of kangaroo hunters into the un-settled parts of the colonies. These hunting parties were soon roaming areas well beyond the borders of the colonised areas (CHMA 2020:27–30).

Pastoralists soon followed the hunting parties, with shepherds penetrating the eastern fringes of the Lakes District by 1818. By the early 1820s, larger flocks of sheep were grazing as far west as the Great Lake. Wild cattle were sighted in these areas in the early 1820s. Grazing operations in the central highlands during this early period were generally small-scale operations run by a single shepherd or small groups of men, with the herds rarely being contained by fences. By the latter part of the 18th century, many of the small-scale pastoral holdings had been abandoned or bought out by large sheep stations that had begun to operate in the district. From 1824 violence and guerrilla attacks came to characterise the highlands. In January 1824 a European stockman was killed at Abyssinia when he attempted to abduct a Big River woman (Ryan 2012:115). This led to a skirmish in which the stockman was speared and his hut burnt (Ryan 2012:115). Attacks continued from both the Big River people and the Europeans throughout the 1820s (CHMA 2020:27–30).

In 1827 Luggermairrernerpairrer people robbed five huts along the Ouse and Shannon Rivers, creating panic among the European settlers (Ryan 2012:118). By the end of the year, the Luggermairrernerpairrer had moved west into more rugged country, although they continued to attack and raid settler's huts. Firearms were sometimes taken during these raids, and Ryan suggests that these were useful trade items (2012:118).
Ryan argues that firearms were quickly absorbed into the material culture of the Big River people and were exchange items rather than valued weapons (1996:118). However, Robinson claims that his companions saw the firearms as weapons, to use against the

Europeans but also in fights with antagonistic neighbouring tribes, such as the North Tribe (Plomley 2008:547). In his 1830 expedition through the highlands, Robinson expresses surprise at the sheer number of weapons caches that his companions reveal to him (Plomley 2008:547). This demonstrates the volatile situation in the highlands, and the rapidity with which violence could erupt (CHMA 2020:27–30).

By 1828 the two surviving Big River clans, the Luggermairrernerpairrer and the Larmairremener had moved to the Lagoon of Islands and Regents Plains areas (Ryan 2012:118). This congregation of people was seen as a threat by the Europeans and prompted the settlers to appeal to Hobart for protection (Ryan 2012:118). Military parties were dispatched to disperse the Aboriginal people, but the bands were not located. Ryan suggests that the Big River people had travelled to the north coast for the winter (2012:118). However, by October the surviving members of the Big River Nation returned to the highlands, and guerrilla warfare intensified (Ryan 2012:118). The Larmairremener people travelling with Robinson told him how during the cold winter of 1830, the people stayed in the highlands rather than follow seasonal migration patterns to Oyster Bay (Jetson 1989:32). This demonstrates the danger on the midlands to Aboriginal people by the early 1830s.
In September 1830 the 'Black Line' moved through the central highlands; a military operation aimed at forcibly removing Aboriginal people from pastoral districts across Tasmania. Ryan (2012:120) argues that the Big River people once again moved from the high country to the west in order to avoid the armed parties (CHMA 2020:27–30).

The Black Line was largely ineffective in the highlands; Robinson relates how his companions showed him how people avoided the line in the steep terrain and thick bush (Plomley 2008:547). He writes that 'the people here had avoided the strictest search' (Plomley 2008:547). Robinson met the surviving Big River people on December 1831 just north of Lake Echo (Ryan 2012:120). At this point, the group numbered only 26 people and was led by Montpeilliater of the Big River Tribe and Tongerlongton from the Oyster Bay Nation (Ryan 2012:121). The group agreed to accompany Robinson to Hobart in order to claim compensation for the loss of their land and the lives of many of their people (Ryan 2012:122). This compensation never eventuated and the people were eventually resettled on offshore islands (CHMA 2020:27–30).

The Big River Nation was dispossessed of their country by the killing of an estimated two hundred and forty people, while around sixty Europeans were also killed in frontier violence on the highlands (Ryan 2012:122). In addition, the trade and abduction of Big River women by male European stockmen and settlers contributed to the decimation of the Big River people (CHMA 2020:29–30).

4.0 Background Archaeology

4.1 Previous Archaeological Investigations in the Region

The study area is located in the Northern Region and the Central Highlands of Tasmania. A number of regional archaeological investigations have been undertaken in these regions over the past three decades. The most comprehensive, and pertinent investigations are those of Cosgrove (1984), Kee (1990) and Thomas (1991). The following provides an overview of these studies.

Cosgrove (1984)

In 1981–1982 Cosgrove conducted a systematic archaeological study of the High Plateau Surface, known as the Tasmanian Central Highlands Prehistory Project. The primary objective of this study was to investigate the site types, distribution and density of sites on the High Plateau Surface (HPS). The secondary objective was to provide data on which to base an archaeological management strategy, due to the previous hydro-electric power development and the subsequent hydrologically altering of river systems and lakes which had impacted the potential archaeological sites within the area (Cosgrove 1984:88).

As part of the survey, five rivers and six lakes were surveyed adding to a total of 41km^2 of transects. The survey resulted in the identification of 116 Aboriginal sites. The vast majority of the sites are classified as artefact scatters and isolated artefacts. The exception is the three rock cairns (possibly of Aboriginal origin), two quarry sites and four sandstone rock shelters (Cosgrove 1984:103).

Cosgrove (1984) noted that the Tasmanian pattern of highland settlement has parallels with the alpine areas of the mainland, the Monaro Tablelands and the Snowy River. Evidence from the survey of the HPS suggests that exploitation of resources by Aboriginal people took place in extremely exposed sections of the highest moorland subject to the westerly weather pattern (Cosgrove 1984:104). Cosgrove (1984) provides two theories for this, the first suggests that the sites represent camping activity in 8000 – 5000 BP when the climate was warmer and wetter; the second suggests that these were sites of ephemeral camps only used in times with optimum weather conditions (Cosgrove 1984:104). The second theory is supported by the fact that few surface artefacts were identified in high moorland areas, which in turn may reflect travel by Aboriginal groups over the quickest routes over the moraine ridges, bypassing difficult terrain (Cosgrove 1984:104).

The distribution and density of artefacts also reveal that campsites were situated in the most advantageous positions for resource acquisition and climatic protection (Cosgrove 1984:103). A tentative settlement model was predicted showing a preference by Aboriginal people toward long-term occupation at the boundaries of rivers, lakes and forests, solidifying the conclusion of campsites being located at advantageous positions in the High Plateau Surface (Cosgrove 1984:103).

Cosgrove (1984) noted that the Tasmanian Aboriginal's land use of the highlands can be seen as highly efficient, considering the Central Plateau's low latitude with long periods of winter and variable climate. It is estimated that the occupation of the highest plateau and the subalpine areas in Tasmania took place around 9000 BP, shortly after the retreat of the last

glaciers (Cosgrove 1984:105). In conclusion, the density and distributed of sites in lake (lacustrine) and highland riverine environments reflect a process of adaptation geared to the exploitation of the subalpine region by Aboriginal people.

Kee (1990)

In 1990 Kee implemented the Midlands Regional Aboriginal archaeological site investigation, which was funded through the National Estate Grants Program. The primary objectives of the study were primarily to establish (on the basis of literary and field research) a predictive model of site location for the Midlands Region, and secondly to carry out a limited archaeological excavation with the aim of providing a temporal context for the information generated for the study.

As part of the study, Kee (1990) surveyed 72km within the Midlands area. This survey resulted in the identification of 236 Aboriginal sites. This brought the total number of known Aboriginal sites in the Midlands to 350. The vast majority of these sites are classified as isolated artefacts or artefact scatters. The exception is the coastal fringes in the midlands where shell-midden sites tend to predominate. Stone quarries and suitable stone sources for procurement were identified in many locations throughout the Midlands, and a small number of rock shelters were also identified (Kee 1990).

As part of the analysis of the distribution of sites throughout the Midlands, Kee (1990) divided the Midlands into seven separate landscape divisions. These are Aeolian lunettes, coastal dunes and beaches, estuaries, lakes (uplands and lowlands), lowland hills and plains, upland hills and plains and rivers. The highest number of sites were identified in the Aeolian lunettes and coastal dunes, accounting for around 50% of the total number of sites recorded in the Midlands. Between 20 and 30 Aboriginal sites were recorded in each of the other five landscape divisions. Kee (1990) is of the opinion that the observed pattern of distribution accurately reflects true differences or variations in site densities throughout these different landscape divisions, and is not merely a product of skewed visibility or survey coverage.

Kee (1990) also noted a distinct difference in the distribution of site types within the Midlands Region, which she believes is also suggestive of differences in occupation patterns throughout the region. For example, the sites recorded around the margins of Lake Dulverton comprise mostly artefact scatters and rock shelters. Some of these sites are quite large (in terms of artefact numbers) and suggest intensive occupation. In contrast, the sites associated with the Aeolian lunettes were mostly small campsites located adjacent to lagoons, and are interpreted as being the product of short-term visitations to the area by small groups of people exploiting the resources of these lagoons and the associated hinterland areas.

One of the features of Kee's (1990) investigations is that the vast majority of sites identified as part of the field survey were recorded within ploughed farm paddocks, where the surface visibility is improved and the soils have been churned. This pattern of site location highlights the importance of good surface visibility in identifying sites during field surveys and demonstrates how varying conditions of surface visibility can potentially skew the results of survey investigations. Kee (1990) does not really adequately address this factor in her assessment. It is plausible that the factor of surface visibility variations could be a major

contributor to the pattern of site distribution observed for the Midlands, with site densities being highest in the Aeolian dunes and coastal areas where surface visibility is improved and lowest in the Riverine and Uplands areas where surface visibility is poor. The only way to adequately determine how accurate the perceived pattern of site distribution is in the Midlands region would be through extensive sub-surface investigations within the various landscape divisions.

The summary interpretation provided by Kee (1990) for the observed archaeological record of the Midlands Region is that the areas with observed higher site and artefact densities correlate with areas where there is an increase in available resources, making these areas attractive for human habitation, and facilitating prolonged periods of occupation. Those areas with lower site and artefact densities also correlate with areas of decreased resource availability, resulting in shorter, less frequent occupation of these areas by small groups of people.

Taking into account historic records for the region, Kee (1990) presents a seasonal model of occupation for the Midlands Region. This model involves the movement of Aboriginal people around inland resource-rich zones such as lagoons and lakes in the spring and early summer months, with summertime spent on the north coast areas. It is suggested that the winter months may have been spent in the inland parts of the Uplands where there was good soil drainage.

Thomas (1991)

Thomas conducted an archaeological study into the Holocene Archaeology and paleoecology of north-eastern Tasmania. Thomas (1991) analysed ethnohistorical sources, fossil pollen, modern pollen rain, contemporary vegetation patterns and the distribution of Aboriginal sites enabling the creation of a model of Holocene vegetation change in north-eastern Tasmania (Thomas 1991:i).

To do this, consultation of ethnohistorical sources dating from 1773–1830 pertaining to Aboriginal cultural burning revealed patterns of land use, as well as other historical sources, helped determine that Aboriginal fire regimes differed across Tasmania according to environmental determinants and social prerogatives (Thomas 1991:i). Archaeological surveys and limited excavations were examined as well to determine the commencement of settlement by Aboriginal people in inland, coastal and mountainous environments (Thomas 1991:i).

On subalpine and alpine areas of the Central Plateau studies conducted by Thomas (1983) and Cosgrove (1984) established that established a pattern of occupation characterised by sites containing <10 artefacts located at the boundaries of rivers, lakes and forests, solidifying the conclusion of campsites being located at advantageous positions within the environments (Thomas 1991:130). In 1983, Thomas found that evidence from the Central Plateau demonstrates that Aboriginal sites are closely associated with the presence of forest. In environments such as the plains to the west of Great Lake where there is stable long-term vegetation history, occupation patterns probably had the same relationship to forests as is suggested by the contemporary archaeological record (Thomas 1991:130).

Thomas (1991) concluded that Aboriginal settlement patterns may therefore have continued relatively unchanged for the entire Holocene (Thomas 1991:130). Furthermore, it was better to view Aboriginal peoples' interactions with vegetation as multi-directional phenomena, continuously varying, rather than as examples of unidirectional change (Thomas 1991:327).

4.2 Registered Aboriginal Sites in the Vicinity of the Study Area

As part of Stage 1 of the present assessment, a search was carried out on Aboriginal Heritage Register (AHR) to determine the extent of registered Aboriginal heritage sites within and in the general vicinity of the Palmerston Battery Project study area.

The search shows that there are a total of 11 registered Aboriginal sites that are situated within a 5km radius of the study area (search results provided by Paul Parker from AHT on 6-06-2022). Eight of these sites are classified as artefact scatters and the remaining three sites are classified as isolated artefacts. Table 1 provides the summary details for these 11 registered Aboriginal sites, with Figures 6 and 7 showing the location of these sites in relation to the study area.

None of these registered sites are situated within the bounds of the study area. The nearest registered site is located around 900m to the south of the study area.

Table 1: Registered Aboriginal sites in a 5km radius of the Palmerston Battery Project study area (based on the results of the AHR search dated 6-06-2022).

AH Number	Site Type	Locality	Grid Reference Easting (GDA94)	Grid Reference Northing (GDA94)
8949	Artefact Scatter	Cressy	499679	5372696
8950	Artefact Scatter	Cressy	499383	5372278
8951	Artefact Scatter	Cressy	499343	5372312
9039	Artefact Scatter	Cressy	502600	5375503
9278	Artefact Scatter	Cressy	500306	5372273
9279	Artefact Scatter	Cressy	500622	5371976
9280	Artefact Scatter	Cressy	500818	5371975
9281	Artefact Scatter	Cressy	501141	5372262
9946	Isolated Artefact	Cressy	501740	5375928
9964	Isolated Artefact	Cressy	500894	5375684
13259	Isolated Artefact	Cressy	499856	5371776

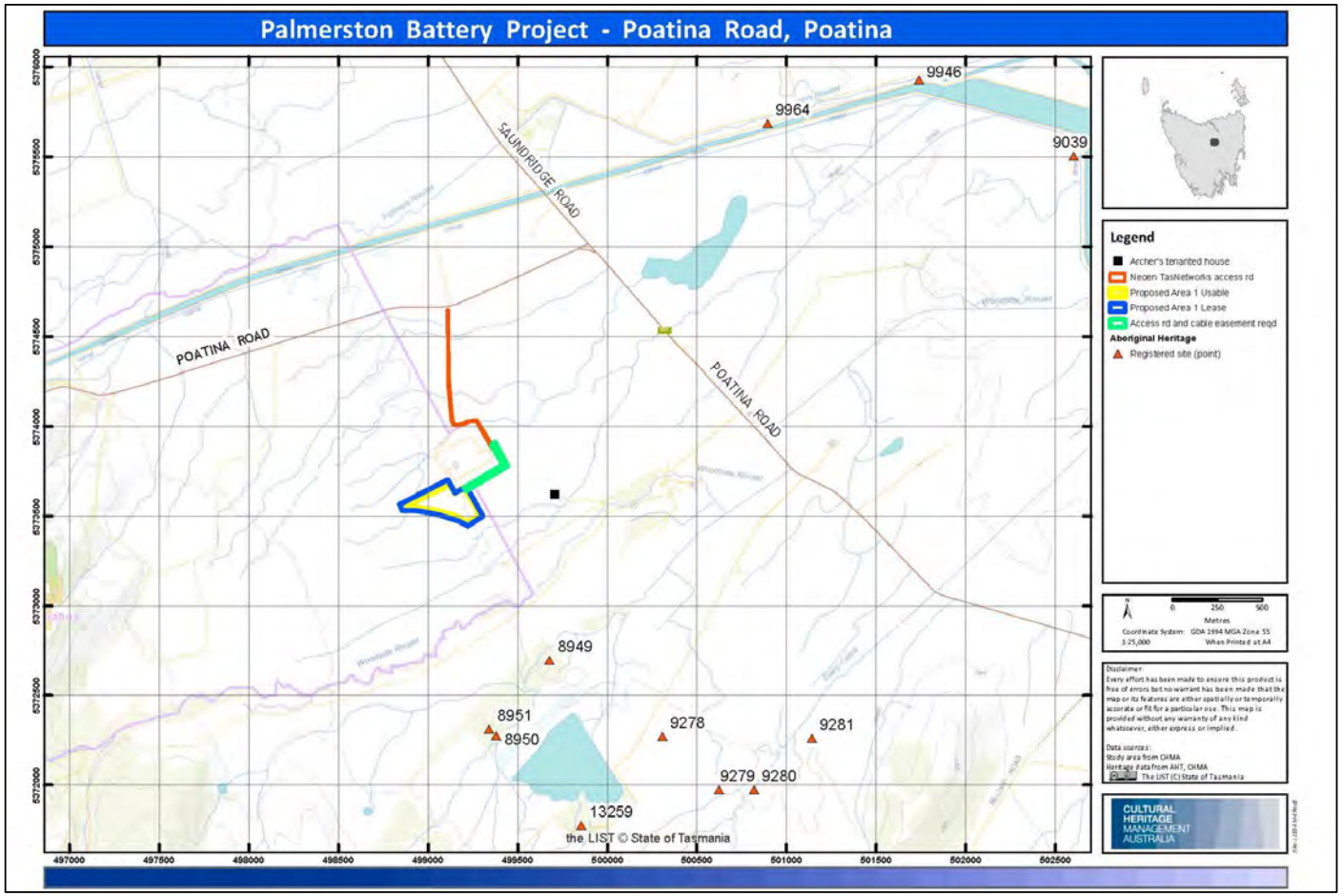

Figure 6: Topographic map showing the location of registered Aboriginal sites located within a 5km radius of the study area (based on the results of the AHR search dated 6-06-2022).

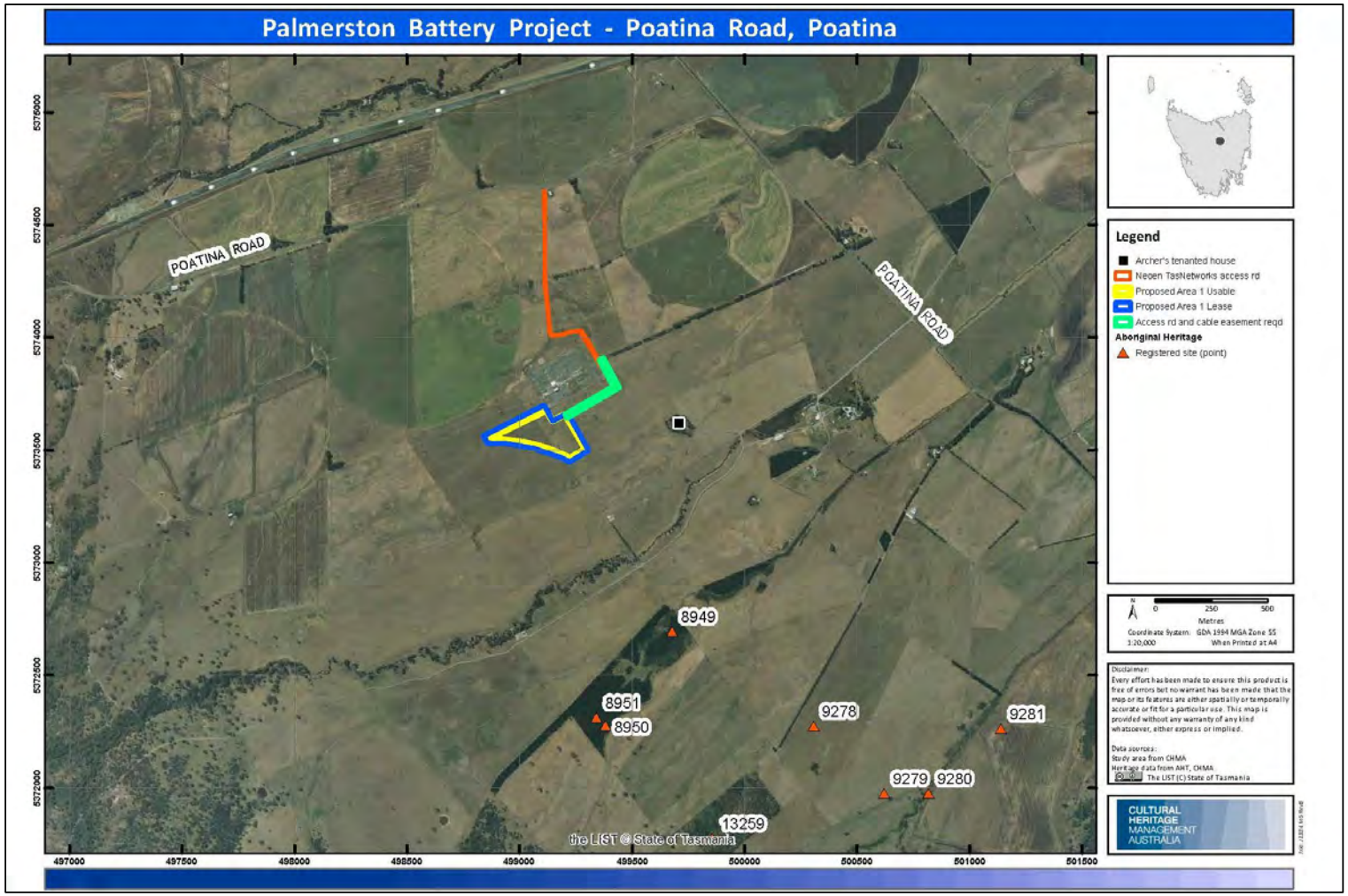

Figure 7: Aerial map showing the location of registered Aboriginal sites located within a 5km radius of the study area (based on the results of the AHR search dated 6-06-2022).

5.0 Predictive Modelling

5.1 Introduction to Predictive Modelling

Predictive modelling, in an archaeological context, is a fairly straightforward concept and has been utilised by archaeologists in Australia for a number of years as a tool for undertaking research into Aboriginal heritage sites. In summary, predictive modelling involves the collation of information generated from previous archaeological research in a given region and using this information to establish patterns of Aboriginal site distributions within the landscape of that particular region. Based on perceived patterns of site distribution, archaeologists can then make predictive statements regarding the potential for various Aboriginal site types to occur within certain landscape settings and can make preliminary assessments regarding the potential archaeological sensitivity of landscape types within a given region.

5.2 Predictive Models; Strengths and Weaknesses

It should be acknowledged that most, if not all predictive models have a number of potential inherent weaknesses, which may serve to limit their value. These include, but may not be limited to the following:

1) The accuracy of a predictive model is directly influenced by the quality and quantity of available site data and information for a given region. The more data available and the greater the quality of that data, the more likely it is that an accurate predictive model can be developed.
2) Predictive modelling works very well for certain types, most particularly isolated artefacts and artefact scatters, and to a lesser extent scarred trees. For other site types, it is far more difficult to accurately establish distribution patterns and therefore make predictive modelling statements. Unfortunately, these site types are generally the rarer site types (in terms of frequency of occurrence) and are therefore generally the most significant sites.
3) Predictive modelling (unless it is very sophisticated and detailed) will generally not take into account micro-landscape features within a given area. These micro features may include (but are certainly not limited to) slight elevations in the landscape (such as small terraces) or small soaks or drainage depressions that may have held water. These micro features have been previously demonstrated to occasionally be focal points for Aboriginal activity.
4) Predictive modelling to a large extent is often predicated on the presence of watercourses. However, in some instances, the alignment of these watercourses has changed considerably over time. As a consequence, the present alignment of a given watercourse may be substantially different to its alignment in the past. The consequence of this for predictive modelling (if these ancient watercourses are not taken into account) is that predicted patterns of site distributions may be greatly skewed.

5.3 A Predictive Model of Site Type Distribution for the Study Area

The findings of previous archaeological investigations undertaken in the general vicinity of the study area, together with the results of the AHR search, indicate that by far the most likely site types that will be encountered during the current assessment will be artefact scatters and isolated artefacts. The following provides a definition for the site types likely to

be encountered in the study area and a general predictive statement for their distribution across the study area.

As discussed in section 4.1 of this report, other Aboriginal site types have been recorded in the Northern Tasmanian and Central Plateau Region, in the general surrounds of the study area. These include shell midden sites, Aboriginal stone quarries and Aboriginal rock shelters. The underlying geology of the study area consists of Cenozoic cover sequences which consist of sand gravel and mud of alluvial, lacustrine and littoral origin (List 2022). The stone material present in the study area was generally not well suited for aboriginal artefact manufacturing and as such it is highly unlikely that Aboriginal stone quarries or Aboriginal rock shelters will be present in the study area.

Artefact Scatters and Isolated artefacts

Definition

Isolated artefacts are defined as single-stone artefacts. Where isolated finds are closer than 50 linear metres to each other they should generally be recorded as an artefact scatter. Artefact scatters are usually identified as a scatter of stone artefacts lying on the ground surface. For the purposes of this project, artefact scatters are defined as at least 2 artefacts within 50 linear metres of each other. Artefacts spread beyond this can be best defined as isolated finds.

It is recognised that this definition, while useful in most instances, should not be strictly prescriptive. On some large landscape features, for example, sites may be defined more broadly. In other instances, only a single artefact may be visible, but there is a strong indication that others may be present in the nearby sediments. In such cases, it is best to define the site as an Isolated Find/Potential Archaeological Deposit (PAD).

Artefact scatters can vary in size from two artefacts to several thousand, and may be representative of a range of activities, from sporadic foraging through to intensive camping activity. In rare instances, campsites which were used over a long period of time may contain stratified deposits, where several layers of occupation are buried one on top of another.

Site Distribution Patterns:

Previous archaeological research in the region has identified the following pattern of distribution for this site type.

- The majority of artefact scatters are located in close proximity to a watercourse, on relatively level and well-drained ground.
- Larger open artefact scatters (representing more intensive activity, such as regular camp areas), tend to be located on level, elevated landscape features, close to (within 500m) major watercourses. The most common areas are the elevated basal slopes of hills, the level spines of spurs (around the termination point of the spur), or on elevated sand bodies.
- Sites in the Midlands are likely to occur at the intersection of the hilly country with the plains. Sheltered valleys at the base of ridgelines have been noted as having an increased likelihood of containing archaeological sites.
- Site and artefact densities on the lower-lying flood plains of watercourses tend to be comparatively lower. This may be reflective of the fact these low-lying

areas were less favoured as camp locations, due to such factors as rising damp and vulnerability to flooding; and

- Site and artefact densities also tend to be comparatively lower in areas away from watercourses.
- Site and artefact densities are comparatively lower in moderate to steeply sloping terrain.
- Isolated artefacts may be found distributed across the landscape.

Predictive Statement:

The proposed Palmerston Battery Project area is situated within terrain that is characteristically flat to gently undulating pastureland, with some sections of lowland floodplains surrounding the existing drainage lines. The gentle slope gradients occur throughout the northern section of the study area, where gradients range between 5º to 10º. In the southeast and southwest sections of the study area, the slope gradients decrease between flat to 5º. The closest watercourses to the study area are Woodside Rivulet which is 670m south and Palmers Rivulet which is 655m north. Both of these watercourses are semi-permanent and tributaries associated with Brumby's Creek which is situated 4.1km northeast of the study area.

Applying the broad regional pattern of site distribution to the study area, it is anticipated that the density of sites (artefact scatters and isolated artefacts), and the density of artefacts associated with these sites would generally be expected to be low to very low. If sites are present in the study area, they are likely to be isolated artefacts or small artefact scatters, representing sporadic hunting and travelling through this landscape. These sites are most likely to be present in those parts of the study area where the slope gradient decreases to below 5º. Higher-density artefact scatters, representing more intensive activities such as interim campsites are unlikely to occur in the study area.

6.0 Survey Coverage of the Study Area

Survey Coverage and Surface Visibility

Survey coverage refers to the estimated portion of a study area that has been visually inspected during a field survey. Surface Visibility refers to the extent to which the actual soils of the ground surface are available for inspection. There are a number of factors that can affect surface visibility, including vegetation cover, surface water and the presence of introduced gravels or materials. Figure 8 provides a useful guide for estimating surface visibility.

The field survey was undertaken by Shay Hannah (CHMA archaeologist) and Vernon Graham (Senior Aboriginal Heritage Officer), over a period of 1 day (19-10-2022). The field team walked a total of 2.15km of survey transects across the proposed Palmerston Battery Project footprint, with the average width of each transect being 5m. Table 2 provides the total transects walked for each section and Figure 9 shows the alignment of the survey transects walked by the field team.

The survey transects were predominately focussed on the Palmerston Battery Project footprint and the main access track leading into the study area. As part of the field survey program, additional transects were walked in areas where there was improved surface visibility, in order to gain a better insight as to the potential presence or absence of Aboriginal sites across the study area. Surface visibility across the study area was variable, ranging between <10% to 90%, averaging at 25% which is in the low range. Improved surface visibility was found within erosion scalds which ranged from 50% and 100%, averaging at 70%. Vegetation cover was the main impediment to visibility.

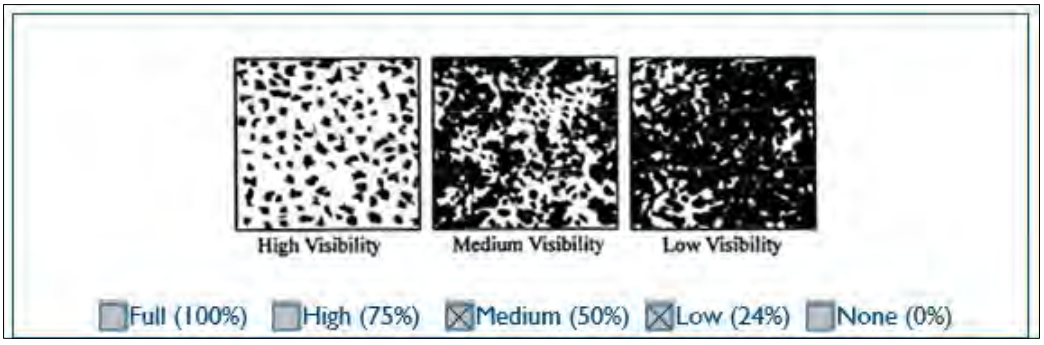

Figure 8: Guidelines for the estimation of surface visibility.

Effective Coverage

Variations in both survey coverage and surface visibility have a direct bearing on the ability of a field team to detect Aboriginal heritage sites, particularly site types such as isolated artefacts and artefact scatters (which are the site types most likely to occur in the study area). The combination of survey coverage and surface visibility is referred to as effective survey coverage. Table 2 presents the estimated effective survey coverage achieved during the course of the survey assessment. The effective coverage is estimated to have been around 2515m². This level of effective coverage is assessed as being adequate for the purposes of determining the potential extent, nature and distribution of Aboriginal cultural heritage sites in the study area.

Table 2: Effective Survey Coverage achieved across the surveyed areas.

Area Surveyed	Survey Transects	Estimated Surface Visibility	Effective Survey Coverage
Access Tracks	690m x 5m= 3450m^2	20%	690m^2
Battery	1460m x 5= 7300m^2	25%	1825m^2
Total	**10,750m^2**		**2515m^2**

Plate 6: View south showing the average 25% surface visibility and vegetation cover and one of the numerous erosion scalds present within the study area.

Plate 7: View southeast showing the main access track into the study area where surface visibility was 20% on average.

Figure 9: Aerial image showing survey transects walked by the field team across the study area.

7.0 Survey Results and Discussion

No Aboriginal heritage sites were identified and recorded during the field survey inspection of the proposed Palmerston Battery Project footprint. As noted previously, a search of the AHR shows that there are no other registered Aboriginal sites within the Palmerston Battery Project footprint. The field survey was able to confirm that there are no stone resources identified within the study area that would be suitable for stone artefact manufacturing. Nor are there any sizeable rock outcrops occurring within the study area, and therefore there is no potential for Aboriginal rock shelters to be present.

As discussed in section 6, surface visibility across the study area was variable, ranging between <10% to 90%, averaging at 25%. Whilst the estimated survey coverage was 10,750m^2 effective coverage was decreased to around 2515m^2. Given these constraints, it cannot be stated with certainty that there are no undetected Aboriginal heritage sites present across the surveyed areas. However, the survey results strongly indicate that site and artefact densities across the study area are likely to be low to very low. If undetected sites are present they are most likely to be isolated artefacts or small artefact scatters, representing sporadic Aboriginal activity. Given that soil deposits across much of the study area were generally shallow to skeletal, there is a very limited potential for sub-surface artefact deposits to be present.

It should be noted that there are no specific landscape features present within the study area footprint, where there would be an elevated likelihood for sites or artefact densities may be present. As noted in section 2, the study area is situated on a floodplain that is generally flat with some rises present in the landscape with slopes of 5° – 10°. The findings of previous regional archaeological investigations undertaken in indicate that site densities are generally significantly lower compared with coastal regions. However, there does appear to be a distinct increase in site and artefact densities around the margins of the natural lakes and marshes in the region, particularly around Brumbys Creek. The study area is situated away from these larger water bodies and therefore site densities would be expected to be lower away from the major resource zones, reflecting more sporadic activity.

The findings of this assessment and the interpretations of these findings are generally consistent with the observations made by Cosgrove (1984), Kee (1990) and Thomas (1991) for the Northern and Central Plateau regions.

The most likely interpretation of the available evidence is that Aboriginal people from the Big River Tribe will have travelled on a seasonal basis through the Central Highlands region. The main focus of activity in the highlands would have been the major river valleys, and the larger natural lake and lagoon systems, mainly because these were the major resource zones where food and water would have been readily available. Occasionally, the hillier terrain fringing these river corridors, and the smaller marsh areas and plains may have been accessed as part of hunting and foraging activity. However, people are unlikely to have camped in these areas for any lengthy duration.

Seasonal, short term visits to the area are likely to leave an archaeological signature of isolated artefacts and low density artefact scatters found in clusters that reflect these pathways. Such patterning is representative of small groups of people returning to roughly the same area on a regular basis, although at long intervals. The visits are short and intermittent so that large scale cultural deposits do not accumulate to any great extent. The people would carry the majority of their tool kit with them, as they needed to be highly mobile

in order to make the most of the seasonal resources and trade opportunities. Artefacts discarded by such groups are likely to be those that are easily replaced. Rates of discard are expected to be low, resulting in low to very low densities of archaeological sites and isolated artefacts. The possible exceptions are areas where favoured camp sites are located, or where there are resources such as stone materials that were targeted for artefact manufacturing.

8.0 Consultation with Aboriginal Communities and Statement of Aboriginal Significance

The designated Aboriginal Heritage Officer (AHO) for this project is Vernon Graham. One of the primary roles of the Aboriginal Heritage Officer is to consult with Aboriginal community groups. The main purpose of this consultation process is:

- to advise Aboriginal community groups of the details of the project,
- to convey the findings of the Aboriginal heritage assessment,
- to document the Aboriginal social values attributed to Aboriginal heritage resources in the study area,
- to discuss potential management strategies for Aboriginal heritage sites, and
- to document the views and concerns expressed by the Aboriginal community representatives.

Aboriginal Heritage Tasmania (AHT) has advised that there have been some changes to the accepted approach to Aboriginal community consultation, based on recommendations made by the AHC on 28 April 2017. These changes relate to cases where the AHC consider it may be sufficient for a Consulting Archaeologist (CA) or Aboriginal Heritage Officer (AHO) to consult only with the Aboriginal Heritage Council.

The Council recommended that consultation with an Aboriginal community organisation is not required for a proposed project when:
There are less than 10 isolated artefacts that are not associated with any other nearby heritage; or
The impact of the project on Aboriginal heritage:

- is not significant; or
- will not destroy the heritage; or
- affects only part of the outer approximately 20% of a buffer around a registered site

The CA and AHO will need to demonstrate in Aboriginal heritage reports including map outputs:

- that the proposed impact on the Aboriginal heritage within the project area is not significant and why;
- that the project activity will not destroy the heritage;
- that the proposed impact to the site buffer is not adjacent to a significant component of the registered site polygon.

No Aboriginal sites were identified during the field survey of the proposed Palmerston Battery Project footprint (the study area). A search of the AHR shows that there are no registered Aboriginal sites located within the study area, and it is assessed that there is a low to very low potential for undetected Aboriginal heritage sites to be present.
Because of the presence of 11 Aboriginal sites within a 5km radius of the study area, the decision has been made to distribute this report to a select range of Aboriginal community groups in the north of the State for information purposes. The report has also been provided to AHT for review.

Vernon Graham has provided a statement of the Aboriginal cultural values attributed to the study area as a whole. This statement is presented below.

Statement of Cultural/Social Significance by Vernon Graham

Aboriginal heritage/relics are not renewable. Hence any cultural heritage values provide a direct link to past occupation undertaken by traditional indigenous ancestors in the region of the project proposal. This provides a story or link for the Aboriginal community today and facilitates the connection to social-cultural heritage values, ethnohistory /story and the relationship pertaining to country. This is an integral part of regaining knowledge so it can be encapsulated and retained by both the individual Aboriginal people and for the Aboriginal community collectively.

We did not identify any Aboriginal heritage sites during the survey conducted on 19/10/2022 of the proposed Palmerston Battery Project area on Poatina Road. Based on these results, and my observations made during the field survey, I am satisfied that there is a low to very low potential for other Aboriginal sites to be present in the study area, given the dense vegetation and the cleared pastureland terrain of the study area. Therefore, I am satisfied that this proposal poses a minimal risk of impacting Aboriginal heritage values.

Even if the site of the project proposal contains no further evidence of Aboriginal heritage there are always the cultural resources (flora, fauna, aquaculture or any other resource values that the earth may offer) and the living landscape, which highlight the high significance to the Aboriginal cultural heritage values to the country. However, due to the past clearing and construction disturbance throughout the study area, there are no cultural resources in the study area that can be disturbed. Therefore it is unlikely that any cultural resources will be impacted as part of the development of the Palmerston Battery Project.

9.0 Statutory Controls and Legislative Requirements

The following provides an overview of the relevant State and Federal legislation that applies to Aboriginal heritage within the state of Tasmania.

9.1 State Legislation

In Tasmania, the *Aboriginal Heritage Act 1975* (the Act) is the primary Act for the treatment of Aboriginal cultural heritage. The Act is administered by the Minister for Aboriginal Affairs, through Aboriginal Heritage Tasmania (AHT) in the Department of Primary Industries, Parks, Water and the Environment (DPIPWE). AHT is the regulating body for Aboriginal heritage in Tasmania and '[n]o fees apply for any application to AHT for advice, guidance, lodgement or permit application'.

The Act applies to 'relics' which are any object, place and/or site that is of significance to the Aboriginal people of Tasmania (as defined in section 2(3) of the Act). The Act defines what legally constitutes unacceptable impacts on relics and a process to approve impacts when there is no better option. Aboriginal relics are protected under the Act and it is illegal to destroy, damage, deface, conceal or otherwise interfere with a relic, unless in accordance with the terms of a permit granted by the Minister. It is illegal to sell or offer for sale a relic, or to cause or permit a relic to be taken out of Tasmania without a permit (section 2(4) qualifies and excludes 'objects made, or likely to have been made, for purposes of sale').

Section 10 of the Act sets out the duties and obligations for persons owning or finding an Aboriginal relic. Under section 10(3) of the Act, a person shall, as soon as practicable after finding a relic, inform the Director or an authorised officer of the find.

It should be noted that with regard to the discovery of suspected human skeletal remains, the *Coroners Act 1995* takes precedence. The *Coroners Act 1995* comes into effect initially upon the discovery of human remains, however once determined to be Aboriginal the *Aboriginal Relics Act* overrides the *Coroners Act.*

In August 2017, the Act was substantively amended and the title changed from the *Aboriginal Relics Act 1975*. As a result, the AHT *Guidelines to the Aboriginal Heritage Assessment Process* were replaced by the *Aboriginal Heritage Standards and Procedures*. The Standards and Procedures are named in the statutory *Guidelines* of the Act issued by the Minister under section 21A of the Act.
Other amendments include:

- An obligation to fully review the Act within three years.
- Increases in maximum penalties for unlawful interference or damage to an Aboriginal relic. For example, maximum penalties (for deliberate acts) are 10,000 penalty units (currently $1.57 million) for bodies corporate other than small business entities and 5,000 penalty units (currently $785,000) for individuals or small business entities; for reckless or negligent offences, the maximum penalties are 2,000 and 1,000 penalty units respectively (currently $314,000 and $157,000). Lesser offences are also defined in sections 10, 12, 17 and 18.
- Prosecution timeframes have been extended from six months to two years.
- The establishment of a statutory Aboriginal Heritage Council to advise the Minister.

Section 21(1) specifies the relevant defence as follows: “It is a defence to a prosecution for an offence under section 9 or 14 if, in relation to the section of the Act which the defendant is alleged to have contravened, it is proved … that, in so far as is practicable … the defendant complied with the guidelines”.

9.2 Commonwealth Legislation

There are also a number of Federal Legislative Acts that pertain to cultural heritage. The main Acts being; *The Australian Heritage Council Act 2003*, *The Aboriginal and Torres Strait Islander Heritage Protection Act 1987* and the *Environment Protection and Biodiversity Conservation Act 1999*

Australian Heritage Council Act 2003 (Comm)

The *Australian Heritage Council Act 2003* defines the heritage advisory boards and relevant lists, with the Act’s Consequential and Transitional Provisions repealing the Australian Heritage Commission Act 1975. The Australian Heritage Council Act, like the Australian Heritage Commission Act, does not provide legislative protection regarding the conservation of heritage items in Australia but has compiled a list of items recognised as possessing heritage significance to the Australian community. The Register of the National Estate, managed by the Australian Heritage Council, applies no legal constraints on heritage items included on this list.

***The Aboriginal and Torres Strait Islander Heritage Protection Act 1987*.**

This Federal Act is administered by the Department of Sustainability, Environment, Water, Populations and Communities (SEWPaC) with the Commonwealth having jurisdiction. The Act was passed to provide protection for the Aboriginal heritage, in circumstances where it could be demonstrated that such protection was not available at a state level. In certain instances, the Act overrides relevant state and territory provisions.

The major purpose of the Act is to preserve and protect from injury and desecration, areas and objects of significance to Aborigines and Islanders. The Act enables immediate and direct action for the protection of threatened areas and objects by a declaration from the Commonwealth Minister or authorised officers. The Act must be invoked by, or on behalf of an Aboriginal or Torres Strait Islander or organisation.

Any Aboriginal or Torres Strait Islander person or organization may apply to the Commonwealth Minister for a temporary or permanent 'Stop Order' for the protection of threatened areas or objects of significant indigenous cultural heritage.

The Commonwealth Act 'overrides' State legislation if the Commonwealth Minister is of the opinion that the State legislation (or undertaken process) is insufficient to protect the threatened areas or objects. Thus, in the event that an application is made to the Commonwealth Minister for a Stop Order, the Commonwealth Minister will, as a matter of course, contact the relevant State Agency to ascertain what protection is being imposed by the State and/or what mitigation procedures have been proposed by the land user/developer.

In addition to the threat of a 'Stop Order' being imposed, the Act also provides for the following:

- If the Federal Court, on application from the Commonwealth Minister, is satisfied that a person has engaged or is proposing to engage in conduct that breaches the 'Stop Order', it may grant an injunction preventing or stopping such a breach (s.26). Penalties for breach of a Court Order can be substantial and may include a term of imprisonment;
- If a person contravenes a declaration in relation to a significant Aboriginal area, penalties for an individual are a fine of up to $10,000.00 and/or 5 years gaol and for a Corporation a fine up to $50,000.00 (s.22);
- If the contravention is in relation to a significant Aboriginal object, the penalties are $5,000.00 and/or 2 years gaol and $25,000.00 respectively (s.22);
- In addition, offences under s.22 are considered 'indictable' offences that also attract an individual fine of $2,000 and/or 12 months gaol or, for a Corporation, a fine of $10,000.00 (s.23). Section 23 also includes attempts, inciting, urging and/or being an accessory after the fact within the definition of 'indictable' offences in this regard.

The Commonwealth Act is presently under review by Parliament and it is generally accepted that any new Commonwealth Act will be even more restrictive than the current legislation.

Environment Protection and Biodiversity Conservation Act 1999 (Comm)
This Act was amended, through the Environment and Heritage Legislation Amendment Act (No1) 2003 to provide protection for cultural heritage sites, in addition to the existing aim of protecting environmental areas and sites of national significance. The Act also promotes the ecologically sustainable use of natural resources, biodiversity and the incorporation of community consultation and knowledge.

The 2003 amendments to the *Environment Protection and Biodiversity Conservation Act 1999* have resulted in the inclusion of indigenous and non-Indigenous heritage sites and areas. These heritage items are defined as:
'indigenous heritage value of a place means a heritage value of the place that is of significance to indigenous persons in accordance with their practices, observances, customs, traditions, beliefs or history;

Items identified under this legislation are given the same penalty as actions taken against environmentally sensitive sites. Specific to cultural heritage sites are §324A-324ZB.

Environment and Heritage Legislation Amendment Act (No1) 2003 (Comm)
In addition to the above amendments to the *Environment Protection and Biodiversity Conservation Act 1999* to include provisions for the protection and conservation of heritage, the Act also enables the identification and subsequent listing of items for the Commonwealth and National Heritage Lists. The Act establishes the *National Heritage List*, which enables the inclusion of all heritage, natural, Indigenous and non-Indigenous, and the *Commonwealth Heritage List*, which enables the listing of sites nationally and internationally that are significant and governed by Australia.

In addition to the *Aboriginal and Torres Strait Islander Heritage Protection Act 1987*, amendments made to the *Environment Protection and Biodiversity Conservation Act 1999 (Cth)* enables the identification and subsequent listing of indigenous heritage values on the Commonwealth and/or National Heritage Lists (ss. 341D & 324D respectively). Substantial penalties (and, in some instances, gaol sentences) can be imposed on any person who

damages items on the National or Commonwealth Heritage Lists (ss. 495 & 497) or provides false or misleading information in relation to certain matters under the Act (ss.488-490). In addition, the wrongdoer may be required to make good any loss or damage suffered due to their actions or omissions (s.500).

10.0 Aboriginal Cultural Heritage Management Plan

Management Recommendations

Heritage management options and recommendations provided in this report are made based on the following criteria.

- Consultation with Vernon Graham (Aboriginal Heritage Officer).
- The legal and procedural requirements as specified in the *Aboriginal Heritage Act 1975* (The Act).
- The results of the investigation as documented in this report; and
- Background research into the extant archaeological and ethnohistoric record for the study area and the surrounding region.

Recommendation 1

No Aboriginal heritage sites, suspected features, or areas of elevated archaeological sensitivity were identified within the proposed development footprint for the Palmerston Battery Project. It is assessed that there is a very low potential for undetected Aboriginal heritage sites to be present. On this basis it is advised that there are no Aboriginal heritage constraints or requirements to the development proceeding.

Recommendation 2

It is assessed that there is generally a low to very low potential for additional undetected Aboriginal heritage sites to occur within the Palmerston Battery Project footprint. However, if, during the course of the proposed works, previously undetected archaeological sites or objects are located, the processes outlined in the Unanticipated Discovery Plan should be followed (see Appendix 1). A copy of the Unanticipated Discovery Plan should be kept on-site during all ground disturbance and construction work. All construction personnel should be made aware of the Unanticipated Discovery Plan and their obligations under the Aboriginal Heritage Act 1975 (the Act).

Recommendation 3

Copies of this report should be submitted to Aboriginal Heritage Tasmania (AHT) for review and comment.

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Glossary of Terms

Aboriginal Archaeological Site
A site is defined as any evidence (archaeological features and/or artefacts) indicating past Aboriginal activity, and occurring within a context or place relating to that activity. The criteria for formally identifying a site in Australia varies between States and Territories.

Artefact
A portable object that has been humanly made or modified (see also stone artefact).

Assemblage (lithic)
A collection of complete and fragmentary stone artefacts and manuports obtained from an archaeological site, either by collecting artefacts scattered on the ground surface, or by controlled excavation.

Broken Flake
A flake with two or more breakages, but retaining its area of break initiation.

Chert
A highly siliceous rock type that is formed biogenically from the compaction and precipitation of the silica skeletons of diatoms. Normally there is a high percentage of cryptocrystalline quartz. Like chalcedony, chert was valued by Aboriginal people as a stone material for manufacturing stone tools. The rock type often breaks by conchoidal (shell like) fracture, providing flakes that have hard, durable edges.

Cobble
Water worn stones that have a diameter greater than 64mm (about the size of a tennis ball) and less than 256mm (size of a basketball).

Core
A piece of stone, often a pebble or cobble, but also quarried stone, from which flakes have been struck for the purpose of making stone tools.

Core Fragment
A piece of core, without obvious evidence of being a chunky primary flake.

Cortex
The surface of a piece of stone that has been weathered by chemical and/or physical means.

Debitage
The commonly used term referring to the stone refuse discarded from knapping. The manufacturing of a single implement may result in the generation of a large number of pieces of debitage in an archaeological deposit.

Flake (general definition)
A piece of stone detached from a nucleus such as a core. A complete or substantially complete flake of lithic material usually shows evidence of hard indenter initiation, or

occasional bending initiation. The most common type of flake is the 'conchoidal flake'. The flake's primary fracture surface (the ventral or inside surface) exhibits features such as fracture initiation, bulb of force, and undulations and lances that indicate the direction of the fracture front.

Flake fragment
An artefact that does not have areas of fracture initiation, but which displays sufficient fracture surface attributes to allow identification as a stone artefact fragment.

Flake portion (broken flake)
The proximal portion of a flake retaining the area of flake initiation, or a distal portion of a flake that retains the flake termination point.

Flake scraper
A flake with retouch along at least one margin. The character of the retouch strongly suggests shaping or rejuvenation of a cutting edge.

Middens
Middens range in thickness from thin scatters to stratified deposits of shell and sediment up to 2m thick. In addition to shell which has accumulated as food refuse, shell middens usually contain other food remains such as bone from fish, birds and terrestrial animals and humus from the decay of plant and animal remains. They also commonly contain charcoal and artefacts made from stone, shell and bone.

Nodules
Regular or irregular cemented masses or nodules within the soil. Also referred to as concretions and buckshot gravel. Cementing agents may be iron and/or manganese oxides, calcium carbonate, gypsum etc. Normally formed in situ and commonly indicative of seasonal waterlogging or a fluctuating chemical environment in the soil such as; oxidation and reduction, or saturation and evaporation. Nodules can be redistributed by erosion. (See also 'concretion').

Pebble
By geological definition, a waterworn stone less than 64 mm in diameter (about the size of a tennis ball). Archaeologists often refer to waterworn stones larger than this as pebbles though technically they are cobbles.
Quartz
A mineral composed of crystalline silica. Quartz is a very stable mineral that does not alter chemically during weathering or metamorphism. Quartz is abundantly common and was used by Aboriginal people throughout Australia to make light-duty cutting tools. Despite the often unpredictable nature of fracture in quartz, the flakes often have sharp cutting edges.

Quartzite
A hard silica rich stone formed in a sandstone that has been recrystallised by heat (metaquartzite) or strengthened by slow infilling of silica in the voids between the sand grains (Orthoquartzite).

Retouch (on stone tools)
An area of flake scars on an artefact resulting from intentional shaping, resharpening, or rejuvenation after breakage or blunting of a cutting edge. In resharpening a cutting edge the retouch is invariably found only on one side (see also 'indeterminate retouched piece', retouch flake' etc).

Scraper
A general group of stone artefacts, usually flakes but also cores, that one or more retouched edges thought to have been used in a range of different cutting and scraping activities. A flake scraper is a flake with retouch along at least one margin, but not qualifying for attribution to a more specific implement category. Flake scrapers sometimes also exhibit use-wear on the retouched or another edge.

Silcrete
A hard, fine grained siliceous stone with flaking properties similar to quartzite and chert. It is formed by the cementing and/or replacement of bedrock, weathering deposits, unconsolidated sediments, soil or other material, by a low temperature physico-chemical process. Silcrete is essentially composed of quartz grains cemented by microcrystalline silica. The clasts in silcrete bare most often quartz grains but may be chert or chalcedony or some other hard mineral particle. The mechanical properties and texture of silcrete are equivalent to the range exhibited by chert at the fine-grained end of the scale and with quartzite at the coarse-grained end of the scale. Silcrete was used by Aboriginal people throughout Australia for making stone tools.

Site Integrity
The degree to which post-depositional disturbance of cultural material has occurred at a site.

Stone Artefact
A piece (or fragment) of stone showing evidence of intentional human modification.

Stone procurement site
A place where stone materials is obtained by Aboriginal people for the purpose of manufacturing stone artefacts. In Australia, stone procurement sites range on a continuum from pebble beds in water courses (where there may be little or no evidence of human activity) to extensively quarried stone outcrops, with evidence of pits and concentrations of hammerstones and a thick layer of knapping debris.

Stone tool
A piece of flaked or ground stone used in an activity, or fashioned for use as a tool. A synonym of stone tool is ‘implement’. This term is often used by archaeologists to describe a flake tool fashioned by delicate flaking (retouch).

Use wear
Macroscopic and microscopic damage to the surfaces of stone tools, resulting from it’s use. Major use-wear forms are edge fractures, use-polish and smoothing, abrasion, and edge rounding bevelling.

Appendix 1

Unanticipated Discovery Plan

Unanticipated Discovery Plan

Procedure for the management of unanticipated discoveries of Aboriginal relics in Tasmania

For the management of unanticipated discoveries of Aboriginal relics in accordance with the *Aboriginal Heritage Act 1975* and the *Coroners Act 1995*. The Unanticipated Discovery Plan is in two sections.

Discovery of Aboriginal Relics other than Skeletal Material

Step 1:

Any person who believes they have uncovered Aboriginal relics should notify all employees or contractors working in the immediate area that all earth disturbance works must cease immediately.

Step 2:

A temporary 'no-go' or buffer zone of at least 10m x 10m should be implemented to protect the suspected Aboriginal relics, where practicable. No unauthorised entry or works will be allowed within this 'no-go' zone until the suspected Aboriginal relics have been assessed by a consulting archaeologist, Aboriginal Heritage Officer or Aboriginal Heritage Tasmania staff member.

Step 3:

Contact Aboriginal Heritage Tasmania on **1300 487 045** as soon as possible and inform them of the discovery. Documentation of the find should be emailed to **aboriginal@dpac.tas.gov.au** as soon as possible. Aboriginal Heritage Tasmania will then provide further advice in accordance with the *Aboriginal Heritage Act 1975*.

Discovery of Skeletal Material

Step 1:

Call the Police immediately. Under no circumstances should the suspected skeletal material be touched or disturbed. The area should be managed as a crime scene. It is a criminal offence to interfere with a crime scene.

Step 2:

Any person who believes they have uncovered skeletal material should notify all employees or contractors working in the immediate area that all earth disturbance works cease immediately.

Step 3:

A temporary 'no-go' or buffer zone of at least 50m x 50m should be implemented to protect the suspected skeletal material, where practicable. No unauthorised entry or works will be allowed within this 'no-go' zone until the suspected skeletal remains have been assessed by the Police and/or Coroner.

Step 4:

If it is suspected that the skeletal material is Aboriginal, Aboriginal Heritage Tasmania should be notified.

Step 5:

Should the skeletal material be determined to be Aboriginal, the Coroner will contact the Aboriginal organisation approved by the Attorney-General, as per the *Coroners Act 1995*.

Aboriginal Heritage Tasmania
Department of Premier and Cabinet

Tasmanian Government

Guide to Aboriginal site types

Stone Artefact Scatters

A stone artefact is any stone or rock fractured or modified by Aboriginal people to produce cutting, scraping or grinding implements. Stone artefacts are indicative of past Aboriginal living spaces, trade and movement throughout Tasmania. Aboriginal people used hornfels, chalcedony, spongelite, quartzite, chert and silcrete depending on stone quality and availability. Stone artefacts are typically recorded as being 'isolated' (single stone artefact) or as an 'artefact scatter' (multiple stone artefacts).

Shell Middens

Middens are distinct concentrations of discarded shell that have accumulated as a result of past Aboriginal camping and food processing activities. These sites are usually found near waterways and coastal areas, and range in size from large mounds to small scatters. Tasmanian Aboriginal middens commonly contain fragments of mature edible shellfish such as abalone, oyster, mussel, warrener and limpet, however they can also contain stone tools, animal bone and charcoal.

Rockshelters

An occupied rockshelter is a cave or overhang that contains evidence of past Aboriginal use and occupation, such as stone tools, middens and hearths, and in some cases, rock markings. Rockshelters are usually found in geological formations that are naturally prone to weathering, such as limestone, dolerite and sandstone

Quarries

An Aboriginal quarry is a place where stone or ochre has been extracted from a natural source by Aboriginal people. Quarries can be recognised by evidence of human manipulation such as battering of an outcrop, stone fracturing debris or ochre pits left behind from processing the raw material. Stone and ochre quarries can vary in terms of size, quality and the frequency of use.

Rock Marking

Rock marking is the term used in Tasmania to define markings on rocks which are the result of Aboriginal practices. Rock markings come in two forms; engraving and painting. Engravings are made by removing the surface of a rock through pecking, abrading or grinding, whilst paintings are made by adding pigment or ochre to the surface of a rock.

Burials

Aboriginal burial sites are highly sensitive and may be found in a variety of places, including sand dunes, shell middens and rock shelters. Despite few records of pre-contact practices, cremation appears to have been more common than burial. Family members carried bones or ashes of recently deceased relatives. The Aboriginal community has fought long campaigns for the return of the remains of ancestral Aboriginal people.

Further information on Aboriginal Heritage is available from:

Aboriginal Heritage Tasmania
Community Partnerships and Priorities
Department of Premier and Cabinet
GPO Box 123 Hobart TAS 7001

Telephone: 1**300 487 045**
Email: **aboriginal@dpac.tas.gov.au**
Web: **www.aboriginalheritage.tas.gov.au**

Palmerston Battery Project
4554 Poatina Road, Cressy

Historic Heritage Assessment Report

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CULTURAL HERITAGE MANAGEMENT AUSTRALIA

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Executive Summary

Project details

Joule Logic is working on the Environmental Impact Assessment and Development Application for a utility scale battery which will be constructed on land adjacent to the Palmerston substation near Poatina, in the Northern Region of Tasmania (see Figures 1–3). The Palmerston Battery Project will be developed by Neoen Australia (the Proponent). The proposed site for the project is situated on an approximately 3ha area of private pastureland. The site will be accessed via an existing access road linking the Palmerston TasNetworks Substation to Poatina Road.

CHMA Pty Ltd has been engaged by Joule Logic (on behalf of Neoen Australia) to undertake an Aboriginal heritage assessment for the proposed Palmerston Battery Project (the study area), to identify any potential historic heritage constraints. This report presents the findings of the heritage assessment.

Results of the Search of the Heritage Registers

A search was carried out of a number of historic registers and databases in order to determine the extent of historic sites and features in the vicinity of each of the Palmerston Battery Project study area. Agency databases searched included:

- Australian National Heritage List (NHL)
- The Australian Heritage Database (AHD)
- Tasmanian Heritage Register (THR)
- The Register of the National Estate (RNE)

The search of the various historic heritage registers shows that there are two registered historic sites or places that are located within a 2km radius of the Palmerston Battery Project site. However, neither of these registered places intersect with the Palmerston Battery Project site. The detailed search results are presented in section 4.3 of this report.

Survey Results and Statement of Archaeological Potential

No historic sites or suspected features were identified during the field survey assessment of the Palmerston Battery Project footprint. Given surface visibility constraints, it can't be stated with absolute certainty that there are no undetected historic heritage sites present in the study area. However, the potential is assessed as being very low.

If undetected features are present in the study area, they are likely to be features associated with pastoral or other agricultural activity. There is no evidence to indicate that more substantive historic heritage features such as dwelling foundations would be present in the study area. The detailed survey results and discussions are presented in section 5.

Management Recommendations

Heritage management options and recommendations provided in this report are made based on the following criteria.

- The legal and procedural requirements as specified in section 4 of this report.
- The results of the investigation as documented in this report.
- The results of the Historic heritage register search.

Recommendation 1

No historic heritage sites, suspected features, or areas of elevated archaeological potential were identified during the field survey assessment of the Palmerston Battery Site (the study area). A search of the various historic heritage registers (as listed in section 1.4 of this report) shows that there are no registered historic sites located within or in the immediate vicinity of the study area. Archival research has not identified any evidence for historic structures or features being present. On this basis, it is advised that the proposed Palmerston Battery will have no impacts on known Historic heritage sites, and therefore there are no Historic heritage constraints, or legal impediments to the project proceeding.

Recommendation 2

It is assessed that there is a very low potential for undetected Historic heritage sites to occur within the Palmerston Battery site. However, if, during the course of the proposed works, previously undetected heritage sites or objects are located, the processes outlined in the Unanticipated Discovery Plan should be followed (see section 8).

1.0 Project Details

1.1 Project Outline

Joule Logic is working on the Environmental Impact Assessment and Development Application for a utility scale battery which will be constructed on land adjacent to the Palmerston substation near Poatina, in the Northern Region of Tasmania (see Figures 1–3). The Palmerston Battery Project will be developed by Neoen Australia (the Proponent). The proposed site for the project is situated on an approximately 3ha area of private pastureland. The site will be accessed via an existing access road linking the Palmerston TasNetworks Substation to Poatina Road.

CHMA Pty Ltd has been engaged by Joule Logic (on behalf of Neoen Australia) to undertake an Aboriginal heritage assessment for the proposed Palmerston Battery Project (the study area), to identify any potential historic heritage constraints. This report presents the findings of the heritage assessment.

1.2 Aims of the Investigation

The principal aims of the present heritage assessment are as follows.

- Complete a Historic Heritage Assessment for the Palmerston Battery Project site (the study area as shown in Figures 1-3). The assessment is to be compliant with both State and Commonwealth legislative regimes.
- To determine the extent of previously identified Historic heritage sites within and in the immediate vicinity of the study area.
- To locate and document historic heritage sites that may be present within the identified bounds of the study area.
- To assess the archaeological sensitivity values of the study area.
- To assess the scientific and cultural values of identified Historic heritage sites.
- To advise on the management of Historic heritage in line with best practice archaeological guidelines.
- Prepare a report which documents the findings of the Historic heritage assessment.

1.3 Project Methodology

A three-stage project methodology was implemented for this historic heritage assessment.

Stage 1 (Pre-Fieldwork Background Work)
Prior to fieldwork being undertaken, the following tasks were completed by CHMA.

The collation of relevant documentation for the project
As part of Stage 1, the following research was carried out and background information was collated for this project.

- A review of the relevant heritage registers and the collation of information pertaining to any registered heritage sites located within the general vicinity of the study area.
- Maps of the study areas.
- Relevant reports documenting the outcomes of previous heritage studies in the vicinity of the study area.
- Historical literature for the region.
- References to the land use history of the study area.
- GIS Information relating to landscape units present in the study area.

- Geotechnical information for the study area, including soil and geology data.

Stage 2 (Field Work)

Stage 2 entailed the fieldwork component of the assessment. The field survey was undertaken over a period of one day (19/10/2022) by Shay Hannah (CHMA archaeologist) and Vernon Graham (Aboriginal Heritage Officer).

The field survey was undertaken on foot and was specifically focused within the Palmerston Battery Project site. The field team walked a series of 2.15km of survey transects within the Palmerston Battery Project footprint, with the average width of each transect being 5m. These transects were aligned to cover a sample of all landscape units present within the study area. The survey also targeted the main graded vehicle track leading into the study area from Poatina Road. Section 3 provides further details as to the survey coverage achieved within the study area.

Stage 3

Stage three of the project involves the production of a Draft and Final Report that includes an analysis of the data obtained from the field survey, an assessment of archaeological sensitivity and management recommendations. The report has been prepared by Shay Hannah from CHMA.

1.4 Project Limitations

Most archaeological investigations are subject to limitations that may affect the reliability of the results. The main constraint to the present investigation was restricted surface visibility due primarily to vegetation cover. At the time of the field survey, surface visibility across the proposed footprint ranged between <10% and 90%, with the estimated average being 20%. The main access track to the study area is a previously graded vehicle track, where surface visibility was <10%. There were also numerous areas where erosion scalds were present within the pastureland that provided locates of improved visibility. To offset constrained surface visibility, any areas of improved visibility were inspected in detail. The constraints in surface visibility limited the effectiveness of the survey assessment to some extent. The issue of surface visibility is further discussed in Section 3 of this report.

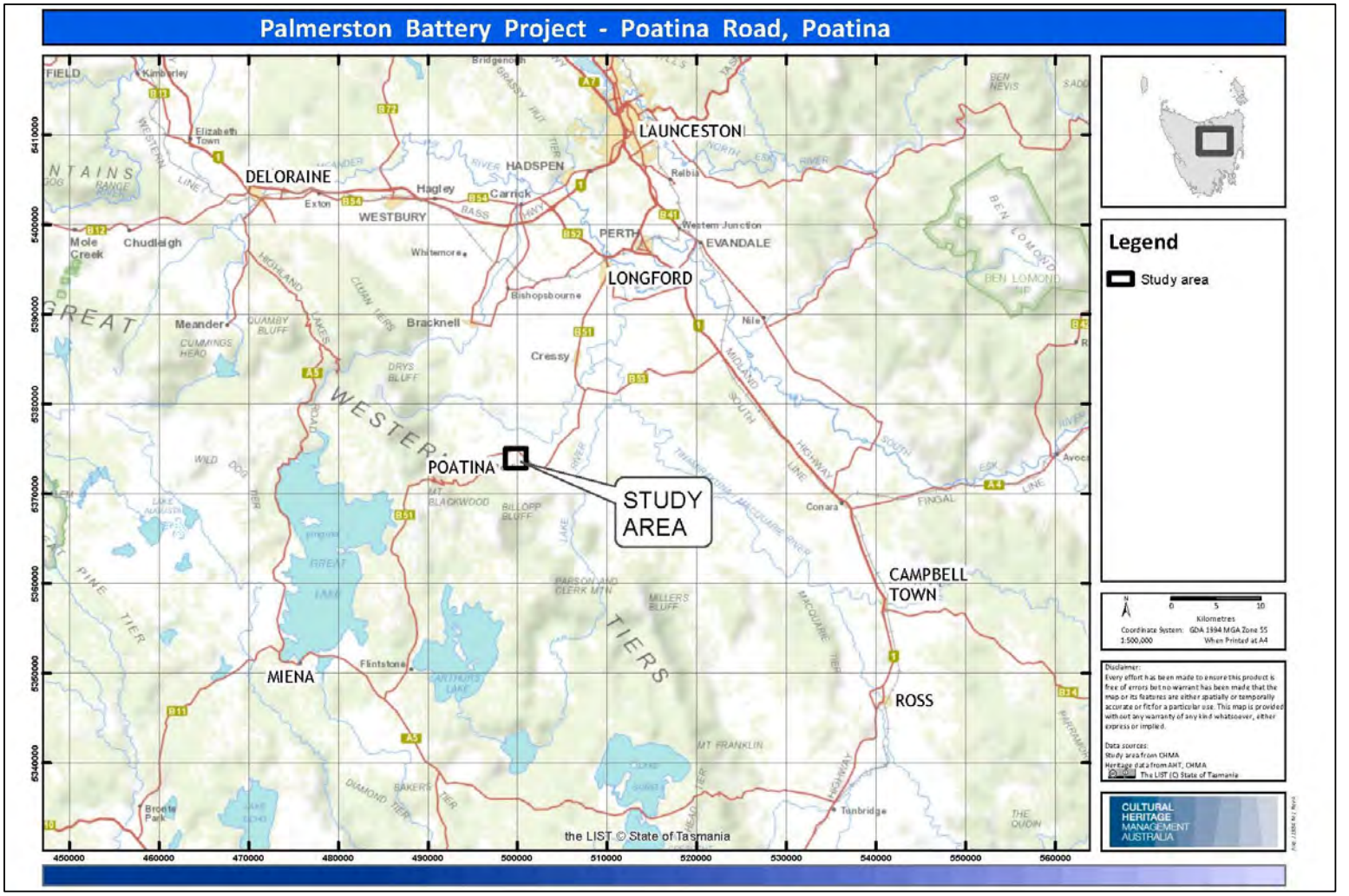

Figure 1: Topographic map showing the location of the study area at Poatina/Cressy in the Northern Region of Tasmania.

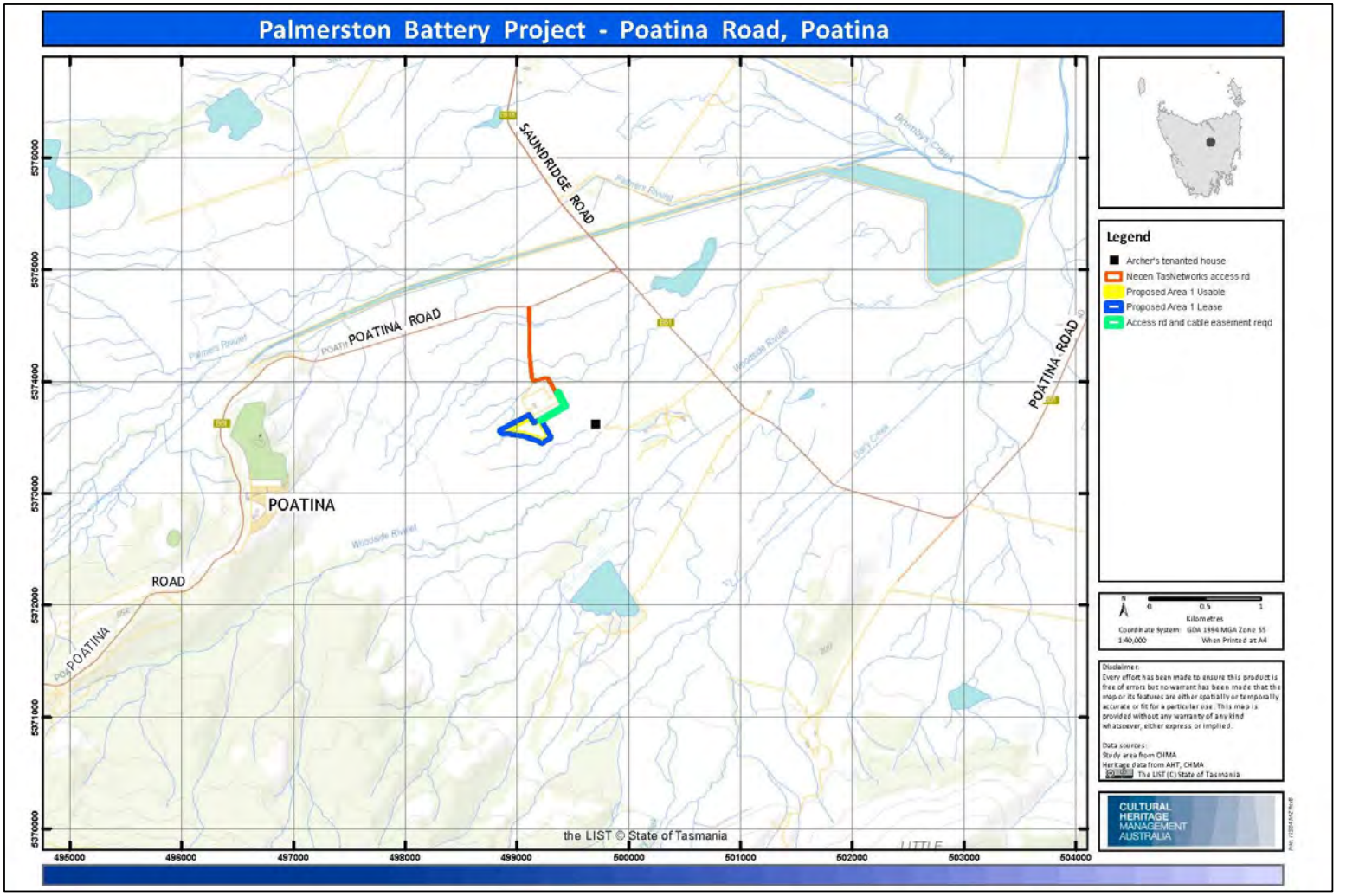

Figure 2: Topographic map showing the landscape setting of the study area.

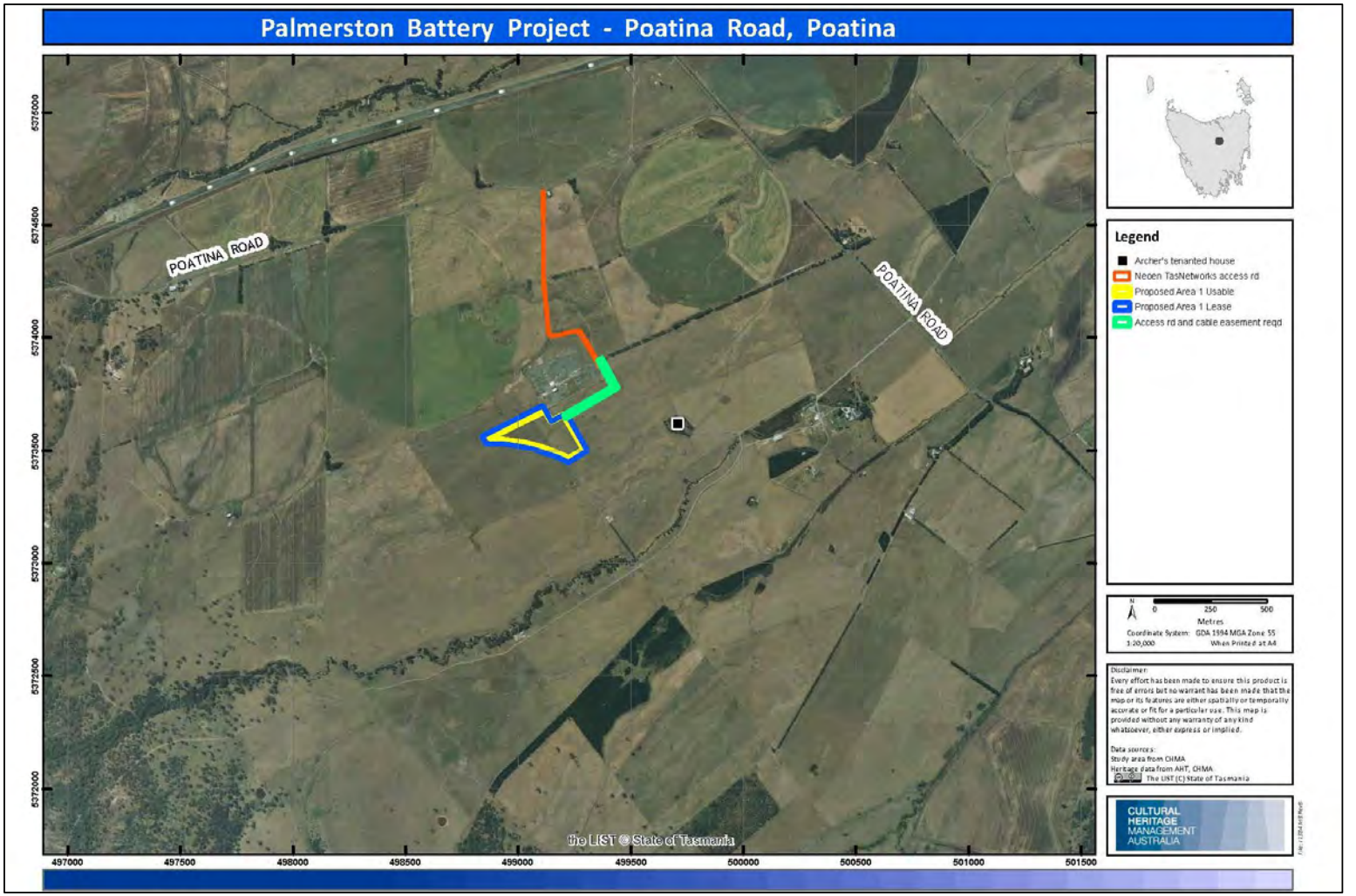

Figure 3: Aerial image showing the boundaries of the study area.

2.0 Environmental Setting of the Study Area

The proposed Palmerston Battery Project footprint (the study area), covers approximately 1.39ha of existing graded access track and approximately 4ha of private pastureland. The study area is situated immediately adjacent to the existing Palmerston TasNetworks Substation and is 6.1km east of Poatina and 16.8km southwest of Cressy in the Northern Region of Tasmania (see Figures 1–3). The study area is situated on a flat to gently undulating floodplain which is primarily used as pastureland.

The underlying geology of the study area consists of Cenozoic cover sequences which consist of sand gravel and mud of alluvial, lacustrine and littoral origin (List 2022). Soils within the study area are light to dark red/brown sandy loam.

The Palmerston Battery Project footprint study area is surrounded by named watercourses, unnamed tributaries and numerous drainage lines. The study area is situated inland from the Woodside Rivulet which is 670m south of the study area and runs in a northeast-to-southwest direction (see Figure 2). The study area is also situated inland from Palmers Rivulet which is 655m north and runs in a northeast-to-southwest direction. Both of these watercourses are semi-permanent and tributaries associated with Brumby's Creek which is situated 4.1km northeast of the study area (see Figure 2).

The vegetation structure across the study area primarily consists of introduced grasses, most notably Prairie Grass (*Bromus wildenowie*) and White Clover (*Trifolium repens*) (NSW Department of Primary Industries 2022). Amongst the introduced grasses are weeds, such as the Scotch Thistle (*Onopordum acanthium*) and sparse stands of native rushes.

The entire study area has been intensively disturbed. The entire study area and immediate surroundings have been subject to past clearing to make way for agricultural activity. The main access track leading into the study area has been graded with bitumen to facilitate access to the Palmerston TasNetworks Substation which is immediately adjacent to the eastern border of the study area. The construction and ongoing maintenance and development of the Palmerston TasNetworks Substation has also been a source of disturbance to the study area. Any Aboriginal sites that may be present within these more highly disturbed infrastructure/agricultural areas will have been either destroyed or heavily impacted.

The study area has a cool, wet climate typical of northern Tasmania. Rainfall occurs throughout the year; with a mean annual rainfall of 589mm. Rainfall is highest in August and September (64mm – 71mm) and lower from January to February (28 – 31mm). The warmest months of the year are January and February when mean temperatures range from minimums of 10°C to maximums of about 23°C. Winter tends to be cold with mean annual temperatures in the coldest months of June and July ranging from 1.5°C mean minimum to maximum temperatures of about 11°C (BOM 2020).

Plate 1: View southeast showing the main access track leading into the study area has been graded with bitumen.

Plate 2: View southeast showing the Prairie Grass (*Bromus wildenowie*) present with the paddocks in the study area.

Plate 3: View south showing one of the drainage lines present within the study area.

Plate 4: View west showing the Palmerston TasNetworks Substation (right) and pastureland within the study area.

Plate 5: View southwest showing the border of the study area overlooking red-brown sandy loam soil.

3.0 Survey Coverage of the Study Area

Survey Coverage and Surface Visibility

Survey coverage refers to the estimated portion of a study area that has been visually inspected during a field survey. Surface Visibility refers to the extent to which the actual soils of the ground surface are available for inspection. There are a number of factors that can affect surface visibility, including vegetation cover, surface water and the presence of introduced gravels or materials. Figure 8 provides a useful guide for estimating surface visibility.

The field survey was undertaken by Shay Hannah (CHMA archaeologist) and Vernon Graham (Senior Aboriginal Heritage Officer), over a period of 1 day (19-10-2022). The field team walked a total of 2.15km of survey transects across the proposed Palmerston Battery Project footprint, with the average width of each transect being 5m. Table 1 provides the total transects walked for each section and figure 9 shows the alignment of the survey transects walked by the field team.

The survey transects were predominately focussed on the Palmerston Battery Project footprint and the main access track leading into the study area. As part of the field survey program, additional transects were walked in areas where there was improved surface visibility, in order to gain a better insight as to the potential presence or absence of historic sites across the study area. Surface visibility across the study area was variable, ranging between <10% to 90%, averaging at 25% which is in the low range. Improved surface visibility was found within erosion scalds which ranged from 50% and 100%, averaging at 70%. Vegetation cover was the main impediment to visibility.

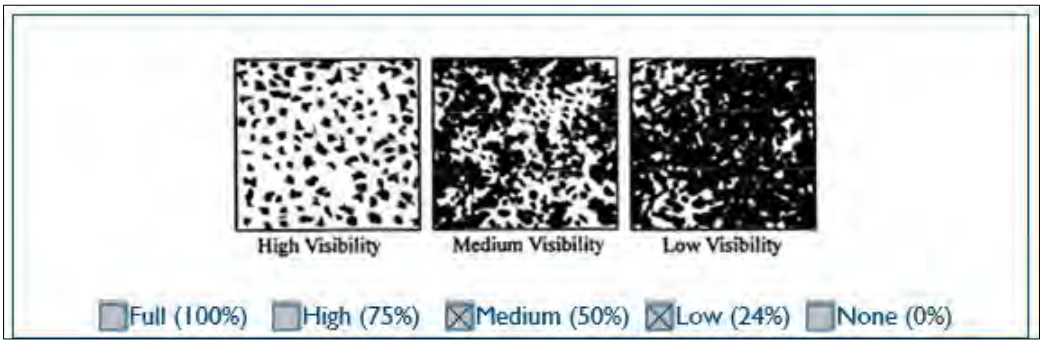

Figure 4: Guidelines for the estimation of surface visibility.

Effective Coverage

Variations in both survey coverage and surface visibility have a direct bearing on the ability of a field team to detect historic heritage sites, particularly more discrete heritage features. The combination of survey coverage and surface visibility is referred to as effective survey coverage. Table 1 presents the estimated effective survey coverage achieved during the course of the survey assessment. The effective coverage is estimated to have been around 2515m². This level of effective coverage is assessed as being adequate for the purposes of determining the potential extent, nature and distribution of historic heritage sites in the study area.

Table 1: Effective Survey Coverage achieved across the surveyed areas.

Area Surveyed	Survey Transects	Estimated Surface Visibility	Effective Survey Coverage
Access Tracks	690m x 5m= 3450m^2	20%	690m^2
Battery	1460m x 5= 7300m^2	25%	1825m^2
Total	**10,750m^2**		**2515m^2**

Plate 6: View south showing the average 25% surface visibility and vegetation cover and one of the numerous erosion scalds present within the study area.

Plate 7: View southeast showing the main access track into the study area where surface visibility was 20% on average.

Figure 5: Aerial image showing survey transects walked by the field team across the study area.

4.0 Historic Heritage Background

4.1 Historic Context

Settlement of the Northern Midlands originated with supply parties from the small European settlements of Port Dalrymple and one on the River Derwent (established between 1803 to 1804) trekking through what would become the Midlands and establishing a track that would later become the basis for the route of the Midland Highway (Alexander 2012:3–4).

The town of Cressy was first built as the main centre for the Cressy Company, a large agricultural company that owned a significant portion of the area known as the Norfolk Plains (Northern Midlands Council 2022). The first company director, Captain Bartholomew Boyle Thomas, named the town after the battle of 'Crecy' fought against the French in 1346 because he was the descendant of a hero from the battle (Northern Midlands Council 2022). The first building in Cressy was the Cressy Hotel in 1845, built by William Brumby and three years later Cressy became an official township. The last director of the Cressy Company, James D Toosey Senior sold the Cressy Company, then called 'The Cressy Establishment', in 1855 for a significant profit (Northern Midlands Council 2022).

Throughout this period, large farming estates were established some of which are still in operation. One of the more notable of these is Palmerston, a large property located off Saundridge Road 19km southwest of Cressy on the banks of Palmers Rivulet. Palmerston was originally named 'Woodside' and first granted to Joseph Archer (Dennison 1994:37).

Cressy was a flourishing agricultural town in 1887 and in 1904 the Anglican theological college St Wilfrid's would be established at Richmond Hill, originally built in 1823 (Our Tasmania 2022; Northern Midlands Council 2022). St Wilfrid's would close in 1929. The twentieth century saw many developments for the township. The Cressy Research Station would be built in 1937 and continues to operate in the area. In 1954, Queen Elizabeth visited Cressy and stayed at the estate known as 'Connorville' (Northern Midlands Council 2022). Today Cressy remains an agricultural town with a thriving tourism industry.

Poatina was commissioned in 1964 and built in the 1960s as housing for hydro-electric workers operating on various projects in the area. The area village is situated on the fringe of the Central Plateau and was named after the Tasmanian Aboriginal word for cavern or cave (Our Tasmania 2022; Dennison 1994:43). By 1994, there were no permanent residents in Poatina village and was only occupied during maintenance projects. It was in 1995 that several buildings in the village were bought by Fusion Australia, a Christian youth and community organisation, who now effectively run and own the village (Dennison 1994:43; Our Tasmania 2022). The town now has accommodation, hospitality and retail services and is a popular tourist destination.

4.2 Results of the Search of the Heritage Registers

There have been several historic heritage assessments that have previously been undertaken in the general surrounds of the Palmerston Battery Project site. These assessments have primarily been focused within the Cressy township and Central Plateau areas and have ranged in scope from Desktop studies to detailed survey assessments. These assessments have resulted in the recording and documentation of a broad range of historic features associated with the early rural settlement of the region.

A search was carried out of a number of historic registers and databases in order to determine the extent of historic sites and features in the vicinity of each of the Palmerston Battery study area. Agency databases searched included:

- Australian National Heritage List (NHL).
- The Australian Heritage Database (AHD).
- Tasmanian Heritage Register (THR).
- The Register of the National Estate (RNE).
- Northern Midlands Heritage Council List

The search of the various historic heritage registers shows that there are two registered historic sites or places located within a 2km radius of the Palmerston Battery Project site, these being the Saundridge and Woodside properties (see Table 2). Both properties are permanently registered on the Tasmanian Heritage Register (THR) and are on the Heritage Code of the *Northern Midlands Interim Planning Scheme 2015.* As such, both properties are afforded Statutory protection.

The registered boundaries of these two properties do not intersect with the Palmerston Battery Project footprint. The closest of these heritage properties is Woodside. The Central Plan Register (CPR) for the Woodside property shows that the heritage listed boundaries of the property is restricted to a 2.35ha area that encompasses the main homestead and immediate surrounds. This is around 1km to the south-east of the Palmerston Battery Project footprint. The Saundridge property is located around 1.2km to the north of the study area. The THR registration applies to the whole of the property boundaries. The Datasheet entries and Central Plan Registers for Woodside and Saundridge are provided in Appendix 1.

Table 2: Registered historic sites in a 2km radius of the Palmerston Battery Project study area.

Tasmanian Heritage Register ID No.	Grid Reference (GDA94)	Site Name	Site Address	Registration Status and Council
5073	E 498371 N 5376138	Saundridge	1243 Saundridge Rd Cressy, 7302	Permanently Registered on the THR and with Northern Midlands Council
5072	E 500483 N 5373679	Woodside	4740 Poatina Rd Cressy, 7302	Permanently Registered on the THR and with Northern Midlands Council

5.0 Survey Results, Statement of Heritage Impacts and Statement of Archaeological Potential

No historic sites or suspected features were identified during the field survey assessment of the Palmerston Battery Project footprint.

As described in section 3 of the report, surface visibility across the study area was variable, ranging between <10% to 90%, averaging at 25% which is in the low range. Improved surface visibility was found within erosion scalds which ranged from 50% and 100%, averaging at 70%. Vegetation cover was the main impediment to visibility. Given surface visibility constraints, it can't be stated with absolute certainty that there are no undetected historic heritage sites present in the study area. However, it is assessed as being highly unlikely that dwellings or other early pastoral structures (such as stock yards or barns) were ever established in this area. Instead, the study area is likely to have simply partially cleared of native vegetation, as part of farming activity. The archaeological signature of this level of historic pastoral occupation is likely to be minimal.

On the basis of the negative survey findings, the absence of registered Historic sites the low potential for undetected historic heritage sites to be present, the archaeological potential of the Palmerston Battery site is assessed as being of very low. It is advised that there is a very low possibility that the proposed development will have any impacts on historic heritage values.

6.0 Statutory Controls and Legislative Requirements

The following provides a summary overview of the various legislative instruments and statutory requirements relating to historic heritage in Tasmania. The review is presented in order to provide the proponent with a basic understanding of the statutory frameworks and procedures relating to heritage in Tasmania.

6.1 National Conventions

Council of Australian Governments Agreement 1997

In 1997, COAG reached an agreement on Commonwealth, State and local government roles and responsibilities for heritage management. Local government, through the Australian Local Government Association, and the Tasmanian Government were both signatories to this Agreement. The Agreement resulted in the following outcomes:

- Acceptance of a tiered model of heritage management, with the definition of places as being of either, world, national, state or of local heritage significance;
- Nominations of Australian places for the World Heritage List and management of Australia's obligations under the World Heritage Convention would be carried out by the Commonwealth Government;
- A new National Heritage System on one was created in January 2004, comprising the Australian Heritage Council (AHC), National Heritage List (NHL) and Commonwealth Heritage List (CHL);
- The Commonwealth Government, through the Australian Heritage Council would be responsible for listing, protecting and managing heritage places of national significance;
- State and Territory Governments would be responsible for listing, protecting and managing heritage places of state significance; and
- Local government would be responsible for listing, protecting and managing heritage places of local significance.

Environment Protection and Heritage Council of the Australian and State/Territory Governments 1998

In 1998, the National Heritage Convention proposed a set of common criteria to be used in order to better assess, understand and manage the heritage values of places.

The Environment Protection and Heritage Council of the Australian and State/Territory Governments adopted this as a national set of desirable common criteria (known as the HERCON criteria). The adoption of these criteria by Heritage Tasmania has not yet been formalised. These criteria are also based upon the Burra Charter values. The Common Criteria (HERCON Criteria) adopted in April 2008 are summarised below:

a) *Importance to the course or pattern of our cultural or natural history.*
b) *Possession of uncommon, rare or endangered aspects of our cultural or natural history*.
c) *Potential to yield information that will contribute to an understanding of our cultural or natural history.*
d) *Importance in demonstrating the principal characteristics of a class of cultural or natural places or environments.*
e) *Importance in exhibiting particular aesthetic characteristics*

f) *Importance in demonstrating a high degree of creative or technical achievement at a particular period.*
g) *Strong or special association with a particular community or cultural group for social, cultural or spiritual reasons. This includes the significance of a place to Indigenous peoples as part of their continuing and developing cultural traditions.*
h) *Special association with the life or works of a person, or group of persons, of importance in our history.*

These criteria have been endorsed by the Heritage Chairs and Officials of Australia and New Zealand (HCOANZ) in the Supporting Local Government Project document, "Protecting Local Heritage Places: A National Guide for Local Government and Communities" (March 2009).

Burra Charter 1999
Australia ICOMOS (International Council on Monuments and Sites) is the peak body of professionals working in heritage conservation in Australia. The Burra Charter was adopted by Australia ICOMOS in 1979 in Burra, South Australia based on other international conventions. Further revisions were adopted in 1981, 1988 and 1999 to ensure the Charter continues to reflect best practice in heritage and conservation management. The current version of the Australia ICOMOS Burra Charter 1999 is the only version that should be used.

The Burra Charter provides guidance for the conservation and management of places of cultural significance (cultural heritage places), and is based on the knowledge and experience of Australian ICOMOS members. The Charter sets a standard of practice for those who provide advice, make decisions about, or undertake works to places of cultural significance, including owners, managers and custodians.

The Charter recognises the need to involve people in the decision-making process, particularly those that have strong associations with a place. It also advocates a cautious approach to changing heritage places: do as much as necessary to care for the place and to make it useable, but otherwise change it as little as possible so that its cultural significance is retained.

6.2 Commonwealth Legislation

Environment Protection and Biodiversity Conservation Act 1999
The Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) provides for the listing of natural, historic or indigenous places that are of outstanding national heritage value to the Australian nation as well as heritage places on Commonwealth lands and waters under Australian Government control.
Once a heritage place is listed under the EPBC Act, special requirements come into force to ensure that the values of the place will be protected and conserved for future generations. The following heritage lists are established through the EPBC Act:

- *National Heritage List* - a list of places of natural, historic and indigenous places that are of outstanding national heritage value to the Australian nation
- *Commonwealth Heritage List* - a list of natural, historic and indigenous places of significance owned or controlled by the Australian Government.

- *List of Overseas Places of Historic Significance to Australia* – this list recognises symbolically sites of outstanding historic significance to Australia but not under Australian jurisdiction.

Australian Heritage Council Act 2003
The Australian Heritage Council is a body of heritage experts that replaced the Australian Heritage Commission as the Australian Government's independent expert advisory body on heritage matters when the new Commonwealth Heritage System was introduced in 2004 under amendments to the Environment Protection and Biodiversity and Conservation Act 1999.

The Council plays a key role in the assessment, advice and policy formulation and support of major heritage programs. Its main responsibilities are to assess and nominate places for the National Heritage List and the Commonwealth Heritage List, promote the identification, assessment, conservation and monitoring of heritage; and advise the Minister on various heritage matters.

Protection of Movable Cultural Heritage Act 1986
The PMCH Act regulates the export of cultural heritage objects from Australia. The purpose of the Act is to protect, for the benefit of the nation, objects which if exported would significantly diminish Australia's cultural heritage. Some Australian protected objects of Aboriginal, military heritage and historical significance cannot be granted a permit for export. Other Australian-protected objects may be exported provided a permit or certificate has been obtained.

6.3 State Legislation
Land Use Planning and Approvals Act 1993
This Act (LUPA) is the cornerstone of the State Resource Management and Planning System (RMPS). It establishes the legitimacy of local planning schemes and regulates land use planning and development across Tasmania. With regard to historic heritage, LUPAA requires that planning authorities will work to conserve those buildings, areas or other places which are of scientific, aesthetic, architectural or historical interest, or otherwise of special cultural value" [Schedule 1 Part 2(g)].

Resource Planning and Development Commission Act 1997
The Resource Planning and Development Commission (now referred to as the Tasmanian Planning Commission) is responsible for overseeing Tasmania’s planning system, approving planning schemes and amendments to schemes and assessing Projects of State Significance. In terms of heritage management, the TPC will consider the establishment of heritage overlays, precincts or areas as part of the creation of planning schemes.

Resource Management and Planning Appeal Tribunal Act 1993
The Resource Management and Planning Appeal Tribunal determine planning appeals and enforce the Acts within the RMPS. The Tribunal plays an important role in the management of heritage places through its determinations on proposed development on, or near to, places of heritage significance.

Historic Cultural Heritage Act 1995

The *Historic Cultural Heritage Act 1995* (HCH Act) is the key piece of Tasmanian legislation for the identification, assessment and management of historic cultural heritage places. The stated purpose of the HCH Act is to promote the identification, assessment, protection and conservation of places having historic cultural heritage significance and to establish the Tasmanian Heritage Council". The HCH Act also includes the requirements to:

- establish and maintain the Tasmanian Heritage Register (THR);
- provide for a system for a system of approvals for work on places on the Register;
- provide for Heritage Agreements and assistance to property owners;
- provide for protection of shipwrecks;
- provide for control mechanisms and penalties for breaches of the Act.

Under the HCH Act, "conservation" in relation to a place is defined as

- the retention of the historic cultural heritage significance of the place; and
- any maintenance, preservation, restoration, reconstruction and adaption of the place.

The definition of "place" under the HCH Act includes:

- a site, precinct or parcel of land;
- any building or part of a building;
- any shipwreck;
- any item in or on, or historically or physically associated or connected with, a site precinct or parcel of land where the primary importance of the item derives in part from its association with that site, precinct or parcel of land; and
- any equipment, furniture, fittings, and articles in or on, or historically or physically associated or connected with any building or item.

The Act created the Tasmanian Heritage Council (THC), which came into existence in 1997 and operates within the State RMPS. The THC is a statutory body, separate from government, which is responsible for the administration of the HCH Act and the establishment of the Tasmanian Heritage Register (THR), which lists all places assessed as having heritage values of state significance. The THC also assesses works that may affect the heritage significance of places and provides advice to state and local government on heritage matters. The primary task of the THC is as a resource management and planning body, which is focused on heritage conservation issues. Any development on heritage-listed places requires the approval of the THC before works can commence.

Heritage Tasmania (HT), which is part of the Department of Primary Industry, Parks, Water and the Environment, also plays a key role in fulfilling statutory responsibilities under the HCH Act.

HT has three core roles:

- coordinating historic heritage strategy and activity for the State Government;
- supporting the Tasmanian Heritage Council to implement the HCH Act; and
- facilitating the development of the historic heritage register.

In 2013, *Historic Cultural Heritage Act 1995* was amended, with the primary goal of streamlining the approvals process and better align the Heritage Act with the Planning Act. Under the Amendment applicants need only lodge a single Development Application (DA)

(as opposed to both a Works Application and DA), which will be referred to the Heritage Council by the local planning authority. Heritage Council then has the opportunity to advise the planning authority whether or not it has an interest in the DA and may request further information under s57 of the LUPAA. If the Heritage Council does not have an interest in the DA, it reverts to the status it has under the Scheme or Planning Act. Where Heritage Council does have an interest in the DA, the Council decision must be incorporated into the final permit (or refusal) issued by the local planning authority.

Also included in the amendments is the incorporation of the HERCON significance criteria for assessing the significance of heritage sites. The Heritage Council may enter a place in the Heritage Register if it satisfied that the place has historic cultural heritage significance by meeting threshold values for one or more of eight individual criteria. Aesthetic characteristics of a place now forms the eighth criterion against which heritage significance may be assessed.

Works to places included in the THR require approval, either through a Certificate of Exemption for works which will have no or negligible impact, or through a discretionary permit for those works which may impact on the significance of the place.

Discretionary permit applications are lodged with the relevant local planning authority. On receipt, the application is sent to the Heritage Council, which will firstly decide whether they have an interest in determining the application. If the Heritage Council has no interest in the matter, the local planning authority will determine the application.

If the Heritage Council has an interest in determining the application, a number of matters may be relevant to its decision. This includes the likely impact of the works on the significance of the place; any representations; and any regulations and works guidelines issued under the HCH Act. The Heritage Council may also consult with the planning authority when making a decision.
In making a decision, the Heritage Council will exercise one of three options: consent to the discretionary permit being granted; consent to the discretionary permit being granted subject to certain conditions; or advise the planning authority that the discretionary permit should be refused. The Heritage Council's decision is then forwarded to the planning authority, which will incorporate the decision into any planning permit

Works Guidelines for Historic Heritage Places
The Tasmanian Heritage Council and Heritage Tasmania have issued Works Guidelines for Historic Heritage Places. The guidelines provide a general reference for the types of works, which may be exempt, or those where a permit will be required. They also define appropriate outcomes for a range of different works and development scenarios. Although specifically designed for places included in the THR, the guidelines provide useful advice for the management of heritage places generally.

6.4 Local Planning Schemes
The *Tasmanian Planning Scheme* came into effect on 22 July 2020 and replaced the former Local Interim Planning Schemes.

The *Tasmanian Planning Scheme* provides a single planning scheme and a consistent set of rules and requirements in relation to the manner in which all land in Tasmania may be used, developed, protected and conserved. It consists of two parts:

1. **State Planning Provisions** contain the mandatory common rules that are to apply in all municipal areas. For consistency in permit and compliance requirements that must be met by a proposed use or development.
2. **Local Provision Schedule** for each municipal area setting out how the State Planning Provisions are to apply.

The planning scheme supports strategic land use planning for residential, business, agriculture, utilities, environmental and recreational zones. The scheme includes considerations such as natural hazards, local heritage values, natural assets, parking requirements and the protection of road, railway and electricity infrastructure.

Section C6 of the *Tasmanian Planning Scheme* deals specifically with the Local Heritage Code. The stated purpose of the code is to recognise and protect the local historic heritage significance of local places, precincts, landscapes and areas of archaeological potential and significant trees by regulating development that may impact on their values, features and characteristics. This code applies to:

(a) development on land within any of the following, as defined in this code:

(i) a local heritage place;

(ii) a local heritage precinct;

(iii) a local historic landscape precinct; and

(iv) for excavation only, a place or precinct of archaeological potential;

and

(b) the lopping, pruning, removal or destruction of a significant tree as defined in this code.

If a site is listed as a local heritage place and also within a local heritage precinct or local historic landscape precinct, it is only necessary to demonstrate compliance with the standards for the local heritage place unless demolition, buildings and works are proposed for an area of the site outside the identified specific extent of the local heritage place.

This code does not apply to a registered place entered on the Tasmanian Heritage Register.

7.0 Heritage Management Plan

Management Recommendations

Heritage management options and recommendations provided in this report are made based on the following criteria.

• The legal and procedural requirements as specified in section 4 of this report.

• The results of the investigation as documented in this report.

• The results of the Historic heritage register search.

Recommendation 1

No historic heritage sites, suspected features, or areas of elevated archaeological potential were identified during the field survey assessment of the Palmerston Battery Site (the study area). A search of the various historic heritage registers (as listed in section 1.4 of this report) shows that there are no registered historic sites located within or in the immediate vicinity of the study area. Archival research has not identified any evidence for historic structures or features being present. On this basis, it is advised that the proposed Palmerston Battery will have no impacts on known Historic heritage sites, and therefore there are no Historic heritage constraints, or legal impediments to the project proceeding.

Recommendation 2

It is assessed that there is a very low potential for undetected Historic heritage sites to occur within the Palmerston Battery site. However, if, during the course of the proposed works, previously undetected heritage sites or objects are located, the processes outlined in the Unanticipated Discovery Plan should be followed (see section 8).

8.0 Unanticipated Discovery Plan

The following text describes the proposed method for dealing with unanticipated discoveries of heritage features or objects during the proposed Palmerston Battery Project development. The plan provides guidance to project personnel so that they may meet their obligations with respect to heritage legislation. Please Note: There are two different processes presented for the mitigation of these unanticipated discoveries. The first process applies to the discovery of all cultural heritage objects or features, with the exception of skeletal remains (burials). The second process applies exclusively to the discovery of skeletal remains (burials).

Discovery of Heritage Objects or Features

Step 1

If any person believes that they have discovered or uncovered a heritage object or feature, the individual should notify any machinery operators that are working in the general vicinity of the area that earth disturbance works should stop immediately.

Step 2

A buffer protection zone of 5m x 5m should be established around the suspected heritage find. No unauthorised entry or earth disturbance will be allowed within this ‘archaeological zone’ until such time as the suspected heritage find has been assessed, and appropriate mitigation measures have been carried out.

Step 3

A qualified heritage consultant should be engaged to assess the suspected heritage find. As a first step in the process, the heritage consultant should contact Heritage Tasmania, the Heritage Council and the Local Council and notify them of the find. The heritage consultant will ensure that Heritage Tasmania, the Heritage Council and the Local Council are consulted throughout the assessment process.

Step 4

If the heritage find is a movable object, then the find should be recorded, photographed and a decision should be made as to whether the object should be re-located to a designated Keeping Place. If the find is an unmovable heritage object or feature, then the find should be recorded and photographed and a HIA and HMP developed for the feature. This should be then submitted to Heritage Tasmania, the Heritage Council and the Local Council for review and advice.

Possible outcomes may necessitate:

a. An amendment to the design of the development
b. Carrying out of archaeological excavations prior to the re-commencement of works
c. Archaeological monitoring and recording during works
d. Preparation (and implementation) of a strategy to ensure communication of the new information to the community.
e. A combination of the above.

Discovery of Skeletal Material

Step 1:
Call the Police immediately. Under no circumstances should the suspected skeletal material be touched or disturbed. The area should be managed as a crime scene. It is a criminal offence to interfere with a crime scene.

Step 2:
Any person who believes they have uncovered skeletal material should notify all employees or contractors working in the immediate area that all earth disturbance works cease immediately.

Step 3:
A temporary 'no-go' or buffer zone of at least 50m x 50m should be implemented to protect the suspected skeletal material, where practicable. No unauthorised entry or works will be allowed within this 'no-go' zone until the suspected skeletal remains have been assessed by the Police and/or Coroner.

Step 4:
If it is suspected that the skeletal material is Aboriginal, Aboriginal Heritage Tasmania should be notified.

Step 5:
Should the skeletal material be determined to be Aboriginal, the Coroner will contact the Aboriginal organisation approved by the Attorney-General, as per the *Coroners Act 1995*.

References Cited

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Our Tasmania 2022: Cressy, Tasmania. Accessed 25 October from <https://www.ourtasmania.com.au/launceston/cressy.html>.

Appendix 1

The Data Sheet Entries and Central Plan Register for the Woodside and Saunders Properties

Tasmanian Heritage Register Datasheet

Tasmanian Heritage Council

134 Macquarie Street (GPO Box 618)
Hobart Tasmania 7001
Phone: 1300 850 332 (local call cost)
Email: enquiries@heritage.tas.gov.au
Web: www.heritage.tas.gov.au

Name: **Woodside**
Status: Permanently Registered
Tier: State
State

THR ID Number: **5072**
Municipality: Northern Midlands Council
Boundary: CPR10314

Location Addresses	Title References	Property Id
4740 POATINA RD, CRESSY 7302 TAS	126579/2	6753425

Woodside homestead in 1921
LINC

Castellated Tower at Woodside
DPIPWE 2008

Woodside homestead
DPIPWE 2002

Woodside homestead and outbuildings
DPIPWE 2002

Statement of Significance: (non-statutory summary)

Woodside is of historic cultural heritage significance because it demonstrates the evolution of Tasmanian pastoral and agricultural history from the 19th century, and the adoption of permanent and substantial constructions for housing and

outbuildings reminiscent of the British model. It is also of historic cultural heritage significance because of its ability to demonstrate the principal characteristics of an Old Colonial Georgian rural homestead with associated outbuildings. Woodside is also of historic cultural heritage significance because of its associations with Joseph Archer and the Archer family, prominent settlers in northern Tasmania.

Why is it significant?:

The Heritage Council may enter a place in the Heritage Register if it meets one or more of the following criteria from the Historic Cultural Heritage Act 1995:

a) The place is important to the course or pattern of Tasmania's history.

Woodside is of historic cultural heritage significance because it demonstrates the evolution of Tasmanian pastoral and agricultural history from the 19th century, and the adoption of permanent and substantial constructions for housing and outbuildings reminiscent of the British model.

b) The place possesses uncommon or rare aspects of Tasmania's history.

No Data Recorded

c) The place has the potential to yield information that will contribute to an understanding of Tasmania's history.

No Data Recorded

d) The place is important in demonstrating the principal characteristics of a class of place in Tasmania's history.

Woodside is of historic heritage significance because of its ability to demonstrate the principal characteristics of an Old Colonial Georgian rural homestead with its associated outbuildings.

e) The place is important in demonstrating a high degree of creative or technical achievement.

No Data Recorded

f) The place has a strong or special association with a particular community or cultural group for social or spiritual reasons.

No Data Recorded

g) The place has a special association with the life or works of a person, or group of persons, of importance in Tasmania's history.

Woodside is of historic heritage significance because of its associations with Joseph Archer and the Archer family , porminent settlers in northern Tasmania.

h) The place is important in exhibiting particular aesthetic characteristics.

No Data Recorded

Heritage approval is required for work that will result in changes to the nature or appearance of the fabric of a Heritage place, both internal and external.
Please refer to the Heritage Council's Works Guidelines (www.heritage.tas.gov.au) for information about the level of approval required and appropriate outcomes.
Heritage Advisors are also available to answer questions and provide guidance on enquiries@heritage.tas.gov.au or Tel 1300850332

This data sheet is intended to provide sufficient information and justification for listing the place on the Heritage Register. Under the legislation, only one of the criteria needs to be met. The data sheet is not intended to be a comprehensive inventory of the heritage values of the place, there may be other heritage values of interest to the Heritage Council not currently acknowledged.

Setting:

Woodside homestead stands among mature plantings at the end of a long , indirect driveway. Woodside Rivulet flows through the property nearby. There is a large collection of outbuildings. Like neighbouring Billopp, Saundridge and Palmerston, the property is in the foothills of the Great Western Tiers , with views of the range.

Description:

Woodside is a two-storey Old Colonial Georgian house of brick with stucco trim, a main facade of five bays broken with two storey pilasters and string course, dressed stone surrounds to openings, a stone string course, twelve-paned windows, and a six panel door in neo-classic trimmings comprising triangular pediment on pilasters. Original interior cornices, fireplaces, doors, skirting boards and architraves contribute to the representative character of the main house. There is a one-and-a-half storey detached kitchen wing which helps to enclose a walled courtyard with a brick coach house. Outside the courtyard is a circular brick tower, a blacksmiths shop, a brick cottage and a fine garden.

Frank L Rigney describes Woodside as 'a long rectangular house only one room deep, built in the colonial Georgian style. The five rooms of the ground floor are connected by a passageway running almost the length of the house at the rear. The hall at the entrance in the centre of the house, extends to both floors with a stairway leading directly up to a doorway giving acess to the passage on the first floor. The plan of each floor is similar. Instead of a fan-light, the central hall is lit by a window above the door on the upper level. A string course marks the level of the first floor and pilasters the division of the rooms. Projecting stonework surrounds each of the windows in a manner more common in Scotland' (*A Midlands Odyssey*, p.76).

Rigney also speculates that the turreted circular brick tower outside the courtyard was 'no doubt ... once filled by a hand pump and later by a windmill. Similar towers are to be seen at Panshanger and Symmons Plains' (*A Midlands Odyssey*, p.76).

The registration includes the main house, stables, wall and courtyard, coach house, blacksmith's shop, castellated tower and other historic outbuildings including the brick cottage.

History:

According to Frank L Rigney, the Woodside property consists, in part, of one of the few land grants given to a woman. The grantee was Elinor Binfield, formerly an assistant to Hannah Clarke who established a girls school at Ellenthorpe Hall near Ross (THR 5270). After marrying Joseph Archer of Panshanger and Burlington, Elinor arranged to have her grant relocated beside his Faro's Run property. Rigney implies that these grants were combined, and that in 1835, while Joseph Archer was in England, his brother Edward Archer commissioned the building of the Woodside house (*A Midlands Odyssey*, p.76). At the time of the 1842 census however, Thomas Turnbull (probably the Archers' overseer) was the head of a finished wooden house while the present one is brick and stone. There were 10 other residents, including shepherds and agricultural workers (*Census of Van Diemen's Land for 1842*). According to Rigney, Woodside was divided after Joseph Archer's death in 1853, with his brothers Edward and William receiving 4,144 acres and 3,644 acres of it respectively 'subject to a life interest to Joseph's widow, Elinor' (*A Midlands Odyssey*, p.76). In 1855 Edward Archer advertised for sawyers 'to cut stuff for a barn and cow-house' at Woodside (*Cornwall Chronicle* 10 October 1855, p.7).

Edward Archer died in 1861, whereupon his sons Basil and Daniel inherited his share of Woodside. Daniel later sold his share to Basil (Rigney, *A Midlands Odyssey*, p.76). In 1903 Basil and Fanny Archer employed 7 labourers, 5 domestic servants, 2 shepherds, a governess, a groom and a cook (*Electoral Roll of Tasmania for 1903*). In 1942 the property included a shearing shed of such size that it was proposed as an evacuation site for 300 people in the event of Japanese invasion (LCC3,57/1 War General—Evacuation Committee Correspondence March-June 1942). The property is still within the Archer family in 2014.

Bibliography

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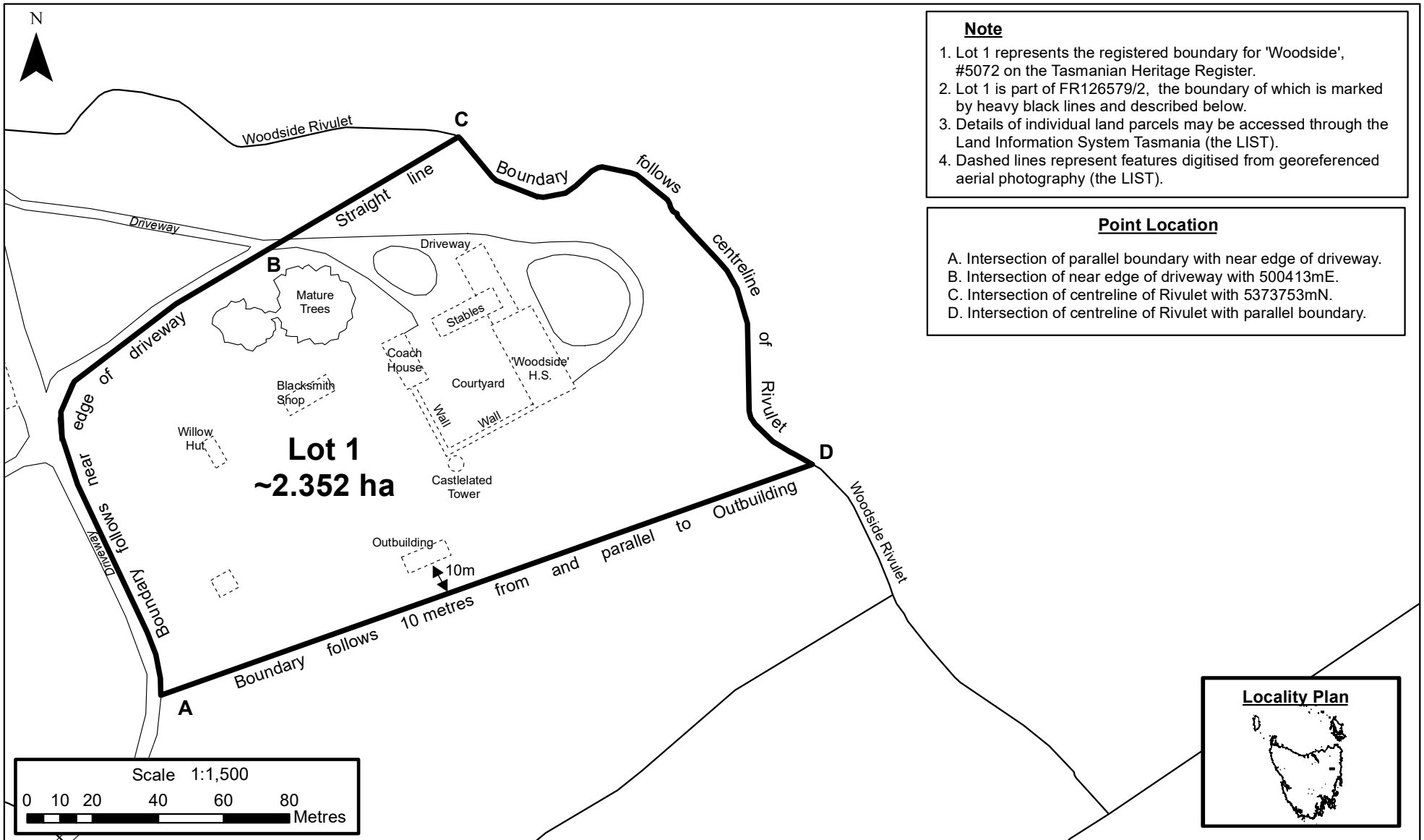

Note

1. Lot 1 represents the registered boundary for 'Woodside', #5072 on the Tasmanian Heritage Register.
2. Lot 1 is part of FR126579/2, the boundary of which is marked by heavy black lines and described below.
3. Details of individual land parcels may be accessed through the Land Information System Tasmania (the LIST).
4. Dashed lines represent features digitised from georeferenced aerial photography (the LIST).

Point Location

A. Intersection of parallel boundary with near edge of driveway.
B. Intersection of near edge of driveway with 500413mE.
C. Intersection of centreline of Rivulet with 5373753mN.
D. Intersection of centreline of Rivulet with parallel boundary.

Locality Plan

TASMAP:	POATINA (4837)	GRID:	MGA94 / ZONE 55	DATUM:	AHD	CONTOUR INTERVAL:	N/A
No.	PRODUCTION / AMENDMENT	AUTHORITY	REFERENCE	DRAWN	APPROVED	DATE	
1	Production	THC	5072	RA	18-FEB-15	B.TAROSSI	

WOODSIDE
4740 POATINA ROAD, CRESSY

Tasmanian Heritage Council
PREPARED BY HERITAGE TASMANIA

GDA

CENTRAL PLAN REGISTER
Surveyor General:
Date Registered: 14-07-2016

Tasmania

CPR 10314

Tasmanian Heritage Register Datasheet

134 Macquarie Street (GPO Box 618)
Hobart Tasmania 7001
Phone: 1300 850 332 (local call cost)
Email: enquiries@heritage.tas.gov.au
Web: www.heritage.tas.gov.au

Name: **Saundridge**
Status: Permanently Registered
Tier: State
State

THR ID Number: **5073**
Municipality: Northern Midlands Council
Boundary: Whole of Title

Location Addresses	Title References	Property Id
1243 SAUNDRIDGE RD, CRESSY 7302 TAS	54212/1	6753345

Saundridge in 1931
Weekly Courier Annual 4 November 1931, p.31

Saundridge in 1975
LINC Tasmania

Saundridge
DPIPWE c2002

Statement of Significance: (non-statutory summary)

Saundridge is of historic cultural heritage significance because it demonstrates the evolution of Tasmanian pastoral and agricultural history from the mid 19th century, and the adoption of permanent and substantial constructions for housing and outbuildings reminiscent of the British model. The house is a fine example of a two- storey Victorian Italianate rural homestead. Saundridge is also of historic heritage significance because of its association with the Archer family , specifically with original owner William Archer of Brickendon, and prominent architect, scientist, woolgrower and politician William Archer IV, who designed the irrigation system and also likely designed the renovations to main house.

Why is it significant?:

The Heritage Council may enter a place in the Heritage Register if it meets one or more of the following criteria from the Historic Cultural Heritage Act 1995:

a) The place is important to the course or pattern of Tasmania's history.

Saundridge is of historic cultural heritage significance because it demonstrates the evolution of Tasmania 's pastoral and agricultural history from the mid 19th century, and the adoption of permanent and substantial constructions for housing and outbuildings reminiscent of the British model.

b) The place possesses uncommon or rare aspects of Tasmania's history.

No Data Recorded

c) The place has the potential to yield information that will contribute to an understanding of Tasmania's history.

No Data Recorded

d) The place is important in demonstrating the principal characteristics of a class of place in Tasmania's history.

Saundridge is of historic heritage significance because of its ability to demonstrate the principal characteristics of a two-storey Victorian Italianate rural homestead complete with its associated outbuildings and garden .

e) The place is important in demonstrating a high degree of creative or technical achievement.

No Data Recorded

f) The place has a strong or special association with a particular community or cultural group for social or spiritual reasons.

No Data Recorded

g) The place has a special association with the life or works of a person, or group of persons, of importance in Tasmania's history.

Saundridge is of historic heritage significance because of its association with the Archer family , specifically with original owner William Archer of Brickendon, and prominent architect, scientist, woolgrower and politician William Archer of Cheshunt, who designed the irrigation system for Saundridge and may have been involved in the design of alterations and additions to the main house.

h) The place is important in exhibiting particular aesthetic characteristics.

No Data Recorded

Heritage approval is required for work that will result in changes to the nature or appearance of the fabric of a Heritage place, both internal and external.
Please refer to the Heritage Council's Works Guidelines (www.heritage.tas.gov.au) for information about the level of approval required and appropriate outcomes.
Heritage Advisors are also available to answer questions and provide guidance on enquiries@heritage.tas.gov.au or Tel 1300850332

This data sheet is intended to provide sufficient information and justification for listing the place on the Heritage Register. Under the legislation, only one of the criteria needs to be met. The data sheet is not intended to be a comprehensive inventory of the heritage values of the place, there may be other heritage values of interest to the Heritage Council not currently acknowledged.

Setting:

Saundridge is situated beneath the Great Westen Tiers on the plains south west of Cressy . The area, which has been farmed for two centuries, is flat and treeless, such that modest outcrops like McRaes Hill, the Hummocky Hills and the hill on which the village of Poatina stands seem to have an exaggerated impact on the skyline. Rows of modern pivot irrigators cross the paddocks surrounding the site. On the opposite side of the road is a small chapel (THR #8784), built in 1862 by the Archer family and given to the local Anglican community .

Description:

This is a two-storey brick and stuccoed Victorian house with Italianate features, two paned round head double hung windows to level two, casement square head to level one, and a six panel door with sidelights and transom light. Above the door is a grouping of three windows in elaborate pilastered casing. The house has bracketed eaves and a return verandah with a terrace on the east side. There is a single storey brick addition with a bay window and decorative eaves, and a single storey brick service wing. Original interior cornices, fireplaces, doors, skirting boards and architraves contribute to the representative character of the main house. The house is complemented by a large garden.

The registration includes the main house, cattle shed and squab house near the main house. Saundridge Chapel (THR #8784), on the opposite side of Saundridge Road, does not form part of this registration.

History:

According to Rigney (2008), William Archer of Brickendon took up this property in 1842. He claims that the house was renovated according to designs by his relative William Archer of Cheshunt, who also designed a flood irrigation system for the property involving up to 85 km of channels and pipes and diverting water from Brumbys Creek (Frank L Rigney, *A Midlands Odyssey*, p.81). Archer had studied engineering in England and in the years 1847–50 developed an irrigation system for Cheshunt (Margaret Mason-Cox, *Lifeblood of a Colony*, pp.28–29), and is reported to have done some sketches for the house at Saundridge but whether these were what was subsequently built is unclear (Lennard, 1980).

Nineteenth-century commentators heaped praise on the house, its gardens and its irrigation system. In 1874, for example, the house was described as 'a substantially built and handsome edifice, embracing every improvement and convenience of modern times. The rooms are spacious and lofty, and the verandah and balcony, richly enshrouded with various climbing plants, extends round three sides of the house' (' A Tour Through the Northern Agricultural Districts', *Mercury* 1 December 1874, p.3). The gardens were also described in great detail in this account. For travelling journalist E Richall Richardson, in 1877 the Norfolk Plains were a picturesque set of country seats, the house at Saundridge being 'surrounded by garden, and shrubberies; the lanes are bordered with tall hawthorn hedges, and clear, sparkling streams meander in all directions. I should judge that Saundridge may be put down as comprising a good slice of "the cream of the country"' (E Richall Richardson, ' A Tour Through Tasmania: no.69', *Tasmanian Tribune* 5 November 1877, p.3). In 1886 the woolsheds were 'stone and brick with iron roof, and, although of ancient structure, they contrast favorably with many of our more recently built sheds for convenience, which appears to have been thoroughly studied in their construction', while 'a well-laid scheme of irrigation' had been put in force ('Longford and its Homesteads', *Daily Telegraph* 9 July 1886, p.3).

At the 1903 census James Thirkell and the four members of his family were supported by a gardener, four labourers and two maids (*Census for Tasmania*, 1903). In 1908 Saundridge was judged unsuitable for closer settlement , that is, the division of large estates into small farms, enabling the property to stay intact ('The Saundridge Estate', *North Western Advocate and the Emu Bay Times* 23 June 1908, p.3). In 1917 the property was bought by RC Field of Westfield near Westbury, who also owned the Creekton property adjoining Saundridge ('Large Property Sale', *Examiner* 20 November 1917, p.6).

Frederick Bowling purchased Saundridge in 1931 and remained there until his death in 1969 (Frank L Rigney, *A Midlands Odyssey*, pp.82–84). Saundridge had always been known for its splendid sheep. The shearing shed at Saundridge was of such a size that during 1942 World War II evacuation plans for Launceston, it was projected as the temporary home of 150 evacuees in the event of Japanese invasion (LCC3, 57/1 War General—Evacuation Committee Correspondence March-June 1942, QVMAG). Dairying was also practised on the property in the days before Rod Thirkell-Johnston took over the property in 1978 (Frank L Rigney, A *Midlands Odyssey*, p.84).

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NEOEN

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FLOOD RISK ASSESSMENT PALMERSTON BATTERY DEVELOPMENT

REPORT

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OCTOBER 2022

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FLOOD RISK ASSESSMENT PALMERSTON BATTERY DEVELOPMENT

REPORT

OCTOBER 2022

Project Flood Risk Assessment Palmerston Battery Development	**Project Number** **122037**
Client Neoen	**Client's Representative** Tom Jenkins
Project Manager **Fiona Ling**	

Revision History

Revision	Description	Distribution	Authors	Reviewed by	Verified by	Date
0	Draft Report for 1% AEP	Neoen	Ingrid Gil	Behzad Jamali	Fiona Ling	OCT 22
1	Additional AEP events added	Neoen	Ingrid Gil	Behzad Jamali	Fiona Ling	OCT 22
2						

FLOOD RISK ASSESSMENT PALMERSTON BATTERY DEVELOPMENT

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LIST OF ACRONYMS

AEP	Annual Exceedance Probability
ARI	Average Recurrence Interval
ALS	Airborne Laser Scanning
ARR	Australian Rainfall and Runoff
BOM	Bureau of Meteorology
DECC	Department of Environment and Climate Change (now OEH)
DNR	Department of Natural Resources (now OEH)
DRM	Direct Rainfall Method
DTM	Digital Terrain Model
GIS	Geographic Information System
GPS	Global Positioning System
IFD	Intensity, Frequency and Duration (Rainfall)
mAHD	meters above Australian Height Datum
OEH	Office of Environment and Heritage
PMF	Probable Maximum Flood
SRMT	Shuttle Radar Mission Topography
TUFLOW	one-dimensional (1D) and two-dimensional (2D) flood and tide simulation software (hydraulic model)
WBNM	Watershed Bounded Network Model (hydrologic model)

ADOPTED TERMINOLOGY

Australian Rainfall and Runoff (ARR, ed Ball et al, 2016) recommends terminology that is not misleading to the public and stakeholders. Therefore, the use of terms such as “recurrence interval” and “return period” are no longer recommended as they imply that a given event magnitude is only exceeded at regular intervals such as every 100 years. However, rare events may occur in clusters. For example, there are several instances of an event with a 1% chance of occurring within a short period, for example the 1949 and 1950 events at Kempsey. Historically the term Average Recurrence Interval (ARI) has been used.

ARR 2016 recommends the use of Annual Exceedance Probability (AEP). Annual Exceedance Probability (AEP) is the probability of an event being equalled or exceeded within a year. AEP may be expressed as either a percentage (%) or 1 in X. Floodplain management typically uses the percentage form of terminology. Therefore a 1% AEP event or 1 in 100 AEP has a 1% chance of being equalled or exceeded in any year.

ARI and AEP are often mistaken as being interchangeable for events equal to or more frequent than 10% AEP. The table below describes how they are subtly different.

For events more frequent than 50% AEP, expressing frequency in terms of Annual Exceedance Probability is not meaningful and misleading particularly in areas with strong seasonality.

Therefore, the term Exceedances per Year (EY) is recommended. Statistically a 0.5 EY event is not the same as a 50% AEP event, and likewise an event with a 20% AEP is not the same as a 0.2 EY event. For example, an event of 0.5 EY is an event which would, on average, occur every two years. A 2 EY event is equivalent to a design event with a 6-month Average Recurrence Interval where there is no seasonality, or an event that is likely to occur twice in one year.

The Probable Maximum Flood is the largest flood that could possibly occur on a catchment. It is related to the Probable Maximum Precipitation (PMP). The PMP has an approximate probability. Due to the conservativeness applied to other factors influencing flooding a PMP does not translate to a PMF of the same AEP. Therefore, an AEP is not assigned to the PMF.

This report has adopted the approach recommended by ARR and uses % AEP for all events rarer than the 50 % AEP and EY for all events more frequent than this.

Frequency Descriptor	EY	AEP (%)	AEP (1 in x)	ARI
Very Frequent	12			
	6	99.75	1.002	0.17
	4	98.17	1.02	0.25
	3	95.02	1.05	0.33
	2	86.47	1.16	0.5
	1	63.21	1.58	1
Frequent	0.69	50	2	1.44
	0.5	39.35	2.54	2
	0.22	20	5	4.48
	0.2	18.13	5.52	5
	0.11	10	10	9.49
Rare	0.05	5	20	19.5
	0.02	2	50	49.5
	0.01	1	100	99.5
Very Rare	0.005	0.5	200	199.5
	0.002	0.2	500	499.5
	0.001	0.1	1000	999.5
	0.0005	0.05	2000	1999.5
Extreme	0.0002	0.02	5000	4999.5
			PMP/ PMP Flood	

1. INTRODUCTION

WMAwater was engaged by Neoen to conduct a flood study to define the characteristics of flooding affecting the proposed utility scale battery site near the Palmerston substation in Poatina. The specific objectives of this study were to:

- develop hydrological and hydraulic models of the study area under existing condition,
- define the estimated 5%, 2%, 1% AEP, and 1% AEP with climate change (CC) flood characteristics,
- Map flood behaviour, including flood levels, extents, and hazard over the site, and
- provide a report.

The location of the proposed utility scale battery is shown in Diagram 1. The site area as approximately 2.5 ha and the access road cover an area of about 0.75 ha. The site is predominantly cleared agricultural land, used for cropping. There are also several small watercourses in the area around the proposed site and access road. The contributing catchment area for the small watercourses is approximately 1.5 km^2. To the southeast of the proposed battery is Woodside Rivulet which rises from the mountains to the west of the site and flows east for around 14 km to discharge into Dairy Creek.

Diagram 1: Palmerston Battery Site (yellow) and access road (green).

2. METHODOLOGY

A hydrologic-hydraulic flood model was developed to simulate the runoff generation and routing processes in the catchment using design rainfall data. These models were used to quantify flood characteristics of the catchment under existing conditions. No design information was available at the time of this study and therefore the assessment was only conducted for the existing condition. The aspects of the flood behaviour to be resolved by the modelling approach were:

- **Hydrology** – converting design rainfalls to runoff in line with the Australian Rainfall and Runoff ARR2019 guideline (Ball et al., 2019).
- **Hydraulics** – resolve the flow behaviour of runoff through the study area including flooding in the main drainage lines and overland flow through the rest of the study catchment.

A semi-distributed hydrologic model, i.e., Watershed Bounded Network Model (WBNM) (WBNM, 2012) was setup for the entire catchment to simulate the sub-catchment runoff generation and channel routing process. The preliminary modelling showed that a much larger catchment area is potentially impacting the site, therefore, the modelling was extended to include a much larger area than the one proposed in the scope.

Hydrographs for each sub-catchment were extracted from the hydrologic model and used as inflows into a Two-dimensional (2D) unsteady flow hydraulic model, i.e., TUFLOW (BMT, 2018), which characterise the flow propagation throughout the major flow paths within the catchment. The schematic of the hydrologic-hydraulic flood model is shown in Figure 1.

2.1. Data

2.1.1. Digital Elevation Model

Two LiDAR Digital Elevation Model (DEM) datasets were obtained from ELVIS, i.e., the Elevation and Depth - Foundation Spatial Data Portal (ICSM, 2021). The basic information of the datasets is summarised in Table 1. As shown in Figure 2, these DEMs cover different parts of the catchment, but do not cover the entire area. The Northern Midlands dataset was used in the hydraulic model as it had sufficient horizontal and vertical accuracy. Both datasets were used to delineate and verify sub-catchments boundaries.

Table 1: LiDAR Derived Digital Elevation Model.

Dataset	Program	Commission by	Acquisition Date	Grid Size	Accuracy
Central Highlands	Forestry Tasmania	AAM	July 2013	1 metre	0.15 m (H), 0.15 m (V)
Northern Midlands	Flood Recovery	DPIPWE	Jan-May 2019	1 metre	+/- 0.30 m (H), +/- 0.80 m (V)

2.2. Hydrology

2.2.1. Catchment Delineation

The sub-catchments within the study area were delineated based on The Conservation of Freshwater Ecosystem Values (CFEV) River Section Catchments (RSCs) (The List, 2015). This delineation was further refined manually based on the LiDAR Digital Elevation Model (DEM) contours to capture a more accurate catchment boundary. The entire catchment was delineated into 35 sub-catchments in total (Figure 1).

2.2.2. WBNM setup

A Watershed Bounded Network Model (WBNM) was developed for the entire study area (Figure 3). WBNM is a runoff routing hydrology model used to estimate rainfall runoff from a sub-catchment and route flows through downstream. In this method, the routing behaviour of the catchment is primarily assumed to be correlated with the catchment area. The WBNM model for the study catchment consists of 35 sub-catchments covering an approximate area of 32 km^2 to its outlet. After catchment delineation, each sub-catchment was characterised based on impervious fractions.

In WBNM, three different types of surfaces are defined: Rural Pervious Area (RPA), Indirectly Connected Area (ICA), and Effective Impervious Area (EIA). The proposed study area can be classified as a rural catchment, predominantly covered by RPA with a minor proportion of ICA and no EIA. Based on visual inspection of the aerial imagery, the ICA for some sub-catchments was set to be 3%. The rest of the area for each sub-catchment was set to be RPA (97%). Following catchment characterisation, the model was run for specific AEPs and different durations under existing conditions. The effective rainfall (rainfall minus infiltration and depression losses) was estimated by the recommended initial loss and continuing loss method in ARR2019 guideline. Given there were no recorded flow data available in the study area, default routing parameters were used.

2.2.3. Design Inputs

ARR 2019 guidelines (Ball et al., 2019) for design flood modelling were adopted for this study, including the use of the most recent intensity-frequency-duration (IFD) information and temporal patterns for the 1% AEP, 1% AEP CC, 2% AEP, 5% AEP events and a range of storm durations and temporal patterns. The selected design flows simulated by WBNM model were imported to TUFLOW for flood behaviour assessment.

2.2.3.1. IFD Data

Design rainfall data (Intensity Frequency Duration information) for the 1% AEP, 1% AEP CC, 2% AEP and 5% AEP was extracted for each sub-catchment from the BoM. The WBNM model implemented here readily allows for the incorporation of a spatial distribution of rainfall in the design events.

2.2.3.2. Temporal Patterns

Temporal patterns are a representation of how the rainfall fell over time. The temporal patterns of real storms can vary significantly, and catchments can respond very differently to the shape of the temporal pattern. For example, some rainfall events can have a significant portion of the rainfall occurring at the start of the storm burst (front loaded), and the catchment response will vary from that to a storm where a large portion of the rainfall occurs towards the end of the rainfall burst (back loaded). ARR 2019 provides ensembles of temporal patterns, i.e., 10 temporal patterns for each rainfall duration and across three AEP groups. The application of the AEP groups is shown in Table 2. In this study, the Rare temporal pattern AEP group was used for the 1%AEP design storms.

Table 2: Temporal Pattern Bins.

AEP Group Name	Design AEP's Applied to
Rare	2%, 1% and 0.5%
Intermediate	10% and 5%
Frequent	50% and 20%

2.2.3.3. Storm Losses

The rainfall initial and continuing losses are available from ARR Datahub and should be used when calibration data is not available. The initial and continuing loss for pervious areas was 21 mm and 4.7 mm/h, respectively. The adopted initial loss for impervious areas was 1.5 mm but the continuing loss was set to zero (no infiltration).

2.2.3.4. Storm Pre-burst

Pre-burst is the rainfall that falls before the main burst of the storm. The median pre-burst values obtained from ARR Datahub were less than the initial losses. Therefore, no pre-burs pattern was required. The pre-burst values were deducted from storm initial losses to estimate storm burst losses.

2.2.3.5. Climate Change (CC)

Climate Change Factors for the study area are shown in Table 3. ARR recommends the use of RCP4.5 and RCP8.5 (Babister et al., 2016). For this study RCP8.5 2090 was adopted for the 1% AEP CC event with an increase in rain by a ratio of 3.09. This is the most severe scenarios and represents the upper bound of climate change impact on flood level. This ratio was multiplied to the selected 1%AEP design rainfall values and then was run through WBNM hydrology model to produce climate change inflow hydrographs.

Table 3: Interin Climate Change Factors (Babister et al., 2016).

	RCP 4.5	RCP 6	RCP 8.5
2030	0.648 (3.2%)	0.687 (3.4%)	0.811 (4.0%)
2040	0.878 (4.4%)	0.827 (4.1%)	1.084 (5.4%)
2050	1.081 (5.4%)	1.013 (5.1%)	1.446 (7.3%)
2060	1.251 (6.3%)	1.229 (6.2%)	1.862 (9.5%)
2070	1.381 (7.0%)	1.460 (7.4%)	2.298 (11.9%)
2080	1.465 (7.4%)	1.691 (8.6%)	2.719 (14.2%)
2090	1.496 (7.6%)	1.906 (9.7%)	3.090 (16.3%)

2.3. DESIGN MODELLING RESULTS

The critical duration is the temporal pattern and duration that can best represent the flood behaviour for a specific design event. The hydrologic modelling was conducted for ten (10) temporal patterns of each duration from 15 minutes to 24 hours for the 1% AEP event. Two different critical durations and temporal patterns were identified for the study catchment representing design flows in the local catchments around the battery site, and the design flows in the Woodside Rivulet in the vicinity of the site. The reason for considering both these flows was due to the fact that the flood behaviour in this area is complex. Our preliminary flood modelling with the estimated flows from Regional Flood Frequency Analysis (RFFA) showed that there is interaction between flows from local catchments and Woodside Rivulet during floods of 1% AEP magnitude.

The critical duration for local catchments was identified to be 4.5 hour based on the flow predictions from WBNM at sub-catchments C3 and C19 located just upstream of the site boundary and on the site respectively. The temporal pattern (TP6624) producing the lowest flow above mean was selected as representative temporal pattern for smaller catchments (Diagram 2). The 1% AEP peak flow rates at catchments C3 and C19 were 0.7 m^3/s and 0.9 m3/s respectively.

The critical duration for the Woodside Rivulet was identified to be 9 hours at sub-catchments C26 and C27 located south the study area. The temporal pattern (TP6800) was selected as representative for larger catchments (Diagram 3). The peak flow rates for these design events at catchments C26 and C27 was approximately 30 m^3/s. Both durations and temporal patterns were then proceeded to hydraulic modelling.

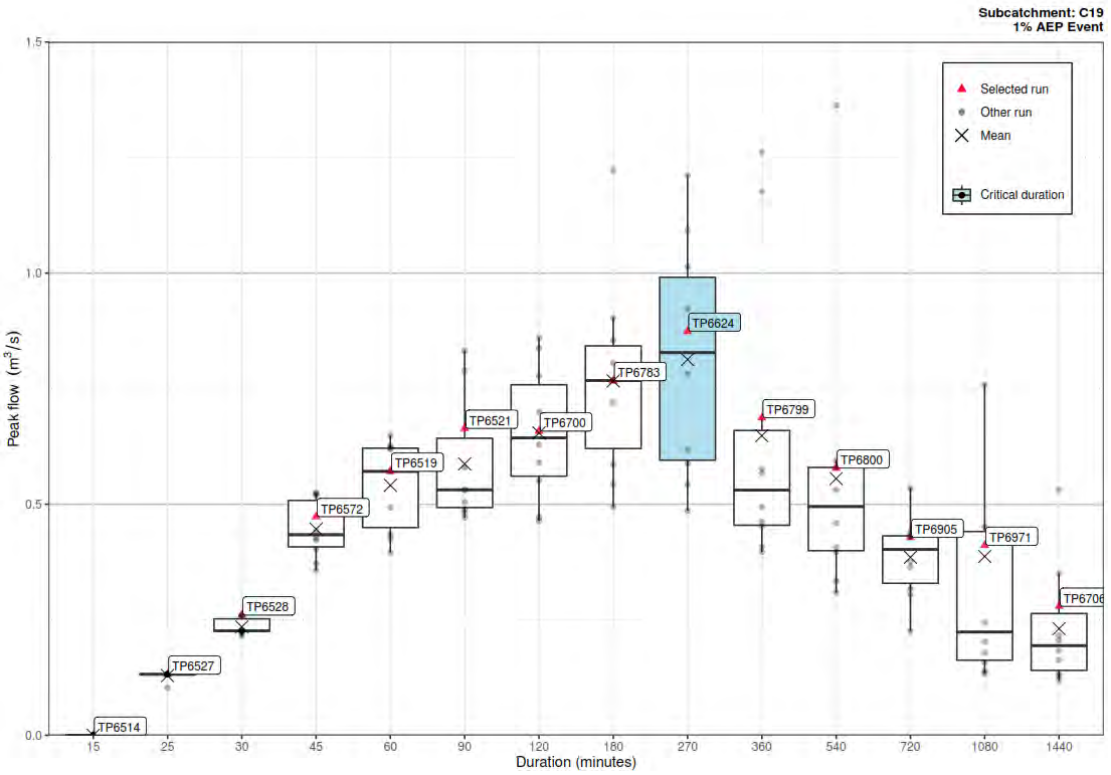

Diagram 2: Boxplot of 1%AEP hydrology model peak flows for different storm durations at C19

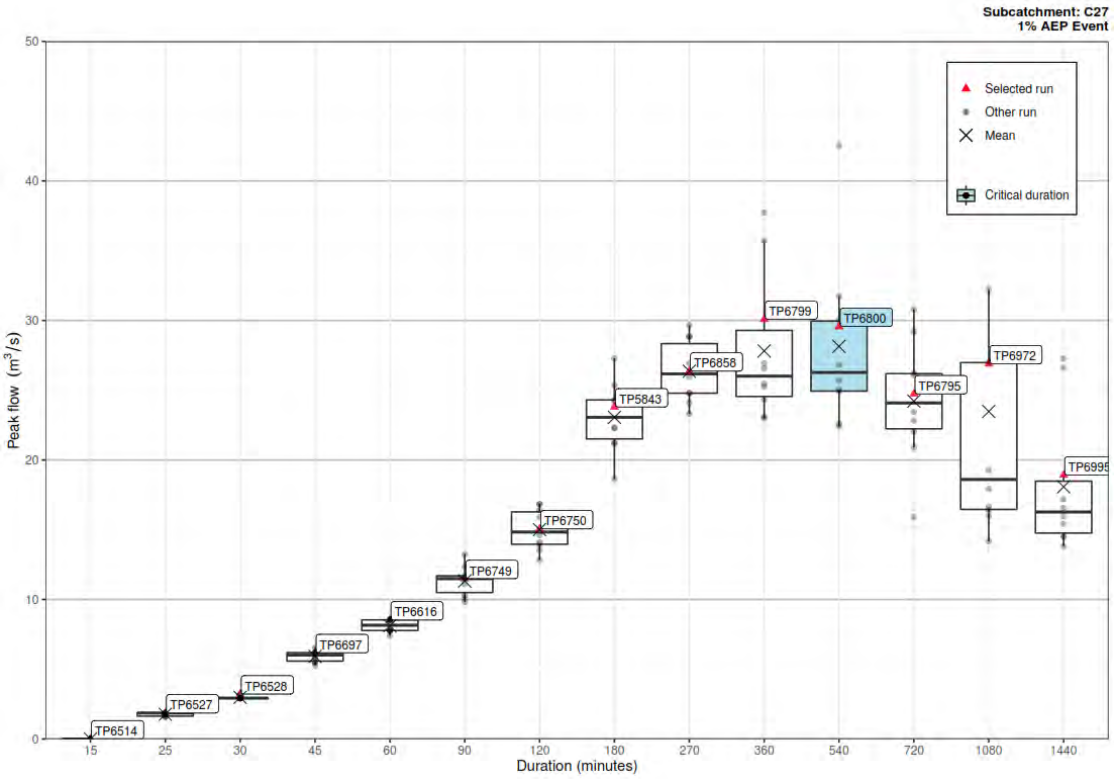

Diagram 3: Boxplot of 1%AEP hydrology model peak flows for different storm durations at C27

The same durations and temporal patterns selected for the 1% AEP event were used to run the

hydrology model for the 1% AEP CC by multiplying the rain by a ratio of 3.09.

Similarly for the 2% AEP event two durations and temporal patterns were identified. The critical duration for smaller catchments and larger catchments was 4.5 hour (TP6624) and 6 hours (TP6799) respectively. The peak flow was 0.7 m^3/s for C19 (Diagram 4) and 25 m^3/s for C27 (Diagram 5) approximately.

One temporal pattern and duration (6-hour TP6887) was found to be critical for both larger and smaller catchments in the 5% AEP design event. The peak flow in sub-catchment C27 was around 20 m^3/s (Diagram 6).

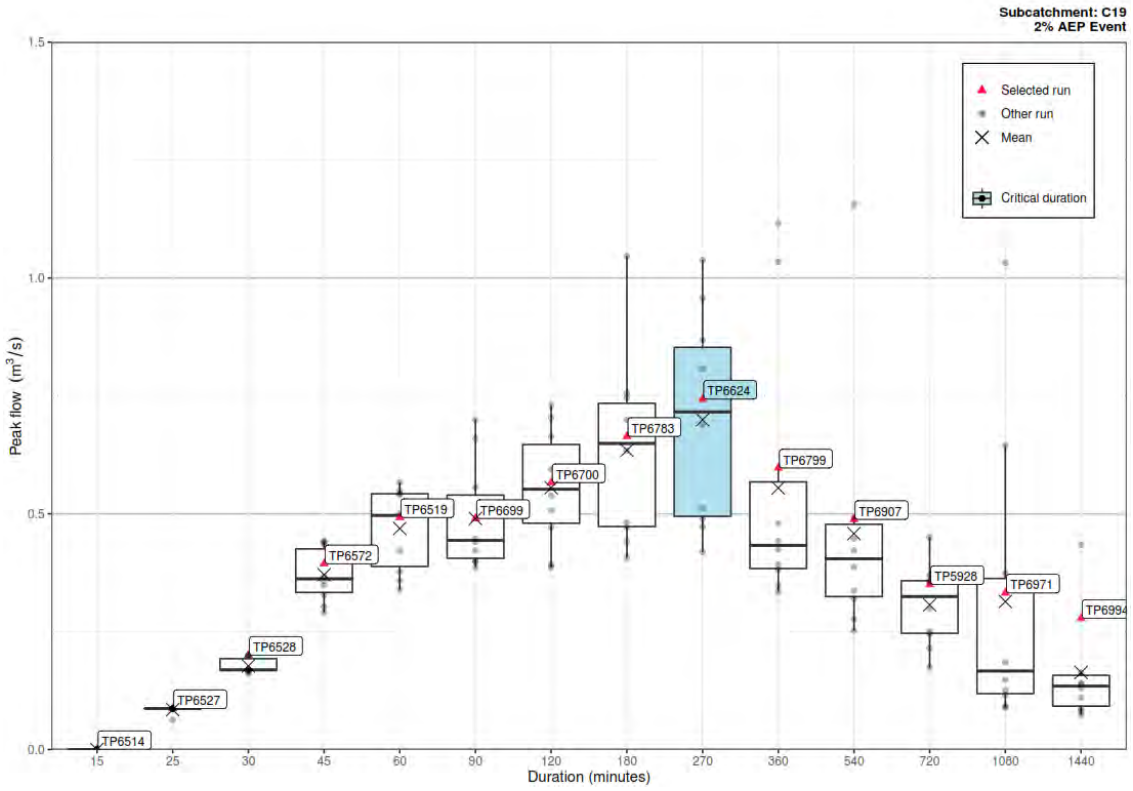

Diagram 4: Boxplot of 2%AEP hydrology model peak flows for different storm durations at C19

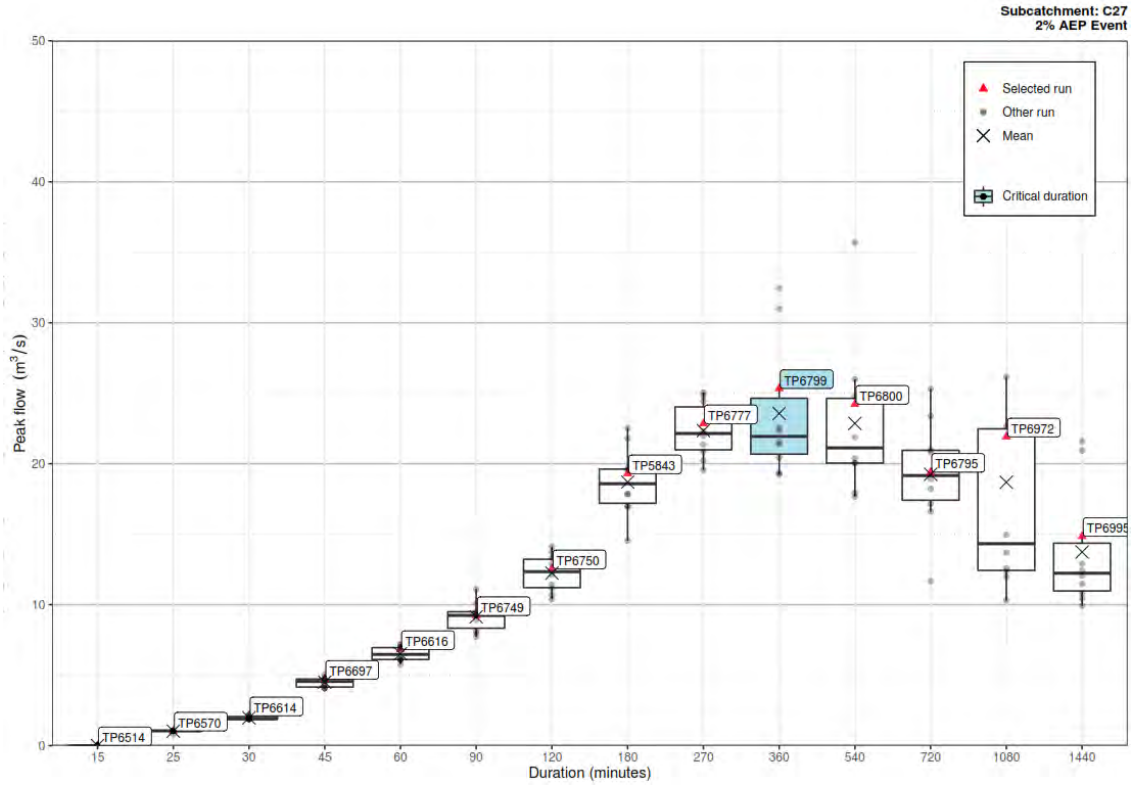

Diagram 5: Boxplot of 2%AEP hydrology model peak flows for different storm durations at C27

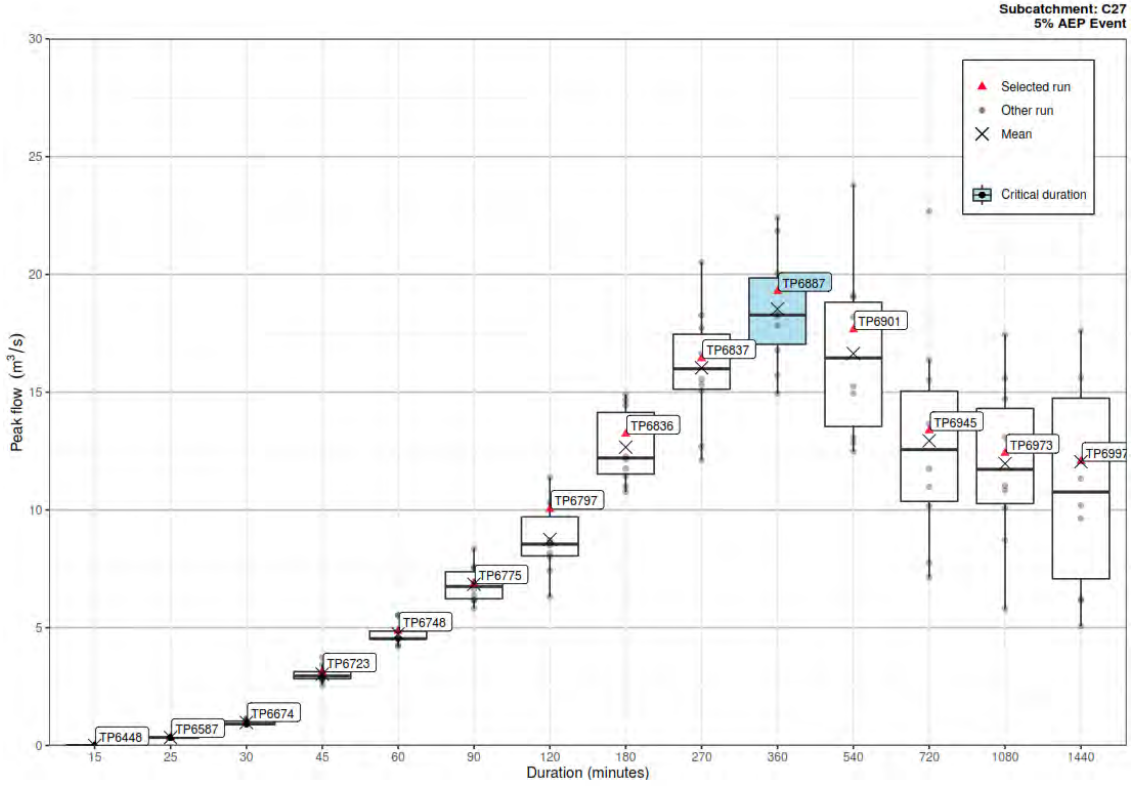

Diagram 6: Boxplot of 5%AEP hydrology model peak flows for different storm durations at C27

2.4. Hydraulic Modelling

2.4.1. TUFLOW Model Setup

A TUFLOW hydraulic model was developed for the site. This modelling package can represent flow in two dimensions (2D), including the implementation of the one dimensional (1D) hydraulic structure such as culverts. The key features and assumptions of the hydraulic model are summarised below:

- The hydraulic model extent covers the entire stream and overland flow network from the sink (discharge location) of the most upstream sub-catchment (C13) to just before the downstream of Brumbys Creek Canal as depicted in Figure 1.
- A grid size of 2 m was adopted, and the LiDAR DEM was used as base topography.
- The downstream boundary condition was placed far enough from the site boundary and near Brumbys Creek Canal. The effect of this boundary condition was not propagated to the site area.
- The hydrographs of all sub-catchments were extracted from WBNM for the selected design storms and used as inflows to the hydraulic model at the inflow locations. The Source Area (SA) polygons method was used as the inflow boundary condition.
- The surface roughness (Manning's *n*) was delineated into pasture, road, industrial/commercial, and residential buildings based on inspection of the aerial imagery as summarised in Table 4.

Table 4: Manning's *n* Coefficient.

Material ID	Land Use	Manning's *n*
1	Pasture	0.6
2	Roads	0.022
3	Industrial/Commercial	0.2
4	Residential Buildings	0.1

- There are several culverts within the modelling extent which are critical hydraulic constrains. The measurements and levels for these culverts were not available. The dimensions and levels of the culverts were therefore estimated based on inspection of the LiDAR DEM, aerial imagery, and street view. A total of 11 culverts were identified in the study area as shown in Figure 4.
- The model for existing conditions was run with the two design storms selected from hydrologic modelling including the 1% AEP 4.5 hours TP6624 and 1% AEP 9 hours TP6800 (see Section 2.3).
- The hydraulic model was also run for the 1% AEP CC, the selected temporal patterns for the 2% AEP and 5% AEP events (see Section 2.3).
- Water depth and water level maps of these runs were then enveloped by taking their maximum in each grid pixel to achieve design flood depth and levels.

3. RESULTS

3.1. Existing Flood Behaviour

3.1.1. 1% AEP Event.

The peak flood depth and level maps for the existing condition are shown from Figure 5 to Figure 10. These include the modelled design events, 1% AEP 4.5 hour (Figure 5 & Figure 8), 1% AEP 9 hours (Figure 6 & Figure 9), and their enveloped maps (Figure 7 & Figure 10). Results show that the proposed site location is generally subject to shallow overland flow of 0.1 to 0.2m during 1% AEP events. No other significant inundation was observed in the vicinity of the study area. It should be noted that the modelling does not represent the shallow overland flow for all areas that are always wetted during rainfall events. This is mainly because TUFLOW (hydraulic model) applies flow hydrographs from hydrologic model at the catchment outlets but not on the entire catchment surface. However, the model can confidently estimate main flooding behaviour, inundation, and flow paths in the area.

Table 5 shows peak flood depth and level sampled from the enveloped grids at the sample points shown in Figure 11. Water depth and level upstream the Sherrifs/Burges Pivot (point p4) are around 0.2 m and 219.0 mAHD, respectively. Those figures at Sherrifs/Burges Pivot (point 8,18 & 10) decreases to around 0.07 m. Similarly, lower water depth and level are observed around the proposed site (point p5 & p22) with around 0.06 m and 183 mAHD on average.

The flow in the Woodside Rivulet peaks at around 30 m^3/s during the 1% AEP event. As it flows northeast, the proposed site receives inflows from western catchments carrying less than 0.1 m^3/s of peak flow during the event and water depth is less than 0.1 m. Flow enters the site throughout the north boundary with 0.7 m^3/s for a 4.5 hr duration and 0.4 m^3/s for 9 hr duration during the 1% AEP event. Flow continues towards the substation and the proposed road with an average flow of 0.6 m^3/s. During the 1% AEP event, much of the proposed site is outside the inundated area. Flow downstream the proposed road is about 0.4 m^3/s for both durations and temporal patterns.

Table 5: Peak flood depth and level sampled from the enveloped grids.

	1% AEP		1% AEP CC		2% AEP		5% AEP	
Sample Point	Max Depth (m)	Max Level (mAHD)	Max Depth (m)	Max Level (mAHD)	Max Depth (m)	Max Level (mAHD)	Max Depth (m)	Max Level (mAHD)
p1	0.09	166.98	0.210	167.12	0.072	166.97	0.066	166.96
p2	0.07	169.86	0.440	170.15	0.119	169.82	0.109	169.81
p3	0.19	166.74	0.310	166.89	0.170	16..75	0.156	166.74
p4	0.23	219.86	1.040	220.45	0.519	219.93	0.486	219.9
p5	0.12	185.08	0.160	185.2	0.051	185.09	0.058	185.09
p6	0.18	174.34	0.480	174.65	0.147	174.31	0.120	174.29
p7	0.01	176.91	0.023	176.92	0.012	176.91	0.012	176.91
p8	0.00	190.94	0.040	190.98	0.002	190.94	0.002	190.94