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ATTACHMENT I

AGRICULTURAL ASSESSMENT REPORT

HOLMES DYER

Boyer Road PSP

October 2024

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DISCLAIMER

Executive Summary

The Boyer Road Precinct Structure Plan (BPSP) study area covers approximately 103 hectares and is located on the north western peri-urban outskirts Bridgewater in the Brighton Municipality of Southern Tasmania.

Six properties are included within the BPSP and they range in size from 7.61 to 31.33 hectares of land and are used for principally residential purposes, with the exception of a single title which is almost entirely covered by a conservation covenant. The southern area of BPSP study area is covered by Future Urban zoned land (approximately 58 hectares) and Landscape Conservation zoned land (approximately 45 hectares) on the northern area.

The land associated with the BPSP study area is severely constrained for agricultural land use activity due to the low/very low land capability of the ground, extensive coverage of native vegetation, absence of irrigation water and the land is divided into six separate titles which limits any potential scale and level of intensification.

The BPSP study area holds a negligible level of local and regional agricultural prominence.

Effectively five of these properties are used for residential purposes and a single property is used for environmental conservation (as per a conservation covenant).

The development of the BPSP study area is associated with the Future Urban zoned land, although no definite design plans are currently available.

The land use zoning adjacent to the BPSP study area includes:
- North: Rural, Landscape Conservation and Utilities (TasWater).
- East: Rural Living and Community Purpose (Northern Christian School.
- South: Rural, General Residential and utilities (Boyer Road).
- West: Agriculture and Landscape Conservation.

A single very small Rural zoned property to the south of the BPSP is best described as a small lifestyle block and has no formal agricultural land use activity conduct therewith, whilst to the north the rural zoned land is used for low intensity sheep grazing on heavily degraded pastures. A combination of the setbacks (north and south) and the presence of a substantial area of native vegetation to the north would be expected to mitigate any negatives associated with any future residential development on the Future Urban zoned land on the BPSP study area.

Agricultural land use activity does occur on the Agriculture zoned land adjacent to the west of the BPSP and this involves grazing livestock on a limited scale and a market garden enterprise. The opportunity to intensify and future scale of agricultural land use activity on this adjacent land is constrained by the low land capability of the land present, prevailing low rainfall climate and limited access to irrigation water.

A number of measures could be undertaken to mitigate the potential negative impacts on the agricultural land use activities undertaken on the Agriculture zoned land, and this includes establishing a shelter belt, secure fencing, weed control and dog control activities.

The proposed development of the Future Urban zoned land on the BPSP study area is consistent with the PAL policy and could be undertaken without undue and unnecessary loss and negative impacts to agricultural land.

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Purpose

Thie agricultural assessment report has been undertaken on behalf of Holmes Dyer in order to provide an assessment of the agricultural qualities and use of the land covered by the BPSP study area.

1 General overview

1.1 LAND CAPABILITY

The currently recognised reference for identifying land capability is based on the class definitions and methodology described in the Land Classification Handbook, Second Edition, C.J Grose, 1999, Department of Primary Industries, Water and Environment, Tasmania.

Most agricultural land in Tasmania has been classified by the Department of Primary Industries and Water at a scale of 1:100,000, according to its ability to withstand degradation. A scale of 1 to 7 has been developed with class 1 being the most productive for agriculture and resilient to degradation and class 7 the least suitable to agriculture. Class 1, 2 and 3 are collectively termed "prime agricultural land". For planning purposes, a scale of 1:100,000 is often unsuitable and a re-assessment is required at a scale of 1:25,000 or 1:10,000. Factors influencing capability include elevation, slope, climate, soil type, rooting depth, salinity, rockiness and susceptibility to wind, water erosion and flooding.

1.2 REPORT AUTHORS

Jason Lynch possesses a Bachelor of Applied Science (horticulture) and is a certified practising agriculturalist (CPAg) with over 25 years' experience in the agricultural industry in Tasmania. He has previously been engaged by property owners, independent planners, and surveyors to undertake evaluations and studies across various council based interim planning schemes. This work involves the assessment of land for development purposes and potential conflict.

Georgia McCarthy holds a Bachelor of Agriculture degree and a Post Graduate Certificate in Agricultural Consulting. She has seven years' experience in agribusiness and agricultural consulting in Tasmania. Georgia is qualified to undertake agricultural and development assessments as well as land capability studies.

2 Property details

2.1 LOCATION

The Boyer Road PSP (BPSP) study area is located on the north west outskirts of Bridgewater and consists of six separate property titles which cover a total area of 103.61 hectares. Table 1 and
Figure 1.

Table 1 Study area location identification details

Owners	Property ID	Title reference	Address	Hectares (approx.)	Map ID (Figure 1)
David and Loretta Olsen	7676361	44724/8	50 Boyer Road, Bridgewater TAS 7030	17.17	1
Jeanette Cooper	7676396	44724/9	170 Boyer Road, Bridgewater TAS 7030	17.74	2
Matthew Booth	1972194	44724/2	182 Boyer Road, Bridgewater TAS 7030	7.61	3
Mona Chui Yee Ho and Mung Ching Wong	2808927	152364/2	31 Cobbs Hill Road, Bridgewater 7030	31.33	4
Gavin Rolf and Karen Woodhouse	2097491	135574/1	29 Cobbs Hill Road, Bridgewater 7030	19.74	5
Nicholas Turner and Karen Sturges	2097504	135574/2	25 Cobbs Hill Road, Bridgewater 7030	10.02	6

Five of the properties involved with the BPSP study area are held as private tenure (as per 50, 170 and 182 Boyer Road, and 25 and 29 Cobbs Hill Road) and a single title (as per 31 Cobbs Hill Road) is covered by a conservation covenant (covenant ID 12588).

Adjacent properties are held as private tenure are located to the north, east and north, conservation covenant covers title adjacent to the north west, and TasWater tenure land is located adjacent to the north.[1]
Figure 2

The zoning of the properties involved with the BPSP study area includes Future Urban zoning (as per the 50, 170 and 182 Boyer Road properties) and split Future Urban and Landscape Conservation zoning (as per 25, 29 and 31 Cobbs Hill Road properties).[2] The Future Urban zoned loan covers approximately 58 hectares and Landscape Conservation covers approximately 45 hectares of the BPSP study area.
Figure 3

The land zoning on adjacent and nearby properties includes:

- North: Rural and Utilities.
- East: Rural Living and Community Purpose.
- South: Rural, General Residential and Utilities.
- West: Agriculture and Landscape Conservation.[3]

[1] The LISTmap dataset
[2] The LISTmap dataset
[3] The LISTmap dataset

The topography of the BPSP study area is characterised by the elevated high ground on the northern and eastern areas (highest point on the far northern point at 140m ASL) which leads down over gentle/moderate sloping ground (8-18º) down to gently sloping (1-8º) and undulating land that covers the southern and western areas.

The vegetation present on the properties involved with the BPSP study area includes:

- Open pastureland: as per 50, 170 and 182 Boyer Road.
- Native vegetation: as per 31 Cobbs Hill Road.
- Native and open pastureland: as per 25 and 29 Cobbs Hill Road.

It should be noted that the open pastureland present on the subject properties is typically in a heavily degraded condition with limited improved species present (e.g. perennial ryegrass, cocksfoot, Phalaris and clovers) and with various broadleaf (e.g. hoary cress, capeweed, wild mignonette and various flat weeds) and woody weeds (African boxthorn and gorse) are present.

Infrastructure present on the properties involved with the BPSP study area includes:

- 50 Boyer Road: boundary and internal paddock fencing, stockyards, various sheds and a residential dwelling (Genappe House is a heritage listed building).
- 170 Boyer Road: boundary and limited internal paddock fencing, various sheds and a residential dwelling.
- 182 Boyer Road: boundary and internal paddock fencing, stockyards and various sheds.
- 25 Cobbs Hill Road: boundary and internal paddock fencing and a residential dwelling.
- 29 Cobbs Hill Road: boundary fencing, various sheds, boundary and limited internal paddock fencing and a residential dwelling.
- 31 Cobbs Hill Road: boundary fencing.

Appendix 1 has a series of images which documents the BPSP study area.

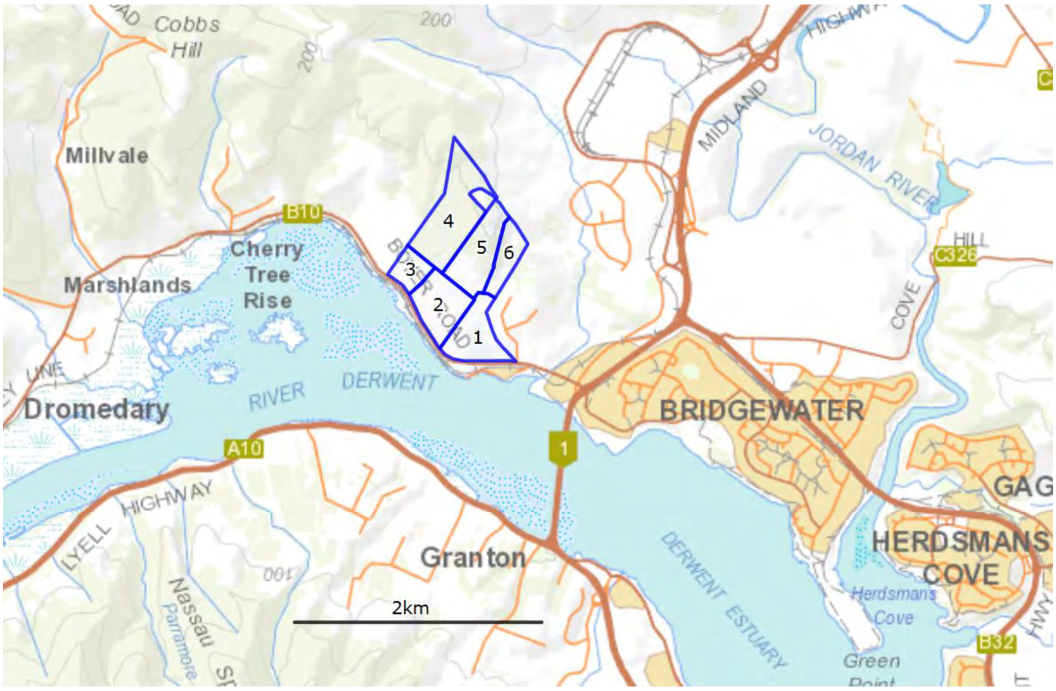

Figure 1 Location map of the BPSP study area. (source the LISTmap)

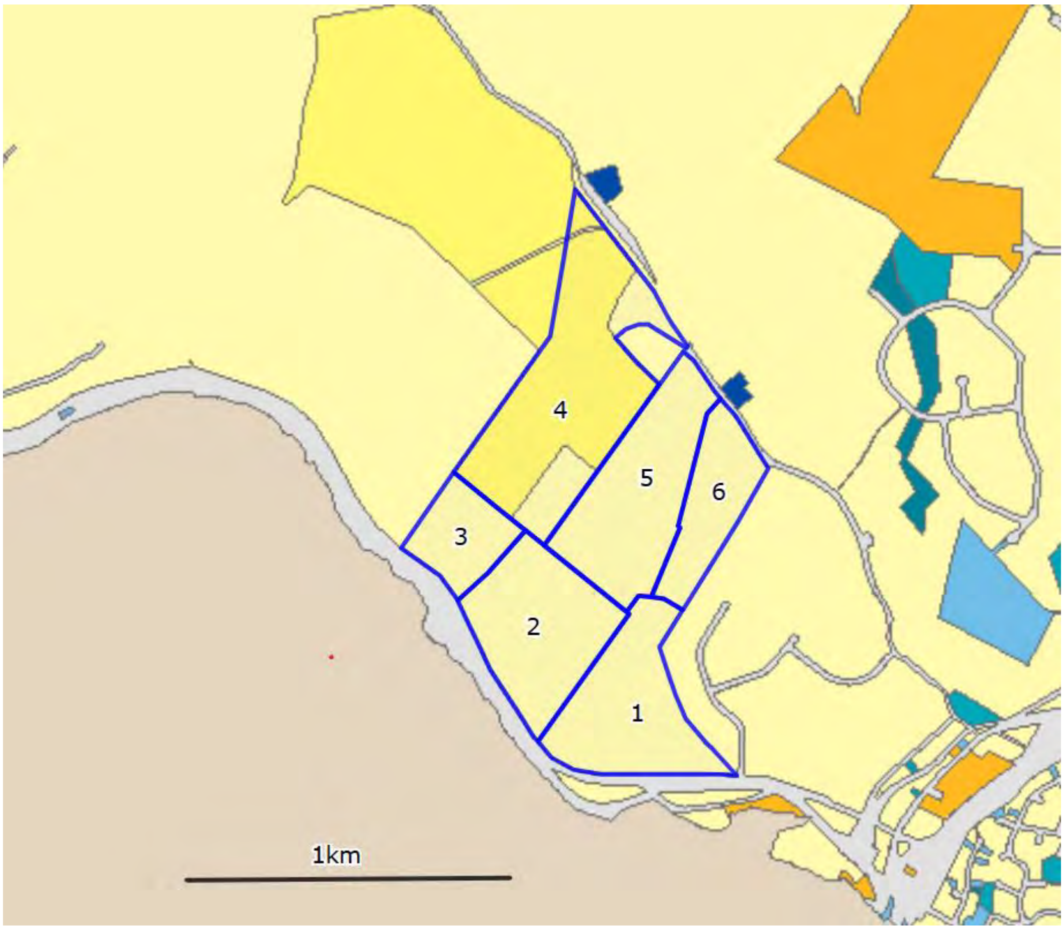

Figure 2 The majority of the BPSP study area is held as private freehold land (yellow shaded) as is the land to the north, east and south, conservation covenant (gold shaded) covers the north, TasWater land (dark blue shaded) is adjacent to the north, and further to the east is land covered by Public Reserve (orange shaded), Authority Freehold (light blue shaded) and Local Government (magenta shaded). (source the LISTmap)

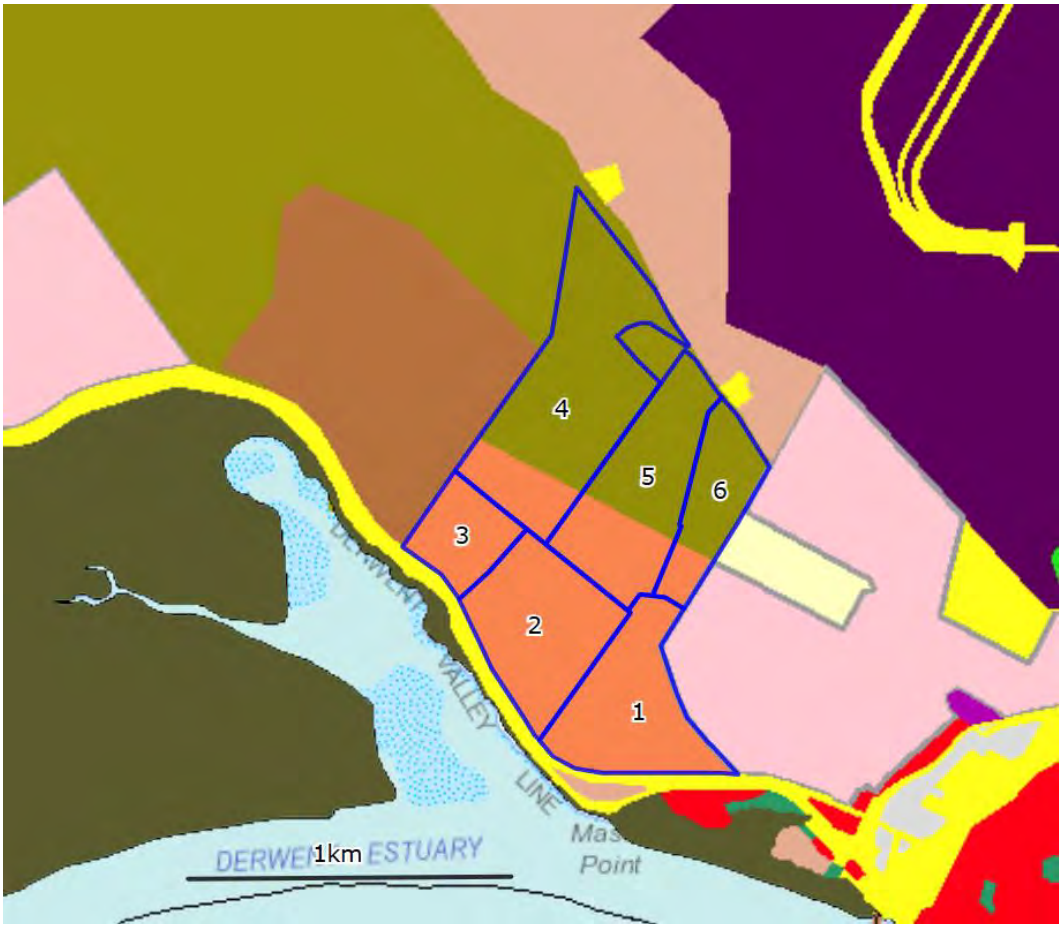

Figure 3 The southern area of the BPSP is covered by Future Urban (orange shaded) zoning and the balance with Landscape Conservation (olive shaded) which extends to the north west, with adjacent land to the west as Agriculture (dark brown shaded) zoned land, adjacent to the north is Rural (light brown shaded) and Utilities (yellow shaded) zoned land, adjacent to the south is Rural (light brown shaded), General Residential (red shaded) and Open Space (light green shaded), and to the east is Rural Living (pink shaded), General Industrial (purple shaded) and Utilities, with Environmental Management (dark green shaded) zoned land to the south and further to the west. (source the LISTmap)

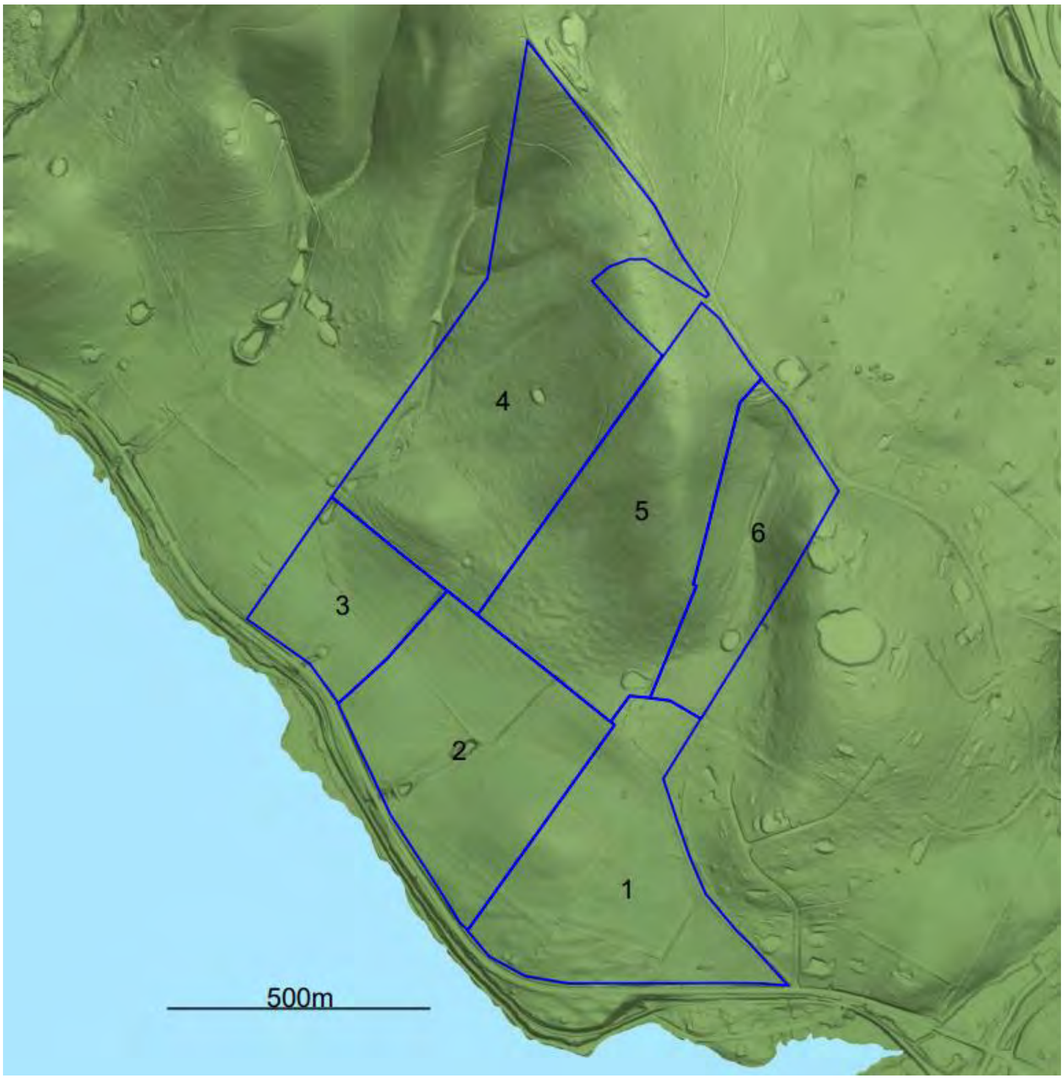

Figure 4 Topography of the BPSP study area. (source the LISTmap)

3 Land capability

Land capability of the study area was assessed according to the Tasmanian land capability classification system (Grose, 1999). Land is graded according to its ability to sustain a range of agricultural activities considering the chances of degradation of the land resource. Class 1 land is prime agricultural and class 7 land is unsuitable for agriculture due to severe limitations. A wide range of limitations are considered, and the most significant limitation determines the final classification. For example, limitations can be in relation to soils and could include stoniness, topsoil depth, drainage and erosion hazard. Limitations to topography could include slope angle and associated erosion hazard.

3.1 SITE VISIT

Desktop research was conducted to review available data associated with geology, topography, presence of threatened native vegetation, land capability, soil information and climatic data of the study area and surrounding area. Pinion Advisory consultants Jason Lynch and Georgia McCarthy conducted a site visits on the 16th and 23rd of October 2024 to ground-truth the available dataset information. The site assessment included inspection of the soil profile (to spade depth), an evaluation of the topography and vegetation as well as examination of land use on the study area and neighbouring properties.

3.1.1 Land capability assessment

The original land capability assessment of the area was modelled undertaken by DPIWE at a scale of 1:100,000 and reported in their Derwent Report[4] [5] in 2000. The properties involved with the BPSP was classified as class 4, 5 and 6 land to be present.

A more detailed recent assessment in October 2024 by the report authors identified class 4, 4+5, 5 and 6+7 land to be present. Figure 5

The soil present in the BPSP study area were identified and compared to the available datasets and were typically lighter textured sandy loam soils. [6] [7]

[4] Musk R. A. and DeRose R. C. (2000) Land Capability Survey of Tasmania. Derwent Report. Department of Primary Industries, Water and Environment, Tasmania
[5] Musk R. A. and DeRose R. C. (2000) Land Capability Survey of Tasmania, Derwent, 1:100 000 map. Department of Primary Industries, Water and Environment, Tasmania.
[6] Spanswick S. & D. Kidd, (2000) Revised Brighton Reconnaissance Soil Map of Tasmania. Brighton Report. Department of Primary Industry Water & Environment.
[7] Spanswick S. & D. Kidd, (2000) Revised Brighton Reconnaissance Soil Map of Tasmania. 1:100,000 Brighton Soil Reconnaissance Map. Department of Primary Industry Water & Environment.

Table 2 Land capability class definitions.[8]

Class	Definition
4	Land well suited to grazing but which is limited to occasional cropping or to a very restricted range of crops. The length of cropping phase and/or range of crops are constrained by severe limitations of erosion, wetness, soils or climate. Major conservation treatments and/or careful management is required to minimise degradation. Cropping rotations should be restricted to one to two years out of ten in a rotation with pasture or equivalent to avoid damage to the soil resource. In some areas longer cropping phases may be possible but the versatility of the land is very limited.
4+5	At least 60% land suitable to cropping and grazing with minimal limitations to use, up to 40% land suited to grazing with moderate limitations to use.
5	Land with slight to moderate limitations to pastoral use. This land is unsuitable for cropping, although some areas on easier slopes may be cultivated for pasture establishment or renewal. The effects of limitations on the grazing potential may be reduced by applying appropriate soil conservation measures and land management practices.
6	Land marginally suitable for grazing because of severe limitations. This land has low productivity, high risk of erosion, low natural fertility or other limitations that severely restrict agricultural use.
6+7	At least 60% land suitable to grazing with severe limitations to use, up to 40% land unsuited for agricultural use.
7	Land with very severe to extreme limitations which make it unsuitable for agricultural use.

The key land capability limitations associated with the property are:

- Erosion (e) associated with the risk rill and sheet erosion caused by surface water movement and wind scouring on bare and exposed soil and potential for degraded soil structural due to pugging from livestock movement on waterlogged soils and/or inappropriate and excessive ground cultivation activities.
- Soils (s) associated with challenging growing conditions for pasture and/or crops due to limitations such as soil depth, texture contrast, shallower depth and the presence of rock and stone.

[8] Grose C.J. (1999) Land Capability Handbook: Guidelines for the Classification of Agricultural Land in Tasmania. 2nd Edition, DPIWE, Tasmania.

Figure 5 Land capability of the BPSP study area.

Table 3 BPSP land capability characteristics

Land capability class	Land characteristics							
	Geology and soils	Slope %	Topography and elevation	Erosion type and severity	Soil qualities	Agricultural versatility	Main land management requirements	Climatic limitations
4se (approx. 37.8 ha)	A complex of dermosol, vertosol and podosol soil types formed from Quaternary alluvium. Red brown clay loam soils (dermosol soil type), grey sandy loam soils (podosol soil type), and red brown sandy soils (vertosol soil type).	2-8%	Gently sloping and undulating ground. 10-20m ASL	Low/moderate risk. Rill and sheet erosion due to surface water movement and wind scouring on bare and exposed soils and structure decline due to excessive and inappropriate soil cultivation.	Moderate to well drained. Variable top soil depth (20-40+cm). Moderate soil moisture and nutrient holding capacity. Occasional stone and rock fragment present in the soil profile.	This is technically suitable for cropping, however in practice due to the complete lack of irrigation water and small area of land it would not be cropped. This land is suitable for grazing with moderate limitations associated with the low rainfall environment, and any scale of grazing enterprise is severely limited.	Moderate/high. Avoid situations that lead to the exposure of bare soil, therefore maintain sufficient ground cover. The risk of soil compaction in winter from soil cultivation, machinery and stock movement increases significantly during periods of soil water logging albeit infrequently as this occurs.	Moderate to high. This land experiences cool winters and warm summer conditions. Receives on average approximately 518mm annual rainfall, has up to 10 annual frost events, has 1,160 GDD (Oct to April) and 780 chill hours (May to August).

Land capability class	Land characteristics							
	Geology and soils	Slope %	Topography and elevation	Erosion type and severity	Soil qualities	Agricultural versatility	Main land management requirements	Climatic limitations
4se.1 (approx. 2.3 ha)	Dermosol soil type, as per the Belmont soil profile class derived from Jurassic dolerite geology Black/brown to black clay soils.	5-15%	Gently sloping and undulating ground. 90-100m ASL	Moderate/high risk. Rill and sheet erosion due to surface water movement on bare and exposed soils and structure decline due to excessive and inappropriate soil cultivation.	Well to rapidly drained. Shallow top soil depth (20-40cm). Low soil moisture holding and moderate nutrient holding capacity. Occasional stone and rock fragment present in the soil profile.	This is technically suitable for cropping, however in practice due to the complete lack of irrigation water and small area of land it would not be cropped. This land is suitable for grazing with moderate limitations associated with the low rainfall environment, and any scale of grazing enterprise is severely limited.	Moderate/high. Avoid situations that lead to the exposure of bare soil, therefore maintain sufficient ground cover. The risk of soil compaction in winter from soil cultivation, machinery and stock movement increases significantly during periods of soil water logging albeit infrequently as this occurs.	Moderate to high. This land experiences cool winters and warm summer conditions. Receives on average approximately 518mm annual rainfall, has up to 10 annual frost events, has 1,160 GDD (Oct to April) and 780 chill hours (May to August).

Land capability class	Land characteristics							
	Geology and soils	Slope %	Topography and elevation	Erosion type and severity	Soil qualities	Agricultural versatility	Main land management requirements	Climatic limitations
4+5se (approx. 6.9 ha)	Dermosol soil type, as per the Belmont soil profile class derived from Jurassic dolerite geology. Black/brown to black clay soils and clay loam soils.	3-8	Gently to moderate sloping and undulating ground and forms a natural gully line. 30-60m ASL	Low to moderate risk. Rill and sheet erosion due to surface water movement on bare and exposed soils and structure decline due to excessive and inappropriate soil cultivation. During periods of high flow in the waterway which bisects this land it is possible stream bank erosion could occur.	Poor to imperfectly drained. Top soil depth of 30-40cm. Moderate/high soil moisture holding and moderate nutrient holding capacity. Stone and rock fragments present on the soil surface and throughout the in the soil profile.	This is unsuitable for cropping. This land is suitable for grazing with moderate/severe limitations associated with the low rainfall environment, and any scale of grazing enterprise is severely limited.	Moderate to high. Avoid situations that lead to the exposure of bare soil, therefore maintain sufficient ground cover. The risk of soil compaction in winter from soil cultivation, machinery and stock movement increases significantly during periods of soil water logging albeit infrequently as this occurs.	This land experiences cool winters and warm summer conditions. Receives on average approximately 518mm annual rainfall, has up to 10 annual frost events, has 1,150 GDD (Oct to April) and 800 chill hours (May to August).

Land capability class	Land characteristics							
	Geology and soils	Slope %	Topography and elevation	Erosion type and severity	Soil qualities	Agricultural versatility	Main land management requirements	Climatic limitations
5se (approx. 10.3)	Texture contrast soils, as per the kurosol soil type and consistent with the Forcette soil profile class, derived from siltstone geology. Shallow brown and grey/brown sandy loam soil over a mottled orange subsoil.	3-8	Gently sloping and undulating ground and forms the extreme foot slopes of the south west flanks of the Genappe Spur. 25-45m ASL.	Moderate/high risk. Rill and sheet erosion due to surface water movement on bare and exposed soils and structure decline due to excessive and inappropriate soil cultivation.	Poor to imperfectly drained. Shallow top soil depth (5-20cm). Low soil moisture and nutrient holding capacity. Frequent presence of stone and rock fragments in the soil profile.	Unsuitable for cropping. Suitable for grazing purposes with very severe restrictions.	Moderate/high. Avoid situations that lead to the exposure of bare soil, therefore maintain sufficient ground cover. Fence off and control access to livestock.	Moderate to high. This land experiences cool winters and warm summer conditions. Receives on average approximately 518mm annual rainfall, has up to 10 annual frost events, has 1,140 GDD (Oct to April) and 825 chill hours (May to August).

Land capability class	Land characteristics							
	Geology and soils	Slope %	Topography and elevation	Erosion type and severity	Soil qualities	Agricultural versatility	Main land management requirements	Climatic limitations
5se.1 (approx. 2 ha)	Dermosol soil type, as per the Belmont soil profile class derived from Jurassic dolerite geology Black/brown to black clay soils.	8-18	Moderate sloping ground. 40-80m ASL	Low to moderate risk. Rill and sheet erosion due to surface water movement on bare and exposed soils and structure decline due to excessive and inappropriate soil cultivation. Some areas of land are subject to mass movement, as per mostly low risk although some medium risk areas are present.	Poor to imperfectly drained. Top soil depth of 30-40cm. Moderate/high soil moisture holding and moderate nutrient holding capacity Stone and rock fragments present on the soil surface and throughout the in the soil profile.	Unsuitable for cropping. This land is suitable for grazing with moderate/severe limitations associated with the low rainfall environment, and any scale of grazing enterprise is severely limited. This land is covered by native vegetation and it would be inappropriate to clear and convert this land due to relative very low level of potential agricultural land use activity. This land should be left as native vegetation and not cleared and/or converted to agricultural use.	Moderate to high. Avoid situations that lead to the exposure of bare soil, therefore maintain sufficient ground cover. Maintain the current native vegetation cover on this land and do not clear this land. Fence off and control access to livestock.	This land experiences cool winters and warm summer conditions. Receives on average approximately 518mm annual rainfall, has up to 10 annual frost events, has 1,150 GDD (Oct to April) and 800 chill hours (May to August).

Land capability class	Land characteristics							
	Geology and soils	Slope %	Topography and elevation	Erosion type and severity	Soil qualities	Agricultural versatility	Main land management requirements	Climatic limitations
6+7se (approx. 44.3 ha)	Texture contrast soils, as per the kurosol soil type and consistent with the Forcette soil profile class, derived from siltstone geology. Very shallow grey/brown sandy loam soil over a mottled orange subsoil.	8-18	Gently to moderate sloping and rolling ground and forms the foot slopes of the south west flanks of the Genappe Spur. 25-145m ASL.	Low to moderate risk. Rill and sheet erosion due to surface water movement on bare and exposed soils and structure decline due to excessive and inappropriate soil cultivation. Some areas of land are subject to mass movement, as per mostly low risk although some medium risk areas are present.	Poor to imperfectly drained. Shallow top soil depth (5-20cm). Low soil moisture and nutrient holding capacity. Frequent presence of stone and rock fragments in the soil profile.	Unsuitable for cropping. Suitable for grazing purposes with very severe restrictions. In reality this land is covered by native vegetation and it would be inappropriate to clear and convert this land due to relative very low level of potential agricultural land use activity. This land should be left as native vegetation and not cleared and/or converted to agricultural use.	High. Avoid situations that lead to the exposure of bare soil, therefore maintain sufficient ground cover. Maintain the current native vegetation cover on this land and do not clear this land. Fence off and control access to livestock.	Moderate to high. This land experiences cool winters and warm summer conditions. Receives on average approximately 518mm annual rainfall, has up to 10 annual frost events, has 1,140 GDD (Oct to April) and 825 chill hours (May to August).

4 Water resources

4.1 CURRENT WATER RESOURSES

It appears that all of the residential dwellings present on the properties located in the BPSP study area are serviced by TasWater for the provision of drinking water.[9]

The study area is not located within a declared irrigation district and not serviced by an irrigation scheme.

No irrigation dams are present within the BPSP study area.

Six small stockwater holes are present that are located in-stream on the 2 minor waterways that flow through the northern and southern areas of the BPSP study area.

Two waterways are present in the study area:

- Northern waterway (identified as stream 1 on Figure 6)
    - An unnamed tributary of the Derwent River
    - Feeds two small in-stream stockwater dams, none of which have an irrigation water allocation allocated and none of these dams have a dam ID allocated.
- Southern waterway (identified as stream 2 on Figure 6)
    - An unnamed tributary of the Derwent River
    - Feeds four small in-stream stockwater dams, none of which have an irrigation water allocation allocated and none of these dams have a dam ID allocated.

None of the properties involved in the BPSP study area have an irrigation water allocation license to extract water from the either of the two waterways which are present.

A single groundwater bore, ID 17404, has been identified within the BPSP study area, as per on the central north western boundary of the 182 Boyer Road property. This bore was installed in 1998 and appears to have been abandoned soon after installation and not used to extract groundwater.[10]

It is reasonable to consider that the properties involved with the BPSP study area that any and all agricultural land use activity regardless of intensity and scale is severely limited due to a combination of the low rainfall climate in conjunction with the complete lack of access to irrigation water.

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[9] Pers comms property owners interviewed as part of the site land holder property visits.
[10] The Listmap datasets.

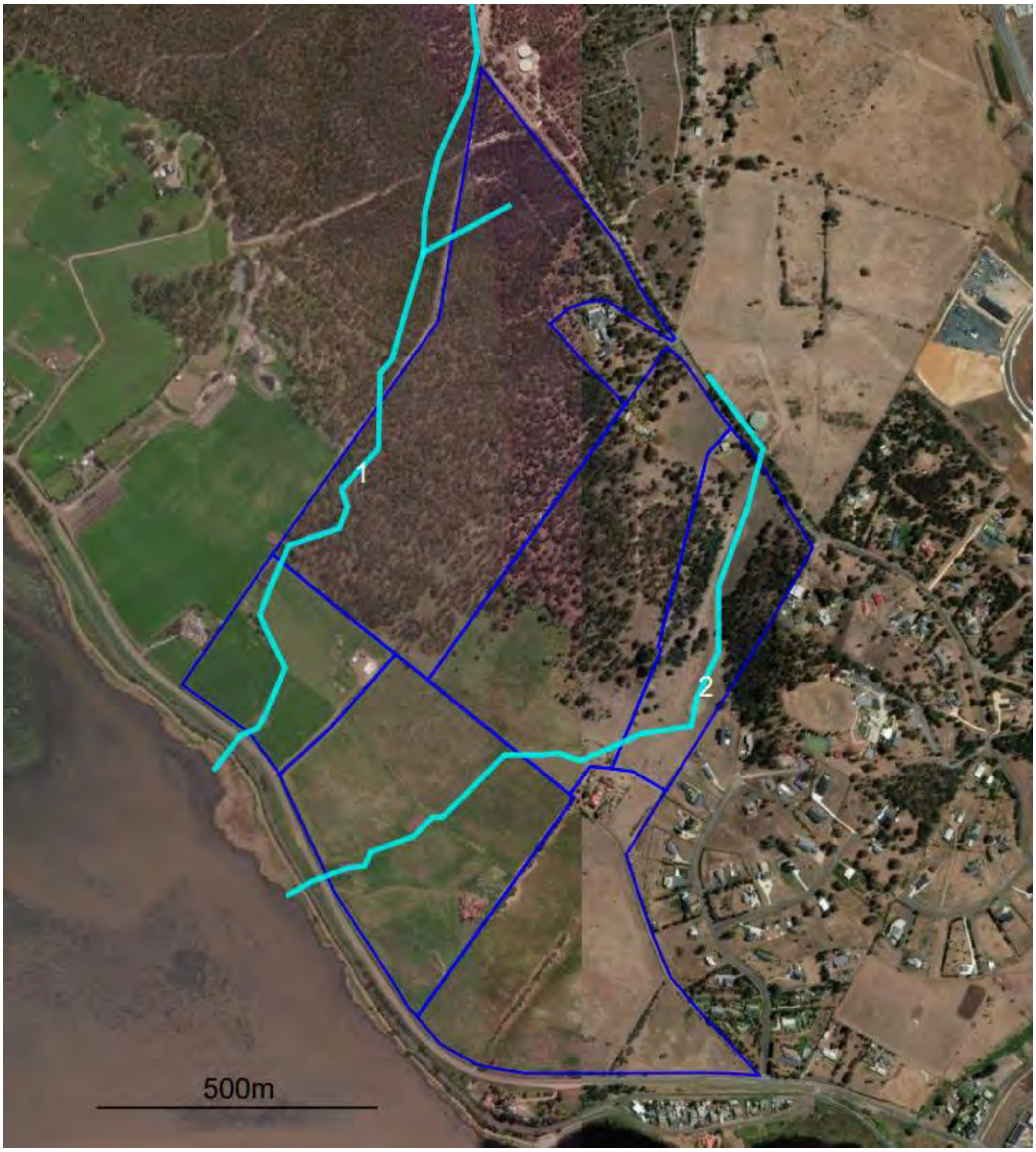

Figure 6 Waterways present on the BPSP study area. (source the LISTmap)

4.2 FUTURE WATER RESOURCES

An assessment of the potential to extract irrigation water from either of the waterways present in the study area are outlined in Table 4. The amount of available irrigation water is very low, and effectively incapable to supporting anything more than a small scale irrigated land use activity. If all the available total irrigation water present in the waterway 1 and 2 was combined used it would allow for the production:

- 0.7 hectares of fully irrigated pasture (typical annual use of 5 ML/ha).
- 1.9 hectares of vineyard (typical annual use of 2 ML/ha).

Table 4 Potentially allocated irrigation water from the waterways present[11]

Waterway ID (Figure 6)	Reliability	Availability limit (ML)	Currently allocated (ML)	Potentially available (ML)
1	High Availability	1.16	0	1.16
	Mid Availability	0.32	0	0.32
2	High Availability	1.82	0	1.82
	Mid Availability	0.51	0	0.51

No other waterways are present in the locale and adjacent or nearby properties which would be considered to have anything more than nominal amounts of available irrigation water.

Based on available datasets[12] [13] the groundwater in this district typically has low yields (<2 L/s) is considered suitable for domestic, garden, livestock and small area irrigation. This area of south east Tasmania is not recognised as having a significant groundwater resource. The geology underlying the BPSP consists of:

- Fractured Jurassic dolerite which typically has a successful bore yield (>0.03 L/s) of 81.8% and average yield 1.24 L/s.
- Porous Quaternary alluvium which typically has a successful bore yield (>0.03 L/s) of 61.8% and average yield 0.77 L/s. Consistent with property titles
- Fractured Permian mudstone which typically has a successful bore yield (>0.03 L/s) of 79.6% and average yield 1.24 L/s.

The yield of bores, regardless of the geology's aquifer is often of lower quality and contains excessive amounts of salt (>1,500 TDS) and limits its use to stockwater. It is reasonable to consider that the opportunity to extract groundwater on and/or in the near vicinity of the BPSP is very limited.

Currently at this time Pinion Advisory is not aware of plans by Irrigation Tasmania to service the BPSP nor adjacent or nearby land with an irrigation scheme. The nearest irrigation scheme is 10 km to the east, as per the South East Irrigation Stage 3 (SEIS3) and this services the middle and lower Coal Valley and Sorell.

Theoretically potable water, supplied by TasWater, could be used a source of irrigation water, however it does come with significant management constraints including:

- Cost[14]:
    - o Current (2024/25) TasWater fixed annual connection charge varies with the diameter of the inlet pipe, such as a 50mm connection costs $2,459 whilst a 100mm connection costs $9,838.

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[11] Department of Natural Resources and Environment, Water Access Tool, accessed 29/9/24.

[12] Matthews W, Latinovic M. (2006) South East Tasmanian Groundwater Map. Department of Infrastructure and Energy.

[13] Department of Natural Resources and Environment, Groundwater Information Access Portal.

[14] TasWater Price and Service Plan 4. 1 July 2022-30 June 2026. CM record number 22/40133.

  - TasWater delivery costs would be anticipated to cost approximately $1,200/ML which is over four times greater than the most expensive irrigation water delivery charges charged TasWater in the SEIS.
- Surety:
  - TasWater is not obliged to give priority access to an irrigation water users. An example would be during periods when water restrictions apply (e.g. summer) and the supply of water to irrigation users could be restricted.
- Flow rate and delivery[15]:
  - The minimum water delivery pressure is 220 kPa and the flow rate is determined by the size of the outlet.
  - If a smaller outlet is available, then it may be necessary to require a buffer dam to ensure sufficient irrigation water delivery. The exact size of any buffer dam would be calculated based on the required irrigation schedule flow rate, irrigation season length and size of the TasWater outlet.

The opportunity to develop new water resources within the BPSP study area and on adjacent and nearby properties is severely limited and realistically not possible.

It would be reasonable to consider that the majority of agricultural land use activity will be dominated by dryland production systems.

[15] TasWater Price and Service Plan 4. 1 July 2022-30 June 2026. CM record number 22/40133

5 Land use

The properties involved with the BPSP study area are principally used for residential purposes and have either no or severely limited agricultural land use activity.

Table 5 Property land use activity.

Property Address	Land use activity
50 Boyer Road	Residential use and low intensity and small-scale dryland livestock grazing. No commercial agricultural land use activity.
170 Boyer Road	Lifestyle use and enjoyment of the rural bucolic amenity of the location. No commercial agricultural land use activity.
182 Boyer Road	Residential use and low intensity and small-scale dryland livestock grazing. No commercial agricultural land use activity.
25 Cobbs Hill	Residential use and grazing by horses. No commercial agricultural land use activity.
29 Cobbs Hill	Residential use and retained native vegetation. No commercial agricultural land use activity.
31 Cobbs Hill	Retained for native vegetation use, as per a conservation covenant. No commercial agricultural land use activity.

5.1 AGRICULTURAL AND PRIMARY INDUSTRIES CONDUCTED

Each of the properties and associated land owners involved in the BPSP study area were visited and interviewed (in person or via an email questionnaire) to obtain information on the past and current agricultural land use activity and management practices which has and is conducted on the subject properties.

In summary none of the properties are involved in any commercial scale agricultural land activity, and all properties are effectively used for residential purposes with the exception of the title located on the far north which is almost entirely covered by a conservation covenant.

Attached in Appendix 1, Table 7 and Table 8 are responses by the land owners in relation the past and current agricultural land use activity and management practices which has and is conducted on the subject properties.

5.1.1 Potential pastoral use

The land associated with the BPSP has the potential to be used for pastoral use, albeit restricted due to a combination of the prevailing land capability of the ground and low rainfall environment (annual rainfall of 518mm[16]). In total 51 hectares of open

[16] Bureau of Meteorology, Bridgewater Treatment plant BoM station# 94005.

pastureland are present on the BPSP, and this would support a modelled potential sustainable total carrying capacity of approximately 470 DSE/ha[17].

470 DSE would equate to equate to a sheep enterprise consisting of 105 mature breeding ewes, finishing 125 prime lambs and running 15 replacement ewe lambs, and this would generate a possible annual gross margin return of approximately $6,500.

At an operational level the exact numbers of sheep run on the property will vary, such as the number of replacement ewes required, sucker lambs sold directly at weaning and the associated number of prime lambs finished.

It would be reasonable to consider that supplementary feeding of livestock run on the property would be required when pasture growth is limiting, such as during winter and to a lesser extent during summer.

Based on the current condition of the pastures present on the properties involved in the BPSP the carrying capacity would be closer to approximately 170 DSE.

A 470 DSE sheep based grazing enterprise as could be undertaken on a combined land holdings nor that of individual properties within the BPSP would not constitute and/or be recognised as a commercial scale grazing operation.

The approximately 51 hectares of open pasture land are present across five properties and it would not be realistic to achieve the modelled carrying capacity due to limitations associated with a loss of production efficiencies due to the dilution of the operational and management capacities.

5.1.2 Potential cropping use

The class 4 land present on the properties associated with the BPSP covers a total combined area of approximately 40.1 hectares (as per the class 4 land) has the theoretical potential to be cropped.

Due to the complete current and future lack of access to irrigation water the range of crops which could be grown is severely restricted and effectively limited to low rainfall dryland cereal production such as wheat or barley.

It should be noted that class 4 land would only be suitable for cropping potentially on an average cropping rotation of 2 times in 10 years, and this equates to a sustainable annual cropping area of 8 ha/yr.

Due to the low rainfall dryland climate, small amount of cropping land available and ability to grow only cereal crops it would be realistic to considered cropping to be viable agricultural land use activity of the land associated with the BPSP.

The approximately 40.1 hectares of cropping land are present across four properties and it would not be realistic to undertake cropping activities due to limitations associated with a loss of production efficiencies due to the dilution of the operational and management capacities.

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[17] A dry sheep equivalent (DSE) is a standard unit used to compare the feed requirements of different classes of livestock to assess the carrying capacity of a farm or paddock. One DSE is defined as the amount of feed required by a two-year-old 50 kg 'dry' Merino sheep (wether or non-lactating, non-pregnant ewe) to maintain its weight.

5.1.3 Potential perennial horticultural use

Due to a combination of the prevailing low rainfall dryland environment and complete current and future lack of access to irrigation water the potential to grow perennial horticultural crops, such as wine grapes, olives or cherries is severely diminished and in reality, would not be possible.

6 Adjacent land use activity

Land use on the properties adjacent to and nearby the BPSP includes residential use, a school, utilities (road, railway and TasWater), lifestyle use and small scale agriculture.

The likely most sensitive boundary would be adjacent to the north west of the BPSP (as per the 182 Boyer Road property) on the 232 Boyer Road property is used for small scale agricultural land use activity.

All other property boundaries have uses which are similar and/or compatible with the potential residential purposes intended for the BPSP or are separated by the extensive native vegetation which would be retained on the north eastern area of the BPSP.

Land use activity on adjacent land includes:

- North east
  - Title 127385/1 of the 158 Cobbs Road property title (approximately 22.5 hectares), Rural zoned, no residential dwelling present, covered by rough grazing land.
  - Title 127216/1 of the 158 Cobbs Road property (approximately 26.8 hectares), split between Rural and General Industry zoned, degraded pasture land used for sheep grazing and a residential dwelling is present.
  - The 26A and 56 Cobbs Hill Road properties (combined area of approximately 1.6 hectares), Utilities zoned, TasWater land, with 3 large water reservoirs.
  - The 29A Cobbs Hill Road property (approximately 2.2 hectares), Landscape Conservation zoned, mostly covered by native vegetation, residential dwelling present, the property is used for residential and amenity purposes and no agricultural land use activity is undertaken.

- North west
  - The 194 Boyer Road property (approximately 1 hectare), Agriculture zoned, residential dwelling present, residential dwelling present, with pastureland (approximately 0.4 hectares) and is best described as a lifestyle block.
  - The 232 Boyer Road property (approximately 43.85 hectares), split Agriculture and Landscape Conservation zoned, covered by pastureland (approximately 18.2 hectares), native vegetation (approximately 10.3 hectares) and a Conservation Covenant (approximately 10.3 hectares), cropping ground (approximately 1.5 hectares) and the balance by dams and residential dwelling and amenity areas, and a residential dwelling is present. This property is used for agricultural land use activity, as per grazing livestock and cropping, albeit at small scale.
- East
  - The 4, 8, 20, 24, 32, 36, 40, 42, 46, 52, 58 and 60 Serentiy Drive properties (ranging in size from approximately 0.48-0.65 hectares), Rural Living zoned, residential dwelling present on each block, and no agricultural land use activity is present.
  - The 9 Cobbs Hill Road property (approximately 2.26 hectares), Rural Living zoned, residential dwelling present, and the property is used for residential and amenity purposes and no agricultural land use activity is undertaken.

    - The 7 Cobbs Hill Road property (approximately 8.1 hectares), Community Purpose zoned, covered by buildings and an oval as part of the Northern Christian school.

- South
    - Boyer Road and the Derwent Valley Railway line, which are Utilities zoned land.
    - The 89 Boyer Road property (approximately 1.23 hectares), Rural zoned, separated by Boyer Road and the Derwent Valley Railway line to the north from the BPSP, a residential dwelling is present, and the property is used for residential and amenity purposes and no agricultural land use activity is undertaken.
    - The 1, 2, 3, 4, 5, 6 , 7, 8, 9, 10, 11, 12 and 13 Riverside Drive properties (ranging in size from approximately 0.015-0.11 hectares), General Residential zoned, separated by Boyer Road and the Derwent Valley Railway line to the north from the BPSP, residential dwelling present on each block.

7 Local and regional importance

The BPSP study area is within the north west peri-urban rural area of Bridgewater area, and it is reasonable to consider that it holds a negligible level of local and regional prominence.

Table 6 provides details on the prominence of the BPSP study area in terms of the area and quality of the land within the Derwent land capability mapping area.

The BPSP study area accounts for less than 0.05% of the Derwent land capability mapping area.

Table 6: Local and regional importance of the study area

Land capability	Derwent mapping area		BPSP study area	
	Area (ha)	Mapping area (%)	Area (ha)	Derwent mapping area (%)
Prime	144	0.007	0	0
Non-prime	173,451	82.14	103	0.059
Exempt	37,726	17.85	0	0
Total	211,321	100.00	103	0.048

The BPSP study area clearly holds a negligible level of agricultural prominence and it should be noted that any current and future potential agricultural land use activity is severely constrained by a number of factors:

- Low land capability of the ground:
  - Limited area of class 4 present (approximately 40.1 hectares) which theoretically could be used for low frequency cropping (2-3 times in 10 years) with a severely restricted range of crops and can be used for grazing minimal limitations (albeit having a low carrying capacity). In reality the complete absence of irrigation water and being present across four properties means it would not be cropped.
  - Class 5 is unsuitable for cropping and is suitable for grazing with moderate/severe restrictions and has a low carrying capacity.
  - The majority of the study area is covered by class 6+7 land which severely restricted/unsuitable for agricultural land use activity.
  - No prime agricultural land is located within 1km of the subject property.
- Lack of access to irrigation both currently and in the future:
  - Only a very small amount of irrigation water (3.8 ML of combined high and mid availability irrigation water entitlements) is available.
  - Not located within an irrigation district and not serviced by an irrigation scheme.
  - No operational bores are located in the BPSP, and groundwater yields in this locale are often unreliable.
  - Sourcing irrigation water from TasWater comes at a particularly high cost and limited surety, with both of these factors making this irrigation water option unrealistic.
  - In reality agricultural land use activity is restricted to dryland activity only.

- Divided into 6 property titles:
    - Property sizes range from 7.6-31.3 hectares in size, with the largest block covered by a conservation covenant and not able to be considered for agricultural use.
    - Smaller land holdings mean it is not possible to undertaken agricultural land use activities at a large scale and justify the investment and use infrastructure to undertake more intensive grazing and/or cropping activities (e.g. larger tractors, cultivators).

8 Protection of Agricultural Land policy compliance

8.1 PRINCIPLE 1

Principle 1 states

"Agricultural land is a valuable resource and its use for the sustainable development of agriculture should not be unreasonably confined or restrained by non-agricultural use or development".

Response: No land present on any of the subject BPSP properties is zoned as Agriculture or Rural. The current level of agricultural land use activity, as is conducted on the 50, 170 and 182 Boyer Road properties, involves pastoral based activities, are of a non-commercial scale, and are best described as lifestyle blocks.

The grazing activities undertaken on the BPSP study area are severely constrained by the low rainfall climate and small amount of available pastureland.

8.2 PRINCIPLE 2

Principle 2 states

"Use and development of prime agricultural land should not result in unnecessary conversion to non-agricultural use or agricultural use not dependent on the soil as the growth medium"

Response: This is not applicable as no prime agricultural land is present within the BPSP study area.

8.3 PRINCIPLE 3

Principle 3 states

"Use and development, other than residential, of prime agricultural land that is directly associated with, and a subservient part of, an agricultural use of that land is consistent with this Policy."

Response: This is not applicable as no prime agricultural land is present within the BPSP study area.

8.4 PRICNIPLE 4

Principle 4 states

"The development of utilities, extractive industries and controlled environment agriculture on prime agricultural land may be allowed, having regard to criteria, including the following:

Response: This is not applicable as no prime agricultural land is present within the BPSP study area.

8.5 PRINCIPLE 5

Principle 5 states

"Residential use of agricultural land is consistent with the Policy where it is required as part of an agricultural use or where it does not unreasonably convert agricultural land and does not confine or restrain agricultural use on or in the vicinity of that land".

Response: The proposed residential use of the BPSP study area (as per the Future Urban zoned land is not intended nor required as part of any agricultural land use activity.

8.6 PRINCIPLE 6

Principle 6 states

"Proposals of significant benefit to a region that may cause prime agricultural land to be converted to non-agricultural use or agricultural use not dependent on the soil as a growth medium, and which are not covered by Principles 3, 4 or 5, will need to demonstrate significant benefits to the region based on an assessment of the social, environmental and economic costs and benefits".

Response: This is not applicable as no prime agricultural land is present within the BPSP study area.

8.7 PRINCIPLE 7

Principle 7 states

"The protection of non-prime agricultural land from conversion to non-agricultural use will be determined through consideration of the local and regional significance of that land for agricultural use".

Response: As identified as section 7 of this report the BPSP study area accounts for less than 0.05% of the Derwent land capability mapping area. Due to limitations associated with the low quality of the land, lack of access to irrigation, majority of land is covered by a conservation covenant and being divided into small land holdings means the current and future potential agricultural use is severely limited.

8.8 PRINCIPLE 8

"Provision must be made for the appropriate protection of agricultural land within irrigation districts proclaimed under Part 9 of the Water Management Act 1999 and may be made for the protection of other areas that may benefit from broad-scale irrigation development".

Response: The BPSP is not covered by a proclaimed irrigation district. None of the subject properties involved in the BPSP have access to irrigation water, and therefore it is not possible to consider that irrigated agricultural land use activity can and could be undertaken.

Even if irrigation water was theoretically made available it would not benefit nor be applicable to broad scale irrigation development due to the small amount of available land and low land capability of the ground present.

8.9 PRINCIPLE 9-11

The remaining principles are not relevant to the BPSP subject area. These principles relate to the following:

- Planning schemes facilitating agricultural use on land zoned for rural purposes (Principle 9); and
- Plantation forestry (Principles 10 and 11).

9 Southern Tasmanian Land Use Strategy

The Southern Tasmanian Land Use Strategy (STRLUS) is a policy document which supports and assist to manage change, growth, and development within Southern Tasmania.

STRULS "provides comprehensive land use policies and strategies for the region based upon: The vision for the State as outlined by Tasmania Together:

- A more defined regional vision;
- Overarching strategic directions; and
- A comprehensive set of regional planning policies addressing the underlying social, economic, and environmental issues in Southern Tasmania.[18]

Section 16.5 of STRLUS provides a series of policy guidelines, PR1-PR5 which provides direction in relation to the use and protection of agricultural land.

9.1 PR 1 SUPPORT AGRICULTURAL PRODUCTION ON LAND IDENTIFIED AS REGIONALLY SIGNIFICANT BY AFFORDING IT THE HIGHEST LEVEL OF PROTECTION FROM FETTERING OR CONVERSION TO NON-AGRICULTURAL USES.

- PR 1.1 Utilise the 'Significant Agriculture Zone' to identify regionally significant agricultural land in planning schemes and manage that land consistently across the region.
    - Response: The BPSP land is zoned as Future Urban and Landscape Conservation and is not identified as Agriculture zoned land (formerly the Significant Agriculture Zone).
- PR 1.2 Avoid potential for further fettering from residential development by setting an acceptable solution buffer distance of 200 metres from the boundary of the Significant Agriculture Zone, within which planning schemes are to manage potential for land use conflict.
    - Response: No definite plans and/or designs are currently available for the development of the Future Urban zoned land on the BPSP study area. It should be noted that a number of measures could be undertaken to mitigate the potential negative impacts on the agricultural land use activities undertaken on the Agriculture zoned land, and this includes establishing a shelter belt, secure fencing, weed control and active dog management activities.
- PR 1.3 Allow for ancillary and/or subservient non-agricultural uses that assist in providing income to support ongoing agricultural production
    - Response: The proposed development on the Future Urban zoned land on the BPSP study area will not include any ancillary and subservient non-agricultural uses.
- PR 1.4 Prevent further land fragmentation by restricting subdivision unless necessary to facilitate the use of the land for agriculture.
    - Response: The BPSP study area which would be subject to the development is Future Urban zoned land, and therefore it was planned to be subject to subdivision in order to facilitate residential development on small land holdings.
- PR 1.5 Minimise the use of significant agricultural land for plantation forestry

[18] Southern Tasmania Regional Land Use Strategy 2010 – 2035. Amended 17 May 2023.

- Response: None of the subject properties involved with the BPSP study area are used for forestry, as per either the production nor harvest of native and/or plantation forest.

9.2 PR 2 MANAGE AND PROTECT THE VALUE OF NON-SIGNIFICANT AGRICULTURAL LAND IN A MANNER THAT RECOGNISES SUB-REGIONAL DIVERSITY IN LAND AND PRODUCTION CHARACTERISTICS.

- PR 2.1 Tailor planning scheme standards, particularly the minimum lot size for subdivision, according to the designated subregion.
  - The future proposed development of the Future Urban zoned land within the BPSP study area would comply with all applicable minimum lot sizes.
- PR 2.2 Ensure the minimum lot size takes into account the optimum size for the predominating agricultural enterprise within that subregion.
  - Response: The subject BPSP study area has a negligible level of local and regional prominence and is incapable to supporting any meaningful agricultural land use activity.
- PR 2.3 Utilise the settlement strategy to assess conversion of rural land to residential land through rezoning, rather than the potential viability or otherwise of the land for particular agricultural enterprises.
  - Response: The BPSP study area which would be subject to the development is Future Urban zoned land, and therefore it was planned to be subject to subdivision in order to facilitate residential development on small land holdings.
- PR 2.4 Ensure opportunities for down-stream processing of agricultural products are supported in appropriate locations or 'on-farm' where appropriate supporting infrastructure exists and the use does not create off-site impacts.
  - Response: Response: The proposed development on the Future Urban zoned land on the BPSP study area will not include any use associated with down-stream processing of agricultural products.
- PR 2.5 Provide flexibility for commercial and tourism uses provided that long-term agricultural potential is not lost and it does not further fetter surrounding agricultural land.
  - Response: The specific use(s) of the Future Urban zoned land will be identified in the near future, and it is not currently possible to determine if commercial and/or tourism uses will occur within the BPSP.
- PR 2.6 Ensure the introduction of sensitive uses not related to agricultural use, such as dwellings on small non-farming titles, are only allowed where it can be demonstrated the use will not fetter agricultural uses on neighbouring land.
  - Response: A significant buffer (350-700m and largely covered by native vegetation) exists between the Rural zoned land located to the north of the Future Urban zoned land on the BPSP study area. A number of mitigation measures can be undertaken, such as establishing a shelter belt, secure fencing, active dog management and weed control, in order mitigate the potential negative impacts on the adjacent Agriculture zoned land to the west of the Future Urban zoned land on the BPSP study area.

9.3 PR 3 SUPPORT AND PROTECT REGIONALLY SIGNIFICANT EXTRACTIVE INDUSTRIES.

None of the subject properties involved with the BPSP study area are used for extractive industries.

The Brighton General Industry zoned land further to the east of the BPSP is setback 680m at the closest point from the potential residential development areas, and this includes a substantial buffer (500m wide) associated with the native vegetation present.

It is reasonable to consider that the proposed residential development of the BPSP would not negative impact existing and/or potential extractive industries.

9.4 PR 5 SUPPORT THE FOREST INDUSTRY.

None of the properties involved with the BPSP study area are used for forestry, as per either for the production or harvest of native and/or plantation forest.

10 Constraint analysis and review

10.1 BPSP STUDY AREA

The BPSP study area is subject to a number of constraints which severely limits the current and future agricultural land use activity of the block, and includes:

1. Low/very low level of land capability and associated severely limited scope for agricultural land use activity, and effectively severely restricts the scale and intensity of all forms of agricultural land use activity and effectively limits the use to low intensity livestock grazing enterprise.

2. The absence of irrigation water, with only a very small amount (3.8 ML) of irrigation water which could be extracted from the two waterways which flow through the study area. No irrigation dams are present within the BPSP study area. The BPSP study area is not located within an irrigation district and not serviced by an irrigation scheme. No operational groundwater bores are located within the BPSP study area. Groundwater yields in this locale are often unreliable and sourcing irrigation water from TasWater comes at a particularly high cost and limited surety and effectively rules out this option.

3. Existing sensitive use (as per the residential dwellings and school to the east) development on the land nearby to the south of the study area applies a degree of constraint and heightened risk of issues relating to incompatible land use activity, as per agricultural versus residential issues including complaints and objections against:
    a. Noise from normal farming practices such as the use of machinery (eg tractors), gas guns and livestock.
    b. Odours from the use of fertiliser (eg organic and/or biological products), compost, and soil conditioners
    c. The application of agricultural chemicals and associated risk of spray drift and chemical trespass, and this can also include both actual and the perceived threats
    d. Dust when paddocks are being cultivated and the application of fertilisers and soil conditioners
    e. Trespass by unauthorised visitors
    f. Biosecurity issues primarily associated with weed infestation due to the movement of garden weeds and challenges associated with managing weed incursions from multiple sources

4. The BPSP study area is divided into six separate property titles. Four properties have residential dwellings present and one is almost entirely covered by a conservation covenant. Smaller land holdings mean it is not possible to undertake agricultural land use activities at a larger scale and justify the investment and use infrastructure to undertake more intensive grazing and/or cropping activities (e.g. larger tractors, cultivators).

It is reasonable to consider that the BPSP study area is incapable of being used to support meaningful agricultural land use activity and no type of commercial scale agriculture could be undertaken.

10.2 ADJACENT AGRICULTURAL LAND

Agricultural land use activity is undertaken on properties adjacent to and nearby the north and west of the BPSP study area:

- West
    - Agricultural zoned land covering 42 hectares and includes two separate property titles, and this forms part of a larger parcel of Agriculture zoned land which in total covers a total of 56.5 hectares divided amongst a total of four separate property titles.
    - The Agriculture zoned properties immediately adjacent to the BPSP study area (as per on the 182 Boyer Road and 31 Cobbs Hill Road properties) includes the properties at 194 Boyer Road (1 hectare) and 232 Boyer Road (split zoned as Agriculture 30.4 hectares and Landscape Conservation 11.6 hectares).
    - All of these Agriculture zoned properties have a residential dwelling present on them.
    - This Agriculture zoned land use principally used for grazing livestock and a small market garden cropping enterprise.
    - Irrigated pasture production and market gardening occurs albeit the extent of irrigation is limited and does not occur on a broadscale (e.g. using centre pivot irrigators). None of the dams located on the Agricultural zoned land are registered.
    - This Agricultural zoned land is not located within a declared irrigation district and it is not serviced by an irrigation scheme.
    - No commercial standalone agricultural land use activity would be undertaken on these Agriculture zoned properties.
- North
    - Rural zoned land covering 36 hectares and includes two separate property titles, and this forms part of a larger parcel of Rural zoned land which extends further to the east and north east and in total covers a total of 620 hectares divided amongst a total of approximately 102 separate property titles.
    - The Rural zoned properties immediately adjacent to the BPSP study area (as per the 25, 29 and 31 Cobbs Hill Road properties) includes title 127385/1 (23 hectares) and the title 127216/1 of the 158 Cobbs Hill Road property (split zoned as Rural 13 hectares and General Industrial 13 hectares).
    - The Rural zoned land use principally used for grazing livestock albeit at a low intensity and typically on degraded and rundown land, and it should be noted extensive areas of land in this zone are covered by remnant native vegetation and includes patches of threatened native vegetation communities.
    - No commercial standalone agricultural land use activity is undertaken on these Rural zoned properties.

The possible negative impacts on the adjacent Agriculture zoned land and associated agricultural land use activities to the north west of the proposed BPSP development area could include trespass, biosecurity issues (weeds) and dogs menacing livestock.

The use and application of agricultural sprays on must abide by the Tasmanian Code of practice for ground and aerial spraying 2014 and any applicable agricultural chemical label requirements.

In terms of managing possible negative impacts to the adjacent Agriculture zoned land appropriate mitigation measures may include:

- Fencing:
    - An appropriately designed fence which provides security, privacy and screening for all land owners.
    - This fence must be built of sturdy materials and be provided with ongoing maintenance.
- Weed management:
    - A commitment should be given that during the development and construction phase of the BPSP Future Urban zoned land that weed control activities will be undertaken.
    - All declared weeds and weeds of national significance should be managed according to best practice.
    - It would be appropriate that weed control advice and recommendations be provided by an appropriately experienced agronomist.
- Dog management:
    - The Brighton council must rigorously and strictly enforce all laws relating dog control.
    - Any reports of dogs menacing livestock must be responded to promptly responded to and dealt with.
- Establishment and maintenance of boundary shelter belt vegetation to provide screening:
    - Establish a 275m long shelter belt along the southern portion of the north west boundary (as per the north west boundary of the 182 Boyer Road property) of the BPSP study area. Figure 7
    - The shelter belt should be composed of mixed native species, include hardy short shrubbery and taller tree species and provide screening from ground level up to 8-10m in height and approximately 3-4m wide.
    - It would be appropriate to see specialist advice on the design, establishment and ongoing care and maintenance of the shelter belt.
- Sufficient boundary buffer setback:
    - The boundary setback buffers must comply with the applicable sections of the Tasmanian Planning Scheme.
    - It should be noted that the presence of an appropriate shelter belt and secure fencing in conjunction with the nature of the current and likely future agricultural land use which can and could be undertaken.

In terms of managing possible negative impacts to the adjacent Rural zoned land to the north it is important to consider that a substantial buffer (approximately 350-700m wide) which is largely covered by native vegetation separates the Rural zoned land and the Future Urban zoned land on the BPSP study zone.

It is reasonable to consider that the width of separation distance and presence of native vegetation would significantly mitigate and be expected to mitigate any negative impacts between the any future residential developments on the BPSP study area’s Future Urban zoned land and the Rural zoned land to the north.

Figure 7 Proposed location of the shelter belt (green line) along the southern area of the north west boundary of the BPSP study area (as per the 182 Boyer Road property).

11 Conclusions

1. The BPSP study area covers approximately 103 hectares and is located on the north western peri-urban outskirts Bridgewater.

2. The land associated with the BPSP study area is severely constrained for agricultural land use activity due to the low/very low land capability of the ground, extensive coverage of native vegetation absence of irrigation water and the land is divided into 6 separate titles one of which is almost entirely covered by a conservation covenant.

3. The BPSP development area is intended to cover the Future Urban zoned land which is present on the western area.

4. The BPSP study area has Rural Living and Community Purpose zoned land adjacent to the east, Rural, Landscape Conservation and Utilities zoned land to the north, Rural, General Residential and Utilities zoned land to the south, and Agriculture and Environmental Management zoned (as per the Derwent Estuary) zoned land to the west.

5. The Rural zoned land to the north is used for low intensity sheep grazing on heavily degraded pastures.

6. The presence of a substantial setback which is largely covered by native vegetation would be expected to mitigate any negatives associated with any future residential development on the Future Urban zoned land on the BPSP study area.

7. Effectively the only meaningful location where agricultural land use activity occurs is to the north west, and this involves grazing livestock at a limited scale and a market garden enterprise.

8. A number of measures could be undertaken to mitigate the potential negative impacts on the agricultural land use activities undertaken on the Agriculture zoned land to the west, and this includes establishing a shelter belt, secure fencing, weed control and dog management activities.

9. The proposed development of the BPSP study area is consistent with the PAL policy.

10. An assessment of relevant sections of STRLUS PR1, PR2, PR3, PR4 and PR5 provides a basis for progression of the future development of the Future Urban zoned land of the BPSP study area.

Appendix 1 Supporting images

Image 1 Northerly view towards the central eastern area (170 Boyer Road and 29 Cobbs Hill Road properties) of the currently zoned Future Urban land on the BPSP study area. (Taken on 23/10/24)

Image 2 Western view over the western area of the 29 Cobbs Hill Road property on the BPSP study area. (Taken on 23/10/24)

Image 3 Easterly view towards over central southern area (as per the 170 Boyer Road property) of the BPSP study area. (Taken on 16/10/24)

Image 4 Easterly view over the Rural zoned land (as per title 127216/1 of the 158 Boyer Road property) adjacent to the east. (Taken on 16/10/24)

Image 5 Example of the land and native vegetation on the conservation covenant present on the 31 Cobbs Hill Road property located on the north area of the BMSP study area. (Taken on 16/10/24)

Image 6 Southerly view from the southern end of the 25 Cobbs Hill Road property towards Genappe House on the 50 Boyer Road property located on the south west area of the BPSP study area. (Taken on 16/10/24)

Image 7 Easterly view towards Genappe House on the 50 Boyer Road property on the south western area of the BPSP study area. (Taken on 16/10/24)

Image 8 Westerly view from the western boundary area of the 170 Boyer Road property on the central area of the BPSP study area. (Taken on 16/10/24)

Image 9 Westerly view along Serenity Drive and the Rural Living zoned land adjacent to the southern area of the BPSP study area. (Taken on 16/10/24)

Image 10 Northerly view over the Agricultural zoned land (as per the 232 Boyer Road property) adjacent to the north westerly boundary of the 170 Boyer Road property. (Taken on 16/10/24)

Image 11 Topsoil profile of the heavy clay dermosol soil present on the 182 Boyer Road property on the BPSP study area. (Taken on 16/10/24)

Image 12 Topsoil profile of the alluvial soil present throughout much the western area of the BPSP study area. (Taken on 23/10/24)

Image 13 Topsoil profile of the deep Forcette soil profile association present throughout much of the eastern areas of the BPSP study area. (Taken on 16/10/24)

Appendix 2 Property land use activity details

Table 7 Property land use activity responses from the property owner (Part 1).

Property address	50 Boyer Road	170 Boyer Road	182 Boyer Road
Property owners	David and Loretta Olsen	Jeanette Cooper	Matthew Booth
In the recent past (say last 10 years) has any agricultural land use activity been undertaken on the property: yes, no or unsure?	Yes	Yes	Yes
Do you currently undertake any agricultural land use activity on the property: yes or no?	Yes		Yes
If yes, what was it, eg running sheep, cattle or other (please state)?	Periodically undertake short term cattle agistment.	Runing sheep.	Harvest fodder, and previously have graze sheep and cattle and agist horses.
If running sheep, horses or cattle please state how many animals were involved and what class (e.g., ewes, cows, lambs, calves etc...)?	Variable, ranges up to fifteen cattle run on the property for a short period (roughly up to four months over winter)	Variable, ranges up to ten sheep.	Variable, ranges up to twenty sheep or cattle (either or)
If yes, what sort of land management activities do you engage in, such as apply fertiliser, control weeds?	No	No fertiliser applied. Ongoing weed control activities undertaken.	Ongoing weed control.
If yes, do you undertake any property improvements, such as new fencing, establish new pastures?	Previously fencing has been undertaken fertiliser was applied and weed control activities undertaken.	Previously fencing has been undertaken and weed control activities undertaken.	Previously fencing has been undertaken and weed control activities undertaken.

Table 8 Property land use activity responses from the property owner (part 2).

Property title	25 Cobbs Hill Road	29 Cobbs Hill Road	31 Cobbs Hill Road
Property owners	Nicholas Turner and Karen Sturges	Gavin Rolf and Karen Woodhouse	Mona Chui Yee Ho and Mung Ching Wong
In the recent past (say last 10 years) has any agricultural land use activity been undertaken on the property: yes, no or unsure?	Yes	Yes	No
Do you currently undertake any agricultural land use activity on the property: yes or no?	No.	Yes.	No
If yes, what was it, eg running sheep, cattle or other (please state)?	Previously agisted horses.	Currently running sheep.	Not applicable
If running sheep, horses or cattle please state how many animals were involved and what class (e.g., ewes, cows, lambs, calves etc...)?	In the past up to four horses were agisted on the property.	Approximately fifteen breeding ewes.	Not applicable
If yes, what sort of land management activities do you engage in, such as apply fertiliser, control weeds?	No fertiliser applied and no weed control activities undertaken.	No fertiliser applied and no weed control activities undertaken.	None undertaken.
If yes, do you undertake any property improvements, such as new fencing, establish new pastures?	Previously fencing has been undertaken and weed control activities undertaken.	Previously fencing has been undertaken and weed control activities undertaken.	None undertaken.

ATTACHMENT J

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Our Ref: 251013

8th November 2024

Update 19 November 2024

Update 31 January 2025

Holmes Dyer Pty Ltd
Leve 3, Reid House, 15 Featherstone Place
Adelaide SA 5000

ATTENTION: S Holmes

Dear Stephen

SITE ANALYSIS REPORT FOR INFRASTRUCTURE REQUIREMENTS – BOYER PSP

I am writing to you about the findings to date for the provision of infrastructure services to the proposed subdivision based on the Plan 1792-002 R2>14.01.25 provided by Holmes Dyer. This working document shows approximately 362 lots. The essential services required include power supply from TasNetworks, sewer systems and water supply from TasWater and communications from NBN Co. Brighton Council have provided feedback on stormwater management including stormwater quantity and quality control. Consideration has been given to the provision of natural gas supply from TasGas. Additionally, to the infrastructure requirements, information from Tas Irrigation is included showing the approximate location of an irrigation supply pipeline. Keith Midson Traffic Engineer, has provided intersection treatments for entry points along Boyer Road.

The collection of background information on the services will inform the establishment of funding models.

TasNetworks - Power Supply

Contact Person – Gary Hancl – 0438 338 060 Alan Heald and Alex Izbecki

Initial contact was made via email to Clodagh Doyle on 24/9/24. Due to some internal staff movements, setting up an Early Engagement meeting proved difficult. On 31/10/24 a discussion finally took place with Gary Hancl – Team Leader. This was a good opportunity to explain the project context and that we are planning the future and not the developers of the project. He understands that we are looking for high level design of the system that will lead to high level costings enabling a model for funding to be established that links the power supply infrastructure to the future development. He has now organised an Early Engagement meeting for 10am on 12/11/24 with the right people within TasNetworks. Further reporting to follow.

Update 19/11/24

Early Engagement meeting was held on 12/11/24 with Gary Hancl, Angela Trewin and Chris Symons. The Network Planning Representative was not at the meeting but was contacted after the meeting. The positive outcomes were that TasNetworks do not have any issues in terms of supply to this location. The design may

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include a looped supply especially if there is connectivity to Cobbs Hill Road. The internal requirements for supply are a 750kVa sub station per 100 lots. Preferable substation locations are central to the lots being supplied.

Update 10/1/24

After advice received from the Enquiry by Design Meeting from TasNetworks, the suggestion was to apply for a Feasibility Study. This occurred and on return to the office 6/1/25 and invitation for a new Early Engagement Meeting was received for 9/1/25 from different people in the Negotiated Connections Team, including Alan Heald and Katherine Johnstone. At the meeting Alex Izbecki was in attendance and understood that we are in a pre-planning and pre-subdivision phase.

The machinations of TasNetworks do not cater for pre-planning and they are used to dealing with subdivision developments with Planning Approval. They could do the feasibility study for a cost and would require a Staging Plan, which has now been produced.

Having said this they have indicated that they have an obligation to supply, that any costs associated with augmentation or upgrade requirements are bundled up into the developer costs that are normally associated with a subdivision. These developer costs include the HV lead in, sub-stations and underground reticulation. TasNetworks have indicated an indicative cost of $15 000 to $20 000 per lot.

Minutes of the meeting attached in Appendix D.

Funding of Infrastructure Decision 31/1/25

Based on advice from TasNetworks the design and supply of the power to the future subdivision site is achievable. Augmentation of HV supply is achievable and final design will be developed with a development plan as per TasNetworks practice. The costs associated to achieve the required HV supply and the breakdown to LV via substations will be distributed to the developer generally as per lot basis. No costs are to be included in a contribution’s arrangement.

TasWater – Sewer Systems and Water Supply

Contact Person - Elio Ross – 0467 874 330 Update provided 22/11/24

Sewer System

In the first instance the advice from TasWater was to lodge a Service Enquiry. This was lodged with TasWater through their Portal on 16/10/24. To provide context to the servicing discussion we made calculations for Equivalent Tenements (ET’s) for the sewer based on the three natural catchments within the development area. Each catchment has a low point adjacent to Boyer Road and will require a Sewer Pump Station. Pump Station 1 is located in 50 Boyer Road (Property ID: 7676361, Title Ref: 44724/8). Pump Station 2 is located in 170 Boyer Road (Property ID: 7676396, Title Ref: 44724/9) and Pump Station 3 is located furthest west in the property known as Boyer Road (Property ID: 1972194, Title Ref: 44724/2). The ET's for each catchment and Pump Station are listed in Table 1. A typical allowance for a 20% growth rate has also been included.

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The sewer pump stations have been sized at the highest level for environmental sensitivity based on their close proximity to the Derwent Estuary, meaning the storage time will be 8 hours (in accordance with *Taswater Supplement to WSA 04-2005 2.1 WSAA Sewage Pumping Code of Australia)* and hence the pump station size will be larger than a regular pump station with low environmental rating. The default environmental rating may be lowered subject to further risk assessments in consultation with Taswater, however due to the proximity to the Derwent Estuary, it is assumed that a high rating is appropriate and is likely to be required.

Consideration was given to a common rising main to allow each pump station to discharge into a common line before being discharged into a gravity manhole outside 24 Boyer Road. A professional discussion took place to investigate the possibility of achieving this outcome. After this discussion it was determined that it would not be possible to achieve this. There are two other possible ways to achieve the discharge requirements of the three pump stations. The first is to install an individual rising main to each sewer pump station. This means a common trench can be used from near Serenity Drive all the way to 24 Boyer Road. The other possible solution is to daisy chain the pump stations, that is one pumps to the other and then the next one. This means the pump stations would have to increase in size to accommodate the additional effluent discharged by the previous pump station and the inflow from the local catchment. A high-level cost analysis of these options will be carried out. In the first instance the multiple rising main option is likely to be the best option for cost but also for the fact that the stand-alone development can occur on the individual larger parcels. Please see new advice received about the pump stations and a common rising main.

The sewer pump station volumes for the multiple rising main option are shown in Table 1.

Table 1 – Sewage Pump Station Parameters – Current Plan > 362 lots

Pump Station ID	Developed Equivalent Tenements (ET's) (+20% Growth Rate)	Pump Station Volume	Pump Flow Rate
1 (50 Boyer Road)	134	20.1 m^3	10.62 L/s
2 (170 Boyer Road)	248	37.2 m^3	18.04 L/s
3 ('Boyer Road')	71	10.6 m^3	5.95 L/s

Preliminary comment from Taswater was received on 05/11/24 (included in Appendix B), with more detailed advice from Taswater's assets and modelling teams still to follow. Taswater's preliminary comment assumed connection to the existing Riverside Drive Sewage Pumping Station (ID: GRPSP12) which represents another option for connection location, however indicated that several upgrades to the existing piped network and sewage pumping station would likely be required in this instance and the Riverside Drive SPS will not be included.

<u>Service Enquiry Update 22/11/24</u>

After discussion with TasWater and receiving the written advice indications are that a common rising main linking all three pumpstations is a possibility. This may change the configuration of each of the pump stations and will be subject of future design. The already calculated total capacity requirements for all three pump stations are unlikely to change and hence these sizes can be used to calculate costs in relation to a contribution model.

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TasWater have also provided additional information about their downstream sewerage infrastructure. They are indicating that there is significant strain on the gravity system, the existing sewer pump stations and rising mains. One positive is that the Green Point Sewerage Treatment Plant has adequate capacity to cater for the development.
Gravity main upgrades are required between the receiving manhole and the Nielsen Parade SPS. Further to this gravity and rising main upgrades maybe required from the Nielsen Parade SPS to the Green Point STP.

The Sewer Pump Station at Nielsen Parade requires an upgrade in volume, at total of 52.6kL. Taswater water have nominated that 30.1kL are the responsibility of the development. Further to this pump upgrades will be required with additional flow rate. The additional flow rate will require a larger rising main. These works are shown on Plan 251013 C503, with alternatives for the possible rising main upgrades. TasWater Servicing Advice found in Appendix B.

Funding of Infrastructure 31/1/25 - Sewer

The upgrade to the existing Nielsen Parade Pump Station will have shared costs between TasWater and an infrastructure contribution for Boyer PSP. Taswater have been clear in regard to volume upgrades and pump upgrades and their portion of these costs. The final part of the puzzle is the final rising main size. The cost difference is minimal in the rising main pipe diameter as most of the cost is in trenching and backfilling. A BoQ has been produced to assist the Quantity Surveyor to establish the apportioned costs to the contributions plan.

Water Supply

The creation of a reticulated water supply network to service the development will require connection to the existing Taswater supply network. The closest connection location is at the intersection of Serenity Drive and Boyer Road to an existing DN100 PVC main. Preliminary comment from Taswater (included in Appendix B) has indicated that the existing DN100 main will be too small to service the development with a DN200 connection (or 2 x DN150) typically required for a development of this size. The existing Taswater network within a reasonable proximity to the site (developed areas to the east) consists entirely of DN100 or less sized mains, meaning no suitable connection is in close proximity to the site from this area.

The existing developed area to the east is supplied from the single Bridgewater Reservoir (ID: HOBWS017), which is located adjacent to Cobbs Hill Road to the north of the site. Taswater has advised that connection for the site will likely be required directly from the existing DN375 main (ID: A203814) at the reservoir. Connection at this location would mean the new water supply will be required to run through areas of 29 Cobbs Hill Road not previously included for development. Taswater has also advised that the creation of a new road reserve would be required to house the new DN200 main as new water mains cannot be located within private property. It is likely that the new mains servicing the site will also require connection back into the existing network at Serenity Drive to create a closed loop.

No other existing infrastructure suitable for direct connection is present within the surrounding areas. Several large bulk transfer mains are located further north of the site as well as a DN630 irrigation main that partially runs through 50 Boyer Road, however these are not suitable nor available for connection. This means that Taswater's initial comments on connection location nearby the reservoir are very likely to be the required solution for the site.

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In preliminary assessment of possible connections to Serenity Drive, an EPANET model has been undertaken which has been adjusted to include supply from the Bridgewater Reservoir. Preliminary results from the model show that adequate pressures and flows are expected to be available to all lots on the site inclusive of both residential and fire flows to the most hydraulically disadvantaged lot. A screenshot of the EPANET model is provided in Figure 1 below.

Service Enquiry Update 22/11/24

Water Infrastructure

Previous advice in regards to supply from the reservoir on Cobbs Hill Road still applies including the trunk supply at DN200 then spreading to DN100 throughout the subdivision. The new advice is that the capacity of the reservoir is not adequate to maintain existing servicing and supply the proposed subdivision. To this end TasWater will require additional capacity, either by rebuilding the existing reservoir with additional capacity or by building a second reservoir to give the additional capacity. If there is adequate land area a second reservoir is the likely outcome as this will limit supply disruption. We will discuss further with TasWater about the like volume requirement for additional storage.

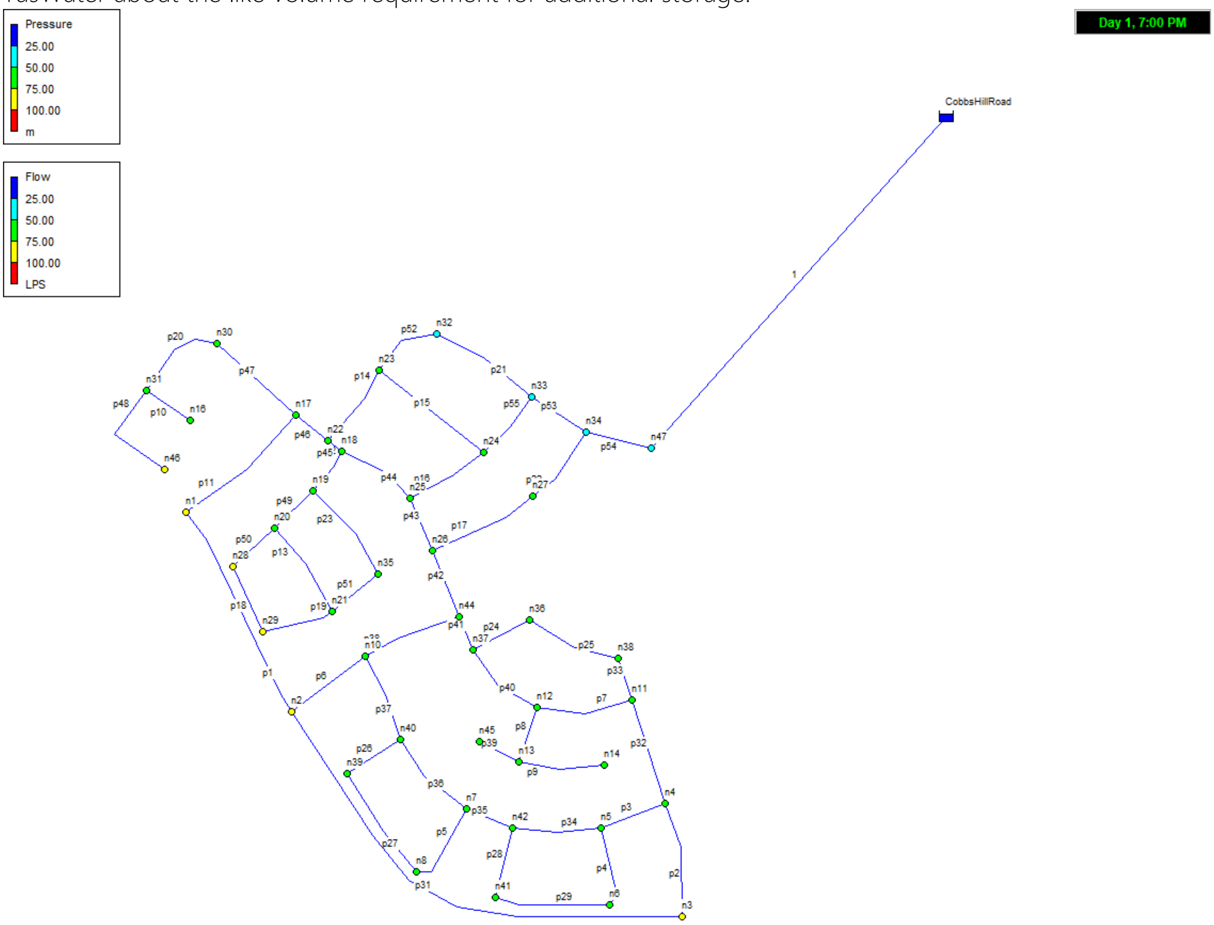

Figure 1 – EPANET Model (Cobbs Hill Road Connection)

This model provides DN 200 lead in from the reservoir spreading to a DN100 network within the subdivision.

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Funding of Infrastructure 31/1/25 - Water

The requirement for additional reservoir storage at Cobbs Hill Road will fall under an infrastructure contribution model. Also included will be the DN200 connection from the Cobbs Hill Reservoir into the subdivision as it is required. Link water infrastructure that enables 50 Boyer Road, 170 Boyer Road and the third property on Boyer Road to be included in the infrastructure contribution model. A Bill of Quantities has been prepared for use by the Quantity Surveyor.

Council - Stormwater Discharges and Onsite Detention – Internal Roads

Contact Person – Leigh Wighton – 0418 569 044

A meeting with Brighton Council was undertaken on 05/11/24 which included discussion on stormwater quality and quantity management with the information provided below being in-line with these discussions and Council's direction/requirements.

The land has three overall catchments with each falling to Boyer Road as shown on the concept plans provided in Appendix A. Each catchment discharges via an existing pipe under Boyer Road. Catchment 1 (50 Boyer Road) has a twin DN375 discharging under Boyer Road into a table drain that runs towards the railway crossing point at Riverside Drive. Catchment 2 (170 Boyer Road) discharges via a DN900 under Boyer Road and then under the railway corridor and finally to the Derwent Estuary. Finally, Catchment 3 ('Boyer Road') has a DN1200 discharging under Boyer Road and then under the railway corridor to the Derwent Estuary. Photos of the existing pipes from the upstream side are provided in Appendix C.

The Catchments 2 & 3 have defined gullies, and because of the rural nature have farm dams capturing flows at various locations. While these dams provide online storage, this has been ignored for the overall catchment modelling. The catchment modelling was carried out using the software package DRAINS to determine the impact of increasing the impervious areas due to development. A screenshot of the DRAINS model is provided in Figure 2. The discharge parameters used consisted of maintaining the existing pipe sizes beneath Boyer Road to control flows up to the 1% AEP event including a climate change increase factor of 16.3%. The results of the modelling including likely detention sizes required, are shown in Table 2, noting that catchment 3 did not require any detention with the existing DN1200 pipe and roadside depression being adequate to build driving head and discharge of the post-development flows.

Table 2 – Stormwater Flows and Detention Requirements

Catchment ID	Existing Pipe Discharge Size	Peak 1% AEP Post-Developed Flow (Generated by Catchment)	Approximate Detention Volume Required	Peak 1% AEP Post-Developed Flow Through Culvert (With Detention)
1 (50 Boyer Road Discharge)	2 x DN375	1.04 m^3/s	1,300 m^3 (Approx. 1400m^2, 2m max. depth)	0.358 m^3/s
2 (170 Boyer Road Discharge)	DN900	3.57 m^3/s	2,360 m^3 (Approx. 2000m^2, 3m max. depth)	2.23 m^3/s

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3 ('Boyer Road' Discharge)	DN1200	3.56 m³/s	Nil (sufficient pipe capacity/inlet storage)	3.35 m³/s

With the presence of an existing gully within Catchment 2, the topography is expected to lend itself to the creation of a suitable detention basin. The topography adjacent to the outlet for Catchment 1 is less well defined in regards to an existing low point/water course and would likely require additional earthworks to construct a suitable detention basin.

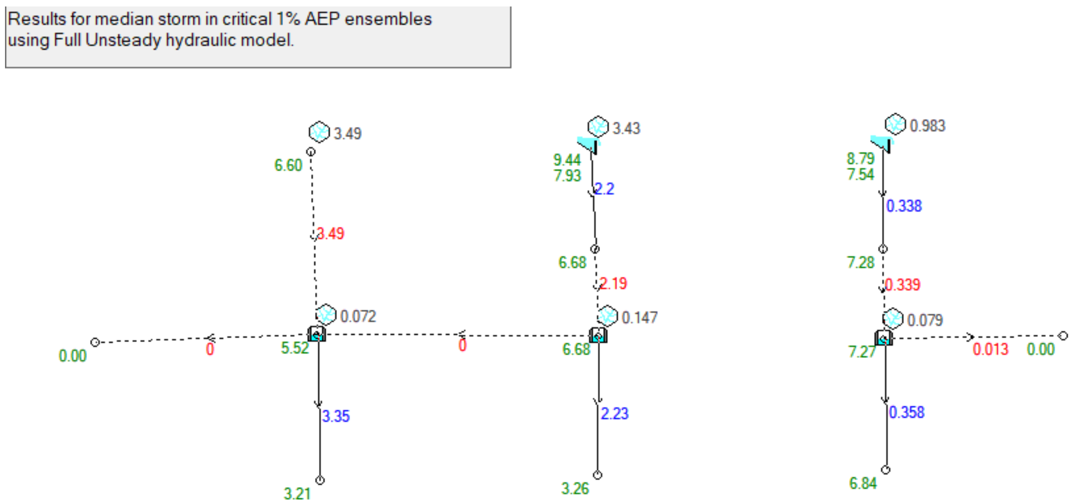

Figure 2 – DRAINS Model (1% AEP Event)

Funding of Infrastructure

It is likely that the detention basins would be included in a funding model as there based on their need to limit flows and prevent further pipe infrastructure upgrades. It would be fair for these to be aggregated as a whole of development requirement.

Stormwater Quality

Treatment of stormwater flows from developed areas is expected to be required in accordance with the pollutant reduction targets of 90% Gross Pollutants (GP), 80% Total Suspended Solids (TSS), 45% Total Phosphorus (TP) and 45% Total Nitrogen (TN) outlined in the *Tasmanian Stormwater Policy Guidance and Standards for Development* document.

Due to the significant portion of external undeveloped catchment flows and the nature of the development having the potential for staged or partial development of individual land parcels, it is expected to provide a better outcome to provide at source treatment/control. This would involve treatment at the localised discharges from the major developed areas before discharging into the existing gullys/watercourses, and/or by providing treatment at the time of development on each individual lot. By allowing the large portion of external catchment flows to discharge directly to Boyer Road, bypassing treatment, more efficient removal of pollutants from developed areas can be carried out with less dilution of polluted flows. This may assist in lowering the total sizes of treatment infrastructure required. Potential locations for combined treatment systems are indicated on the concept plans provided in Appendix A, however may be located elsewhere depending on final outlet locations.

It is expected that with the inclusion of the open space/watercourse areas that sufficient space will be available for treatment devices to meet the required pollutant reduction targets at the outlets from individual developed areas. The configuration of treatment devices may include both the use of 'natural' WSUD solutions (e.g. sediment ponds, swales, bioretention) and proprietary treatment devices (e.g. gross pollutant traps, filtration systems) with further assessment required to determine treatment sizes dependant on selected methods.

Funding of Infrastructure

Local source control water quality devices to fall under local developer costs.

Internal Road Bridges

While the internal road network built to LGAT standards and requirements will be the developers cost, there are two bridges crossing the water ways, one in 170 Boyer Road and the other in western Boyer Road property. Thes have been considered for contribution funding but on the basis that they are not required to facilitate the development for all six properties have been excluded from contribution funding.

NBN

Contact Person – Peter Freshney – Kisstel – 0417 287 006 Daniel Costa – NBN Co. daniel.costa@nbnco.com.au

Communication services in the form of the NBN are located at the intersection of Boyer Road and Serenity Drive. Both 50 and 170 Boyer Road are connected by Fixed Wireless to the NBN network. Contact has been made with a local designer and installer to receive an appropriate contact with Development Planning at NBN for discussion. Peter has advised that Daniel Costa of NBN Co. is our contact. We will follow up with Daniel in due course.

Update 6/12/24

Met with Daniel Costa from NBN. He is confident that NBN will supply the future subdivision and lead in infrastructure will be provided as part of an overall development plan. Costs will be part of developer charges similar to TasNetworks. Typically costs are $1000 to $1500 per lot.

Funding of Infrastructure

NBN infrastructure to fall under local developer costs.

TasGas

TasGas have reticulation of Natural Gas on the eastern side of the Midland Highway in Bridgewater. The supply of Natural Gas is not considered to be an essential service but rather an optional service. Generally,

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TasGas will make a commercial decision in terms of supplying an area based on the level of interest of future customers.

Funding of Infrastructure

As this is not an essential service this will not form any part of the funding agreement.

Department of State Growth – Entry Road Intersections

Advice has been received from Keith Midson concerning the treatment at the three entry road locations. A CHR(S) treatment is appropriate at all three locations. A CHR(S) treatment is approximately 160m long and involves introducing pavement widening, line marking and signage. A Bill of Quantities will be prepared for the Quantity Surveyor.

The construction of the CHR(S) intersections will facilitate development for the total land holding and the total cost for the three intersections will form part of the contributions plan.

Further to the intersections, a possible shared bike and pedestrian path from the Main Street to the entry point in 50 Boyer Road is being considered. Space and terrain may limit this proposal.

Funding of Infrastructure

The construction of three intersections to be included in a contributions plan and cost distributed on a per lot or developable land basis. A bike shared pathway would be included in a contributions scheme.

Tas Irrigation

Inquiries with Tas Irrigation have taken place after the LIST showed an irrigation pipeline located in the property. This is a DN630 irrigation line that runs from the north at Cobbs Hill Road into 25 Cobbs Hill Road and then into 50 Boyer Road before leaving the property crossing Boyer Road, under the rail corridor and into the Derwent Estuary crossing the river to Granton. The proposed layout keeps this irrigation infrastructure in proposed public land areas.

Conclusion

The Boyer Road development requires the provision of new services infrastructure to service approximately 360 residential lots. Early discussions with service authorities have been undertaken alongside preliminary concept design to determine the most likely and/or appropriate way forward for delivery of services.

Sewer infrastructure is expected to require the provision of three separate sewage pump stations at the low points of each catchment for pumping to existing gravity infrastructure outside 24 Boyer Road to the east. Upgrades to existing Nielsen Pde SPS will be required and include additional gravity and rising mains

Water supply will come from the Reservoir on Cobbs Hill Road. A minimum DN200 connection with a new main required to feed the development within a new road reserve or public reserve through the northern properties. To meet the supply needs a volume upgrade will be required to the reservoir.

To manage stormwater from both the site and existing catchments, stormwater detention is proposed within the two eastern-most catchments 1 & 2 with approximately 1,300m^3 and 2,360m^3 of detention volume expected to be required respectively. The western-most catchment 3 is not expected to require detention.

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All three catchments are to discharge through existing culverts beneath Boyer Road. Stormwater treatment is recommended to be provided at the source, either at the discharge from each developed area or on an individual lot basis to more effectively treat more highly polluted flows and minimise required infrastructure.

Power and communications supply is achievable with connection to existing infrastructure or augmented infrastructure and is not considered a risk to the development. TasNetworks will bundle supply and reticulation into a per lot charge passed onto the developer. NBN will take the same approach with guarantee to supply and cost recovery via a developer charge.

TasGas is considered an optional service with TasGas to determine if servicing the development is to be commercially viable.

The Traffic Engineer has provided intersection details and the cost of these will be determined and included in an overall contributions plan.

To assist the Quantity Surveyor a scope discussion is provided in Table format in Appendix E.

Yours Faithfully

Rodney Jesson
Director
Civil and Infrastructure

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Appendix A – Concept Site Services Plans

CONCEPT STORMWATER PLAN

SCALE 1:2500

REV:	ISSUED FOR / DESCRIPTION:	BY:	DATE:
A	INFORMATION PURPOSES	PVD	31-01-25

STATUS:
PRELIMINARY / INFORMATION

DO NOT SCALE - IF IN DOUBT, ASK

APPROVED: - ACRED. No: -

DESIGN BY: RJ
DESIGN CHK: JS
DRAWN BY: PVD
DRAFT CHK: -
DATE: -

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CLIENT: HOLMESDYER
PROJECT: BOYER ROAD PRECINCT
ADDRESS: 50 - 170 BOYER ROAD BRIDGEWATER

TITLE: CONCEPT STORMWATER SERVICE PLAN

SCALE: 1:2500 SHEET SIZE: A1 DWGS IN SET: -

PROJECT No: 251013 DWG No: C501 REV: A

CONCEPT SEWER + WATER SERVICE PLAN - SHEET 1
SCALE 1:2500

A	INFORMATION PURPOSES	PVD	31-01-25
REV:	ISSUED FOR / DESCRIPTION:	BY:	DATE:

STATUS:
PRELIMINARY / INFORMATION

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DESIGN CHK:	JS
DRAWN BY:	PVD
DRAFT CHK:	-
DATE:	-

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CLIENT: HOLMESDYER
PROJECT: BOYER ROAD PRECINCT
ADDRESS: 50 - 170 BOYER ROAD BRIDGEWATER

TITLE: CONCEPT SEWER + WATER SERVICE PLAN - SHEET 1
SCALE: 1:2500 SHEET SIZE: A1 DWGS IN SET: -
PROJECT No: 251013 DWG No: C502 REV: A

CONCEPT SEWER + WATER SERVICE PLAN - SHEET 2

SCALE 1:2500

REV:	ISSUED FOR / DESCRIPTION:	BY:	DATE:
A	INFORMATION PURPOSES	PVD	29-01-25

STATUS:

PRELIMINARY / INFORMATION

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DRAWN BY: PVD
DRAFT CHK: -
DATE: -

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CLIENT: HOLMESDYER
PROJECT: BOYER ROAD PRECINCT
ADDRESS: 50 - 170 BOYER ROAD BRIDGEWATER

TITLE: CONCEPT SEWER + WATER SERVICE PLAN - SHEET 2
SCALE: 1:2500 SHEET SIZE: A1 DWGs IN SET: -
PROJECT No: 251013 DWG No: C503 REV: A

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Appendix B – Taswater Correspondence

Update 22/11/24 Attached

Water and Sewerage Servicing Advice

TasWater Reference No.	TWSI 2024/00697-BTN
Date of response	22/11/2024 19/11/2024 05/11/2024
TasWater Contact	Elio Ross
Phone No.	0467 874 330

Response issued to

Name	Rare Innovation Pty Ltd
Address	22-24 Paterson Street LAUNCESTON, TAS 7250
Contact details	approvals@rarein.com.au

Development details

Address	170 BOYER RD, BRIDGEWATER
Property ID (PID)	7676396
Description of development	Proposed Subdivision 250-300 Lot

Advice

Hi Paul,

Thanks for the call earlier regarding the proposed 300 lots subdivision at 170 BOYER RD, BRIDGEWATER.

Pending the official comments back for our assets and modelling teams, I have reviewed the documentation to provide some preliminary comments.

~~It's assumed that the sewer is to fall to Riverside Drive Sewage Pumping Station BRIDGEWATER, (id GRPSP12). Likely several upgrades would be required, depending on the proposed discharge location it looks as though pipes will need to be upsized as well as SPS and storage locations.~~ See updated advice below

Water, there were no concept plans provided with potential connection points nominated for the water network. Currently, the area is partly zoned in the Boyer Restricted Zone (BRW16), Pressure Head Level 161.7m, assuming this is because of its coming off the DN648 (id: A3352946) Bulk main and not suitable for a connection for this development.

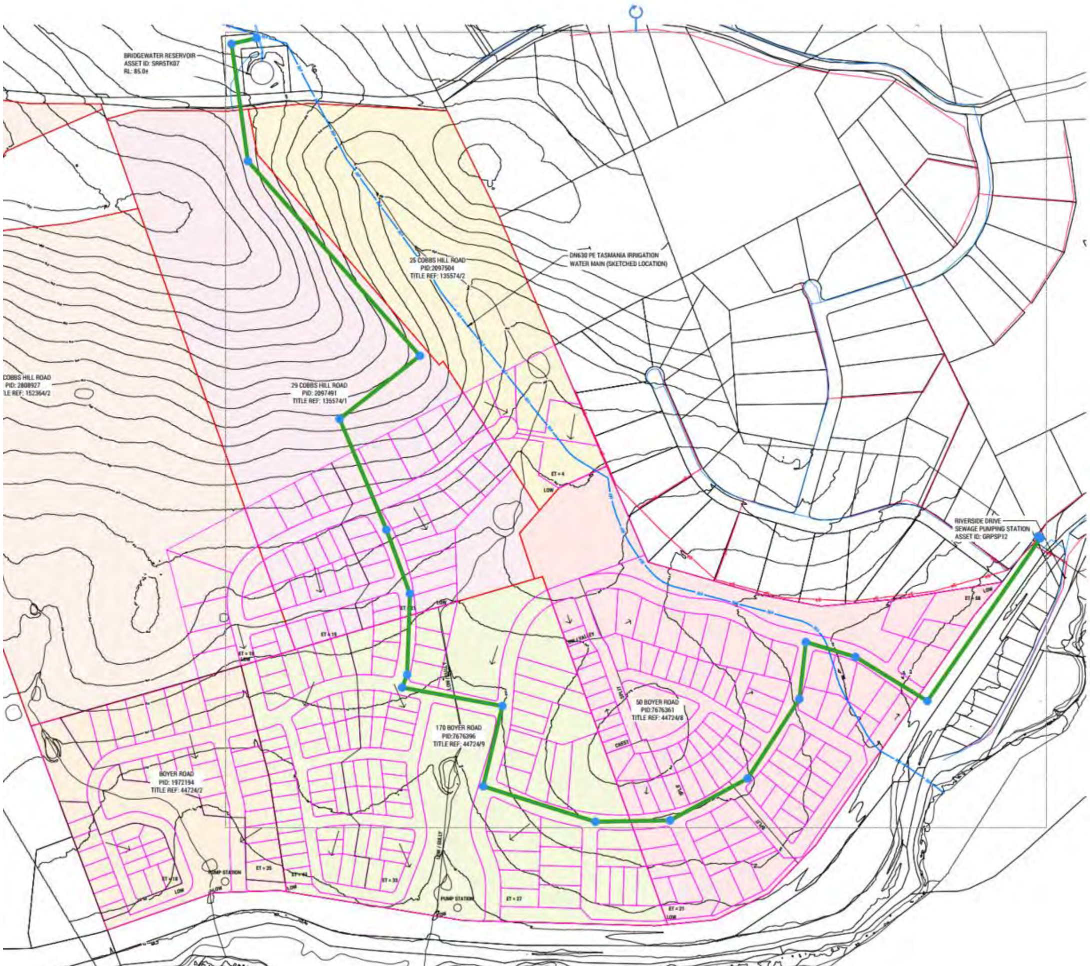
The other part of the development is located at 50 BOYER RD, which is zoned as Bridgewater Reservoir Zone (BRW1), with a head of 91m. This zone is more suitable for pressures given the approximate elevation of the lots range is 10m to 50m.

It is unclear where the proposed connections to the water network to feed the development will be located. The nearest location would be D100 (id A199973), which is too small to feed this development.

Typically, a single-direction feed would require a DN200 connection, or at least 2 x dn150 connections on a well-looped stable network.

Possibly a min DN200 connection to DN375 (id A203814) at the Bridgewater Reservoir, looped down to Serenity Drives DN100 would be the best approach.
Please note that the new water main cannot be in private property, the upper section of the loop will need to be located in a new roadway or council reserve.

I have sketched this below in green.



Please note that this is an early, provisional review of the area. More detailed modelling and asset reviews are being conducted, which will result in changes to the current assessment. This process will take additional time to complete.

Sewer Gravity:

Modelling analysis indicated that in the absence of the development, there is already a huge strain on the system with an abundance of excessively surcharging sewers and significant downstream capacity issues.

To accommodate this development all of the gravity mains between the discharge of the Riverside Drive SPS rising main to the Nielsen Parade SPS will need upsizing. TasWater may consider in a joint venture with the developer. However, this will require further investigations, consideration and approvals that will need to be confirmed.

The developer may also have to contribute to the upsizing of gravity mains between the discharge of the Nielsen Parade SPS rising main and the STP.

TasWater cannot accept the risks of allowing this development to connect without any infrastructure upgrades occurring.

SPS:

The development impacts two downstream SPS's GRPSP11 Nielsen Parade SPS and GRPSP12 Riverside Drive SPS.

GRPSP11 Nielsen Parade SPS

The downstream SPS "GRPSP11 Nielsen Parade SPS" currently has insufficient storage to support the proposed development. The total additional storage required at this site without the development is 22.5 kL. The total additional storage required at this site including the development is 52.6 kL. TasWater will hence be responsible for 22.5 kL and the developer responsible for 30.1 kL.

Pumps:

The pump station prior to the development fails to meet pump requirements by 10.3 l/s. With this development included, the pump station fails to meet pump requirements by 21.1 l/s.

Rising Main:

Following the required pump upgrade specified above, the rising main will need upsizing to accommodate the development.

GRPSP12 Riverside Drive SPS

The downstream SPS "GRPSP12 Riverside Drive SPS" currently has insufficient storage to support the proposed development. The total additional storage required at this site without the development is 0 kL. The total additional storage required at this site including the development is 25 kL. TasWater will hence be responsible for 0 kL and the developer responsible for 25 kL.

Pumps:

The pump station prior to the development meets pumping requirements. With this development included, the pump station fails to meet pump requirements by 0.8 l/s.

Rising Main:

Following the required pump upgrade specified above, the rising main will need upsizing to accommodate the development.

STP:

The Green Point STP has sufficient hydraulic and treatment capacity to accommodate the additional loading from the proposed development.

Water Modelling:

Modelling indicates there is capacity (in regards to available pressures) in the existing network at 170 Boyer Rd, Bridgewater (pipe A199973 and A203814) to supply this proposed development without impacting adversely on the existing infrastructure or customers. Total boundary heads (HGL), not pressures, at the proposed connection point(s) with the reservoir set to 1/3rd full are:

Location	H.G.L. Peak hour	H.G.L Peak day + 10 l/s fire flow
A199973 (Boyer Rd)	86	86
A203814 (Rev outlet)	87	87

These are heads within the Taswater network, so they do not account for losses in customer piping and fittings. This result is based on a sound but imperfect knowledge of conditions on the field and those who use this information should allow an appropriate margin of error in their design.

We noticed that the site falls within the Boyer Restricted Zone, and we agree that connecting to the A3352946 bulk main is not suitable for this development. Therefore, we proposed a DN200 loop: one connection from the reservoir outlet and another from 50 Boyer Rd (see image below).

The reservoir is already fully committed prior to adding this development. If this development proceeds, it will require upsizing storage (ie new reservoir) by the devloper prior to the completion of the subdivion.

TasWater confirms that you have made a pre-lodgement enquiry for the above proposal. TasWater's servicing advice in this response to the above proposal is based on the water and sewerage components of the proposal only. The other aspects of the proposal will be assessed by the relevant Planning Authority, or the Development Assessment Panel established under section 60G of the *Land Use Planning and Approvals Act* ("the Act") where the proposal is declared as a major project under 60C of the Act.

Despite anything else in the servicing advice TasWater reserves its rights regarding this proposal, when it is submitted for assessment as required by law under the Act.

Fees

This assessment is provided at no cost. For details on fees applicable for a formal assessment please see www.taswater.com.au

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Appendix C – Culvert Photos

Catchment 1 (50 Boyer Road)

Catchment 2 (170 Boyer Road)

Catchment 3 ('Boyer Road')

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Appendix D – TasNetworks Minutes

Early Engagement Meeting - Subdivisions

Case Reference No.	CN24-316681		
Case Manager	Alan Heald		
Date	10/01/2025	Site Address	170 Boyer Road BRIDGEWATER
Attendees	Chris Symons, Alex Izbicki, Katherine Johnston, Alan Heald. Rodney Jesson (RodneyJ@rarein.com.au)		
Apologies	Stephen Holmes (customer) admin@holmesdyer.com.au Kirsty Spilsbury (consultant) approvals@rarein.com.au		

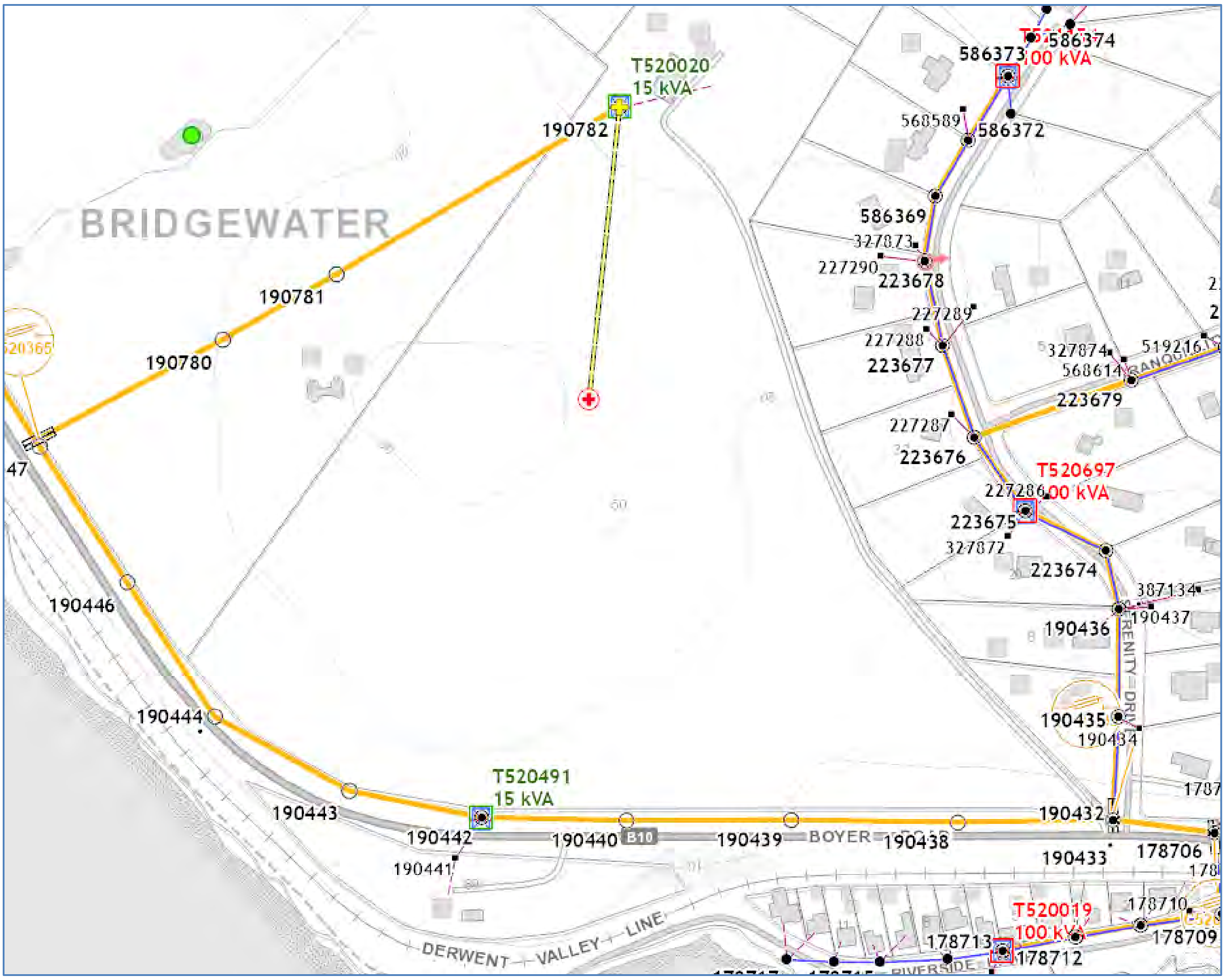
Agenda

#	Items Discussed
1	Introductions
2	Developer to discuss overview of Development: • 250 lots / multi staged development. Rodney has advised this could be up to 400 lots • There are 6 parcels of land with 6 separate owners • Planning is being undertaken by the local council and Rodney is acting as a planning consultant. • Various stakeholders have attended a meeting to future plan and gain insight into the proposed development. Cost contribution is an important factor for the development planning. • The planning approvals and stages have not been finalised and are subject to feasibility studies. Rodney is requesting this from TasNetworks. For TasNetworks to provide this, a staged plan will need to be provided. What outcomes does Developer require from this meeting: Is a Planning Permit in-place? ☐ Yes or ☑ No Note: application will not be progressed to design without receipt of the planning permit. Have any aboriginal /Enviro studies been undertaken as part of the planning permit? ☐ Yes or ☑ No Reports to be provided if available Have CAD files been supplied? ☐ Yes or ☑ No Is this Development Staged? ☑ Yes or ☐ No

	If yes staged, please provide a staging plan and confirm sequences of construction so TasNetworks can design a development plan. What are the intentions for street lighting, council will need to provide advice on what they require (rural subdivision)?
3	Customer choice options (note TasNetworks due to administrative requirements may not support changes to an option part way through the application process). ☐ Accredited Electrical Designers (AED) & Accredited Electrical Constructors (AEC) ☐ TasNetworks as Designers & Accredited Electrical Constructors (AEC) ☐ TasNetworks as Designers & TasNetworks as Constructor
4	What are the Developer's program timings? Note: Timing of TasNetworks Services • Currently: o 14 weeks to design from start date. o 20 weeks construction min. 36 weeks construction min. if a substation is required. Due to construction scheduling and procurement of equipment the construction stage may take approximately 20 weeks (indicative estimates only) to complete. In some instances, these timeframes may be extended due to the supply of materials, weather, the work schedule of construction crews, or delays that are attributable to you or your external service provider. This can push up-to 24 weeks if a substation is involved. Do you require pre-purchase of substation if choosing TN to design/construct (18-20 weeks delivery time)? ☐ Yes or ☐ No
5	Network planning feedback: • A staging plan is required for an accurate feasibility study to strategically place substations and HV network and provide a clear feasibility plan. • The feeder that supplies development will need a network augmentation when development begins. The augmentation will be based on future needs. • Network Augmentation is triggered by the required needs as the development proceeds, this trigger will try to be picked up at Stage 1 but may not occur until Stage 7 depending on what other infrastructure requirements are within the network.

7	Design and Estimation Feedback: • Estimation of the cost per lot is a rough order of magnitude and can be subject to various factors that can alter this amount and should only be a guided estimation only. A figure of approximately $12,000.00 per lot was discussed however after receiving further technical advice at the conclusion of the meeting held, cost will be in the order of $15,000.00 to $20,000.00. • Cost separation between network augmentation and the new network within the development is preferred for cost allocation. Note: TasNetworks conducts audits to assess the general compliance of the proposed (AED) designs. Acceptance by TasNetworks does not relieve the AED of responsibility for suitability or correctness of the design. The audit will be undertaken within ten business days, unless otherwise agreed.
8	Construction Auditing Requirement for Accredited Electrical Constructors (AEC). • Open trench and cabling audit • Pre-commissioning and As-built audit Note: A TasNetworks Electrical Safety Specialist will complete the above staged audits, and non-compliance will be communicated to the Constructor and the Developer. The Developer is to ensure Constructor rectifies the identified non-conformance to ensure the construction schedule goes ahead as planned to mitigate any further delays. Note: regarding street and road names, can the developer please initiate this process early in the subdivision construction and provide to the AEC to ensure electrical labelling by the AEC is accurate at time of requesting the pre-commissioning and as-built audits Having labels fitted with roads 1,2 and 3 does not meet compliance and will not proceed to commissioning until such times as labelling is rectified.
9	Are there any known risks or issues associated to this development?

	Actions	**Due Date**
1	Civil Site Contact #	
2	Staging plan from developer for feasibility study	


BRIDGEWATER
T520020
15 kVA
190782
190781
190780
190446
190444
190443
T520491
15 kVA
190442
190441
190440
B10
190439
BOYER
190438
190432
190433
178706
DERWENT VALLEY LINE
T520019
100 kVA
178713
178712
178710
178709
586374
586373
586372
568589
586369
327873
227290
223678
227289
227288
223677
327874
568614
519216
223679
227287
223676
T520697
227286
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327872
223674
387134
190437
190436
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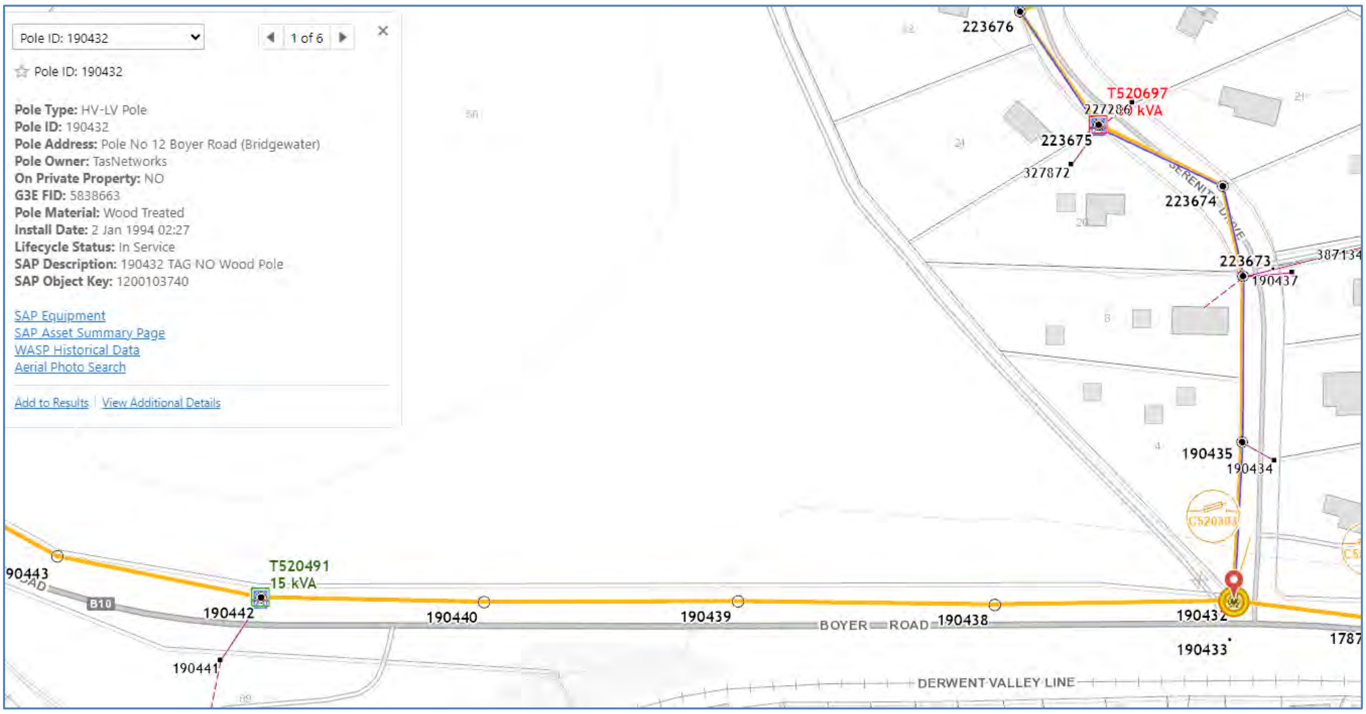
190434
SERENITY DRIVE


Pole ID: 190432
1 of 6
Pole ID: 190432
Pole Type: HV-LV Pole
Pole ID: 190432
Pole Address: Pole No 12 Boyer Road (Bridgewater)
Pole Owner: TasNetworks
On Private Property: NO
G3E FID: 5838663
Pole Material: Wood Treated
Install Date: 2 Jan 1994 02:27
Lifecycle Status: In Service
SAP Description: 190432 TAG NO Wood Pole
SAP Object Key: 1200103740
SAP Equipment
SAP Asset Summary Page
WASP Historical Data
Aerial Photo Search
Add to Results
View Additional Details
223676
T520697
227286 kVA
223675
327872
223674
223673
387134
190437
190435
190434
T520491
15 kVA
190443
B10
190442
190441
190440
190439
BOYER ROAD
190438
190432
190433
DERWENT VALLEY LINE

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Appendix E – Funding Scope Table

Authority	Infrastructure Element	Contribution Funding	Developer Cost
TasNetworks - Power			
	HV Augmentation and Site supply		Yes
	Internal Reticulation		Yes
Council - Stormwater			
	Detention Basins x 2 including Landscaping	Yes	
	Water Quality Devices – Source Control		Yes
	Local Stormwater Network		Yes
Council - Roads			
	Internal Road Network		Yes
	Internal Bridges x2		Yes
Council - Landscaping			
	Streetscape		Yes
	Parks and Waterways		Yes
	Walking Trails		Yes
	Playground	Yes	
Department of State Growth			
	Intersection Treatment	Yes	
	Shared Bike/Pedestrian Pathway	Yes	
TasWater - Water			
	New Reservoir Capacity Upgrade	Yes	
	DN200 and trunk watermain	Yes	
	Internal water reticulation		Yes
TasWater - Sewer			
	Sewer Pump Stations and Rising Main	Yes	
	Nielsen Pde Sewer Pump Station Upgrade	Yes (TW contribution)	
	Downstream gravity main upgrades	Yes	
	Internal reticulation network		Yes
NBN			
	Infrastructure supply		Yes
	Internal reticulation		Yes

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Our Ref: 251013

8th November 2024

Update 19 November 2024

Update 31 January 2025

Holmes Dyer Pty Ltd
Leve 3, Reid House, 15 Featherstone Place
Adelaide SA 5000

ATTENTION: S Holmes

Dear Stephen

SITE ANALYSIS REPORT FOR INFRASTRUCTURE REQUIREMENTS – BOYER PSP

I am writing to you about the findings to date for the provision of infrastructure services to the proposed subdivision based on the Plan 1792-002 R2>14.01.25 provided by Holmes Dyer. This working document shows approximately 362 lots. The essential services required include power supply from TasNetworks, sewer systems and water supply from TasWater and communications from NBN Co. Brighton Council have provided feedback on stormwater management including stormwater quantity and quality control. Consideration has been given to the provision of natural gas supply from TasGas. Additionally, to the infrastructure requirements, information from Tas Irrigation is included showing the approximate location of an irrigation supply pipeline. Keith Midson Traffic Engineer, has provided intersection treatments for entry points along Boyer Road.

The collection of background information on the services will inform the establishment of funding models.

TasNetworks - Power Supply

Contact Person – Gary Hancl – 0438 338 060 Alan Heald and Alex Izbecki

Initial contact was made via email to Clodagh Doyle on 24/9/24. Due to some internal staff movements, setting up an Early Engagement meeting proved difficult. On 31/10/24 a discussion finally took place with Gary Hancl – Team Leader. This was a good opportunity to explain the project context and that we are planning the future and not the developers of the project. He understands that we are looking for high level design of the system that will lead to high level costings enabling a model for funding to be established that links the power supply infrastructure to the future development. He has now organised an Early Engagement meeting for 10am on 12/11/24 with the right people within TasNetworks. Further reporting to follow.

Update 19/11/24

Early Engagement meeting was held on 12/11/24 with Gary Hancl, Angela Trewin and Chris Symons. The Network Planning Representative was not at the meeting but was contacted after the meeting. The positive outcomes were that TasNetworks do not have any issues in terms of supply to this location. The design may

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include a looped supply especially if there is connectivity to Cobbs Hill Road. The internal requirements for supply are a 750kVa sub station per 100 lots. Preferable substation locations are central to the lots being supplied.

Update 10/1/24

After advice received from the Enquiry by Design Meeting from TasNetworks, the suggestion was to apply for a Feasibility Study. This occurred and on return to the office 6/1/25 and invitation for a new Early Engagement Meeting was received for 9/1/25 from different people in the Negotiated Connections Team, including Alan Heald and Katherine Johnstone. At the meeting Alex Izbecki was in attendance and understood that we are in a pre-planning and pre-subdivision phase.

The machinations of TasNetworks do not cater for pre-planning and they are used to dealing with subdivision developments with Planning Approval. They could do the feasibility study for a cost and would require a Staging Plan, which has now been produced.

Having said this they have indicated that they have an obligation to supply, that any costs associated with augmentation or upgrade requirements are bundled up into the developer costs that are normally associated with a subdivision. These developer costs include the HV lead in, sub-stations and underground reticulation. TasNetworks have indicated an indicative cost of $15 000 to $20 000 per lot.

Minutes of the meeting attached in Appendix D.

Funding of Infrastructure Decision 31/1/25

Based on advice from TasNetworks the design and supply of the power to the future subdivision site is achievable. Augmentation of HV supply is achievable and final design will be developed with a development plan as per TasNetworks practice. The costs associated to achieve the required HV supply and the breakdown to LV via substations will be distributed to the developer generally as per lot basis. No costs are to be included in a contribution's arrangement.

TasWater – Sewer Systems and Water Supply

Contact Person - Elio Ross – 0467 874 330 Update provided 22/11/24

Sewer System

In the first instance the advice from TasWater was to lodge a Service Enquiry. This was lodged with TasWater through their Portal on 16/10/24. To provide context to the servicing discussion we made calculations for Equivalent Tenements (ET's) for the sewer based on the three natural catchments within the development area. Each catchment has a low point adjacent to Boyer Road and will require a Sewer Pump Station. Pump Station 1 is located in 50 Boyer Road (Property ID: 7676361, Title Ref: 44724/8). Pump Station 2 is located in 170 Boyer Road (Property ID: 7676396, Title Ref: 44724/9) and Pump Station 3 is located furthest west in the property known as Boyer Road (Property ID: 1972194, Title Ref: 44724/2). The ET's for each catchment and Pump Station are listed in Table 1. A typical allowance for a 20% growth rate has also been included.

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The sewer pump stations have been sized at the highest level for environmental sensitivity based on their close proximity to the Derwent Estuary, meaning the storage time will be 8 hours (in accordance with *Taswater Supplement to WSA 04-2005 2.1 WSAA Sewage Pumping Code of Australia)* and hence the pump station size will be larger than a regular pump station with low environmental rating. The default environmental rating may be lowered subject to further risk assessments in consultation with Taswater, however due to the proximity to the Derwent Estuary, it is assumed that a high rating is appropriate and is likely to be required.

Consideration was given to a common rising main to allow each pump station to discharge into a common line before being discharged into a gravity manhole outside 24 Boyer Road. A professional discussion took place to investigate the possibility of achieving this outcome. After this discussion it was determined that it would not be possible to achieve this. There are two other possible ways to achieve the discharge requirements of the three pump stations. The first is to install an individual rising main to each sewer pump station. This means a common trench can be used from near Serenity Drive all the way to 24 Boyer Road. The other possible solution is to daisy chain the pump stations, that is one pumps to the other and then the next one. This means the pump stations would have to increase in size to accommodate the additional effluent discharged by the previous pump station and the inflow from the local catchment. A high-level cost analysis of these options will be carried out. In the first instance the multiple rising main option is likely to be the best option for cost but also for the fact that the stand-alone development can occur on the individual larger parcels. Please see new advice received about the pump stations and a common rising main.

The sewer pump station volumes for the multiple rising main option are shown in Table 1.

Table 1 – Sewage Pump Station Parameters – Current Plan > 362 lots

Pump Station ID	Developed Equivalent Tenements (ET's) (+20% Growth Rate)	Pump Station Volume	Pump Flow Rate
1 (50 Boyer Road)	134	20.1 m^3	10.62 L/s
2 (170 Boyer Road)	248	37.2 m^3	18.04 L/s
3 ('Boyer Road')	71	10.6 m^3	5.95 L/s

Preliminary comment from Taswater was received on 05/11/24 (included in Appendix B), with more detailed advice from Taswater's assets and modelling teams still to follow. Taswater's preliminary comment assumed connection to the existing Riverside Drive Sewage Pumping Station (ID: GRPSP12) which represents another option for connection location, however indicated that several upgrades to the existing piped network and sewage pumping station would likely be required in this instance and the Riverside Drive SPS will not be included.

<u>Service Enquiry Update 22/11/24</u>

After discussion with TasWater and receiving the written advice indications are that a common rising main linking all three pumpstations is a possibility. This may change the configuration of each of the pump stations and will be subject of future design. The already calculated total capacity requirements for all three pump stations are unlikely to change and hence these sizes can be used to calculate costs in relation to a contribution model.

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TasWater have also provided additional information about their downstream sewerage infrastructure. They are indicating that there is significant strain on the gravity system, the existing sewer pump stations and rising mains. One positive is that the Green Point Sewerage Treatment Plant has adequate capacity to cater for the development.
Gravity main upgrades are required between the receiving manhole and the Nielsen Parade SPS. Further to this gravity and rising main upgrades maybe required from the Nielsen Parade SPS to the Green Point STP.

The Sewer Pump Station at Nielsen Parade requires an upgrade in volume, at total of 52.6kL. Taswater water have nominated that 30.1kL are the responsibility of the development. Further to this pump upgrades will be required with additional flow rate. The additional flow rate will require a larger rising main. These works are shown on Plan 251013 C503, with alternatives for the possible rising main upgrades. TasWater Servicing Advice found in Appendix B.

Funding of Infrastructure 31/1/25 - Sewer

The upgrade to the existing Nielsen Parade Pump Station will have shared costs between TasWater and an infrastructure contribution for Boyer PSP. Taswater have been clear in regard to volume upgrades and pump upgrades and their portion of these costs. The final part of the puzzle is the final rising main size. The cost difference is minimal in the rising main pipe diameter as most of the cost is in trenching and backfilling. A BoQ has been produced to assist the Quantity Surveyor to establish the apportioned costs to the contributions plan.

Water Supply

The creation of a reticulated water supply network to service the development will require connection to the existing Taswater supply network. The closest connection location is at the intersection of Serenity Drive and Boyer Road to an existing DN100 PVC main. Preliminary comment from Taswater (included in Appendix B) has indicated that the existing DN100 main will be too small to service the development with a DN200 connection (or 2 x DN150) typically required for a development of this size. The existing Taswater network within a reasonable proximity to the site (developed areas to the east) consists entirely of DN100 or less sized mains, meaning no suitable connection is in close proximity to the site from this area.

The existing developed area to the east is supplied from the single Bridgewater Reservoir (ID: HOBWS017), which is located adjacent to Cobbs Hill Road to the north of the site. Taswater has advised that connection for the site will likely be required directly from the existing DN375 main (ID: A203814) at the reservoir. Connection at this location would mean the new water supply will be required to run through areas of 29 Cobbs Hill Road not previously included for development. Taswater has also advised that the creation of a new road reserve would be required to house the new DN200 main as new water mains cannot be located within private property. It is likely that the new mains servicing the site will also require connection back into the existing network at Serenity Drive to create a closed loop.

No other existing infrastructure suitable for direct connection is present within the surrounding areas. Several large bulk transfer mains are located further north of the site as well as a DN630 irrigation main that partially runs through 50 Boyer Road, however these are not suitable nor available for connection. This means that Taswater's initial comments on connection location nearby the reservoir are very likely to be the required solution for the site.

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In preliminary assessment of possible connections to Serenity Drive, an EPANET model has been undertaken which has been adjusted to include supply from the Bridgewater Reservoir. Preliminary results from the model show that adequate pressures and flows are expected to be available to all lots on the site inclusive of both residential and fire flows to the most hydraulically disadvantaged lot. A screenshot of the EPANET model is provided in Figure 1 below.

<u>Service Enquiry Update 22/11/24</u>

Water Infrastructure

Previous advice in regards to supply from the reservoir on Cobbs Hill Road still applies including the trunk supply at DN200 then spreading to DN100 throughout the subdivision. The new advice is that the capacity of the reservoir is not adequate to maintain existing servicing and supply the proposed subdivision. To this end TasWater will require additional capacity, either by rebuilding the existing reservoir with additional capacity or by building a second reservoir to give the additional capacity. If there is adequate land area a second reservoir is the likely outcome as this will limit supply disruption. We will discuss further with TasWater about the like volume requirement for additional storage.

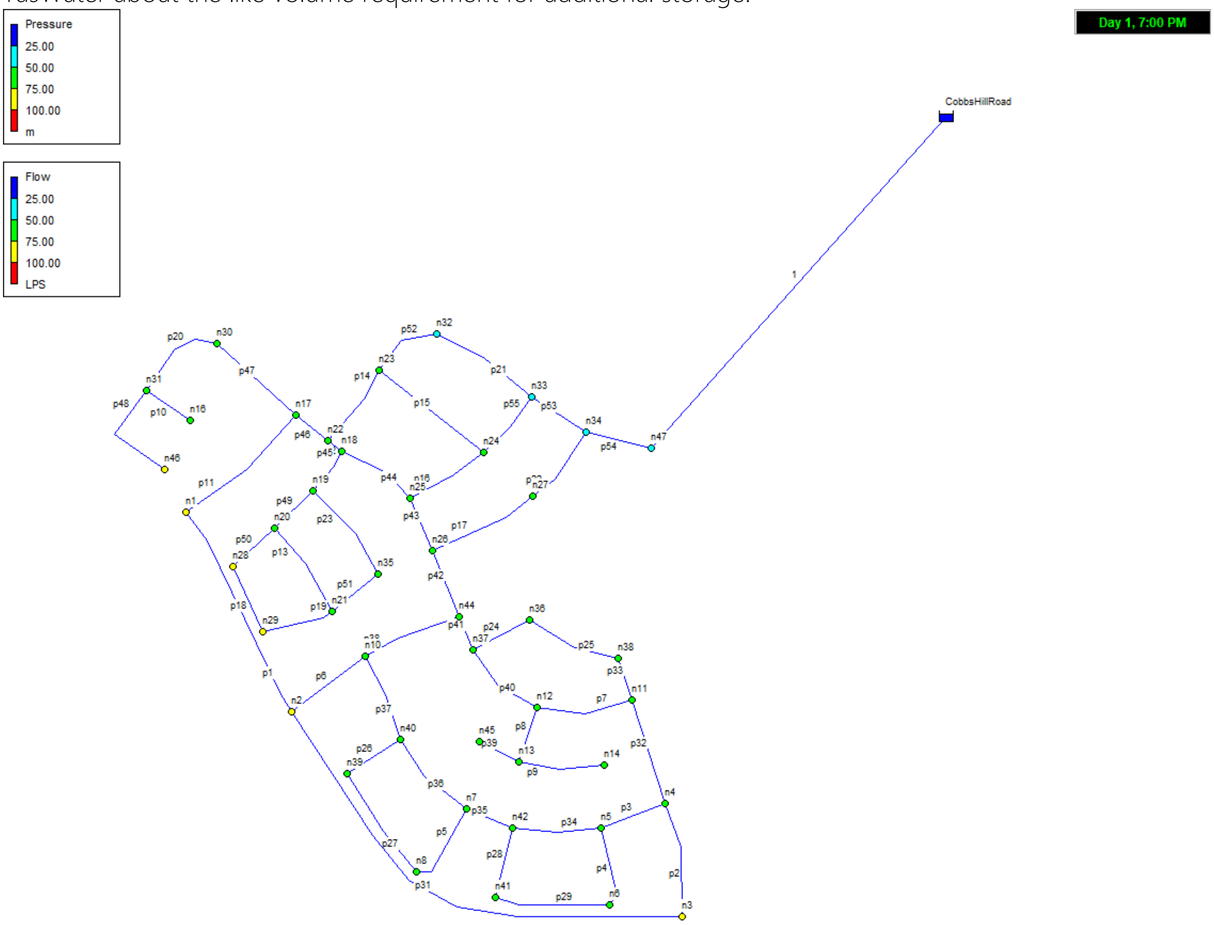

Figure 1 – EPANET Model (Cobbs Hill Road Connection)

This model provides DN 200 lead in from the reservoir spreading to a DN100 network within the subdivision.

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Funding of Infrastructure 31/1/25 - Water

The requirement for additional reservoir storage at Cobbs Hill Road will fall under an infrastructure contribution model. Also included will be the DN200 connection from the Cobbs Hill Reservoir into the subdivision as it is required. Link water infrastructure that enables 50 Boyer Road, 170 Boyer Road and the third property on Boyer Road to be included in the infrastructure contribution model. A Bill of Quantities has been prepared for use by the Quantity Surveyor.

Council - Stormwater Discharges and Onsite Detention – Internal Roads

Contact Person – Leigh Wighton – 0418 569 044

A meeting with Brighton Council was undertaken on 05/11/24 which included discussion on stormwater quality and quantity management with the information provided below being in-line with these discussions and Council's direction/requirements.

The land has three overall catchments with each falling to Boyer Road as shown on the concept plans provided in Appendix A. Each catchment discharges via an existing pipe under Boyer Road. Catchment 1 (50 Boyer Road) has a twin DN375 discharging under Boyer Road into a table drain that runs towards the railway crossing point at Riverside Drive. Catchment 2 (170 Boyer Road) discharges via a DN900 under Boyer Road and then under the railway corridor and finally to the Derwent Estuary. Finally, Catchment 3 ('Boyer Road') has a DN1200 discharging under Boyer Road and then under the railway corridor to the Derwent Estuary. Photos of the existing pipes from the upstream side are provided in Appendix C.

The Catchments 2 & 3 have defined gullies, and because of the rural nature have farm dams capturing flows at various locations. While these dams provide online storage, this has been ignored for the overall catchment modelling. The catchment modelling was carried out using the software package DRAINS to determine the impact of increasing the impervious areas due to development. A screenshot of the DRAINS model is provided in Figure 2. The discharge parameters used consisted of maintaining the existing pipe sizes beneath Boyer Road to control flows up to the 1% AEP event including a climate change increase factor of 16.3%. The results of the modelling including likely detention sizes required, are shown in Table 2, noting that catchment 3 did not require any detention with the existing DN1200 pipe and roadside depression being adequate to build driving head and discharge of the post-development flows.

Table 2 – Stormwater Flows and Detention Requirements

Catchment ID	Existing Pipe Discharge Size	Peak 1% AEP Post-Developed Flow (Generated by Catchment)	Approximate Detention Volume Required	Peak 1% AEP Post-Developed Flow Through Culvert (With Detention)
1 (50 Boyer Road Discharge)	2 x DN375	1.04 m^3/s	1,300 m^3 (Approx. 1400m^2, 2m max. depth)	0.358 m^3/s
2 (170 Boyer Road Discharge)	DN900	3.57 m^3/s	2,360 m^3 (Approx. 2000m^2, 3m max. depth)	2.23 m^3/s

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3 ('Boyer Road' Discharge)	DN1200	3.56 m^3/s	Nil (sufficient pipe capacity/inlet storage)	3.35 m^3/s

With the presence of an existing gully within Catchment 2, the topography is expected to lend itself to the creation of a suitable detention basin. The topography adjacent to the outlet for Catchment 1 is less well defined in regards to an existing low point/water course and would likely require additional earthworks to construct a suitable detention basin.

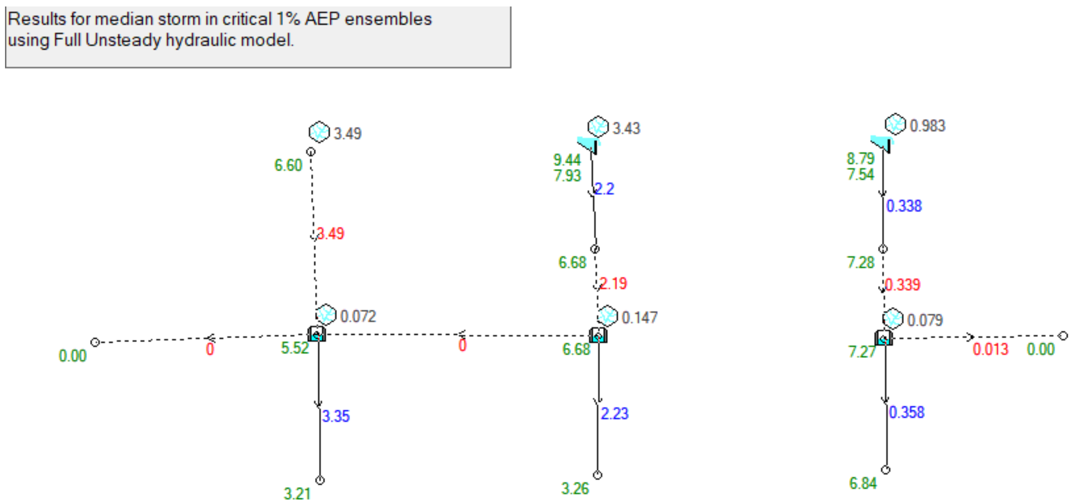

Figure 2 – DRAINS Model (1% AEP Event)

Funding of Infrastructure

It is likely that the detention basins would be included in a funding model as there based on their need to limit flows and prevent further pipe infrastructure upgrades. It would be fair for these to be aggregated as a whole of development requirement.

Stormwater Quality

Treatment of stormwater flows from developed areas is expected to be required in accordance with the pollutant reduction targets of 90% Gross Pollutants (GP), 80% Total Suspended Solids (TSS), 45% Total Phosphorus (TP) and 45% Total Nitrogen (TN) outlined in the *Tasmanian Stormwater Policy Guidance and Standards for Development* document.

Due to the significant portion of external undeveloped catchment flows and the nature of the development having the potential for staged or partial development of individual land parcels, it is expected to provide a better outcome to provide at source treatment/control. This would involve treatment at the localised discharges from the major developed areas before discharging into the existing gullys/watercourses, and/or by providing treatment at the time of development on each individual lot. By allowing the large portion of external catchment flows to discharge directly to Boyer Road, bypassing treatment, more efficient removal of pollutants from developed areas can be carried out with less dilution of polluted flows. This may assist in lowering the total sizes of treatment infrastructure required. Potential locations for combined treatment systems are indicated on the concept plans provided in Appendix A, however may be located elsewhere depending on final outlet locations.

It is expected that with the inclusion of the open space/watercourse areas that sufficient space will be available for treatment devices to meet the required pollutant reduction targets at the outlets from individual developed areas. The configuration of treatment devices may include both the use of 'natural' WSUD solutions (e.g. sediment ponds, swales, bioretention) and proprietary treatment devices (e.g. gross pollutant traps, filtration systems) with further assessment required to determine treatment sizes dependant on selected methods.

Funding of Infrastructure

Local source control water quality devices to fall under local developer costs.

Internal Road Bridges

While the internal road network built to LGAT standards and requirements will be the developers cost, there are two bridges crossing the water ways, one in 170 Boyer Road and the other in western Boyer Road property. Thes have been considered for contribution funding but on the basis that they are not required to facilitate the development for all six properties have been excluded from contribution funding.

NBN

Contact Person – Peter Freshney – Kisstel – 0417 287 006 Daniel Costa – NBN Co. daniel.costa@nbnco.com.au

Communication services in the form of the NBN are located at the intersection of Boyer Road and Serenity Drive. Both 50 and 170 Boyer Road are connected by Fixed Wireless to the NBN network. Contact has been made with a local designer and installer to receive an appropriate contact with Development Planning at NBN for discussion. Peter has advised that Daniel Costa of NBN Co. is our contact. We will follow up with Daniel in due course.

<u>Update 6/12/24</u>

Met with Daniel Costa from NBN. He is confident that NBN will supply the future subdivision and lead in infrastructure will be provided as part of an overall development plan. Costs will be part of developer charges similar to TasNetworks. Typically costs are $1000 to $1500 per lot.

Funding of Infrastructure

NBN infrastructure to fall under local developer costs.

TasGas

TasGas have reticulation of Natural Gas on the eastern side of the Midland Highway in Bridgewater. The supply of Natural Gas is not considered to be an essential service but rather an optional service. Generally,

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TasGas will make a commercial decision in terms of supplying an area based on the level of interest of future customers.

Funding of Infrastructure

As this is not an essential service this will not form any part of the funding agreement.

Department of State Growth – Entry Road Intersections

Advice has been received from Keith Midson concerning the treatment at the three entry road locations. A CHR(S) treatment is appropriate at all three locations. A CHR(S) treatment is approximately 160m long and involves introducing pavement widening, line marking and signage. A Bill of Quantities will be prepared for the Quantity Surveyor.

The construction of the CHR(S) intersections will facilitate development for the total land holding and the total cost for the three intersections will form part of the contributions plan.

Further to the intersections, a possible shared bike and pedestrian path from the Main Street to the entry point in 50 Boyer Road is being considered. Space and terrain may limit this proposal.

Funding of Infrastructure

The construction of three intersections to be included in a contributions plan and cost distributed on a per lot or developable land basis. A bike shared pathway would be included in a contributions scheme.

Tas Irrigation

Inquiries with Tas Irrigation have taken place after the LIST showed an irrigation pipeline located in the property. This is a DN630 irrigation line that runs from the north at Cobbs Hill Road into 25 Cobbs Hill Road and then into 50 Boyer Road before leaving the property crossing Boyer Road, under the rail corridor and into the Derwent Estuary crossing the river to Granton. The proposed layout keeps this irrigation infrastructure in proposed public land areas.

Conclusion

The Boyer Road development requires the provision of new services infrastructure to service approximately 360 residential lots. Early discussions with service authorities have been undertaken alongside preliminary concept design to determine the most likely and/or appropriate way forward for delivery of services.

Sewer infrastructure is expected to require the provision of three separate sewage pump stations at the low points of each catchment for pumping to existing gravity infrastructure outside 24 Boyer Road to the east. Upgrades to existing Nielsen Pde SPS will be required and include additional gravity and rising mains

Water supply will come from the Reservoir on Cobbs Hill Road. A minimum DN200 connection with a new main required to feed the development within a new road reserve or public reserve through the northern properties. To meet the supply needs a volume upgrade will be required to the reservoir.

To manage stormwater from both the site and existing catchments, stormwater detention is proposed within the two eastern-most catchments 1 & 2 with approximately 1,300m^3 and 2,360m^3 of detention volume expected to be required respectively. The western-most catchment 3 is not expected to require detention.

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All three catchments are to discharge through existing culverts beneath Boyer Road. Stormwater treatment is recommended to be provided at the source, either at the discharge from each developed area or on an individual lot basis to more effectively treat more highly polluted flows and minimise required infrastructure.

Power and communications supply is achievable with connection to existing infrastructure or augmented infrastructure and is not considered a risk to the development. TasNetworks will bundle supply and reticulation into a per lot charge passed onto the developer. NBN will take the same approach with guarantee to supply and cost recovery via a developer charge.

TasGas is considered an optional service with TasGas to determine if servicing the development is to be commercially viable.

The Traffic Engineer has provided intersection details and the cost of these will be determined and included in an overall contributions plan.

To assist the Quantity Surveyor a scope discussion is provided in Table format in Appendix E.

Yours Faithfully

Rodney Jesson
Director
Civil and Infrastructure

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Appendix A – Concept Site Services Plans

CONCEPT STORMWATER PLAN

SCALE 1:2500

REV:	ISSUED FOR / DESCRIPTION:	BY:	DATE:
A	INFORMATION PURPOSES	PVD	21-05-25

STATUS: **PRELIMINARY / INFORMATION**

DO NOT SCALE - IF IN DOUBT, ASK

APPROVED: - ACRED. No: -

DESIGN BY:	RJ
DESIGN CHK:	JS
DRAWN BY:	PVD
DRAFT CHK:	-
DATE:	-

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CLIENT: HOLMESDYER

PROJECT: BOYER ROAD PRECINCT

ADDRESS: 50 - 170 BOYER ROAD BRIDGEWATER

TITLE: CONCEPT STORMWATER SERVICE PLAN

SCALE: 1:2500 SHEET SIZE: A1 DWGs IN SET: -

PROJECT No: 251013 DWG No: C501 REV: A

CONCEPT SEWER + WATER SERVICE PLAN - SHEET 1

SCALE 1:2500

REV:	ISSUED FOR / DESCRIPTION:	BY:	DATE:
A	INFORMATION PURPOSES	PVD	21-05-25

STATUS:
PRELIMINARY / INFORMATION

DO NOT SCALE - IF IN DOUBT, ASK

APPROVED: -
ACRED. No: -

DESIGN BY:	RJ
DESIGN CHK:	JS
DRAWN BY:	PVD
DRAFT CHK:	-
DATE:	-

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CLIENT: HOLMESDYER
PROJECT: BOYER ROAD PRECINCT
ADDRESS: 50 - 170 BOYER ROAD BRIDGEWATER

TITLE: CONCEPT SEWER + WATER SERVICE PLAN - SHEET 1
SCALE: 1:2500 SHEET SIZE: A1 DWGS IN SET: -
PROJECT No: 251013 DWG No: C502 REV: A

CONCEPT SEWER + WATER SERVICE PLAN - SHEET 2

SCALE 1:2500

REV:	ISSUED FOR / DESCRIPTION:	BY:	DATE:
A	INFORMATION PURPOSES	PVD	29-01-25

STATUS:
PRELIMINARY / INFORMATION

DO NOT SCALE - IF IN DOUBT, ASK

APPROVED: - | ACRED. No: -

DESIGN BY: RJ
DESIGN CHK: JS
DRAWN BY: PVD
DRAFT CHK: -
DATE: -

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CLIENT: HOLMESDYER
PROJECT: BOYER ROAD PRECINCT
ADDRESS: 50 - 170 BOYER ROAD BRIDGEWATER

TITLE: CONCEPT SEWER + WATER SERVICE PLAN - SHEET 2
SCALE: 1:2500 SHEET SIZE: A1 DWGs IN SET: -
PROJECT No: 251013 DWG No: C503 REV: A

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Appendix B – Taswater Correspondence

Update 22/11/24 Attached

Water and Sewerage Servicing Advice

TasWater Reference No.	TWSI 2024/00697-BTN
Date of response	22/11/2024 19/11/2024 05/11/2024
TasWater Contact	Elio Ross
Phone No.	0467 874 330

Response issued to

Name	Rare Innovation Pty Ltd
Address	22-24 Paterson Street LAUNCESTON, TAS 7250
Contact details	approvals@rarein.com.au

Development details

Address	170 BOYER RD, BRIDGEWATER
Property ID (PID)	7676396
Description of development	Proposed Subdivision 250-300 Lot

Advice

Hi Paul,

Thanks for the call earlier regarding the proposed 300 lots subdivision at 170 BOYER RD, BRIDGEWATER.

Pending the official comments back for our assets and modelling teams, I have reviewed the documentation to provide some preliminary comments.

~~It's assumed that the sewer is to fall to Riverside Drive Sewage Pumping Station BRIDGEWATER, (id GRPSP12). Likely several upgrades would be required, depending on the proposed discharge location it looks as though pipes will need to be upsized as well as SPS and storage locations.~~ See updated advice below

Water, there were no concept plans provided with potential connection points nominated for the water network. Currently, the area is partly zoned in the Boyer Restricted Zone (BRW16), Pressure Head Level 161.7m, assuming this is because of its coming off the DN648 (id: A3352946) Bulk main and not suitable for a connection for this development.

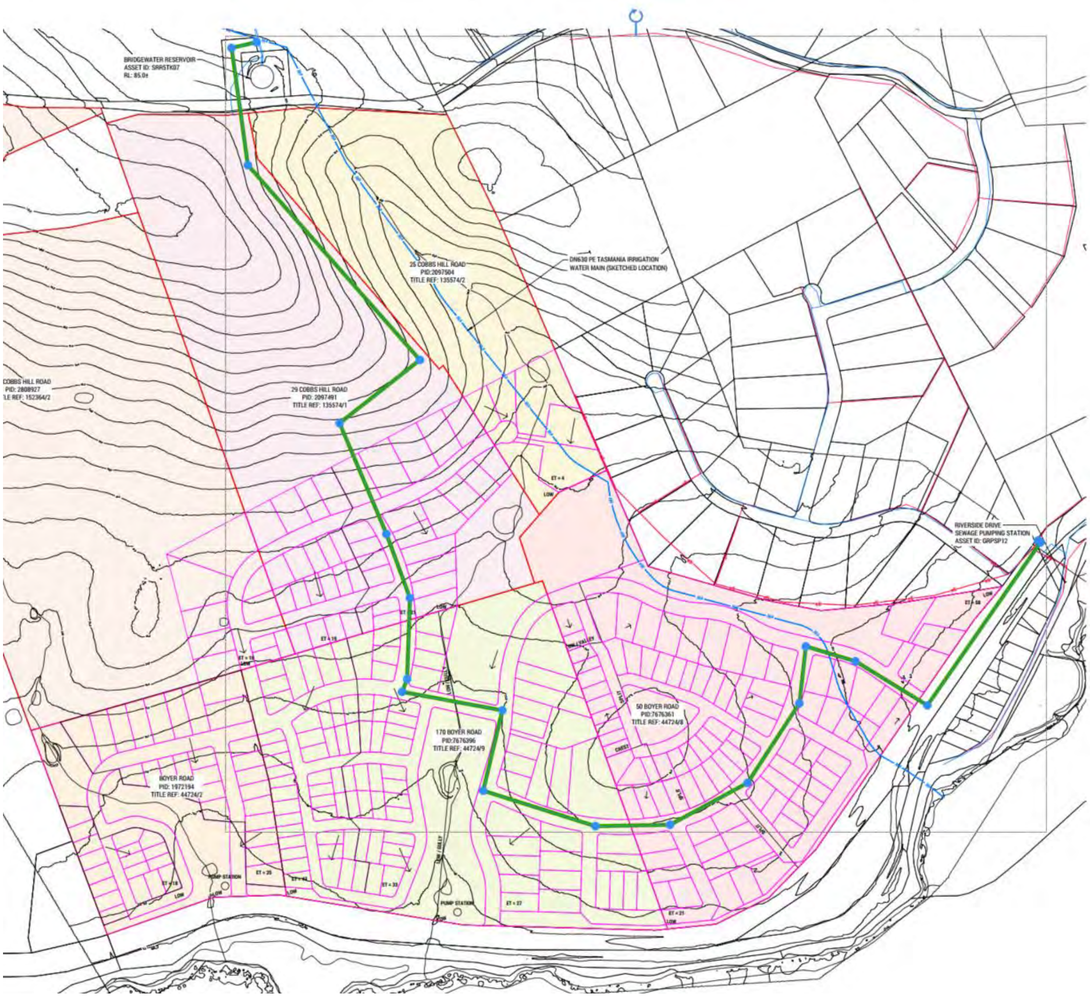
The other part of the development is located at 50 BOYER RD, which is zoned as Bridgewater Reservoir Zone (BRW1), with a head of 91m. This zone is more suitable for pressures given the approximate elevation of the lots range is 10m to 50m.

It is unclear where the proposed connections to the water network to feed the development will be located. The nearest location would be D100 (id A199973), which is too small to feed this development.

Typically, a single-direction feed would require a DN200 connection, or at least 2 x dn150 connections on a well-looped stable network.

Possibly a min DN200 connection to DN375 (id A203814) at the Bridgewater Reservoir, looped down to Serenity Drives DN100 would be the best approach.
Please note that the new water main cannot be in private property, the upper section of the loop will need to be located in a new roadway or council reserve.

I have sketched this below in green.



Please note that this is an early, provisional review of the area. More detailed modelling and asset reviews are being conducted, which will result in changes to the current assessment. This process will take additional time to complete.

Sewer Gravity:
Modelling analysis indicated that in the absence of the development, there is already a huge strain on the system with an abundance of excessively surcharging sewers and significant downstream capacity issues.
To accommodate this development all of the gravity mains between the discharge of the Riverside Drive SPS rising main to the Nielsen Parade SPS will need upsizing. TasWater may consider in a joint venture with the developer. However, this will require further investigations, consideration and approvals that will need to be confirmed.

The developer may also have to contribute to the upsizing of gravity mains between the discharge of the Nielsen Parade SPS rising main and the STP.
TasWater cannot accept the risks of allowing this development to connect without any infrastructure upgrades occurring.

SPS:

The development impacts two downstream SPS's GRPSP11 Nielsen Parade SPS and GRPSP12 Riverside Drive SPS.

GRPSP11 Nielsen Parade SPS

The downstream SPS "GRPSP11 Nielsen Parade SPS" currently has insufficient storage to support the proposed development. The total additional storage required at this site without the development is 22.5 kL. The total additional storage required at this site including the development is 52.6 kL. TasWater will hence be responsible for 22.5 kL and the developer responsible for 30.1 kL.

Pumps:

The pump station prior to the development fails to meet pump requirements by 10.3 l/s. With this development included, the pump station fails to meet pump requirements by 21.1 l/s.

Rising Main:

Following the required pump upgrade specified above, the rising main will need upsizing to accommodate the development.

GRPSP12 Riverside Drive SPS

The downstream SPS "GRPSP12 Riverside Drive SPS" currently has insufficient storage to support the proposed development. The total additional storage required at this site without the development is 0 kL. The total additional storage required at this site including the development is 25 kL. TasWater will hence be responsible for 0 kL and the developer responsible for 25 kL.

Pumps:

The pump station prior to the development meets pumping requirements. With this development included, the pump station fails to meet pump requirements by 0.8 l/s.

Rising Main:

Following the required pump upgrade specified above, the rising main will need upsizing to accommodate the development.

STP:

The Green Point STP has sufficient hydraulic and treatment capacity to accommodate the additional loading from the proposed development.

Water Modelling:

Modelling indicates there is capacity (in regards to available pressures) in the existing network at 170 Boyer Rd, Bridgewater (pipe A199973 and A203814) to supply this proposed development without impacting adversely on the existing infrastructure or customers. Total boundary heads (HGL), not pressures, at the proposed connection point(s) with the reservoir set to 1/3rd full are:

Location	H.G.L. Peak hour	H.G.L Peak day + 10 l/s fire flow
A199973 (Boyer Rd)	86	86
A203814 (Rev outlet)	87	87

These are heads within the Taswater network, so they do not account for losses in customer piping and fittings. This result is based on a sound but imperfect knowledge of conditions on the field and those who use this information should allow an appropriate margin of error in their design.

We noticed that the site falls within the Boyer Restricted Zone, and we agree that connecting to the A3352946 bulk main is not suitable for this development. Therefore, we proposed a DN200 loop: one connection from the reservoir outlet and another from 50 Boyer Rd (see image below).

The reservoir is already fully committed prior to adding this development. If this development proceeds, it will require upsizing storage (ie new reservoir) by the devloper prior to the completion of the subdivion.

TasWater confirms that you have made a pre-lodgement enquiry for the above proposal. TasWater's servicing advice in this response to the above proposal is based on the water and sewerage components of the proposal only. The other aspects of the proposal will be assessed by the relevant Planning Authority, or the Development Assessment Panel established under section 60G of the *Land Use Planning and Approvals Act* ("the Act") where the proposal is declared as a major project under 60C of the Act.

Despite anything else in the servicing advice TasWater reserves its rights regarding this proposal, when it is submitted for assessment as required by law under the Act.

Fees

This assessment is provided at no cost. For details on fees applicable for a formal assessment please see www.taswater.com.au

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Appendix C – Culvert Photos

Catchment 1 (50 Boyer Road)

Catchment 2 (170 Boyer Road)

Catchment 3 ('Boyer Road')

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Appendix D – TasNetworks Minutes

Early Engagement Meeting - Subdivisions

Case Reference No.	CN24-316681		
Case Manager	Alan Heald		
Date	10/01/2025	Site Address	170 Boyer Road BRIDGEWATER
Attendees	Chris Symons, Alex Izbicki, Katherine Johnston, Alan Heald. Rodney Jesson (RodneyJ@rarein.com.au)		
Apologies	Stephen Holmes (customer) admin@holmesdyer.com.au Kirsty Spilsbury (consultant) approvals@rarein.com.au		

Agenda

#	Items Discussed
1	Introductions
2	Developer to discuss overview of Development: • 250 lots / multi staged development. Rodney has advised this could be up to 400 lots • There are 6 parcels of land with 6 separate owners • Planning is being undertaken by the local council and Rodney is acting as a planning consultant. • Various stakeholders have attended a meeting to future plan and gain insight into the proposed development. Cost contribution is an important factor for the development planning. • The planning approvals and stages have not been finalised and are subject to feasibility studies. Rodney is requesting this from TasNetworks. For TasNetworks to provide this, a staged plan will need to be provided. What outcomes does Developer require from this meeting: Is a Planning Permit in-place? ☐ Yes or ☑ No Note: application will not be progressed to design without receipt of the planning permit. Have any aboriginal /Enviro studies been undertaken as part of the planning permit? ☐ Yes or ☑ No Reports to be provided if available Have CAD files been supplied? ☐ Yes or ☑ No Is this Development Staged? ☑ Yes or ☐ No

<table>
<tr><td></td><td>If yes staged, please provide a staging plan and confirm sequences of construction so TasNetworks can design a development plan.

What are the intentions for street lighting, council will need to provide advice on what they require (rural subdivision)?</td></tr>
<tr><td>3</td><td>Customer choice options (note TasNetworks due to administrative requirements may not support changes to an option part way through the application process).

☐ Accredited Electrical Designers (AED) & Accredited Electrical Constructors (AEC)
☐ TasNetworks as Designers & Accredited Electrical Constructors (AEC)
☐ TasNetworks as Designers & TasNetworks as Constructor</td></tr>
<tr><td>4</td><td>What are the Developer’s program timings?

Note: Timing of TasNetworks Services
• Currently:
o 14 weeks to design from start date.
o 20 weeks construction min.
36 weeks construction min. if a substation is required.

Due to construction scheduling and procurement of equipment the construction stage may take approximately 20 weeks (indicative estimates only) to complete. In some instances, these timeframes may be extended due to the supply of materials, weather, the work schedule of construction crews, or delays that are attributable to you or your external service provider.

This can push up-to 24 weeks if a substation is involved.

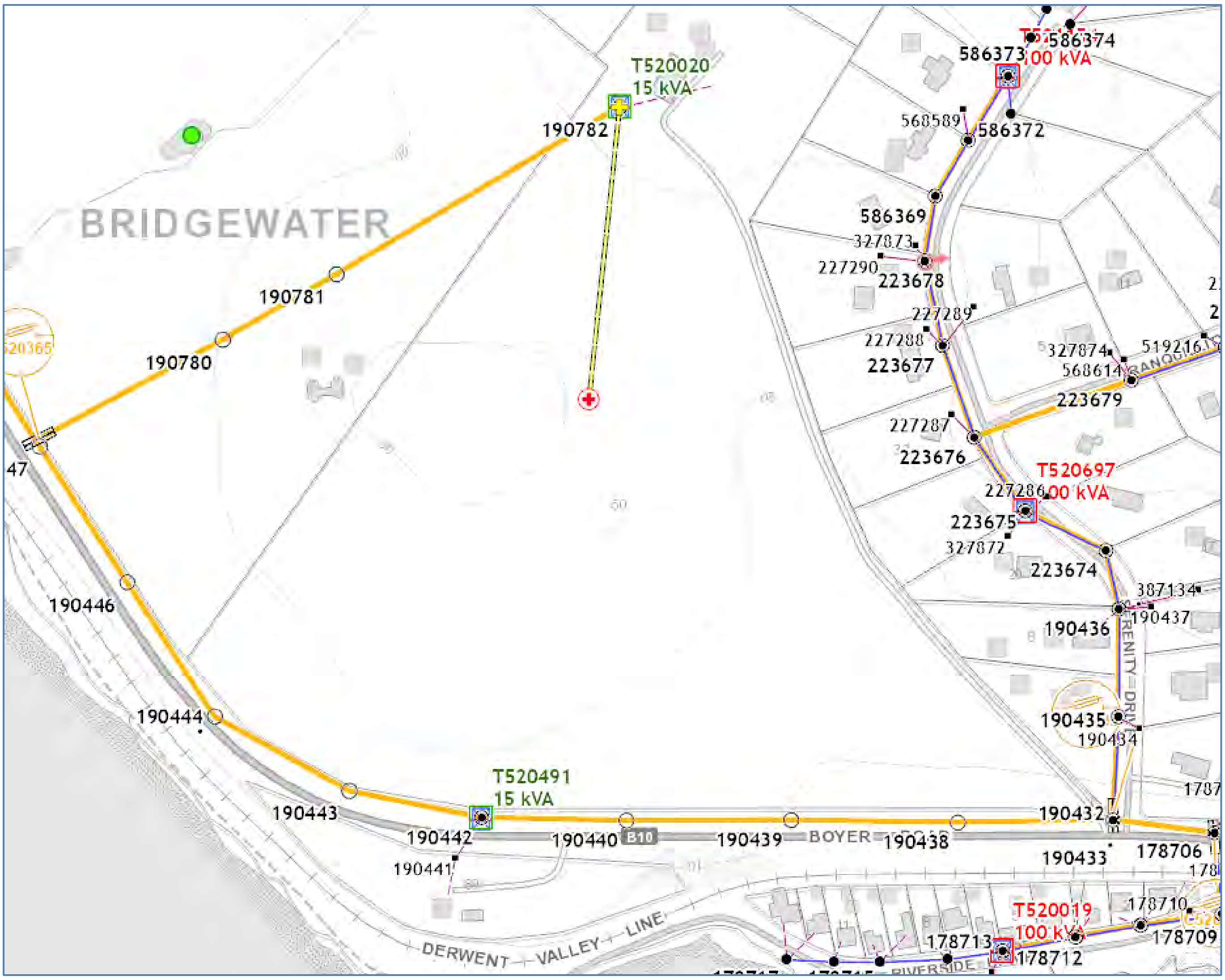
Do you require pre-purchase of substation if choosing TN to design/construct (18-20 weeks delivery time)?
☐ Yes or ☐ No</td></tr>
<tr><td>5</td><td>Network planning feedback:

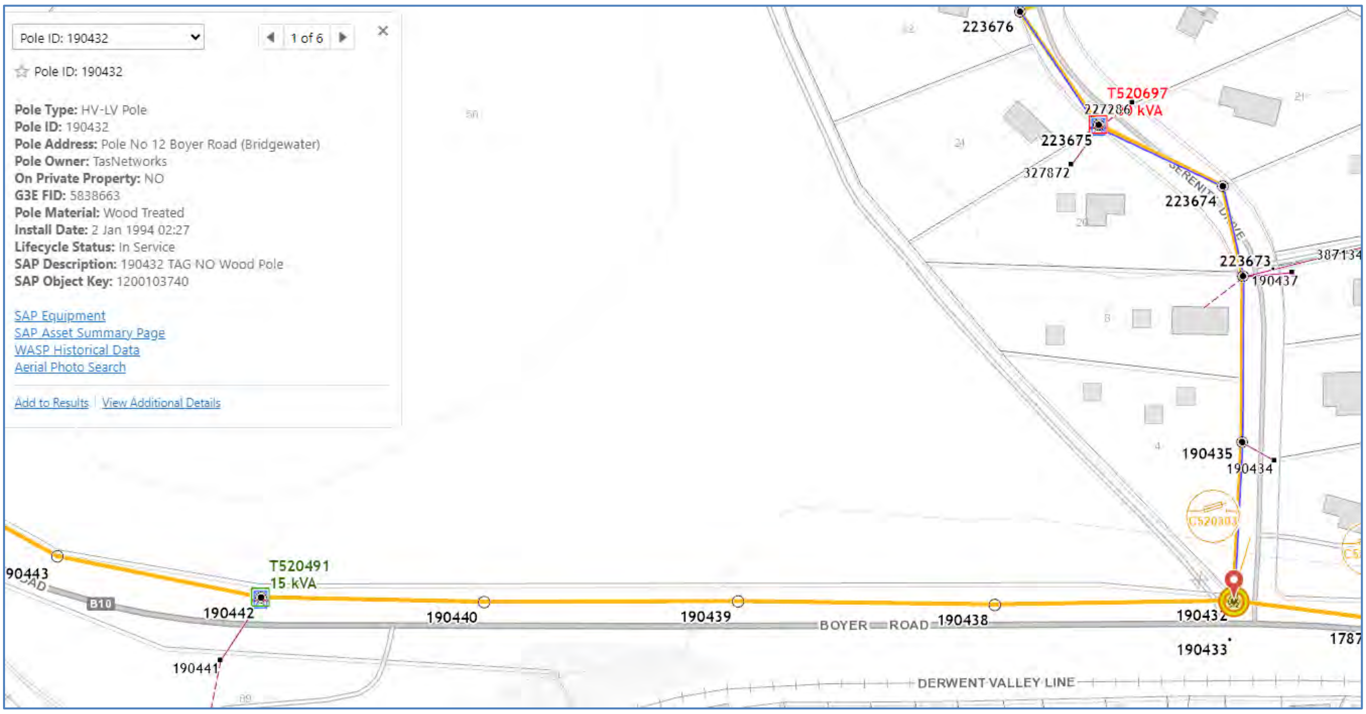
• A staging plan is required for an accurate feasibility study to strategically place substations and HV network and provide a clear feasibility plan.
• The feeder that supplies development will need a network augmentation when development begins. The augmentation will be based on future needs.

• Network Augmentation is triggered by the required needs as the development proceeds, this trigger will try to be picked up at Stage 1 but may not occur until Stage 7 depending on what other infrastructure requirements are within the network.</td></tr>
</table>

7	Design and Estimation Feedback: • Estimation of the cost per lot is a rough order of magnitude and can be subject to various factors that can alter this amount and should only be a guided estimation only. A figure of approximately $12,000.00 per lot was discussed however after receiving further technical advice at the conclusion of the meeting held, cost will be in the order of $15,000.00 to $20,000.00. • Cost separation between network augmentation and the new network within the development is preferred for cost allocation. Note: TasNetworks conducts audits to assess the general compliance of the proposed (AED) designs. Acceptance by TasNetworks does not relieve the AED of responsibility for suitability or correctness of the design. The audit will be undertaken within ten business days, unless otherwise agreed.
8	Construction Auditing Requirement for Accredited Electrical Constructors (AEC). • Open trench and cabling audit • Pre-commissioning and As-built audit Note: A TasNetworks Electrical Safety Specialist will complete the above staged audits, and non-compliance will be communicated to the Constructor and the Developer. The Developer is to ensure Constructor rectifies the identified non-conformance to ensure the construction schedule goes ahead as planned to mitigate any further delays. Note: regarding street and road names, can the developer please initiate this process early in the subdivision construction and provide to the AEC to ensure electrical labelling by the AEC is accurate at time of requesting the pre-commissioning and as-built audits Having labels fitted with roads 1,2 and 3 does not meet compliance and will not proceed to commissioning until such times as labelling is rectified.
9	Are there any known risks or issues associated to this development?

	Actions	Due Date
1	Civil Site Contact #	
2	Staging plan from developer for feasibility study	


BRIDGEWATER
T520020
15 kVA
190782
190781
190780
190446
190444
190443
190442
190441
190440
B10
190439
BOYER
190438
T520491
15 kVA
190432
190433
178706
DERWENT VALLEY LINE
T520019
100 kVA
178713
178712
178710
178709
586374
586373
568589
586372
586369
327873
227290
223678
227289
227288
223677
327874
568614
519216
223679
227287
223676
T520697
227286
223675
327872
223674
387134
190437
190436
190435
190434
SERENITY DRIVE


Pole ID: 190432
1 of 6
Pole ID: 190432
Pole Type: HV-LV Pole
Pole ID: 190432
Pole Address: Pole No 12 Boyer Road (Bridgewater)
Pole Owner: TasNetworks
On Private Property: NO
G3E FID: 5838663
Pole Material: Wood Treated
Install Date: 2 Jan 1994 02:27
Lifecycle Status: In Service
SAP Description: 190432 TAG NO Wood Pole
SAP Object Key: 1200103740
SAP Equipment
SAP Asset Summary Page
WASP Historical Data
Aerial Photo Search
Add to Results
View Additional Details
223676
T520697
227286 kVA
223675
327872
223674
223673
387134
190437
SERENITY DRIVE
190435
190434
T520491
15 kVA
190443
B10
190442
190441
190440
190439
BOYER ROAD
190438
190432
190433
DERWENT VALLEY LINE

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Appendix E – Funding Scope Table

Authority	Infrastructure Element	Contribution Funding	Developer Cost
TasNetworks - Power			
	HV Augmentation and Site supply		Yes
	Internal Reticulation		Yes
Council - Stormwater			
	Detention Basins x 2 including Landscaping	Yes	
	Water Quality Devices – Source Control		Yes
	Local Stormwater Network		Yes
Council - Roads			
	Internal Road Network		Yes
	Internal Bridges x2		Yes
Council - Landscaping			
	Streetscape		Yes
	Parks and Waterways		Yes
	Walking Trails		Yes
	Playground	Yes	
Department of State Growth			
	Intersection Treatment	Yes	
	Shared Bike/Pedestrian Pathway	Yes	
TasWater - Water			
	New Reservoir Capacity Upgrade	Yes	
	DN200 and trunk watermain	Yes	
	Internal water reticulation		Yes
TasWater - Sewer			
	Sewer Pump Stations and Rising Main	Yes	
	Nielsen Pde Sewer Pump Station Upgrade	Yes (TW contribution)	
	Downstream gravity main upgrades	Yes	
	Internal reticulation network		Yes
NBN			
	Infrastructure supply		Yes
	Internal reticulation		Yes

Stormwater Analysis Report

Holmes Dyer Pty Ltd
Boyer PSP
Boyer Road, Bridgewater

Prepared for:	Holmes Dyer Pty Ltd
Project No:	251013
Document No:	251013-RPT-001
Issue No:	01
Revision No:	B

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DOCUMENT CONTROL

Project	Holmes Dyer – Boyer PSP – Boyer Road, Bridgewater
Report Title	Stormwater Analysis Report
Project No	251013
Document ID	251013-RPT-001
File Path	R:\Projects\2025\251000 Civil\251013-Boyer Road Precicnt0Civil Services\4 Internal\STW Report
Client	Holmes Dyer Ptd Ltd

Record of Report					
Issue	Reason	Revision	Date	Prepared By	Approved By
01	Client Issue	B	14/03/2025	JS	RJ

Distribution of Report			
Company	Name & Address	Contact	Copies
Holmes Dyer Pty Ltd	Holmes Dyer Ptd Ltd Level 3, Reid House 15 Featherstone Place, Adelaide SA 5000	E: stephen@holmesdyer.com.au Ph: 08 7231 1889	1 (elec)

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Contents

1. INTRODUCTION

Rare Innovation Pty Ltd (Rare) have been engaged to undertake investigation into the provision of infrastructure services to the proposed subdivision based on the Plan 1792-002>14.01.25 provided by Holmes Dyer. This working document shows approximately 362 lots for the potential future subdivision. This report focuses on the stormwater related aspects of the development including existing and proposed infrastructure, stormwater quantity management and stormwater quality treatment. The objective of this report is to inform early engineering design, planning and future requirements for the potential subdivision.

2. EXISTING SITE

2.1. Location & Property Details

The proposed development is located across six existing land titles in Bridgewater, Tasmania:

- 50 Boyer Road, Property ID: 7676361, Title Reference: 44724/8
- 170 Boyer Road, Property ID: 7676396, Title Reference: 44724/9
- 182 Boyer Road, Property ID: 1972194, Title Reference: 44724/2
- 25 Cobbs Hill Road, Property ID: 2097504, Title Reference: 135574/2
- 29 Cobbs Hill Road, Property ID: 2097491, Title Reference: 135574/1
- 31 Cobbs Hill Road, Property ID: 2808927, Title Reference: 152364/2

The site is zoned as Future Urban across the extent of the proposed subdivision area. The northern portions of the Cobbs Hill Road properties remain zoned as Landscape Conservation, however are outside the extend of the proposed subdivision areas. The site is bounded by Boyer Road to the south, Cobbs Hill Road to the north, existing Rural Living zoned residential developments to the east and existing rural/agricultural properties to the west.

2.2. Land Description

The development site currently contains multiple rural residential properties across the six existing titles with accesses onto Boyer Road and Cobbs Hill Road. The areas designated for future development as part of this subdivision (as shown in Figure 1) generally consist of cleared rural farmland. Areas to the north of the subdivision area and partly within the north-western corner of the subdivision area generally consist of existing native bushland.

The existing topography varies across the whole development site but typically falls towards the south-west and Boyer Road with undulating falls from the north-westerly to the south-easterly direction forming three distinct minor valleys with several existing drainage dams present. Falls typically range from 5-10% towards the south-west across the lower half of the existing six titles where the subdivision is predominantly located. Falls are typically higher in the range of 10-25% within the upper existing bushland areas.

Figure 1 – Existing Site/Development Area

2.3. Existing Stormwater System & Catchments

Due to the nature of the existing land being largely rural/agricultural with existing bushland, the drainage across the site consists predominantly of naturally formed topographical drainage lines along minor valleys and gullies through the various properties towards the south-west and Boyer Road. Three distinct drainage paths are present which ultimately reach Boyer Road at the eastern end of no. 50 Boyer Road (Catchment 1, [east]), approximately in the centre of no. 170 Boyer Road (Catchment 2 [central]) and in the centre of no. 182 Boyer Road (Catchment 3 [west]). Multiple man-made farm dams are present within the central and western catchments. Appendix A provides an overview of the catchments and flows for the site which are discussed in further sections of this report. The catchments shown are the combined existing and developed catchments as they are expected to be altered in the developed areas of the site, although only marginally.

The outflow from each existing catchment discharges under Boyer Road through existing concrete culverts, which subsequently flow through the adjacent rail line and into the Derwent River. The western catchment contains a single DN1200 culvert in an existing gully, the central catchment contains a single DN900 culvert also located in an existing gully, and the eastern catchment contains a twin DN375 culvert located in a shallower open drain adjacent to the road. Photos of the existing culverts are provided in Appendix B.

rare.

3. PROPOSAL

3.1. Proposed Development

The proposed development is for the creation of a new subdivision area consisting of 362 lots and associated road and services infrastructure. The development is to feature three new road accesses from Boyer Road and proposes to retain the existing natural drainage corridors for use in stormwater management for the site. Figure 2 shows the master plan for the proposed extent of development and general lot layout.

Figure 2 – Development Master Plan (Source: Holmes Dyer)

3.2. Stormwater Objective

The overall objective for stormwater management across the development is to ensure that stormwater flows through the development area and as generated by the development are sufficiently managed with no/minimal impact to the existing environment. Stormwater quantity and quality modelling has been undertaken and is discussed further in the relevant sections of this report addressing the increased flows and pollutants likely to be generated by the proposed development and how they may be managed. This report provides high-level desktop assessments to inform the future design of the subdivision.

The intent for stormwater infrastructure for the site is to utilise the existing infrastructure wherever possible to meet the above objectives and determine any new required infrastructure or modification that may be required.

3.3. Stormwater Quantity Analysis

Modelling of the proposed development/existing site catchments has been undertaken using the Watercom DRAINS software package. Model input data has been obtained from the AR&R Data Hub for the development location utilising an initial loss/continuing loss model in accordance with AR&R guidelines. The following key model input parameters were used:

- Impervious Area Initial Loss: 1.0mm
- Impervious Area Continuing Loss: 0mm/hr
- Pervious Area Initial Loss: 26.0mm
- Pervious Area Continuing Loss: 4.3mm/hr
- Climate Change loading factor of 16.3% rainfall intensity increase adopted.

The modelling that has been undertaken has utilised the existing culverts beneath Boyer Road effectively as the limiting discharge for each catchment. The intent is to ensure that if fully utilised, that the existing culverts do not overtop the road in storm events up to the 1% AEP (1 in 100 year) frequency. Any stormwater detention infrastructure that may be required to meet this objective has also been modelled with results from each of the three catchments provided in Table 1 below. A screenshot of the DRAINS model is also shown in Figure 3.

Additional consideration of recent climate change factor increases and worst-case scenarios for limiting flows to pre-development levels are also discussed further in Section 3.4.

Table 1 – Stormwater Flows and Detention Requirements

Catchment ID	Existing Pipe Discharge Size	Peak 1% AEP Post-Developed Flow (Generated by Catchment)	Approximate Detention Volume Required	Peak 1% AEP Post-Developed Flow Through Culvert (With Detention)
1 (50 Boyer Road Discharge) (East)	2 x DN375	1.04 m^3/s	1,300 m^3 (Approx. 1400m^2, 2m max. depth)	0.358 m^3/s
2 (170 Boyer Road Discharge) (Central)	DN900	3.57 m^3/s	2,360 m^3 (Approx. 2000m^2, 3m max. depth)	2.23 m^3/s
3 (182 Boyer Road Discharge) (West)	DN1200	3.56 m^3/s	Nil (sufficient pipe capacity/inlet storage)	3.35 m^3/s

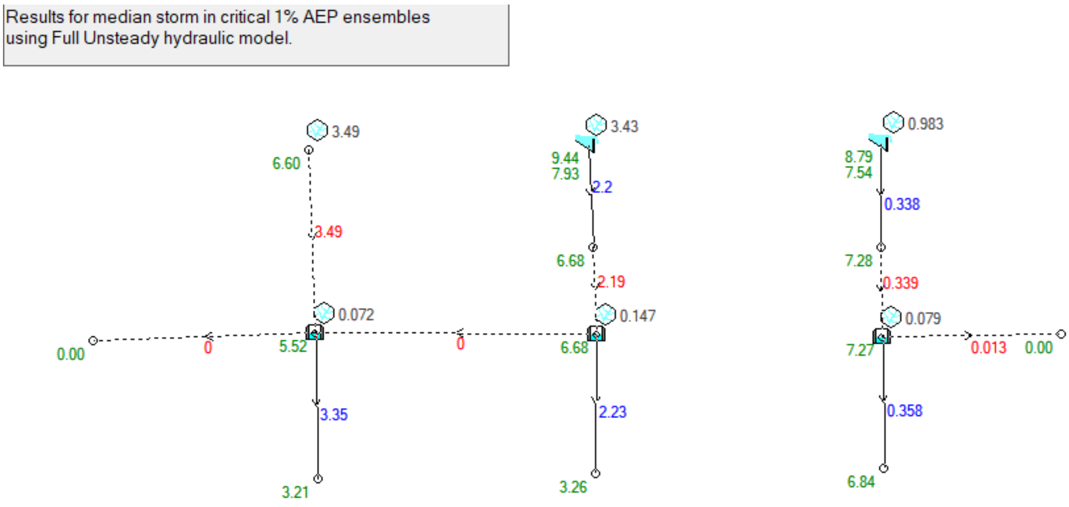

Figure 3 – DRAINS Model (1% AEP event)

The results shown in Table 1 for the 'Peak 1% AEP Post-Developed Flow (Generated by Catchment)', indicate the total flow that is expected to be generated by each catchment including the proposed developed areas and existing upstream properties/bushland areas. These flows were modelled as entering each respective culvert and detention storages were applied if required to ensure that the flows would not overtop Boyer Road. The existing gully depressions around the western and central culverts assist in allowing water to pond at the culvert inlet and build driving head in large flows, however the eastern-most culvert is situated in a shallower drain and does not allow for much ponding around the inlet in it's current state. It is expected that some minor works may be required around this culvert inlet to improve inlet capture efficiency.

From the modelling undertaken and as summarised in Table 1, Catchments 1 and 2 (east and central) will require detention storages to limit flows and allow discharge without overtopping through the existing culverts. A detention storage volume of approximately 1,300m^3 is expected to be required for Catchment 1 and 2,360m^3 for Catchment 2. With these detention storages in place the 'Peak 1% AEP Post-Developed Flow Through Culvert (With Detention)' is shown to be reduced, with these flows able to be adequately drained by the existing culverts. Modelling has indicated that the culvert for Catchment 3 is able to adequately discharge the 1% AEP developed flows without requiring additional detention storages.

The above detention storages were modelled utilising the existing valley depressions/topography to form an above ground basin. The detention basins may alter in size, shape and/or configuration when undertaken during more detailed design and as such the final flows discharged may change. However, with the detention basins modelled, this indicates that basins of sufficient size to achieve the required flow reductions are achievable. It is noted that the topography of Catchment 2 lends itself to the creation of a suitable detention basin, however Catchment 1 has a less defined depression/drainage route and will likely require additional earthworks.

The current basins have been modelled with a single control outlet only to ensure maximum flows for the 1% AEP event (climate change inclusive) are controlled. Additional multi-stage outlet control can be implemented during detailed design if required to control more frequent rainfall events.

It is expected that the approach of utilising the existing culverts and constructing detention basins within the site will be the most efficient approach to managing stormwater from the development rather than upgrading the existing culverts to allow for the full development's flows. Upgrades to the existing culverts would require significant works beneath Boyer Road (being a State Road owned by Department of State Growth) as well as additional upgrade works further downstream until reaching the Derwent River including potential upgrades being required to any drainage culverts beneath the adjacent rail line.

3.4. Stormwater Quantity Analysis – Climate Change Increases & Further Discharge Limiting

Further considerations for increased climate change loading and limiting of discharges to pre-development levels has also been assessed to provide guidance on the likely required detention infrastructure required in such scenarios.

Previous modelling as described in Section 3.3 used the capacity of the existing culverts beneath Boyer Road as the limiting factor for site discharges. It is noted that there may be further limiting factors downstream of these culvert locations (e.g. additional culverts or drainage infrastructure through the rail corridor) and so it may be appropriate to restrict flows further to pre-development levels should this be the case. As such, the stormwater runoff quantities generated by the site during a 1% AEP event (current condition, no climate change loading) have also been assessed and are presented in Table 2.

Recent revisions to AR&R have adjusted the climate change factors to be dependant on the storm durations being assessed, typically with increases to climate change loading multipliers across the board compared to previous values and in particular for short duration storms (increases of up to 77% to base rainfall intensities for SSP5-8.5 2090). Additional modelling has been undertaken in accordance with AR&R guidance from Watercom for modelling in DRAINS software. The following key model input parameters include adjustment factors also now provided as part of the revised AR&R data.

- Impervious Area Initial Loss: 1.0mm
- Impervious Area Continuing Loss: 0mm/hr
- Pervious Area Initial Loss: 30.42mm
- Pervious Area Continuing Loss: 5.977mm/hr
- Rainfall intensity data adjusted based on SSP5-8.5 Pathway (2090)

Both the adjusted climate change factors and the pre-development flows (as limits to site discharges) have been used to determine the required stormwater detention infrastructure in such a case, with summaries of flows provided in Table 2.

Table 2 – Pre-Development & Post-Development Flows (new climate change factors included)

Catchment ID	1% AEP Pre-Development Flow	Peak 1% AEP Post-Developed Flow	Peak 1% AEP Post-Developed Flow (with Detention)	Approximate Detention Volume Required
1 (50 Boyer Road Discharge) (East)	0.692 m^3/s	2.14 m^3/s	0.343 m^3/s	3,400 m^3 (Approx. 2000m^2, 3m max. depth)
2 (170 Boyer Road Discharge) (Central)	2.51 m^3/s	7.07 m^3/s	2.44 m^3/s	8,300 m^3 (Approx. 3,500m^2, 5m max. depth)
3 (182 Boyer Road Discharge) (West)	2.46 m^3/s	6.72 m^3/s	2.47 m^3/s	8,400 m^3 (Approx. 4,000m^2, 3.5m max. depth)

The increase in stormwater runoff generated by each catchment is shown to be significant in comparison the those shown in Table 1 using the previous climate change factors with increases of 88-102%.

Catchment 1 (East) is likely to be able to accommodate the increased detention basin size required. It is noted that the capacity of the existing twin culvert in this location is actually less than the peak pre-development 1% AEP flow and so the capacity of the culvert remains the limiting factor for discharge in this location. It is expected that the increased basin size noted in Table 2 will be able to limit flows to the lesser culvert capacity (and thus the pre-development flow also).

Catchment 2 (Central) is likely to be able to accommodate the increased detention basin size required in the same location as noted in Appendix A, however the shape and configuration of this basin is likely to be more constrained by the width of the open space area available. It is likely that a basin of this size will be approaching the limits of what is able to fit within this area, with the possibility of additional earthworks required to chase the basin out further uphill. There is also the possibility of splitting the detention into two separate basins with a second located further uphill, possibly at the location of one of the existing farm dams if required. It is noted than the pre-development flow for this catchment is approximately equal to the existing culvert capacity.

Catchment 3 (West) will require detention to accommodate this scenario where previously none was required for the scenario described in Section 3.3. The basin would likely be constructed in a similar position to the other two catchments at the low point of the open space area where the lowest existing farm dam is currently located. However, it is likely to encounter space constraints if constructing a single full size basin to the size noted in Table 2. Such a basin will be achievable and will meet the required targets, however will likely occupy the entire lower portion of the open space area up to approximately the 10m contour line. This is expected to impact on the space available for localised treatment locations. It is recommended that if this climate change/discharge scenario is adopted that the detention be split across two separate basins with one located in the same position as shown in Appendix A and another positioned uphill at the location of the existing farm dam in the northern corner of the developed area. The sizing of these basins to meet the pre-development discharge requirement will be approximately 7,000m^3 (3,700m^2, 3.5m max. depth) for the lower basin and approximately 2,000m^3 (1,900m^2, 3m max. depth) for the upper basin, providing some reduction in size of the lower basin from a single basin configuration.

By considering only the increase in climate change factors and continuing to utilise the maximum capacity of the existing culverts beneath Boyer Road, some reduction in the size of the western basin can be achieved due to spare culvert capacity available above pre-development levels. It is noted that the pre-development flows are approximately equal to the culvert capacity for the central catchment and are higher than the culvert capacity for the eastern catchment, so no further reductions to detention can be made in this scenario for these catchments. The resulting basin size that would be required for the western catchment in this scenario is approximately 5,100m^3 (3,300m^2, 2.65m max. depth) and is likely to be achievable within the lowest portion of the open space area.

3.5. Stormwater Retention

With the creation of multiple detention basins, there is the potential for allowing for a permanent retention storage in each to create a permanent water body to improve natural values and/or for water re-use. The creation of retention volumes within each basin will require additional earthworks to increase the size of the basin, allowing for a permanent storage volume as well as sufficient additional capacity to allow for temporary detention in large rainfall events.

The size of the permanent storage area will be largely determined based on nominated landscape design, cost constraints and physical area limitations, however to ensure the retention storage is able to retain a permanent water body it is necessary to conduct a water balance check to ensure that evapotranspiration (ET) losses do not outweigh yearly rainfall inflows.

A maximum retention surface area has been estimated by modelling using MUSICX software using a 10-year representative period of rainfall data. Net yearly inflow to the smallest catchment (eastern catchment) is approximately 32.5 ML/year.

The maximum retention pond surface area resulting in ET losses greater than the above net inflow is approximately 41,000m^2.

With the areas available in the open space locations for the proposed development and considering existing topography, it is not expected that maximum sized ponds in excess of 2,000-3,000m^2 will be achievable. It is thus also expected that any permanent retention ponds are able to maintain yearly storage.

Due to no detention basin being required for the western catchment, it is expected that construction of a permanent retention pond would be achievable in this area.

Due to the size of detention basin for the central catchment (approximately 2000m^2) requiring use of a large portion of the available open space area, it is not expected that this basin will also be able to be utilised as a permanent retention pond with limited additional space available. To provide a permanent retention pond, a second separate pond may be located further upstream of the detention basin.

It is possible that the detention basin for the eastern catchment may be increased in size to accommodate some permanent retention with sufficient open space available. However, the topography in this area does not feature a prominent low valley/drainage channel and more significant earthworks than the other two catchments would likely be required to cut and retain a pond/basin of sufficient size.

Re-use of water stored in permanent retention ponds is achievable, however is expected to be mostly dependent on available space and budget for construction of suitably sized storages to meet any re-use volumes required. Catchment inflows are expected to be sufficiently high to assist in servicing any intended re-use, however will be dependent on the storage volumes constructed and frequency of draw-down from the storages.

3.6. Stormwater Quality Analysis

Treatment of stormwater flows is expected to be required in accordance with the pollutant reduction targets of 90% Gross Pollutants (GP), 80% Total Suspended Solids (TSS), 45% Total Phosphorus (TP) and 45% Total Nitrogen (TN) outlined in the *Tasmanian Stormwater Policy Guidance and Standards for Development* document.

The required treatment may be achieved in a number of ways by using proprietary treatment devices and/or natural treatment systems in multiple configurations. These include a combination of the below main configurations:

- Primary treatment in-line with catchment drainage courses, utilising sedimentation ponds or extended period detention.
- Localised treatment from individual development areas.
- Treatment provided on an individual lot basis.

With the site proposing to maintain the existing drainage routes for each catchment through the developed areas, an option for treatment may include utilising retention ponds, possibly in combination with the detention storages to achieve some of this treatment requirement. However, due to the large portion of external natural catchment flows that will continue to flow through the drainage course, this is not expected to be the most efficient treatment method. Treatment systems typically provide their most effective treatment when pollution concentrations in the inflows are high. Pollutant loading from non-developed areas such as rural catchments or native bushlands are typically low, whereas pollutant loading in runoff from developed urban catchments is typically higher. By attempting to treat both the existing natural catchment as well as the developed catchment, pollutant loadings will be diluted, resulting in less efficient treatment. Due to the larger flows from the combined catchment, the treatment systems would also likely be required to be larger in size to cope with the increased diluted flows. Additional tertiary treatment systems to remove finer particles and reduce Nitrogen levels would likely also be required. As such, this method of providing primary treatment within the drainage course is not recommended.

Alternative options which would provide a more efficient treatment system include at source treatment or localised treatment from each developed area. Individual areas of development will require localised discharges into the central drainage routes depending on site topography and available grades. Treatment may be provided at each discharge point into the drainage courses which will provide more efficient treatment of inflows having a higher pollutant concentration. This may be in the form of proprietary treatment devices at the outflow or in combination with natural solutions such as bioretention if available space allows. Additional treatment devices could also be incorporated into the streetscape such as biofiltration pits to assist as at-source control. Appendix A indicates several areas where localised treatment systems from development areas may be best suited. The use of bio-retention as a treatment option requires both sufficient area and low enough grades to efficiently construct a level treatment system. Appendix A also highlights the nominated treatment areas where it is likely that bio-retention may be more suitable, with urban catchment areas of sufficient size to warrant the additional maintenance from construction of such bio-retention. These may however be dependant on impact from the chosen detention basin sizes/configurations also.

Treatment may also be provided on an individual lot basis by requiring the owner/developer of each future lot to provide treatment systems to meet the required pollutant reduction targets for their individual development. This ensures that a significant portion of the overall developed catchment is treated at the required level prior to discharge into the public system. However, this may place an unnecessary burden on individual residential owners/builders with upfront and maintenance costs that may be more effectively used to provide combined treatments at the point of discharge, resulting in an overall lesser sized system.

It is recommended that a combination of localised treatment to treat flows from sections of development areas be provided along with treatment on an individual lot basis for any larger individual lot developments (e.g. unit developments resulting in higher impervious surfaces and pollutant loads than a typical residential lot). The proposed development has been modelled using MUSICX software to analyse if this treatment method is achievable with the model configurations and results shown in Figures 4-6 and Tables 3-9 below.

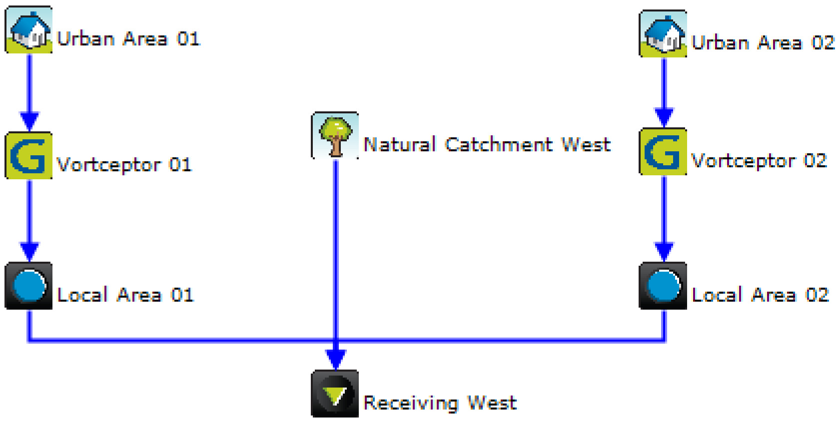

Figure 4 – MUSICX Model – West Catchment

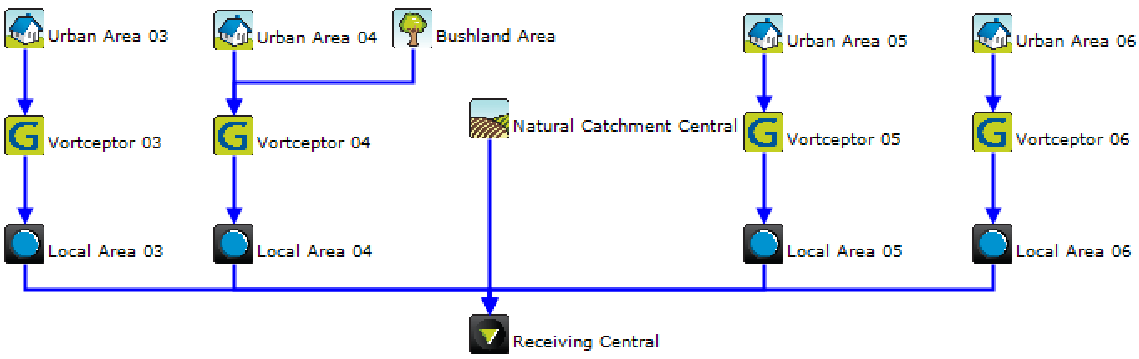

Figure 5 – MUSICX Model – Central Catchment

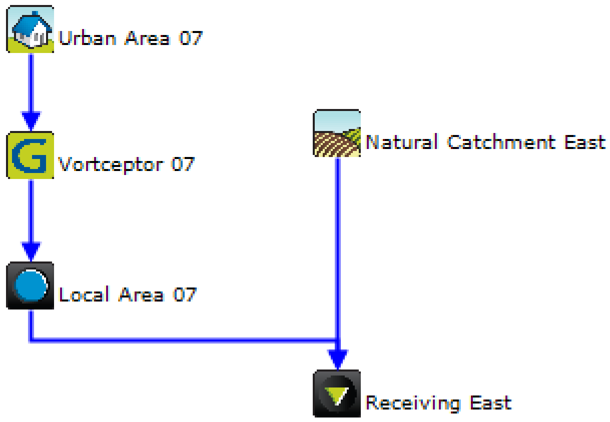

Figure 6 – *MUSICX Model – East Catchment*

Table 3 – *MUSICX Model Results – West Catchment – Urban Area 01*

(1) West Catchment : Treatment Train Effectiveness : Local Area 01

	Sources	Residual Load	% Reduction
Flow (ML/yr)	5.392	5.392	0
Total Suspended Solids (kg/yr)	1071	82.55	92.29
Total Phosphorus (kg/yr)	2.224	0.3269	85.3
Total Nitrogen (kg/yr)	15.51	7.967	48.64
Gross Pollutants (kg/yr)	187.1	0.4618	99.75

Table 4 – *MUSICX Model Results – West Catchment – Urban Area 02*

(1) West Catchment : Treatment Train Effectiveness : Local Area 02

	Sources	Residual Load	% Reduction
Flow (ML/yr)	41.89	41.89	0
Total Suspended Solids (kg/yr)	8419	1065	87.35
Total Phosphorus (kg/yr)	17.22	3.313	80.77
Total Nitrogen (kg/yr)	119.7	64.6	46.01
Gross Pollutants (kg/yr)	1453	59.71	95.89

Table 5 – MUSICX Model Results – Central Catchment – Urban Area 03

(2) Central Catchment : Treatment Train Effectiveness : Local Area 03

	Sources	Residual Load	% Reduction
Flow (ML/yr)	10.28	10.28	0
Total Suspended Solids (kg/yr)	2022	171.6	91.52
Total Phosphorus (kg/yr)	4.259	0.6671	84.34
Total Nitrogen (kg/yr)	29.6	15.34	48.17
Gross Pollutants (kg/yr)	356.7	3.56	99

Table 6 – MUSICX Model Results – Central Catchment – Urban Area 04

(2) Central Catchment : Treatment Train Effectiveness : Local Area 04

	Sources	Residual Load	% Reduction
Flow (ML/yr)	31.97	31.97	0
Total Suspended Solids (kg/yr)	5090	615.2	87.91
Total Phosphorus (kg/yr)	9.929	1.819	81.68
Total Nitrogen (kg/yr)	73.54	39.33	46.51
Gross Pollutants (kg/yr)	787.3	16.24	97.94

Table 7 – MUSICX Model Results – Central Catchment – Urban Area 05

(2) Central Catchment : Treatment Train Effectiveness : Local Area 05

	Sources	Residual Load	% Reduction
Flow (ML/yr)	35.69	35.69	0
Total Suspended Solids (kg/yr)	7174	834.3	88.37
Total Phosphorus (kg/yr)	14.64	2.676	81.72
Total Nitrogen (kg/yr)	102	54.22	46.85
Gross Pollutants (kg/yr)	1238	37.26	96.99

Table 8 – MUSICX Model Results – Central Catchment – Urban Area 06

(2) Central Catchment : Treatment Train Effectiveness : Local Area 06

	Sources	Residual Load	% Reduction
Flow (ML/yr)	10.67	10.67	0
Total Suspended Solids (kg/yr)	2137	190.7	91.08
Total Phosphorus (kg/yr)	4.335	0.6703	84.54
Total Nitrogen (kg/yr)	30.39	15.72	48.26
Gross Pollutants (kg/yr)	370	3.971	98.93

Table 9 – MUSICX Model Results – East Catchment – Urban Area 07

Latest Run : Treatment Train Effectiveness : Local Area 07

	Sources	Residual Load	% Reduction
Flow (ML/yr)	27.38	27.38	0
Total Suspended Solids (kg/yr)	5442	525.8	90.34
Total Phosphorus (kg/yr)	11.1	1.835	83.48
Total Nitrogen (kg/yr)	78.22	41.08	47.48
Gross Pollutants (kg/yr)	950.1	17.88	98.12

The purpose of this modelling is to determine if a reasonable method of stormwater treatment is achievable for the development. Treatment of the final subdivision design may take many forms, with many options available for both proprietary and natural treatment systems. Modelling has been undertaken using a single proprietary hydrodynamic separator GPT (Atlan Vortceptor – offline configuration) at multiple assumed localised urban catchment outlets as a basic design solution.

From the results shown in Tables 3-9, each urban catchment area can be seen to achieve the required pollutant reduction targets of 90% Gross Pollutants (GP), 80% Total Suspended Solids (TSS), 45% Total Phosphorus (TP) and 45% Total Nitrogen (TN).

4. SUMMARY

The Boyer Road development will require the provision of additional stormwater infrastructure to ensure that any increases to flow quantities and pollutant loads are adequately managed and that impacts to the receiving environment are mitigated.

Expected stormwater runoff for the proposed development has been modelled using DRAINS software. It is proposed to utilise the existing stormwater culverts beneath Boyer Road as the limiting factor for stormwater quantity. To ensure that the capacity of the existing culverts for the 1% AEP storm event (16.3% climate change loading inclusive) is not exceeded, stormwater detention infrastructure will be required for two of the three catchments across the site (central and eastern catchments) with approximate volumes of 2,360m^3 and 1,300m^3 required respectively. The western culvert has been assessed to provide sufficient capacity for the developed flows and will not require stormwater detention.

Recent increases to climate change loading factors as well as limiting flows to pre-development levels has also been considered to provide advice on increased infrastructure requirements for this worst-case condition.

Stormwater treatment has been modelled using MUSICX software to determine if a basic treatment train option can achieve the required pollutant reduction targets for the development. The most appropriate and efficient method for treatment is expected to be by utilising treatment structures (proprietary or natural) at several localised discharges from areas of the urban development prior to discharge into the existing water courses flowing through the site. This allows natural flows from the upper catchment to continue to flow through the site unchanged, whilst the new urban areas are treated more effectively at higher pollutant concentrations. Results from modelling have indicated that treatment using the above method is achievable.

Permanent stormwater retention is also expected to be achievable from a water balance perspective, however will be largely dependent on available space and cost constraints.

Yours Faithfully

Rodney Jesson
Director
Civil and Infrastructure

5. APPENDIX A – CONCEPT STORMWATER SERVICE PLAN

CONCEPT STORMWATER PLAN

SCALE 1:2500

REV:	ISSUED FOR / DESCRIPTION:	BY:	DATE:
B	INFORMATION PURPOSES	JWS	14-03-25
A	INFORMATION PURPOSES	PVD	31-01-25

STATUS: **PRELIMINARY / INFORMATION**

DO NOT SCALE - IF IN DOUBT, ASK

APPROVED: - ACRED. No: -

DESIGN BY: RJ
DESIGN CHK: JS
DRAWN BY: PVD
DRAFT CHK: -
DATE: -

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P. 03 6388 9200

CLIENT: HOLMESDYER
PROJECT: BOYER ROAD PRECINCT
ADDRESS: 50 - 170 BOYER ROAD BRIDGEWATER

TITLE: CONCEPT STORMWATER SERVICE PLAN
SCALE: 1:2500 SHEET SIZE: A1 DWGs IN SET: -
PROJECT No: 251013 DWG No: C501 REV: B

6. APPENDIX B – CULVERT PHOTOS

Eastern Catchment 1 (50 Boyer Road)

Central Catchment 2 (170 Boyer Road)

Western Catchment 3 (182 Boyer Road)

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Launceston, TAS 7250

P. 6388 9200

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Our Ref: 251013

4th June 2025

Holmes Dyer
Level 3, Reid House, 15 Featherstone Place
Adelaide SA 5000

ATTENTION: N TAYLOR

Dear Nitsan,

This letter is provided as confirmation that the roads as detailed in the provided concept documentation (specifically Rare concept plans *251013-C – Road 25-05-21*) comply with the relevant standards as listed below and with the following additional notes:

- *Tasmanian Municipal Standard Drawings - v3 December 2020* ('LGAT Standard Drawings')
- *Tasmanian Subdivision Guidelines – October 2013*
- *Austroads Guide to Road Design Part 3: Geometric Design Edition 3.4*
- *AS 2890.5 Parking Facilities, Part 5: On-Street Parking*
- *AS/NZS 2890.1 Parking Facilities, Part 1: Off-Street Car Parking*

The Tasmanian Subdivision Guidelines and the LGAT Standard Drawings have predominantly informed the concept designs. The main point of note in relation to compliance with these standards/guidelines is with vertical grading due to the existing site grades being moderate to steep in some areas. The concept drawings noted above provide preliminary longitudinal sections for the proposed roads. The Tasmanian Subdivision Guidelines Clause 5.8, 11.4.1 (ii) & (iii) specify that the longitudinal road (and kerb) gradient shall be between 0.5% to 14%, except that in special circumstances the council may permit a grade of 20% for short lengths of road up to 70m. As shown in the above noted drawings, all grades are able to be designed within this range, except for Road 8 for which grades may exceed 14% (up to 16.19%) between chainages 230m – 289.575m (60m approx.). However this still complies with the above condition allowing for approval of such grades below 20% for lengths ≤70m by Council, for which it is potentially warranted in this case due to existing grades.

Further refinement of road levels can be undertaken to increase earthworks cut/fill to minimise these grades if required, at the expense of additional cost of construction. Further refinement of road reserve cross section geometry may also be undertaken to optimise the location/offset of footpaths closer to kerbs in places where reduction of cut/fill earthworks may be warranted (e.g. limit batter encroachment into lots by moving footpath hard against back of kerb to reduce overall road footprint).

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The current typical cross section designs specify nature strip batter transitions to allow for driveways to be constructed with appropriate grade changes in accordance with the LGAT Standard Drawings and AS/NZS 2890.1.

If you require anything further please contact us.

Yours faithfully,

Rodney Jesson

Director - Civil

CONCEPT ROAD CHAINAGE PLAN

SCALE 1:2000

REV:	ISSUED FOR / DESCRIPTION:	BY:	DATE:
A	INFORMATION PURPOSES	PVD	21-05-25

STATUS:
PRELIMINARY / INFORMATION

DO NOT SCALE - IF IN DOUBT, ASK

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APPROVED: -

ACRED. No: -

DESIGN BY: RJ

DESIGN CHK: JS

DRAWN BY: PVD

DRAFT CHK: -

DATE: -

rare.

22-24 Paterson Street
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CLIENT: HOLMESDYER

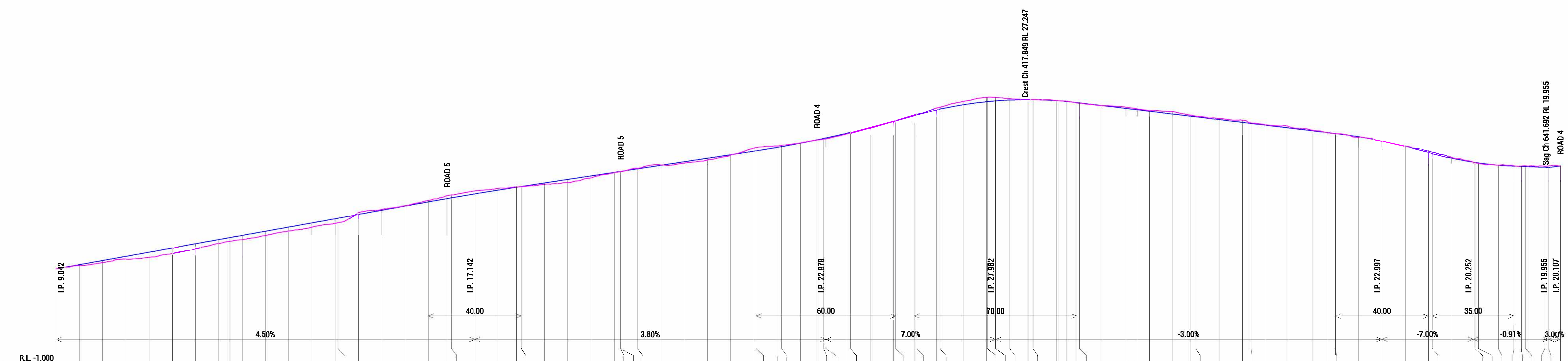
PROJECT: BOYER ROAD PRECINCT

ADDRESS: 50 - 170 BOYER ROAD BRIDGEWATER

TITLE: CIVIL WORKS PLAN

SCALE: 1:2000 SHEET SIZE: A1 DWGs IN SET: -

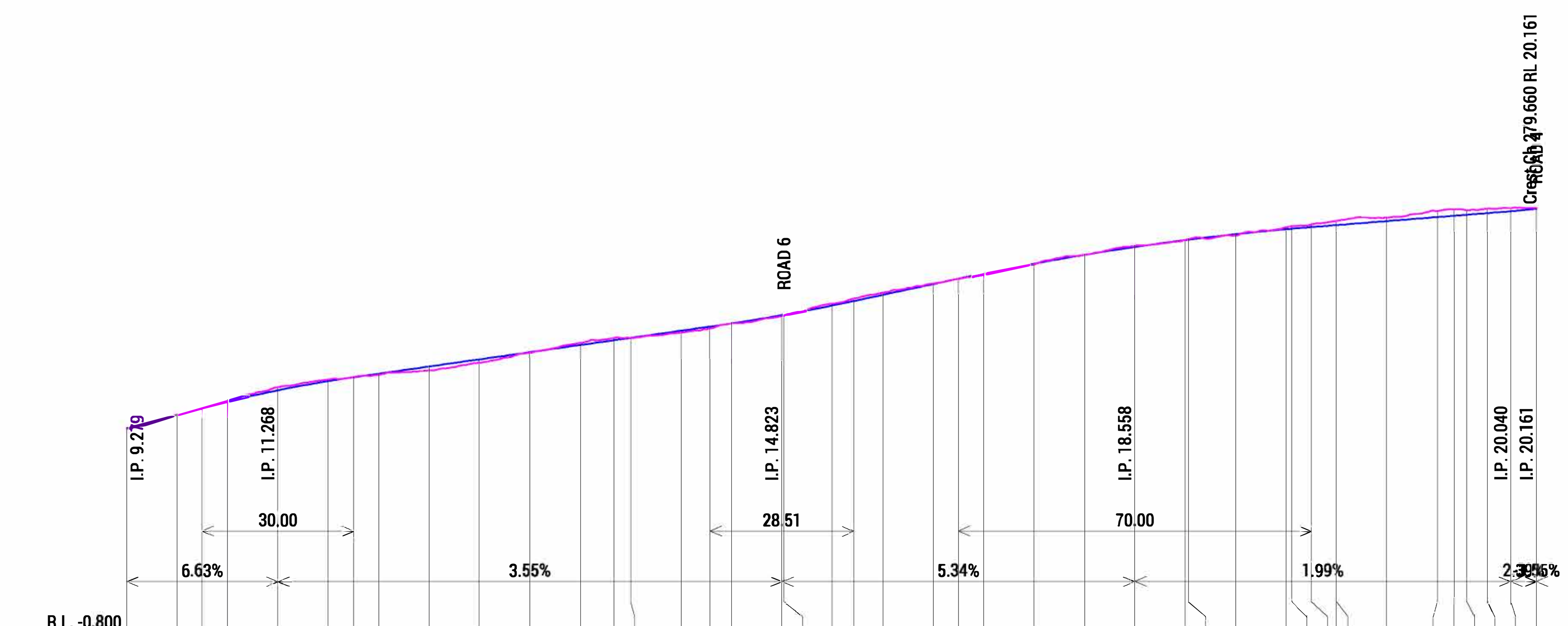
PROJECT No: 251013 DWG No: C400 REV: A



Chainage	Existing Levels	Design Levels	Cut Fill
0.000	9.042	9.042	+0.000
10.000	9.397	9.492	+0.095
20.000	9.717	9.942	+0.225
30.000	10.107	10.392	+0.285
40.000	10.292	10.842	+0.550
50.000	10.734	11.292	+0.558
60.000	11.226	11.742	+0.516
70.000	11.757	12.192	+0.435
74.701	12.008	12.404	+0.396
80.000	12.173	12.642	+0.469
90.000	12.626	13.092	+0.466
100.000	13.120	13.542	+0.422
110.000	13.530	13.992	+0.462
120.000	13.938	14.442	+0.504
121.170	14.015	14.495	+0.480
130.000	15.081	14.892	-0.189
140.000	15.437	15.342	-0.095
150.000	15.836	15.792	-0.044
160.000	16.407	16.242	-0.165
168.101	16.908	16.601	-0.307
170.000	17.007	16.684	-0.323
180.000	17.432	17.107	-0.325
190.000	17.703	17.514	-0.189
197.917	17.864	17.823	-0.041
200.000	17.890	17.902	+0.012
210.000	18.136	18.282	+0.146
220.000	18.322	18.662	+0.340
230.000	18.833	19.042	+0.209
240.000	19.399	19.422	+0.023
242.615	19.506	19.522	+0.016
242.663	19.507	19.524	+0.017
250.000	19.874	19.802	-0.072
260.000	20.230	20.182	-0.048
270.000	20.425	20.562	+0.137
280.000	20.750	20.942	+0.192
290.000	21.285	21.322	+0.037
300.000	22.027	21.702	-0.325
300.937	22.083	21.738	-0.345
310.000	22.260	22.104	-0.156
311.881	22.328	22.186	-0.142
320.000	22.587	22.559	-0.028
327.101	22.878	22.915	+0.037
330.000	22.986	23.068	+0.082
330.937	23.029	23.118	+0.089
340.000	23.557	23.629	+0.072
341.542	23.656	23.721	+0.065
350.000	24.206	24.244	+0.038
360.000	24.944	24.913	-0.031
360.937	25.018	24.978	-0.040
368.849	25.631	25.532	-0.099
370.000	25.699	25.611	-0.088
378.546	26.340	26.143	-0.197
380.000	26.417	26.224	-0.193
390.000	27.060	26.693	-0.367
400.000	27.498	27.019	-0.479
400.355	27.498	27.028	-0.470
403.849	27.482	27.107	-0.375
410.000	27.354	27.203	-0.151
417.849	27.256	27.247	-0.009
420.000	27.247	27.244	-0.003
430.000	27.141	27.141	+0.000
434.551	27.073	27.048	-0.025
438.849	26.901	26.932	+0.031
440.000	26.866	26.897	+0.031
450.000	26.603	26.597	-0.006
460.000	26.423	26.297	-0.126
465.028	26.235	26.146	-0.089
470.000	26.063	25.997	-0.066
480.000	25.962	25.697	-0.265
487.803	25.581	25.463	-0.118
490.000	25.466	25.397	-0.069
500.000	25.212	25.097	-0.115
510.000	25.032	24.797	-0.235
513.712	24.739	24.686	-0.053
520.000	24.552	24.497	-0.055
530.000	24.347	24.197	-0.150
540.000	23.962	23.897	-0.065
546.360	23.691	23.707	+0.016
550.000	23.581	23.597	+0.016
560.000	23.176	23.247	+0.071
570.000	22.801	22.797	-0.004
580.000	22.253	22.247	-0.006
590.000	21.728	21.597	-0.131
591.712	21.637	21.477	-0.160
600.000	21.029	20.957	-0.072
609.212	20.523	20.519	-0.004
610.000	20.472	20.488	+0.016
611.487	20.382	20.433	+0.051
620.000	20.202	20.193	-0.009
626.712	20.132	20.092	-0.040
630.000	20.110	20.062	-0.048
631.693	20.125	20.047	-0.078
640.000	20.076	19.971	-0.105
641.693	20.112	19.955	-0.157
646.743	20.122	20.107	-0.015

LONGITUDINAL SECTION
Scales: H 1:1000 V 1:250

ROAD 1



Chainage	Existing Levels	Design Levels	Cut Fill
0.000	9.238	9.279	+0.041
10.000	9.943	9.942	-0.001
15.000	10.292	10.274	-0.018
20.000	10.648	10.592	-0.056
30.000	11.312	11.153	-0.159
40.000	11.693	11.611	-0.082
45.000	11.812	11.801	-0.011
50.000	11.921	11.979	+0.058
60.000	12.142	12.334	+0.192
70.000	12.525	12.690	+0.165
80.000	13.015	13.045	+0.030
90.000	13.501	13.401	-0.100
96.692	13.747	13.639	-0.108
100.000	13.749	13.756	+0.007
110.000	14.012	14.112	+0.100
115.744	14.219	14.316	+0.097
120.000	14.474	14.473	-0.001
130.000	14.834	14.886	+0.052
130.367	14.870	14.903	+0.033
140.000	15.454	15.362	-0.092
144.256	15.707	15.584	-0.123
150.000	15.997	15.890	-0.107
160.000	16.450	16.424	-0.026
165.000	16.685	16.691	+0.006
170.000	16.907	16.951	+0.044
180.000	17.401	17.437	+0.036
190.000	17.884	17.875	-0.009
200.000	18.320	18.265	-0.055
210.000	18.613	18.608	-0.005
210.588	18.655	18.626	-0.029
220.000	18.824	18.902	+0.078
230.000	19.239	19.148	-0.091
231.160	19.304	19.174	-0.130
235.000	19.381	19.254	-0.127
240.000	19.561	19.353	-0.208
250.000	19.717	19.552	-0.165
260.000	20.053	19.750	-0.303
263.352	20.150	19.817	-0.333
265.856	20.092	19.867	-0.225
270.000	20.171	19.949	-0.222
274.592	20.192	20.040	-0.152
279.660	20.202	20.161	-0.041

LONGITUDINAL SECTION
Scales: H 1:1000 V 1:250

ROAD 2

REV:	ISSUED FOR / DESCRIPTION:	BY:	DATE:
A	INFORMATION PURPOSES	PVD	21-05-25

STATUS: **PRELIMINARY / INFORMATION**

DO NOT SCALE - IF IN DOUBT, ASK

APPROVED: - ACRED. No: -

DESIGN BY: RJ
DESIGN CHK: JS
DRAWN BY: PVD
DRAFT CHK: -
DATE: -

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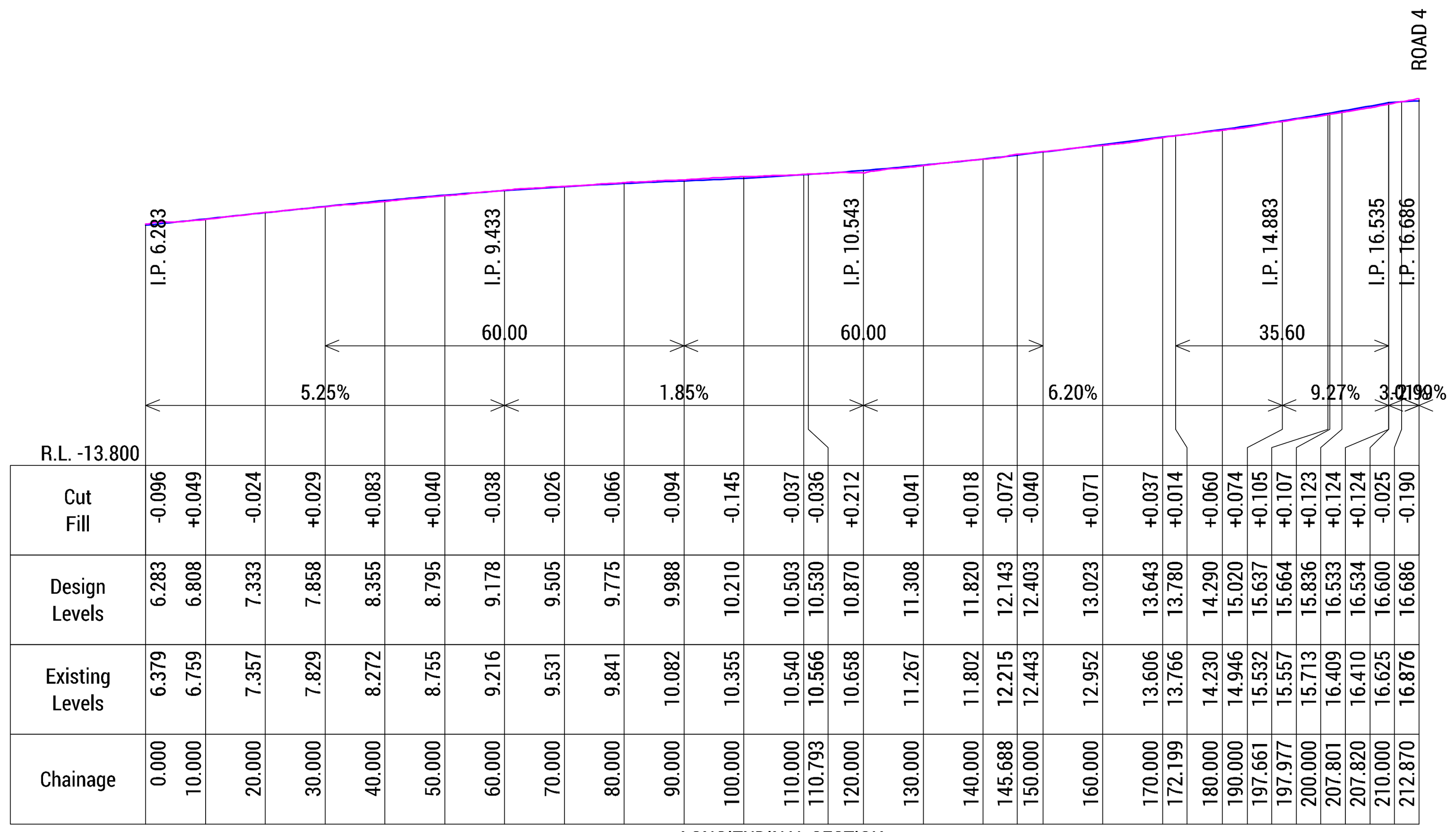
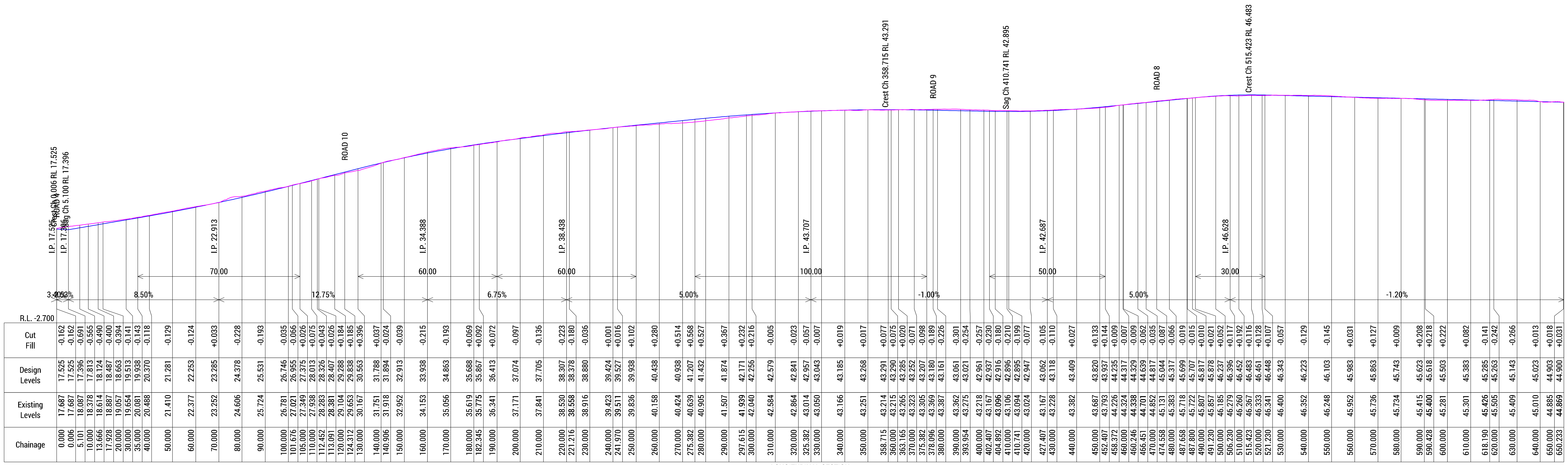
CLIENT: HOLMESDYER
ROJECT: BOYER ROAD PRECINCT
ADDRESS: 50 - 170 BOYER ROAD BRIDGEWATER

TITLE: LONG SECTION - ROAD 1 & ROAD 2
SCALE: AS NOTED SHEET SIZE: A1 DWGs IN SET: -
PROJECT No: 251013 DWG No: C411 REV: A



LONGITUDINAL SECTION
Scales: H 1:1000 V 1:500

ROAD 3



LONGITUDINAL SECTION
Scales: H 1:1000 V 1:500

REV:	ISSUED FOR / DESCRIPTION:	BY:	DATE:
A	INFORMATION PURPOSES	PVD	21-05-25

STATUS:
PRELIMINARY / INFORMATION

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APPROVED: - ACRED. No: -

DESIGN BY: RJ
DESIGN CHK: JS
DRAWN BY: PVD
DRAFT CHK: -
DATE: -

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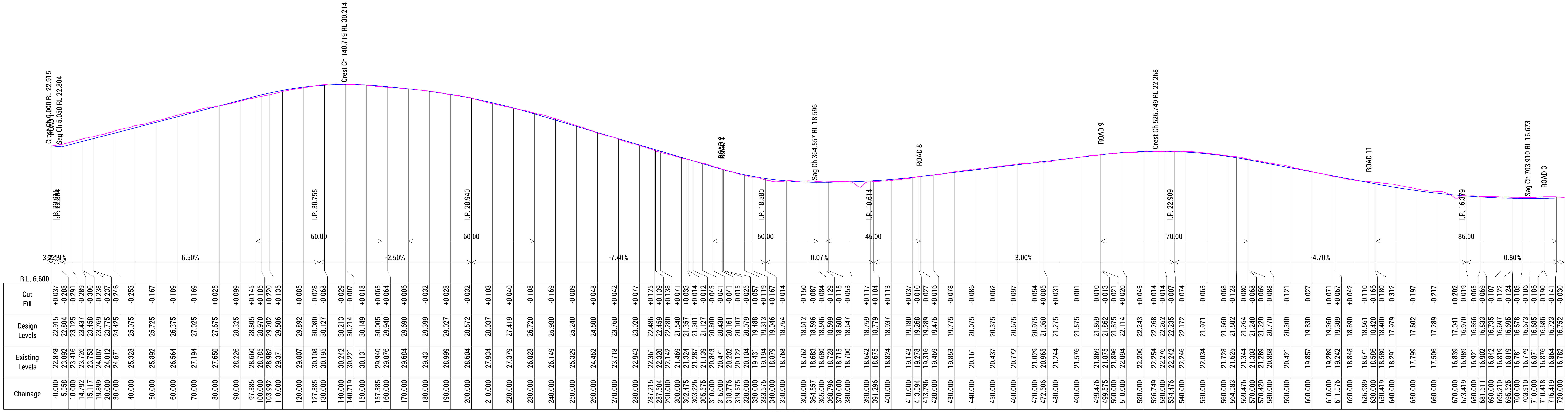
CLIENT: HOLMESDYER
PROJECT: BOYER ROAD PRECINCT
ADDRESS: 50 - 170 BOYER ROAD BRIDGEWATER

TITLE: LONG SECTION - ROAD 3 & 15

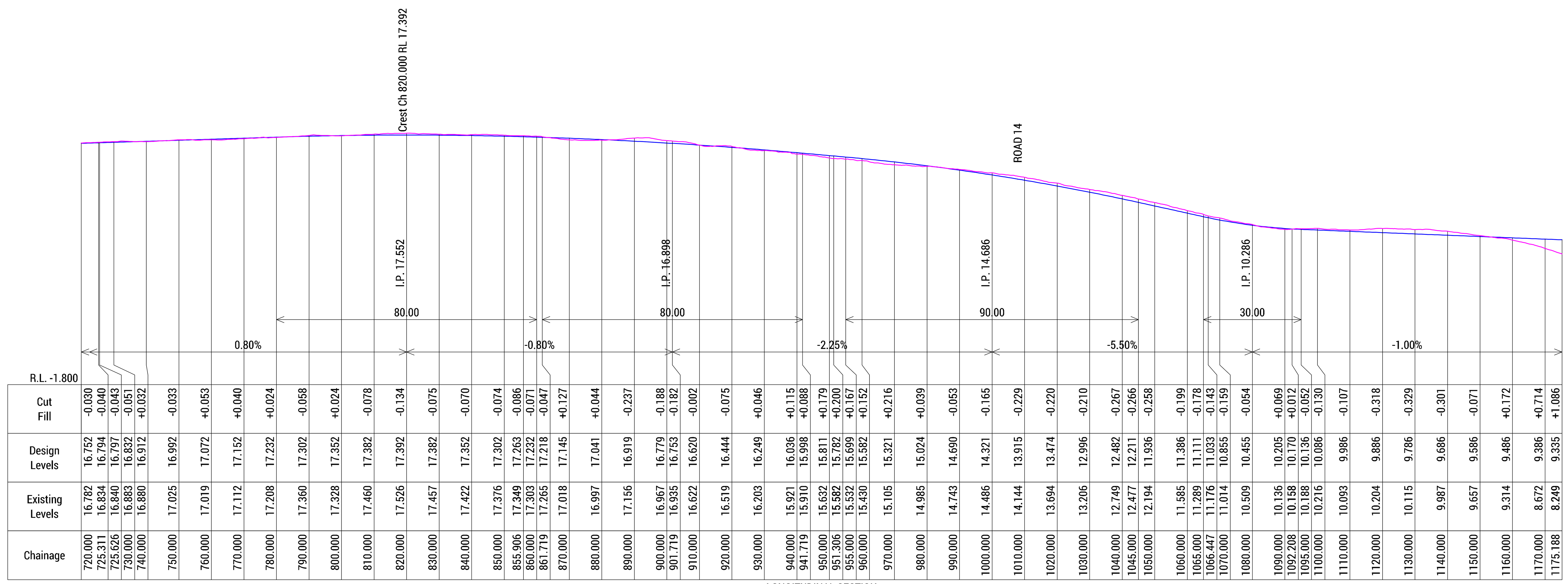
SCALE: AS NOTED SHEET SIZE: A1 DWGs IN SET: -

PROJECT No: 251013 DWG No: C412 REV: A



LONGITUDINAL SECTION
Scales: H 1:1000 V 1:250

ROAD 4



LONGITUDINAL SECTION
Scales: H 1:1000 V 1:250

ROAD 4

REV:	ISSUED FOR / DESCRIPTION:	BY:	DATE:
A	INFORMATION PURPOSES	PVD	21-05-25

STATUS:
PRELIMINARY / INFORMATION

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DESIGN CHK: JS
DRAWN BY: PVD
DRAFT CHK: -
DATE: -

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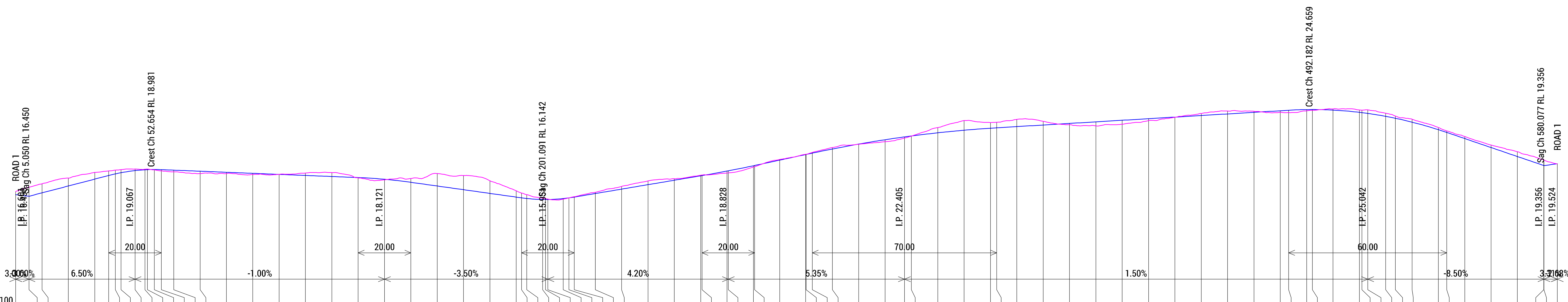
CLIENT: HOLMESDYER
PROJECT: BOYER ROAD PRECINCT
ADDRESS: 50 - 170 BOYER ROAD BRIDGEWATER

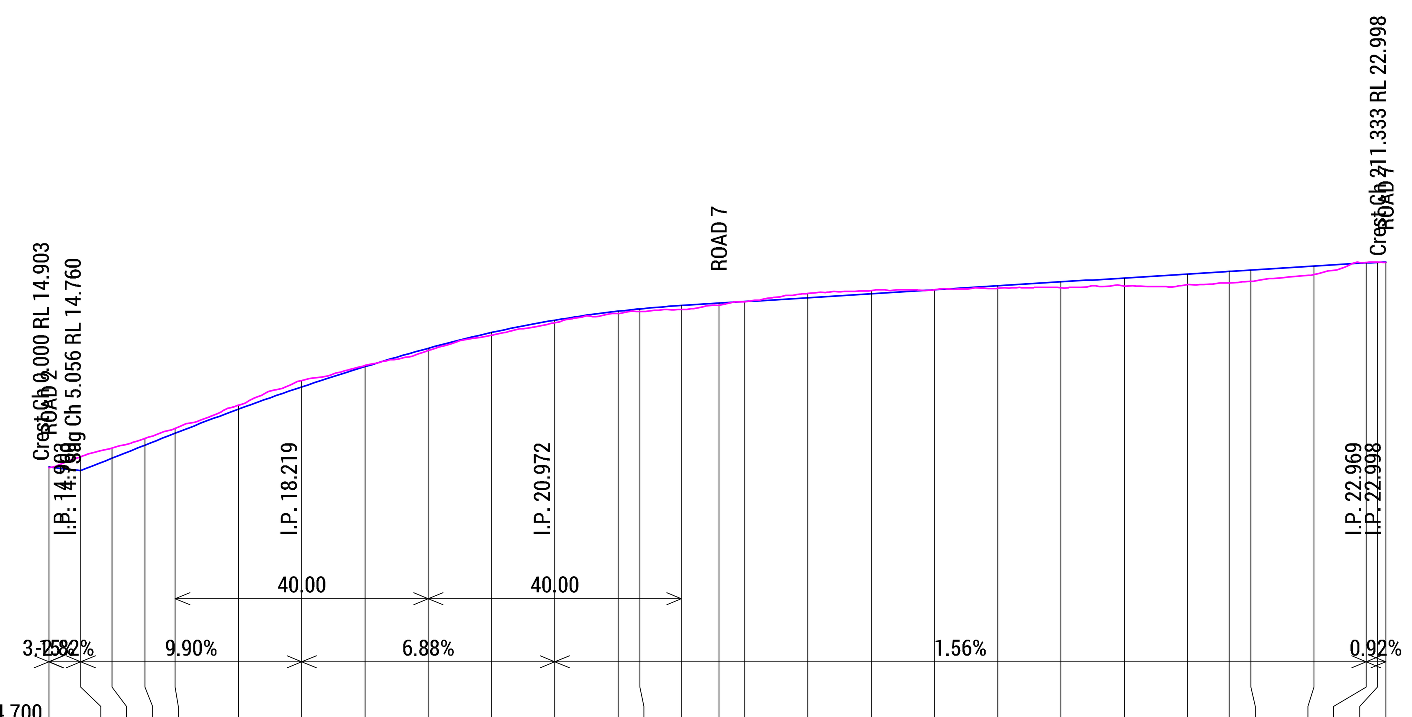
TITLE: LONG SECTION - ROAD 4
SCALE: AS NOTED SHEET SIZE: A1 DWGs IN SET: -
PROJECT No: 251013 DWG No: C413 REV: A



Chainage	Existing Levels	Design Levels	Cut / Fill
-0.000	16.908	16.601	-0.307
5.050	17.312	16.450	-0.862
10.000	17.634	16.772	-0.862
20.000	18.176	17.422	-0.754
30.000	18.709	18.072	-0.637
35.320	18.850	18.417	-0.433
37.862	18.925	18.570	-0.355
40.000	18.969	18.681	-0.288
45.320	19.027	18.880	-0.147
49.108	19.009	18.957	-0.052
50.000	19.029	18.968	-0.061
52.654	18.947	18.981	+0.034
55.320	18.853	18.967	+0.114
60.000	18.765	18.921	+0.156
70.000	18.608	18.821	+0.213
80.000	18.581	18.721	+0.140
90.000	18.513	18.621	+0.108
100.000	18.530	18.521	-0.009
110.000	18.643	18.421	-0.222
120.000	18.691	18.321	-0.370
130.000	18.185	18.221	+0.036
140.000	18.006	18.058	+0.052
150.000	18.133	17.771	-0.362
160.000	18.605	17.421	-1.184
170.000	18.416	17.071	-1.345
180.000	17.922	16.721	-1.201
190.000	16.968	16.371	-0.597
192.000	16.755	16.301	-0.454
193.997	16.601	16.238	-0.363
200.000	16.274	16.144	-0.130
201.091	16.229	16.142	-0.087
202.000	16.185	16.143	-0.042
207.859	16.178	16.230	+0.052
210.000	16.300	16.294	-0.006
212.000	16.406	16.371	-0.035
220.000	16.827	16.707	-0.120
230.000	17.383	17.127	-0.256
240.000	17.901	17.547	-0.354
250.000	18.104	17.967	-0.137
260.000	18.445	18.387	-0.058
260.503	18.465	18.408	-0.057
270.000	18.646	18.833	+0.187
270.503	18.658	18.856	+0.198
280.000	19.211	19.336	+0.125
280.503	19.249	19.363	+0.114
290.000	19.928	19.871	-0.057
299.828	20.420	20.397	-0.023
300.000	20.427	20.406	-0.021
302.359	20.597	20.532	-0.065
310.000	21.057	20.925	-0.132
320.000	21.370	21.390	+0.020
330.000	21.612	21.801	+0.189
337.359	21.956	22.068	+0.112
340.000	22.146	22.156	+0.010
350.000	22.954	22.457	-0.497
360.000	23.615	22.702	-0.913
370.000	23.434	22.893	-0.541
372.359	23.458	22.930	-0.528
380.000	23.727	23.044	-0.683
390.000	23.543	23.194	-0.349
400.000	23.225	23.344	+0.119
410.000	23.110	23.494	+0.384
420.000	23.272	23.644	+0.372
430.000	23.617	23.794	+0.177
440.000	23.924	23.944	+0.020
450.000	24.290	24.094	-0.196
460.000	24.519	24.244	-0.275
470.000	24.496	24.394	-0.102
480.000	24.401	24.544	+0.143
483.182	24.370	24.592	+0.222
490.000	24.532	24.655	+0.123
492.182	24.591	24.659	+0.068
500.000	24.713	24.608	-0.105
510.000	24.620	24.395	-0.225
510.994	24.602	24.364	-0.238
513.182	24.631	24.292	-0.339
520.000	24.312	24.015	-0.297
523.681	24.042	23.833	-0.209
530.000	23.745	23.468	-0.277
540.000	22.959	22.754	-0.205
543.182	22.639	22.492	-0.147
550.000	22.108	21.912	-0.196
560.000	21.293	21.062	-0.231
570.000	20.668	20.212	-0.456
580.000	19.890	19.362	-0.528
580.077	19.882	19.356	-0.526
585.143	19.507	19.524	+0.017

LONGITUDINAL SECTION
Scales: H 1:1000 V 1:250

ROAD 5



Chainage	Existing Levels	Design Levels	Cut / Fill
-0.000	14.870	14.903	+0.033
5.056	15.306	14.760	-0.546
10.000	15.655	15.249	-0.406
15.204	16.027	15.764	-0.263
20.000	16.428	16.239	-0.189
30.000	17.348	17.191	-0.157
40.000	18.321	18.068	-0.253
50.000	18.915	18.869	-0.046
60.000	19.503	19.595	+0.092
70.000	20.106	20.217	+0.111
80.000	20.607	20.705	+0.098
90.000	20.972	21.061	+0.089
93.440	21.047	21.152	+0.105
100.000	21.124	21.283	+0.159
105.936	21.288	21.376	+0.088
110.000	21.432	21.439	+0.007
120.000	21.756	21.595	-0.161
130.000	21.871	21.750	-0.121
140.000	21.909	21.906	-0.003
150.000	21.962	22.062	+0.100
160.000	21.986	22.218	+0.232
170.000	22.050	22.373	+0.323
180.000	22.108	22.529	+0.421
186.619	22.174	22.632	+0.458
190.000	22.241	22.685	+0.444
200.000	22.510	22.841	+0.331
208.242	22.987	22.969	-0.018
210.000	22.999	22.985	-0.014
211.334	22.989	22.998	+0.009

LONGITUDINAL SECTION
Scales: H 1:1000 V 1:250

ROAD 6

REV:	ISSUED FOR / DESCRIPTION:	BY:	DATE:
A	INFORMATION PURPOSES	PVD	21-05-25

STATUS: **PRELIMINARY / INFORMATION**

DO NOT SCALE - IF IN DOUBT, ASK

APPROVED: - ACRED. No: -

DESIGN BY:	RJ
DESIGN CHK:	JS
DRAWN BY:	PVD
DRAFT CHK:	-
DATE:	-

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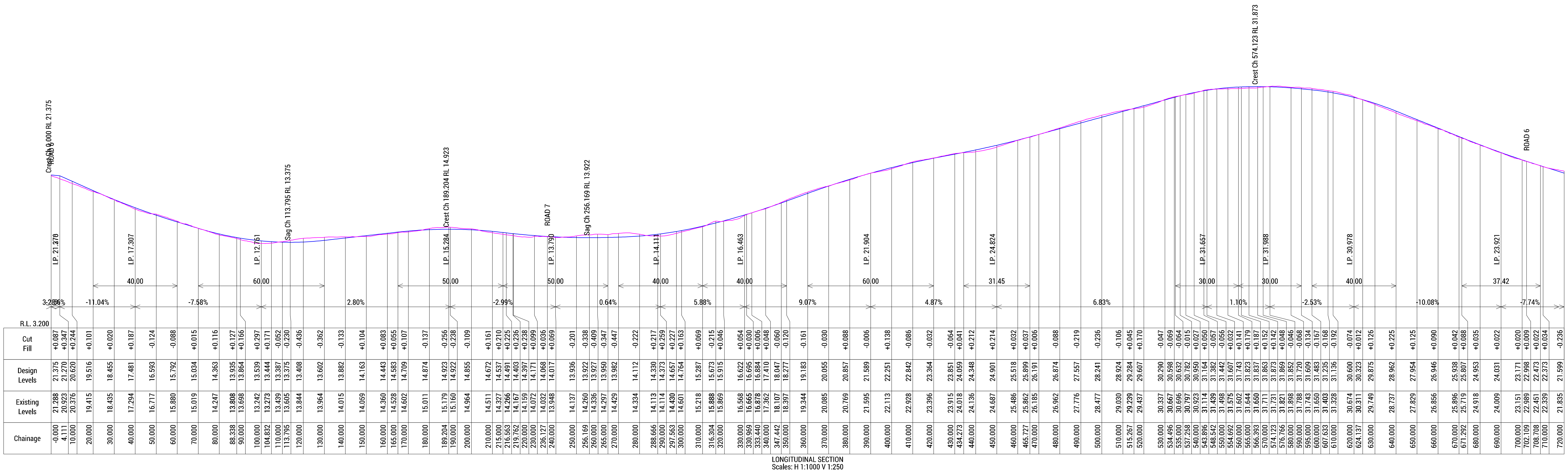
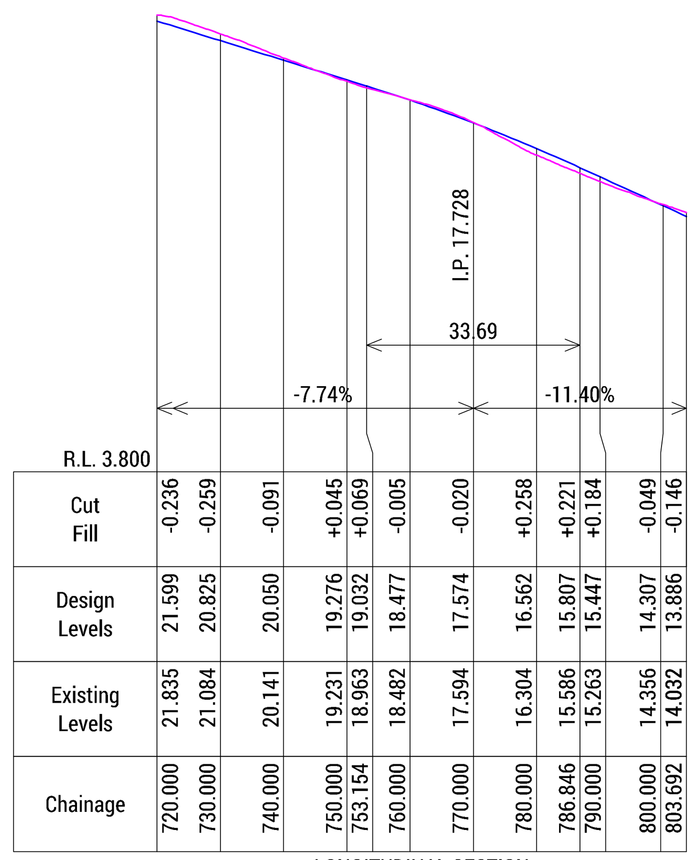
CLIENT: HOLMESDYER
PROJECT: BOYER ROAD PRECINCT
ADDRESS: 50 - 170 BOYER ROAD BRIDGEWATER

TITLE: LONG SECTION - ROAD 5 & ROAD 6
SCALE: AS NOTED SHEET SIZE: A1 DWGs IN SET: -
PROJECT No: 251013 DWG No: C414 REV: A



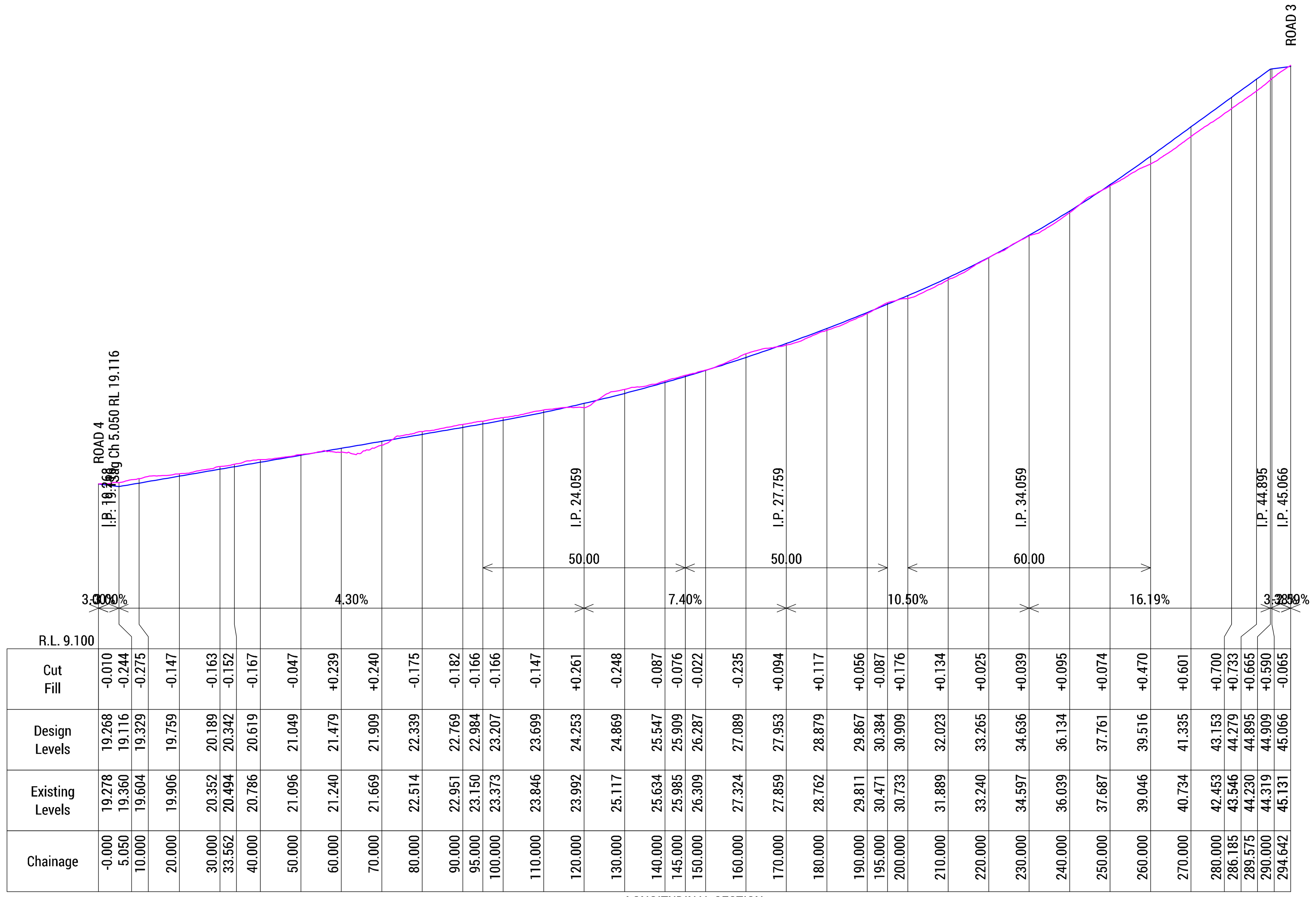
LONGITUDINAL SECTION
Scales: H 1:1000 V 1:250

ROAD 7



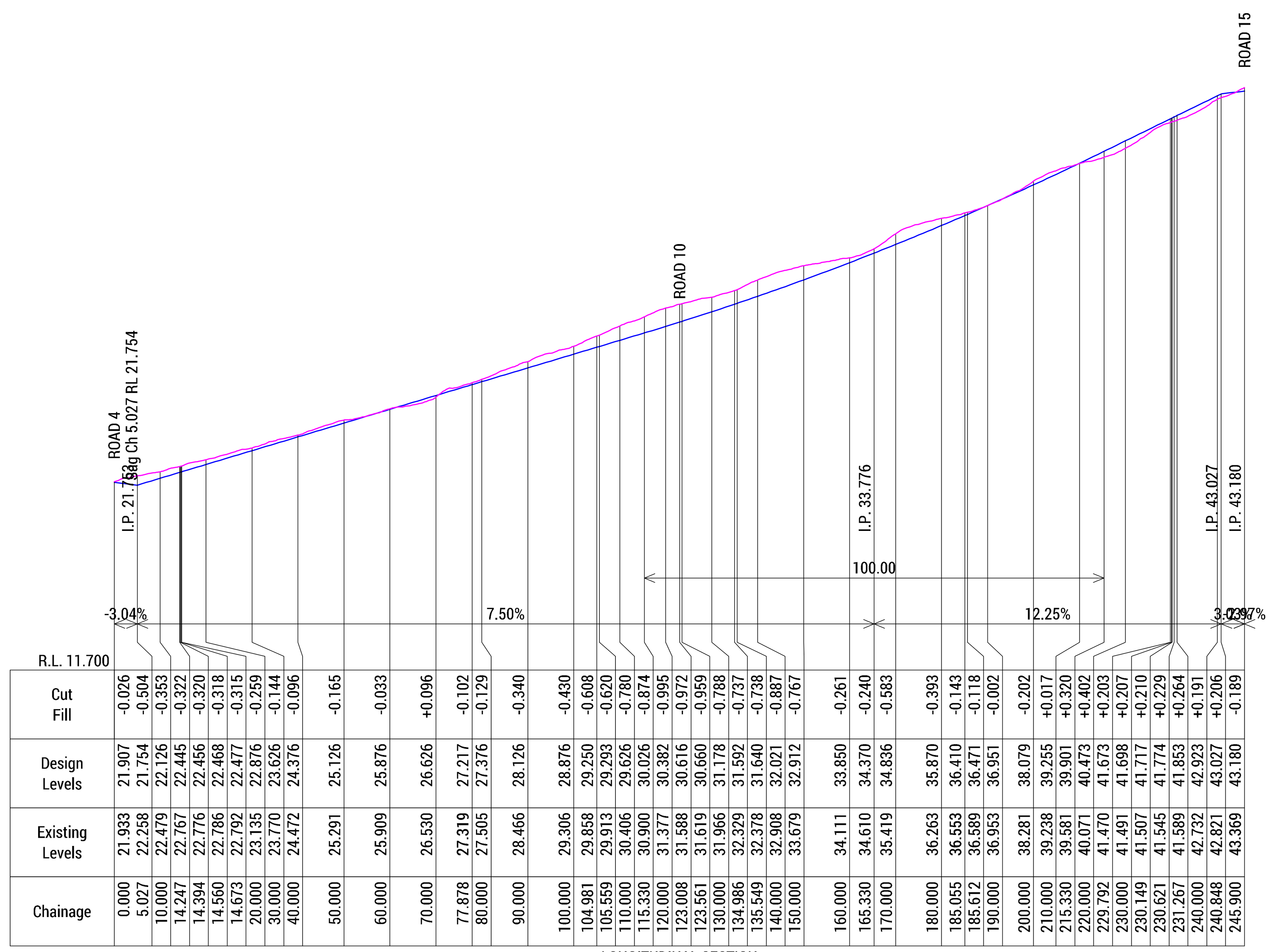
LONGITUDINAL SECTION
Scales: H 1:1000 V 1:250

ROAD 7



LONGITUDINAL SECTION
Scales: H 1:1000 V 1:250

ROAD 8



LONGITUDINAL SECTION
Scales: H 1:1000 V 1:250

ROAD 9

REV:	ISSUED FOR / DESCRIPTION:	BY:	DATE:
A	INFORMATION PURPOSES	PVD	21-05-25

STATUS:
PRELIMINARY / INFORMATION

DO NOT SCALE - IF IN DOUBT, ASK

APPROVED: - ACRED. No: -

DESIGN BY: RJ
DESIGN CHK: JS
DRAWN BY: PVD
DRAFT CHK: -
DATE: -

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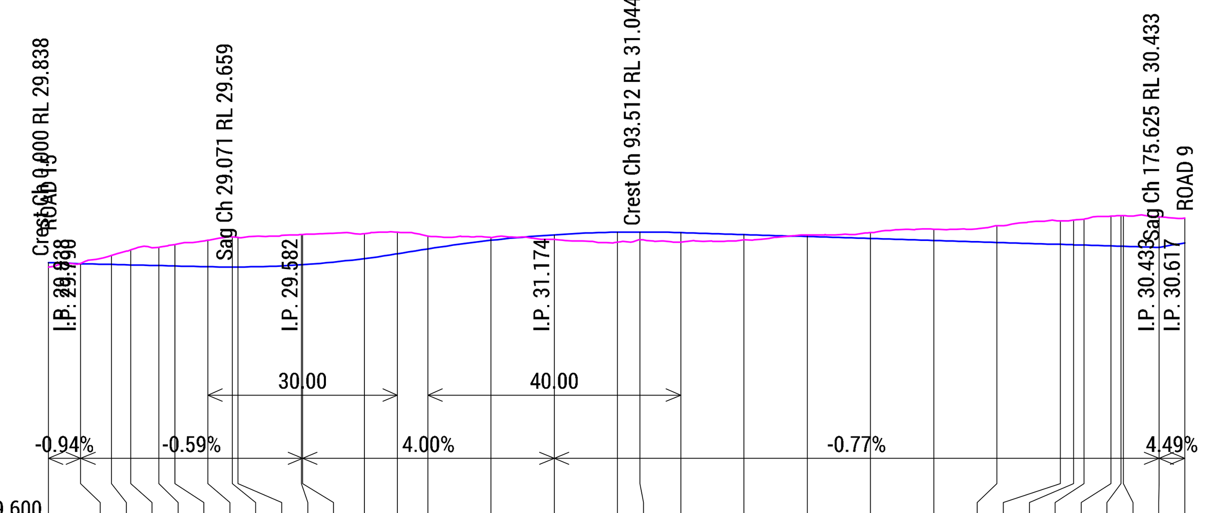
CLIENT: HOLMESDYER
PROJECT: BOYER ROAD PRECINCT
ADDRESS: 50 - 170 BOYER ROAD BRIDGEWATER

TITLE: LONG SECTION - ROAD 7 - ROAD 9

SCALE: AS NOTED SHEET SIZE: A1 DWGs IN SET: -

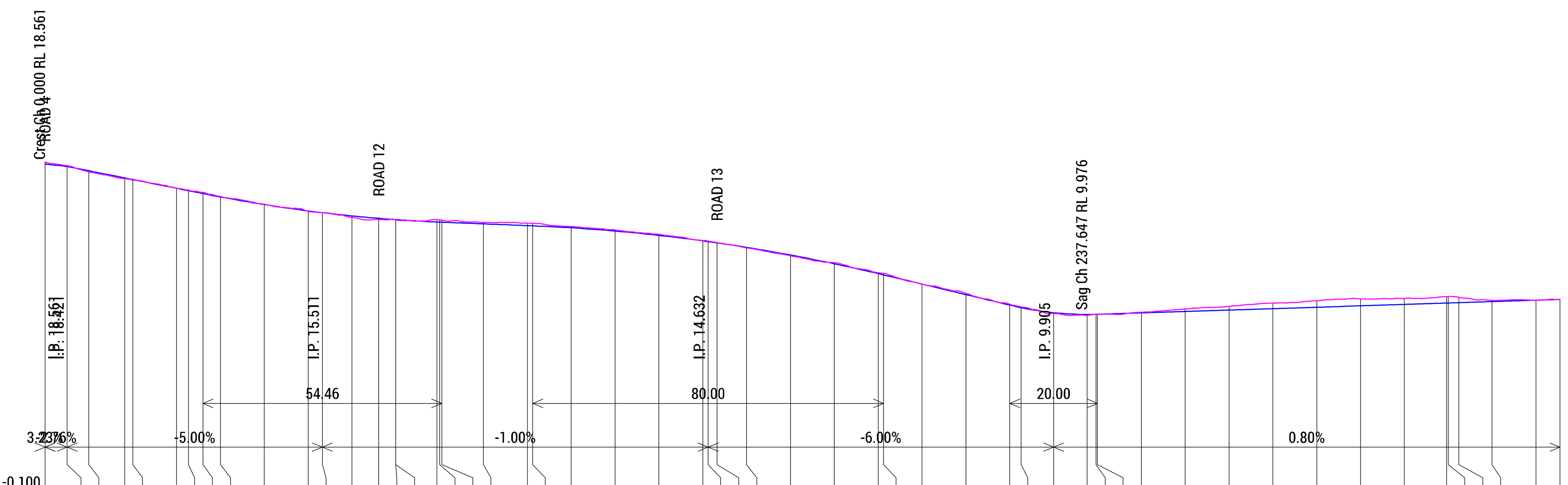
PROJECT No: 251013 DWG No: C415 REV: A



Chainage	Existing Levels	Design Levels	Cut Fill
-0.000	29.653	29.838	+0.185
5.115	29.807	29.790	-0.017
10.000	30.123	29.761	-0.362
12.998	30.334	29.743	-0.591
17.489	30.435	29.716	-0.719
20.000	30.548	29.702	-0.846
25.208	30.713	29.671	-1.042
29.071	30.855	29.659	-1.196
30.000	30.825	29.660	-1.165
40.000	30.944	29.751	-1.193
40.208	30.948	29.754	-1.194
50.000	30.981	29.995	-0.986
55.208	31.034	30.182	-0.852
60.000	30.883	30.374	-0.509
70.000	30.824	30.714	-0.110
80.000	30.746	30.935	+0.189
90.000	30.640	31.037	+0.397
93.512	30.741	31.044	+0.303
100.000	30.642	31.019	+0.377
110.000	30.734	30.941	+0.207
120.000	30.931	30.864	-0.067
130.000	31.021	30.787	-0.234
140.000	31.155	30.709	-0.446
150.000	31.298	30.632	-0.666
160.000	31.479	30.554	-0.925
162.104	31.511	30.538	-0.973
163.744	31.554	30.525	-1.029
168.010	31.668	30.492	-1.176
169.616	31.685	30.480	-1.205
170.000	31.685	30.477	-1.208
175.626	31.637	30.433	-1.204
179.709	31.588	30.617	-0.971

LONGITUDINAL SECTION
Scales: H 1:1000 V 1:250

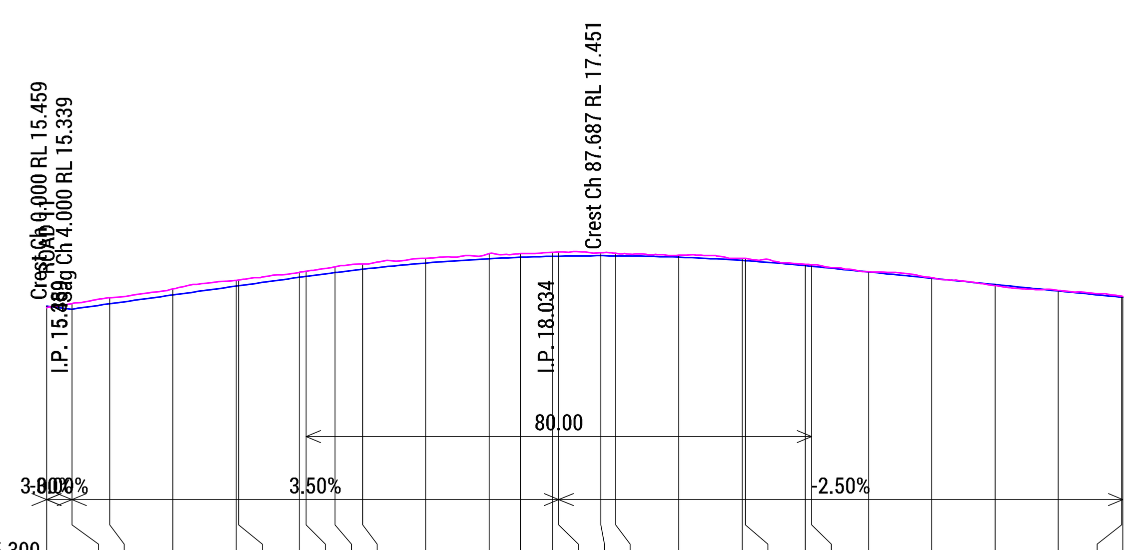
ROAD 10



Chainage	Existing Levels	Design Levels	Cut Fill
-0.000	18.671	18.561	-0.110
5.055	18.460	18.421	-0.039
10.000	18.113	18.174	+0.061
18.180	17.719	17.765	+0.046
20.000	17.644	17.674	+0.030
30.000	17.183	17.174	-0.009
32.727	17.068	17.038	-0.030
36.026	16.937	16.873	-0.064
40.000	16.701	16.680	-0.021
50.000	16.261	16.246	-0.015
60.000	15.851	15.885	+0.034
63.257	15.783	15.784	+0.001
70.000	15.516	15.598	+0.082
76.116	15.393	15.459	+0.066
79.939	15.367	15.385	+0.018
80.000	15.362	15.384	+0.022
89.376	15.379	15.251	-0.128
90.000	15.366	15.244	-0.122
90.488	15.356	15.239	-0.117
100.000	15.225	15.144	-0.081
110.000	15.185	15.044	-0.141
111.232	15.182	15.032	-0.150
120.000	14.988	14.920	-0.068
130.000	14.792	14.734	-0.058
140.000	14.544	14.485	-0.059
150.000	14.195	14.174	-0.021
151.232	14.159	14.132	-0.027
153.248	14.073	14.060	-0.013
160.000	13.767	13.801	+0.034
170.000	13.321	13.365	+0.044
180.000	12.934	12.866	-0.068
190.000	12.355	12.305	-0.050
191.232	12.318	12.232	-0.086
200.000	11.707	11.705	-0.002
210.000	11.176	11.105	-0.071
220.000	10.566	10.505	-0.061
222.604	10.402	10.361	-0.041
230.000	10.030	10.075	+0.045
237.647	9.922	9.976	+0.054
239.673	9.979	9.983	+0.004
240.000	9.983	9.985	+0.002
250.000	10.104	10.065	-0.039
260.000	10.287	10.145	-0.142
270.000	10.441	10.225	-0.216
280.000	10.623	10.305	-0.318
290.000	10.756	10.385	-0.371
300.000	10.860	10.465	-0.395
310.000	10.896	10.545	-0.351
319.645	10.989	10.623	-0.366
320.000	10.996	10.625	-0.371
322.407	10.958	10.645	-0.313
330.000	10.781	10.705	-0.076
340.000	10.783	10.785	+0.002
345.463	10.829	10.829	+0.000

LONGITUDINAL SECTION
Scales: H 1:1000 V 1:250

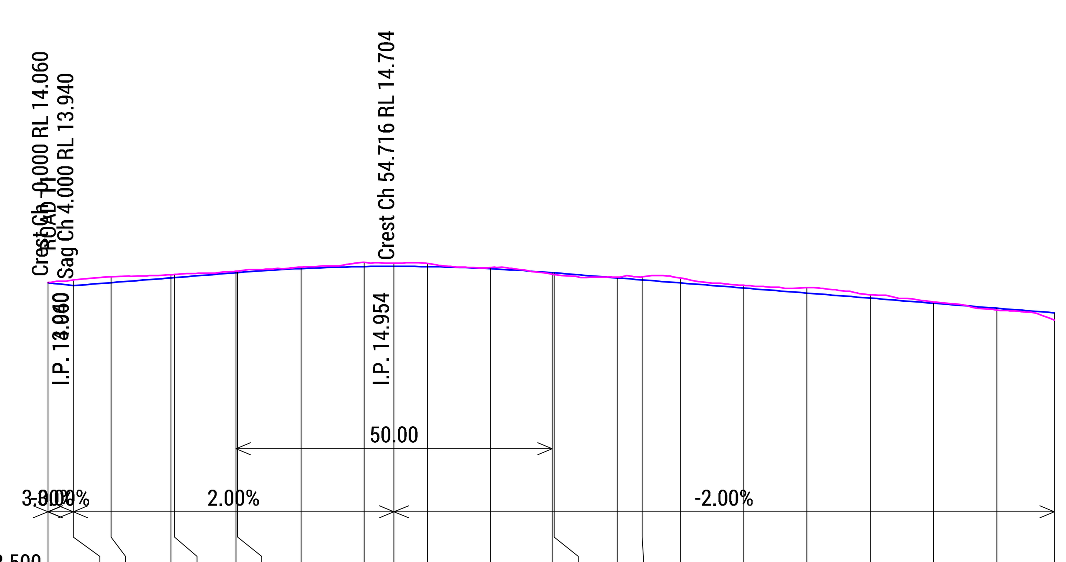
ROAD 11



Chainage	Existing Levels	Design Levels	Cut Fill
0.000	15.393	15.459	+0.066
4.000	15.559	15.339	-0.220
10.000	15.791	15.549	-0.242
20.000	16.134	15.899	-0.235
30.000	16.480	16.249	-0.231
30.378	16.492	16.262	-0.230
40.000	16.798	16.599	-0.199
41.021	16.838	16.634	-0.204
45.607	17.007	16.787	-0.220
50.000	17.125	16.918	-0.207
60.000	17.354	17.163	-0.191
70.000	17.530	17.334	-0.196
74.954	17.530	17.390	-0.140
80.000	17.587	17.429	-0.158
81.021	17.599	17.434	-0.165
87.687	17.562	17.451	-0.111
90.000	17.546	17.449	-0.097
100.000	17.468	17.394	-0.074
110.000	17.352	17.264	-0.088
110.490	17.344	17.256	-0.088
120.000	17.116	17.059	-0.057
121.021	17.097	17.034	-0.063
130.000	16.818	16.810	-0.008
140.000	16.584	16.560	-0.024
150.000	16.268	16.310	+0.042
160.000	16.078	16.060	-0.018
170.000	15.855	15.810	-0.045
170.242	15.846	15.804	-0.042

LONGITUDINAL SECTION
Scales: H 1:1000 V 1:250

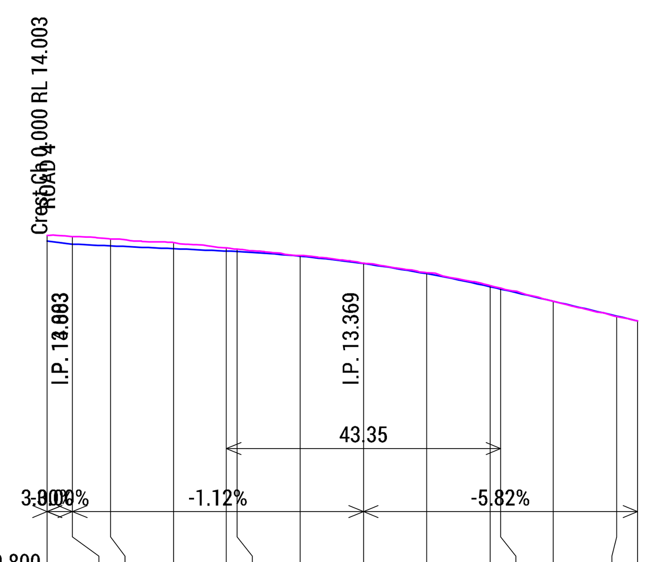
ROAD 12



Chainage	Existing Levels	Design Levels	Cut Fill
-0.000	14.073	14.060	-0.013
4.000	14.164	13.940	-0.224
10.000	14.296	14.060	-0.236
19.451	14.377	14.249	-0.128
20.000	14.385	14.260	-0.125
29.716	14.515	14.454	-0.061
30.000	14.520	14.460	-0.060
40.000	14.672	14.617	-0.055
50.000	14.861	14.695	-0.166
54.716	14.833	14.704	-0.129
60.000	14.817	14.693	-0.124
70.000	14.656	14.611	-0.045
79.716	14.396	14.454	+0.058
80.000	14.380	14.448	+0.068
90.000	14.276	14.248	-0.028
93.928	14.289	14.170	-0.119
100.000	14.244	14.048	-0.196
110.000	13.956	13.848	-0.108
120.000	13.870	13.648	-0.222
130.000	13.584	13.448	-0.136
140.000	13.300	13.248	-0.052
150.000	12.982	13.048	+0.066
159.091	12.572	12.867	+0.295

LONGITUDINAL SECTION
Scales: H 1:1000 V 1:250

ROAD 13



Chainage	Existing Levels	Design Levels	Cut Fill
0.000	14.227	14.003	-0.224
4.000	14.183	13.883	-0.300
10.000	14.093	13.816	-0.277
20.000	13.943	13.704	-0.239
28.325	13.735	13.611	-0.124
30.000	13.686	13.591	-0.095
40.000	13.436	13.407	-0.029
50.000	13.134	13.114	-0.020
60.000	12.751	12.713	-0.038
70.000	12.247	12.203	-0.044
71.675	12.145	12.107	-0.038
80.000	11.625	11.623	-0.002
90.000	11.017	11.041	+0.024
93.350	10.842	10.846	+0.004

LONGITUDINAL SECTION
Scales: H 1:1000 V 1:250

ROAD 14

REV:	ISSUED FOR / DESCRIPTION:	BY:	DATE:
A	INFORMATION PURPOSES	PVD	21-05-25

STATUS:
PRELIMINARY / INFORMATION

DO NOT SCALE - IF IN DOUBT, ASK

APPROVED: - ACRED. No: -

DESIGN BY: RJ
DESIGN CHK: JS
DRAWN BY: PVD
DRAFT CHK: -
DATE: -

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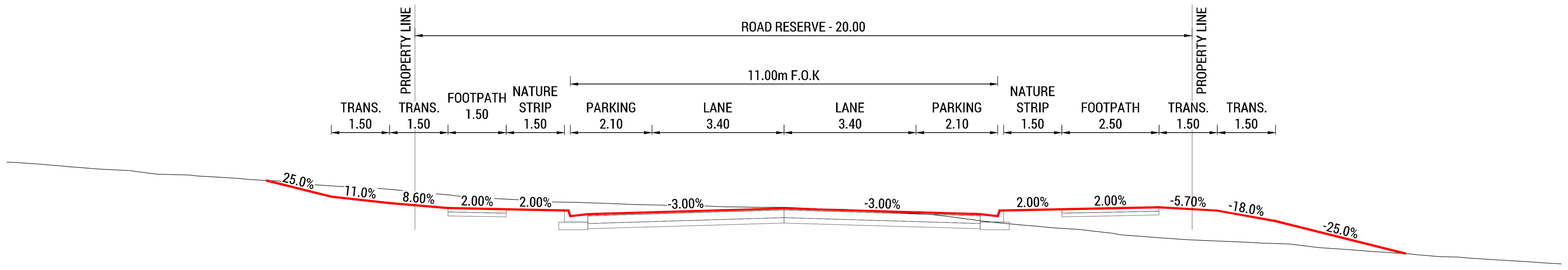
CLIENT: HOLMESDYER
PROJECT: BOYER ROAD PRECINCT
ADDRESS: 50 - 170 BOYER ROAD BRIDGEWATER

TITLE: LONG SECTION - ROAD 10 - ROAD 14
SCALE: AS NOTED SHEET SIZE: A1 DWGs IN SET: -
PROJECT No: 251013 DWG No: C416 REV: A



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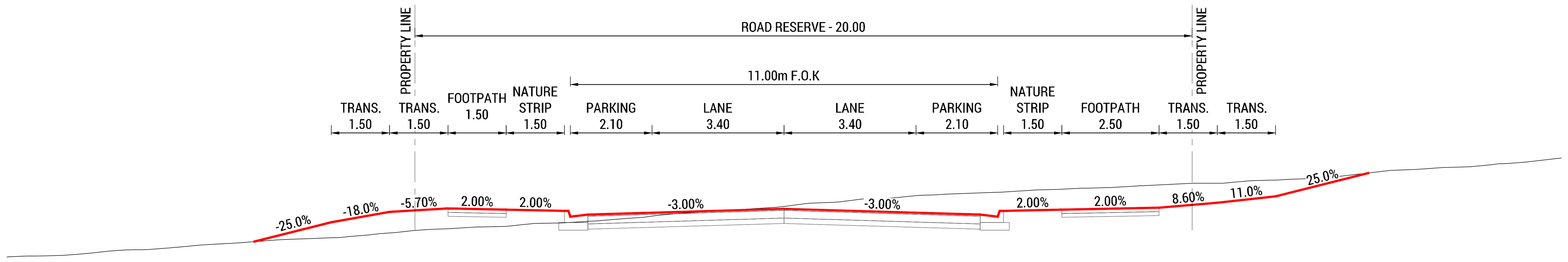

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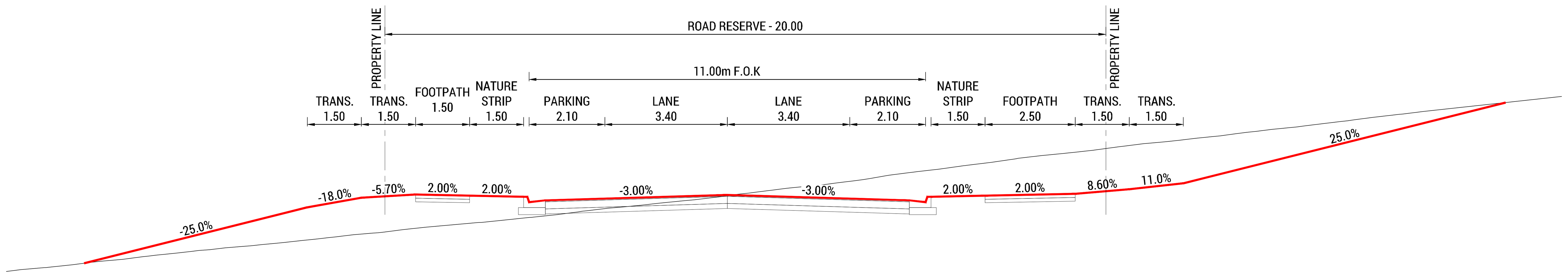

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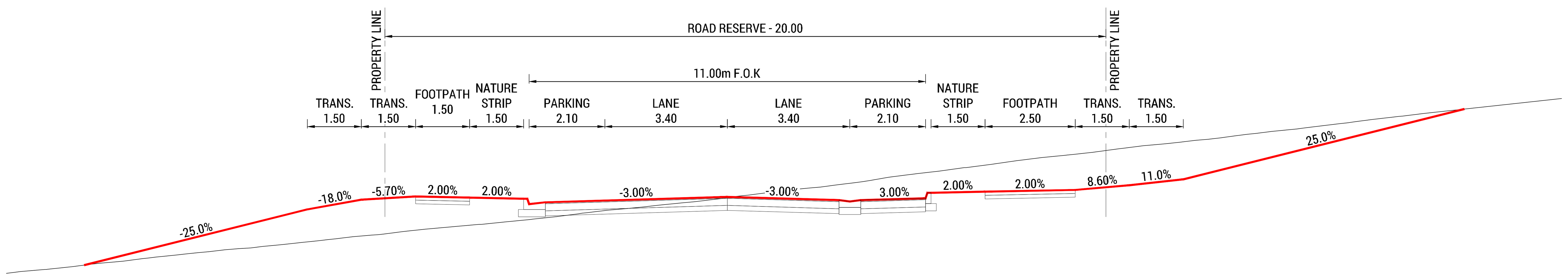

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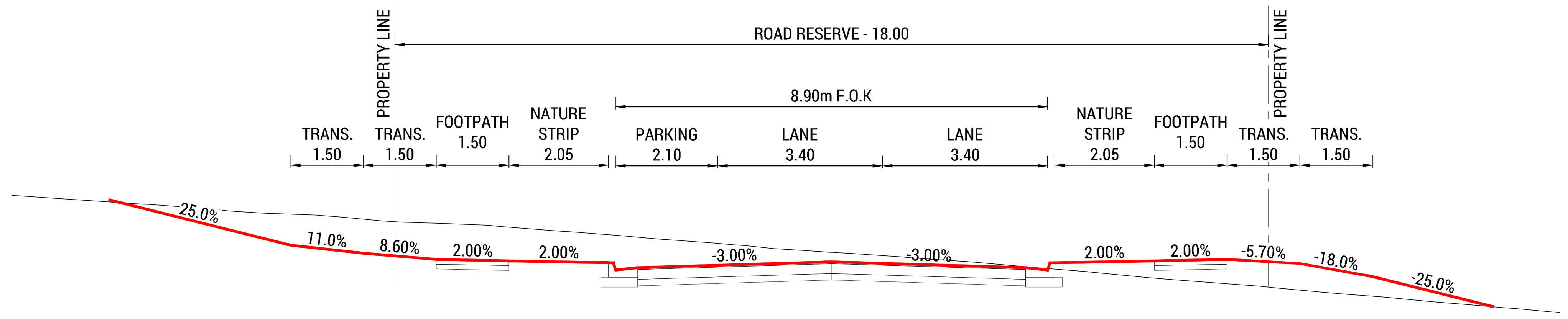
SCALE 1:100



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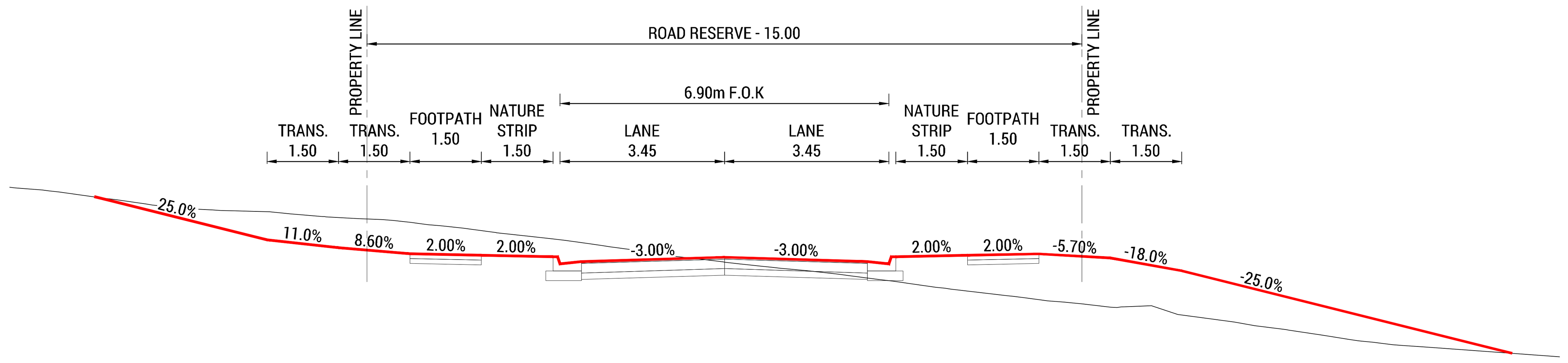

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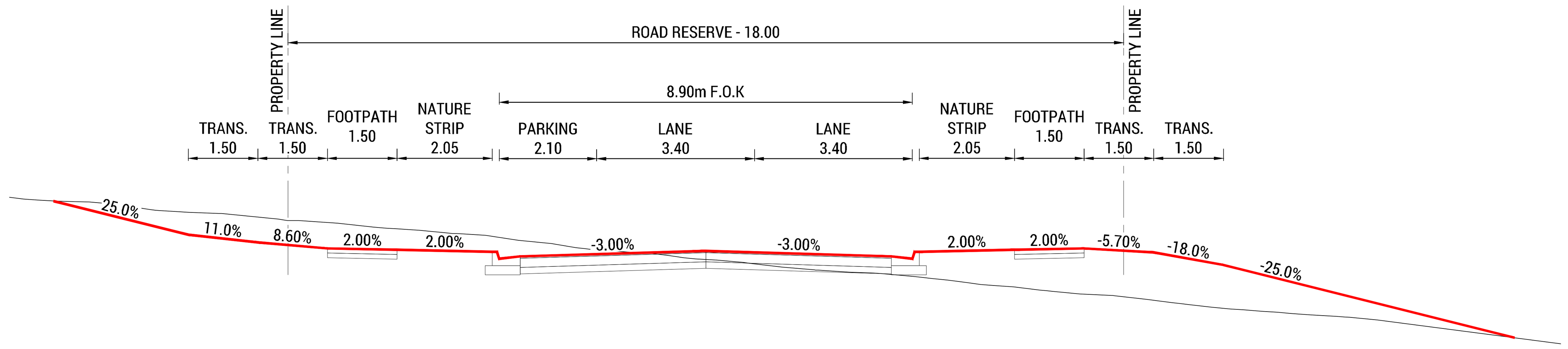

06 TYPICAL ROAD SECTION - ROAD 10 CH 150
SCALE 1:100

REV:	ISSUED FOR / DESCRIPTION:	BY:	DATE:
A	INFORMATION PURPOSES	PVD	21-05-25

STATUS: PRELIMINARY / INFORMATION

DO NOT SCALE - IF IN DOUBT, ASK

APPROVED: - ACRED. No: -

DESIGN BY: RJ
DESIGN CHK: JS
DRAWN BY: PVD
DRAFT CHK: -
DATE: -

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CLIENT: HOLMESDYER
PROJECT: BOYER ROAD PRECINCT
ADDRESS: 50 - 170 BOYER ROAD BRIDGEWATER

TITLE: TYPICAL ROAD CROSS SECTIONS

SCALE: 1:100 SHEET SIZE: A1 DWGs IN SET: -

PROJECT No: 251013 DWG No: C421 REV: A

MIDSON traffic pty ltd

Holmes Dyer

Boyer Road Precinct Structure Plan Traffic Impact Assessment

February 2025

CELEBRATING 15 YEARS
2008 - 2023

Contents

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Table Index

1. Introduction

1.1 Background

Midson Traffic were engaged by Holmes Dyer to prepare a traffic impact assessment for a proposed rezoning and masterplan development for future residential subdivision in Bridgewater.

1.2 Traffic Impact Assessment (TIA)

A traffic impact assessment (TIA) is a process of compiling and analysing information on the impacts that a specific development proposal is likely to have on the operation of roads and transport networks. A TIA should not only include general impacts relating to traffic management, but should also consider specific impacts on all road users, including on-road public transport, pedestrians, cyclists and heavy vehicles.

This TIA has been prepared in accordance with the Department of State Growth (DSG) publication, *Traffic Impact Assessment Guidelines*, August 2020. This TIA has also been prepared with reference to the Austroads publication, *Guide to Traffic Management,* Part 12: *Integrated Transport Assessments for Developments*, 2020.

Land use developments generate traffic movements as people move to, from and within a development. Without a clear understanding of the type of traffic movements (including cars, pedestrians, trucks, etc), the scale of their movements, timing, duration and location, there is a risk that this traffic movement may contribute to safety issues, unforeseen congestion or other problems where the development connects to the road system or elsewhere on the road network. A TIA attempts to forecast these movements and their impact on the surrounding transport network.

A TIA is not a promotional exercise undertaken on behalf of a developer; a TIA must provide an impartial and objective description of the impacts and traffic effects of a proposed development. A full and detailed assessment of how vehicle and person movements to and from a development site might affect existing road and pedestrian networks is required. An objective consideration of the traffic impact of a proposal is vital to enable planning decisions to be based upon the principles of sustainable development.

This TIA also addresses the relevant clauses of C2.0, *Parking and Sustainable Parking Code*, and C3.0, *Road and Railway Assets Code*, of the Tasmanian Planning Scheme – Brighton, 2021.

1.3 Statement of Qualification and Experience

This TIA has been prepared by an experienced and qualified traffic engineer in accordance with the requirements of Council's Planning Scheme and The Department of State Growth's, *Traffic Impact Assessment Guidelines*, August 2020, as well as Council's requirements.

The TIA was prepared by Keith Midson. Keith's experience and qualifications are briefly outlined as follows:

- 29 years professional experience in traffic engineering and transport planning.
- Master of Transport, Monash University, 2006
- Master of Traffic, Monash University, 2004

- Bachelor of Civil Engineering, University of Tasmania, 1995
- Engineers Australia: Fellow (FIEAust); Chartered Professional Engineer (CPEng); Engineering Executive (EngExec); National Engineers Register (NER)

1.4 Project Scope

The project scope of this TIA is outlined as follows:

- Review of the existing road environment in the vicinity of the site and the traffic conditions on the road network.
- Provision of information on the proposed development with regards to traffic movements and activity.
- Identification of the traffic generation potential of the proposal with respect to the surrounding road network in terms of road network capacity.
- Review of the parking requirements of the proposed development. Assessment of this parking supply with Planning Scheme requirements.
- Traffic implications of the proposal with respect to the external road network in terms of traffic efficiency and road safety.

1.5 Subject Site

The subject site is located approximately 550 metres west of Old Main Road along Boyer Road. The subject site also has frontage onto Cobbs Hill Road.

The subject site consists of several titles covering an area of approximately 52 hectares:

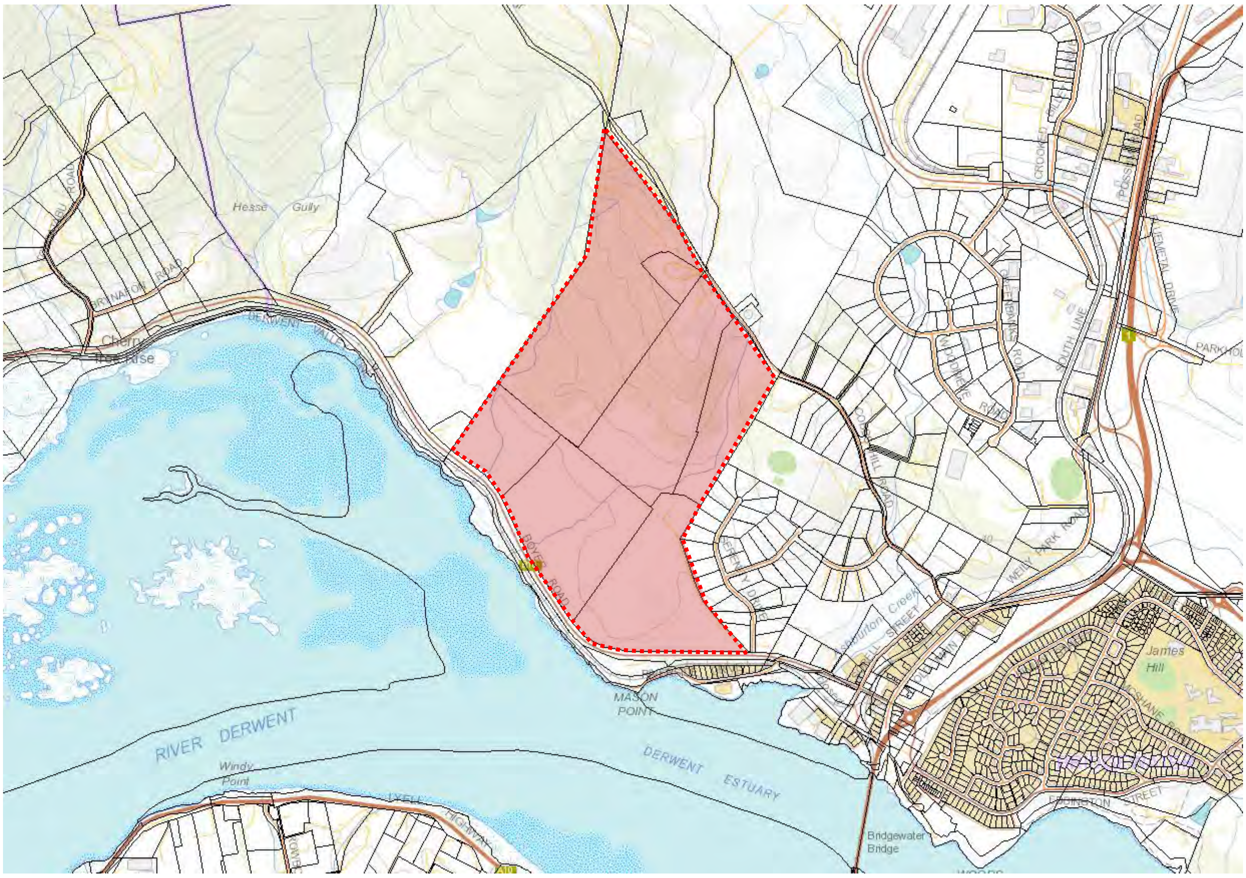
- Title reference 44724/8 (50 Boyer Road).
- Title reference 44724/9 (170 Boyer Road).
- Title reference 44724/2.
- Title reference 152364/2 (31 Cobbs Road).
- Title reference 135574/1 (29 Cobbs Road).
- Title reference 135574/2 (25 Cobbs Road).

The subject site connects to Boyer Road along its southern boundary and Cobbs Hill Road along its northern boundary.

The subject site is Zoned 'Future Urban' under the Bridgewater Local Provision Schedule. The existing use of the site is low density residential, with one dwelling situated on each lot, with the exception of 31 Cobbs Hill Road.

The subject site and surrounding road network is shown in Figure 1.

Figure 1 Subject Site & Surrounding Road Network



<u>Image Source</u>: LIST Map, DPIPWE

1.6 Reference Resources

The following references were used in the preparation of this TIA:

- Tasmanian Planning Scheme – Brighton, 2021 (Planning Scheme)
- Austroads, *Guide to Traffic Management,* Part 12: *Integrated Transport Assessments for Developments*, 2020
- Austroads, Guide to Road Design, Part 4A: Unsignalised and Signalised Intersections, 2021
- Department of State Growth, *Traffic Impact Assessment Guidelines*, 2020
- Transport NSW, *Guide to Traffic Impact Assessment*, 2024 (TIA Guide)
- Australian Standards, AS2890.1, *Off-Street Parking*, 2004 (AS2890.1)
- Hubble Traffic, *Land Rezoning for New Residential Subdivision*, 2024 (Hubble Report)

2. Existing Conditions

2.1 Transport Network

For the purposes of this report, the transport network consists of Boyer Road, Serenity Drive, Old Main Road and The Derwent Valley Rail Line.

2.1.1 Boyer Road

Boyer Road is a State Growth owned road that connects between the Midland Highway in Bridgewater and Rocks Road in New Norfolk along the eastern shore of the Derwent River. It has a two-lane configuration with a sealed pavement width of 6-metres. Edge and centre lines are provided along its length near the subject site. Boyer Road is not proclaimed as a Limited Access Road.

Under the Tasmanian Road Hierarchy, Boyer Road is categorised as a category 5, which is defined as follows:'

> *"Other Roads are primarily access roads for private properties.*
>
> *Some may be used for comparatively low frequency heavy freight vehicle transport, for example:*
>
> - *Log transport – but they are not the most important log transport roads and experience fluctuation in use; and*
> - *Farm property access – for purposes including delivery of fuel and supplies, stock transport, crop delivery and milk pickup.*
>
> *While a few of these roads may currently carry larger numbers of heavy freight vehicles, they may duplicate existing Trunk, Regional Freight or Regional Access Roads and are not DIER's strategically preferred heavy freight vehicle routes."*

Boyer Road currently carries 3,500 vehicles per day[1] near the subject site, with a peak flow of approximately 450 vehicles per hour (PM peak). The heavy vehicle proportion of traffic is 11.5%. The hourly distribution of traffic flow on Boyer Road west of Sorell Street is shown in Figure 2.

Boyer Road adjacent to the subject site is shown in Figure 3.

[1] Department of State Growth traffic data, 2023

Figure 2 Boyer Road Weekday Hourly Traffic Flow

Figure 3 Boyer Road

2.1.2 Serenity Drive

Serenity Drive is a local cul-de-sac that services a small residential catchment area. It is approximately 600 metres in length, connecting to Boyer Road at a T-junction at its southern end and a cul-de-sac at its northern termination. The general urban speed limit of 50-km/h is applicable to Serenity Drive. The traffic volume is estimated to be approximately 300 vehicles per day.

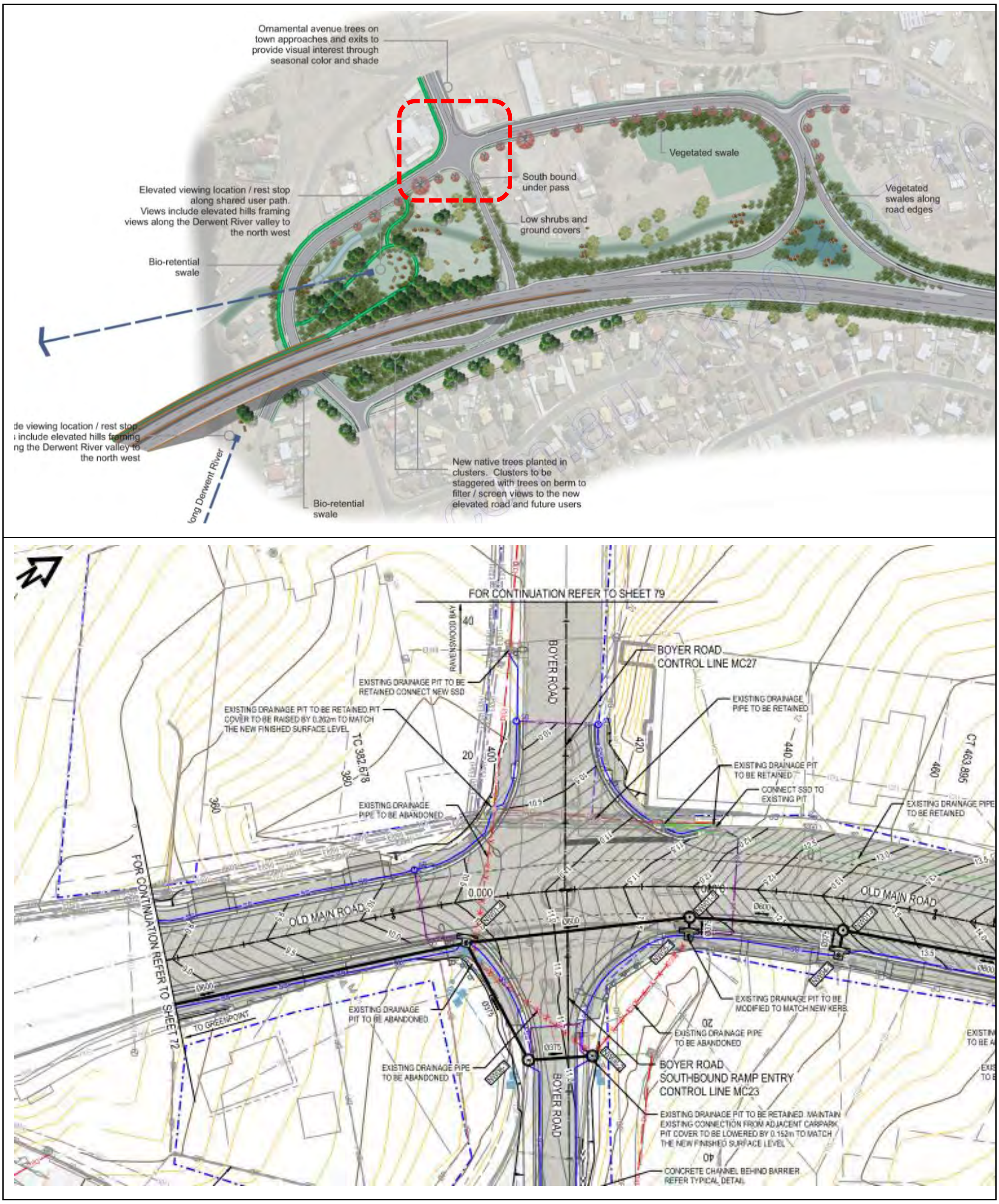
2.1.3 Old Main Road

Old Main Road is a local collector road that once formed part of the Midland Highway corridor. It now serves as access to residential and commercial properties for a short length to the north of the Midland Highway. Traffic volumes are very low, in the order of 300 vehicles per day near the Boyer Road junction.

The current roundabout at the intersection of Boyer Road with Old Main Road will be removed and converted to a give-way junction as part of the Bridgewater Bridge works that are currently underway. The Old Main Road/ Boyer Road junction will form a component of the northern interchange associated with the new Bridgewater Bridge.

The layout associated with the Bridgewater Bridge is shown in Figure 4.

Figure 4 Old Main Rd / Boyer Rd New Bridgewater Bridge



2.1.4 Derwent Valley Rail Line

The Derwent Valley Line connects between Maydena and Bridgewater along the western and northern side of the Derwent River. It connects to the South Line at Bridgewater, where it continues to Western Junction where it connects to the Western Line.

The Derwent Valley Railway Line crosses Boyer Road and Cobbs Hill Road within the study area.

2.2 Road Safety Performance

Crash data can provide valuable information on the road safety performance of a road network. Existing road safety deficiencies can be highlighted through the examination of crash data, which can assist in determining whether traffic generation from the proposed development may exacerbate any identified issues.

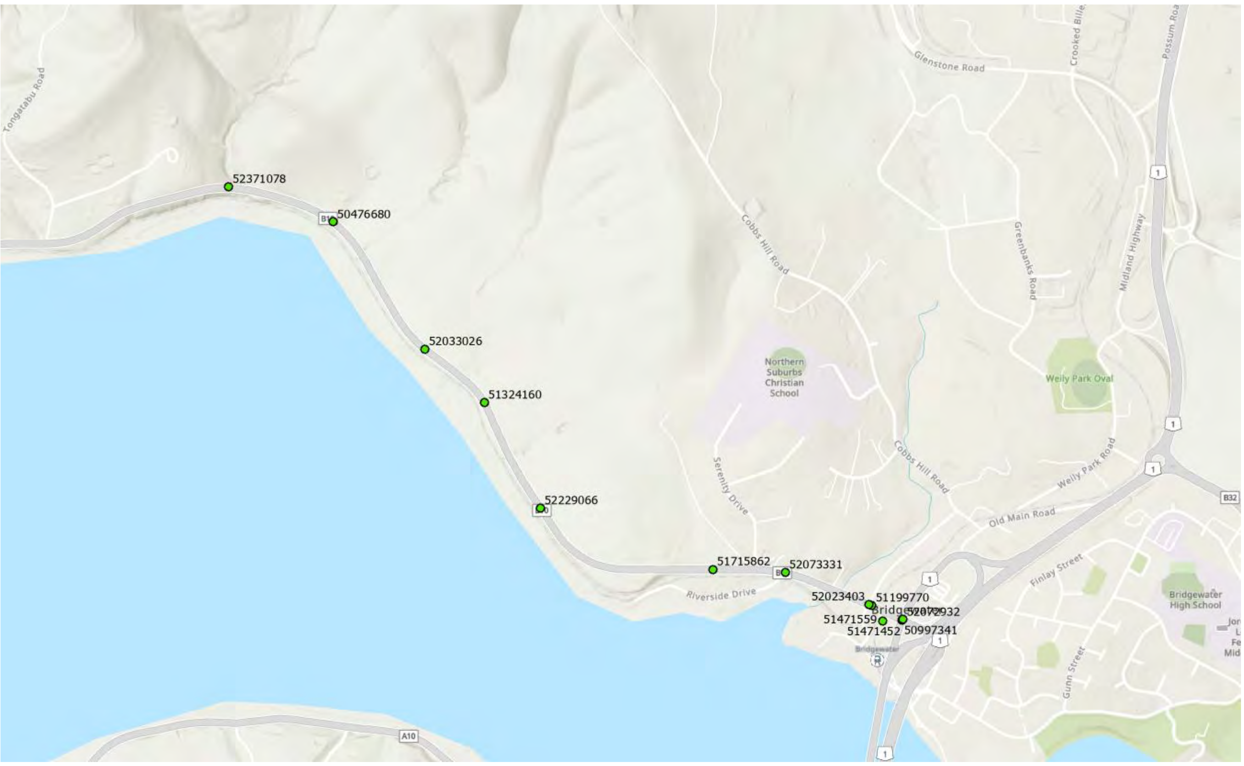
Crash data was obtained from the Department of State Growth for a 5+ year period between 1st January 2019 and 31st August 2024 for Boyer Road between Old Main Road and Tongatabu Road.

The findings of the crash data is summarised as follows:

- A total of 16 crashes were reported during this time.
- Severity. 2 crashes involved minor injury; 14 crashes involved property damage only.
- Time of day. Crashes were disbursed throughout the day. 9 crashes were reported between 8:00am and 5:00pm. 2 crashes were reported prior to 8:00am and 5 crashes were reported after 6:00pm. Afternoon crashes were dominant, with a total of 5 crashes reported between 12:00pm and 3:00pm.
- Day of week. 5 crashes were reported on Fridays; 3 crashes were reported on Mondays and Sundays; 2 crashes were reported on a Wednesday; 1 crash was reported on a Tuesday and a Saturday.
- Crash types. 5 crashes involved a 'cross-traffic' collisions; 3 crashes involved 'rear-end' collisions; 2 crashes involved 'other-manoeuvring' collisions; and various other crash types with no clear trend.
- Crash locations. Crashes were relatively evenly disbursed along Boyer Road. 5 crashes were reported at the Boyer Road/ Old Main Road intersection; 1 crash was reported at the Boyer Road/ Riverside Drive intersection; 1 crash was reported at the Boyer Road/ Sorell Street/ Wallace Street junction; the remaining crashes were reported at midblock locations. The crash locations are shown in Figure 5.
- Vulnerable road users. 2 crashes involved motorcyclists – 1 crash at the Boyer Road/ Old Main Road junction and the other approximately 800 metres west of the Serenity Drive junction. Both crashes involved minor injury

The crash history does not provide any indication that there are pre-existing road safety deficiencies in the transport network near the subject site. Whilst Boyer Road has a posted speed limit of 80-km/h the severity of crashes reported is relatively low.

Figure 5 Crash Locations



Source: *Department of State Growth*

3. Proposed Masterplan

3.1 Masterplan Proposal

The proposed development involves the subdivision of land to create the following 372 residential lots (including 3 existing dwellings) accessed via Boyer Road. The breakdown of the lots includes the following:

- 260 single dwelling lots
- 42 units
- 66 duplex lots (two dwellings on one lot)
- 3 triplex lots (three dwellings on one lot)
- 1 'mixed residential' lot that can be used for possible commercial/ retail/ community use

The subdivision will be accessed via three new junctions connecting to Boyer Road. The proposed masterplan is shown in Figure 6.

Figure 6 Proposed Masterplan Layout - South

3.2 Alternative Access Considerations

The site has road frontage at Cobbs Hill Road and Boyer Road. Whilst the subject site is located in close proximity to Serenity Drive, no direct road access is considered possible due to property constraints.

Cobbs Hill Road is a low volume rural/ residential access road that has a variable pavement width between 5 and 6 metres. This road could only be considered to be appropriate for low volume vehicular access to the subject site for the following reasons:

- The existing construction of Cobbs Hill Road is not suitable for the modest increase in traffic associated with the structure plan.
- The existing rail level crossing near Old Main Road would likely require upgrading. The existing level crossing is a low volume standard with warning lights and limited storage between the crossing and Old Main Road.

On this basis, Boyer Road was considered to be the most appropriate road connection for the subject site. Boyer Road has substantial spare capacity that can accommodate the potential traffic generation associated with future subdivision of the subject site (refer to modelling in Sections 4.3 and 4.4). No access to Cobbs Hill Road has been provided in the masterplan layout.

4. Traffic Impacts

4.1 Trip Generation

Trip generation rates were sourced from the TIA Guide. The TIA Guide recommends the following traffic generation rates:

- Single dwellings. 7.4 vehicles per day per dwelling, with a peak of 0.78 vehicles per hour per dwelling.
- Units. 5 vehicles per day, with a peak of 0.5 vehicles per hour per unit (noting one unit per lot).
- Duplex & Triplex lots. 5 vehicles per day, with a peak of 0.5 vehicles per hour per unit (noting 2 or 3 dwellings per lot).
- Commercial/ retail/ community use. 43.4 vehicles per day per 100m2 of GLFA[2], with a peak of 1.78 vehicles per hour per 100m^2 GLFA during the AM peak and 3.71 vehicles per hour per 100m^2 GLFA during the PM peak.

This equates to the following traffic generation:

- Daily traffic generation. 2,904 vehicles per day
- AM peak traffic generation. 297 vehicles per hour
- PM peak traffic generation. 300 vehicles per hour

4.2 Trip Assignment

When fully developed, the subdivision will connect to Boyer Road at three new road junctions.

Based on the layout of the concept structure plan, the traffic generation is estimated to be spread across the three accesses as follows:

- Access 1 (northern access) 900 vehicles per day/ 93 vehicles per hour
- Access 2 (middle access) 958 vehicles per day/ 96 vehicles per hour
- Access 3 (southern access) 1,045 vehicles per day/ 108 vehicles per hour

[2] GLFA = 'Gross leasable floor area'. In this case it is assumed that a building can be constructed on the lot with a GLFA of 150m^2.

4.3 Road Junction Capacity Analysis

Traffic modelling of the proposed road junctions on Boyer Road was undertaken using SIDRA Intersection software.

SIDRA uses complex analytical traffic models coupled with iterative approximation technique to provide estimates of capacity and performance of intersections. SIDRA is endorsed as a modelling tool by Austroads.

One of the key SIDRA outputs is an indication of level of service (LOS) at intersections. The LOS concept describes the quality of traffic service in terms of 6 levels, with level of service A (LOS A) representing the best operating condition (ie. at or close to free flow) and level of service F (LOS F) representing the worst (i.e. forced flow). Other key outputs of SIDRA include average movement delay and 95th percentile queue lengths[3].

The level of service method used in the modelling is the Delay method, where level of service is based solely on average movement delay, including geometric delay, as summarised in Table 1.

Table 1 SIDRA LOS Performance standards

Level of Service	Signals and Roundabouts	Sign Control (Give Way & Stop)
LOS A	$d \leq 10$	$d \leq 10$
LOS B	$10 < d \leq 20$	$10 < d \leq 15$
LOS C	$20 < d \leq 35$	$15 < d \leq 25$
LOS D	$35 < d \leq 55$	$25 < d \leq 35$
LOS E	$55 < d \leq 80$	$35 < d \leq 50$
LOS F	$80 < d$	$50 < d$

The lowest target level of service considered acceptable for an urban environment is LOS D, which corresponds to a maximum delay of 50 seconds for give way control. LOS E and F represent the junction operating at capacity, with forced flow conditions.

4.3.1 2034 Modelling

Traffic modelling was conducted for the 10-year forecast period of 2034. This accounts for the likely minimum period for the masterplan to be fully developed. The 10-year forecast is also a requirement within the Department of State Growth's TIA guidelines.

Boyer Road has experienced a 1.8% compound growth rate between 2018 and 2023. This growth rate was applied to determine the background traffic volumes on Boyer Road in 2034. The 2034 Boyer Road

[3] This is the queue length not exceeded 95% of the time.

peak hour volumes will be 275 vehicles per hour during the AM peak and 471 vehicles per hour in the PM peak.

All three access junctions will effectively have the same through traffic on Boyer Road. In this regard the southern access will carry the highest traffic volume associated with the masterplan. The southern access was therefore modelled using SIDRA under 2034 peak hour conditions (noting that the remaining two accesses will have a better operational efficiency as they have less traffic generation associated with the junctions).

The junction was modelled with a channelised right turn land (CHR) and short channelised left turn lane (CHL(S)).

The SIDRA modelling for 2034 conditions during the AM and PM peak periods are summarised in Table 2 and Table 3 respectively. It can be seen that the junction will operate at a high level of efficiency during both AM and PM peak periods, with LOS-A, LOS-B and LOS-C for all approaches.

Table 2 AM Peak 2034 Boyer Road SIDRA

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m
East: Boyer Road								
5	T	92	11.5	0.050	0.0	LOS A	0.0	0.0
6	R	29	3.0	0.025	9.2	LOS A	0.1	0.7
Approach		121	9.4	0.050	2.2	NA	0.1	0.7
North: Masterplan site								
7	L	62	3.0	0.065	9.4	LOS A	0.2	1.7
9	R	16	3.0	0.029	11.9	LOS B	0.1	0.8
Approach		78	3.0	0.065	9.9	LOS A	0.2	1.7
West: Boyer Road								
10	L	7	3.0	0.004	8.3	LOS A	0.0	0.0
11	T	198	11.5	0.109	0.0	LOS A	0.0	0.0
Approach		205	11.2	0.109	0.3	NA	0.0	0.0
All Vehicles		404	9.1	0.109	2.7	NA	0.2	1.7

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.

Table 3 PM Peak 2034 Boyer Road SIDRA

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m
East: Boyer Road								
5	T	278	11.5	0.153	0.0	LOS A	0.0	0.0
6	R	53	3.0	0.046	9.4	LOS A	0.2	1.3
Approach		331	10.1	0.153	1.5	NA	0.2	1.3
North: Masterplan Site								
7	L	38	3.0	0.040	9.4	LOS A	0.1	1.0
9	R	9	3.0	0.026	15.9	LOS C	0.1	0.7
Approach		47	3.0	0.040	10.7	LOS B	0.1	1.0
West: Boyer Road								
10	L	14	3.0	0.008	8.3	LOS A	0.0	0.0
11	T	217	11.5	0.120	0.0	LOS A	0.0	0.0
Approach		231	11.0	0.120	0.5	NA	0.0	0.0
All Vehicles		608	9.9	0.153	1.8	NA	0.2	1.3

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.

4.4 Boyer Road/ Old Main Road Impacts

The proposed implementation of the Master Plan will increase traffic flows at the Boyer Road/ Old Main Road intersection. The Boyer Road/ Old Main Road junction is currently being modified as part of the New Bridgewater Bridge project (as outlined in Section 2.1.3).

Traffic modelling was undertaken for the Boyer Road/ Old Main Road junction (revised layout associated with the Bridgewater Bridge project). The existing turning movements associated with the junction are summarised in Table 4. The turning movements were derived from origin-destination data associated with the Bridgewater Bridge and factored to 2024 conditions by applying background traffic growth of 1.8% per annum for all approaches.

Table 4 Boyer Rd/ Old Main Rd Existing Peak Turning Movements

Peak	Boyer Road			Old Main Rd South			Old Main Rd North		
	Left	thru	Right	Left	thru	Right	Left	thru	Right
AM Peak	108	136	18	25	22	87	9	87	72
PM Peak	81	110	36	38	8	53	6	61	167

Turning movements for 2034 peak periods were calculated incorporating background traffic growth (as per Section 4.3.1 assumptions) and traffic generation associated with the proposed development (utilising the same turning proportions as existing conditions). The 2034 turning movements at the Boyer Road/ Old Main Road junction are shown in Table 3.

Table 5 Boyer Rd/ Old Main Rd 2034 Peak Turning Movements

Peak	Boyer Road			Old Main Rd South			Old Main Rd North		
	Left	thru	Right	Left	thru	Right	Left	thru	Right
AM Peak	203	242	32	32	45	98	11	98	128
PM Peak	136	183	60	60	63	60	7	69	278

The SIDRA modelling for 2034 conditions during the AM and PM peak periods are summarised in Table 6 and Table 7 for the AM and PM peaks respectively.

It can be seen that all movements at the intersection have a LOS of C or better. The intersection therefore caters for the additional traffic generation of the proposed masterplan at a high level of service.

Table 6 AM Peak 2034 Boyer Rd/ Old Main Rd SIDRA

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m
South: Old Main Rd								
1	L	51	2.0	0.130	8.8	LOS A	0.6	4.6
2	T	28	2.0	0.130	0.5	LOS A	0.6	4.6
3	R	113	2.0	0.130	9.5	LOS A	0.6	4.6
Approach		192	2.0	0.130	8.0	NA	0.6	4.6
North: Old Main Rd								
7	L	13	2.0	0.172	8.6	LOS A	0.9	6.5
8	T	113	2.0	0.172	0.3	LOS A	0.9	6.5
9	R	142	2.0	0.172	8.9	LOS A	0.9	6.5
Approach		267	2.0	0.172	5.3	NA	0.9	6.5
West: Boyer Road								
10	L	214	2.0	0.767	20.8	LOS C	12.2	86.9
11	T	271	2.0	0.767	19.6	LOS C	12.2	86.9
12	R	36	2.0	0.767	21.1	LOS C	12.2	86.9
Approach		520	2.0	0.767	20.2	LOS C	12.2	86.9
All Vehicles		979	2.0	0.767	13.7	NA	12.2	86.9

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.

Table 7 PM Peak 2034 Boyer Rd / Old Main Rd SIDRA

Movement Performance - Vehicles								
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Distance m
South: Old Main Rd								
1	L	71	2.0	0.096	8.6	LOS A	0.5	3.4
2	T	11	2.0	0.096	0.3	LOS A	0.5	3.4
3	R	68	2.0	0.096	9.3	LOS A	0.5	3.4
Approach		149	2.0	0.096	8.3	NA	0.5	3.4
North: Old Main Rd								
7	L	8	2.0	0.280	8.7	LOS A	1.5	10.9
8	T	80	2.0	0.280	0.4	LOS A	1.5	10.9
9	R	312	2.0	0.280	8.9	LOS A	1.5	10.9
Approach		400	2.0	0.280	7.2	NA	1.5	10.9
West: Boyer Road								
10	L	152	2.0	0.739	22.3	LOS C	9.4	66.6
11	T	205	2.0	0.739	21.0	LOS C	9.4	66.6
12	R	67	2.0	0.739	22.6	LOS C	9.4	66.6
Approach		424	2.0	0.739	21.7	LOS C	9.4	66.6
All Vehicles		974	2.0	0.739	13.7	NA	9.4	66.6

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.

4.5 Access Impacts

The Structure Plan proposes three new road junctions connecting to Boyer Road. The Acceptable Solution A1.2 of Clause C3.5.1 of the Planning Scheme states "*For a road, excluding a category 1 road or a limited access road, written consent for a new junction, vehicle crossing, or level crossing to serve the use and development has been issued by the road authority*".

Advice was sought from the Department of State Growth as the road authority. General comments were provided and no objection was made subject to a detailed assessment being provided in the form of a TIA. No written consent has been received from the Department of State Growth for the new junctions and therefore the Acceptable Solution A1.2 of Clause C3.5.1 of the Planning Scheme is not met.

The Performance Criteria P1 of Clause C3.5.1 of the Planning Scheme states:

> *"Vehicular traffic to and from the site must minimise any adverse effects on the safety of a junction, vehicle crossing or level crossing or safety or efficiency of the road or rail network, having regard to:*
>
> *(a) any increase in traffic caused by the use;*
>
> *(b) the nature of the traffic generated by the use;*
>
> *(c) the nature of the road;*
>
> *(d) the speed limit and traffic flow of the road;*
>
> *(e) any alternative access to a road;*

(f) the need for the use;

(g) any traffic impact assessment; and

(h) any advice received from the rail or road authority".

The following is relevant with respect to each of the three proposed junctions on Boyer Road associated the structure plan:

a. Increase in traffic. The traffic generation of the three accesses varies between 637 and 816 vehicles per day. Traffic modelling of the traffic movements at the three proposed junctions indicate that they will operate at an acceptable level of efficiency (refer to Section 4.3.1).

b. Nature of traffic. The traffic generated by the rezoning and future subdivision will be residential in nature, which is consistent and compatible with existing traffic utilising Boyer Road.

c. Nature of road. Boyer Road is a Category 5 highway under the Department of State Growth's road hierarchy.

d. Speed limit and traffic flow of road. Boyer Road has a posted speed limit of 80-km/h and carries a volume of 3,500 vehicles per day.

e. Alternative access. Alternative access arrangements were considered. This is detailed in Section 3.2.

f. Need for use. The structure plan has been proposed to address an identified housing shortfall. The subject site was selected due to its potential to provide a large residential lot yield located in reasonable proximity to services (shops, schools, etc).

g. Traffic impact assessment. This report documents the findings of a traffic impact assessment. Importantly the proposed junctions have been demonstrated to operate at a high level of efficiency through traffic modelling (Section 4.3), provide sufficient sight distance in accordance with Austroads requirements (Section 4.9), and have an appropriate design in accordance with Austroads requirements (Section 4.7).

h. Road authority advice. The Department of State Growth were consulted. No objection was received in principle subject to a TIA being prepared that confirmed sight distance standards are met and appropriate junction designs were documented.

Based on the above assessment the proposed junctions connecting to Boyer Road satisfy the requirements of Performance Criteria P1 of Clause C3.5.1 of the Planning Scheme.

4.6 Junction Spacing

The three proposed new junctions on Boyer Road will have a physical spacing of approximately 780 metres between accesses 1 and 2, and 300 metres between accesses 2 and 3. The spacing is appropriate for an 80-km/h highway and will result in negligible conflicts between turning movements associated with the proposed accesses.

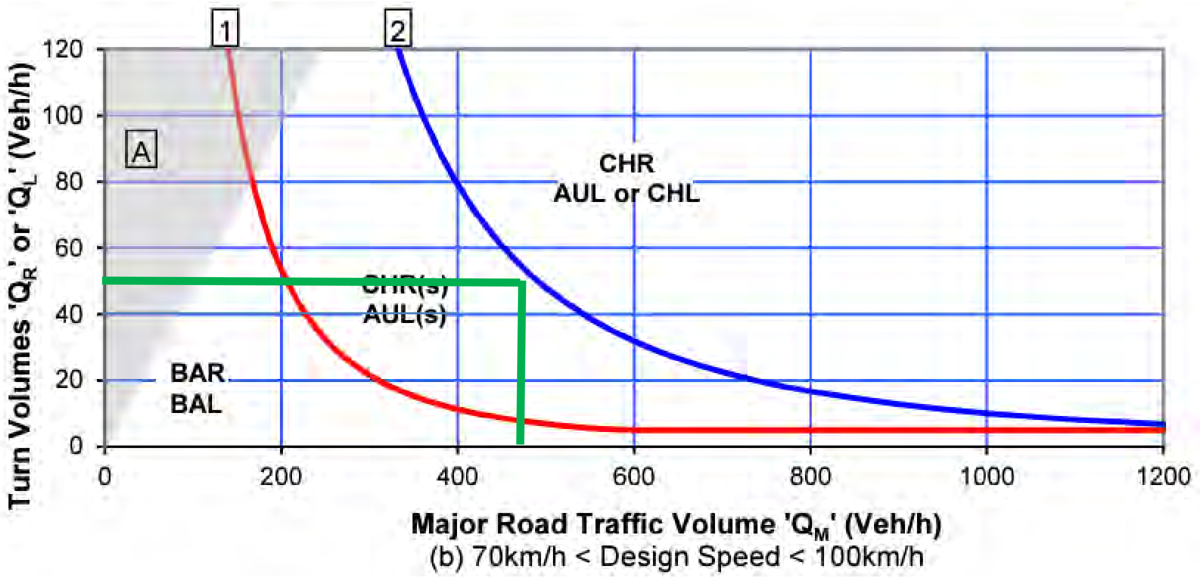
4.7 Junction Design

Right turn entry movements will be dominant at each of the three access locations on Boyer Road. This is based on the connectivity of the site with the arterial road network.

Austroads Guide to Traffic Management, Part 6, provides warrants for the provision of turn lane facilities. The turn lane warrants are reproduced in Figure 3.

During the PM peak period, right turning traffic is likely to be in the order of 40 vehicles per hour (based on an inward peak hour split of 60%, and a right turn split of 80%). With opposing traffic flow on Boyer Road peaking at 400 vehicles per hour, short channelised right turn lanes, CHR(S), will be required. This is shown in Figure 7.

Figure 7 Austroads Turn Lane Warrants



Note that the demand flows for left turning movements from Boyer Road into the site's junction accesses is low. On this basis no channelised left turn facility is warranted.

As such, Basic Auxiliary Left Turn treatments (BAL) should be applied at all three junctions. The BAL is the minimum treatment for use in a rural situation which provides tapers leading into and out of the left-turn treatment in order to cater for the swept path of a large design vehicle.

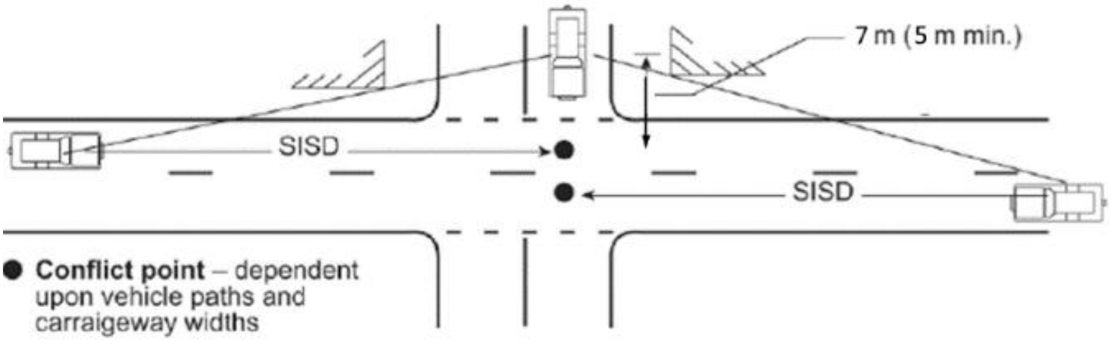
4.8 Street Lighting

The design of the new road junctions will require street lighting in accordance with Australian Standards. The existing section of Boyer Road west of the Serenity Drive junction currently has no street lighting.

4.9 Sight Distance

Sight distance requirements for road junctions are set out in Austroads Part 4A. Safe Intersection Sight Distance (SISD) is the minimum sight distance which should be provided on the major road at any intersection. SISD is measured along the carriageway from the approaching vehicle to the conflict point; the line of sight having to be clear to a point 7.0 metres (5.0 metres minimum) back along the side road from the conflict point as shown in Figure 8.

Figure 8 Austroads SISD Requirements



The 85th percentile speed of vehicles travelling along Boyer Road was estimated at each of the three proposed junction locations using a hand-held radar device. The 85th percentile speed was assessed to be 80-km/h (same as the posted speed limit).

Austroads requires the following minimum Safe Intersection Sight Distance (SISD) provision to be 181 metres for a design speed of 80-km/h.

The available sight distance at each potential access location were measured. The results are summarised in Table 8. All proposed access locations satisfy Austroads SISD requirements.

Table 8 Access Sight Distance

Access Location	Sight Distance West	Sight Distance East	Comments
Access 1	200 metres	210 metres	Complies with SISD requirements
Access 2	300 metres	260 metres	Complies with SISD requirements
Access 3	185 metres	210 metres	Vegetation on the highway verge can be removed to improve sight distance to west. This is shown in Figure 9.

Figure 9 Access 3 Sight Distance - Vegetation Maintenance

4.10 Internal Road Layout & Hierarchy

The subdivision will create new lengths of road within the masterplan site as follows:

- Three new road junctions that connect to Boyer Road, extending into the site. The roads extending from these junctions form collector roads through the site. The westernmost collector road extends to the northern boundary of the site, terminating at a cul-de-sac.
- A central 'spine' road that links through the site, connecting all three roads that link to Boyer Road, as well as other connecting roads within the subdivision. The central road will form the main collector road through the site.
- A number of local access roads.
- 5 short cul-de-sacs.

The internal road network provides good connectivity to all lots within the subdivision. All lots can be accessed via any of the three roads that connect to Boyer Road.

Council relies on the design criteria of LGAT Tasmanian Standard Drawings and Subdivision Guidelines, 2020. The requirements for residential subdivision roads are reproduced in Table 9. The following standards are applicable for the internal road network:

- Road design should be in accordance with Austroads Guidelines.
- LGAT Standard Drawings and Tasmanian Subdivision Guidelines.

Table 9 LGAT Standard Drawings – Road Requirements, Residential

ROAD TYPES	ROAD TYPE	ROAD LENGTH / NUMBER OF TENEMENTS	MINIMUM ROAD WIDTH	MINIMUM RESERVATION WIDTH	MINIMUM FOOTPATH REQUIREMENTS
1 – Arterial	Detail design required				
2 – Sub Arterial					
3 – Collector	Through Road	Any length	11.0m	20.0m	Both Sides
4 – Local	Through Road	Any length	8.9m	18.0m	One Side Only
	Cul-De-Sac	Length > 150m	8.9m	18.0m	One Side Only
	Cul-De-Sac	Length ≤ 150m and / or No. of equiv. tenements ≤ 15	6.9m	15.0m	One Side Only

The LGAT road design specifications for the collector roads within the masterplan is 20 metre reservation width and 11 metre pavement width. Other internal roads within the subdivision require a road reservation width of 18 metres with a sealed road width of 8.9 metres. The cul-de-sacs can be designed with a reservation width of 15 metres and sealed pavement width of 6.9 metres.

The proposed masterplan will incorporate contemporary design elements to support active transport modes. Specifically, the design intends to incorporate:

- 8.9m pavements for 20m road reserves (plus a separate 2.5m pedestrian /cycleway on one verge); and
- 7.5m pavements for 18m and 15m road reserves with 1.2m footpaths.

The proposed pavement widths align with modern road design principles and provides a safe environment for pedestrians and cyclists within the study area.

4.11 Adjacent Development

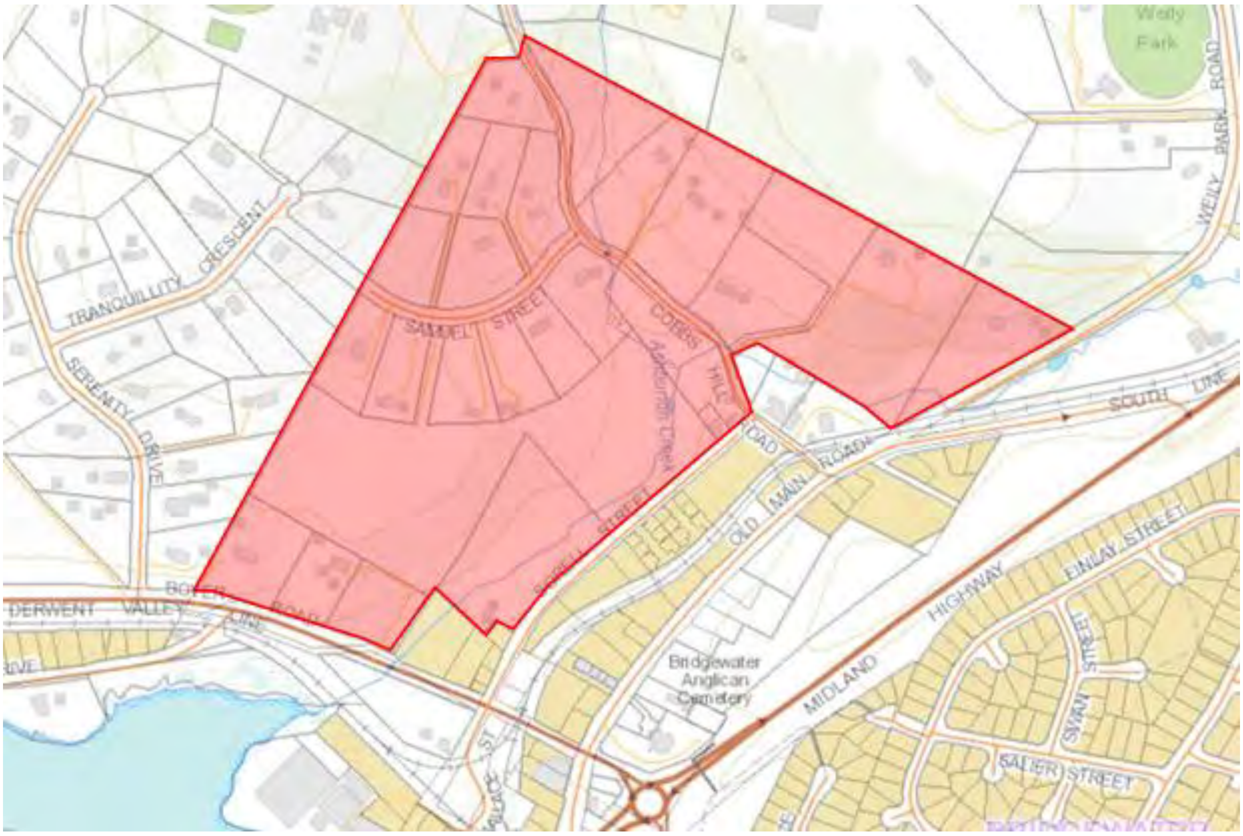
It is noted that rezoning is proposed in 28 hectares of land situated adjacent to the subject site. A TIA prepared by Hubble Traffic in April 2024 that considered the development of land highlighted in Figure 10.

The Hubble report identified that the rezoning has the potential to generate an additional 218 vehicle trips in the surrounding network during weekday peak periods.

Of relevance to the proposed masterplan subject of this report is the increase in traffic generated by the neighbouring site on Cobbs Hill Road. The Hubble Report indicates that traffic PM peak flows on Cobbs Hill Road will be 135 vehicles per hour between Old Main Road and Sorell Street; and 65 vehicles per hour between Samuel Street and Sorell Street.

The traffic generation of the neighbouring site will mostly access the Midland Highway and Bridgewater Bridge, with some increased flows on Boyer Road between Old Main Road and Serenity Drive. The traffic modelling in this report effectively captures this increase as background traffic growth, noting that the neighbouring development site is unlikely to generate significant traffic in Boyer Road west of the Serenity Drive junction.

Figure 10 Serenity Drive/ Sorell Street Masterplan Area



4.12 Road Network Impacts

The proposed masterplan will generate a moderately large amount of traffic, with new road junctions that will extend the urban boundary along Boyer Road. It will therefore have impacts on the surrounding transport network that are examined in the following sections.

4.12.1 Boyer Road

The construction of three new road junctions on Boyer Road will not have any significant adverse impacts on traffic flow for through movements due to the design of the junctions and the inclusion of channelised turn lanes.

The existing line marking along Boyer Road will need to be modified to remove the overtaking line marking located adjacent to the subject site as a result of the new road junctions.

The changes associated with access to Boyer Road (ie. The introduction of three new road junctions, but no direct property driveway access) are not considered sufficient to warrant reduction of the existing 80-km/h speed limit.

4.12.2 Old Main Road Junction

Traffic generated by the structure plan when fully developed will predominantly access the network to the east of the structure plan site due to the connectivity with the arterial road network. This will result in the majority of traffic generation utilising the Boyer Road/ Old Main Road junction.

The Boyer Road/ Old Main Road junction will form a component of the Bridgewater Bridge northern interchange. When complete it will be converted to a T-junction with a one-way link opposite Boyer Road that will provide access to the southbound carriageway of the Bridge. This is shown in Figure 4.

Assuming 80% of traffic generation accesses Old Main Road, this equates to a peak traffic volume increase of 232 vehicles per hour at the junction.

Traffic modelling for this junction was undertaken in Section 4.4. The increased traffic generation associated with the structure plan is well within the intersections capacity to absorb, thus continuing to operate at the intersection at a high level of service.

4.12.3 Cobbs Hill Road Impacts

Cobbs Hill Road is a local access road that currently services a small residential and rural catchment area. The Hubble Report indicates that future traffic flows associated with rezoning of land adjacent to the site will increase peak hour flows on Cobbs Hill Road to 135 vehicles per hour between Old Main Road and Sorell Street.

The structure plan will not access Cobbs Hill Road. No changes to traffic flow on Cobbs Hill Road will result from the proposed structure plan.

4.13 Rail Network Impacts

An existing railway level crossing is located in Boyer Road approximately 65 metres west of the Old Main Road junction. The railway crossing is actively controlled by railway level crossing traffic lights.

TasRail were consulted during the preparation of the TIA. TasRail have indicated that an ALCAM[4] assessment of the railway level crossings will be required to determine whether the level of safety at the crossings is adequate for the future traffic growth associated with the proposed masterplan. The ALCAM assessment can be undertaken by TasRail prior to the future subdivision's construction.

The peak hour increase in traffic flow as a result of the fully developed structure plan is likely to be 240 vehicles per hour (assuming 80% of all traffic generation accesses the Old Main Road junction). This equates to an average of an additional 4 vehicles per minute during peak periods.

[4] The Australian Level Crossing Assessment Model (ALCAM) is a comprehensive assessment tool used to identify risks at level crossings, in line with both Australian Standard 1742.7:2016 and the New Zealand Transport Agency Traffic Control Devices Manual Part 09, which produces a unique risk score for each level crossing.

The daily traffic volume on Boyer Road in 10-years will be 7,100 vehicles per day based on the same assumptions (increased from 3,500 vehicles per day currently). The peak traffic flow of Boyer Road will increase to approximately 780 vehicles per hour at the rail level crossing. This assumes a 10-year background compound growth rate of 1.8% on Boyer Road in addition to the traffic generation by the structure plan.

It is noted that railway movements at the crossing are infrequent and typically occur outside of peak periods. Assuming that the railway crossing was operational during peak periods, then the two-minute closure of Boyer Road is likely to result in queues of up to 85 metres[5]. This would create localised congestion beyond the intersection of Boyer Road into Old Main Road for a period of several minutes. This would not cause any operational, efficiency or safety issues as there is sufficient spare capacity to store approximately 2 to 3 cars within Old Main Road on both approaches waiting to enter Boyer Road. Importantly the railway level crossing typically operates outside of peak periods when traffic flows are low, resulting in smaller queues.

On this basis the flashing signal control is the appropriate railway crossing treatment at this location. Boom gates (as the next higher level of control) are typically utilised when multiple tracks cross in urban areas.

It is noted that 95th percentile queue lengths from the Old Main Road junction on Boyer Road are likely to be 87 metres and 67 metres during the AM and PM peaks respectively (refer to SIDRA summary in Table 6 and Table 7). The 95th percentile queue length therefore will extend beyond the location of the railway level crossing under the 2035 forecast conditions. Appropriate keep clear line marking should therefore be considered as part of TasRail's ALCAM assessment of the railway crossing.

4.14 Pedestrian and Cyclist Impacts

The masterplan will generate a moderate amount of pedestrian activity. Walking paths are proposed through the site to connect to the surrounding network, including Boyer Road and Cobbs Hill Road.

Footpaths are proposed along each of the internal roads. Pedestrian movements are encouraged within the subdivision network, but it is not recommended to encourage pedestrian movements to/ from Boyer Road. Boyer Road is a rural highway with a speed limit of 80-km/h with no formal footpath provision.

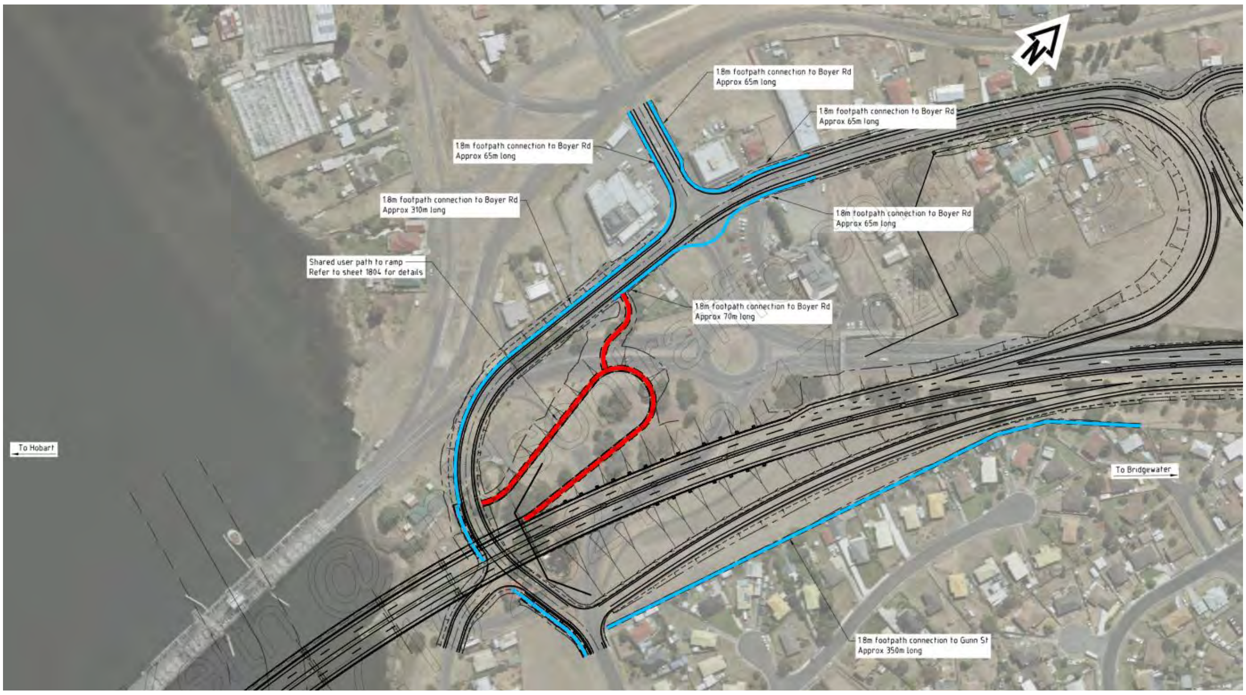
A pedestrian path is provided through the site which will connect between Cobbs Hill Road and the internal roads that connect to Boyer Road.

An existing walking track is located along the foreshore (running south of the railway line), connecting at the western termination of Riverside Drive and extending to Tongatabu Road. It is noted that there are no pedestrian crossing facilities over the railway line near the subject site. All access to the walking track will be via the existing junction of Riverside Drive.

The construction of the New Bridgewater Bridge will introduce pedestrian and cyclist infrastructure that will connect to Old Main Road. This is shown in Figure 11. Consideration of the construction of a future footpath or shared pedestrian/ cyclist path on the northern side of Boyer Road between the proposed eastern access and Old Main Road should be considered.

[5] Based on peak Boyer Road flow of 780 vehicles per hour and a PM westbound split of 57.5% based on existing flow characteristics.

Figure 11 Pedestrian and Cyclist Paths – Northern Interchange



Source: Department of State Growth

4.15 Public Transport Impacts

The structure plan will create a residential catchment area of approximately 383 dwellings. The nearest public transport services currently operate through Bridgewater to the east of the subject site, well beyond what would be considered a reasonable walking distance.

It would be expected that as the subdivision is developed, Metro Tasmania should be consulted to expand Bridgewater bus services through the site. The design of the internal road network associated with the structure plan can facilitate bus movements that can be accessible for all lots.

The proposed road network connecting to Boyer Road can facilitate a bus route through the site to enable all lots to be within a 400 metre distance from the route. A logical route through the site could be between the central road through the site connecting between the westernmost and easternmost junctions with Boyer Road.

4.16 Road Safety Impacts

There are no significant detrimental road safety impacts foreseen for the proposed completion of the masterplan's subdivision. This is based on the following:

- The surrounding road network is capable of absorbing the traffic generated by the proposed subdivision. The subdivision accesses Boyer Road at three new road junctions that defray the overall generation to acceptable levels that results in all junctions operating at a high level of efficiency.
- The existing road safety performance of the road network does not indicate that there are any current road safety deficiencies that might be exacerbated by the proposed development.
- The horizontal geometry and vertical alignment of Boyer Road provides sufficient sight distance for vehicles approaching each of the three proposed junctions.

5. Conclusions

This Traffic Impact Assessment (TIA) for the Boyer Road Precinct Structure Plan has evaluated the potential impacts of the proposed residential subdivision on the surrounding transport network. The key findings of this assessment are as follows:

- Traffic Generation and Distribution: The development is expected to generate approximately 2,904 vehicle trips per day via Boyer Road. The peak traffic generation of the fully developed masterplan will be 300 vehicles per hour. Traffic modelling indicates that the new access junctions on Boyer Road will operate at acceptable levels of service, with minimal impact on existing traffic conditions.
- Intersection Performance: SIDRA intersection modelling analysis confirms that the Boyer Road and Old Main Road intersection, which is being modified as part of the Bridgewater Bridge project, will continue to function efficiently under future 2034 traffic conditions, with all movements maintaining a Level of Service (LOS) of C or better.
- Road Safety and Sight Distance Compliance: Crash data analysis does not indicate any significant pre-existing safety deficiencies in the network. The proposed access points on Boyer Road provide adequate Safe Intersection Sight Distance (SISD) as per Austroads requirements, with minor vegetation clearance recommended at one location.
- Public Transport and Active Transport Considerations: The proposed masterplan will require future public transport integration. The road network proposed will facilitate good public transport accessibility for all lots within the subject site. Internal pedestrian pathways will provide connectivity within the site, with additional active transport infrastructure along Boyer Road recommended.
- Impact on Rail Infrastructure: While traffic increases at nearby rail crossings remain within acceptable limits, TasRail has recommended ALCAM assessments to confirm the safety and adequacy of existing rail level crossing controls in light of future traffic volume increases within the network.
- Compliance with Planning Requirements: The proposed access arrangements satisfy the Performance Criteria of Clause C3.5.1 of the Planning Scheme, and the development aligns with State Growth requirements, subject to final approval.

Overall, the proposed masterplan can be accommodated within the existing and planned transport infrastructure, with no significant adverse impacts on road network performance, safety, or capacity.

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2	Keith Midson	Zara Kacic-Midson	25 February 2025

MIDSON traffic pty ltd

Holmes Dyer

Boyer Road Precinct Structure Plan Traffic Impact Assessment

March 2025

CELEBRATING 15 YEARS
2008 - 2023

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1. Introduction

1.1 Background

Midson Traffic were engaged by Holmes Dyer to prepare a traffic impact assessment for a proposed rezoning and masterplan development for future residential subdivision in Bridgewater.

1.2 Traffic Impact Assessment (TIA)

A traffic impact assessment (TIA) is a process of compiling and analysing information on the impacts that a specific development proposal is likely to have on the operation of roads and transport networks. A TIA should not only include general impacts relating to traffic management, but should also consider specific impacts on all road users, including on-road public transport, pedestrians, cyclists and heavy vehicles.

This TIA has been prepared in accordance with the Department of State Growth (DSG) publication, *Traffic Impact Assessment Guidelines*, August 2020. This TIA has also been prepared with reference to the Austroads publication, *Guide to Traffic Management,* Part 12: *Integrated Transport Assessments for Developments*, 2020.

Land use developments generate traffic movements as people move to, from and within a development. Without a clear understanding of the type of traffic movements (including cars, pedestrians, trucks, etc), the scale of their movements, timing, duration and location, there is a risk that this traffic movement may contribute to safety issues, unforeseen congestion or other problems where the development connects to the road system or elsewhere on the road network. A TIA attempts to forecast these movements and their impact on the surrounding transport network.

A TIA is not a promotional exercise undertaken on behalf of a developer; a TIA must provide an impartial and objective description of the impacts and traffic effects of a proposed development. A full and detailed assessment of how vehicle and person movements to and from a development site might affect existing road and pedestrian networks is required. An objective consideration of the traffic impact of a proposal is vital to enable planning decisions to be based upon the principles of sustainable development.

This TIA also addresses the relevant clauses of C2.0, *Parking and Sustainable Parking Code*, and C3.0, *Road and Railway Assets Code*, of the Tasmanian Planning Scheme – Brighton, 2021.

1.3 Statement of Qualification and Experience

This TIA has been prepared by an experienced and qualified traffic engineer in accordance with the requirements of Council's Planning Scheme and The Department of State Growth's, *Traffic Impact Assessment Guidelines*, August 2020, as well as Council's requirements.

The TIA was prepared by Keith Midson. Keith's experience and qualifications are briefly outlined as follows:

- 29 years professional experience in traffic engineering and transport planning.
- Master of Transport, Monash University, 2006
- Master of Traffic, Monash University, 2004

- Bachelor of Civil Engineering, University of Tasmania, 1995
- Engineers Australia: Fellow (FIEAust); Chartered Professional Engineer (CPEng); Engineering Executive (EngExec); National Engineers Register (NER)

1.4 Project Scope

The project scope of this TIA is outlined as follows:

- Review of the existing road environment in the vicinity of the site and the traffic conditions on the road network.
- Provision of information on the proposed development with regards to traffic movements and activity.
- Identification of the traffic generation potential of the proposal with respect to the surrounding road network in terms of road network capacity.
- Review of the parking requirements of the proposed development. Assessment of this parking supply with Planning Scheme requirements.
- Traffic implications of the proposal with respect to the external road network in terms of traffic efficiency and road safety.

1.5 Subject Site

The subject site is located approximately 550 metres west of Old Main Road along Boyer Road. The subject site also has frontage onto Cobbs Hill Road.

The subject site consists of several titles covering an area of approximately 52 hectares:

- Title reference 44724/8 (50 Boyer Road).
- Title reference 44724/9 (170 Boyer Road).
- Title reference 44724/2.
- Title reference 152364/2 (31 Cobbs Road).
- Title reference 135574/1 (29 Cobbs Road).
- Title reference 135574/2 (25 Cobbs Road).

The subject site connects to Boyer Road along its southern boundary and Cobbs Hill Road along its northern boundary.

The subject site is Zoned 'Future Urban' under the Bridgewater Local Provision Schedule. The existing use of the site is low density residential, with one dwelling situated on each lot, with the exception of 31 Cobbs Hill Road.

The subject site and surrounding road network is shown in Figure 1.

Figure 1 Subject Site & Surrounding Road Network

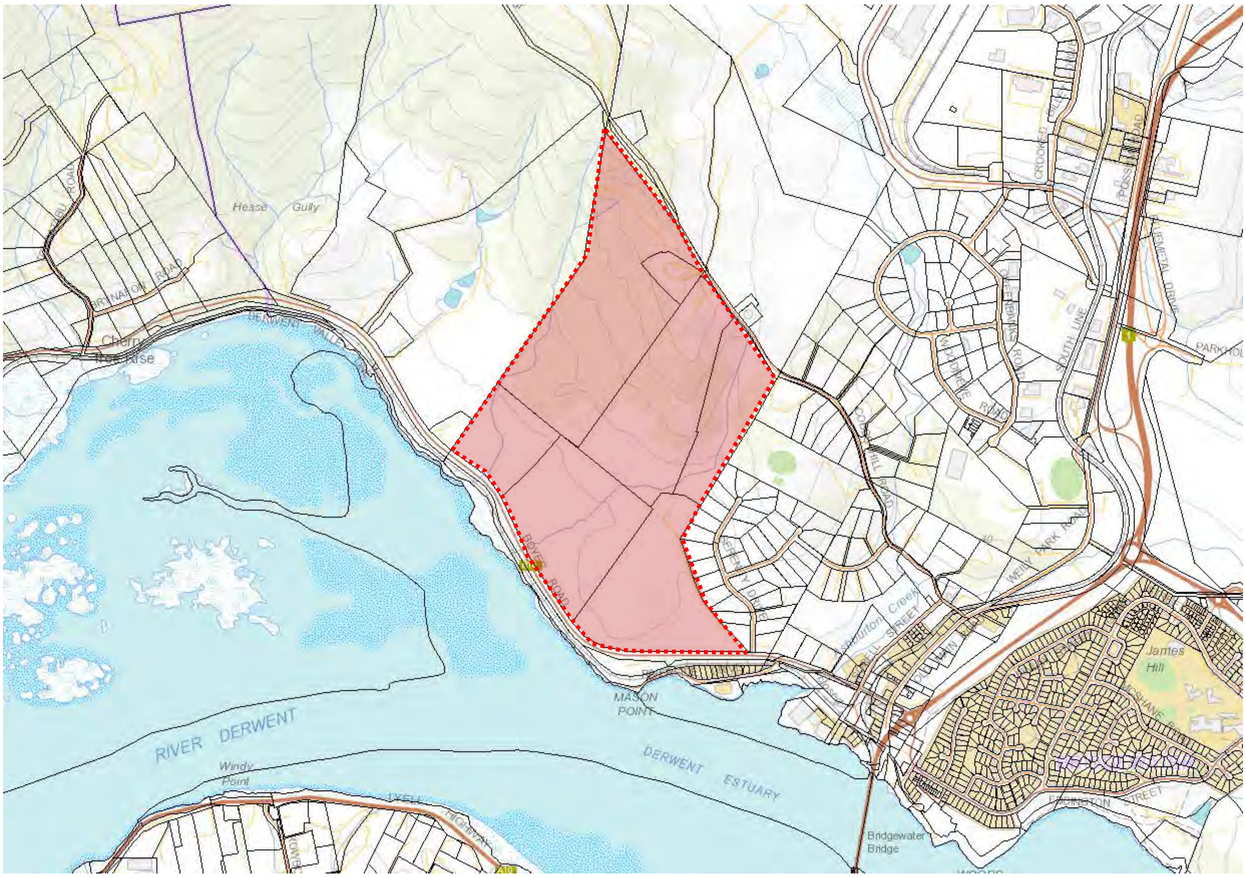


Image Source: LIST Map, DPIPWE

1.6 Reference Resources

The following references were used in the preparation of this TIA:

- Tasmanian Planning Scheme – Brighton, 2021 (Planning Scheme)
- Austroads, *Guide to Traffic Management,* Part 12: *Integrated Transport Assessments for Developments*, 2020
- Austroads, Guide to Road Design, Part 4A: Unsignalised and Signalised Intersections, 2021
- Department of State Growth, *Traffic Impact Assessment Guidelines*, 2020
- Transport NSW, *Guide to Traffic Impact Assessment*, 2024 (TfNSW Guide)
- Australian Standards, AS2890.1, *Off-Street Parking*, 2004 (AS2890.1)
- Hubble Traffic, *Land Rezoning for New Residential Subdivision*, 2024 (Hubble Report)

2. Existing Conditions

2.1 Transport Network

For the purposes of this report, the transport network consists of Boyer Road, Serenity Drive, Old Main Road and The Derwent Valley Rail Line.

2.1.1 Boyer Road

Boyer Road is a State Growth owned road that connects between the Midland Highway in Bridgewater and Rocks Road in New Norfolk along the eastern shore of the Derwent River. It has a two-lane configuration with a sealed pavement width of 6-metres. Edge and centre lines are provided along its length near the subject site. Boyer Road is not proclaimed as a Limited Access Road.

Under the Tasmanian Road Hierarchy, Boyer Road is categorised as a category 5, which is defined as follows:'

> *"Other Roads are primarily access roads for private properties.*
>
> *Some may be used for comparatively low frequency heavy freight vehicle transport, for example:*
>
> - *Log transport – but they are not the most important log transport roads and experience fluctuation in use; and*
> - *Farm property access – for purposes including delivery of fuel and supplies, stock transport, crop delivery and milk pickup.*
>
> *While a few of these roads may currently carry larger numbers of heavy freight vehicles, they may duplicate existing Trunk, Regional Freight or Regional Access Roads and are not DIER's strategically preferred heavy freight vehicle routes."*

Boyer Road currently carries 3,500 vehicles per day[1] near the subject site, with a peak flow of approximately 450 vehicles per hour (PM peak). The heavy vehicle proportion of traffic is 11.5%. The hourly distribution of traffic flow on Boyer Road west of Sorell Street is shown in Figure 2.

Boyer Road adjacent to the subject site is shown in Figure 3.

[1] Department of State Growth traffic data, 2023

Figure 2 Boyer Road Weekday Hourly Traffic Flow

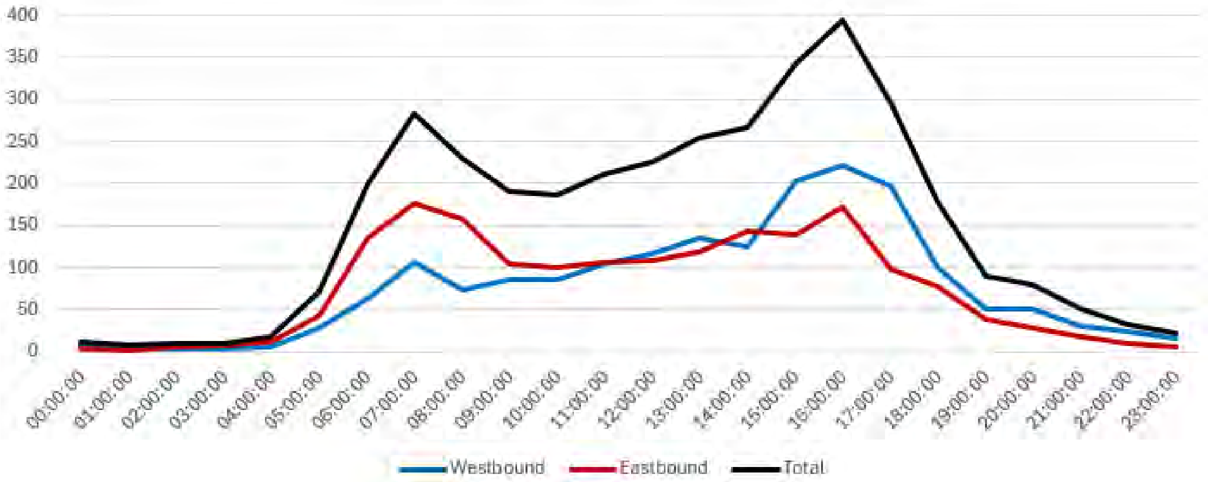


Figure 3 Boyer Road

2.1.2 Serenity Drive

Serenity Drive is a local cul-de-sac that services a small residential catchment area. It is approximately 600 metres in length, connecting to Boyer Road at a T-junction at its southern end and a cul-de-sac at its northern termination. The general urban speed limit of 50-km/h is applicable to Serenity Drive. The traffic volume is estimated to be approximately 300 vehicles per day.

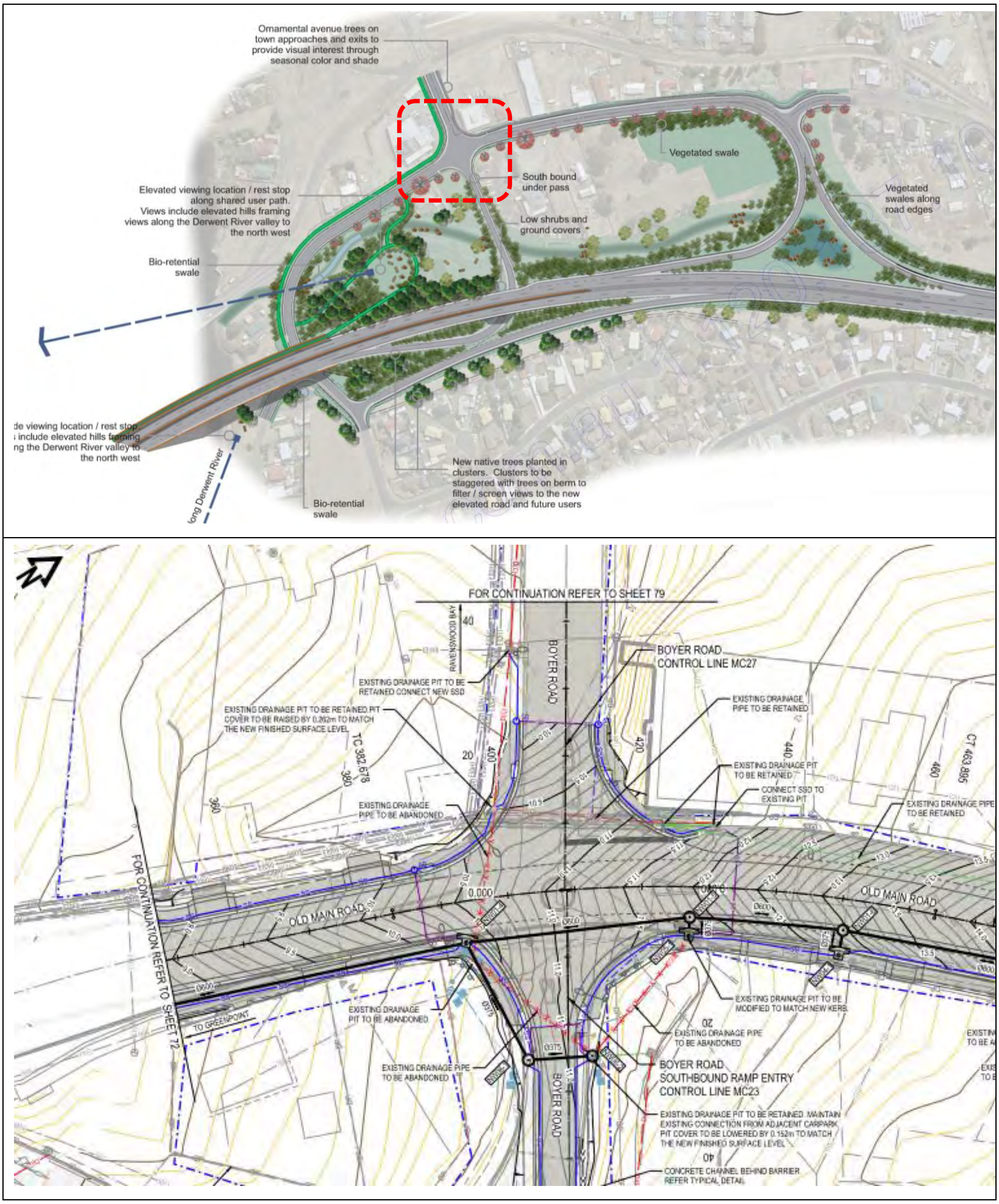
2.1.3 Old Main Road

Old Main Road is a local collector road that once formed part of the Midland Highway corridor. It now serves as access to residential and commercial properties for a short length to the north of the Midland Highway. Traffic volumes are very low, in the order of 300 vehicles per day near the Boyer Road junction.

The current roundabout at the intersection of Boyer Road with Old Main Road will be removed and converted to a give-way junction as part of the Bridgewater Bridge works that are currently underway. The Old Main Road/ Boyer Road junction will form a component of the northern interchange associated with the new Bridgewater Bridge.

The layout associated with the Bridgewater Bridge is shown in Figure 4.

Figure 4 Old Main Rd / Boyer Rd New Bridgewater Bridge



2.1.4 Derwent Valley Rail Line

The Derwent Valley Line connects between Maydena and Bridgewater along the western and northern side of the Derwent River. It connects to the South Line at Bridgewater, where it continues to Western Junction where it connects to the Western Line.

The Derwent Valley Railway Line crosses Boyer Road and Cobbs Hill Road within the study area.

2.2 Road Safety Performance

Crash data can provide valuable information on the road safety performance of a road network. Existing road safety deficiencies can be highlighted through the examination of crash data, which can assist in determining whether traffic generation from the proposed development may exacerbate any identified issues.

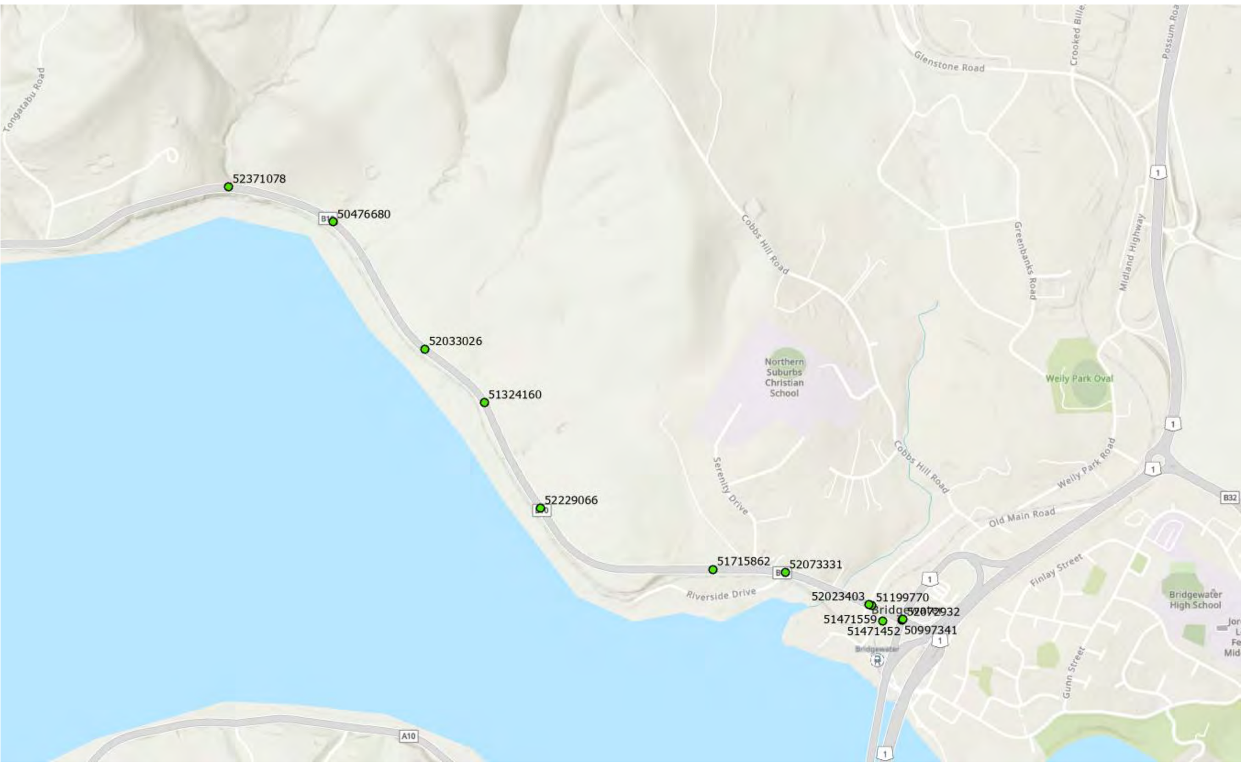
Crash data was obtained from the Department of State Growth for a 5+ year period between 1st January 2019 and 31st August 2024 for Boyer Road between Old Main Road and Tongatabu Road.

The findings of the crash data is summarised as follows:

- A total of 16 crashes were reported during this time.
- Severity. 2 crashes involved minor injury; 14 crashes involved property damage only.
- Time of day. Crashes were disbursed throughout the day. 9 crashes were reported between 8:00am and 5:00pm. 2 crashes were reported prior to 8:00am and 5 crashes were reported after 6:00pm. Afternoon crashes were dominant, with a total of 5 crashes reported between 12:00pm and 3:00pm.
- Day of week. 5 crashes were reported on Fridays; 3 crashes were reported on Mondays and Sundays; 2 crashes were reported on a Wednesday; 1 crash was reported on a Tuesday and a Saturday.
- Crash types. 5 crashes involved a 'cross-traffic' collisions; 3 crashes involved 'rear-end' collisions; 2 crashes involved 'other-manoeuvring' collisions; and various other crash types with no clear trend.
- Crash locations. Crashes were relatively evenly disbursed along Boyer Road. 5 crashes were reported at the Boyer Road/ Old Main Road intersection; 1 crash was reported at the Boyer Road/ Riverside Drive intersection; 1 crash was reported at the Boyer Road/ Sorell Street/ Wallace Street junction; the remaining crashes were reported at midblock locations. The crash locations are shown in Figure 5.
- Vulnerable road users. 2 crashes involved motorcyclists – 1 crash at the Boyer Road/ Old Main Road junction and the other approximately 800 metres west of the Serenity Drive junction. Both crashes involved minor injury

The crash history does not provide any indication that there are pre-existing road safety deficiencies in the transport network near the subject site. Whilst Boyer Road has a posted speed limit of 80-km/h the severity of crashes reported is relatively low.

Figure 5 Crash Locations



<u>Source</u>: Department of State Growth

3. Proposed Masterplan

3.1 Masterplan Proposal

The proposed development involves the subdivision of land to create the following 388 residential lots (including 3 existing dwellings) accessed via Boyer Road. The breakdown of the lots includes the following:

- 350 single dwelling lots
- 38 strata lots
- 1 'mixed residential' lot that can be used for possible commercial/ retail/ community use

The subdivision will be accessed via three new junctions connecting to Boyer Road. The proposed masterplan is shown in Figure 6.

Figure 6 Proposed Masterplan Layout

3.2 Alternative Access Considerations

The site has road frontage at Cobbs Hill Road and Boyer Road. Whilst the subject site is located in close proximity to Serenity Drive, no direct road access is considered possible due to property constraints.

Cobbs Hill Road is a low volume rural/ residential access road that has a variable pavement width between 5 and 6 metres. This road could only be considered to be appropriate for low volume vehicular access to the subject site for the following reasons:

- The existing construction of Cobbs Hill Road is not suitable for the modest increase in traffic associated with the structure plan.
- The existing rail level crossing near Old Main Road would likely require upgrading. The existing level crossing is a low volume standard with warning lights and limited storage between the crossing and Old Main Road.

On this basis, Boyer Road was considered to be the most appropriate road connection for the subject site. Boyer Road has substantial spare capacity that can accommodate the potential traffic generation associated with future subdivision of the subject site (refer to modelling in Sections 4.3 and 4.4). No access to Cobbs Hill Road has been provided in the masterplan layout.

3.3 Masterplan Road Hierarchy

The proposed layout of the masterplan will provide a road hierarchy that comprises of collector roads with 20-metre road reservation providing connectivity with Boyer Road and within the site, and local access roads with reservations of 18 and 15 metres. The location and layout of these roads are shown in Figure 7.

Figure 7 Road Hierarchy Layout

4. Traffic Impacts

4.1 Trip Generation

Trip generation rates were sourced from the TfNSW Guide. The TfNSW Guide recommends the following traffic generation rates:

- Single dwellings. 7.53 vehicles per day per dwelling, with a peak of 0.83 and 0.84 vehicles per hour per dwelling for AM and PM peaks respectively.
- Strata titles. 5 vehicles per day, with a peak of 0.5 vehicles per hour per unit (noting one unit per strata title).
- Commercial/ retail/ community use. This area has the potential for commercial use with residential units above. This report has assumed 500m^2 of retail, 1,600m^2 of commercial and 8 duplex units.
  - → Retail - 43.4 vehicles per day per 100m^2 of GLFA[2], with a peak of 1.78 vehicles per hour per 100m^2 GLFA during the AM peak and 3.71 vehicles per hour per 100m^2 GLFA during the PM peak;
  - → Commercial – 10 vehicles per day per 100m^2 of GLFA, with a peak of 2 vehicles per hour per 100m^2 of GLFA;
  - → duplex units as per strata titles, with a total of 8 units total.

This equates to the following traffic generation:

- Daily traffic generation. 2,490 vehicles per day
- AM peak traffic generation. 271 vehicles per hour
- PM peak traffic generation. 284 vehicles per hour

4.2 Trip Assignment

When fully developed, the subdivision will connect to Boyer Road at three new road junctions. Based on the layout of the concept structure plan, the traffic generation is estimated to be spread across the three accesses as follows:

Access 1 (northern access)	Daily:	771 vehicles per day
	AM peak:	84 vehicles per hour
	PM peak:	88 vehicles per hour
Access 2 (middle access)	Daily:	822 vehicles per day
	AM peak:	90 vehicles per hour
	PM peak:	94 vehicles per hour

[2] GLFA = 'Gross leasable floor area'. In this case it is assumed that a building can be constructed on the lot with a GLFA of 150m^2.

- Access 3 (southern access) — Daily: 897 vehicles per day; AM peak: 97 vehicles per hour; PM peak: 102 vehicles per hour

4.3 Road Junction Capacity Analysis

Traffic modelling of the proposed road junctions on Boyer Road was undertaken using SIDRA Intersection software.

SIDRA uses complex analytical traffic models coupled with iterative approximation technique to provide estimates of capacity and performance of intersections. SIDRA is endorsed as a modelling tool by Austroads.

One of the key SIDRA outputs is an indication of level of service (LOS) at intersections. The LOS concept describes the quality of traffic service in terms of 6 levels, with level of service A (LOS A) representing the best operating condition (ie. at or close to free flow) and level of service F (LOS F) representing the worst (i.e. forced flow). Other key outputs of SIDRA include average movement delay and 95th percentile queue lengths[3].

The level of service method used in the modelling is the Delay method, where level of service is based solely on average movement delay, including geometric delay, as summarised in Table 1.

Table 1 SIDRA LOS Performance standards

Level of Service	Signals and Roundabouts	Sign Control (Give Way & Stop)
LOS A	$d \leq 10$	$d \leq 10$
LOS B	$10 < d \leq 20$	$10 < d \leq 15$
LOS C	$20 < d \leq 35$	$15 < d \leq 25$
LOS D	$35 < d \leq 55$	$25 < d \leq 35$
LOS E	$55 < d \leq 80$	$35 < d \leq 50$
LOS F	$80 < d$	$50 < d$

The lowest target level of service considered acceptable for an urban environment is LOS D, which corresponds to a maximum delay of 50 seconds for give way control. LOS E and F represent the junction operating at capacity, with forced flow conditions.

[3] This is the queue length not exceeded 95% of the time.

4.3.1 2034 Modelling

Traffic modelling was conducted for the 10-year forecast period of 2034. This accounts for the likely minimum period for the masterplan to be fully developed. The 10-year forecast is also a requirement within the Department of State Growth's TIA guidelines.

Boyer Road has experienced a 1.8% compound growth rate between 2018 and 2023. This growth rate was applied to determine the background traffic volumes on Boyer Road in 2034. The 2034 Boyer Road peak hour volumes will be 275 vehicles per hour during the AM peak and 471 vehicles per hour in the PM peak.

All three access junctions will effectively have the same through traffic on Boyer Road. In this regard the southern access will carry the highest traffic volume associated with the masterplan. The southern access was therefore modelled using SIDRA under 2034 peak hour conditions (noting that the remaining two accesses will have a better operational efficiency as they have less traffic generation associated with the junctions).

The junction was modelled with a channelised right turn land (CHR) and short channelised left turn lane (CHL(S)).

The SIDRA modelling for 2034 conditions during the AM and PM peak periods are summarised in Table 2 and Table 3 respectively. It can be seen that the junction will operate at a high level of efficiency during both AM and PM peak periods, with LOS-A, LOS-B and LOS-C for all approaches.

Table 2 AM Peak 2034 Boyer Road SIDRA

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m
East: Boyer Road								
5	T	92	11.5	0.050	0.0	LOS A	0.0	0.0
6	R	29	3.0	0.025	9.2	LOS A	0.1	0.7
Approach		121	9.4	0.050	2.2	NA	0.1	0.7
North: Masterplan site								
7	L	63	3.0	0.066	9.4	LOS A	0.2	1.7
9	R	16	3.0	0.029	11.9	LOS B	0.1	0.8
Approach		79	3.0	0.066	9.9	LOS A	0.2	1.7
West: Boyer Road								
10	L	7	3.0	0.004	8.3	LOS A	0.0	0.0
11	T	198	11.5	0.109	0.0	LOS A	0.0	0.0
Approach		205	11.2	0.109	0.3	NA	0.0	0.0
All Vehicles		405	9.1	0.109	2.7	NA	0.2	1.7

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.

Table 3 PM Peak 2034 Boyer Road SIDRA

Movement Performance - Vehicles									
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m
East: Boyer Road								
5	T	278	11.5	0.153	0.0	LOS A	0.0	0.0
6	R	54	3.0	0.047	9.4	LOS A	0.2	1.3
Approach		332	10.1	0.153	1.5	NA	0.2	1.3
North: Masterplan Site								
7	L	39	3.0	0.042	9.4	LOS A	0.1	1.1
9	R	9	3.0	0.026	15.9	LOS C	0.1	0.7
Approach		48	3.0	0.042	10.7	LOS B	0.1	1.1
West: Boyer Road								
10	L	14	3.0	0.008	8.3	LOS A	0.0	0.0
11	T	217	11.5	0.120	0.0	LOS A	0.0	0.0
Approach		231	11.0	0.120	0.5	NA	0.0	0.0
All Vehicles		611	9.9	0.153	1.9	NA	0.2	1.3

Level of Service (LOS) Method: Delay (HCM 2000)
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.

4.4 Boyer Road/ Old Main Road Impacts

The proposed implementation of the Master Plan will increase traffic flows at the Boyer Road/ Old Main Road intersection. The Boyer Road/ Old Main Road junction is currently being modified as part of the New Bridgewater Bridge project (as outlined in Section 2.1.3).

Traffic modelling was undertaken for the Boyer Road/ Old Main Road junction (revised layout associated with the Bridgewater Bridge project). The existing turning movements associated with the junction are summarised in Table 4. The turning movements were derived from origin-destination data associated with the Bridgewater Bridge and factored to 2024 conditions by applying background traffic growth of 1.8% per annum for all approaches.

Table 4 Boyer Rd/ Old Main Rd Existing Peak Turning Movements

Peak	Boyer Road			Old Main Rd South			Old Main Rd North		
	Left	thru	Right	Left	thru	Right	Left	thru	Right
AM Peak	108	136	18	25	22	87	9	87	72
PM Peak	81	110	36	38	8	53	6	61	167

Turning movements for 2034 peak periods were calculated incorporating background traffic growth (as per Section 4.3.1 assumptions) and traffic generation associated with the proposed development (utilising the same turning proportions as existing conditions). The 2034 turning movements at the Boyer Road/ Old Main Road junction are shown in Table 3.

Table 5 Boyer Rd / Old Main Rd 2034 Peak Turning Movements

Peak	Boyer Road			Old Main Rd South			Old Main Rd North		
	Left	thru	Right	Left	thru	Right	Left	thru	Right
AM Peak	203	242	32	32	45	98	11	98	128
PM Peak	136	183	60	60	63	60	7	69	278

The SIDRA modelling for 2034 conditions during the AM and PM peak periods are summarised in Table 6 and Table 7 for the AM and PM peaks respectively.

It can be seen that all movements at the intersection have a LOS of C or better. The intersection therefore caters for the additional traffic generation of the proposed masterplan at a high level of service.

Table 6 AM Peak 2034 Boyer Rd / Old Main Rd SIDRA

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m
South: Old Main Rd								
1	L	51	2.0	0.130	8.8	LOS A	0.6	4.6
2	T	28	2.0	0.130	0.5	LOS A	0.6	4.6
3	R	113	2.0	0.130	9.5	LOS A	0.6	4.6
Approach		192	2.0	0.130	8.0	NA	0.6	4.6
North: Old Main Rd								
7	L	13	2.0	0.172	8.6	LOS A	0.9	6.5
8	T	113	2.0	0.172	0.3	LOS A	0.9	6.5
9	R	142	2.0	0.172	8.9	LOS A	0.9	6.5
Approach		267	2.0	0.172	5.3	NA	0.9	6.5
West: Boyer Road								
10	L	214	2.0	0.767	20.8	LOS C	12.2	86.9
11	T	271	2.0	0.767	19.6	LOS C	12.2	86.9
12	R	36	2.0	0.767	21.1	LOS C	12.2	86.9
Approach		520	2.0	0.767	20.2	LOS C	12.2	86.9
All Vehicles		979	2.0	0.767	13.7	NA	12.2	86.9

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.

Table 7 PM Peak 2034 Boyer Rd/ Old Main Rd SIDRA

Movement Performance - Vehicles

Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	95% Back of Queue Distance m
South: Old Main Rd								
1	L	71	2.0	0.096	8.6	LOS A	0.5	3.4
2	T	11	2.0	0.096	0.3	LOS A	0.5	3.4
3	R	68	2.0	0.096	9.3	LOS A	0.5	3.4
Approach		149	2.0	0.096	8.3	NA	0.5	3.4
North: Old Main Rd								
7	L	8	2.0	0.280	8.7	LOS A	1.5	10.9
8	T	80	2.0	0.280	0.4	LOS A	1.5	10.9
9	R	312	2.0	0.280	8.9	LOS A	1.5	10.9
Approach		400	2.0	0.280	7.2	NA	1.5	10.9
West: Boyer Road								
10	L	152	2.0	0.739	22.3	LOS C	9.4	66.6
11	T	205	2.0	0.739	21.0	LOS C	9.4	66.6
12	R	67	2.0	0.739	22.6	LOS C	9.4	66.6
Approach		424	2.0	0.739	21.7	LOS C	9.4	66.6
All Vehicles		974	2.0	0.739	13.7	NA	9.4	66.6

Level of Service (LOS) Method: Delay (HCM 2000).
Vehicle movement LOS values are based on average delay per movement
Minor Road Approach LOS values are based on average delay for all vehicle movements.

4.5 Access Impacts

The Structure Plan proposes three new road junctions connecting to Boyer Road. The Acceptable Solution A1.2 of Clause C3.5.1 of the Planning Scheme states "*For a road, excluding a category 1 road or a limited access road, written consent for a new junction, vehicle crossing, or level crossing to serve the use and development has been issued by the road authority*".

Advice was sought from the Department of State Growth as the road authority. General comments were provided and no objection was made subject to a detailed assessment being provided in the form of a TIA. No written consent has been received from the Department of State Growth for the new junctions and therefore the Acceptable Solution A1.2 of Clause C3.5.1 of the Planning Scheme is not met.

The Performance Criteria P1 of Clause C3.5.1 of the Planning Scheme states:

> *"Vehicular traffic to and from the site must minimise any adverse effects on the safety of a junction, vehicle crossing or level crossing or safety or efficiency of the road or rail network, having regard to:*
>
> *(a) any increase in traffic caused by the use;*
>
> *(b) the nature of the traffic generated by the use;*
>
> *(c) the nature of the road;*
>
> *(d) the speed limit and traffic flow of the road;*
>
> *(e) any alternative access to a road;*

(f) the need for the use;

(g) any traffic impact assessment; and

(h) any advice received from the rail or road authority".

The following is relevant with respect to each of the three proposed junctions on Boyer Road associated the structure plan:

a. Increase in traffic. The traffic generation of the three accesses varies between 637 and 816 vehicles per day. Traffic modelling of the traffic movements at the three proposed junctions indicate that they will operate at an acceptable level of efficiency (refer to Section 4.3.1).

b. Nature of traffic. The traffic generated by the rezoning and future subdivision will be residential in nature, which is consistent and compatible with existing traffic utilising Boyer Road.

c. Nature of road. Boyer Road is a Category 5 highway under the Department of State Growth's road hierarchy.

d. Speed limit and traffic flow of road. Boyer Road has a posted speed limit of 80-km/h and carries a volume of 3,500 vehicles per day.

e. Alternative access. Alternative access arrangements were considered. This is detailed in Section 3.2.

f. Need for use. The structure plan has been proposed to address an identified housing shortfall. The subject site was selected due to its potential to provide a large residential lot yield located in reasonable proximity to services (shops, schools, etc).

g. Traffic impact assessment. This report documents the findings of a traffic impact assessment. Importantly the proposed junctions have been demonstrated to operate at a high level of efficiency through traffic modelling (Section 4.3), provide sufficient sight distance in accordance with Austroads requirements (Section 4.9), and have an appropriate design in accordance with Austroads requirements (Section 4.7).

h. Road authority advice. The Department of State Growth were consulted. No objection was received in principle subject to a TIA being prepared that confirmed sight distance standards are met and appropriate junction designs were documented.

Based on the above assessment the proposed junctions connecting to Boyer Road satisfy the requirements of Performance Criteria P1 of Clause C3.5.1 of the Planning Scheme.

4.6 Junction Spacing

The three proposed new junctions on Boyer Road will have a physical spacing of approximately 780 metres between accesses 1 and 2, and 300 metres between accesses 2 and 3. The spacing is appropriate for an 80-km/h highway and will result in negligible conflicts between turning movements associated with the proposed accesses.

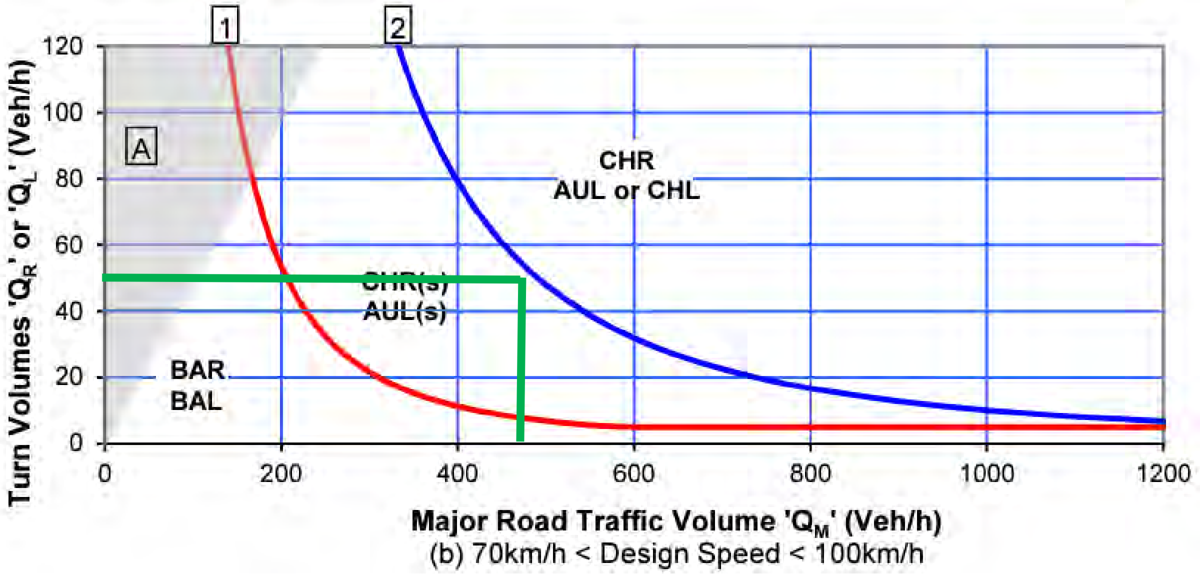
4.7 Junction Design

Right turn entry movements will be dominant at each of the three access locations on Boyer Road. This is based on the connectivity of the site with the arterial road network.

Austroads Guide to Traffic Management, Part 6, provides warrants for the provision of turn lane facilities. The turn lane warrants are reproduced in Figure 3.

During the PM peak period, right turning traffic is likely to be in the order of 48 vehicles per hour (based on an inward peak hour split of 60%, and a right turn split of 80%). With opposing traffic flow on Boyer Road peaking at 400 vehicles per hour, short channelised right turn lanes, CHR(S), will be required. This is shown in Figure 8.

Figure 8 Austroads Turn Lane Warrants



Note that the demand flows for left turning movements from Boyer Road into the site's junction accesses is low. On this basis no channelised left turn facility is warranted.

As such, Basic Auxiliary Left Turn treatments (BAL) should be applied at all three junctions. The BAL is the minimum treatment for use in a rural situation which provides tapers leading into and out of the left-turn treatment in order to cater for the swept path of a large design vehicle.

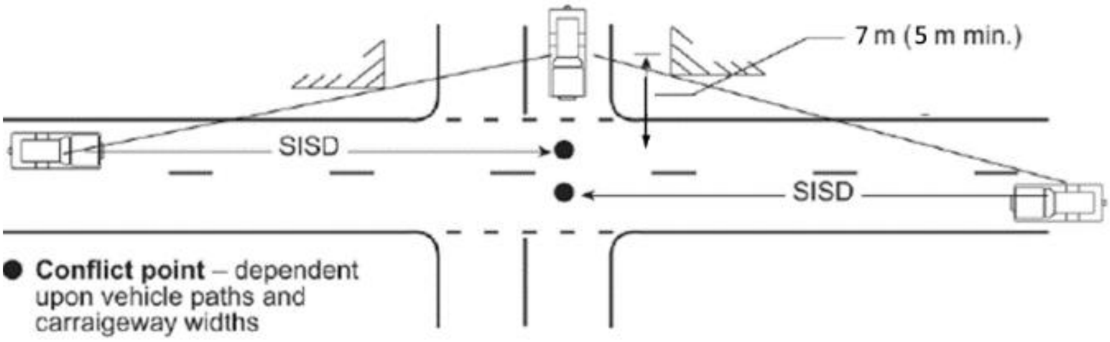
4.8 Street Lighting

The design of the new road junctions will require street lighting in accordance with Australian Standards. The existing section of Boyer Road west of the Serenity Drive junction currently has no street lighting.

4.9 Sight Distance

Sight distance requirements for road junctions are set out in Austroads Part 4A. Safe Intersection Sight Distance (SISD) is the minimum sight distance which should be provided on the major road at any intersection. SISD is measured along the carriageway from the approaching vehicle to the conflict point; the line of sight having to be clear to a point 7.0 metres (5.0 metres minimum) back along the side road from the conflict point as shown in Figure 9.

Figure 9 Austroads SISD Requirements



The 85th percentile speed of vehicles travelling along Boyer Road was estimated at each of the three proposed junction locations using a hand-held radar device. The 85th percentile speed was assessed to be 80-km/h (same as the posted speed limit).

Austroads requires the following minimum Safe Intersection Sight Distance (SISD) provision to be 181 metres for a design speed of 80-km/h.

The available sight distance at each potential access location were measured. The results are summarised in Table 8. All proposed access locations satisfy Austroads SISD requirements.

Table 8 Access Sight Distance

Access Location	Sight Distance West	Sight Distance East	Comments
Access 1	200 metres	210 metres	Complies with SISD requirements
Access 2	300 metres	260 metres	Complies with SISD requirements
Access 3	185 metres	210 metres	Vegetation on the highway verge can be removed to improve sight distance to west. This is shown in Figure 10.

Figure 10 Access 3 Sight Distance - Vegetation Maintenance

4.10 Internal Road Layout

The subdivision will create new lengths of road within the masterplan site as follows:

- Three new road junctions that connect to Boyer Road, extending into the site. The roads extending from these junctions form collector roads through the site. The westernmost collector road extends to the northern boundary of the site, terminating at a cul-de-sac.
- A central 'spine' road that links through the site, connecting all three roads that link to Boyer Road, as well as other connecting roads within the subdivision. The central road will form the main collector road through the site.
- A number of local access roads.
- 5 short cul-de-sacs with full turning head provision.

The internal road network provides good connectivity to all lots within the subdivision. All lots can be accessed via any of the three roads that connect to Boyer Road. The road hierarchy is shown in Figure 7.

The proposed masterplan will incorporate contemporary design elements to support active transport modes. Specifically, the design intends to incorporate:

- 8.9m pavements for 20m road reserves (plus a separate 2.5m pedestrian /cycleway on one verge); and
- 7.5m pavements for 18m and 15m road reserves with 1.2m footpaths.

The proposed pavement widths align with modern road design principles and provides a safe environment for pedestrians and cyclists within the study area. The layout of these roads are provided in Figure 7.

The proposed pavement widths align with modern road design principles and provides a safe environment for pedestrians and cyclists within the study area. The design layouts for these roads are shown in Figure 11, Figure 12 and Figure 13 for 20-metre, 18-metre and 15-metre road reserves respectively.

Figure 11 20m Road Reserve Details

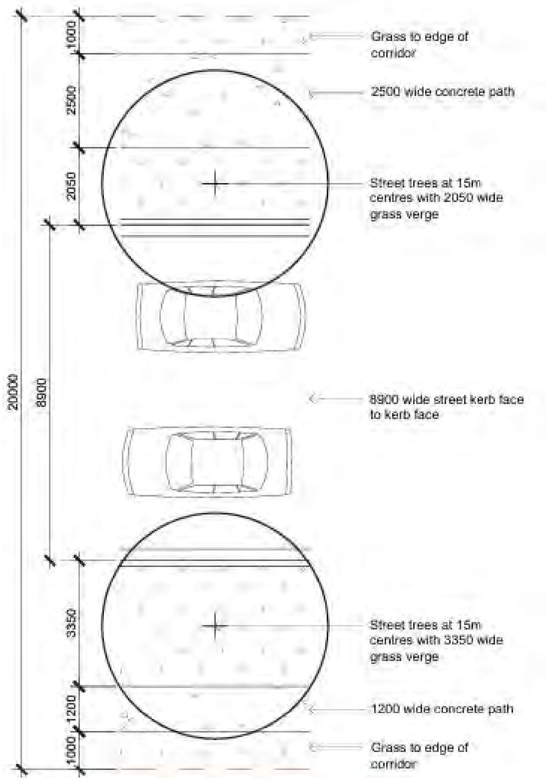


Figure 12 18m Road Reserve Details

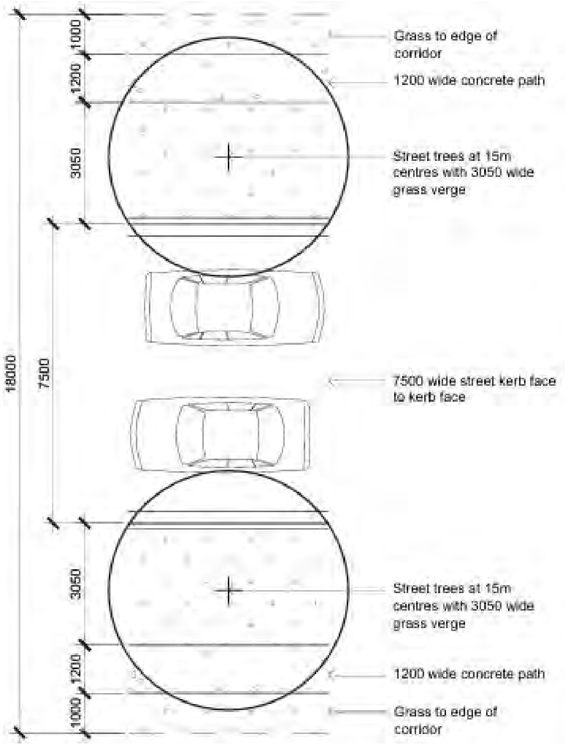
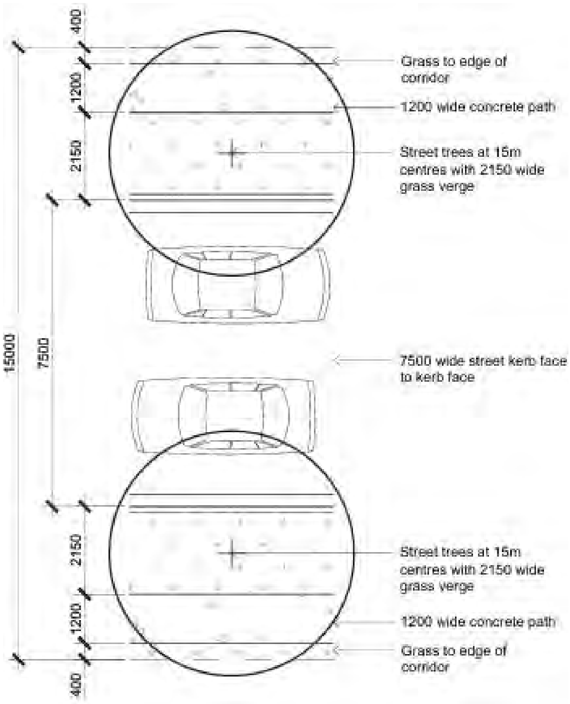


Figure 13 15m Road Reserve Details



4.10.1 Geometric Design Standards Assessment

The civil engineering plans associated with the Structure Plan are provided in Appendix A.

The internal road network for the Boyer Road Precinct Structure Plan has been designed in accordance with Austroads Guide to Road Design standards, specifically complying with requirements for 50-km/h residential road network design. The geometric design parameters have been established to ensure safe and efficient operation for all road users, including passenger vehicles, service vehicles, pedestrians and cyclists.

<u>Design Speed and Operating Environment</u>

The internal road network has been designed for a 50-km/h operating speed, consistent with the general urban speed limit applicable to residential subdivisions. This design speed governs all geometric design parameters including horizontal and vertical alignment, sight distance requirements, and intersection design.

<u>Vertical Alignment</u>

The internal road network has been designed to accommodate the site's challenging topography while maintaining appropriate gradient standards for the local conditions. Based on the detailed longitudinal civil engineering sections, gradients vary throughout the network with maximum gradients reaching up to 16.19% on a local access road (Road 8) and 13.5% on collector roads (Road 3).

These gradients reflect the topographical constraints of the site and are designed to balance earthwork requirements with acceptable vehicle operation and pedestrian accessibility. The maximum gradients are consistent with grades of similar residential roads within the Greater Hobart area.

Critical gradient locations include:

- <u>Road 3</u>: Maximum gradients of 13.5% over limited sections
- <u>Road 7</u>: Gradients ranging from 3.28% to -11.04%
- <u>Road 8</u>: Maximum gradient of 16.19% accommodating significant level changes
- <u>Road 4</u>: Generally more moderate gradients ranging from -7.4% to 3.22%

<u>Topographical Response</u>

The road alignment has been carefully designed to respond to the site's natural topography, minimizing cut and fill requirements while maintaining vehicular and pedestrian accessibility throughout the development. The higher gradients on some roads reflect the site's challenging terrain and represent an engineered solution that balances multiple design objectives.

Austroads Part 3 specifically acknowledges that "*grades steeper than the general maximum may be justified*" in certain situations, all of which apply to the Structure Plan design. The challenging topography of the site creates "*difficult terrain in which general maximum grades are not practical*" without significant cut and fill operations that would be both environmentally and economically inappropriate. The steep sections represent "*comparatively short sections of steeper grade which can lead to significant cost savings*" by working with the natural landform rather than requiring extensive earthworks.

Critically, these roads serve residential access functions where "*absolute numbers of heavy vehicles are generally low*". Road 8, with the steepest gradient of 16.19%, is a local access road serving only residential lots, meaning traffic will consist almost entirely of passenger vehicles with minimal commercial or heavy vehicle movements.

Road 3, while classified as a collector within the development, functions as a dead-end residential access road serving a limited residential catchment, not a through-traffic route. This aligns with Austroads guidance that steeper grades are acceptable on "*less important local roads where the costs or impact of achieving higher standards are difficult to justify*".

The development's traffic generation analysis shows peak flows well within the low-volume residential context that Austroads considers appropriate for relaxed gradient standards. Table 8.4 in the Austroads Part 3 indicates maximum desirable lengths for steep grades, and the site's geometric design ensures these steep sections are limited in length, minimising any operational impacts. Furthermore, the 50-km/h design speed and residential environment means vehicles will be operating at low speeds where gradient impacts on vehicle performance are reduced compared to higher-speed arterial roads.

<u>Sight Distance Provision</u>

Safe Stopping Sight Distance (SSD) of 65 metres has been provided along all internal roads, exceeding the minimum Austroads requirement of 60 metres for 50-km/h design speed. Intersection sight distance has been designed in accordance with Austroads Part 4A requirements, with appropriate sight triangles maintained at all internal road junctions.

<u>Intersection Design</u>

Internal road intersections have been designed as priority-controlled T-junctions and roundabouts with appropriate corner radii to accommodate the design vehicle movements. Intersection spacing along collector roads maintains appropriate distances between junctions, consistent with the site constraints and traffic distribution requirements.

<u>Cross-Sectional Design</u>

The proposed pavement widths align with Austroads recommendations for residential road design (as detailed in Section 4.10):

- 20-metre collector roads: 8.9-metre pavement width providing for two-way traffic with adequate clearance for service vehicles
- 18-metre local roads: 7.5-metre pavement width appropriate for local residential access
- 15-metre local roads: 6.9-metre pavement width suitable for low-volume residential access

<u>Service Vehicle Accommodation</u>

The geometric design accommodates Australian Standard AS 2890.2 service vehicles, including waste collection vehicles and emergency services vehicles. The design has been optimized to balance vehicle accessibility with the significant topographical constraints present on the site.

Traffic Capacity Assessment

The internal road network has been designed with a structured road hierarchy that carefully balances through traffic movement and local access requirements.

The traffic generated by the fully developed Structure Plan will be distributed across the three access points connecting to Boyer Road, with peak hour traffic volumes as follows:

- Access 1 (northern): 88 vehicles per hour (PM peak)
- Access 2 (middle): 94 vehicles per hour (PM peak)
- Access 3 (southern): 102 vehicles per hour (PM peak)

The maximum internal traffic flow of 102 vehicles per hour occurs on the southern collector road during the PM peak period. This represents the highest traffic volume that the internal road network will be required to accommodate.

These peak hour traffic volumes are well within the capacity of the proposed residential road network. The 20-metre collector roads with 8.9-metre pavement widths can comfortably accommodate traffic volumes significantly higher than the projected 102 vehicles per hour maximum. Similarly, the 18-metre and 15-metre local access roads are appropriately sized for their anticipated traffic loads, which will be substantially lower than the collector road volumes due to the hierarchical distribution of traffic.

The structured road hierarchy ensures that higher volume traffic is channelled along the collector roads, while local access roads maintain their primary function of providing direct property access with minimal through traffic. This design approach optimizes traffic flow efficiency while preserving the amenity and safety characteristics appropriate for a residential environment.

Future Detailed Design

Detailed engineering design associated with the Structure Plan demonstrates compliance with geometric design principles while responding appropriately to site constraints. The design provides a safe, functional residential road system that integrates effectively with the existing Boyer Road corridor while accommodating the site's topographical challenges.

4.11 Adjacent Development

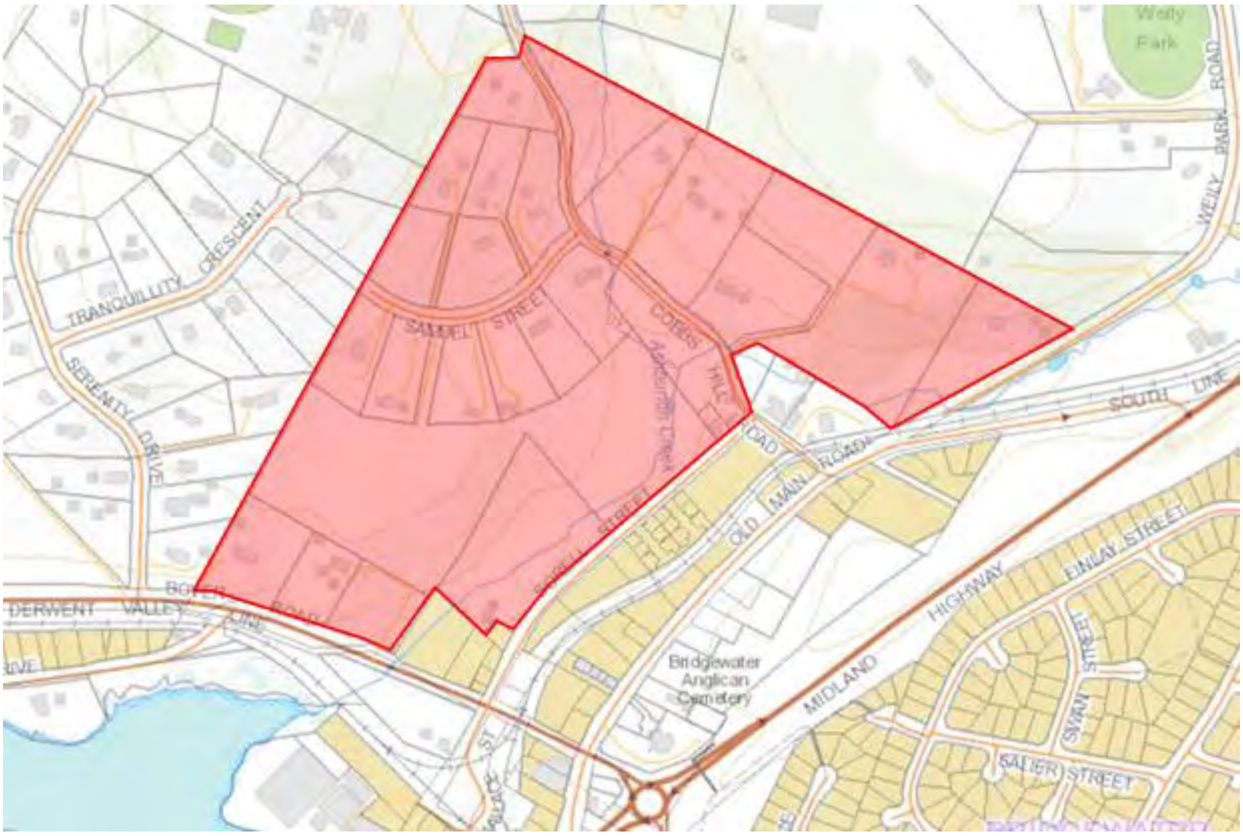
It is noted that rezoning is proposed in 28 hectares of land situated adjacent to the subject site. A TIA prepared by Hubble Traffic in April 2024 that considered the development of land highlighted in Figure 14.

The Hubble report identified that the rezoning has the potential to generate an additional 218 vehicle trips in the surrounding network during weekday peak periods.

Of relevance to the proposed masterplan subject of this report is the increase in traffic generated by the neighbouring site on Cobbs Hill Road. The Hubble Report indicates that traffic PM peak flows on Cobbs Hill Road will be 135 vehicles per hour between Old Main Road and Sorell Street; and 65 vehicles per hour between Samuel Street and Sorell Street.

The traffic generation of the neighbouring site will mostly access the Midland Highway and Bridgewater Bridge, with some increased flows on Boyer Road between Old Main Road and Serenity Drive. The traffic modelling in this report effectively captures this increase as background traffic growth, noting that the neighbouring development site is unlikely to generate significant traffic in Boyer Road west of the Serenity Drive junction.

Figure 14 Serenity Drive/ Sorell Street Masterplan Area



4.12 Road Network Impacts

The proposed masterplan will generate a moderately large amount of traffic, with new road junctions that will extend the urban boundary along Boyer Road. It will therefore have impacts on the surrounding transport network that are examined in the following sections.

4.12.1 Boyer Road

The construction of three new road junctions on Boyer Road will not have any significant adverse impacts on traffic flow for through movements due to the design of the junctions and the inclusion of channelised turn lanes.

The existing line marking along Boyer Road will need to be modified to remove the overtaking line marking located adjacent to the subject site as a result of the new road junctions.

The changes associated with access to Boyer Road (ie. The introduction of three new road junctions, but no direct property driveway access) are not considered sufficient to warrant reduction of the existing 80-km/h speed limit.

4.12.2 Old Main Road Junction

Traffic generated by the structure plan when fully developed will predominantly access the network to the east of the structure plan site due to the connectivity with the arterial road network. This will result in the majority of traffic generation utilising the Boyer Road/ Old Main Road junction.

The Boyer Road/ Old Main Road junction will form a component of the Bridgewater Bridge northern interchange. When complete it will be converted to a T-junction with a one-way link opposite Boyer Road that will provide access to the southbound carriageway of the Bridge. This is shown in Figure 4.

Assuming 80% of traffic generation accesses Old Main Road, this equates to a peak traffic volume increase of 232 vehicles per hour at the junction.

Traffic modelling for this junction was undertaken in Section 4.4. The increased traffic generation associated with the structure plan is well within the intersections capacity to absorb, thus continuing to operate at the intersection at a high level of service.

4.12.3 Cobbs Hill Road Impacts

Cobbs Hill Road is a local access road that currently services a small residential and rural catchment area. The Hubble Report indicates that future traffic flows associated with rezoning of land adjacent to the site will increase peak hour flows on Cobbs Hill Road to 135 vehicles per hour between Old Main Road and Sorell Street.

The structure plan will not access Cobbs Hill Road. No changes to traffic flow on Cobbs Hill Road will result from the proposed structure plan.

4.13 Rail Network Impacts

An existing railway level crossing is located in Boyer Road approximately 65 metres west of the Old Main Road junction. The railway crossing is actively controlled by railway level crossing traffic lights.

TasRail were consulted during the preparation of the TIA. TasRail have indicated that an ALCAM[4] assessment of the railway level crossings will be required to determine whether the level of safety at the crossings is adequate for the future traffic growth associated with the proposed masterplan. The ALCAM assessment can be undertaken by TasRail prior to the future subdivision's construction.

The peak hour increase in traffic flow as a result of the fully developed structure plan is likely to be 240 vehicles per hour (assuming 80% of all traffic generation accesses the Old Main Road junction). This equates to an average of an additional 4 vehicles per minute during peak periods.

The daily traffic volume on Boyer Road in 10-years will be 7,100 vehicles per day based on the same assumptions (increased from 3,500 vehicles per day currently). The peak traffic flow of Boyer Road will increase to approximately 780 vehicles per hour at the rail level crossing. This assumes a 10-year background compound growth rate of 1.8% on Boyer Road in addition to the traffic generation by the structure plan.

It is noted that railway movements at the crossing are infrequent and typically occur outside of peak periods. Assuming that the railway crossing was operational during peak periods, then the two-minute closure of Boyer Road is likely to result in queues of up to 85 metres[5]. This would create localised congestion beyond the intersection of Boyer Road into Old Main Road for a period of several minutes. This would not cause any operational, efficiency or safety issues as there is sufficient spare capacity to store approximately 2 to 3 cars within Old Main Road on both approaches waiting to enter Boyer Road. Importantly the railway level crossing typically operates outside of peak periods when traffic flows are low, resulting in smaller queues.

On this basis the flashing signal control is the appropriate railway crossing treatment at this location. Boom gates (as the next higher level of control) are typically utilised when multiple tracks cross in urban areas.

It is noted that 95th percentile queue lengths from the Old Main Road junction on Boyer Road are likely to be 87 metres and 67 metres during the AM and PM peaks respectively (refer to SIDRA summary in Table 6 and Table 7). The 95th percentile queue length therefore will extend beyond the location of the railway level crossing under the 2035 forecast conditions. Appropriate keep clear line marking should therefore be considered as part of TasRail's ALCAM assessment of the railway crossing.

4.14 Pedestrian and Cyclist Impacts

The masterplan will generate a moderate amount of pedestrian activity. Walking paths are proposed through the site to connect to the surrounding network, including Boyer Road and Cobbs Hill Road.

Footpaths are proposed along each of the internal roads. Pedestrian movements are encouraged within the subdivision network, but it is not recommended to encourage pedestrian movements to/ from Boyer Road. Boyer Road is a rural highway with a speed limit of 80-km/h with no formal footpath provision.

[4] The Australian Level Crossing Assessment Model (ALCAM) is a comprehensive assessment tool used to identify risks at level crossings, in line with both Australian Standard 1742.7:2016 and the New Zealand Transport Agency Traffic Control Devices Manual Part 09, which produces a unique risk score for each level crossing.

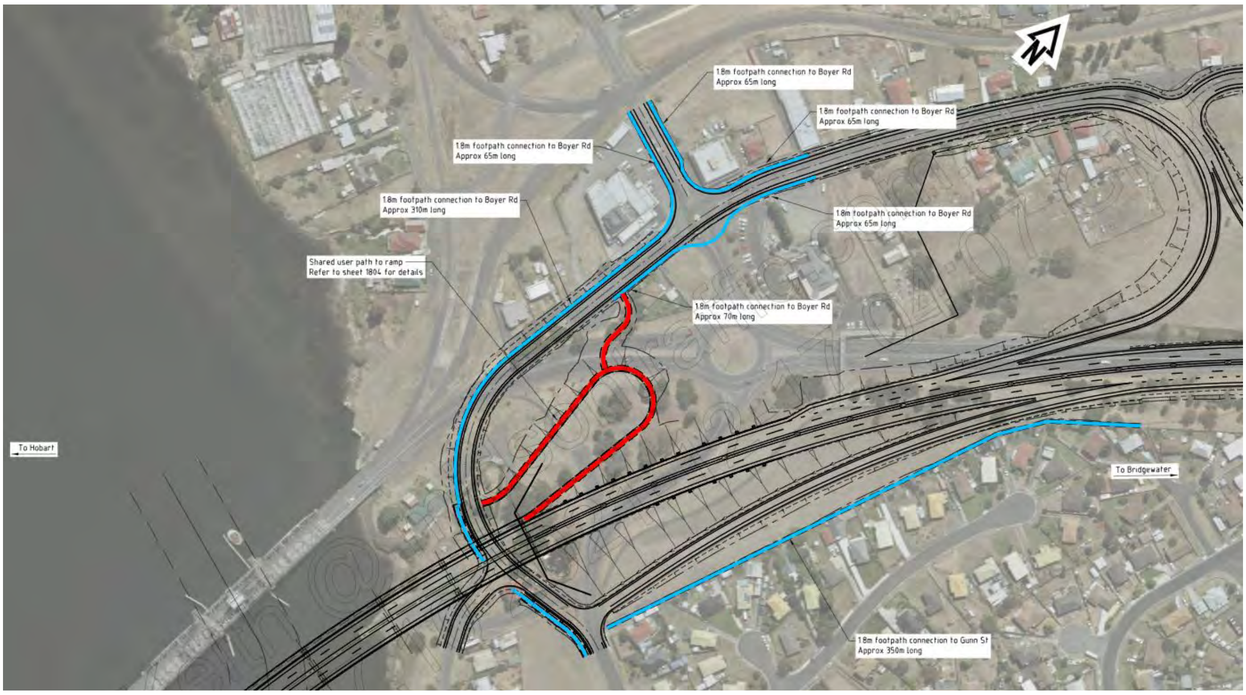
[5] Based on peak Boyer Road flow of 780 vehicles per hour and a PM westbound split of 57.5% based on existing flow characteristics.

A pedestrian path is provided through the site which will connect between Cobbs Hill Road and the internal roads that connect to Boyer Road.

An existing walking track is located along the foreshore (running south of the railway line), connecting at the western termination of Riverside Drive and extending to Tongatabu Road. It is noted that there are no pedestrian crossing facilities over the railway line near the subject site. All access to the walking track will be via the existing junction of Riverside Drive.

The construction of the New Bridgewater Bridge will introduce pedestrian and cyclist infrastructure that will connect to Old Main Road. This is shown in Figure 15. Consideration of the construction of a future footpath or shared pedestrian/ cyclist path on the northern side of Boyer Road between the proposed eastern access and Old Main Road should be considered.

Figure 15 Pedestrian and Cyclist Paths – Northern Interchange



Source: Department of State Growth

4.15 Public Transport Impacts

The structure plan will create a residential catchment area of approximately 383 dwellings. The nearest public transport services currently operate through Bridgewater to the east of the subject site, well beyond what would be considered a reasonable walking distance.

It would be expected that as the subdivision is developed, Metro Tasmania should be consulted to expand Bridgewater bus services through the site. The design of the internal road network associated with the structure plan can facilitate bus movements that can be accessible for all lots.

The road hierarchy within the Master Plan site is well defined, with the 11-metre pavement/ 20-metre road reserve providing the major internal linkages and scope for a bus route that traverses the site via an entry/ exit at the eastern Boyer Road intersection and an entry/ exit at the western Boyer Road intersection. This potential public transport route is within 400 metres of every allotment within the Master Plan area and within 200 metres of the vast majority of lots.

4.16 Road Safety Impacts

There are no significant detrimental road safety impacts foreseen for the proposed completion of the masterplan's subdivision. This is based on the following:

- The surrounding road network is capable of absorbing the traffic generated by the proposed subdivision. The subdivision accesses Boyer Road at three new road junctions that defray the overall generation to acceptable levels that results in all junctions operating at a high level of efficiency.
- The existing road safety performance of the road network does not indicate that there are any current road safety deficiencies that might be exacerbated by the proposed development.
- The horizontal geometry and vertical alignment of Boyer Road provides sufficient sight distance for vehicles approaching each of the three proposed junctions.

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5. Conclusions

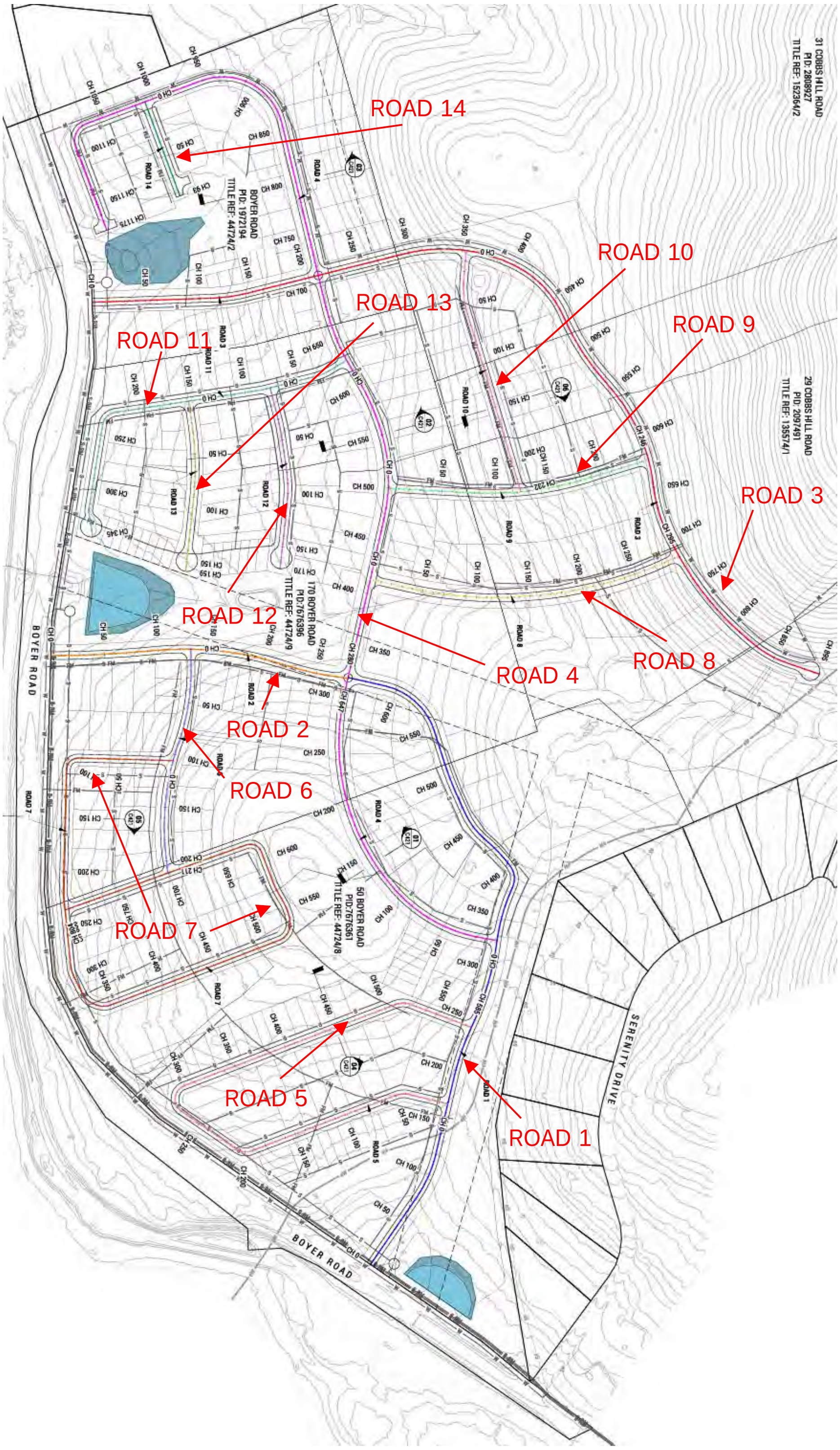
This Traffic Impact Assessment (TIA) for the Boyer Road Precinct Structure Plan has evaluated the potential impacts of the proposed residential subdivision on the surrounding transport network. The key findings of this assessment are as follows:

- Traffic Generation and Distribution: The development is expected to generate approximately 2,490 vehicle trips per day via Boyer Road. The peak traffic generation of the fully developed masterplan will be 284 vehicles per hour. Traffic modelling indicates that the new access junctions on Boyer Road will operate at acceptable levels of service, with minimal impact on existing traffic conditions.
- Intersection Performance: SIDRA intersection modelling analysis confirms that the Boyer Road and Old Main Road intersection, which is being modified as part of the Bridgewater Bridge project, will continue to function efficiently under future 2034 traffic conditions, with all movements maintaining a Level of Service (LOS) of C or better.
- Road Safety and Sight Distance Compliance: Crash data analysis does not indicate any significant pre-existing safety deficiencies in the network. The proposed access points on Boyer Road provide adequate Safe Intersection Sight Distance (SISD) as per Austroads requirements, with minor vegetation clearance recommended at one location.
- Public Transport and Active Transport Considerations: The proposed masterplan will require future public transport integration. The road network proposed will facilitate good public transport accessibility for all lots within the subject site. Internal pedestrian pathways will provide connectivity within the site, with additional active transport infrastructure along Boyer Road recommended.
- Impact on Rail Infrastructure: While traffic increases at nearby rail crossings remain within acceptable limits, TasRail has recommended ALCAM assessments to confirm the safety and adequacy of existing rail level crossing controls in light of future traffic volume increases within the network.
- Compliance with Planning Requirements: The proposed access arrangements satisfy the Performance Criteria of Clause C3.5.1 of the Planning Scheme, and the development aligns with State Growth requirements, subject to final approval.

Overall, the proposed masterplan can be accommodated within the existing and planned transport infrastructure, with no significant adverse impacts on road network performance, safety, or capacity.

Appendix A

Master Plan Civil Works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ROAD 5
ROAD 1
BOYER ROAD
SERENITY DRIVE

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3	Keith Midson	Zara Kacic-Midson	3 March 2025
4	Keith Midson	Zara Kacic-Midson	2 June 2025

Common Infrastructure Costs

On the basis of the costings provided by Matrix Management Group, which include allowances for preliminaries, design development, contract contingencies and escalation over two years, total shared infrastructure costs are estimated as follows:

Item	Total Shared Infrastructure Cost (Exc. GST)
Boyer Road Intersections	$604,000 + GST
External Stormwater Drainage	$688,000 + GST
External Sewer Drainage	$3,260,000 + GST
External Water Supply	$1,568,000 + GST
External Power	$1,066,000 + GST
Total	$7,186,000 + GST
@ 387 lots	$18,527 / lot

Cost contributions per landowner would amount to the following:

- 50 Boyer Road - $2,061,000
- 170 Boyer Road - $2,841,000
- 182 Boyer Road - $1,096,000
- 25 Cobbs Hill Road - $74,000
- 29 Cobbs Hill Road - $910,000
- 31 Cobbs Hill Road - $204,000

Note that these costs are exclusive of any authority connection and headworks charges.

Landscaping costs for the delivery of the full Playstreet scheme amount to $13,285,000 which equates to $34,198/lot. We do not believe it is reasonable to expect this level of investment by individual landowners. These plans and costs are most useful in the preparation of grant funding bids with State and Federal Government of identified elements of the overall concept.

ATTACHMENT M

Boyer Road Precinct Structure Plan
Aboriginal Heritage Assessment

Final Draft Report V1

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Holmes Dyer

20.11.2024

CULTURAL
HERITAGE
MANAGEMENT
AUSTRALIA

Report Version Control

Report version	Report distribution	Date of Distribution
Draft Report V1	Zoe Smith (CHMA for Internal Review)	20.11.2024
Draft Report V1	Proponent for Internal Review	20.11.2024
Final Draft Report V1	Aboriginal Heritage Tasmania	
Final Report V2	Aboriginal Heritage Tasmania	

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Executive Summary

Project Outline

The Brighton Council has engaged Holmes Dyer to prepare a Precinct Structure Plan (PSP) for land along Boyer Road at Bridgewater. The area of land encompasses approximately 59ha and is zoned Future Urban under the Brighton Local Provision Schedule. Figures 1-3 show the location and boundaries of the land, with Figure 4 providing a very preliminary development concept plan for the Boyer Road Precinct. It should be noted that this concept plan is likely to change, pending the outcomes of the various studies being undertaken.

CHMA Pty Ltd and Rocky Sainty (AHO) have been engaged by the Holmes Dyer to undertake an Aboriginal heritage assessment for the 59ha parcel of land (the study area), in order to identify any potential Aboriginal heritage constraints. The information generated from Aboriginal heritage assessment will be used to inform the Boyer Road PSP. This report presents the findings of the assessment.

Results of the AHR Search

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

The search results show that there are 29 registered Aboriginal heritage sites that are located within an approximate 1km radius of the study area (search results provided by Joel Williams from AHT on the 24.9.2024). Of these 29 registered Aboriginal sites, there are 10 sites that are situated within a 100m radius of the study area. Based on the available information, two of these sites are situated within the boundaries of the study area (sites AH8815 and AH11483). The other eight sites appear to be situated just outside the south-west boundary of the study area. Table i provides the summary details for these registered sites, with Figure i showing the location of the sites in relation to study area. It should be noted that for most of these sites, only a single grid reference point location is available on the AHR. However, Figure i denotes the potential spatial extent of these sites, based on the available descriptive information and any associated mud maps. The detailed AHR search results are presented in section 4.3.

Table i: Summary details for registered Aboriginal sites located within a 100m radius of the Boyer Road Precinct study area (Based on the AHR search results dated 24.9.2024)

AH Number	Site Type	Grid Reference (GDA 94) Easting	Grid Reference (GDA 94) Northing	Description
191	Shell Midden	517312	5268682	Site recorded in 1977 (recorder unknown) and described as a large concentration of midden material exposed across an area measuring 36m x 4m. site exposed in rail cutting and partly covered by Boyer Road. Midden material comprised mud oyster and mussel. Site is possibly a component of site AH1386 and AH11485. Site is located just to the south-west of study area.
11483	Isolated Artefact	517070	5269150	Site recorded by CHMA (2011) and described as a brown waterworn quartzite top grindstone that was located on the basal slopes of a hill, 20m north of Boyer Road and 100m north of Derwent River. Site is within study area.
11484	Shell Midden	517184	5268950	Site recorded by CHMA (2011) and described as a shell midden with an associated stone artefact. Site is described as being within rail reserve, on north cutting of rail line across an area 50m x 10m. Site noted to be heavily disturbed, with potential for additional material to be present. Site is possibly a component of site AH1387. Site is located just to the south-west of study area.
11485	Shell Midden	517300	5268742	Site recorded by CHMA (2011) and described as a large shell midden that extends across an area measuring 350m x 50m. Site noted to be primarily within rail reserve, with midden material exposed within embankment cuttings and erosion scalds on north and south side of rail line. Some midden material also noted to extend on to embankment cutting on north side of Boyer Road. Site is possibly a component of site AH1386 and AH191. Site is located just to the south-west of study area.
11520	Shell Midden	517234	5268908	Site recorded by CHMA (2011) and described as a low density dispersed scatter of mud oyster shell that was exposed along the northern embankment of Boyer Road. Site is located just to the south-west of study area.
1385	Shell Midden	517620	5268370	Site recorded by Officer (1980) and described as four huge shell midden mounds located on point, on bank, above shore, and exposed in rail cutting. Site is located just to the south-west of study area.
1386	Shell Midden	517410	5268615	Site recorded by Officer (1980) and described as a large shell midden extending for 600m from point. Midden exposed in rail cutting, ion bank above the shore. And extending to top side of bank cutting of Boyer Road in parts. Site is possibly a component of site AH191 and AH11485. Site is located just to the south-west of study area.
1387	Shell Midden	517212	5268882	Site recorded by Officer (1980) and described as extending from creek, NW for 200m on shore up to shallow point on bank. Midden material exposed in rail

AH Number	Site Type	Grid Reference (GDA 94) Easting	Grid Reference (GDA 94) Northing	Description
				cutting and in parts of the bank cutting of Boyer Road. Site is possibly a component of site AH11484. Site is located just to the south-west of study area.
1388	Shell Midden	516812	5269382	Site recorded by Officer (1980) and described as being located just NW of small point on bank above shore. Site is located around 100m to the south-west of study area.
8815	Artefact Scatter	517638	5268622	Site recorded by Stanton (2001) and was described as a large artefact scatter (25+ artefacts) extending across an area measuring around 300m x 50m, either side of a row of box thorns within a farm paddock. Majority of artefacts were cherty hornfel flakes. High potential for additional artefacts to be present. Site is within study area.

Summary Survey Results

The field survey of the Boyer Road Precinct resulted in the recording of two stone artefacts. Both artefacts were situated in the area where Stanton (2001) described recording site AH8815. For this reason, these two artefacts are deemed to be a component of site AH8815. There are no accurate spatial boundaries available for the Stanton (2001) recording of site AH8815. The boundaries for the site have been estimated, based on the site descriptions provided by Stanton (2001). Figure ii shows these estimated site boundaries, together with the two artefacts that were recorded during the current survey. Table ii provides the summary details for site AH8815, with the detailed site recording presented in Appendix 2.

In addition to site AH8815, one specific area of High Potential Archaeological Sensitivity (PAS1) was identified in the study area. This is an area where it is assessed that there is a high potential for undetected artefact deposits to be present. PAS1 encompasses a broad, flat benched slope area on the mid slopes of a hill, measuring approximately 90m x 90m. The area immediately abuts the northern end of site AH8815. Table ii provides the summary details for PAS1, with Figure ii showing the spatial extent of the PAS area.

As detailed in section 4.3 of this report, the AHR search results show that there is one other registered Aboriginal site within the bounds of the study area, this being AH11483. Despite an extensive search, of this area during the current survey, the field team were unable to find this artefact. The grid reference provided by CHMA (2011) was taken with a handheld GPS, so is likely to be accurate to within 5m. The fact that the artefact could not be found is therefore most likely to be a product of surface visibility. It is very likely that the artefact is still present in this area, but is obscured by grass or covered by soil deposits. Table ii provides the summary details for this site, with Figure ii showing the site location.

In section 4.3 of this report, it was noted that there are eight other registered Aboriginal sites that appear to be located within a 100m radius of the study area boundaries. All eight of these sites are classified as Aboriginal shell middens and are clustered along the margins of the River Derwent estuary, close to the south-west boundary of the study area. Based on the available information (taken from site descriptions and mud maps), there is no evidence to indicate that any of these eight sites extend into the boundaries of the study area. The main concentration of midden deposits from these sites appear to be confined to within 100m of the foreshores, on the south side of Boyer Road. However, midden material from a few of these sites were observed to be present within the embankment cutting on the northern side of Boyer Road, immediately outside the south-west boundary of the study area. This of course means that there is the potential that cultural deposits associated with these sites may extend into the study area itself. During the current field survey, a number of survey transects were walked along the basal slopes of the hill, close to the south-west boundary of the study area. However, no Aboriginal cultural deposits were identified in this area. Surface visibility across these basal slopes was generally restricted to 20% or less due to grass cover. Because there is some potential for cultural deposits to occur within this south-west portion if the study area, along the basal hill slopes, this area has been assessed as being a zone of moderate sensitivity (see Figure ii).

Besides the sites and areas discussed above, no other Aboriginal heritage sites, suspected features or specific areas of elevated archaeological potential were identified within the Boyer Road Precinct study area. The field survey did not identify any stone material types present within the study area that would be in any way suited for artefact manufacturing. The field survey was able to confirm that there are no large outcrop features present in the study area, with bedrock outcrop only exposed to up to a metre above ground level, which eliminates the possibility of Aboriginal rock shelters being present. The detailed survey results are presented in section 7 of this report.

Table ii: Summary Details for sites AH8815, AH11483 and PAS1

Site Name	Site Type	Grid Reference (GDA 94)	Site Description
AH8815	Artefact Scatter	Estimate Only E517543 N5268507 E517580 N5268493 E517667 N5268622 E517744 N5268748 E517705 N5268765 E517628 N5268632	Site recorded by Stanton (2001) and was described as a large artefact scatter (25+ artefacts) extending across an area measuring around 300m x 50m, extending from basal hill slopes to mid hill slopes, either side of a row of box thorns within a farm paddock. Two artefacts associated with site AH8815 were recorded during current survey. High potential for additional surface and sub-surface artefact deposits to be present. Artefact details Artefact 1 (E517712 N5268724) Brown chert flake 48mm x 36mm x 12mm Artefact 2 (E517634 N5268619) Brown chert flake 42mm x 32mm x 9mm

Site Name	Site Type	Grid Reference (GDA 94)	Site Description
AH11483	Isolated Artefact	E517070 N5269150	Site recorded by CHMA (2011) and described as a brown waterworn quartzite top grindstone that was located on the basal slopes of a hill, 20m north of Boyer Road and 100m north of Derwent River. Site is within study area but was not found during current survey.
PAS1	Area of Potential Archaeological Sensitivity	E517584 N5268755 E517605 N5268721 E517650 N5268695 E517680 N5268690 E517715 N5268745 E517636 N5268805	PAS encompasses a broad, flat benched slope area on the mid slopes of a hill, measuring approximately 90m x 90m. The area immediately abuts the northern end of site AH8815. Slope gradients in this area decrease to around 1-2°. Soils across the PAS are comprise loosely consolidated aeolian sand deposits with good depth. High potential for artefact deposits to be present.

Significance Assessment

Sites AH8815 and AH11483 which are confirmed as being situated within the Boyer Road Precinct, have been assessed and allocated a rating of significance. A five tiered rating system has been adopted for the significance assessment; low, low-medium, medium, medium-high and high. Table iii provides the summary details for significance ratings for the recorded sites. A more detailed explanation for the assessment ratings are presented in section 8. Section 9 of this report presents a statement of social significance provided by Rocky Sainty for the four recorded sites and the study area more broadly.

Table iii: Summary significance ratings for recorded Aboriginal sites

Site Number	Site Type	Scientific Significance	Aesthetic Significance	Historic Significance	Social Significance
AH8815	Artefact Scatter	Medium	Medium	N/A	High
AH11483	Isolated Artefact	Low-Medium	Medium	N/A	Medium-High

Management Recommendations

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

- Background research into the extant archaeological and ethno-historic record for the study area and the surrounding region (see sections 3 and 4 of this report).
- The results of the investigation as documented in this report (see section 7)
- Consultation with Aboriginal Heritage Officer Rocky Sainty and the outcomes of the Aboriginal community consultation (see section 9 and Appendix 4)
- The legal and procedural requirements as specified in the *Aboriginal Heritage Act 1975* (see section 10).

Table iv provides the summary management recommendations for this project.The more detailed recommendations are presented in section 11.

Table iv: Summary management recommendations for the project

Site/Area	Grid Reference (GDA 94)	Management Recommendations
AH8815	Estimate Only E517543 N5268507 E517580 N5268493 E517667 N5268622 E517744 N5268748 E517705 N5268765 E517628 N5268632	Site AH8815 is an artefact scatter that is located within the study area (see Figure 14). Preferred management option is for the site area to be plotted onto the zoning plans for the project and it noted that the site is required to be avoided and protected in open space. Short, Medium and Long term management plan should be developed for the site area. If there is the potential for the site complex to be impacted by future rezoning and development, then it is recommended that further sub-surface investigations should be undertaken within the site complex and immediate surrounds. Aim of investigations will be to more accurately clarify the spatial extent and nature of artefact deposits present and to develop informed management and mitigation options for the site. Scope and methodology for investigations is to be ratified with AHT. Permit will be required.
Site AH11483	E517070 N5269150	Site AH11483 is an isolated artefact that is located within the study area (see Figure 14). This artefact could not be found during the current survey, but is likely to be still present in area. Preferred management option is for the site area to be plotted onto the zoning plans for the project and it noted that the site is required to be avoided and protected. If site cannot be avoided then seek permit to impact site.
PAS1	E517584 N5268755 E517605 N5268721 E517650 N5268695 E517680 N5268690 E517715 N5268745 E517636 N5268805	PAS1 is an area of High Potential Archaeological sensitivity that is situated within the study area (see Figure 14). Preferred management option is for the PAS1 area to be plotted onto the zoning plans for the project and it noted that PAS1 is required to be avoided and protected. If there is the potential that the PAS1 area may be partially or entirely impacted, then undertake program of sub-surface investigations to more accurately determine presence/absence, nature and extent of cultural deposits that may be present. Scope and methodology for investigations is to be ratified with AHT. No permit initially required to commence investigations. Permit may be required pending findings.
Zone of Moderate Sensitivity		A zone of moderate archaeological sensitivity is present along the south-west boundary of the study area (see Figure 14). It is recommended that a limited program of sub-surface investigations in undertaken in this area, Scope and methodology for investigations is to be ratified with AHT. No permit initially required to commence investigations. Permit

Site/Area	Grid Reference (GDA 94)	Management Recommendations
		may be required pending findings.
General Recommendations		• No additional site specific Aboriginal heritage constraints or requirements apply to the remainder of the Boyer Road Precinct study area. • Develop an Aboriginal cultural heritage interpretation plan for the precinct. • If previously undetected Aboriginal sites or suspected features are located within the Boyer Road Precinct during any future works, the processes outlined in the Unanticipated Discovery Plan should be followed (see Appendix 3). • Copies of this report should be submitted to AHT and the AHC for review and comment.

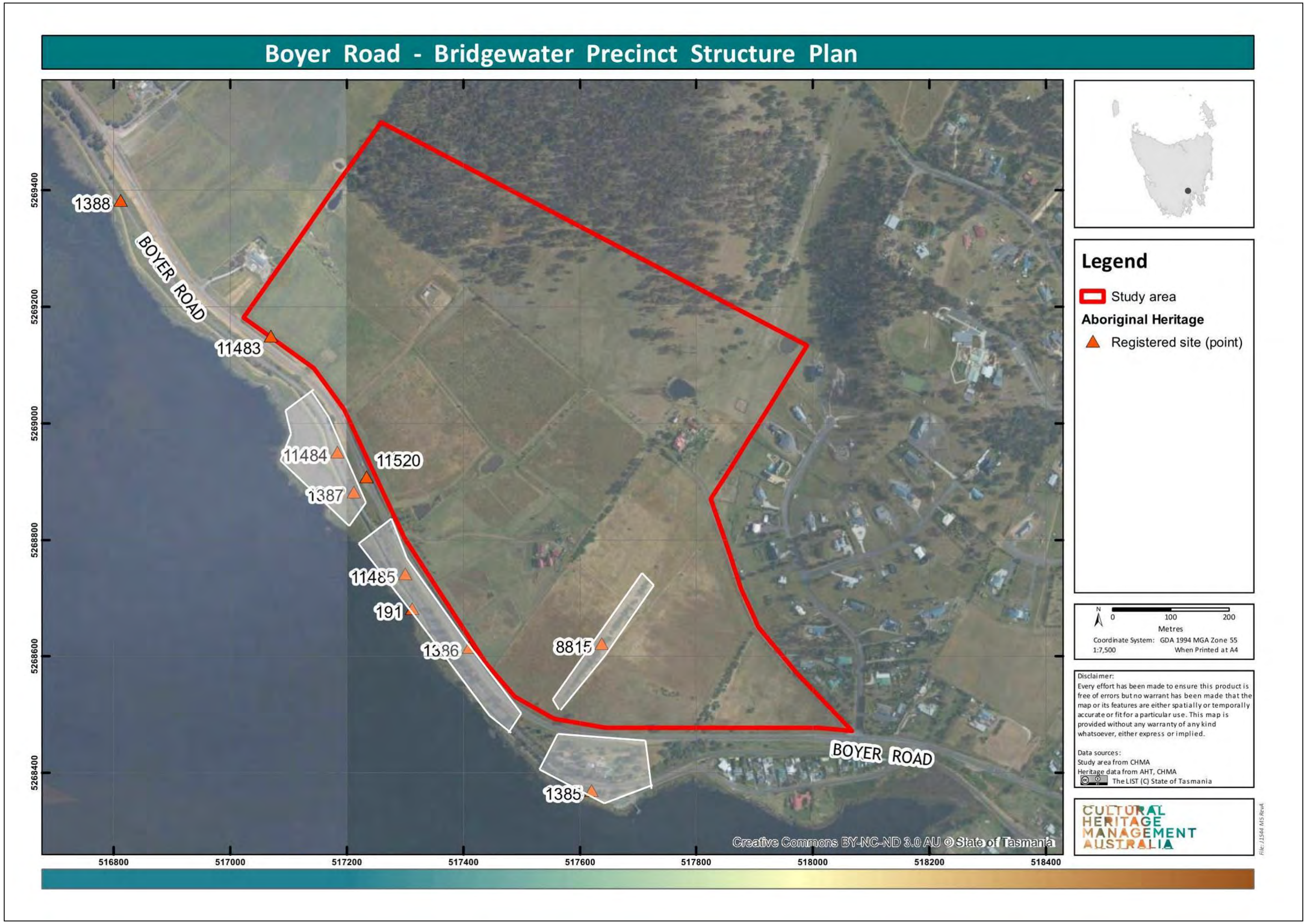


Figure i: Aerial image showing registered Aboriginal heritage sites located within a 100m radius of the Boyer Road Precinct study area

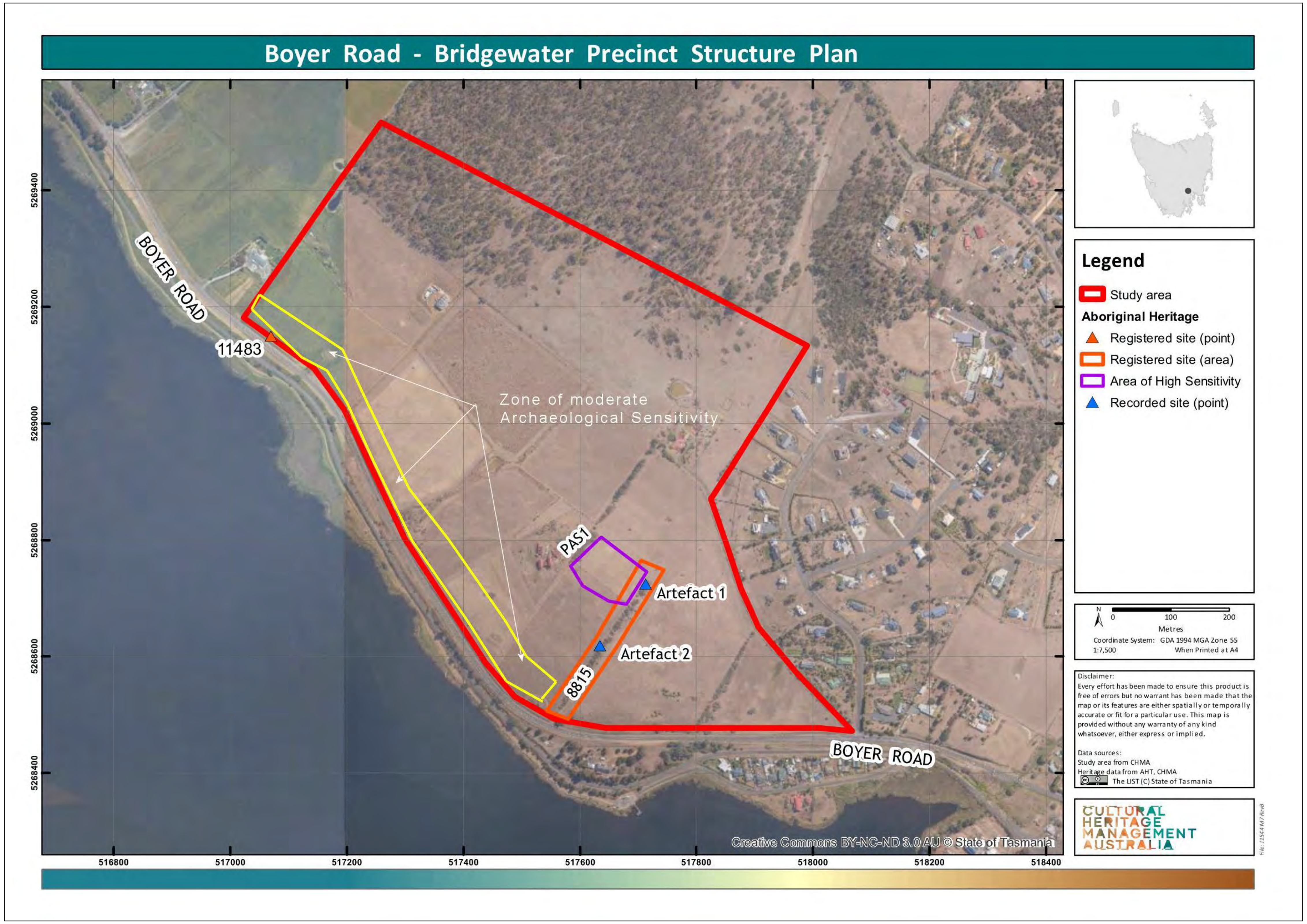


Figure ii: Aerial image showing the location and spatial extent of sites AH8815, AH11483 and PAS1, as well as the zone of moderate archaeological sensitivity

1.0 Project Description

1.1 Project Outline

The Brighton Council has engaged Holmes Dyer to prepare a Precinct Structure Plan (PSP) for land along Boyer Road at Bridgewater. The area of land encompasses approximately 59ha and is zoned Future Urban under the Brighton Local Provision Schedule. Figures 1-3 show the location and boundaries of the land, with Figure 4 providing a very preliminary development concept plan for the Boyer Road Precinct. It should be noted that this concept plan is likely to change, pending the outcomes of the various studies being undertaken.

CHMA Pty Ltd and Rocky Sainty (AHO) have been engaged by the Holmes Dyer to undertake an Aboriginal heritage assessment for the 59ha parcel of land (the study area), in order to identify any potential Aboriginal heritage constraints. The information generated from Aboriginal heritage assessment will be used to inform the Boyer Road PSP. This report presents the findings of the assessment.

1.2 Aims of the Assessment

The principal aims of the Aboriginal Heritage assessment are as follows.

- To undertake an Aboriginal cultural heritage assessment for the area encompassed by the Boyer Road PSP (the study area as shown in Figures 1-3). The assessment is to be compliant with both State and Commonwealth legislative regimes, in particular the intent of the *Aboriginal Heritage Act 1975* and the associated *Aboriginal Heritage Standards and Procedures (2024).*
- Search the Aboriginal Heritage Register (AHR) to identify previously registered Aboriginal heritage sites within and in the general vicinity of the study area.
- Undertake relevant archaeological, environmental and ethno-historical background research to develop and understanding of site patterning within the study area.
- To locate, document and assess any Aboriginal heritage sites located within the study area.
- To assess the archaeological and cultural sensitivity of the study area.
- To assess the scientific and Aboriginal cultural values of any identified Aboriginal cultural heritage sites located within the study area.
- Consult with (or ensure the Aboriginal community representative consults with) Aboriginal organisation(s) and/or people(s) with an interest in the study area in order to obtain their views regarding the cultural heritage of the area.
- To develop a set of management recommendations aimed at minimising the impact of any future proposed activities within the Boyer Road Precinct on identified Aboriginal heritage values.
- Prepare a report which documents the findings of the Aboriginal heritage assessment and meets the requirements of the current *Aboriginal Heritage Standards and Procedures* prepared by AHT.

1.3 Project Methodology

A three stage project methodology was implemented for this assessment.

Stage 1 (Pre-Fieldwork Background Investigations)

Prior to field work being undertaken, the following tasks were completed by CHMA staff.

Consultation with Aboriginal Heritage Tasmania

Aboriginal Heritage Tasmania (AHT) was contacted and informed that CHMA and Rocky Sainty had been engaged to undertake an Aboriginal heritage assessment for the Boyer Road Precinct. As part of this initial contact, CHMA submitted an Aboriginal Heritage Register (AHR) search request for the study area (search request submitted on the 9/9/2024).

Consultation with Rocky Sainty (Aboriginal Heritage Officer)

Rocky Sainty is the designated Aboriginal Heritage Officer for the present investigations. As part of Stage 1 works Stuart Huys (CHMA archaeologist) and Rocky Sainty were in regular contact. The main purpose of this contact was to discuss the scope of the present investigations, to ratify the proposed methodology for the investigations and to co-ordinate the timeframes for implementing field work.

The collation of relevant documentation for the Project

The following documentation was collated for this project.

- A review of the Aboriginal Heritage Register (AHR), and the collation of information pertaining to any registered heritage sites located within the general vicinity of the study area.
- Relevant reports documenting the outcomes of previous Aboriginal heritage studies in the vicinity of the study area.
- Ethno-historic literature for the region.
- References to the land use history of the study area.
- Geotechnical information for the study area, including soil and geology data.

Stage 2 (Field Work)

Stage 2 entailed the field work component of the assessment. The field survey was undertaken over a period of two days (22.10.2024 and 23.10.2024) by Stuart Huys (CHMA archaeologist) and Rocky Sainty (Aboriginal Heritage Officer). As noted in section 1.1 of this report, the land that is the focus of this assessment encompasses approximately 59ha. The field team walked a series of 13.7km of survey transects across this area, with the average width of each transect being 5m. Section 6 provides further details as to the survey coverage achieved within the study area.

Processes for Relocating Registered Sites

For any registered Aboriginal sites reported to be located on or in the immediate vicinity of the study area, the field team carried out an inspection of the reported grid reference location for these sites (as provided on the AHR register). Where Aboriginal heritage items were identified, the field team cross referenced the existing site records (site recording forms and reports) with the field observations, in an effort to determine that the identified site did correlate with the existing site records for these sites. Where this was confirmed, then the site was recorded as being an expression of the existing registered site.

Where no evidence of Aboriginal heritage was evident, the field team carried out an inspection of the area within a 20m radius of the grid reference location and consulted existing site records (where available) to try to ascertain where the site may be situated in the landscape. If no evidence of Aboriginal heritage items was again identified, then the field team made the determination that the site could not be relocated.

Determining the Boundaries of a Site
The criteria for formally identifying and defining the boundaries of a site (where one site ends and another begins) vary between states and territories in Australia. For the purposes of this assessment the end boundary of a site was established by determining a break of at least 50m between observed expression of cultural items. Where this gap occurred, the cultural items were designated as separate sites. Where the gap between cultural items was determined to be less than 50m, then these items were determined to be a part of the one contiguous site.

Site Recordings
For any Aboriginal sites identified by the field team, the following details were recorded.
- The spatial extent of the site (polygon co-ordinates).
- The nature of Aboriginal heritage deposits and features associated with the site.
- Any intra-site variations that occur.
- The condition of the site, and any notable impacts to the site.
- Photos and site maps.
- Proposed management recommendations (as discussed between the archaeologist and AHOs).

Aboriginal Heritage Register (AHR) forms for all located Aboriginal sites have been completed and submitted as part of the process.

The results of the field investigation were discussed between Rocky Sainty, and Stuart Huys. This included the potential cultural and archaeological sensitivity of each of the three surveyed areas, and possible management options for identified Aboriginal heritage sites.

Stage 3 (Report preparation)
Stage three of the project involves the production of a report that includes an analysis of the data obtained from the field survey, an assessment of archaeological sensitivity of the study area and management recommendations. The report was prepared by Stuart Huys (CHMA), in liaison with Rocky Sainty. The report has been structured to be compliant with the *Aboriginal Heritage Standards and Procedures 2024* prepared by

AHT. A draft copy (one electronic copy) of the report has been submitted to Holmes Dyer and AHT for review. In addition, CHMA has provided AHT with all site spatial data files, and mapping associated with the project (in ESRI shape file format (GDA94). The draft report has also been sent out to a range of Tasmanian Aboriginal organisations in Southern Tasmania for review and comment. The outcomes of this consultation are presented in Appendix 4.

1.4 Project Limitations

All 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 the presence of vegetation cover and the presence of introduced gravels. Surface visibility across the study area varied between an estimated average of 10% and 50%. Erosion scalds, vehicle tracks and animal diggings provided locales of improved surface visibility. The constraints in surface visibility limited the effectiveness of the survey assessment to some degree. This is discussed in more detail in Section 6 of this report.

The other limitation relates to property access constraints. There are two rural properties within the study area where there are existing residential dwellings. The field team were requested not to enter the core house yard areas surrounding these dwellings.

Plate 1: Rocky Sainty, the AHO for this project

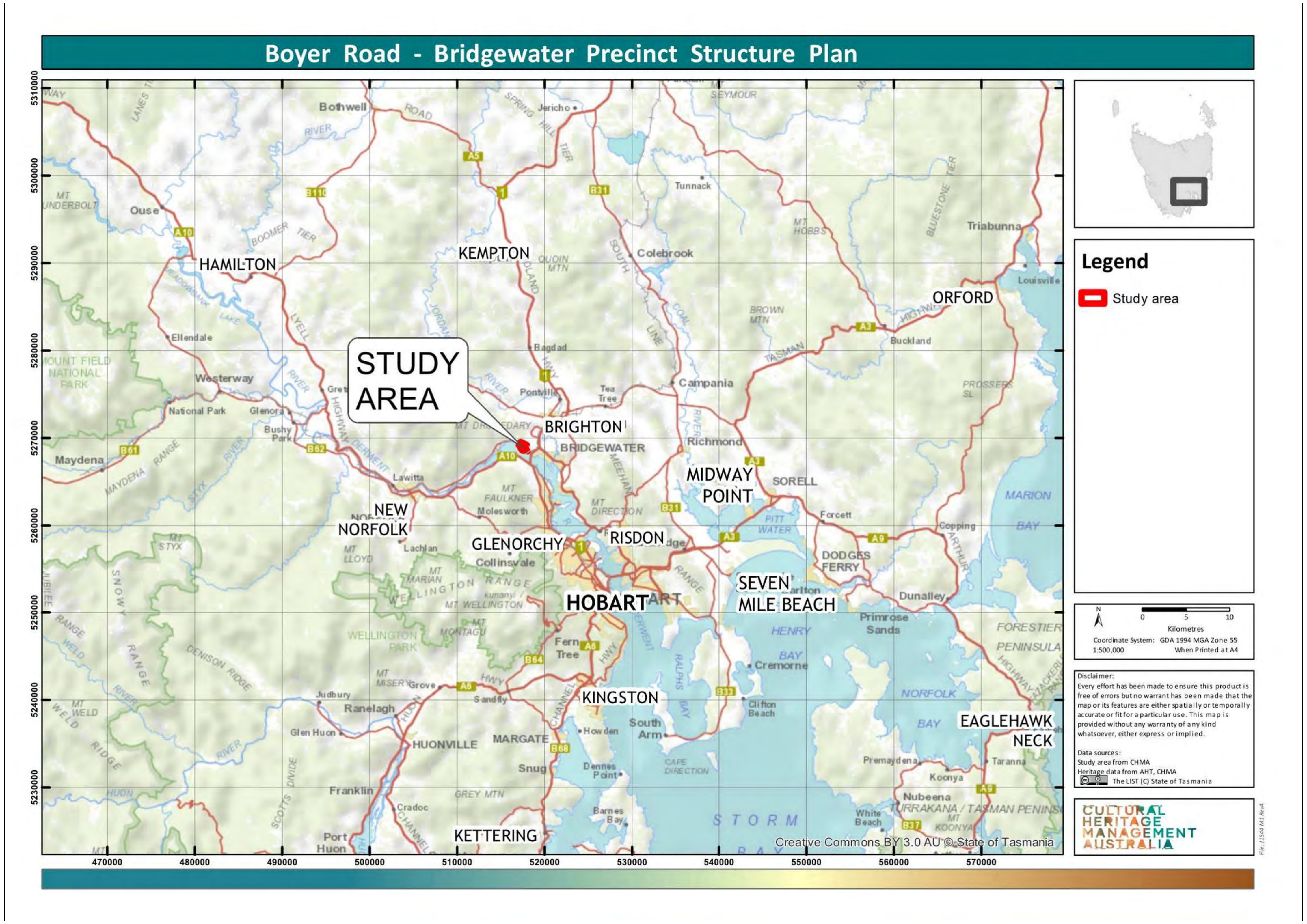


Figure 1: Topographic map showing the general location of the study area at Boyer Road, Brighton, in the South East Region of Tasmania

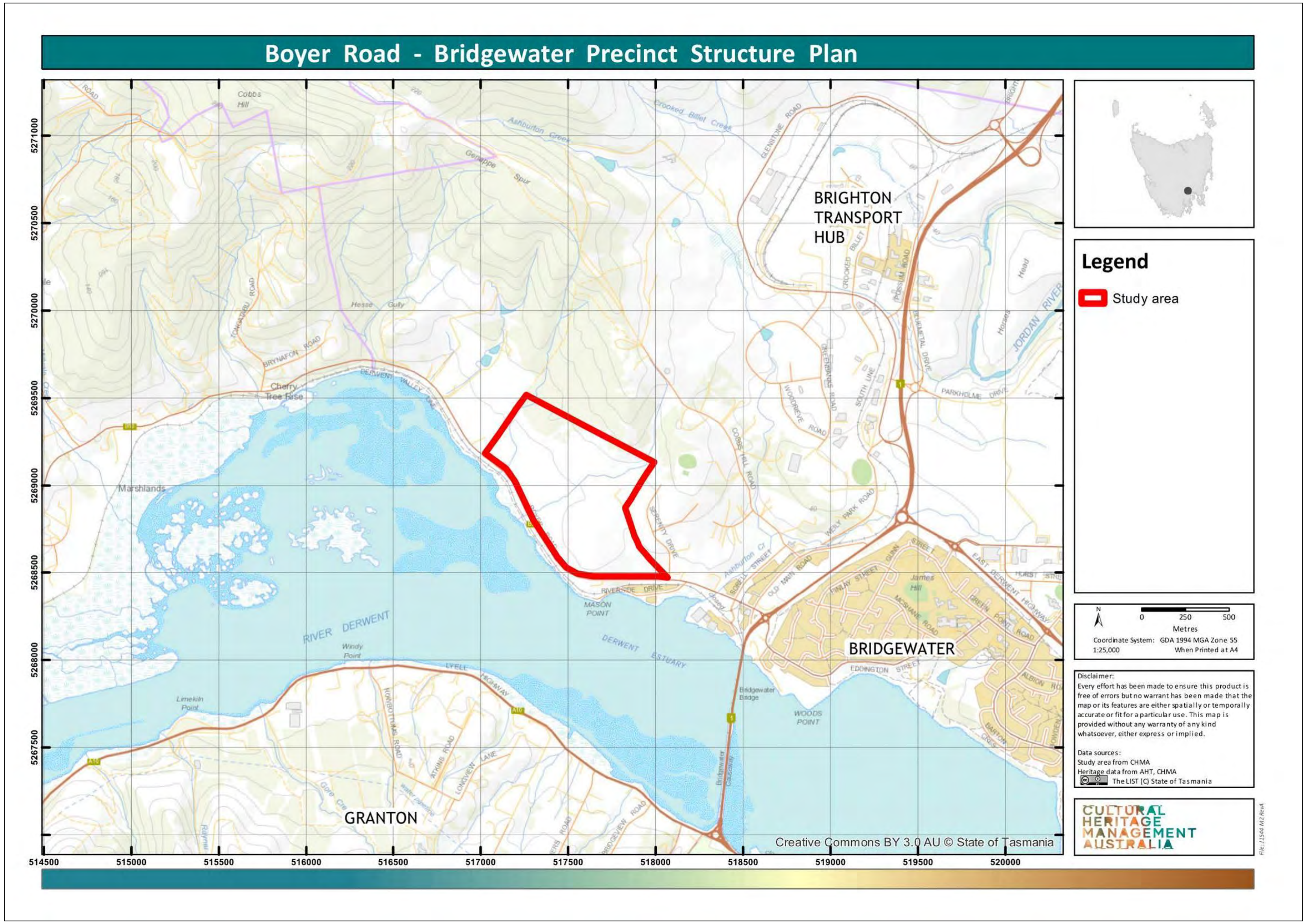


Figure 2: Topographic map showing the landscape setting of the Boyer Road Precinct (the study area)

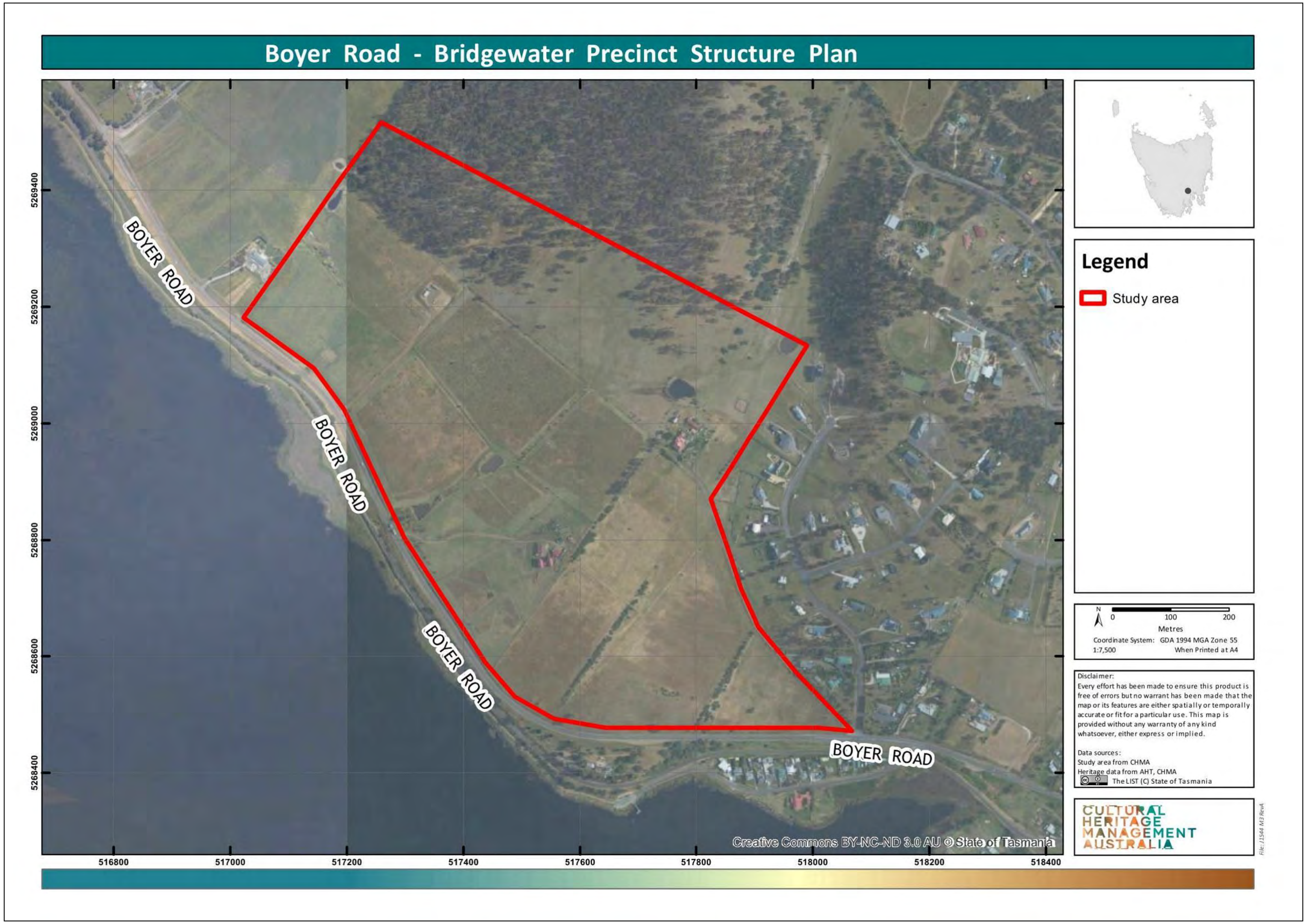


Figure 3: Aerial image showing the boundaries for the Boyer Road Precinct (the study area)

Figure 4: The Preliminary Concept Plan for the Boyer Road Precinct

2.0 Environmental Setting of the Study Area

2.1 Introduction

Prior to undertaking 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 Boyer Road Precinct encompasses approximately 59ha and is located at Bridgewater in the South East Region of Tasmania. The land is situated on the lower to basal southern slopes of the Genappe Spur, which runs in a north-west to south-east direction off Cobbs Hill. The slope gradients across the land range from around 15º to 20º in the northern portion of the study area (see Plate 2), with gradients generally decreasing to less than 5º, approaching Boyer Road in the south-west of the study area (see Plate 3). Within the central eastern portion of the study area there is a discrete benched slope areas, where gradients decrease to less than 2º (see Plate 4).

The south-west boundary of the study area, along Boyer Road, approaches to within 150m of the River Derwent Estuary. The River Derwent estuary is a 'ria' or drowned river valley formed by coastal submergence about 6,000 years ago. The shoreline of the estuary in the surrounds of Bridgewater is low-energy, with mudflats and shoals exposed at low tide. The River is estuarine at this point, and subject to tidal influences. The other major water course in the vicinity of the study area is the Jordan River. The Jordan River has its' headwaters at Lake Tiberias, around 40km to the north-east of the study area. From here the river flows in a north-west direction through a broad open valley system, cutting across the Midland Highway near Jericho. It then enters more steeply incised hills just south of Melton Mowbray, where the river then loops around to the south-east, eventually emptying into the Derwent River at Herdsmans Cove. The river is also estuarine at this point, and subject to tidal influences.

Ashburton Creek, which is located around 500m to the east of the study area is the closest named fresh water course. This is an ephemeral water course that flows in a south-east direction down from Cobbs Hill and along the east edge of the Genappe Spur, through the study area and eventually emptying into the River Derwent just east of Mason Point. Within the study area itself, the hill slopes are drained by a series of small ephemeral un-named gullies. These gullies have a series of small farm dams constructed at various points (see Plate 5).

The underlying geology across the south-east portion of the study area is dominated by Jurassic dolerite and related rocks. There is a transition to Permian siltstone bedrock within the north-west portion of the study area (TheList 2024). From an Aboriginal heritage perspective, neither siltstone nor dolerite are particularly well suited to the manufacture of stone tools and were seldom targeted for this purpose. It is therefore unlikely that evidence of Aboriginal quarrying or stone procurement activity will be present within the study area. However, there may be small pockets of metamorphosed siltstone suitable for artefact manufacturing, in the geological contact zone between the dolerites and the siltstone.

The existing soil landscapes broadly reflect the underlying geology. Within the south-east of the study area there are moderately well drained black soils developed on Jurassic dolerite bedrock and colluvium on low undulating (3-10%) land. Across the north-west of the study area there are poor to imperfectly drained grey brown texture contrast soils developed on Permian siltstone bedrock and colluvium on undulating to rolling (3-32%) land. Rainfall <750mm. Undifferentiated soils developed on Quaternary alluvium occur across the basal slopes on the south-west boundary (TheList 2024). Although not noted on the Listmap, there is a deposit of what appears to be aeolian (wind blown) sand deposits present within the south-east portion of the study area (see Plate 6).

The vegetation across the majority of the south-west and central parts of the study area consists primarily of agricultural, urban, and exotic vegetation. The native vegetation in these areas has been cleared and replanted with grasses (see Plates 2-4). There are also a number of residential dwellings and associated infrastructure in these areas (roads, powerlines etc). The land clearing and installation of residential dwellings within the study area will have resulted in varying levels of impacts to the Aboriginal heritage resources that may be present in these areas.

Within the north-west portion of the study area there are remnant patches of native vegetation comprising *Eucalyptus tenuiramis* forest and woodland on sediments, *Eucalyptus amygdalina* forest on mudstone and *Eucalyptus risdonii* forest and woodland (see Plate 7). It is possible that any Aboriginal sites that are present in these areas may be relatively intact.

Plate 2: View south-west across the study area from the northern boundary, showing typical topography and vegetation

Plate 3: View south-east showing the gentle hill slope gradients within the south-west of the study area

Plate 4: View east at the benched slope area within the central-eastern portion of the study area

Plate 5: View north at a farm dam along one of the gullies that run through the study area

Plate 6: A patch of aeolian wind blow sand deposits in the south-east of the study area

Plate 7: View west at a remnant patch of Eucalypt woodland in the northern part of the study area

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 that 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 (clans) 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 comprising between six to 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).

Ryan (2012:13) presents a map showing the approximate boundaries for the nine Tasmanian Aboriginal Nations. This map shows that the study area is situated around the confluence of the boundaries of three Aboriginal Nations, these being the South East Nation, The Oyster Bay Nation and the Big River Nation (see Figure 5).

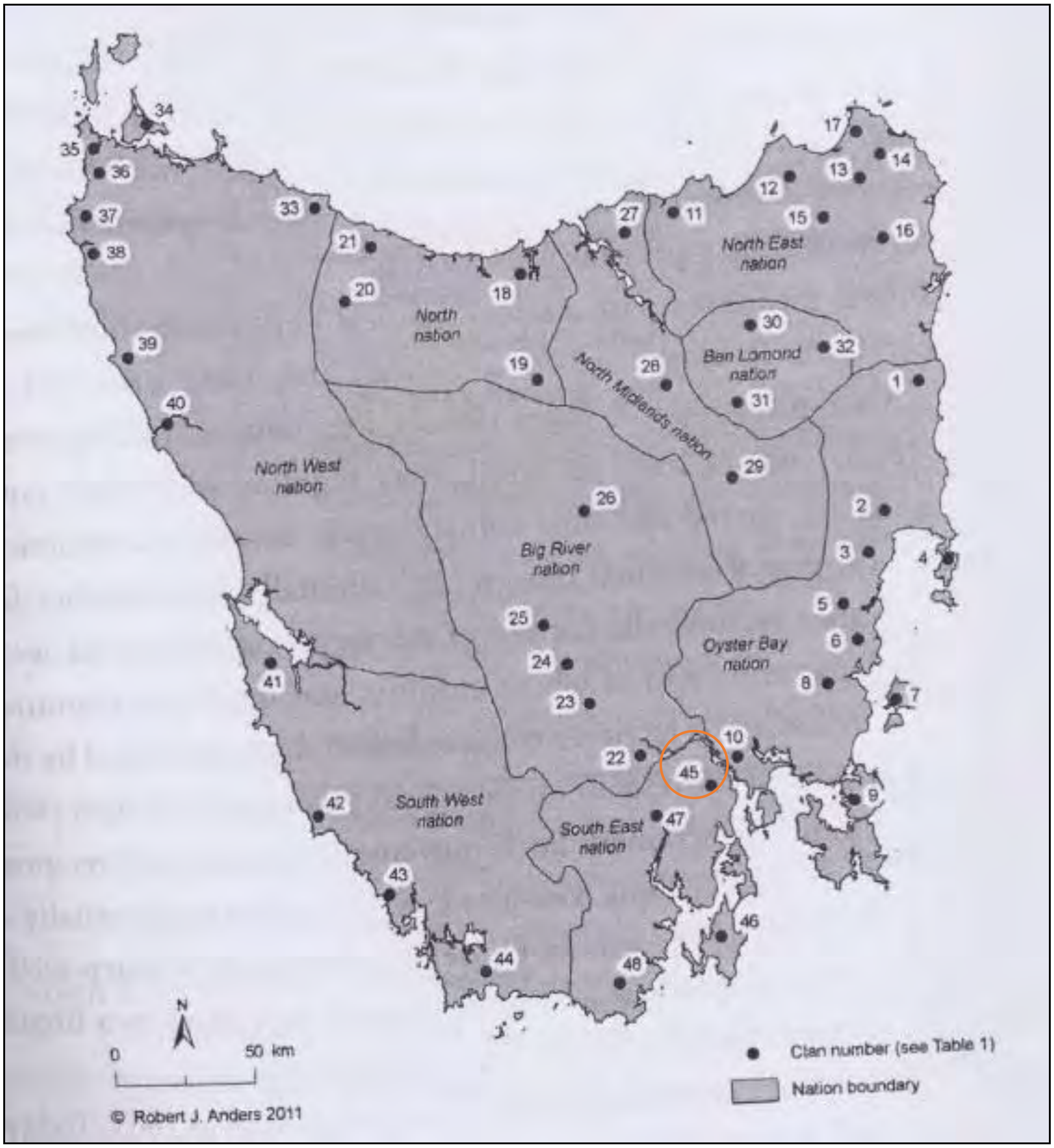


Figure 5: The Aboriginal Nations of Tasmania in relation to the study area (after Ryan 2012:13)

The South East Nation

The South East Nation was essentially a maritime people with their territory encompassing 555km of coastline, and their economy being based primarily on coastal resources. The boundaries of their territory extended from the west bank of the Derwent River, around present day New Norfolk down to South Cape, an inland through to the Huon Valley, and included all the D'Entrecasteaux Channel and Bruny Islands. In total, the territory of the South East Tribe encompassed 3100km2 (Ryan 2012). It is believed that prior to European contact the South East Nation probably consisted of seven individual clans. However, only four clans have been definitively recorded by the early European settlers. The southern margins of the River Derwent, around Bridgewater falls within the range of the Mouheneenner Clan who occupied the land around present day Hobart.

The South East Nation is believed to have spent the vast majority of the year exploiting the resources along the coastline, and the immediate hinterland areas. Their seasonal movement took place up and down the coastline. In winter they were primarily focused along the coastline gathering shellfish. In November they are reported to have gathered on North Bruny Island to exploit the mutton-bird colonies. By mid-summer the people had moved down to Recherché Bay to hunt seals. The South East People are known to have built sturdy bark catamarans, which were used to access the various Islands D'Entrecsasteaux Channel and Bruny Islands. More extensive voyages were also undertaken across Storm Bay to the Tasman Peninsula (Ryan 2012). Figure 6 illustrates the proposed movements of the South East Nation.

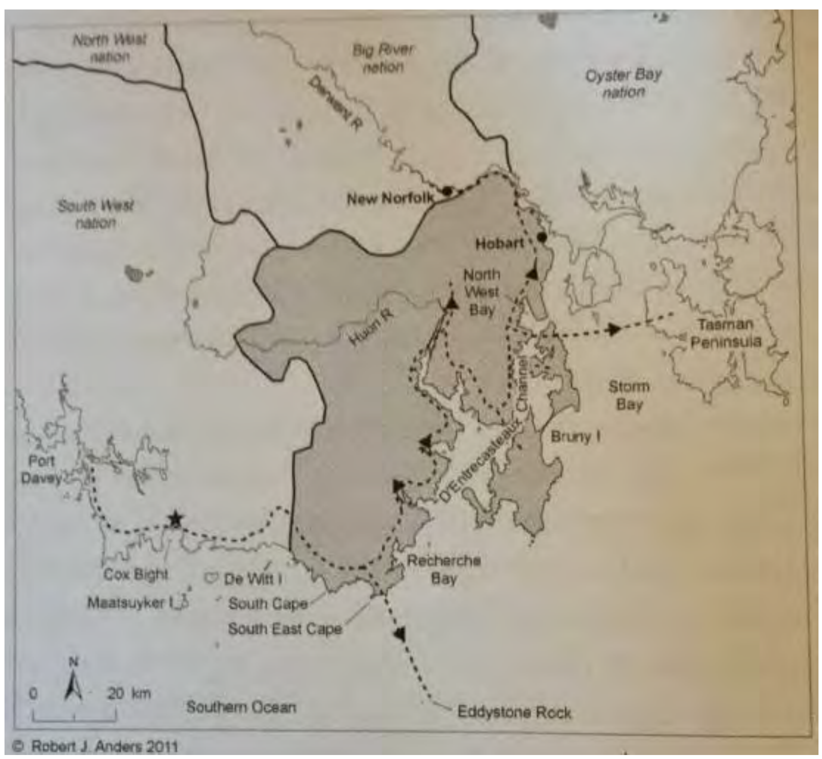


Figure 6: Seasonal movement of the South East Nations (after Ryan 2012:40)

The Oyster Bay Nation

The Oyster Bay Nation occupied the area to the east of the Jordan River, on the north side of the River Derwent, with their territory encompassing around 7800 square km. The Nation consisted of ten bands with an estimated total population of between 700-800 people, making it the largest Nation in Tasmania (Ryan 2012:17). Of the ten clans that comprised the Oyster Bay Nation, it is the Moomairremener that probably occupied the land in the vicinity of Bridgewater, on the north side of the River Derwent.

The movement of the Oyster Bay Nation through the landscape is thought to have been largely based on the seasonal availability of food resources. In this sense, the Oyster Bay Nation could be divided into two distinct groups: the northern group (from North Oyster Bay through to St Patricks Head) and the southern group (from Little Swanport through to the Tasman Peninsula) (Ryan 2012:18).

The southern Oyster Bay people started to move inland in early spring to hunt and fish. The Moomairremener generally commenced moving inland around September/October, travelling up the Derwent River towards New Norfolk, and across to Abysinia, and from there they would travel along the Clyde and Ouse Rivers. Travel was along well-defined routes, generally along the edges of the Band’s territory. The two big attractions of the Big River country were the kangaroo hunting grounds around Great Lake and the Clyde and Ouse Rivers, and the availability of a potentially intoxicating gum procured from the *Eucalyptus gunii* tree. The Moomairremener would begin moving back through the Midlands in late February, early March, eventually returning to the coastal areas around June (Ryan 2012:17-20). These routes are shown in Figure 7 below.

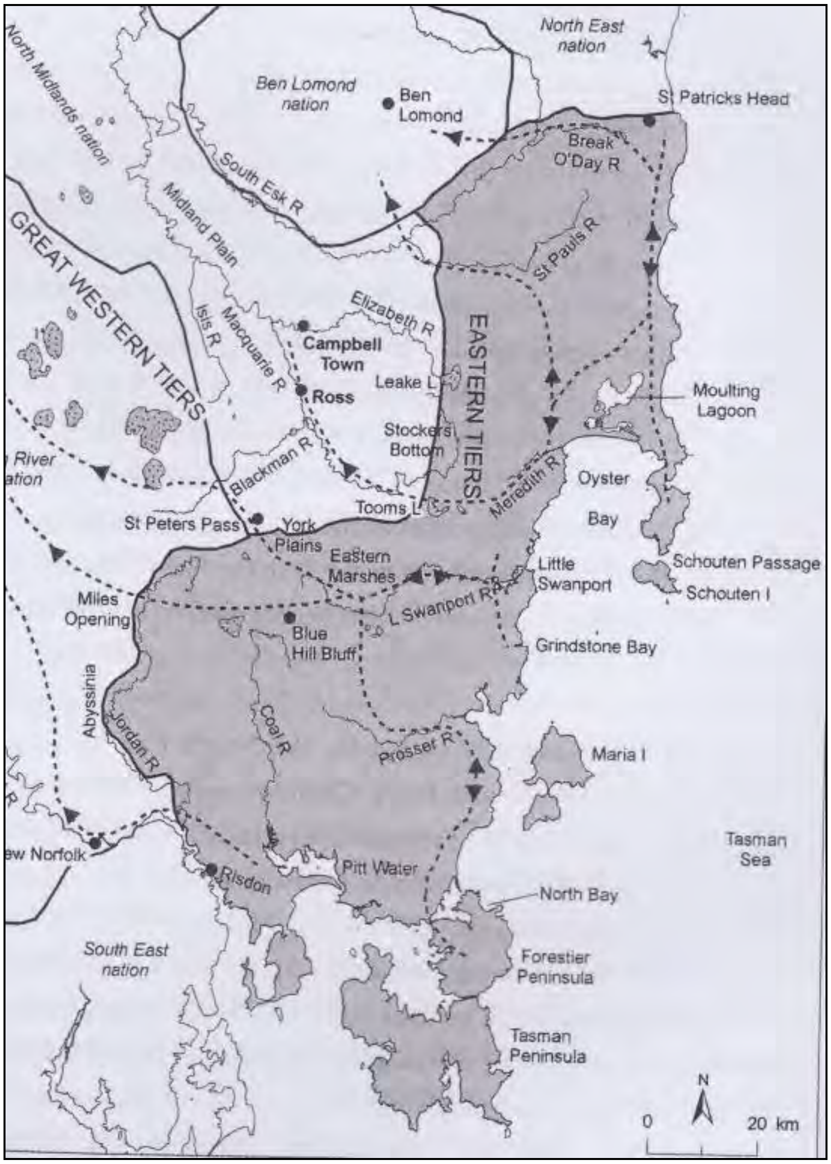


Figure 7: Seasonal movement of the Oyster Bay Nation clans (Ryan 2012:19)

The Big River Nation

The area to the west of the Jordan River was believed to have been the Territory of the Big River Nation (Ryan 2012:15 and 26). The territory of the Big River Nation is described by Ryan as extending from around New Norfolk on the Derwent River, south-west through to the rugged Mountains beyond the source of the Derwent River, north to Surrey Hills, then east through the mountains to Quamby Bluff (encompassing all the lake country) and finally south along the Western Tiers and the Jordan River (Ryan 2012:26). The Big River Nation are estimated to have numbered between four and five hundred people at the time of contact with European settlers (Ryan 2012:26).

The Big River Nation is believed to have comprised five clans; the Leenowwenne people who lived near New Norfolk, the Pangerninghe who lived on the west bank of the River

Derwent just opposite the meeting of the Derwent and Clyde Rivers, the Braylwunyer people who lived on the hilly plains between the Ouse and Dee Rivers, the Larmairrenener people lived in the high country west of the Dee River and the Luggermairrernerpairner people who lived north of the Great Lake (Ryan 2012:16).

The Big River people were the only Tasmanian nation without access to a coastal strip. However, this was compensated by the highland lake system, control over Great Lake, and visiting arrangements with the neighbouring North and Oyster Bay Nations (Ryan 2012:25). Through these relationships the Big River people had seasonal access to the east, north and west coasts, and to the ochre sources in the mountains to the north (Ryan 2012:28). The Big River Nation interacted with a greater number of diverse nations and clans than any other Tasmanian nation (Ryan 2012:27). This suggests an active and dynamic social unit continually exposed to varying cultures and ideas through this high level of interaction outside the nation.

In return, neighbouring nations were granted access to the resources of the highlands in the territory of the Big River Nation. Oyster Bay people are known to have travelled up the Clyde and Ouse River valleys during the summer months to hunt, and to harvest the *eucalyptus gurii* forests, a tree confined to the highlands that produces an intoxicating gum (Ryan 2012:26).

Travel across the Big River Nation's lands was via well maintained and regularly used travelling routes. Ryan (2012: 26-7) describes the Big River Nation as having two routes running north out of their country (see Figure 8). One route ran along their western boundary "from near Lake St Clair, past Cradle Mountain and Lake Dove, to south of Black Bluff". The second route, being the one "they most commonly used went past the Great Lake and through a pass in the Great Western Tiers near Quamby Bluff where the present-day Lake Highway makes its descent."

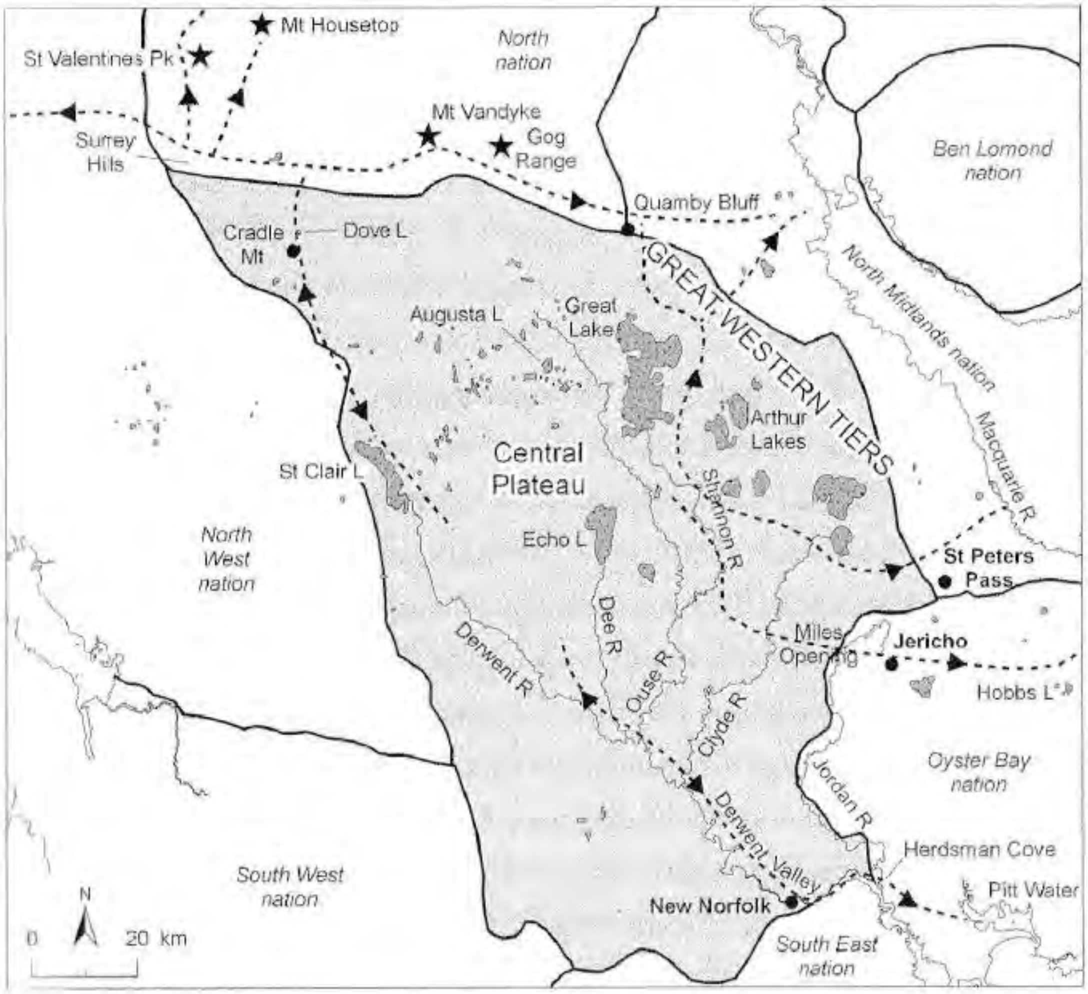


Figure 8: Trade routes and seasonal movements of the Big River Nation (Ryan 2012: 27)

3.2 Material Culture, Social Customs and Ethnographic Sources

The ethnographic observations of early European explorers provide a valuable snapshot into aspects of the material cultural and social customs of the Aboriginal Nations inhabiting southeastern Tasmania. 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). These observations are especially valuable where they describe to those items and practices that do not survive in the archaeological record.

The Subsistence Economy

Information gleaned from the variety of ethnographic and historical sources for South East Tasmania provides some illustration of the subsistence economy in this region. There are a number of ethno-historic accounts that comment on the prevalence of shellfish and crustaceans in the diet of the local inhabitants (see Plomley 1966 and

1983). The archaeological evidence (in the form of midden sites) provides testimony to this.

In contrast, archaeological evidence for the consumption of fish is comparatively very sparse. This has led to some suggestions that fish was not a component of the diet of the Tasmanian Aborigines (see Jones 1974). At Adventure Bay in 1777 Cook reported how Aboriginal people refused a gift of fish (AT 2010:10). Robinson also recorded an instance of trying to convince his Aboriginal companions to eat fish, and the strong reluctance which they demonstrated (Plomley 2008:59).

Ethnographic accounts also indicate that terrestrial fauna was an important component of the Aboriginal diet. This is particularly the case with kangaroos and wallabies, which appear to have been hunted *en masse* at certain times of the year. McGowan (1985:92), for example reports that in May 1804 a large group of Aborigines, variously estimated to be up to 500 individuals, including men women and children were observed hunting kangaroo near the first European settlement at Risdon Cove. Robinson provides an account of the ‘chief’ Mannalargennana of the Oyster Bay tribe cooking wallaby:

> *…The animal is first thrown on the fire whole as is their custom with all animals, and when the hair is singed they take the carcase off the fire and rub off the scorched hair with their hands. This practice is tenaciously observed with all animals except the possum; the fur of this animal is first pulled off previous to its being placed on the fire. After the chief has rubbed the hair off the wallaby, he broke the fore leg by twisting it with his hands…He then cut the hind legs, after which he made a hole in the belly with his fingers and pulled out the entrails and then thrust in some hot ashes, the animal being previously roasted outside.* (Plomley 1966:548-549).

Possum also seems to have been frequently hunted. Plomley (1966:533) describes possums being knocked down out of trees with waddies, or people climbed trees to reach possum holes. Women again are recorded as hunting possum. Robinson records how foot and hand holes were cut in trees to assist climbing and the women used fibre ropes to pull themselves up the trunk (Plomley 1966:533).

Unfortunately, there are very few accounts available for the hunting of other terrestrial fauna. It is likely that a much wider range of species were targeted, including echidna and smaller marsupials.

In the Midlands region, birds and eggs appear to have also formed a major component of the diet of the local inhabitants, with swans, ducks and red bills being some of the main species targeted (Plomley 1966: 217). However, there are very few historical accounts are available for South East Tasmanian regarding the hunting of birds and gathering of eggs. Nonetheless, it is reasonable to assume that this also was carried out at certain times of the year.

Only a few plant foods are documented in the ethnohistoric accounts as having been eaten. This includes a bulbous plant known as 'native bread' and a plant that has the appearance of asparagus which was found by the roots of peppermint trees (Plomley 1966). It is very likely that many more plant foods were eaten by the local Aboriginal population. Jones (1971:91-95) for example lists 70 edible plant species that are available in Tasmania, and are likely to have been consumed at times of seasonal availability. This would include tree ferns, fern roots, pig face and a variety of sea weeds.

Material Culture

The ethnographic observations of early European explorers provide a valuable snapshot into aspects of the material cultural and social customs of the Aboriginal people of South East Tasmania. These observations are especially valuable where they describe to those items and practices that do not survive in the archaeological record. Clothing, shelter, weapons and hunting tools are all aspects of material culture described in ethnographic sources.

While the early European explorers generally recorded the people of South East Tasmania as being mostly naked, there are references to kangaroo skin being used for capes, slings and binding for wounds. Both William Anderson (Cook's surgeon in 1777 when he anchored briefly in Adventure Bay) and Labillardiere (the 1793 expedition anchored in Recherche Bay) recorded seeing kangaroo skin used to bind injured feet (Dyer 2005:25). This was very effective it would seem as the people were able to keep up with their companions (Dyer 2005:26). Cook also recorded women using kangaroo skin slings to carry children, and there are several illustrations of this in the paintings by Petit and Lasueur from the Baudin expedition (Bonnemains *et al* 1988). Baudin's diaries suggest that women wore kangaroo skins slung across their shoulders, which provided both warmth and a means of carrying children and other items (Cornell 1974:329).

Ethnographic sources document a range of shelters used in Tasmania. The most common in the South East were simple windbreaks of thick strips of bark woven together and supported on vertical wooden poles, as seen in the artwork from the Baudin expedition (Bonnemains *et al* 1988). These shelters were often built facing west, offering protection against the cold winds off the Channel to the east (AT 2010:16). The other major type of shelter in South Eastern Tasmania was a durable, weatherproof structure made from bending leafy branches together to form a 'beehive' looking hut (AT 2010:15).

Robinson reported seeing huts that were decorated with symbols he recognised as similar to those observed in rock engraving sites at Cape Grim (Plomley 2008:17). In June 1804 Lieutenant Governor Collins made contact with Aboriginal people living on the Huon River (Plomley 2008:18). He recorded an 'Aboriginal village' with about twenty families congregated at the site. Labilliare similarly documented seeing a group of 5-6 huts made of 'leafy branches' and surrounded by a single fire, suggesting communal cooking, and piles of shellfish (AT 2010:16).

Plomley (1983:185-194) provides a comprehensive account of the weapons and hunting implements used by the Tasmanian Aborigines, based on the ethnographic accounts. It appears that the two main weapons used by the local inhabitants were the spear and the club. The spear was a simple flexible rod with a point at one end, the length of which appears to have varied significantly from between 6-12 feet. Spears in South East Tasmania do not seem to have been hafted with points, nor were they barbed (AT 2010:17). The waddie or club is described as a piece of wood about 60cm long, 2.5cm in diameter and slightly tapered toward the gripping end. This item is reported to have been used as a throwing stick as well as a club. In addition, Labilliardere records women at Recherche Bay collecting shellfish using a small chisel like wooden implement to prise the shellfish from the rocks (Plomley 1983:22).

In many of the early ethnographic accounts for the South East region, there is reference to the baskets carried by the Aboriginal people. The ethnographic sources indicate at least four different types of basket making in South East Tasmania. There are a number of reports of water vessels constructed from the fronds of giant kelp which could hold up to five to ten litres of water (see Labillardiere 1800:190). Other types include braided baskets made from bark and dried seaweed, woven rush baskets and grass baskets made from a grass called an iris that grew on Bruny Island (AT 2010:17). One of the more detailed descriptions of basket manufacture comes from Robinson while he was on Bruny Island:

> *The native basket is made of rushes of a species of grass called iris. In preparing them for use they place the same on a slow fire which gives them a tenacity that enables the manufacturer to twist them into threads. These are plaited together and then formed into a basket which in shape is somewhat semiglobular.* (Plomley 1966:58)

There are numerous ethnographic accounts for the South East region describing the watercraft used by the local inhabitants. From these accounts it appears that the South East people were active in their travels between the mainland and the numerous offshore islands.

One of the most detailed descriptions of these watercraft comes from Louis Freycinet, an officer on the *Naturalist* in 1802:

> *We have seen them and have measured several. They had the same dimensions and were constructed in exactly the same way. Three roles of the bark of the eucalypt made up its whole structure…These bundles when taken separately, resemble in a way the yard of a vessel, were joined at their ends, and this caused them to stick up in a point and make up the whole of the canoe. The assemblage was made quite firm with a sort of grass or sedge. In this state, the craft had the following dimensions-*
>
> - *Length inside 2.95m*

- *Breadth outside 0.89m*
- *Total height 0.65m*
- *Depth inside 0.22m*
- *Size at the ends 0.27m*

> *They can put five or six peoples in these canoes; but more commonly only three or four are taken at a time. Their paddles are plain pieces of wood… Usually they sit down to manoeuvre their canoes; in that case they place bundles of grass to serve as seats. At other times they stand up. We have seen them cross the Channel only in fine weather. One can imagine that such a fragile and imperfect craft would never be able to make their way, let alone keep afloat, in a rough sea… It is to be noted that they always put a fire at one end of their canoes, and to prevent the fire from spreading they place under it a bed of earth or ashes of sufficient thickness.* (Plomley 1983:119-120).

Interestingly, although stone artefacts dominate the archaeological record for Tasmania (and Australia generally), there are few ethnographic accounts in Tasmania documenting their use. Those observations that are made, primarily relate to the finding of stone implements at camp sites. Frustratingly, there are virtually no accounts regarding the form of the implements, how they were made and used. Robinson reports that he:

> *Obtained a stone from one of the Bruny natives with which they sharpen their waddies…It has the resemblance of flint and is found at the Isthmus of Brune [sic]* (Plomley 1966:113)

One of the very few descriptions of Aboriginal people carrying out quarrying activity comes from Raynor who recounted that his father had come across about 20-30 Aborigines, men, women and children, at a quarry near Plenty on the southern side of the middle Derwent Valley:

> *Noisily chatting, they were breaking the stone into fragments, either by dashing them on the rocks or by striking them with other stones, and picking up the sharp edged ones for use…* (Raynor in Roth 1899:151)

This quarry was subsequently visited by Rhys Jones, who noted that the quarried material was an indurated cherty hornfel and that the quarry extended over an area of about 2 ½ hectares (Jones 1971:456).

Aboriginal people of South East Tasmania are described as frequently bearing tattoos and cicatrices. The ethnographers generally describe these as decorative, although it is likely that they held a range of other meanings as well. Robinson described the process of cutting the skin with a sharp stone and rubbing the wound with charcoal or red ochre mixed with animal fat (Plomley 2008:137). The scarring was observed on both men and women and typically was either in the form of a series of short lines, or straight, concentric or circular liens across the chest (AT 2010:25). At Rocky Bay Labillieire noted that people rubbed their bodies with powdered charcoal and records one man whose cropped hair was 'plastered with ochre' (AT 2010:25).

Burial Practices

Burial customs were also observed by the ethnographers. Cremation was the usual form of disposing of a deceased person (Plomley 2008:17). The cremated remains were observed by Robinson to sometimes be wrapped in kangaroo skins and carried as an amulet by members of the deceased person's clan (AT 2010:21). Robinson reports on a funeral pyre built by both men and women of branches and twigs. The body was placed on the pyre with bound arms and legs. This was left to burn for a day, with the relatives returning the following day. The remains were collected and burnt a second time, after which the ash was scattered through the grass (Plomley 2008:17).

Other burial practices in the South East region include internment and burial in hollow trees. Illustrations from the Baudin expedition show 'tombs' at Maria Island (Bonnemains *et al* 1988:131). These were bark tepee-like constructions built over remains that have been covered in fibres or leaves weighted down by rocks (Bonnemains *et al* 1988:131). The practice of placing remains in hollow trees in the South East region is reported by Robinson (Plomley 2008; AT 2010:21). Hollow tree burials are perhaps associated with violent deaths, as occurred in the Central Highlands (AT 2010:20).

Land Management

Aboriginal people across South Eastern Tasmania appear to have actively managed their environment. Historical sources provide numerous references to burning vegetation. AT (2010:9) suggest that this had a range of applications, including modifying the environment, attracting terrestrial game, encouraging edible plant regrowth and maintaining pathways used to travel across the country. Robinson recorded that Aboriginal people in the South East would travel along 'well beaten paths' and leave abalone shells at drinking places along rivers (Plomley 2008:59). Aboriginal pathways were also utilised by the first European settlers to the area.

The Aboriginal people of the South East greatly valued fire and there are several first-hand accounts of fire being transported by means of burning torches or 'fire brands'. In 1777 Bligh recorded seeing a basket of white 'flint like stones' at Adventure Bay (AT 2010:12). These are likely to have been fire brands.

Baudin in 1802 reported seeing a 'multiplicity of fires' burning in 'on all sides' from where his ship was anchored in North West Bay (AT 2010:12). Captain Hamlin reported to Baudin watching two Aboriginal men pull up their canoe at North West Bay and walk into the scrub, setting fire to the undergrowth as they walked (AT 2010:12).

3.3 Contact History

It appears that outside the initial settlements at Risdon and Sullivan's Cove, there was a brief period of amicable relations between Aboriginal people and the European settlers. For the most part, the Mouheneener would not visit British camp at Sullivan's Cove, and were friendly to small groups of Europeans met in the bush.

In 1804, Colonial chaplain Robert Knopwood records observing 'a great many native huts and fires they made' on the western shore of the Derwent, north of Hobart (Nicholls 1986). He also recorded that Aboriginal people were around the camp at Sullivans Cove but could not be persuaded to enter (Nicholls 1986). By 1805, Aboriginal people were visiting outlying huts in areas near now Kingston, Taroona and New Town, with trades systems established in which Aboriginal people would exchange kelp and crayfish in return for bread and potatoes (AT 2013:8).

However, these friendly relations where relatively short-lived. Conflicts over food resources triggered a deterioration in these relationships as European settlers sought to augment their meagre resources with freshly caught game. Hobart the surrounding areas became vital hunting grounds supplying kangaroo meat to the struggling colony on the brink of starvation (Alexander 2006:5).

The economic importance of the kangaroo hunters to the success of the colony cannot be over emphasised. Without the supply of kangaroo meat, the government would have been unable to meet the rations and maintain the settlement (Boyce 2009:52). The European consumption of kangaroo was so great that by late 1808 they had been largely exhausted from the immediate surrounds of Hobart – causing hunting parties to venture further afield. The reliance of the colonisers on kangaroo brought them into direct conflict with the Aboriginal people.

At first, the Europeans were at an advantage as they had hunting dogs that greatly increased the numbers of kangaroo that a hunter could kill (Boyce 2009:52). But, Aboriginal people quickly adapted to the use of dogs, an example of rapid cultural and economic adaptation. This brought the two groups onto a more even par (Boyce 2009:66). This period of parity only lasted while the European population was small; as early as 1806 the kangaroo populations around Hobart had been decimated and the hunters were being forced to move further north, towards the Brighton district (Boyce 2009:54). The British settlement was literally starving, and there was a strong economic imperative for hunters to extend to the north in search of fresh sources of game. As the settlement continued to expand, both the colonists need for a meat supply, and their transformation of the hunting grounds into cleared, pastoral farms set the scene for an escalation in conflict (Boyce 2009).

As the population of Van Diemen's Land increased, farms gradually spread out along the shores of the Derwent, the agricultural economy grew and land grants increased in number. Isolated relationships between Aboriginal people and European settlers have been recorded during this time. For example, Knopwood, who was granted land at Battery Point, records having a 17 year old Aboriginal girl come to his home seeking fire (1806), and several years later a group of seven Aboriginal people coming to his home and camping in the garden to gather oysters and mussels from the nearby shore (now Salamanca Place) (Nicholls 1986).

Of William Collins, a settler at Macquarie Point, Knopwood records ‘He see many of the natives and was conducted to the town by some of them. Where there were about 20 families, he stayed all night with them; they were very friendly. He see 3 of their cattermerans or small boats made of bark that will hold about 6 of them’ (Nicholls 1986 cited in AT 2013).

A more prolonged relationship existed between Edward Lord and an Aboriginal man named ‘Musquito’ whom Lord employed as a stock keeper. In 1816, Musquito accompanied Lord on a cattle-buying mission to Mauritius (AT 2013).

Visits by groups of Aboriginal people to Hobart Town continued into the early 1820s; Robinson records Aboriginal people visiting the Town in both 1824 and 1825. Between 1804-1824 interactions between Aboriginal and Europeans have been classified as ‘uneasy co-existence’, however things became much more hostile following 1824. By the 1820s the European population of the town had exploded, resulting in a corresponding increase in the issuing of land grants over the most valuable grass plains. This in-turn caused issues relating to access to native game, hunting grounds and the connection of Aboriginal people with their traditional tribal lands (AT 2013). Attempts to forcibly remove Aboriginal people from the areas settled by Europeans failed and unprecedented violence ensued.

Clashes with Aboriginal communities became more frequent and more violent as European settlement expanded. Lieutenant Governor George Arthur proclaimed Martial Law in November 1828, leading to the active pursuit, capture and death of many Aboriginal people. A bounty was introduced in February 1830 of five pounds for every adult captured and two pounds for each child. In the two years between November 1828 and November 1830 some twenty Aboriginal people were captured and a further sixty lost their lives (Ryan 1996:102).

This violence culminated in the declaration in November 1828 of Martial Law against the Aboriginal people in the ‘settled areas’ (Ryan 1996:101). A series of six ‘roving parties’ were established for the purposes hunting and capturing the remaining Aboriginal occupants of the settled areas. This military action resulted in a general increase in the scale of violent conflict between Europeans and Aboriginals, and by 1830 it was decided that a full scale military offensive was required in order to quell the Aboriginal uprising.

This operation, termed the ‘Black Line’, involved the assembly of 2000 men in October 1830. They formed a human chain that swept through the settled districts over a period of three weeks, with the aim of driving the remnant Aboriginal populations from these areas. The Black Line was Governor Arthur's response to repeated insistence from settlers that Aboriginal people should be removed from the midlands (Alexander 2006:15). This reflects the level which conflict had reached by 1830. Martial Law was finally revoked in 1832 (Ryan 2012:112-113).

The Black Line itself proved to be a dismal failure, with the total capture of two Aborigines and death of another three. However, it was sufficiently distressing to the general Aboriginal community that more than two hundred people subsequently allowed themselves to be persuaded by George Augustus Robinson (the 'Protector of Aborigines') to relocate to Flinders Island in exchange for food, shelter and safety (Lines 1991:47). They were further promised that they would be returned to their former homes on the Tasmanian mainland as soon as possible.

By 1835 the majority of the 220 Aborigines who arrived with Robinson at the Wybalenna Aboriginal establishment on Flinders Island had died from inadequate shelter, insufficient provisions and introduced disease. Birth rates were extremely low and few children survived infancy. In 1847 six Aborigines at Wybalenna made a petition to Queen Victoria asking that the promises made to them be honoured. In October 1847, the surviving 47 Aborigines were transferred to an ex convict probation station at Oyster Cove. Only forty four people survived the trip (Lines 1991:47).

Conditions at Oyster Cove were only marginally better than at Wybalenna and the Aboriginal population continued to experience high mortality rates. However, throughout the 1850s and 1860s the European settlers recorded numerous anecdotes of Aboriginal people at Oyster Cove maintaining elements of their pre-contact lifestyle (AT 2010:26). They hunted, performed ceremonies and continued making traditional cultural items. The best known example is Fanny Cochrane who married ex-convict William Sawyer. She is reputed to have practiced traditional shellfish gathering, basket making, medicine and religious practices (AT 2010:27).

The Oyster Cove station closed in 1862. For most of the next 100 years, parts of the former station land were sold, while some remained as Crown land. In 1981, the majority of the former station area was proclaimed as a Historic Site. Despite strong opposition, the Aboriginal community reoccupied the site on 16 January 1984. Each year since occupying the putalina site, the Tasmanian Aboriginal Corporation has held an annual music and cultural festival (AHT fact sheet accessed 2021).

In 1995, the State Government formally handed the title of Oyster Cove putalina to the Aboriginal Land Council of Tasmania. The site continues to be managed by the Tasmanian Aboriginal Corporation. Today, the putalina festival attracts hundreds of people each January to enjoy local and interstate musicians, cultural activities and interactions with extended family and community (AHT fact sheet accessed 2021).

4.0 Background Archaeology

4.1 Regional Studies

The study area is situated within the South-East Region of Tasmania. There have been a number of Aboriginal archaeological studies undertaken within the South-East region over the past two decades. The majority of these have been in the form of survey assessments associated with proposed development activities and have focused on discreet areas (these are summarised in section 4.2). However, there has also been some broader research based investigations undertaken in the region. Probably the most comprehensive of these and the one most pertinent to the present investigations are that of Officer (1980) and Brown (1986).

Officer (1980)

Iain Officer (1980) carried out an extensive survey of the Derwent Estuary region, as part of his thesis works. The areas covered by the survey investigations extended from Blinking Billy Point (west bank of River) and Trywork (east bank of River), upstream to New Norfolk. The survey assessment in this area involved walking a series of survey transects along the shoreline of the River, with transects in some areas extending up to 1km inland from the River.

In the course of his investigations, Officer recorded a total of 416 midden sites. Of these, 298 were located on the east bank of the River and 118 on the west bank (Officer 1980).

The shell midden sites identified by Officer were predominantly comprised of mussel (*Mytilus planulatus, Xenostrobus secures* or *Brachidontes rostratus*) and oyster (*Ostrea angasi*). A wide range of other shell fish species were represented in low numbers at a number of these sites (Officer 1980).

Stone artefacts were observed at 33 of the recorded midden sites (28 artefacts on the east bank and 5 artefacts on the west bank). A wide range of stone material types were represented in these artefact assemblages, including cherty hornfels, silicified breccia, mudstone, chalcedony, quartz, basalt and dolerite (Officer 1980).

Bone material was observed at only four midden site locations, indicating that for whatever reason, bone material in middens on the Derwent River is a rare occurrence (Officer 1980).

One of the areas intensively surveyed by Officer (1980) was Bedlam Walls, which lies on the east side of the Derwent River, between Geilston Bay and Risdon Cove and extends up to 1.2km inland from the shore of the River. Officer (1980) recorded a total of 74 sites in this area (sites AH 1184-1257). The vast majority of sites are classified as middens, however, three stone quarries and one rock shelter was also identified. A large number of the midden sites (28%) are described as being extensive, covering in excess of 1000m², with the largest site being over 8000m² (Officer 1980). The midden sites range from being located immediately on the shore line through to up to 530m inland from the shore. The dominant shell material represented in these midden sites was the black mussel (*Mytilus planulatus*) and oyster (*Ostrea angasi*).

Officer (1980) notes that a local resident (Dr Jacklyn) also recorded a large number of Aboriginal sites in the Bedlam Walls area, in the period between 1965-1973. The sites recorded by Officer (1980) included those site identified by Dr Jacklyn. Officer identified an additional 19 midden sites to those identified by Jacklyn. As part of his recording efforts, Dr Jacklyn carried out an extensive salvage of stone artefacts in the Bedlam Walls area. Jennings (1983) subsequently undertook an analysis of this collection. Jennings (1983) reports that of the 1016 pieces of stone material collected by Dr Jacklyn, 991 pieces are determined as being stone artefacts, giving an average artefact density for the area of 381 artefacts/km². The majority of artefacts were collected from the shoreline area between Shag Bay and Geilston Bay (641 artefacts). Of the 991 artefacts, 633 were un-worked and 358 are worked. Stone material types represented in the assemblage include hornfels, quartzites, chalcedony and sub-basaltic hornfels (Jennings 1983).

Brown (1986)

Steve Brown (1986) was engaged to carry out the South East Tasmanian Archaeology Project. This was one of nine regional overview studies, funded through National Estate grants, which were directed at examining the Aboriginal archaeological resources of Tasmania. The aims or duty statement for the South East Tasmanian Archaeology Project was to define the prehistory of the region and to define present and potential future impacts on the Aboriginal heritage resources in the region.

As part of his research design, Brown (1986:49-50) divided the landscape of the south-east region into landform unit types. Five major landform unit divisions were identified. These were;

- small offshore islands,
- Bruny Island,
- coastal and estuarine environments (consisting of coastal margins, coastal plains, river estuaries, lagoons and swamps),
- inland hills, plains and river valleys, and
- inland mountains (alpine plateau).

Brown (1986:49-50) then collated available archaeological data for these landscape units, including the range of site types present, the site components and the distribution and frequency of sites. The data was generated from previous archaeological investigations undertaken in the region, as well as the findings from the field work carried out by Brown.

Of the five landscape units identified by Brown (1986), the most pertinent to the present investigations are the coastal and estuarine environments. The following provides an overview of the findings, as presented by Brown (1986) for this landform unit.

Coastal and Estuarine Regions
The Coastal and Estuarine Regions consists of coastal margins, coastal plains, river estuaries, lagoons and swamps. It encompasses the River Derwent.

Brown (1986:79) notes that shell middens are by far the most common site type occurring within the coastal and estuarine environmental zone. A number of trends were observed in relation to the distribution of this site type within the coastal and estuarine environmental zone, and the composition of materials at these sites. These are summarised as follows.

- Middens are generally not present in areas with steep shore profiles.
- The greatest number of middens was identified on coast lines which contain a mixture of rocky headlands and short sandy beaches (mixed coast areas).
- On long sandy beaches the volume of midden material was found to decline with distance from a rocky coast.
- Middens are essentially comprised of two types; rocky coastal and bay estuarine, reflecting different landscape settings. However, middens with shell species common to both these types occur in intermediate zones such as estuary and lagoon mouths.
- The largest rocky coastal shell middens occur on rocky headlands and points, with associated rock platforms, where abalone, turbo, mussels and limpets occur.
- The bay estuarine type middens are generally composed predominantly of mussel and oyster shellfish species. The largest middens are found immediately adjacent to the shoreline, near to the shell fish resources. A few sizeable middens have been noted up to 500m inland, with smaller middens having been identified up to 1km inland.
- Shell middens in South-east Tasmania are comprised almost entirely of shell, and rarely contain large numbers of stone artefacts or faunal remains (Brown 1986:79-82).

Overview for the South-East Tasmanian Region
In summary, Brown (1986:99-102) has identified the following broad patterns of site type distribution in South-East Tasmania.

- Aboriginal archaeological sites occur in all parts of the landscape.
- The coastal margins (including off shore islands), coastal plains and river estuaries are very rich in archaeological resources and contain a high density of sites with large quantities of archaeological remains. The Derwent Estuary in particular was an area of rich archaeological resources.
- Inland sites are dominated by open artefact scatters and isolated artefacts. Artefact densities are highest along the river, rivulet and creek valley floors and

adjacent to lower hill slopes, particularly where the hill slopes are gently inclined, with a north aspect, and have sandy well drained soils.

- Shell middens most frequently occur in close proximity to shellfish resources, particularly on cliff tops or headlands where there is easy access to these resources.
- Stone artefact quarries most frequently occur where there is a surface expression of geological contact zones, in particular between Jurassic dolerite and Triassic or Permian strata.

As a general statement, Brown (1986:102) summarises that site numbers and densities in South-east Tasmania are greatest within 300m of the present coastline and in the immediate vicinity of coastal lagoons.

In terms of environmental factors determining site location, Brown (1986:103) is of the opinion that topography is perhaps the most consistent and important factor. Sites in general, but particularly the larger ones (in terms of artefact numbers) are very seldom found on steep gradient slopes.

In terms of duration of Aboriginal occupation, Brown (1986:99-100) believes that the South-eastern Tasmanian region has probably been occupied by Aboriginal people for the past 20 000 years. However, he acknowledged that there are no conclusive dates for sites beyond 6000 years old for the region. Notable at the time was the absence of Pleistocene and early Holocene sites in this portion of Tasmania. This may be due in part to rising sea levels at 7,000BP causing the inundation coastal sites, and to geomorphological changes in sand dunes with the re-deposition of sand sheet and dunes approximately 6,000 years ago. However, Brown (1986) believed that the systematic occupation of the area did not begin until 6,000 years ago when those populations occupying the Derwent Estuary area moved into the southern part of the region. Further research in the region was deemed to be necessary before any of these hypotheses could be confirmed.

4.2 Previous Aboriginal Heritage Assessments Undertaken in the Vicinity of the Study Area

There have been a large number of Aboriginal heritage assessments undertaken within the general vicinity of Bridgewater and Brighton. Most have these have been undertaken as part of the planning processes for specific infrastructure projects, such as the Bridgewater Bridge upgrade, the Brighton Bypass and Brighton Transport Hub projects. The following provides a summary review for those assessments that are most relevant and in closest proximity to the Boyer Road Precinct study area.

4.2.1 Bridgewater Bridge Studies

Austral Archaeology (1997) and Stanton (1997)

David Parham (Austral Archaeology 1997) and Stephen Stanton (1997) carried out a joint field survey assessment as part of the Bridgewater Bridge Planning Study. In the course of the field investigations three Aboriginal sites were identified (AH 7774, 7775 and 7776). All three sites were situated on the northern foreshores of the Derwent River (Bridgewater side). Site AH 7774 is located approximately 300m west of the Bridge and is described as a thin scatter of shell midden, which has been partially exposed through the construction of a glass house. Austral Archaeology (1997) suggested that the AH 7774 shell exposure was part of a larger, subsurface midden obscured beneath the soil surface. The site appears to correlate with the location of AH 1384 which was previously recorded by Officer (1980). The site is situated outside the bounds of the study area.

Site AH7775 was described as an extensive scatter of shell fragments extending along the northern Derwent River foreshore, approximately 175m east of the Bridge. The site consisted of fragments of oyster shell which have been exposed by the growth of the large pine trees in the area. The dimensions of the site are reported to be 90 metres in length by up to 12 metres in width. The site is reported to have been disturbed by the establishment of the gravel access road to the property, with fragments of shell visible in the paddock on the other (northern) side of the road, away from the main concentration of shell (Stanton (1997). Site 7775 is situated within the immediate vicinity of site AH 1383 recorded by Officer (1980), and given their spatial proximity were considered likely to be part of the one site complex.

AH 7776 was located further to the east at Woods Point, also on the northern Derwent foreshore. This site is reported as comprising two stone artefacts. One is a retouched flake struck from grey banded chert and the other a flaked piece of quartzite.

In addition to these three sites, Stanton (1997) and Austral Archaeology (1997) also identified a 'potentially sensitive landform' on the Granton side of the Derwent foreshore, opposite Black Snake Lane. The landform is described by Stanton (1997) as a partially disturbed, small hummock covered by dense vegetation. According to Austral Archaeology (1997), the landform is 'a remnant section of higher, hard ground on the shore that has not been either reclaimed or otherwise intensively developed.

Stone (2009)

Tim Stone (2009) was engaged to implement a preliminary Aboriginal cultural heritage assessment for the proposed Bridgewater Bridge Replacement Planning Study. The assessment essentially constituted a desk top assessment and review of previous studies. Stone (2009) identifies that two previously recorded Aboriginal sites are located within the bounds of the then identified study area (sites AH 1383 and 7775). Stone also noted that these two sites were likely to be part of the one site complex. Stone (2009) identified the fact there was a possibility that these two sites (or 1 site complex) may be larger in extent that what has been previously recorded, and that the site(s) may be impacted by proposed bridge construction work.

Stone (2009) recommended that a qualified archaeologist and Aboriginal Heritage Officer should be engaged to conduct a surface survey of the Bridgewater Bridge planning study area, with the aim of locating all Aboriginal cultural heritage sites and areas of archaeological potential in the study area. Stone (2009) also recommended that a staged approach be adopted for heritage investigations, which allows time for archaeological subsurface investigation of AH 1383/7775 midden site, if this site cannot be avoided by the bridge design.

Hydro Consulting (2009) and Maynard (2009)

Aboriginal Heritage Officer Leigh Maynard and Hydro Tasmania Consulting trainee Jessie Digney were commissioned by DIER to undertake Aboriginal community consultation work for the Bridgewater Bridge Replacement Planning Study. The primary aim of this consultation was so the views, concerns and beliefs of the Aboriginal community regarding the Aboriginal heritage in the area can be considered, and incorporated into any required permit applications (under the *Aboriginal Relics Act 1975*). Hydro (2009) reports that the outcomes of the consultation was that the wider Aboriginal community were strongly opposed to any development that negatively impacts Aboriginal heritage or other values. Maynard (2009) reports that determining the size and extent of AH site 7775, and thus the potential impacts to this site through the proposed Bridge construction became one of the major issues discussed during the course of the community consultation. Maynard (2009) reports that some community members supported augering techniques to determine the extent of the site, others were in favour of test pitting, while some members were of the view that the bridge alignment should be moved altogether in order avoid any potential impacts to the site.

CHMA (2011)

CHMA (2011) was commissioned by GHD (on behalf of DIER) to undertake further Aboriginal heritage assessment work for the proposed Bridgewater Bridge replacement project. This is around 2km to the west of the current study area. In the course of the field survey assessment two Aboriginal heritage sites were identified and recorded (Sites AH1383/7775 and AH11190).

Site AH1383/7775, was situated on the northern foreshore of the Derwent River, within 200m east of the existing Bridge. The site had been previously identified by both Officer (1980) and Stanton (1997). The site was described by CHMA (2011) as an extensive thin veneer of broken shell material that was observed to extend over an area measuring approximately 100m (east-west) x 10m (north-south). The shell material was exposed along a series of small erosion patches that occur primarily around the bases of a row of mature pine trees that extend along this section of the foreshore. The shell had been heavily fragmented, and much of the material had been burnt. Despite the heavily fragmented nature of the shell material, two types of shell fish could be identified as being definitively represented in the midden, these being black mussel (*Mytilus planulatus*) and oyster (*Ostrea angasi*) A small number of stone artefacts were also observed to be in association with this shell.

Site AH11190 was classified as an isolated artefact which was situated approximately 100m south of the southern foreshores of the Derwent River, and 300m down-stream (east) of the existing Bridge. The artefact was located on a graded vehicle track that runs in an east-west direction across the lower slopes of a hill. These slopes run from south-west to north-east down towards the southern margins of the Derwent River. The gradient of these lower slopes, in the vicinity of where the artefact was identified is between 2-4º. Besides the two Aboriginal sites described above, no additional Aboriginal sites or areas of potential archaeological sensitivity were identified within the bounds of the proposed Bridgewater Bridge Replacement corridor.

CHMA (2020a)
CHMA (2020a) were engaged by State Growth to undertake an updated Aboriginal heritage assessment for the broader Bridgewater Bridge route corridor. The field survey program resulted in the identification of five Aboriginal sites. Four of these sites were re-recordings of registered Aboriginal sites (AH1382, AH1382/AH7775, AH7776, 11873), with the fifth site being a new recording (AH13833). Sites AH1382, AH1382/AH7775 and AH7776 were all shell midden deposits that were located on the northern margins of the River Derwent Estuary, downstream (east of the Bridgewater Bridge. Site AH11873 was an isolated artefact that is located within a rural farm paddock, approximately 40m north of the East Derwent Highway. Site AH13833 was an isolated artefact that is located 220m to the south of the southern margins of the River Derwent, and 600m downstream (south-east) of Bridgewater Bridge. In addition to these five sites, three Potential Archaeological Deposits (PADs) were identified within the study area corridor. PADs 1 and 2 were situated on the northern margins of the River Derwent, with PAD 3 being situated on the east margins of the Black Snake Rivulet, on the south side of the River Derwent. The PAD1 area incorporated site AH1383/AH7775.

CHMA (2021)
CHMA (2021) were subsequently engaged by State Growth to undertake a program of sub-surface investigations within the PAD1 and PAD3 areas. The purpose of the sub-surface investigations is to determine the extent and nature of Aboriginal heritage values within these two PAD areas, and based on the findings of the investigations, to develop appropriate management/mitigation options.

A total of 14 stone artefacts were recovered from the test pitting program at PAD1
In addition, low densities of shell midden material were recovered from five of the test pits. No lenses or stratified deposits of midden material was identified in any of these pits. Instead, fragments of shell material was scattered throughout the soil deposits. Based on the observations made during the test pitting program, and the previous recording of this site undertaken by Stanton (1997) and CHMA (2011 and 2018), it appeared that the artefact deposits associated with this site is confined to an area measuring approximately 70m in length (south-east to north-west) x 20m wide. The site may once have been larger in spatial extent. However, the area to the north and west of the site has been very heavily impacted by development activity and any artefact

deposits that may once have been present in these areas appears to have been destroyed. The density and nature of the artefact deposits present at site AH1383/AH7775 was assessed as being consistent with the area having been utilised as an interim seasonal camp site positioned on the northern margins of the River Derwent (CHMA 2021).

A total of eight stone artefacts were recovered from the test pitting program at PAD3 These deposits were confined to the central and southern portions of the PAD, across an area measuring approximately 75m (north-south) x 50m. These artefact deposits were classified as a newly recorded Aboriginal site (AH13880). The artefact densities identified at site AH13880 were interpreted as being consistent with more sporadic levels of activity. It was considered likely that these margins on the east side of Black Snake Rivulet were occasionally utilised as an interim camp site. Black Snake Rivulet would have provided a reasonably reliable source of fresh water, and the area is situated less than 1km from the resource rich River Derwent estuary (CHMA 2021).

CHMA (2022)

During the course of undertaking historic investigations at the Former Black Snake Inn historic site located at 650 Main Road Granton, a number of suspected Aboriginal stone artefacts were uncovered by Southern Archaeology (SA). The Unanticipated Discovery Plan (UDP) process for Aboriginal heritage was followed and Aboriginal Heritage Tasmania (AHT) was informed of the discoveries. The Aboriginal artefacts identified by SA were registered on the Aboriginal Heritage Register (AHR) as being an extension of site AH11190, which was originally recorded by CHMA (2011).

CHMA (2022) were engaged to undertake a program of sub-surface investigations in order to better understand the nature and extent of Aboriginal heritage site AH11190. The investigations involved the excavation of 85 test pits. A total of four stone artefacts were recovered from these 85 test pits. Only two of the test pits were artefact bearing (pits 33 and 35), with two artefacts recovered from each test pit. Test pits 33 and 35 are situated within 15m of each other, in the western portion of the study area, on the lower northern slopes of the hill. Slope gradients in this area are around 2-3º. This is the general area where the majority of Aboriginal artefacts associated with AH11190 were identified by Southern Archaeology during the course of the historic investigations. The artefacts recovered through the test pitting program were all situated in a highly disturbed context, being within imported fill material.

Subsequent to the completion of the test pitting program, SA identified a further six Aboriginal stone artefacts during historic investigations. All six artefacts are situated in heavily disturbed contexts, in the immediate vicinity of the previously identified boundaries of site AH11190. The boundaries of site AH11190 were amended to incorporate these six artefacts.

4.2.2 Other Investigations in the Vicinity of the Study Area

Tasmania Natural Gas Project (Stanton 2001)

Stanton (2001) was engaged by Duke Energy to undertake an Aboriginal heritage assessment for the Tasmanian Natural Gas Project, which was focused on a 430km long pipeline easement. A section of this easement branched off near Bridgewater, running through to New Norfolk. The assessment of the 430km resulted in the recording of 23 Aboriginal heritage sites. One of these sites (AH8815) was identified along the section of easement between Bridgewater and New Norfolk and appears to be situated within the Boyer Road Precinct study area. The site was described as an extensive artefact scatter. This is discussed in more detail in section 4.3 of this report.

South East Irrigation Scheme (CHMA 2011)

CHMA (2011) was engaged by Entura to undertake an Aboriginal heritage assessment for the South East Irrigation Scheme (SEIS). The total length of the pipeline corridor that was the focus of the assessment was 164km. The assessment resulted in the recording of sixty-nine (69) Aboriginal sites, comprising thirty-four (34) artefact scatters, thirty (30) isolated artefacts, two (2) artefact scatters with associated areas of potential archaeological sensitivity (PASs), two (2) shell middens and one (1) possible shell midden. An additional 29 areas where no cultural material was evident but which were considered to have potential archaeological sensitivity were also identified.

A small section of the pipeline corridor ran through the Derwent River Valley, between New Norfolk and Bridgewater and passed through the Boyer Road Precinct study area. CHMA (2011) recorded four sites along this section of pipeline corridor, comprising three shell middens (AH11484, AH11485 and AH11520), as well as one Isolated artefact (AH11483). Site AH11483 appears to be situated within the study area. In addition, three areas of Potential Archaeological Sensitivity (PAS) were recorded. These were areas where although no cultural deposits were identified, it was assessed that there was some potential for cultural deposits to be present. One of these PAS areas (PAS1) is situated on the northern side of Boyer Road and runs through the Boyer Road Precinct study area, traversing the lower slopes of the hill.

The Brighton Transport Hub (Stanton 2008b and 2008c; CHMA 2008b)

A series of archaeological investigations were recently undertaken at the Brighton Transport Hub, located immediately to the west of the southern section of the proposed Brighton Bypass route (on the west side of the Midlands Highway).

Three Aboriginal sites (AH10648, AH10649 and AH10650) were identified Stanton (2008b and 2008c). A total of 103 artefacts were identified at AH10648, concentrated around the northern basal slopes of a prominent hill. A scatter of 29 artefacts were identified at site 10650 located along the southern portion of a broad flat spur line, on the northern side of Ashburton Creek, while site AH10649 comprised 3 artefacts with sub-surface potential near the Creek.

Following subsurface investigations at these sites by CHMA (2008b) site 10648 was found to comprise a range of cultural features including moderate-high densities of surface and sub-surface artefacts, stone procurement sites and an early European occupation site. Spatial and temporal links indicate the area is a single site complex including both AH10648 and AH10650.

A silcrete procurement site was found at AH10650 comprising a discreet concentration of silcrete/quartzite nodules (varying in size from a soccer ball to a medicine ball), which are located on the basal southern side slopes of a hill, on the northern margins of Ashburton Creek (grid reference E518633 N5269971). This WAS just to the south of the southern boundary of the Hub site. These nodules have been the focus of extensive procurement activity, with several thousand artefacts (mainly primary flakes and debitage) noted within a 50m radius of the nodules. Given the dominance of silcrete stone artefacts at site AH10650, and the close spatial association of the site with the silcrete procurement source, it appears that this site is representative of sporadic activity associated with the procurement of stone from this source.

Primary areas of Aboriginal occupation were the elevated terraces on the southern and northern margins of Crooked Billet Creek with activity radiating out from the area. The terraces occur on a sheltered part of the small valley associated with Crooked Billet Creek at a point where the creek flattens to form a small swamp area. It is likely that these elevated terraces were regularly utilised as interim camp locations by Aboriginal people in the area. Foraging activity (including the procurement of stone materials) would have occurred in the broader valley area, with people returning to these terrace areas to process their harvests. The occupation of this area appears to have extended through to the 'Post Contact' period as evidenced by the presence of flaked bottle glass. There was some evidence to suggest that Aboriginal activity in this area during the 'Post Contact' period may have shifted from the terraces either side of the Creek, slightly to the east to the lower northern slopes of a nearby prominent hill. Why this is the case was uncertain (CHMA 2008b).
The likely scenario was that Aboriginal people were carrying out initial procurement and reduction activities at the procurement site itself, and then secondary reduction processing at other locations (including site 10650). The results of the test pitting undertaken at site AH10650 indicate that the movement of the silcrete material from the stone procurement site was generally north toward Crooked Billet Creek and site AH10648. Secondary reduction processing appears to have been mainly carried out at site AH10648, and along the western edge of the hill summit between sites AH10648 and AH10650 (CHMA 2008b).

Maynard and McConnell 2003
Anne McConnell and Leigh Maynard were engaged to undertake an Aboriginal heritage assessment for a proposed natural gas pipeline development in the Greater Hobart region. The assessment focused on an off take station which was located approximately 2km north of Bridgewater, and the distribution pipeline which extended south to the

centre of Hobart, via a section of this pipeline ran from Bridgewater to Old Beach, following the alignment of the East Derwent Highway. This is the closest section to the present study area. The survey assessment did not identify any Aboriginal heritage sites or areas of cultural heritage value either on or in the immediate vicinity of the investigated areas. Apart from the Hobart City Centre, there were no areas where there was considered to be an elevated potential for sub-surface Aboriginal heritage deposits to be present Maynard and McConnell (2003:11).

Sainty 2007

Rocky Sainty was engaged by the Brighton Council to carry out an Aboriginal heritage assessment for a proposed walking track between Old Beach and Bridgewater. The survey resulted in the identification of two Aboriginal sites (1372 and 1335), with sites having been previously recorded and registered. Site 1372 is classified as a shell midden deposit, which was located at the Green Point Nature Reserve. This is around 500m to the west of the current study area, on the west side of Herdsmans Cove. Site 1335 was also classified as a shell midden, and is located within the coastal reserve at Swan Park, Gagebrook, on the eastern side of Herdsmans Cove (Sainty 2007:3).

CHMA (2017)

CHMA (2017) was engaged by MONA to undertake an Aboriginal heritage assessment for a 16ha parcel of land which was part of a Derwent Foreshore Masterplan proposal. CHMA (2017:54) recorded two Aboriginal heritage sites during the field survey (AH1379 and AH1380). These two sites were both originally recorded by Officer (1980) as part of his survey of the Derwent Estuary. The two sites were both classified as shell middens, and were both located on the northern foreshore margins of the River Derwent, immediately to the east of the Sewage Treatment Plant. Both sites comprised sparse scatters of shell midden material. The midden material at the two sites appeared to be primarily confined to the soil surface and very upper soil horizon. No shell midden lenses were noted at either site. The two site areas had been subject to moderate to high levels of disturbance through prior land clearing, at the cutting of artificial embankments across the site area. There was also evidence of fill material having been placed across the foreshore area (CHMA 2017:54).

CHMA (2020b)

CHMA (2020b) was engaged by Brighton Council to undertake an Aboriginal heritage assessment for the proposed Bridgewater Reserve Playground, which is situated around 1km to the east of the current study area. No Aboriginal heritage sites or specific area of elevated archaeological potential were identified during the field survey assessment. CHMA (2020b) noted that the search of the AHR undertaken for this project showed that there are no registered Aboriginal sites that were located within or in the immediate vicinity of the study area boundaries. The negative survey results were interpreted as being a reasonably accurate indication that either there were no Aboriginal sites located in the study area, or that site and artefact densities across the study area are likely very low, reflecting sporadic activity. The most likely site type to be present would be small artefact scatters or isolated artefacts, or very sparse midden deposits (CHMA 2020b:48-49).

CHMA (2023)

CHMA (2023) was engaged by Brighton Council to undertake an Aboriginal heritage assessment for a 30ha parcel of land at Sorell Street, Brighton, which is proposed for rezoning. This is immediately to the east of the Boyer Road Precinct. The assessment resulted in the recording of one Aboriginal heritage site (Site AH14306), which is an isolated artefact. Besides AH14306, no other Aboriginal heritage sites, suspected features or specific areas of elevated archaeological potential were identified. CHMA (2023) noted that surface visibility across much of the surveyed areas was low. However, the survey results were interpreted as being a reasonably accurate indication that either there were no other Aboriginal sites located in the study area, or site and artefact densities across the study area were likely to be low to very low, reflecting sporadic activity. The most likely site type to be present would be small artefact scatters or isolated artefacts, or very sparse midden deposits.

4.3 Registered Aboriginal Sites in the Vicinity of the Study Area

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

The search results show that there are 29 registered Aboriginal heritage sites that are located within an approximate 1km radius of the study area (search results provided by Joel Williams from AHT on the 24.9.2024). The majority of these sites (18 sites) are classified as Aboriginal shell middens, with three of these shell middens also having stone artefacts present. In addition, there are seven Artefact scatters and four isolated artefacts. Figure 9 shows the location of these registered Aboriginal sites in relation to the study area. The majority of sites are clustered along the foreshore margins of the River Derwent.

Of these 29 registered Aboriginal sites, there are 10 sites that are situated within a 100m radius of the study area. Based on the available information, two of these sites are situated within the boundaries of the study area (sites AH8815 and AH11483). The other eight sites appear to be situated just outside the south-west boundary of the study area. Table 1 provides the summary details for these registered sites, with Figure 10 showing the location of the sites in relation to study area. It should be noted that for most of these sites, only a single grid reference point location is available on the AHR. However, Figure 10 denotes the potential spatial extent of these sites, based on the available descriptive information and any associated mud maps.

Table 1: Summary details for registered Aboriginal sites located within a 100m radius of the Boyer Road Precinct study area (Based on the AHR search results dated 24.9.2024)

AH Number	Site Type	Grid Reference (GDA 94) Easting	Grid Reference (GDA 94) Northing	Description
191	Shell Midden	517312	5268682	Site recorded in 1977 (recorder unknown) and described as a large concentration of midden material exposed across an area measuring 36m x 4m. site exposed in rail cutting and partly covered by Boyer Road. Midden material comprised mud oyster and mussel. Site is possibly a component of site AH1386 and AH11485. Site is located just to the south-west of study area.
11483	Isolated Artefact	517070	5269150	Site recorded by CHMA (2011) and described as a brown waterworn quartzite top grindstone that was located on the basal slopes of a hill, 20m north of Boyer Road and 100m north of Derwent River. Site is within study area.
11484	Shell Midden	517184	5268950	Site recorded by CHMA (2011) and described as a shell midden with an associated stone artefact. Site is described as being within rail reserve, on north cutting of rail line across an area 50m x 10m. Site noted to be heavily disturbed, with potential for additional material to be present. Site is possibly a component of site AH1387. Site is located just to the south-west of study area.
11485	Shell Midden	517300	5268742	Site recorded by CHMA (2011) and described as a large shell midden that extends across an area measuring 350m x 50m. Site noted to be primarily within rail reserve, with midden material exposed within embankment cuttings and erosion scalds on north and south side of rail line. Some midden material also noted to extend on to embankment cutting on north side of Boyer Road. Site is possibly a component of site AH1386 and AH191. Site is located just to the south-west of study area.
11520	Shell Midden	517234	5268908	Site recorded by CHMA (2011) and described as a low density dispersed scatter of mud oyster shell that was exposed along the northern embankment of Boyer Road. Site is located just to the south-west of study area.
1385	Shell Midden	517620	5268370	Site recorded by Officer (1980) and described as four huge shell midden mounds located on point, on bank, above shore, and exposed in rail cutting. Site is located just to the south-west of study area.
1386	Shell Midden	517410	5268615	Site recorded by Officer (1980) and described as a large shell midden extending for 600m from point. Midden exposed in rail cutting, ion bank above the shore. And extending to top side of bank cutting of Boyer Road in parts. Site is possibly a component of site AH191 and AH11485. Site is located just to the south-west of study area.
1387	Shell Midden	517212	5268882	Site recorded by Officer (1980) and described as extending from creek, NW for 200m on shore up to shallow point on bank. Midden material exposed in rail

AH Number	Site Type	Grid Reference (GDA 94) Easting	Grid Reference (GDA 94) Northing	Description
				cutting and in parts of the bank cutting of Boyer Road. Site is possibly a component of site AH11484. Site is located just to the south-west of study area.
1388	Shell Midden	516812	5269382	Site recorded by Officer (1980) and described as being located just NW of small point on bank above shore. Site is located around 100m to the south-west of study area.
8815	Artefact Scatter	517638	5268622	Site recorded by Stanton (2001) and was described as a large artefact scatter (25+ artefacts) extending across an area measuring around 300m x 50m, either side of a row of box thorns within a farm paddock. Majority of artefacts were cherty hornfel flakes. High potential for additional artefacts to be present. Site is within study area.

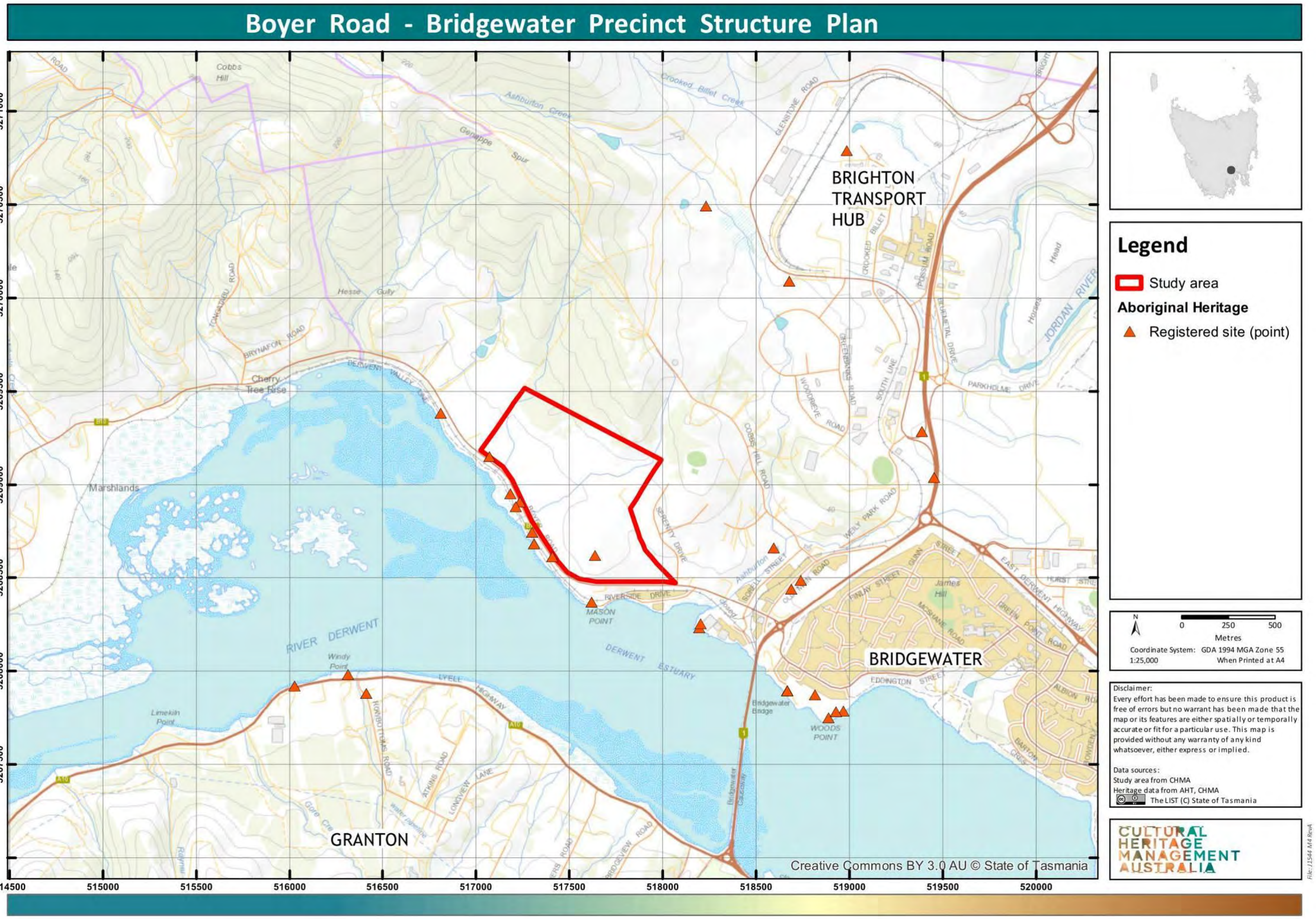


Figure 9: Topographic map showing the location of registered Aboriginal sites located within a 1km radius of the Boyer Road Precinct study area (Based on the AHR search results dated 24.9.2024)

Figure 10: Aerial image showing registered Aboriginal heritage sites located within a 100m radius of the Boyer Road Precinct study area

5.0 Predictive Modelling

5.1 Introduction to Predictive Modelling

Predictive modelling, in an archaeological context, is a fairly straight forward 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. On the basis of 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 inherit 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 is 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 water courses. However, in some instances the alignment of these water courses has changed considerably over time. As a consequence, the present alignment of a given water course may be substantially different to its alignment in the past. The consequence of this for predictive modelling (if these ancient water courses 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 surrounds of Bridgewater and Brighton indicate that the most likely site types that will be encountered within the study area will be artefact scatters/Isolated artefacts and shell midden deposits (or a combination thereof). It is also possible, although less likely, that Aboriginal stone quarry or procurement sites will be present. The following provides a definition of these site types and a general predictive statement for their distribution within the study area.

Artefact Scatters and Isolated artefacts

<u>Definition</u>

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.

<u>Predictive Statement:</u>

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

- Stone artefact scatters are numerous within the larger river valley systems;
- The largest open artefact scatters tend to be situated on well-drained sandy soils, in slightly elevated positions above river and creek floodplains, with a north aspect;
- 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, and on moderate to steeply sloping terrain.

Applying this broad pattern of site distribution to the study area, it would be anticipated that the highest densities of artefact deposits would most likely to be encountered on those elevated and level landscape features that occur in the study area, such as the spines of spurs or the crest of hills or knolls. Particularly those areas where there are loose, well drained soil deposits. Increased artefact densities could also be expected to occur around any elevated and level and well drained landscape features that may be present around the margins of the ephemeral water courses that are present in the study area. Low to very low densities of artefact deposits could be expected to occur across the remainder of the study area.

Midden Sites

Definition

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.

Predictive Statement

In the South-East Tasmanian region, the bay estuarine type middens are generally composed predominantly of mussel and oyster shellfish species. The largest middens are found immediately adjacent to the shoreline, near to the shellfish resources, and are on elevated, generally gently sloping or level terrain. A few sizeable middens have been noted up to 500m inland, with smaller middens having been identified up to 1km inland. These shell middens are comprised almost entirely of shell, and rarely contain large numbers of stone artefacts or faunal remains.

Shell midden deposits are most likely to be encountered within 100m of the foreshore margins of the Derwent Estuary. The shell middens are likely to be comprised primarily of mussel and oyster species, and stone artefacts are unlikely to be in association, or present in low numbers. The middens are most likely to be sited in discrete areas where the hill slope gradients are low.

As noted previously, the southern boundary of the study area is located around 150m of the River Derwent estuary. If midden sites are present in the study area, they are therefore likely to be situated around this south-west boundary area. There is a very low probability that middens will be encountered elsewhere throughout the study area.

Stone Procurement/Quarry Sites

Definition

A stone procurement site is a place where stone materials were obtained by Aboriginal people for the purpose of manufacturing stone artefacts. Quarry sites on the other hand have some evidence of the stone being actively extracted using knapping and/or digging. Stone procurement sites are often pebble beds in water courses (where there may be little or no evidence of human activity) or naturally occurring lag deposits exposed on the surface. Quarry sites are usually stone outcrops, with evidence of knapping and pits dug to expose the rock. Concentrations of hammer stones and a thick layer of knapping debris are often present.

Predictive Statement

Previous archaeological research in the South East Tasmanian region has shown that the most common source of raw materials for making stone artefacts are outcrops of stone materials such as silcrete, cherty hornfels, quartzites, quartz, and fined grained volcanics. These tend to occur along prominent landscape features, such as the spines of ridges or on hills.

As noted in section 2 of this report, the bedrock geology of the study area, the underlying geology across the south-east portion of the study area is dominated by Jurassic dolerite, with a transition to Permian siltstone bedrock within the north-west portion of the study area. From an Aboriginal heritage perspective, neither siltstone nor dolerite are particularly well suited to the manufacture of stone tools and were seldom targeted for this purpose. However, there may be small pockets of metamorphosed siltstone suitable for artefact manufacturing, in the geological contact zone between the dolerites and the siltstone. It is difficult to predict where this contact zone might occur in the study area.

6.0 Survey Coverage of the Study Area

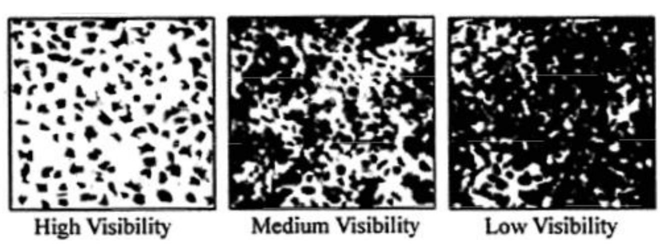
Survey Coverage and Surface Visibility

Survey coverage refers to the estimated portion of a study area that has actually 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 introduced gravels or materials. Figure 11 provides a useful guide for estimating ground surface visibility.

The field survey was undertaken over a period of two days (22.10.2024 and 23.10.2024) by Stuart Huys (CHMA archaeologist) and Rocky Sainty (Aboriginal Heritage Officer). As noted in section 1.1 of this report, the land that is the focus of this assessment encompasses approximately 59ha. The field team walked a series of 13.7km of survey transects across this area, with the average width of each transect being 5m.This equates to a survey coverage of 68 500m². Figure 12 shows the survey transects walked across the study area. As noted in section 1, the field team were requested not to enter the core house yard areas surrounding the two rural dwellings in the study area.

In order to maximise effective coverage, the field team targeted existing informal walking tracks and erosion scalds throughout the study area, which provided transects of improved surface visibility. Away from these areas, surface visibility was reduced to between 20%-40% due to vegetation cover (see Plates 8-11). As a general observation, surface visibility was typically slightly more improved in the northern parts of the study area, on the steeper hill slopes, where vegetation cover was generally more sparse. Average visibility was estimated at 40% in these areas. Surface visibility was reduced to an average of 20% in the southern portion of the study area, on the lower hill slopes, where grass cover was thickest.

Visibility



☐Full (100%) ☐High (75%) ☒Medium (50%) ☒Low (24%) ☐None (0%)

Figure 11: 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. The combination of survey coverage and surface visibility is referred to as effective survey coverage. Table 2 presents the effective survey coverage achieved during the course of the survey assessment of the Boyer Road Precinct study area. The effective coverage achieved by the field survey is estimated at 21 600m², which is deemed to be sufficient for generating a reasonable understanding as to the potential extent and nature of Aboriginal heritage values that may be present.

Table 2: Effective survey coverage during the survey assessment

Area Surveyed	Total Survey Transects	Estimated Average Surface Visibility	Effective Survey Coverage
Areas of improved visibility	900m x 5m = 4 500m²	60%	2 700m²
Transects in North of study area	6 100m x 5m = 30 500m²	40%	12 200m²
Transects in South of study area	6 700m x 5m = 33 500m²	20%	6 700m²
Total	**13 700m x 5m = 68 500m²**		**21 600m²**

Plate 8: View west showing typical surface visibility in the north portion of the study area

Plate 9: View west showing typical surface visibility in the south portion of the study area

Plate 10: View west at erosion scalds and a vehicle track in the north of the study area providing improved visibility

Plate 11: View north-west at erosion scalds in the south of the study area providing improved visibility

Figure 12: Aerial image showing survey transects walked by the field team during the assessment of the Boyer Road Precinct study area

7.0 Survey Results and Discussion

7.1 Summary Survey Results

The field survey of the Boyer Road Precinct resulted in the recording of two stone artefacts. Both artefacts were situated in the area where Stanton (2001) described recording site AH8815. For this reason, these two artefacts are deemed to be a component of site AH8815. As summarised in section 4.3 of this report, site AH8815 was described by Stanton (2001) as a large artefact scatter (25+ artefacts) that was observed to extend across an area measuring approximately 300m (north-south) x 50m (east-west). This area extends from the basal slopes of the hill, around Boyer Road, north through to a benched slope area on the mid-slopes of the hill and incorporates a series of erosion scalds either side of a row of box thorns within a farm paddock. Stanton (2001) noted that the majority of artefacts were cherty hornfel flakes. Stanton (2001) commented that there was a high potential for additional artefacts to be present. The fact that the current survey assessment resulted in the recording of just two artefacts in the area where site AH8815 is located, is likely to be a reflection of surface visibility issues. While there were several stock erosion scalds present in the area around the box thorn row, visibility was typically limited to around 20-30% due to vegetation cover (see Plate 12). It is clear that additional artefacts associated with AH8815 are present in this area, but are most likely to be currently obscured by vegetation cover. The soils in this area are loosely consolidated wind blown sand deposits which have good depth and it is assessed that there is a high potential for sub-surface artefact deposits to be present.

There are no accurate spatial boundaries available for the Stanton (2001) recording of site AH8815. The boundaries for the site have been estimated, based on the site descriptions provided by Stanton (2001). Figure 13 shows these estimated site boundaries, together with the two artefacts that were recorded during the current survey. Table 3 provides the summary details for site AH8815, with the detailed site recording presented in Appendix 2.

In addition to site AH8815, one specific area of High Potential Archaeological Sensitivity (PAS1) was identified in the study area. This is an area where it is assessed that there is a high potential for undetected artefact deposits to be present. PAS1 encompasses a broad, flat benched slope area on the mid slopes of a hill, measuring approximately 90m x 90m (see Plate 13). The area immediately abuts the northern end of site AH8815. Slope gradients in this area decrease to around 1-2º. Soils across the PAS are comprise loosely consolidated aeolian sand deposits with good depth. Based on predictive modelling, there is a reasonable potential that Aboriginal activity may have been focused in this area. It affords a comfortable camp location, with the area being flat, with well drained soils and elevated above the fog line. It also affords good views across the River Derwent Valley, with comparatively easy access to the estuarine resources of the River Derwent. The presence of site AH8815 immediately to the east lends some support to this contention. Surface visibility across the PAS1 area was restricted to around 10%, making it difficult to gauge the presence or absence of artefact deposits in this area. This would need to be done through a program of sub-surface investigations. The PAS area has been entirely cleared of native vegetation as part of past farming activity, which means that any artefact deposits that are present will have been impacted to some extent. However, these disturbances are likely to be primarily confined to the top 30cm of the soil horizon, involving some vertical and horizontal displacements of artefacts. Table 3 provides the summary details for PAS1, with Figure 13 showing the spatial extent of the PAS area.

As detailed in section 4.3 of this report, the AHR search results show that there is one other registered Aboriginal site within the bounds of the study area, this being AH11483. This site was recorded by CHMA (2011) and described as a brown waterworn quartzite top grindstone that was located on the basal slopes of a hill, 20m north of Boyer Road and 100m north of Derwent River. The grid reference places the site in the south-west corner of the study area (see Figure 13). Despite an extensive search, of this area during the current survey, the field team were unable to find this artefact. The grid reference provided by CHMA (2011) was taken with a handheld GPS, so is likely to be accurate to within 5m. The fact that the artefact could not be found is therefore most likely to be a product of surface visibility. Grass cover in the immediate vicinity of the site was thick, reducing visibility to 10% (see Plate 14). It is very likely that the artefact is still present in this area, but is obscured by grass or covered by soil deposits. Table 3 provides the summary details for this site.

In section 4.3 of this report, it was noted that there are eight other registered Aboriginal sites that appear to be located within a 100m radius of the study area boundaries. All eight of these sites are classified as Aboriginal shell middens and are clustered along the margins of the River Derwent estuary, close to the south-west boundary of the study area. Based on the available information (taken from site descriptions and mud maps), there is no evidence to indicate that any of these eight sites extend into the boundaries of the study area. The main concentration of midden deposits from these sites appear to be confined to within 100m of the foreshores, on the south side of Boyer Road. However, midden material from a few of these sites were observed to be present within the embankment cutting on the northern side of Boyer Road, immediately outside the south-west boundary of the study area. This of course means that there is the potential that cultural deposits associated with these sites may extend into the study area itself. During the current field survey, a number of survey transects were walked along the basal slopes of the hill, close to the south-west boundary of the study area. However, no Aboriginal cultural deposits were identified in this area. Surface visibility across these basal slopes was generally restricted to 20% or less due to grass cover. Given these constraints, it can't be stated with certainty that cultural deposits are not present in this area. However, the density of deposits would most likely be in the low-moderate range, with densities expected to decrease in line with the distance away from the margins of the River Derwent. Because there is some potential for cultural deposits to occur within this south-west portion if the study area, along the basal hill slopes, this area has been assessed as being a zone of moderate sensitivity (see Figure 13). This area correlates with the area of Potential Archaeological Sensitivity (PAS1) identified by CHMA (2011), who also identified the area as having a moderate potential for sub-surface deposits to be present. Because the area is currently assessed as only being of moderate sensitivity, it hasn't formally classified as a PAS.

Plate 12: View south at the location of site AH8815

Plate 13: View south at PAS1

Plate 14: View south at the location of site AH11483

7.2 Further Discussions

Besides the sites and areas discussed above, no other Aboriginal heritage sites, suspected features or specific areas of elevated archaeological potential were identified within the Boyer Road Precinct study area. The field survey did not identify any stone material types present within the study area that would be in any way suited for artefact manufacturing. The field survey was able to confirm that there are no large outcrop features present in the study area, with bedrock outcrop only exposed to up to a metre above ground level, which eliminates the possibility of Aboriginal rock shelters being present.

As noted in section 6 of this report, there were some constraints in surface visibility throughout much of the study area. Given these constraints in can't be stated with certainty that there are no additional undetected Aboriginal sites present across the broader study area.

However, the general impression generated from the survey inspection is that site densities across the majority of the study area (with the exception of those sites and areas discussed in section 7.1) are likely to be low. This is because the remainder of the study area incorporates land that is typically quite steeply sloping and situated away from water courses. Previous archaeological investigations in the general area have shown that site densities in this type of landscape setting would be low to very low. The most likely site type would be isolated artefacts or small artefact scatters. As outlined in section 2, much of the study area has been quite disturbed, so any undetected sites that may be present will have been impacted to some extent. The exception is the north-west portion of the study area, where there are lesser disturbed remnant patches of Eucalypt forest. Any undetected sites in this area will be reasonably intact.

The sites recorded during the current investigations, together with the AHR site record for the general surrounds of the study area, provide tangible archaeological evidence that this section of the River Derwent was regularly frequented by the local Aboriginal inhabitants. This was most likely the the Leenowwenne people from the Big River Nation. The main focus of the activity appears to have been the shell fish resources (specifically mud oyster and black mussels) that were in abundance along the foreshores, and easily accessible. The clustering of large midden deposits along the River Derwent foreshores in this area provide evidence that these areas were possibly favoured locations that were visited more regularly on a seasonal basis.

Table 3: Summary Details for sites AH8815, AH11483 and PAS1

Site Name	Site Type	Grid Reference (GDA 94)	Site Description
AH8815	Artefact Scatter	Estimate Only E517543 N5268507 E517580 N5268493 E517667 N5268622 E517744 N5268748 E517705 N5268765 E517628 N5268632	Site recorded by Stanton (2001) and was described as a large artefact scatter (25+ artefacts) extending across an area measuring around 300m x 50m, extending from basal hill slopes to mid hill slopes, either side of a row of box thorns within a farm paddock. Two artefacts associated with site AH8815 were recorded during current survey. High potential for additional surface and sub-surface artefact deposits to be present. Artefact details Artefact 1 (E517712 N5268724) Brown chert flake 48mm x 36mm x 12mm Artefact 2 (E517634 N5268619) Brown chert flake 42mm x 32mm x 9mm
AH11483	Isolated Artefact	E517070 N5269150	Site recorded by CHMA (2011) and described as a brown waterworn quartzite top grindstone that was located on the basal slopes of a hill, 20m north of Boyer Road and 100m north of Derwent River. Site is within study area but was not found during current survey.
PAS1	Area of Potential Archaeological Sensitivity	E517584 N5268755 E517605 N5268721 E517650 N5268695 E517680 N5268690 E517715 N5268745 E517636 N5268805	PAS encompasses a broad, flat benched slope area on the mid slopes of a hill, measuring approximately 90m x 90m. The area immediately abuts the northern end of site AH8815. Slope gradients in this area decrease to around 1-2º. Soils across the PAS are comprise loosely consolidated aeolian sand deposits with good depth. High potential for artefact deposits to be present.

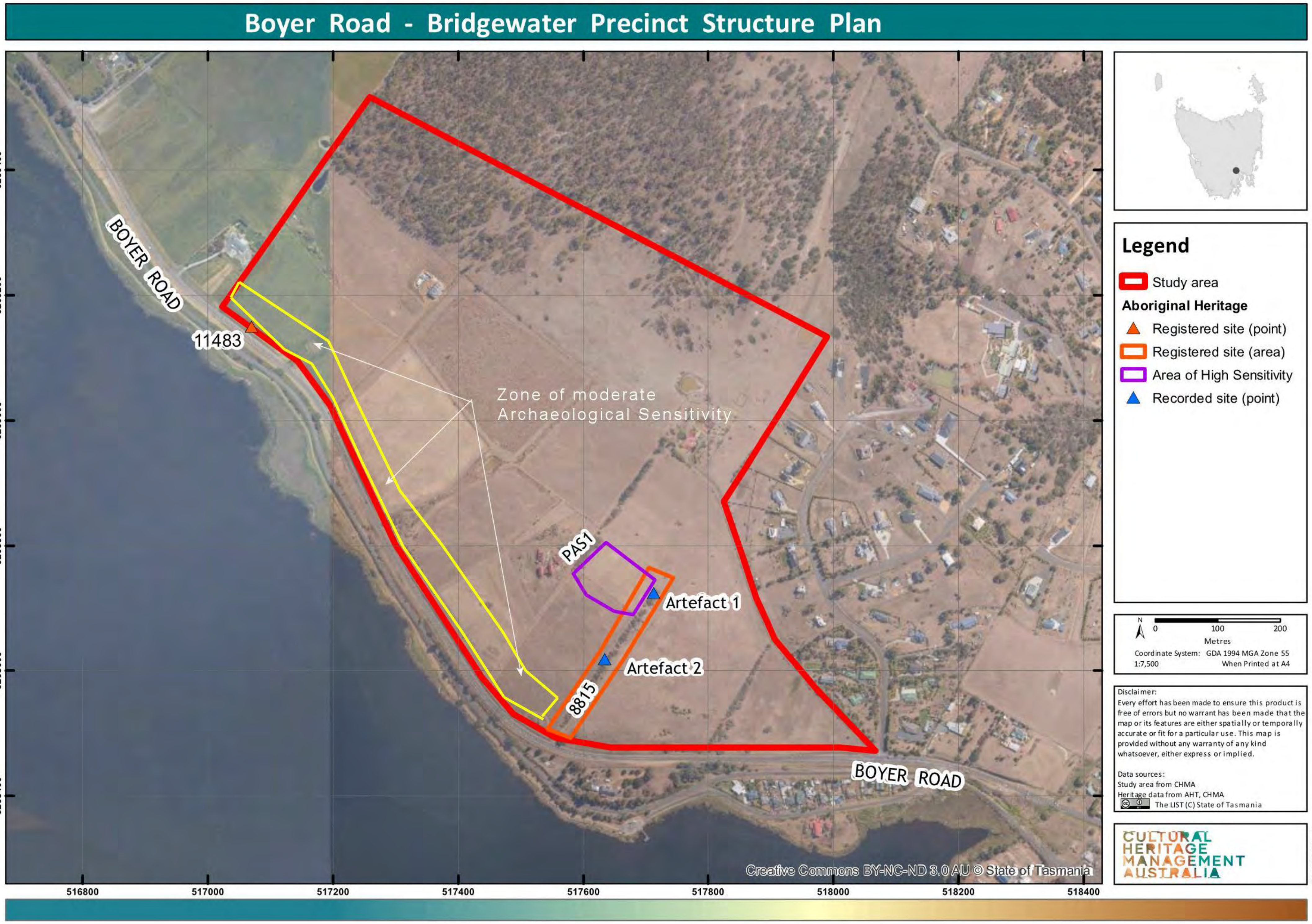


Figure 13: Aerial image showing the location and spatial extent of sites AH8815, AH11483 and PAS1, as well as the zone of moderate archaeological sensitivity

8.0 Site Significance Assessments

The following provides an outline of the processes used to assess the significance of any cultural heritage sites that were identified during the course of the assessment.

8.1 Assessment Guidelines

There are several different ways of defining types of significance, and many practitioners have developed their own system of significance assessment. However, as Sullivan and Pearson (1995) point out, there seems to be a general advantage in using a set of criteria which is already widely accepted. In Australia cultural significance is usually assessed against the Burra Charter guidelines and the Australian Heritage Commission guidelines (ICOMOS 1988, 1999).

8.2 The Burra Charter

Under the guidelines of the Burra Charter ‘cultural significance’ refers to the ‘aesthetic, historic, scientific, social or spiritual value for past, present or future generations’ of a ‘place’ (ICOMOS 1999:2). The guidelines to the Burra Charter comment:
“Although there are a variety of adjectives used in definitions of cultural significance in Australia, the adjectives ‘aesthetic’, ‘historic’, ‘scientific’ and social’ ... can encompass all other values”.

The following provides the descriptions given for each of these terms.

Aesthetic Value

Aesthetic value includes aspects of sensory perception for which criteria can and should be stated. Such criteria may include consideration of the form, scale, colour, texture and materials of the fabric; the smells and sounds associated with the place and its use (Marquis-Kyle & Walker 1992).

Historic Value

A place may have historic value because it has influenced, or has been influenced by, an historic figure, event, phase or activity. It may also have historic value as the site of an important event. For any given place the significance will be greater where evidence of the association or event survives in situ, or where the settings are substantially intact, than where it has been changed or evidence does not survive. However, some events or associations may be so important that the place retains significance regardless of subsequent treatment (Marquis-Kyle & Walker 1992).

Scientific Value

The scientific or research value of a place will depend upon the importance of the data involved or its rarity, quality or representativeness and on the degree to which the place may contribute further substantial information.

A site or a resource is said to be scientifically significant when its further study may be expected to help current research questions. That is, scientific significance is defined as research potential (Marquis-Kyle & Walker 1992).

Social Value

The social value of a place is perhaps the most difficult value for heritage professionals to substantiate (Johnston 1994). However, social value is broadly defined as 'the qualities for which a place has become a focus of spiritual, political, natural or other cultural sentimental to a majority or minority group' (ICOMOS 1988:30). In What is Social Value, Johnston (1994) has provided a clear definition of social value:

"Social value is about collective attachment to places that embody meaning important to a community, these places are usually community owned or publicly accessible or in some other way 'appropriated' into people's daily lives. Such meanings are in addition to other values, such as the evidence of valued aspects of history or beauty, and these meanings may not be apparent in the fabric of the place, and may not be apparent to the disinterested observer". (Johnston 1994:10)

Although encompassed within the criterion of social value, the spiritual value of a place is a relatively new addition to the Burra Charter (ICOMOS 1999:1). Spiritual value is predominantly used to assess places of cultural significance to Indigenous Australians.

The degree to which a place is significant can vary. As Johnston (1994:3) has stated when trying to understand significance a 'variety of concepts [are] used from a geographical comparison ('national', 'state', 'local') to terms such as 'early', 'rare', or 'seminal''. Indeed, the Burra Charter clearly states that when assessing historic significance, one should note that for:

"any given place the significance will be greater where evidence of the association or event survives in situ, or where the setting are substantially intact, than where it has been changed or evidence does not survive". (ICOMOS 1988:29)

8.3 Significance Criteria Relevant to Indigenous Sites

Indigenous heritage sites and places may have educational, tourism and other values to groups in society. However, their two principal values are likely to be in terms of their cultural / social significance to Aboriginal people and their scientific / archaeological significance. These are the two criteria that are commonly used in establishing the significance of Aboriginal sites. The following provides an explanation of these criteria.

1) Aboriginal Cultural / Social Significance

This relates to the value placed upon a site or suite of sites by the local or regional Aboriginal community. The identification and assessment of those sites that are significant to Aboriginal people is a matter for Aboriginal people. This assessment can only be made by the appropriate Aboriginal representatives of the relevant communities.

2) Scientific (Archaeological) Significance
Archaeological significance values (or scientific values) generally are assessed on the potential of a site or place to generate knowledge through archaeological research or knowledge. Bowdler (1984) states that the scientific significance should be assessed according to timely and specific research questions (research potential) and site representativeness.

Research potential entails the potential of a site or suite of sites for scientific research and excavation. This is measured in terms of a site's ability to provide information on aspects of Aboriginal culture. In this respect, the contents of a site and their state of preservation are important considerations.

Representativeness takes account of how common a site type is (Bowdler 1984). That is, it allows sites to be evaluated with reference to the known archaeological record within the given region. The primary goal of cultural resource management is to afford the greatest protection to a representative sample of sites throughout a region. The corollary of a representative site is the notion of a rare or unique site. These sites may help to understand the patterning of more common sites in the surrounding area, and are therefore often considered of archaeological significance. The concept of a rarity cannot be easily separated from that of representativeness. If a site is determined to be rare, then it will, by definition, be included as part of the representative sample of that site type.

The concepts of both research potential and representativeness are ever changing variables. As research interests shift and archaeological methods and techniques change, then the criteria for assessing site significance are also re-evaluated. As a consequence, the sample of site types which are used to assess site significance must be large enough to account for the change in these variables.

8.4 Summary Significance Ratings for Recorded Sites
Sites AH8815 and AH11483 which are confirmed as being situated within the Boyer Road Precinct, have been assessed and allocated a rating of significance, based on the criteria presented in section 8.2. As discussed in section 8.2, Aboriginal sites are usually assessed in terms of their scientific and social significance. The concepts of Aesthetic significance and Historic significance are rarely applied in the assessment of Aboriginal sites unless there is direct evidence for European/Aboriginal contact activity at the site, or the site has specific and outstanding aesthetic values. However, based on advice received from AHT, aesthetic and historic significance values have also been taken into consideration as part of the assessment of these sites.

A five tiered rating system has been adopted for the significance assessment; low, low-medium, medium, medium-high and high. Table 4 provides the summary details for significance ratings for the recorded sites. A more detailed explanation for the assessment ratings are presented in sections 8.5 to 8.7. Section 8.8 provides an assessment of significance in relation to the *Aboriginal Heritage Act 1975* (the Act). Section 9 of this report presents a statement of social significance provided by Rocky Sainty for the four recorded sites and the study area more broadly.

Table 4: Summary significance ratings for recorded Aboriginal sites

Site Number	Site Type	Scientific Significance	Aesthetic Significance	Historic Significance	Social Significance
AH8815	Artefact Scatter	Medium	Medium	N/A	High
AH11483	Isolated Artefact	Low-Medium	Medium	N/A	Medium-High

8.5 Scientific Significance for Recorded Sites

Site AH8815 is classified as an artefact scatter, with AH11483 being an isolated artefact. Isolated artefacts and artefact scatters are two of the most common site types recorded in the South East Region, and more broadly, the State of Tasmania (as demonstrated through the AHR search results for this project). As such, the scientific significance of artefact scatters and isolated artefacts usually relates primarily to their research potential as opposed to the rarity of the site type. The potential exception to this is where comparatively rare artefact types (either tool or stone material types) are represented in assemblages.

In this instance, site AH8815 is assessed as most probably being of Medium scientific significance, based primarily on the evidence presented by Stanton (2001). The site appears to be comparatively quite spatially large and the indications are that the densities of artefacts associated with the site may be in the low to moderate range. The artefacts associated with the site are reported to be dominated by cherty hornfel flakes. This material type and stone tool type are commonly represented in other site types in the region, so rarity does not seem to be a factor. The site has been disturbed by land clearing and farming activity, which reduces the research potential of the site. However, this is potentially balanced out by the fact that there is likely to be surface and sub-surface artefact deposits present, some of which may be at a depth which is lesser disturbed.

AH11483 is assessed as being of low-medium scientific significance. This is primarily based on the artefact type recorded at the site by CHMA (2011), which is reported to be a brown waterworn quartzite top grindstone. This is a comparatively rarer tool type, which elevates the scientific significance. Otherwise, the site would be assessed as being of low scientific significance.

8.6 Aesthetic Significance of Recorded Sites

Aesthetic value includes aspects of sensory perception for which criteria can and should be stated. Such criteria may include consideration of the form, scale, colour, texture and materials of the fabric; the smells and sounds associated with the place and its use (Marquis-Kyle & Walker 1992).

Sites AH8815 and AH11483 are both situated on the slopes of a hill, bordering the northern side of the River Derwent Valley. As detailed in section 2 of this report, the study area has been modified through land clearing and farming activity, with much of the native vegetation having been cleared and replanted with grasses. This diminishes the aesthetic setting of the sites to some extent. Nonetheless the broad vista of the River Derwent valley still retains some integrity and the Aesthetic significance of the two sites has therefore been assessed as Medium.

8.7 Historic Significance of Recorded Sites

A place may have historic value because it has influenced, or has been influenced by, an historic figure, event, phase or activity. It may also have historic value as the site of an important event. For any given place the significance will be greater where evidence of the association or event survives in situ, or where the settings are substantially intact, than where it has been changed or evidence does not survive. However, some events or associations may be so important that the place retains significance regardless of subsequent treatment (Marquis-Kyle & Walker 1992).

Historic significance is not an attribute often considered when assessing the significance of Aboriginal sites, unless there is direct evidence for some form of European/Aboriginal contact activity. In this instance no such specific evidence exists for Sites AH8815 and AH11483. Therefore, historic significance is not a factor that needs to be considered.

8.8 Significance Under the Aboriginal Heritage Act 1975

In Tasmania, the *Aboriginal Heritage Act 1975* (the Act) is the primary Act for the treatment of Aboriginal cultural heritage. Under Part 1, Section 2(8) of *the Aboriginal Heritage Act 1975*, Aboriginal tradition and significance is defined as follows.

Aboriginal tradition means –

> (a) the body of traditions, knowledge, observances, customs and beliefs of Aboriginal people generally or of a particular community or group of Aboriginal people; and
> (b) any such tradition, knowledge, observance, custom or belief relating to particular persons, areas, objects or relationships;

significance, of a relic, means significance in accordance with –

> (a) the archaeological or scientific history of Aboriginal people; or
> (b) the anthropological history of Aboriginal people; or
> (c) the contemporary history of Aboriginal people; or
> (d) Aboriginal tradition.

In accordance with the *Aboriginal Heritage Standards and Procedures 2024,* Aboriginal heritage assessments in Tasmania have addressed the issue of significance as per the Burra Charter 2013. This approach has been adopted for this assessment (see sections 8.1 to 8.7 above). However, AHT have now advised that in order to ensure compliance with the *Aboriginal Heritage Act 1975* (the Act), assessments are now also to also consider significance and Aboriginal tradition as defined in the Act.

The Act came into effect in 1975, which is several decades before the Burra Charter Guidelines and protocols for determining significance were developed. To a large extent, the definitions of Aboriginal tradition and significance, as defined under Section 2(8) of the Act are covered by the Burra Charter and have been addressed in this report.

The archaeological or scientific history of Aboriginal people (a) is covered under the concept of Scientific significance. This component of significance, as it relates to sites identified during this current assessment, have been addressed in detail in sections 8.2, 8.3 and 8.5 of this report.

Aboriginal cultural, social and spiritual significance under the Burra Charter relates to the value placed upon a site or suite of sites by the local or regional Aboriginal community (see sections 8.2 and 8.3 of this report). The definition of Aboriginal tradition, as provided in the Act, is broadly covered under this section of the Burra Charter. As is the anthropological history of Aboriginal people (b), the contemporary history of Aboriginal people (c) and Aboriginal tradition (d).

The notion of Aboriginal cultural, social and spiritual significance, and the assessment of these values is a matter for Aboriginal people and can only be made by the appropriate Aboriginal representatives of the relevant communities. Section 9 of this report presents a statement of cultural/social significance provided by Rocky Sainty for the Aboriginal sites recorded during the current assessment and the broader area. Rocky Sainty is an experienced Aboriginal Heritage Officer, and a respected member of the Tasmanian Aboriginal community. He is appropriately skilled and experienced to make these cultural values statements. The report has also been distributed to a select range of Tasmanian Aboriginal organisations for review, comment and feedback. The outcome of this consultation is presented in Appendix 4.

As described in section 3 of this report, the available ethnographic information indicates that the study area is situated around the confluence of the boundaries of three Aboriginal Nations, these being the South East Nation, The Oyster Bay Nation and the Big River Nation. The River Derwent estuary was likely to have been an important major resource zone for all three Aboriginal Nations, and the Aboriginal sites recorded in this area are likely to be a small extant remnant of much larger site complexes that existed along this section of the River Derwent, between Bridgewater and New Norfolk, prior to European development. These sites are generally considered to be of high cultural significance to the contemporary Tasmanian Aboriginal people, as they represent tangible evidence of the occupation of the area by the Old People.

9.0 Consultation with Aboriginal Communities and Statement of Aboriginal Significance

The designated Aboriginal Heritage Officer (AHO) for this project is Rocky Sainty. 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.

Two Aboriginal heritage sites and one area of Potential Archaeological Sensitivity are confirmed as being present within the Boyer Road Precinct. In addition, there are several other known Aboriginal heritage sites within a 100m radius of the study area. Given the important Aboriginal heritage values in these areas, the decision has been made to distribute this report for Aboriginal community consultation. The outcomes of this consultation process is presented in Appendix 4 of this report.
.
Rocky Sainty has provided a statement of the Aboriginal cultural values attributed to the Aboriginal heritage values identified as part of this assessment, and the broader study area. This statement is presented below.

Statement of Cultural/Social Significance by Rocky Sainty
Aboriginal heritage provides a direct link to the past, however, is not limited to the physical evidence of the past. It includes both tangible and intangible aspects of culture. Physical and spiritual connection to land and all things within the landscape has been, and continues to be, an important feature of cultural expression for Aboriginal people since creation.

Physical evidence of past occupation of a specific place may include artefacts, living places (middens), rock shelters, markings in rock or on the walls of caves and/or rock shelters, burials and ceremonial places. Non-physical aspects of culture may include the knowledge (i.e. stories, song, dance, weather patterns, animal, plant and marine resources for food, medicines and technology) connected to the people and the place.

While so much of the cultural landscape that was **lutruwita** *(Tasmania) before invasion and subsequent colonization either no longer exists, or has been heavily impacted on, these values continue to be important to the Tasmanian Aboriginal community and are relevant to the region of the project proposal.*

Our survey assessment, together with other previous investigations has confirmed the presence of two Aboriginal heritage sites within the Boyer Road Precinct (sites AH8815 and AH11483) as well as numerous Aboriginal shell midden sites along the section of the Derwent estuary just to the south of the study area. There are also areas where there is the possibility of more sub-surface deposits being present. Specifically the area termed PAS1, which also sits within the study area.

So much of the area around Bridgewater and other parts of the River Derwent estuary has been developed, and as a result much of our cultural heritage has been destroyed. These recorded Aboriginal sites and areas represent some of the few remaining sites along this part of the estuary. These remaining sites are highly valued by the Tasmanian Aboriginal community as they provide a strong tangible link with our ancestors. I would strongly advocate that they are protected and conserved. To this end, I support the management recommendations that are presented in this report, specifically as they relate to sites AH8815 and AH11483 and PAS1. I would strongly advocate that options are explored for avoiding impacts to sites AH8815 and AH11483 and potentially conserving these sites in open space reserves of some sort. My preference would also be that PAS1 is treated in the same manner and conserved and protected. If this is not possible and there is the potential that some or all of this PAS may be potentially impacted by future development, then I would advocate for a program of sub-surface investigations to be undertaken in this area. This would help clarify whether there are in fact cultural deposits in this area, which in turn will allow for more informed management decisions to be made for this PAS area.

Even if the site of the project proposal contains no evidence of Aboriginal heritage there is 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. The vast majority of the study area incorporates land that has been subject to high levels of landscape modification from land clearing, farming and urban development. Through this, much of the traditional resources of the area are now gone. With this said, the River Derwent, including the estuary area has always been an important resource zone for our people, and this estuary system is still rich in resources important to our people.

This project provides the opportunity for interpretation initiatives to be implemented, which highlight the importance of the River Derwent to the Tasmanian Aboriginal community, past and present. I would urge Council to pursue these interpretation initiatives, as part of the future development of this precinct.

10.0 Statutory Controls and Legislative Requirements

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

10.1 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). 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 of 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 Heritage 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 unites (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".

10.2 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 1984* 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 1984*.**

This Federal 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 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 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 landuser/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 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 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 1984*, 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).

11.0 Aboriginal Cultural Heritage Management Plan

11.1 Summary Management Recommendations

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

- Background research into the extant archaeological and ethno-historic record for the study area and the surrounding region (see sections 3 and 4 of this report).
- The results of the investigation as documented in this report (see section 7)
- Consultation with Aboriginal Heritage Officer Rocky Sainty and the outcomes of the Aboriginal community consultation (see section 9 and Appendix 4)
- The legal and procedural requirements as specified in the *Aboriginal Heritage Act 1975* (see section 10).

Table 5 provides the summary management recommendations for this project.
The more detailed recommendations are presented in section 11.2.

Table 5: Summary management recommendations for the project

Site/Area	Grid Reference (GDA 94)	Management Recommendations
AH8815	Estimate Only E517543 N5268507 E517580 N5268493 E517667 N5268622 E517744 N5268748 E517705 N5268765 E517628 N5268632	Site AH8815 is an artefact scatter that is located within the study area (see Figure 14). Preferred management option is for the site area to be plotted onto the zoning plans for the project and it noted that the site is required to be avoided and protected in open space. Short, Medium and Long term management plan should be developed for the site area. If there is the potential for the site complex to be impacted by future rezoning and development, then it is recommended that further sub-surface investigations should be undertaken within the site complex and immediate surrounds. Aim of investigations will be to more accurately clarify the spatial extent and nature of artefact deposits present and to develop informed management and mitigation options for the site. Scope and methodology for investigations is to be ratified with AHT. Permit will be required.
Site AH11483	E517070 N5269150	Site AH11483 is an isolated artefact that is located within the study area (see Figure 14). This artefact could not be found during the current survey, but is likely to be still present in area. Preferred management option is for the site area to be plotted onto the zoning plans for the project and it noted that the site is required to be avoided and protected. If site cannot be avoided then seek permit to impact site.
PAS1	E517584 N5268755 E517605 N5268721 E517650 N5268695 E517680 N5268690	PAS1 is an area of High Potential Archaeological sensitivity that is situated within the study area (see Figure 14). Preferred management option is for the PAS1 area to be plotted onto the

Site/Area	Grid Reference (GDA 94)	Management Recommendations
	E517715 N5268745 E517636 N5268805	zoning plans for the project and it noted that PAS1 is required to be avoided and protected. If there is the potential that the PAS1 area may be partially or entirely impacted, then undertake program of sub-surface investigations to more accurately determine presence/absence, nature and extent of cultural deposits that may be present. Scope and methodology for investigations is to be ratified with AHT. No permit initially required to commence investigations. Permit may be required pending findings.
Zone of Moderate Sensitivity		A zone of moderate archaeological sensitivity is present along the south-west boundary of the study area (see Figure 14). It is recommended that a limited program of sub-surface investigations in undertaken in this area, Scope and methodology for investigations is to be ratified with AHT. No permit initially required to commence investigations. Permit may be required pending findings.
General Recommendations		• No additional site specific Aboriginal heritage constraints or requirements apply to the remainder of the Boyer Road Precinct study area. • Develop an Aboriginal cultural heritage interpretation plan for the precinct. • If previously undetected Aboriginal sites or suspected features are located within the Boyer Road Precinct during any future works, the processes outlined in the Unanticipated Discovery Plan should be followed (see Appendix 3). • Copies of this report should be submitted to AHT and the AHC for review and comment.

11.2 Detailed Management Recommendations

Recommendation 1 (Site AH8815)

This assessment has confirmed that site AH8815 is situated within the bounds of the Boyer Road Precinct study area (see Figure 14). The preferred management option is that site AH8815 is conserved and managed within open space, and that the site is not impacted by future development.

A detailed landscaping plan should be developed for the open space area incorporating site AH8815. The landscaping plan should outline the short, medium and long term strategies for managing this area. It should include what plant species could be planted in the area, what access arrangements apply for the area and what facilities are permitted in the area (such as signage, walking tracks etc). The landscaping plan should be developed in consultation with the Tasmanian Aboriginal community and Tasmanian Aboriginal community members with the appropriate levels of skills and experience would be engaged to assist with the development of the landscaping plan as well as the implementation of the plan.

During any future construction works, the proponent will need to ensure that there is no soil disturbing works undertaken with the registered boundaries of site AH8815. Once the proponent takes control of the site, it is recommended that temporary high visibility protective barricading should be erected around the spatial extent of the site that occurs within the study area, with a 5m buffer applied to the current site boundary. The erection of the barricading should be inspected by the designated archaeologist and AHO, to ensure that it adequately protects site AH8815. No earth disturbance works should be undertaken within the barricaded exclusion zone, and no machinery or vehicles should access this zone. The type of barricading used, and the installation methods adopted should be designed to minimise any soil disturbances. The preferred form of barricading would be star pickets and plastic mesh webbing. The barricading should remain in pace for the duration of construction activities. Construction contractors should be made aware of the obligations with regards to the exclusion zone.

All Aboriginal relics are protected under the *Aboriginal Heritage Act 1975* (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. Therefore, if there is the potential that site AH8815 may be impacted by future development, then it is recommended that a program of sub-surface investigations should be implemented within and in the immediate surrounds of the site. The aim of these investigations will be to more accurately determine the potential extent and nature of Aboriginal cultural deposits that are present. The findings of these investigations will inform future management decisions. The scope and requirements of the sub-surface test pitting program should be ratified with AHT prior to the test pitting being implemented. A permit will be required to implement these investigations.

The findings of the test pitting program should be presented in a report which would act as an addendum to this report. The report would include management recommendations for any further requirements that may apply to the proposed development and obligations regarding managing identified Aboriginal cultural values.

Recommendation 2 (Site AH11483)

Site AH11483 is an isolated artefact that is located within the study area (see Figure 14). This artefact could not be found during the current survey, but is likely to be still present in area. The Preferred management option is for the site area to be plotted onto the zoning plans for the project and it noted that the site is required to be avoided and protected.

All Aboriginal relics are protected under the *Aboriginal Heritage Act 1975* (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. Therefore, if there is the potential that site AH11483 may be impacted by future development, then the proponent will need to apply for and be granted a Permit to impact this site.

Recommendation 3 (Sub-surface Investigations at PAS1)

PAS1 is an area of high Potential Archaeological sensitivity that is located in the study area (see Figure 14). If there is a risk that the PAS1 area may be impacted by future development, then it is recommended that a program of sub-surface investigations should be undertaken within the boundaries of the PAS1 area.

The primary aim of the sub-surface investigations will be to determine whether there are any Aboriginal cultural deposits present within the PAS1 area. If Aboriginal cultural deposits are determined to be present, then the objective would be to determine the potential extent and nature of these deposits and whether they are associated with site AH8815. The scope and requirements of the sub-surface test pitting program should be ratified with AHT prior to the test pitting being implemented. This would involve the development of an approved Method Statement for these works. Given that the sub-surface investigations are not being undertaken within the boundaries of a registered Aboriginal site, then no Permit will be required to initiate these investigations. However, if Aboriginal cultural deposits are detected, then investigation works will need to stop in that area and an application made for a Permit. The Permit will need to be granted before works can recommence.

The findings of the test pitting program should be presented in a report which would act as an addendum to this report. The report would include management recommendations for any further requirements that may apply to the proposed development and obligations regarding managing identified Aboriginal cultural values.

Recommendation 4 (Sub-surface Investigations in the Zone of Moderate Sensitivity)

If there is a risk that the Zone of Moderate Sensitivity may be impacted by future development, then it is recommended that a program of sub-surface investigations should be undertaken within this zone. The primary aim of the sub-surface investigations will be to determine whether there are any Aboriginal cultural deposits present within the zone. If Aboriginal cultural deposits are determined to be present, then the objective would be to determine the potential extent and nature of these deposits. The scope and requirements of the sub-surface test pitting program should be ratified with AHT prior to the test pitting being implemented. This would involve the development of an approved Method Statement for these works. Given that the sub-surface investigations are not being undertaken within the boundaries of a registered Aboriginal site, then no Permit will be required to initiate these investigations. However, if Aboriginal cultural deposits are detected, then investigation works will need to stop in that area and an application made for a Permit. The Permit will need to be granted before works can recommence.

The findings of the test pitting program should be presented in a report which would act as an addendum to this report. The report would include management recommendations for any further requirements that may apply to the proposed development and obligations regarding managing identified Aboriginal cultural values.

Recommendation 5 (Interpretation Plan)
A detailed Aboriginal cultural interpretation plan should be developed for the Boyer Road Precinct. At a minimum, the interpretation plan should address what cultural information is appropriate to present for the area, what the most appropriate forms of delivery are for this information, and where within the development is the appropriate location for placement of information.

The Interpretation plan should be developed in consultation with the Tasmanian Aboriginal community and Tasmanian Aboriginal community members with the appropriate levels of skills and experience would be engaged to assist with the development of the landscaping plan as well as the implementation of the plan.

Recommendation 6 (Unanticipated Discovery Plan)
If, during the course of proposed future development works, previously undetected archaeological sites or objects are located, the processes outlined in the Unanticipated Discovery Plan should be followed (see Appendix 3). A copy of the Unanticipated Discovery Plan should be kept on site during all ground disturbance and development work. All personnel should be made aware of the Unanticipated Discovery Plan and their obligations under the *Aboriginal Heritage Act 1975* (the Act). 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.

Recommendation 7 (Provision of Reports)
Copies of this report should be submitted to Aboriginal Heritage Tasmania (AHT) for review and comment.

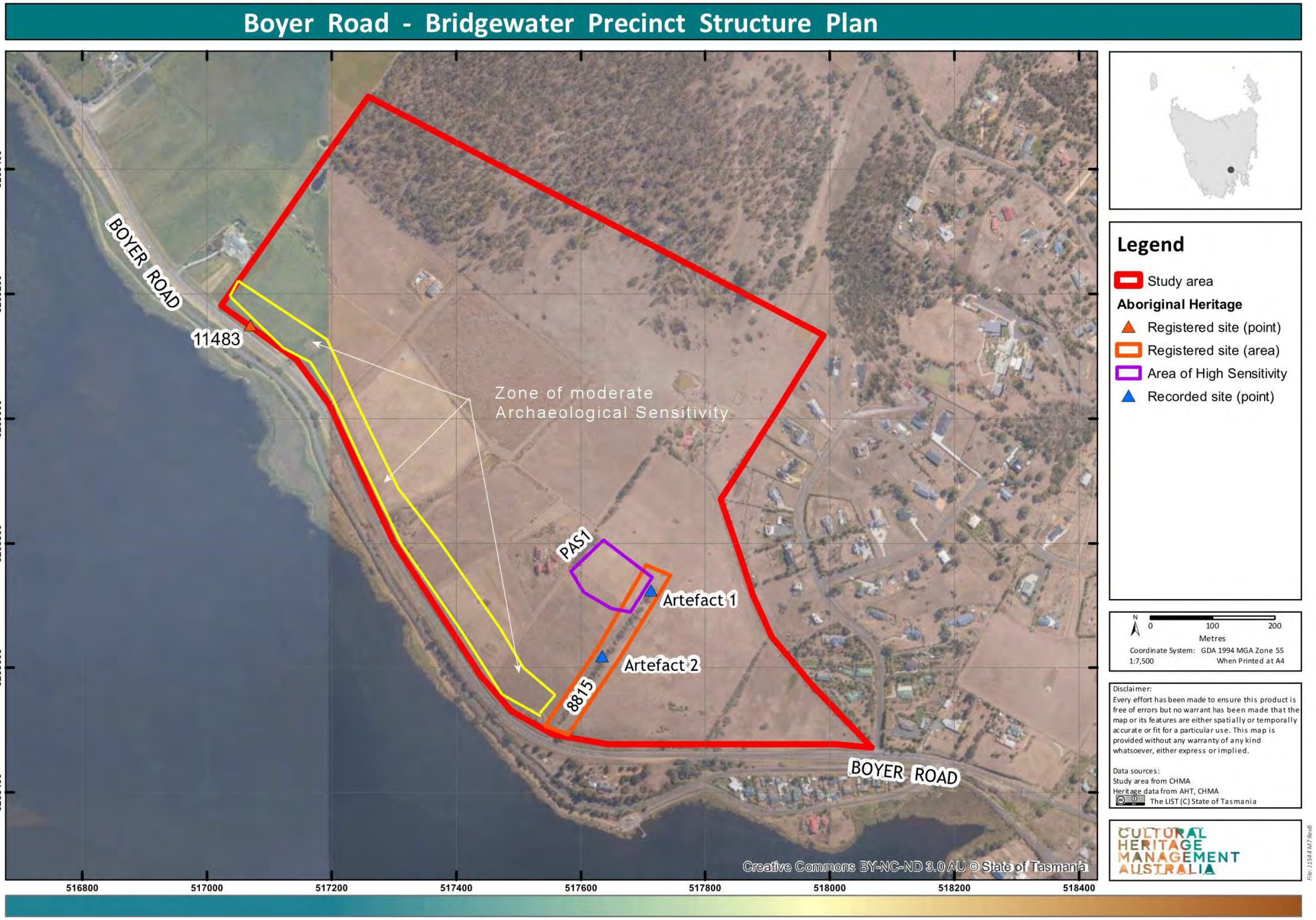


Figure 14: Aerial image showing the location and spatial extent of sites AH8815, AH11483 and PAS1, as well as the zone of moderate archaeological sensitivity

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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 quarry/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

Gazetteer of Recorded Sites

Site Name	Site Type	Grid Reference (GDA 94)	Site Description
AH8815	Artefact Scatter	Estimate Only E517543 N5268507 E517580 N5268493 E517667 N5268622 E517744 N5268748 E517705 N5268765 E517628 N5268632	Site recorded by Stanton (2001) and was described as a large artefact scatter (25+ artefacts) extending across an area measuring around 300m x 50m, extending from basal hill slopes to mid hill slopes, either side of a row of box thorns within a farm paddock. Two artefacts associated with site AH8815 were recorded during current survey. High potential for additional surface and sub-surface artefact deposits to be present. Artefact details Artefact 1 (E517712 N5268724) Brown chert flake 48mm x 36mm x 12mm Artefact 2 (E517634 N5268619) Brown chert flake 42mm x 32mm x 9mm

Appendix 2

Detailed Site Descriptions

Site Name: AH8815
Site Type: Artefact Scatter
Grid references: (GDA 94)
Estimate Only
E517543 N5268507
E517580 N5268493
E517667 N5268622
E517744 N5268748
E517705 N5268765
E517628 N5268632

Site Description

Site AH8815 is located around 1km to the north-west of Bridgewater, within a farm paddock, on the north side of Boyer Road. The site was originally recorded by Stanton (2001) and was described as a large artefact scatter (25+ artefacts) that was observed to extend across an area measuring approximately 300m (north-south) x 50m (east-west). This area extends from the basal slopes of the hill, around Boyer Road, north through to a benched slope area on the mid-slopes of the hill and incorporates a series of erosion scalds either side of a row of box thorns within a farm paddock. Stanton (2001) noted that the majority of artefacts were cherty hornfel flakes. Stanton (2001) commented that there was a high potential for additional artefacts to be present.

During the current field survey of the Boyer Road Precinct two stone artefacts were identified in the area where Stanton (2001) described recording site AH8815. For this reason, these two artefacts are deemed to be a component of site AH8815. Both artefacts were identified on erosion scald areas immediately adjacent to row of boxthorns. The fact that the current survey assessment resulted in the recording of just two artefacts in the area where site AH8815 is located, is likely to be a reflection of surface visibility issues. While there were several stock erosion scalds present in the area around the box thorn row, visibility was typically limited to around 20-30% due to vegetation cover. It is clear that additional artefacts associated with AH8815 are present in this area, but are most likely to be currently obscured by vegetation cover. The soils in this area are loosely consolidated wind blown sand deposits which have good depth and it is assessed that there is a high potential for sub-surface artefact deposits to be present.

Details for recorded artefacts

- Artefact 1 (E517712 N5268724) Brown chert flake 48mm x 36mm x 12mm;
- Artefact 2 (E517634 N5268619) Brown chert flake 42mm x 32mm x 9mm.

Plate 1: View south at the location of Artefact 1 from site AH8815

Plate 2: View south at the location of Artefact 2 from site AH8815

Plate 3: Artefact 1 from site AH8815 (ventral)

Plate 4: Artefact 1 from site AH8815 (dorsal)

Plate 5: Artefact 2 from site AH8815 (dorsal)

Plate 6: Artefact 2 from site AH8815 (ventral)

Appendix 3

Unanticipated Discovery Plan

Appendix 4

Aboriginal Community Consultation Outcomes

Executive Summary

Project Details
The Brighton Council has engaged Holmes Dyer to prepare a Precinct Structure Plan (PSP) for land along Boyer Road at Bridgewater. The area of land encompasses approximately 59ha and is zoned Future Urban under the Brighton Local Provision Schedule.

CHMA and Aboriginal Heritage Officer (AHO) Rocky Sainty were engaged by the Holmes Dyer to undertake an Aboriginal heritage assessment for the 59ha parcel of land (the study area), in order to identify any potential Aboriginal heritage constraints. The information generated from Aboriginal heritage assessment would be used to inform the Boyer Road PSP. This report presents the findings of the sub-surface test pitting program that has been undertaken within the Boyer Road Precinct Structure Plan study area. It follows on from the initial survey assessment undertaken by CHMA (2024).

Summary Results of the Sub-Surface Investigations
The test pitting program was implemented over a period of three days, (12.5.2025 to 14.5.2025), by Stuart Huys (CHMA excavation director), Rocky Sainty (Project Aboriginal Heritage Officer) and Sara Valentine (CHMA Field assistant) and involved the excavation of 45 test pits. Thirty (30) of these test pits were placed within the Zone of Moderate sensitivity identified by CHMA (2024). The remaining 15 test pits were placed along the edge of the PAS1 area and either side of the registered boundaries of site AH8815. Figure i shows the distribution of the 45 Phase 1 test pits.

No Aboriginal cultural deposits (midden material, stone artefacts, hearth material etc) was recovered from any of the 45 excavated test pits. Nor were any suspected Aboriginal cultural features identified in these test pits. The negative results for test pits 1-30 provide a very clear indication that the midden deposits associated with these registered sites do not extend into the boundaries of the study area. Site AH11483 is also located within this zone of moderate sensitivity. This site was recorded by CHMA (2011) and described as a brown waterworn quartzite top grindstone that was located on the basal slopes of a hill, 20m north of Boyer Road and 100m north of Derwent River. The grid reference places the site in the north-west corner of the study area. The negative findings for test pits 1-5, which were placed in the area close to where the site is reported as being located clearly indicates that the site is unlikely to be larger in extent.

The negative findings for the test pits placed along the edge of the boundaries of site AH8815 provides a good indication that artefact deposits are unlikely to extend beyond the current indicative boundaries of the site, as documented by CHMA (2024). The negative findings for the test pits placed around the edge of the PAS1 area also strongly indicates that artefact deposits do not extend beyond the PAS1 boundaries (as determined by CHMA (2024). It is important to note that the test pitting program did not cover the main PAS1 area. As such, it is not currently clear as to whether artefact deposits are in fact present within the PAS1 area and if present, what the nature and extent of these deposits may be.

The detailed test pitting results and discussions are presented in section 3 of this report.

Significance Assessment

The investigations undertaken by CHMA (2024) have confirmed that sites AH8815 and AH11483 are situated within the Boyer Road Precinct. CHMA (2024) allocated a rating of significance to these two sites, based on the criteria presented in section 4.2. There has been no information that has come forward through the test pitting program that would serve to alter this significance assessment. A five tiered rating system has been adopted for the significance assessment; low, low-medium, medium, medium-high and high. Table i provides the summary details for significance ratings for the recorded sites. A more detailed explanation for the assessment ratings are presented in section 4. Section 5 of this report presents a statement of social significance provided by Rocky Sainty for the four recorded sites and the study area more broadly.

Table i: Summary significance ratings for recorded Aboriginal sites

Site Number	Site Type	Scientific Significance	Aesthetic Significance	Historic Significance	Social Significance
AH8815	Artefact Scatter	Medium	Medium	N/A	High
AH11483	Isolated Artefact	Low-Medium	Medium	N/A	Medium-High

Management Recommendations

Table ii provides the summary management recommendations for this project. The more detailed recommendations are presented in section 7 of this report.

Table ii: Summary management recommendations for the project

Site/Area	Grid Reference (GDA 94)	Management Recommendations
AH8815	Estimate Only E517543 N5268507 E517580 N5268493 E517667 N5268622 E517744 N5268748 E517705 N5268765 E517628 N5268632	Site AH8815 is an artefact scatter that is located within the study area (see Figure 6). Preferred management option is for the site area to be protected in open space. This is reflected in current Masterplan (see Figure 7). Short, Medium and Long term management plan should be developed for the site area. If there is the potential for the site to be impacted by future rezoning and development, then it is recommended that further sub-surface investigations should be undertaken within the site complex and immediate surrounds. Aim of investigations will be to more accurately clarify the spatial extent and nature of artefact deposits present and to develop informed management and mitigation options for the site. Scope and methodology for investigations is to be ratified with AHT. Permit will be required.
Site AH11483	E517070 N5269150	Site AH11483 is an isolated artefact that is located within the

Site/Area	Grid Reference (GDA 94)	Management Recommendations
		study area (see Figure 6). This artefact could not be found during the CHMA (2024) assessment or the current investigations, but is likely to be still present in area. Preferred management option is for the site to be protected in open space. This is reflected in current Masterplan (see Figure 7). If there is the risk that this site may be impacted then apply for a permit.
PAS1	E517584 N5268755 E517605 N5268721 E517650 N5268695 E517680 N5268690 E517715 N5268745 E517636 N5268805	PAS1 is an area of High Potential Archaeological sensitivity that is situated within the study area (see Figure 6). Preferred management option is for the PAS1 area to be protected in open space. This is reflected in current Masterplan (see Figure 7). Short, Medium and Long term management plan should be developed for the PAS1 area. If there is the potential that the PAS1 area may be partially or entirely impacted, then undertake program of sub-surface investigations to more accurately determine presence/absence, nature and extent of cultural deposits that may be present. Scope and methodology for investigations is to be ratified with AHT. No permit initially required to commence investigations. Permit may be required pending findings.
General Recommendations		• Develop an Aboriginal cultural heritage interpretation plan for the precinct. • If previously undetected Aboriginal sites or suspected features are located within the Boyer Road Precinct during any future works, the processes outlined in the Unanticipated Discovery Plan should be followed (see Appendix 3). • Copies of this report should be submitted to AHT and the AHC for review and comment.

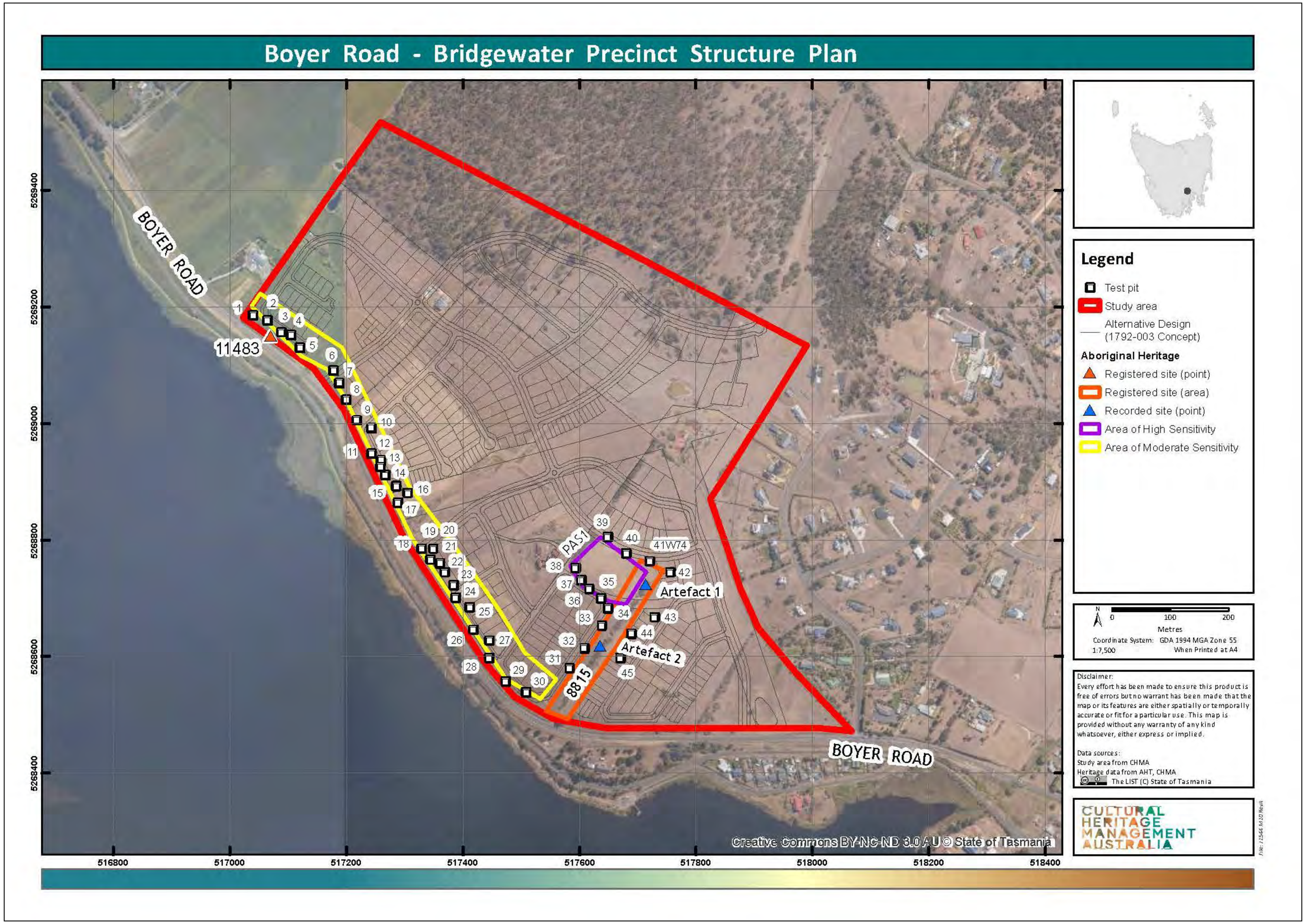

Figure i: The distribution of the 45 Phase 1 test pits

1.0 Project Outline

The Brighton Council has engaged Holmes Dyer to prepare a Precinct Structure Plan (PSP) for land along Boyer Road at Bridgewater. The area of land encompasses approximately 59ha and is zoned Future Urban under the Brighton Local Provision Schedule. Figure 1 shows the location and boundaries of the land.

CHMA and Aboriginal Heritage Officer (AHO) Rocky Sainty were engaged by the Holmes Dyer to undertake an Aboriginal heritage assessment for the 59ha parcel of land (the study area), in order to identify any potential Aboriginal heritage constraints. The information generated from Aboriginal heritage assessment would be used to inform the Boyer Road PSP.

CHMA (2024) recorded two stone artefacts during the field survey. Both artefacts were situated in the area where Stanton (2001) described recording site AH8815. For this reason, these two artefacts were deemed to be a component of site AH8815. There are no accurate spatial boundaries available for the Stanton (2001) recording of site AH8815. The boundaries for the site were estimated by CHMA (2024), based on the site descriptions provided by Stanton (2001). Figure 2 shows these estimated site boundaries, together with the two artefacts that were recorded during the current survey.

In addition to site AH8815, one specific area of High Potential Archaeological Sensitivity (PAS1) was identified in the study area by CHMA (2024). This is an area where it is assessed that there is a high potential for undetected artefact deposits to be present. PAS1 encompasses a broad, flat benched slope area on the mid slopes of a hill, measuring approximately 90m x 90m. The area immediately abuts the northern end of site AH8815. Figure 2 shows the spatial extent of the PAS area.

The AHR search results for the project showed that there is one other registered Aboriginal site within the bounds of the study area, this being AH11483 (an Isolated artefact). Despite an extensive search, CHMA (2024) was unable to find this artefact. CHMA (2024) noted that it was very likely that the artefact is still present in this area, but is obscured by grass or covered by soil deposits. Figure 2 shows the location of site AH11483.

CHMA (2024) noted that there were eight other registered Aboriginal sites that appear to be located within a 100m radius of the study area boundaries. All eight of these sites are classified as Aboriginal shell middens and are clustered along the margins of the River Derwent estuary, close to the south-west boundary of the study area. Based on the available information (taken from site descriptions and mud maps), there was no evidence to indicate that any of these eight sites extend into the boundaries of the study area. The main concentration of midden deposits from these sites appears to be confined to within 100m of the foreshores, on the south side of Boyer Road. However, midden material from a few of these sites were observed to be present within the embankment cutting on the northern side of Boyer Road, immediately outside the south-west boundary of the study area. This of course means that there is the potential that cultural deposits associated with these sites may extend into the study area itself. Because there is some potential for cultural deposits to occur within this south-west portion if the study area, along the basal hill slopes, this area has been assessed as being a zone of moderate sensitivity (see Figure 2).

CHMA (2024) recommended that the preferred management option was for sites AH8815 and AH11483 avoided and conserved in open space. CHMA (2024) also recommended that if PAS1 and the Zone of Moderate Sensitivity could not be avoided then a program of sub-surface investigations should be undertaken in these areas. The primary aim of these sub-surface investigations would be to determine whether there are any Aboriginal cultural deposits present within these areas. If Aboriginal cultural deposits are determined to be present, then the objective would be to determine the potential extent and nature of these deposits. AHT has reviewed the report prepared by CHMA (2024) and advised that the report conforms to the assessment standards outlined in the Aboriginal Heritage Standards and Guidelines procedures.

Subsequent to the submission of the CHMA (2024) report, Holmes Dyer has finalised the proposed Masterplan for the Boyer Road study area (see Figure 3). The masterplan shows that sites AH8815 and AH11483 avoided and conserved in open space. The vast majority of PAS1 has also been conserved in open space. The proposed development footprint does impact on the zone of moderate sensitivity identified by CHMA (20204). Figure 4 shows the Aboriginal sites and zones of sensitivity identified by CHMA (2024) overlayed on the Masterplan.

CHMA have now been engaged to undertake the sub-surface investigations recommended above. This report presents the findings of the sub-surface investigations.

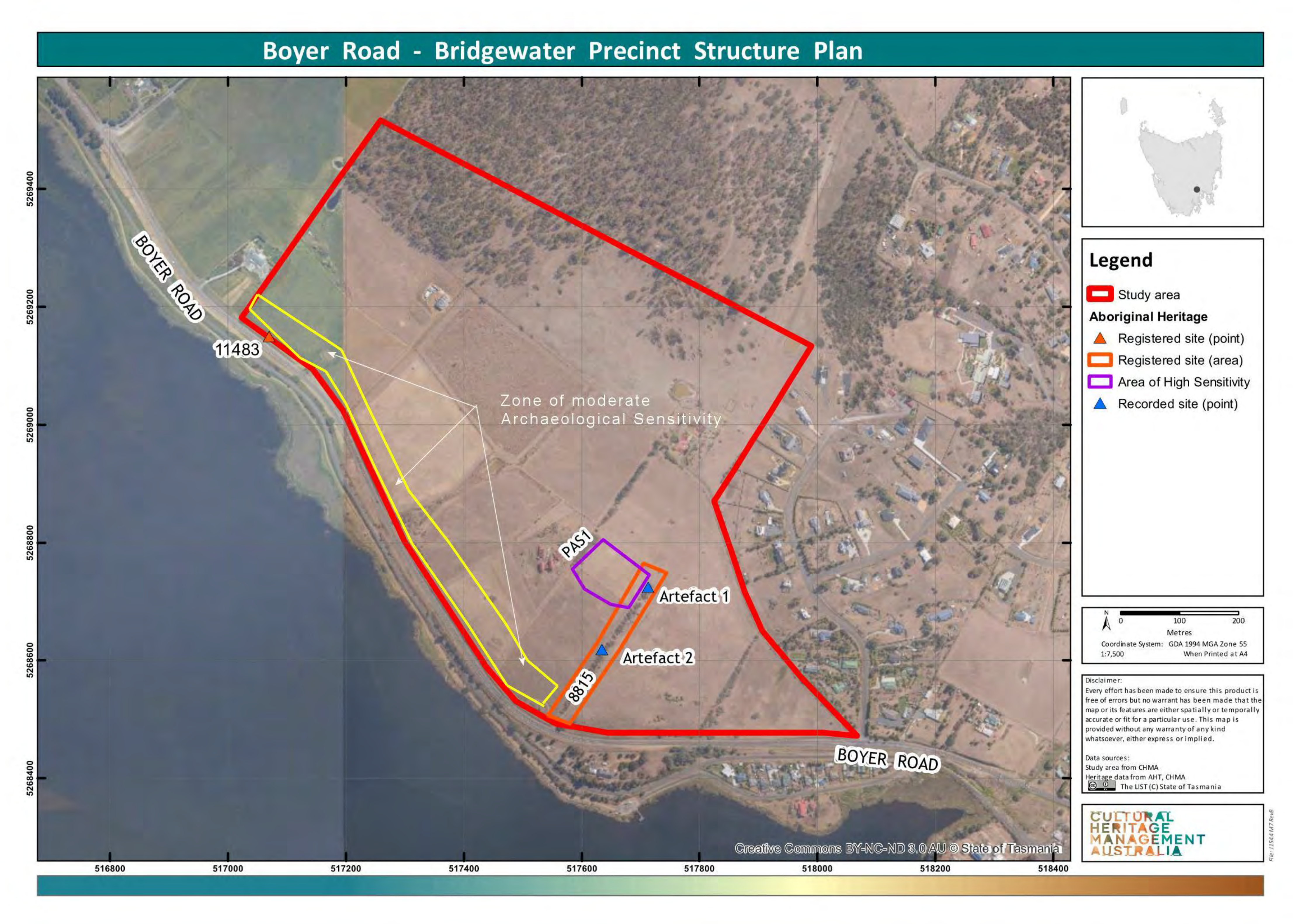

Figure 2: Aerial image showing the location and spatial extent of sites AH8815, AH11483 and PAS1, as well as the zone of moderate archaeological sensitivity

2.0 Aims and Methodology for the Test Pitting Program

2.1 Aims of the Test Pitting Program

The aims of the test pitting program are as follows.

- To determine whether there are any Aboriginal cultural deposits present within the zone of moderate sensitivity and the small portion of the PAS1 area that is within the proposed development footprint. If Aboriginal cultural deposits are determined to be present, then the objective would be to determine the potential extent and nature of these deposits.
- To develop a set of management/mitigation strategies which are directed towards minimising and mitigating any potential impacts of the works associated with the project on the Aboriginal heritage values associated with these zones of sensitivity.

2.2 Statutory Requirements

All Aboriginal relics are protected under the *Aboriginal Heritage Act 1975* (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.

The Boyer Road study area is situated on Privately owned land. Any test pits excavated on privately owned land, outside the current defined boundaries of registered Aboriginal sites does not require a Permit. These are referred to below as Phase 1 test pits. However, if Aboriginal cultural materials or suspected features are identified during the test pitting program then test pitting works at that test pit location were to cease and AHT would be contacted and advised of the find. Test pitting works at the location of the identified find would not re-commence until such time as a Permit was obtained. For any Phase 2 and Phase investigations, a Permit would be required.

2.3 Test Pitting Methodology

Prior to test pitting works commencing, a test pitting methodology for the investigations was prepared by CHMA and submitted to AHT for review. This Method Statement is presented in Appendix 4 of this report. The test pitting methodology was designed to be implemented in up to three Phases. Ultimately, only Phase 1 of the test pitting works was implemented. Based on the findings of the Phase 1, and subsequent discussions with AHT, it was decided that Phases 2 and 3 of the test pitting program would not be required at this point (see below for further details).

Phase 1 Test Pitting

Phase 1 of the test pitting involved the excavation of 45 test pits. Thirty (30) of these test pits were placed within the Zone of Moderate sensitivity identified by CHMA (2024). The remaining 15 test pits were placed along the edge of the PAS1 area and either side of the registered boundaries of site AH8815. Figure 5 shows the distribution of the 45 Phase 1 test pits. The exact positioning of the pits was determined in the field by the project archaeologist and AHO, with the pits being placed in areas of reduced disturbance, where there is an elevated potential for sub-surface deposits to be present.

Methodology for the Phase Test Pitting Program

The Phase 1 test pitting program was implemented over a period of three days, (12.5.2025 to 14.5.2025), by Stuart Huys (CHMA excavation director), Rocky Sainty (Project Aboriginal Heritage Officer) and Sara Valentine (CHMA Field assistant). Phase 1 involved the excavation of 45 test pits. No Permit was required to undertake the Phase 1 test pitting program. Figure 5 shows the distribution of the Phase 1 test pits.

The following procedures were implemented for the Phase 1 test pitting program.

- Each test pit measured 50cm × 50cm and as a general rule were excavated to a depth at which bed rock or culturally sterile sediment was exposed.
- The test pits were excavated with a square flat blade shovel in combination with small hand tools (such as flat blade shovels, pointing trowels, brushes and pans).
- For vertical control, excavations proceeded in 10cm spits.
- The location of each test pit was recorded with a GPS.
- Each pit was photographed, and notes taken on the soil profiles.
- All excavated soils were placed into buckets which were labelled according to provenance. These soils were then dry sieved through 3mm screen mesh.
- At the completion of test pitting, each pit was in-filled.
- The excavation director or the supervising archaeologist kept a field journal and a visual diary, creating a written and photographic record of the daily progression of the excavation.

2.4 Report Preparation

The report documenting the findings of Phase 1 of the test pitting program has been prepared by Stuart Huys, in consultation with Rocky Sainty (AHO). The report has been structured in accordance with AHT Guideline requirements.

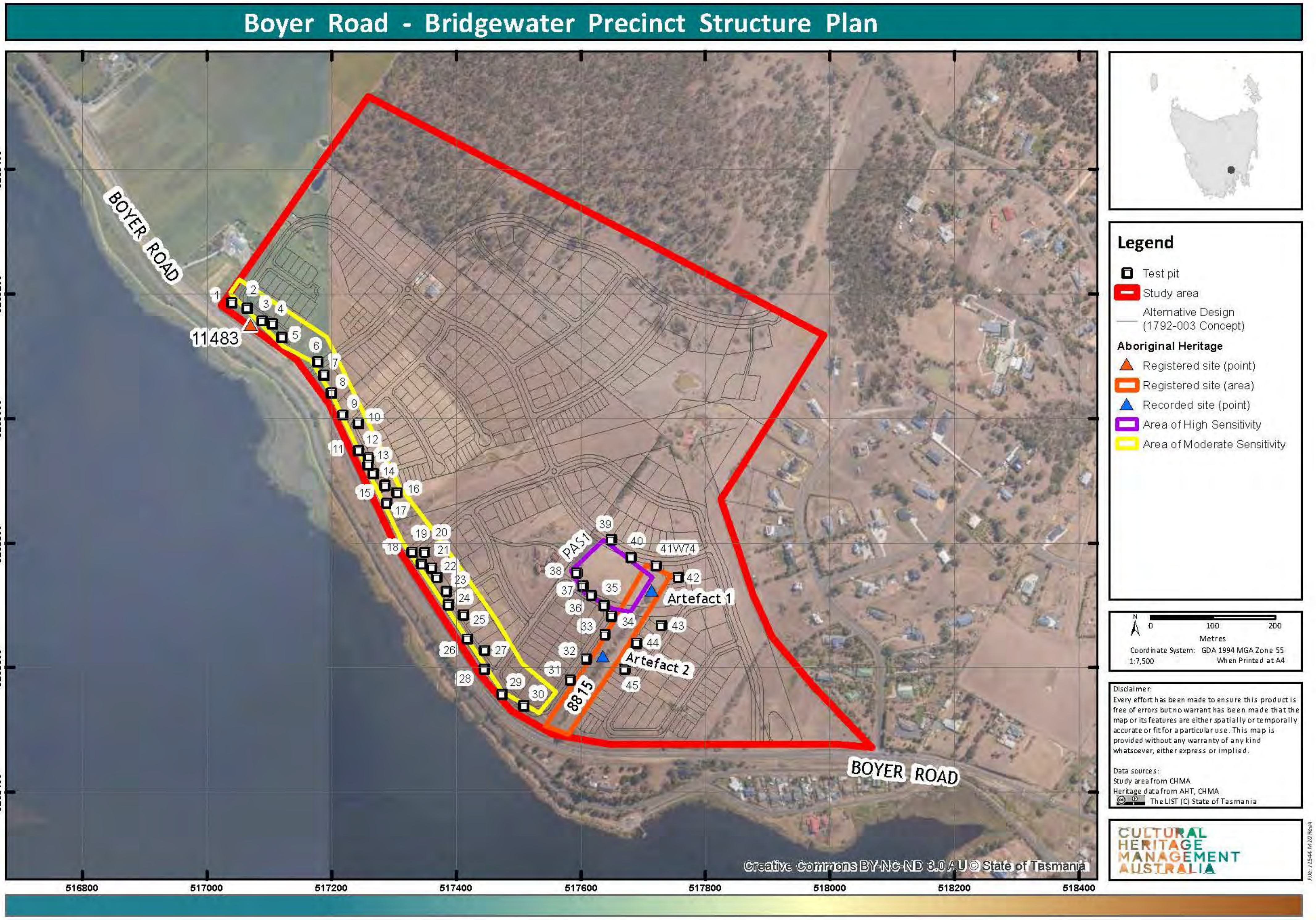

Figure 5: The distribution of the 45 Phase 1 test pits

3.0 Results of the Test Pitting Program

3.1 Soil Profiles of the Phase 1 Test Pits

As noted in section 2.3 of this report, Phase 1 of the test pitting program involved the excavation of 45 test pits.

Thirty (30) of these test pits were placed within the Zone of Moderate sensitivity identified by CHMA (2024), which is along the southern boundary of the study area (see Figure 5). This is on the lower south-west side slopes of Genappe Spur, within 150m of the River Derwent Estuary. These pits are situated within farm paddocks that have been entirely cleared of native vegetation and replanted with grasses. These paddocks are likely to also have been ploughed in the past (see Plate 3). The soil profiles for the 30 test pits were reasonably consistent. For pits 1-25 the soil profile comprised an upper soil horizon of brown loams extending down to a depth of between 8cm to 22cm. Clay content was noted to increase with depth. Beneath this was a compact layer of either regolith clays, or decomposing bedrock (see Plate 4). The shallowest soil horizons were noted for Pits 1-5 which were positioned in the south-west portion of the study area (see plate 5). For Pits 26-30, there was a notable transition in the soil profile. These pits comprised an upper soil horizon of quite loosely consolidated brown aeolian sand deposits extending down to a depth of between 15cm to 30cm. Beneath this was much more compact lighter brown to yellow sands, with a very compact clay base reached at a maximum depth of 35cm (see Plate 6).

The remaining 15 test pits (Pits 31-45) were placed along the edge of the PAS1 area and either side of the registered boundaries of site AH8815 (see Figure 5). These pits extended up the side slopes of the Genappe Spur, through to the summit of a discrete summit of a broad, flat benched slope area. Again, these pits are situated within farm paddocks that have been entirely cleared of native vegetation and replanted with grasses. These paddocks are likely to also have been ploughed in the past (see Plate 7). The soil profile for the majority of these pits was reasonably consistent, comprising an upper soil horizon of quite loosely consolidated brown aeolian sand deposits extending down to a depth of between 19cm to 27cm. Beneath this was much more compact lighter brown to yellow sands, with a very compact clay base reached at a maximum depth of 30cm (see Plate 8). The exceptions were Pits 38, 39 and 40. For these pits the soil profile comprised an upper soil horizon of gravelly sandy loams extending to a depth of between 12cm and 13cm, below which was a regolith bedrock (see Plate 9).

The test pit soil profiles are presented in Appendix 2.

Plate 3: View east along the south-east along the lower hill slopes where test pits 1-30 were positioned (Photo taken by Stuart Huys on 13.5.2025)

Plate 4: Soil profile of test pit 12 which is typical of test pits 6-25 (Photo taken by Stuart Huys on 13.5.2025)

Plate 9: Soil profile of test pit 40 which is typical of test pits 38-40 (Photo taken by Stuart Huys on 14.5.2025)

3.2 Summary Overview of Results

No Aboriginal cultural deposits (midden material, stone artefacts, hearth material etc) was recovered from any of the 45 excavated test pits. Nor were any suspected Aboriginal cultural features identified in these test pits.

Test pits 1-30 were focused within the zone of moderate sensitivity identified by CHMA (2024). This was classified as a zone of moderate sensitivity primarily because the AHR search results showed that there were a number of registered Aboriginal shell midden sites that were located along the margins of the River Derwent estuary, close to the south-west boundary of the study area. Based on the available information (taken from site descriptions and mud maps), there was no evidence to indicate that any of these sites extended into the boundaries of the study area. The main concentration of midden deposits from these sites appeared to be confined to within 100m of the foreshores, on the south side of Boyer Road. However, midden material from a few of these sites were observed to be present within the embankment cutting on the northern side of Boyer Road, immediately outside the south-west boundary of the study area. This meant that there was the potential that cultural deposits associated with these sites may extend into the study area itself.

One of the primary aims of the Phase 1 test pitting program was to determine whether there were any Aboriginal cultural deposits present within this zone of moderate sensitivity. If Aboriginal cultural deposits were present, then the objective would be to determine the potential extent and nature of these deposits and whether they were associated with any of the other registered Aboriginal sites that were situated within and in the immediate vicinity of the Boyer Road study area. The negative results for test pits 1-30 provide a very clear indication that the midden deposits associated with these registered sites do not extend into the boundaries of the study area.

Site AH11483 is also located within this zone of moderate sensitivity. This site was recorded by CHMA (2011) and described as a brown waterworn quartzite top grindstone that was located on the basal slopes of a hill, 20m north of Boyer Road and 100m north of Derwent River. The grid reference places the site in the north-west corner of the study area. The negative findings for test pits 1-5, which were placed in the area close to where the site is reported as being located clearly indicates that the site is unlikely to be larger in extent.

Pits 31-45 were positioned along the edge of the PAS1 area and either side of the registered boundaries of site AH8815 (see Figure 5). The negative findings for the test pits placed along the edge of the boundaries of site AH8815 provides a good indication that artefact deposits are unlikely to extend beyond the current indicative boundaries of the site, as documented by CHMA (2024). The negative findings for the test pits placed around the edge of the PAS1 area also strongly indicates that artefact deposits do not extend beyond the PAS1 boundaries (as determined by CHMA (2024). It is important to note that the test pitting program did not cover the main PAS1 area. As such, it is not currently clear as to whether artefact deposits are in fact present within the PAS1 area and if present, what the nature and extent of these deposits may be.

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4.0 Site Significance Assessments

The following provides an outline of the processes used to assess the significance of any cultural heritage sites that have been identified within the Boyer Road Precinct Structure Plan study area.

4.1 Assessment Guidelines

There are several different ways of defining types of significance, and many practitioners have developed their own system of significance assessment. However, as Sullivan and Pearson (1995) point out, there seems to be a general advantage in using a set of criteria which is already widely accepted. In Australia cultural significance is usually assessed against the Burra Charter guidelines and the Australian Heritage Commission guidelines (ICOMOS 1988, 1999).

4.2 The Burra Charter

Under the guidelines of the Burra Charter ‘cultural significance’ refers to the ‘aesthetic, historic, scientific, social or spiritual value for past, present or future generations’ of a ‘place’ (ICOMOS 1999:2). The guidelines to the Burra Charter comment:
“Although there are a variety of adjectives used in definitions of cultural significance in Australia, the adjectives ‘aesthetic’, ‘historic’, ‘scientific’ and social’ ... can encompass all other values”.

The following provides the descriptions given for each of these terms.

Aesthetic Value
Aesthetic value includes aspects of sensory perception for which criteria can and should be stated. Such criteria may include consideration of the form, scale, colour, texture and materials of the fabric; the smells and sounds associated with the place and its use (Marquis-Kyle & Walker 1992).

Historic Value
A place may have historic value because it has influenced, or has been influenced by, an historic figure, event, phase or activity. It may also have historic value as the site of an important event. For any given place the significance will be greater where evidence of the association or event survives in situ, or where the settings are substantially intact, than where it has been changed or evidence does not survive. However, some events or associations may be so important that the place retains significance regardless of subsequent treatment (Marquis-Kyle & Walker 1992).

Scientific Value
The scientific or research value of a place will depend upon the importance of the data involved or its rarity, quality or representativeness and on the degree to which the place may contribute further substantial information.

A site or a resource is said to be scientifically significant when its further study may be expected to help current research questions. That is, scientific significance is defined as research potential (Marquis-Kyle & Walker 1992).

Social Value

The social value of a place is perhaps the most difficult value for heritage professionals to substantiate (Johnston 1994). However, social value is broadly defined as 'the qualities for which a place has become a focus of spiritual, political, natural or other cultural sentimental to a majority or minority group' (ICOMOS 1988:30). In What is Social Value, Johnston (1994) has provided a clear definition of social value:

"Social value is about collective attachment to places that embody meaning important to a community, these places are usually community owned or publicly accessible or in some other way 'appropriated' into people's daily lives. Such meanings are in addition to other values, such as the evidence of valued aspects of history or beauty, and these meanings may not be apparent in the fabric of the place, and may not be apparent to the disinterested observer". (Johnston 1994:10)

Although encompassed within the criterion of social value, the spiritual value of a place is a new addition to the Burra Charter (ICOMOS 1999:1). Spiritual value is predominantly used to assess places of cultural significance to Indigenous Australians.

The degree to which a place is significant can vary. As Johnston (1994:3) has stated when trying to understand significance a 'variety of concepts [are] used from a geographical comparison ('national', 'state', 'local') to terms such as 'early', 'rare', or 'seminal''. Indeed, the Burra Charter clearly states that when assessing historic significance, one should note that for:

"any given place the significance will be greater where evidence of the association or event survives in situ, or where the setting are substantially intact, than where it has been changed or evidence does not survive". (ICOMOS 1988:29)

4.3 Significance Criteria Relevant to Indigenous Sites

Indigenous heritage sites and places may have educational, tourism and other values to groups in society. However, their two principal values are likely to be in terms of their cultural / social significance to Aboriginal people and their scientific / archaeological significance. These are the two criteria that are commonly used in establishing the significance of Aboriginal sites. The following provides an explanation of these criteria.

1) Aboriginal Cultural / Social Significance

This relates to the value placed upon a site or suite of sites by the local or regional Aboriginal community. The identification and assessment of those sites that are significant to Aboriginal people is a matter for Aboriginal people. This assessment can only be made by the appropriate Aboriginal representatives of the relevant communities.

2) Scientific (Archaeological) Significance
Archaeological significance values (or scientific values) generally are assessed on the potential of a site or place to generate knowledge through archaeological research or knowledge. Bowdler (1984) states that the scientific significance should be assessed according to timely and specific research questions (research potential) and site representativeness.
Research potential entails the potential of a site or suite of sites for scientific research and excavation. This is measured in terms of a site's ability to provide information on aspects of Aboriginal culture. In this respect, the contents of a site and their state of preservation are important considerations.

Representativeness takes account of how common a site type is (Bowdler 1984). That is, it allows sites to be evaluated with reference to the known archaeological record within the given region. The primary goal of cultural resource management is to afford the greatest protection to a representative sample of sites throughout a region. The corollary of a representative site is the notion of a rare or unique site. These sites may help to understand the patterning of more common sites in the surrounding area and are therefore often considered of archaeological significance. The concept of a rarity cannot be easily separated from that of representativeness. If a site is determined to be rare, then it will, by definition, be included as part of the representative sample of that site type.

The concepts of both research potential and representativeness are ever changing variables. As research interests shift and archaeological methods and techniques change, then the criteria for assessing site significance are also re-evaluated. As a consequence, the sample of site types which are used to assess site significance must be large enough to account for the change in these variables.

4.4 Summary Significance Ratings for Recorded Sites

The investigations undertaken by CHMA (2024) have confirmed that sites AH8815 and AH11483 are situated within the Boyer Road Precinct. CHMA (2024) allocated a rating of significance to these two sites, based on the criteria presented in section 4.2. There has been no information that has come forward through the test pitting program that would serve to alter this significance assessment. The following provides an review of the significance values attributed to sites AH8815 and AH11483 by CHMA (2024).

A five tiered rating system has been adopted for the significance assessment; low, low-medium, medium, medium-high and high. Table 1 provides the summary details for significance ratings for the recorded sites. A more detailed explanation for the assessment ratings are presented in sections 4.5 to 4.7. Section 4.8 provides an assessment of significance in relation to the *Aboriginal Heritage Act 1975* (the Act). Section 5 of this report presents a statement of social significance provided by Rocky Sainty for the four recorded sites and the study area more broadly.

Table 1: Summary significance ratings for recorded Aboriginal sites

Site Number	Site Type	Scientific Significance	Aesthetic Significance	Historic Significance	Social Significance
AH8815	Artefact Scatter	Medium	Medium	N/A	High
AH11483	Isolated Artefact	Low-Medium	Medium	N/A	Medium-High

4.5 Scientific Significance for Recorded Sites

Site AH8815 is classified as an artefact scatter, with AH11483 being an isolated artefact. Isolated artefacts and artefact scatters are two of the most common site types recorded in the South East Region, and more broadly, the State of Tasmania (as demonstrated through the AHR search results for this project). As such, the scientific significance of artefact scatters and isolated artefacts usually relates primarily to their research potential as opposed to the rarity of the site type. The potential exception to this is where comparatively rare artefact types (either tool or stone material types) are represented in assemblages.

In this instance, site AH8815 is assessed as most probably being of Medium scientific significance, based primarily on the evidence presented by Stanton (2001). The site appears to be comparatively quite spatially large and the indications are that the densities of artefacts associated with the site may be in the low to moderate range. The artefacts associated with the site are reported to be dominated by cherty hornfel flakes. This material type and stone tool type are commonly represented in other site types in the region, so rarity does not seem to be a factor. The site has been disturbed by land clearing and farming activity, which reduces the research potential of the site. However, this is potentially balanced out by the fact that there is likely to be surface and sub-surface artefact deposits present, some of which may be at a depth which is lesser disturbed.

AH11483 is assessed as being of low-medium scientific significance. This is primarily based on the artefact type recorded at the site by CHMA (2011), which is reported to be a brown waterworn quartzite top grindstone. This is a comparatively rarer tool type, which elevates the scientific significance. Otherwise, the site would be assessed as being of low scientific significance.

4.6 Aesthetic Significance of Recorded Sites

Aesthetic value includes aspects of sensory perception for which criteria can and should be stated. Such criteria may include consideration of the form, scale, colour, texture and materials of the fabric; the smells and sounds associated with the place and its use (Marquis-Kyle & Walker 1992).

Sites AH8815 and AH11483 are both situated on the slopes of a hill, bordering the northern side of the River Derwent Valley. As detailed in section 2 of this report, the study area has been modified through land clearing and farming activity, with much of the native vegetation having been cleared and replanted with grasses. This diminishes the aesthetic setting of the sites to some extent. Nonetheless the broad vista of the River Derwent valley still retains some integrity and the Aesthetic significance of the two sites has therefore been assessed as Medium.

4.7 Historic Significance of Recorded Sites

A place may have historic value because it has influenced, or has been influenced by, an historic figure, event, phase or activity. It may also have historic value as the site of an important event. For any given place the significance will be greater where evidence of the association or event survives in situ, or where the settings are substantially intact, than where it has been changed or evidence does not survive. However, some events or associations may be so important that the place retains significance regardless of subsequent treatment (Marquis-Kyle & Walker 1992).

Historic significance is not an attribute often considered when assessing the significance of Aboriginal sites, unless there is direct evidence for some form of European/Aboriginal contact activity. In this instance no such specific evidence exists for Sites AH8815 and AH11483. Therefore, historic significance is not a factor that needs to be considered.

4.8 Significance Under the Aboriginal Heritage Act 1975

In Tasmania, the *Aboriginal Heritage Act 1975* (the Act) is the primary Act for the treatment of Aboriginal cultural heritage. Under Part 1, Section 2(8) of *the Aboriginal Heritage Act 1975*, Aboriginal tradition and significance is defined as follows.
Aboriginal tradition means –

> (a) the body of traditions, knowledge, observances, customs and beliefs of Aboriginal people generally or of a particular community or group of Aboriginal people; and
> (b) any such tradition, knowledge, observance, custom or belief relating to particular persons, areas, objects or relationships;

significance, of a relic, means significance in accordance with –

> (a) the archaeological or scientific history of Aboriginal people; or
> (b) the anthropological history of Aboriginal people; or
> (c) the contemporary history of Aboriginal people; or
> (d) Aboriginal tradition.

In accordance with the *Aboriginal Heritage Standards and Procedures 2024,* Aboriginal heritage assessments in Tasmania have addressed the issue of significance as per the Burra Charter 2013. This approach has been adopted for this assessment (see sections 4.1 to 4.7 above). However, AHT have now advised that in order to ensure compliance with the *Aboriginal Heritage Act 1975* (the Act), assessments are now also to also consider significance and Aboriginal tradition as defined in the Act.
The Act came into effect in 1975, which is several decades before the Burra Charter Guidelines and protocols for determining significance were developed. To a large extent, the definitions of Aboriginal tradition and significance, as defined under Section 2(8) of the Act are covered by the Burra Charter and have been addressed in this report.

The archaeological or scientific history of Aboriginal people (a) is covered under the concept of Scientific significance. This component of significance, as it relates to sites identified during this current assessment, have been addressed in detail in sections 4.2, 4.3 and 4.5 of this report.

Aboriginal cultural, social and spiritual significance under the Burra Charter relates to the value placed upon a site or suite of sites by the local or regional Aboriginal community (see sections 4.2 and 4.3 of this report). The definition of Aboriginal tradition, as provided in the Act, is broadly covered under this section of the Burra Charter. As is the anthropological history of Aboriginal people (b), the contemporary history of Aboriginal people (c) and Aboriginal tradition (d).

The notion of Aboriginal cultural, social and spiritual significance, and the assessment of these values is a matter for Aboriginal people and can only be made by the appropriate Aboriginal representatives of the relevant communities. Section 5 of this report presents a statement of cultural/social significance provided by Rocky Sainty for the Aboriginal sites recorded during the current assessment and the broader area. Rocky Sainty is an experienced Aboriginal Heritage Officer, and a respected member of the Tasmanian Aboriginal community. He is appropriately skilled and experienced to make these cultural values statements. The report has also been distributed to a select range of Tasmanian Aboriginal organisations for review, comment and feedback. The outcome of this consultation is presented in Appendix 1.

The available ethnographic information collated by CHMA (2024) indicates that the study area is situated around the confluence of the boundaries of three Aboriginal Nations, these being the South East Nation, The Oyster Bay Nation and the Big River Nation. The River Derwent estuary was likely to have been an important major resource zone for all three Aboriginal Nations, and the Aboriginal sites recorded in this area are likely to be a small extant remnant of much larger site complexes that existed along this section of the River Derwent, between Bridgewater and New Norfolk, prior to European development. These sites are generally considered to be of high cultural significance to the contemporary Tasmanian Aboriginal people, as they represent tangible evidence of the occupation of the area by the Old People.

5.0 Consultation with Aboriginal Communities and Statement of Aboriginal Significance

The designated Aboriginal Heritage Officer (AHO) for this project is Rocky Sainty. 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.

Two Aboriginal heritage sites (AH8815 and AH11483) and one area of Potential Archaeological Sensitivity (PAS1) are confirmed as being present within the Boyer Road Precinct study area. In addition, there are several other known Aboriginal heritage sites within a 100m radius of the study area. As part of the initial assessment undertaken by CHMA (2024) the report prepared by CHMA (2024) was sent out to the Aboriginal organisations listed below for comment. No comments were received.

Given the important Aboriginal heritage values in these areas, the decision has been made to distribute this test pitting report for Aboriginal community consultation. The report has been sent to the same organisations as listed below.

- Tasmanian Aboriginal Centre (TAC)
- Parrdarrama Pungenna Aboriginal Corporation
- South East Tasmanian Aboriginal Corporation (SETAC)
- Weetapoona
- Karadi Aboriginal Corporation.

The outcomes of this consultation process is presented in Appendix 1 of this report.
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Rocky Sainty has provided a statement of the Aboriginal cultural values attributed to the Aboriginal heritage values identified as part of this assessment, and the broader study area. This statement is presented below.

Statement of Cultural/Social Significance by Rocky Sainty

Aboriginal heritage provides a direct link to the past, however, is not limited to the physical evidence of the past. It includes both tangible and intangible aspects of culture. Physical and spiritual connection to land and all things within the landscape has been, and continues to be, an important feature of cultural expression for Aboriginal people since creation.

Physical evidence of past occupation of a specific place may include artefacts, living places (middens), rock shelters, markings in rock or on the walls of caves and/or rock *shelters, burials and ceremonial places. Non-physical aspects of culture may include the knowledge (i.e. stories, song, dance, weather patterns, animal, plant and marine resources for food, medicines and technology) connected to the people and the place. While so much of the cultural landscape that was* ***lutruwita*** *(Tasmania) before invasion and subsequent colonization either no longer exists, or has been heavily impacted on, these values continue to be important to the Tasmanian Aboriginal community and are relevant to the region of the project proposal.*

The survey assessment undertaken by myself and CHMA in 2024, together with other previous investigations has confirmed the presence of two Aboriginal heritage sites within the Boyer Road Precinct (sites AH8815 and AH11483) as well as numerous Aboriginal shell midden sites along the section of the Derwent estuary just to the south of the study area. There are also areas where there is the possibility of more sub-surface deposits being present. Specifically, the area termed PAS1, which also sits within the study area.

Our current test pitting program has been useful in determining that cultural deposits associated with a number of registered shell midden sites that are situated along the River Derwent margins, do not extend into the study area. The test pitting program has also confirmed that site AH11483 (an Isolated artefact which is on the west boundary of the study area) does not appear to be a larger artefact scatter. We didn't place test pits within the boundaries of site AH8815 and PAS1. However, we did place a number of test pits around the edges of the site and PAS boundaries. No cultural deposits were recovered in these test pits. These negative results provide a good indication that site AH8815 probably doesn't extend beyond the current recorded boundaries and that the PAS1 boundaries that we established are reasonably accurate.

So much of the area around Bridgewater and other parts of the River Derwent estuary has been developed, and as a result much of our cultural heritage has been destroyed. These recorded Aboriginal sites and areas represent some of the few remaining sites along this part of the estuary. These remaining sites are highly valued by the Tasmanian Aboriginal community as they provide a strong tangible link with our ancestors. I would strongly advocate that they are protected and conserved. To this end, I support the management recommendations that are presented in this report, specifically as they relate to sites AH8815 and AH11483 and PAS1. I would strongly advocate that options are explored for avoiding impacts to sites AH8815 and AH11483 and potentially conserving these sites in open space reserves of some sort. My preference would also be that PAS1 is treated in the same manner and conserved and protected. If this is not possible and there is the potential that some or all of this PAS may be potentially impacted by future development, then I would advocate for a program of sub-surface investigations to be undertaken in this area. This would help clarify whether there are in fact cultural deposits in this area, which in turn will allow for more informed management decisions to be made for this PAS area. I have reviewed the current proposed Masterplan for the Boyer Road Precinct project and I can see that these *recommendations have been taken into consideration and that the two sites and the PAS1 area has been incorporated into open space. This project also provides the opportunity for interpretation initiatives to be implemented, which highlight the importance of the River Derwent to the Tasmanian Aboriginal community, past and present. I would urge Council to pursue these interpretation initiatives, as part of the future development of this precinct*

6.0 Statutory Controls and Legislative Requirements

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

6.1 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). 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 of 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 Heritage 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 for bodies corporate other than small business entities and 5,000 penalty units for individuals or small business entities; for reckless or negligent offences, the maximum penalties are 2,000 and 1,000 penalty units respectively. 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".

6.2 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 1984* and the *Environment Protection and Biodiversity Conservation Act 1999*

Australian Heritage Council Act 2003

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 1984

This Federal 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 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 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 landuser/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 and/or 5 years gaol and a larger fine for a Corporation (s.22);
- If the contravention is in relation to a significant Aboriginal object, the penalties are increased and/or 2 years gaol (s.22);
- In addition, offences under s.22 are considered 'indictable' offences that also attract an individual fine and/or 12 months gaol or, for a Corporation, a larger fine (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

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 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 1984*, 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).

7.0 Aboriginal Cultural Heritage Management Plan

7.1 Summary Management Recommendations

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

- The findings of the CHMA (2024) investigations.
- The results of the current sub-surface investigation as documented in section 3 of this report.
- Consultation with Aboriginal Heritage Officer Rocky Sainty and the outcomes of the Aboriginal community consultation (see section 5 and Appendix 1)
- The legal and procedural requirements as specified in the *Aboriginal Heritage Act 1975* (see section 6).

Table 2 provides the summary management recommendations for this project. The more detailed recommendations are presented in section 7.2.

Table 2: Summary management recommendations for the project

Site/Area	Grid Reference (GDA 94)	Management Recommendations
AH8815	Estimate Only E517543 N5268507 E517580 N5268493 E517667 N5268622 E517744 N5268748 E517705 N5268765 E517628 N5268632	Site AH8815 is an artefact scatter that is located within the study area (see Figure 6). Preferred management option is for the site area to be protected in open space. This is reflected in current Masterplan (see Figure 7). Short, Medium and Long term management plan should be developed for the site area. If there is the potential for the site to be impacted by future rezoning and development, then it is recommended that further sub-surface investigations should be undertaken within the site complex and immediate surrounds. Aim of investigations will be to more accurately clarify the spatial extent and nature of artefact deposits present and to develop informed management and mitigation options for the site. Scope and methodology for investigations is to be ratified with AHT. Permit will be required.
Site AH11483	E517070 N5269150	Site AH11483 is an isolated artefact that is located within the study area (see Figure 6). This artefact could not be found during the CHMA (2024) assessment or the current investigations, but is likely to be still present in area. Preferred management option is for the site to be protected in open space. This is reflected in current Masterplan (see Figure 7). If there is the risk that this site may be impacted then apply for a permit.
PAS1	E517584 N5268755 E517605 N5268721 E517650 N5268695 E517680 N5268690 E517715 N5268745	PAS1 is an area of High Potential Archaeological sensitivity that is situated within the study area (see Figure 6). Preferred management option is for the PAS1 area to be protected in open space. This is reflected in current Masterplan (see Figure

Site/Area	Grid Reference (GDA 94)	Management Recommendations
	E517636 N5268805	7). Short, Medium and Long term management plan should be developed for the PAS1 area. If there is the potential that the PAS1 area may be partially or entirely impacted, then undertake program of sub-surface investigations to more accurately determine presence/absence, nature and extent of cultural deposits that may be present. Scope and methodology for investigations is to be ratified with AHT. No permit initially required to commence investigations. Permit may be required pending findings.
General Recommendations		• Develop an Aboriginal cultural heritage interpretation plan for the precinct. • If previously undetected Aboriginal sites or suspected features are located within the Boyer Road Precinct during any future works, the processes outlined in the Unanticipated Discovery Plan should be followed (see Appendix 3). • Copies of this report should be submitted to AHT and the AHC for review and comment.

7.2 Detailed Management Recommendations

Recommendation 1 (Site AH8815)
Site AH8815 is situated within the bounds of the Boyer Road Precinct study area (see Figure 6). The preferred management option is that site AH8815 is conserved and managed within open space, and that the site is not impacted by future development. This recommendation has been adopted in the current Masterplan (see Figure 7).

A detailed landscaping plan should be developed for the open space area incorporating site AH8815. The landscaping plan should outline the short, medium and long term strategies for managing this area. It should include what plant species could be planted in the area, what access arrangements apply for the area and what facilities are permitted in the area (such as signage, walking tracks etc). The landscaping plan should be developed in consultation with the Tasmanian Aboriginal community and Tasmanian Aboriginal community members with the appropriate levels of skills and experience would be engaged to assist with the development of the landscaping plan as well as the implementation of the plan.

During any future construction works, the proponent will need to ensure that there is no soil disturbing works undertaken with the registered boundaries of site AH8815. Once the proponent takes control of the site, it is recommended that temporary high visibility protective barricading should be erected around the spatial extent of the site that occurs within the study area, with a 5m buffer applied to the current site boundary. The erection of the barricading should be inspected by the designated archaeologist and AHO, to ensure that it adequately protects site AH8815. No earth disturbance works should be undertaken within the barricaded exclusion zone, and no machinery or vehicles should access this zone. The type of barricading used, and the installation methods adopted should be designed to minimise any soil disturbances. The preferred form of barricading would be star pickets and plastic mesh webbing. The barricading should remain in pace for the duration of construction activities. Construction contractors should be made aware of the obligations with regards to the exclusion zone.

All Aboriginal relics are protected under the *Aboriginal Heritage Act 1975* (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. Therefore, if there is the potential that site AH8815 may be impacted by future development, then it is recommended that a program of sub-surface investigations should be implemented within and in the immediate surrounds of the site. The aim of these investigations will be to more accurately determine the potential extent and nature of Aboriginal cultural deposits that are present. The findings of these investigations will inform future management decisions. The scope and requirements of the sub-surface test pitting program should be ratified with AHT prior to the test pitting being implemented. A permit will be required to implement these investigations.

The findings of the test pitting program should be presented in a report which would act as an addendum to this report. The report would include management recommendations for any further requirements that may apply to the proposed development and obligations regarding managing identified Aboriginal cultural values.

Recommendation 2 (Site AH11483)

Site AH11483 is an isolated artefact that is located within the study area (see Figure 6). This artefact could not be found during the CHMA (2024) survey and no additional artefacts were identified in the area during the current test pitting program. The artefact is likely to be still present in the area, but covered by vegetation. The preferred management option is for the site area to be avoided and protected and if possible, retained in open space. The current Masterplan shows that site AH11483 is situated in an open space area, outside the development footprint (see Figure 7).

During any future construction works, the proponent will need to ensure that there is no soil disturbing works undertaken with the registered boundaries of site AH11483. Once the proponent takes control of the site, it is recommended that temporary high visibility protective barricading should be erected around the spatial extent of the site that occurs within the study area, with a 3m buffer applied to the current site boundary. The erection of the barricading should be inspected by the designated archaeologist and AHO, to ensure that it adequately protects site AH11483. No earth disturbance works should be undertaken within the barricaded exclusion zone, and no machinery or vehicles should access this zone. The type of barricading used, and the installation methods adopted should be designed to minimise any soil disturbances. The preferred form of barricading would be star pickets and plastic mesh webbing. The barricading should remain in pace for the duration of construction activities. Construction contractors should be made aware of the obligations with regards to the exclusion zone.

All Aboriginal relics are protected under the *Aboriginal Heritage Act 1975* (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. Therefore, if there is the potential that site AH11483 may be impacted by future development, then the proponent will need to apply for and be granted a Permit to impact this site.

Recommendation 3 (PAS1)

PAS1 is an area of high Potential Archaeological sensitivity that is located in the study area (see Figure 6). The preferred management option is that PAS1 is conserved and managed within open space, and that the PAS1 area is not impacted by future development. This recommendation has been adopted in the current Masterplan (see Figure 7). As specified for site AH8815, a detailed landscaping plan should be developed for the open space area incorporating PAS1.

If there is a risk that the PAS1 area may be impacted by future development, then it is recommended that a program of sub-surface investigations should be undertaken within the boundaries of the PAS1 area. The primary aim of the sub-surface investigations will be to determine whether there are any Aboriginal cultural deposits present within the PAS1 area. If Aboriginal cultural deposits are determined to be present, then the objective would be to determine the potential extent and nature of these deposits and whether they are associated with site AH8815. The scope and requirements of the sub-surface test pitting program should be ratified with AHT prior to the test pitting being implemented. This would involve the development of an approved Method Statement for these works. Given that the sub-surface investigations are not being undertaken within the boundaries of a registered Aboriginal site, then no Permit will be required to initiate these investigations. However, if Aboriginal cultural deposits are detected, then investigation works will need to stop in that area and an application made for a Permit. The Permit will need to be granted before works can recommence.

The findings of the test pitting program should be presented in a report which would act as an addendum to this report. The report would include management recommendations for any further requirements that may apply to the proposed development and obligations regarding managing identified Aboriginal cultural values.

Recommendation 4 (Interpretation Plan)

A detailed Aboriginal cultural interpretation plan should be developed for the Boyer Road Precinct. At a minimum, the interpretation plan should address what cultural information is appropriate to present for the area, what the most appropriate forms of delivery are for this information, and where within the development is the appropriate location for placement of information. The Interpretation plan should be developed in consultation with the Tasmanian Aboriginal community and Tasmanian Aboriginal community members with the appropriate levels of skills and experience would be engaged to assist with the development of the landscaping plan as well as the implementation of the plan.

Recommendation 5 (Unanticipated Discovery Plan)

If, during the course of proposed future development works, previously undetected archaeological sites or objects are located, the processes outlined in the Unanticipated Discovery Plan should be followed (see Appendix 3). A copy of the Unanticipated Discovery Plan should be kept on site during all ground disturbance and development work. All personnel should be made aware of the Unanticipated Discovery Plan and their obligations under the *Aboriginal Heritage Act 1975* (the Act). 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.

Recommendation 6 (Provision of Reports)

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

Figure 6: Aerial image showing the locations of sites AH8815, AH11483 and PAS1 within the Boyer Road Precinct study area

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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 vary 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 Fragments
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.

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 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, with 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 its use. Major use-wear forms are edge fractures, use-polish and smoothing, abrasion, and edge rounding bevelling.

Appendix 1

Aboriginal Community Consultation Record

Appendix 2

Test Pit Profiles

Pit No.	Soil Profile and Comments	Results
Phase 1 Test Pits within the Zone of Moderate Sensitivity		
1	Pit located on flat terrain on basal hill slope. Grassed area, 50m west of creek. - 0-2cm Grey humic sand - 2cm-17cm Brown clay loams with increasing clay with depth. - 17cm-19cm Gravelly clays - 19cm Decomposed bedrock	No cultural deposits.
2	-	
3	-	
4	-	
5	-	
6	-	
7	-	
8	-	
9	-	
10	-	
11	-	
12	-	
13	-	
14	-	
15	-	
16	-	
17	-	
18	-	
19	-	
20	-	
21	-	
22	-	
23	-	
24	-	
25	-	
26	-	
27	-	
28	-	
29	-	
30	-	
Phase 1 Test Pits around PAS1		

Pit No.	Soil Profile and Comments	Results
31	Pit located on benched lower hill slope (1°). Pine Plantation, 70m from creek. - 0-2cm Grey humic sand - 2cm-21cm Light grey gravelly sand loams with increasing gravels with depth. - 21cm Bedrock and decomposing bedrock.	No cultural deposits.
32	-	
33	-	
34	-	
35	-	
36	-	
37	-	
38	-	
39	-	
40	-	
41	-	
42	-	
43	-	
44	-	
45	-	

Appendix 3

Unanticipated Discovery Plan

Appendix 4

Test Pitting Method Statement