GEO-ENVIRONMENTAL SOLUTIONS

PRELIMINARY LAND CAPABILITY ASSESSMENT

Longford Expansion Study area

CLIENT

JMG

February 2021

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EXECUTIVE SUMMARY

Geo-Environmental Solutions Pty Ltd was engaged by JMG Engineers and Planners on behalf of the Northern Midlands Council to complete a preliminary land capability assessment of the Longford Expansion Study Area.

Following desktop review and limited field inspection of the land in the study area, the land has been classified as a mix of Class 3 and Class 4 agricultural land. The capability of the land is suited for continued agricultural use, provided suitable land management techniques are utilised to maintain the soil resource. Current land use includes grazing and broad acre cropping and much of the land would also support future development for horticulture.

As part of the land surveyed is Class 3 agricultural land (i.e. prime land), and part of the area is within a declared irrigation district, future conversion to a non-agricultural use such as residential could be in conflict with the state policy on the protection of agricultural land.

It is recommended further detailed land capability assessment be completed of the study area to clearly define the class boundaries, existing land uses, irrigation resources, and potential fettering of future agricultural land use in the area. A study of the regional economic benefit to the area of a future rezoning to residential use must also be undertaken for assessment against the State Protection of Agricultural Land Policy.

FOUNDING STATEMENT

This assessment report is one of many completed by John Paul Cumming of Geo-Environmental Solutions P/L (GES). John Paul holds a first class honours degree in Agricultural Science (major in soil science) and a PhD in environmental soil chemistry. John Paul is formerly an Honorary Research Associate in the Faculty of Engineering, Science, and Technology where he participated in a number of academic and research projects pertaining to soil and environmental management. John Paul has current status as a Certified Professional Soil Scientist (CPSS).

John Paul is a graduate member of the Australian Institute of company directors, and a director of Geo-Environmental Solutions P/L (GES). In his role at GES John Paul has completed numerous land capability assessments for Federal, State and Local Government agencies. In addition, over the past eighteen years John Paul has supervised over 15000 site and soil classifications for residential developments according to AS2870-2011 and AS/NZS1547-2012.

1 INTRODUCTION

The study area is located on the southern margins of the Township of Longford, in the Northern Midlands Council Municipal area. The township is located approximately 20 kilometres South West of Launceston (Figure 1).

A number of towns in the Northern Midlands area including Longford have experienced recent residential growth as the towns become a more popular choice for commuters into Launceston. As a result, the Northern Midlands Council is undertaking a study into potential expansion of the existing township, and in particular in the area to the south of the township (see figure 2). In general terms the study area is bound to the south by Haselwood Street, to the East By Brumby Street, The West by Back Creek West of Cressy Road, and the existing residential areas along Cracroft to Bulwer Streets in the township to the north.

It is the scope of this report to consider the agricultural capability of the study area and the immediate surrounds, in the context of potential future residential development. The report will refer to the relevant sections of the State Policy on the Protection of Agricultural Land (PAL).

Figure 1 – Area Location

1.1 Planning context

The majority of the land in the study falls within land zoned 'Rural Resource' under the Northern Midlands Interim Planning Scheme (2013) – see figure 2. Smaller areas of land are zoned Utilities (waste management centre), industrial (brickworks), recreation (race track) and low density residential. The study area is also covered by the bushfire prone areas overlay and attenuation overlays from the waste management centre and brickworks.

It is assumed that the outcomes of the Longford Expansion Study and community consultation process would be utilised to inform any future change of zoning for residential or other uses within the area as part of the future Tasmanian Planning Scheme. As a result, it is important to consider the effect of possible land use change from the current rural resource zoning upon the loss of agricultural land, and the possible fettering of surrounding agricultural land. Possible future changes to land use within the study area may also include commercial, industrial and community uses. However, a potential change of use to residential is considered to have the most potential for future conflict with surrounding agricultural land use and as such will be considered in the most detail.

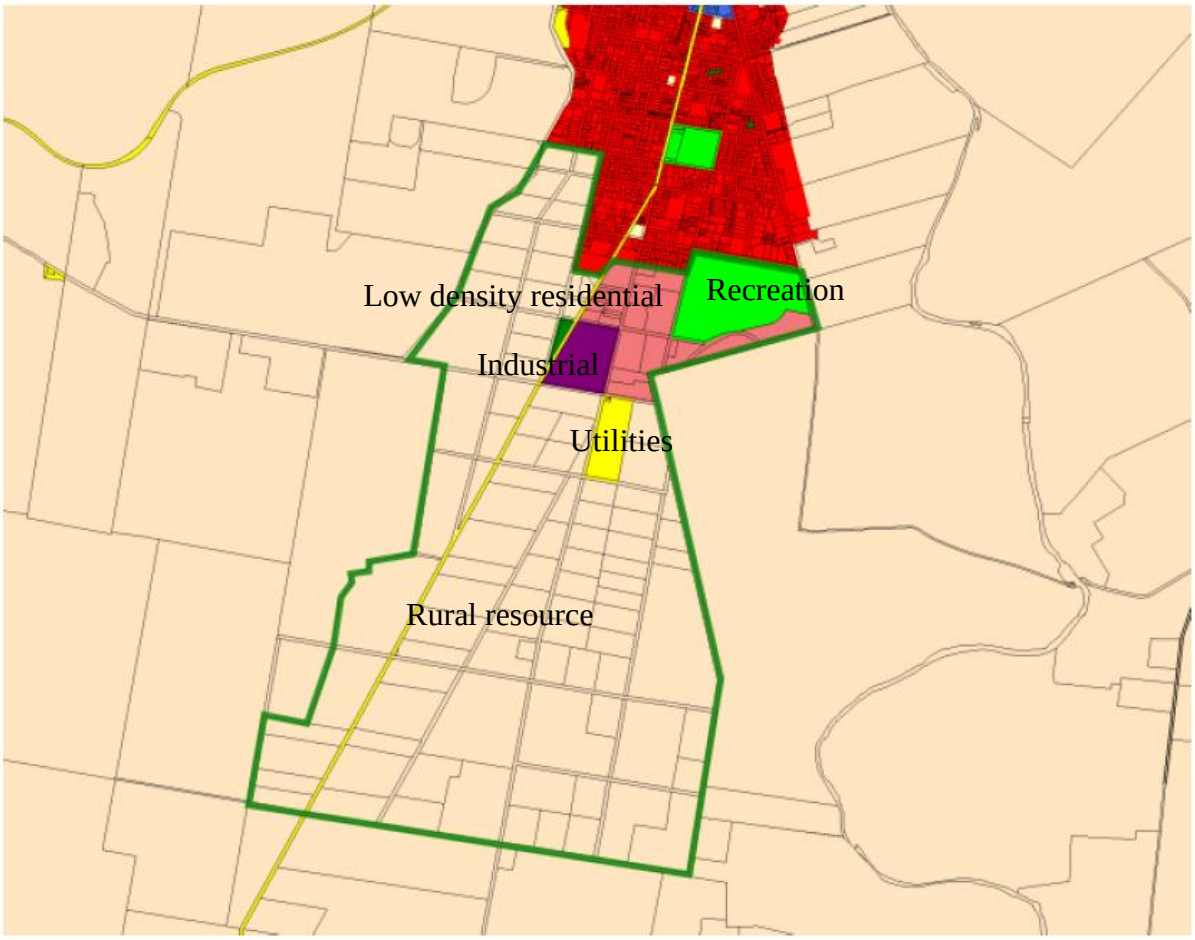

Figure 2 – Study Area Identified in green (extract from JMG Briefing Paper) and existing zoning

2 SITE INFORMATION

Site information pertaining to the agricultural capability of the land was collected from desktop and limited field survey.

2.1 Topography

The area is characterised by relatively flat agricultural land with Back Creek running to the West of the township, and the Macquarie river to the East (see figure 3). The study area has an elevation of approximately 140-145 m AHD and the majority of the land has a slope angle of less than 5% (see figure 4). There is no evidence of significant erosion, although due to the flat topography seasonal surface water is known to accumulate, and localised flooding may occur in areas close to Back Creek. A number of small dams can also be found across the area, and most appear to have been developed to support stock grazing and equine pursuits (see figure 5).

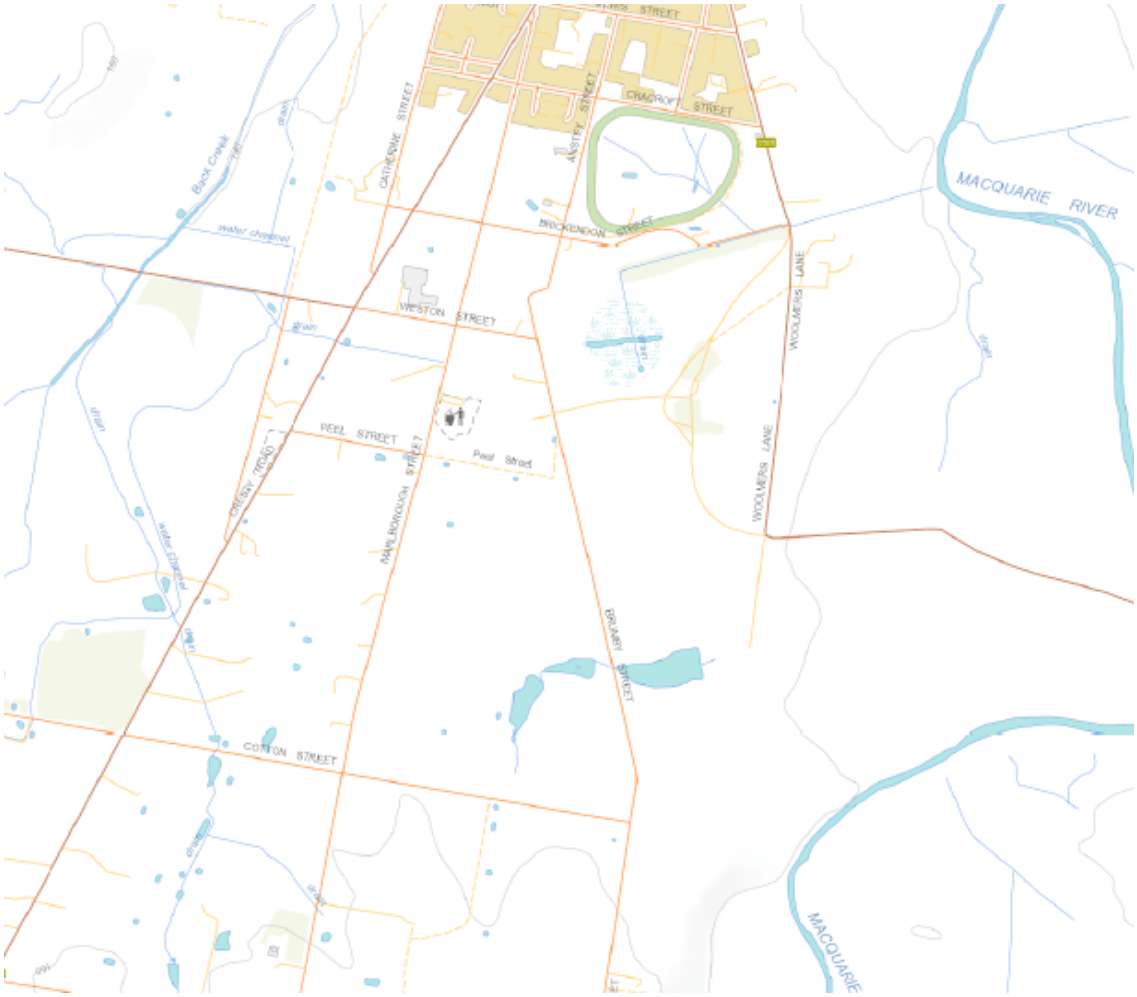

Figure 3 – Topography of the study area

Figure 4 – Example of the relatively flat topography in the area of Marlborough Street

Figure 5 – Example of one of the small dams in the area

2.2 Climate

According to the rainfall information supplied by the Bureau of Meteorology, the weather station at Cressy Research Farm Station Number 091022 (approximately 10Km to the South) has recorded an average annual rainfall of 629mm. The rainfall is moderate to low and is generally consistent with many other agricultural regions in the northern midlands region as a dry temperate climate. There is a general rainfall deficit in summer months and any intensive agriculture will require irrigation to supplement natural rainfall, whilst due to the topography and low winter temperatures there can be localised water logging and flooding.

The mean maximum temperature of 24^{o}C in summer suits a range of temperate fresh fruit, cereal, and vegetable production. The highest daily temperatures recorded will not pose a problem for temperate plants and maximum night temperatures are below 20^{o}C. This is sufficient to prevent plants continuing to respire at high levels after daily heat stress.

According to bureau data nearly 100 frosts occur a year at Cressy, the majority during the period May to October although frosts have been recorded in all months of the year. As most intensive horticultural crops are temperate plants, the critical period for frost avoidance is during flowering (Sept – Oct). Therefore, it is anticipated that temperatures could decrease to significantly low levels and be of high enough frequency to prohibit several horticultural crops. As a result careful crop choice and frost protection measures may need to be considered in the area.

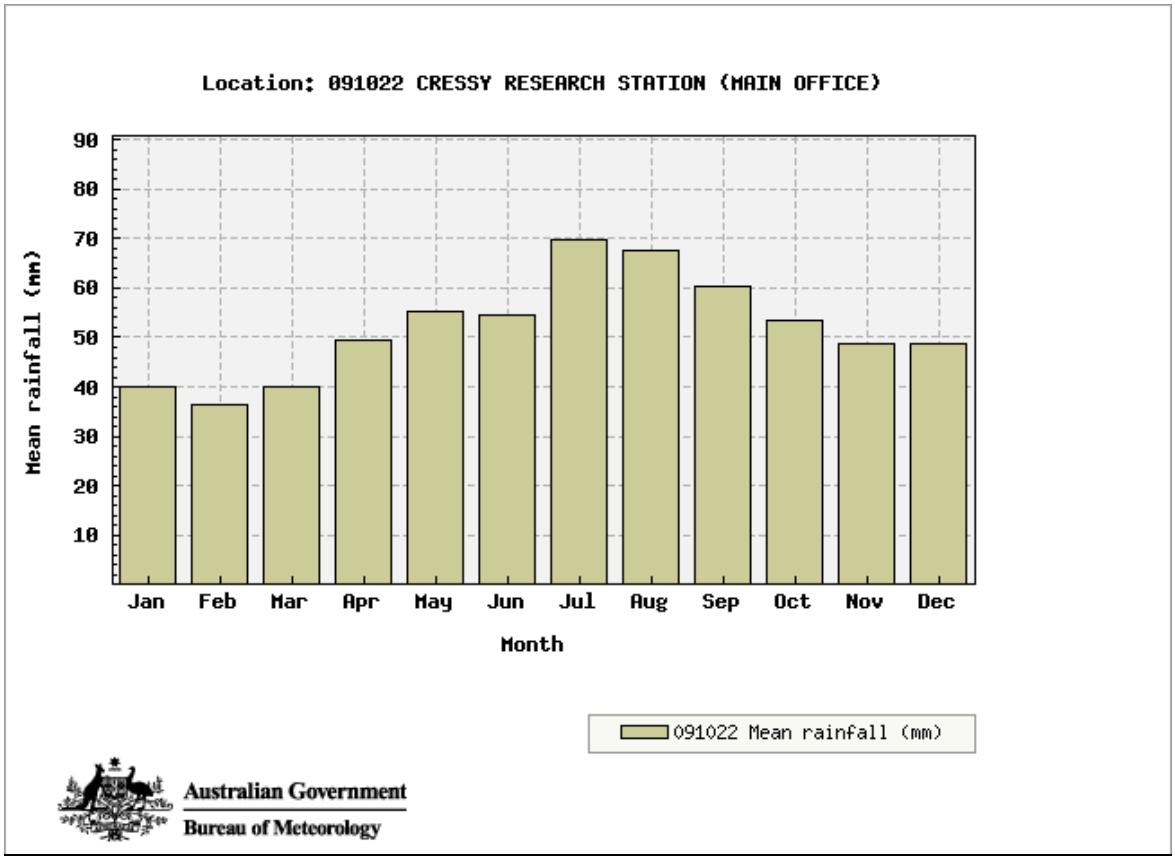

Figure 6 – Mean monthly rainfall averages for Cressy Station

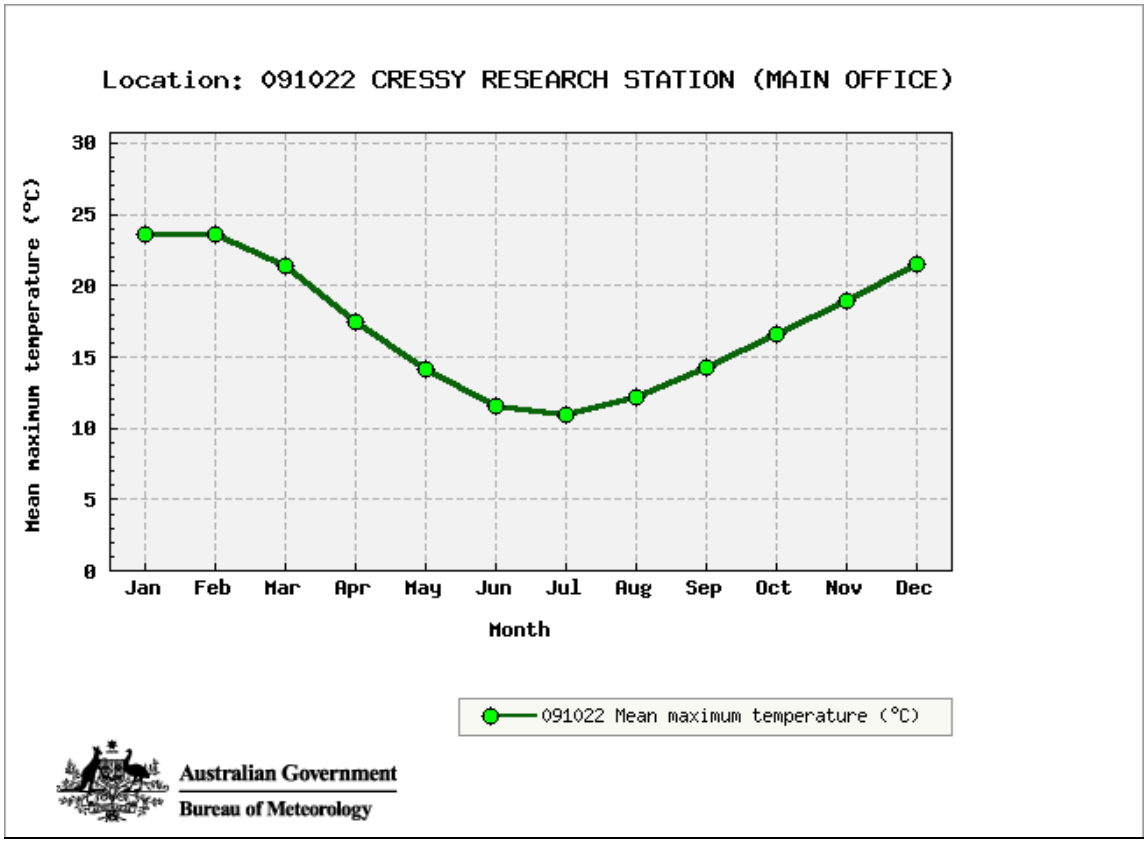

Figure 7 – Mean maximum temperature averages for Cressy Station

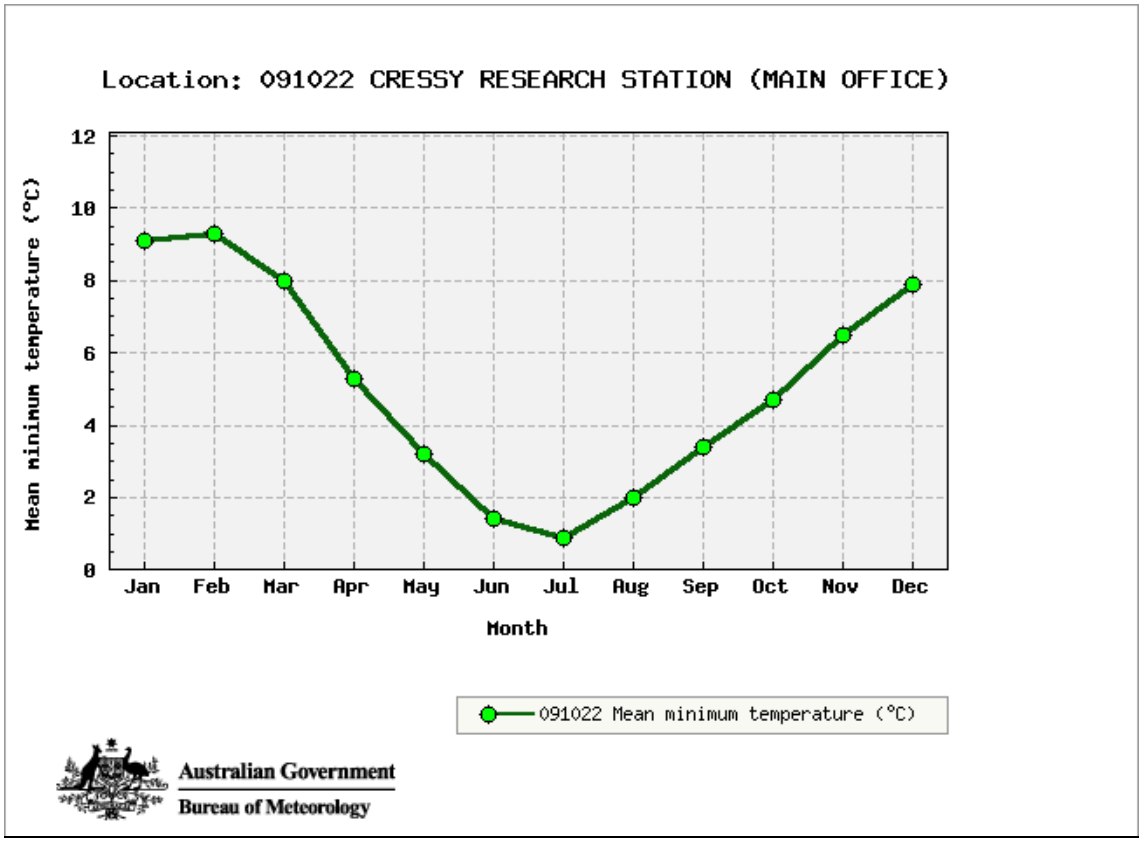

Figure 8 – Mean minimum temperature averages for Cressy Station

2.3 Geology

The northern midlands area around Longford is dominated by the Launceston Tertiary Basin. The basin was formed as a result of normal faulting during the early Tertiary period and subsequent partial infilling of the basin by transported material eroded from the surrounding uplifted blocks. The basin is bordered by the Ben Lomond Plateau to the North East and the Great Western Tiers to the South West.

The geology of the Launceston Tertiary Basin generally comprises unconsolidated clays, sands and gravels. These materials have been interpreted as lake and river sediments (Matthews, 1974), which have been deposited during the mid to late Tertiary period after being eroded from the surrounding uplifted areas. As the lake waters drained from the basin, river systems cut through the landscape to form a series of flat terraces. It is a long flat terrace of the type that characterises the study area at Longford.

The Longford area is covered by a current 1:25 000 MRT geological map, which can be found in figure 9. The map confirms that tertiary aged deposits (Cenozoic over sequences) dominate the local area, and the Woodstock and Brickendon surfaces in particular. Both the Woodstock and Brickendon Terraces have undergone varying degrees of laterisation during late Tertiary or early Quaternary times and ironstone gravels are a common feature of the deposits. The mapping also indicates a very small area of quaternary alluvial sediments in the immediate vicinity of Back Creek.

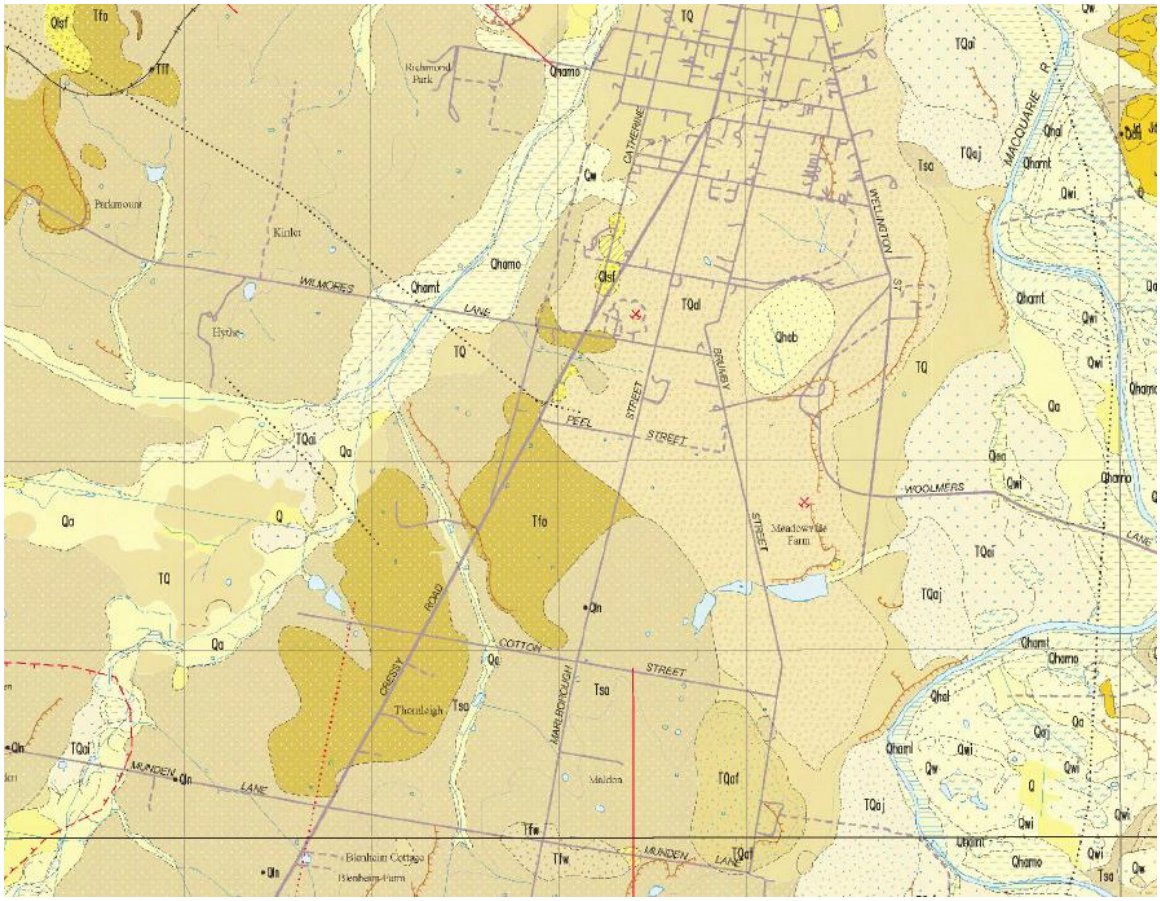

Figure 9 – Geology of the local area (MRT 1:25 000)

2.4 Soil distribution

Soils of the area were mapped as part of the South Esk Sheet (DPIPWE - Doyle 1993) as presented in figure 10. Limited field survey was also undertaken to identify and confirm the general soil distribution and photos of typical profiles in exposed cuttings can be found in figures 11 & 12.

The majority of the soils in the study area have developed on Tertiary sediments which have undergone various periods of weathering, transportation and deposition. The soils on Tertiary sediments are dominated by duplex profiles with occasional gradational profiles. The duplex profiles can pose significant problems for agricultural use. Under the climatic conditions prevalent throughout the region, duplex soils typically dry out in summer and are wet in winter. Many profiles have a bleached A2 horizon which is deficient in nutrients and has a poor structural condition. The duplex soils generally fall into a classification of Chromosols and Sodosols under the Australian Soil Classification of Isbell (1996) and generally have low agricultural potential due to inherent soil physical and chemical properties.

The older terraces which dominate much of the study area have also experienced more extreme weathering and as a consequence, soils found on the Woodstock and Brickendon surfaces tend to be acidic, intensively leached and are deficient in major nutrients such as potassium and phosphorous. Soils on the Woodstock and Brickendon surfaces have undergone variable laterization whereby there has been significant leaching of iron and aluminium from the upper soil horizons and a corresponding accumulation lower in the profile usually in the form of "ironstone or buckshot" gravels. In some areas these gravels may form a discontinuous cemented layer which can prevent root penetration and reduce soil moisture availability to plants.

The more favourable gradational soil types in the study area on the Tertiary and Quaternary sediments are known locally as the Cressy soils and Kinburn soils. The Cressy soils are classified as Dermosols due to a more neutral (less acid) base status, and are generally moderately well structured clay loams. The Kinburn soils, are often found in lower positions in the landscape, and as a result are normally poorly drained (in the study are they are found associated with Back Creek). Both profiles may contain variable amounts of ironstone and other gravels. The Cressy soils are found in the southern margins of the study area (south of Cotton Street) and are some of the best soils in the area. The Cressy soils have been used intensively in the South Esk region for agriculture and as a result many of the soils have seen organic carbon and structural degradation from over cropping.

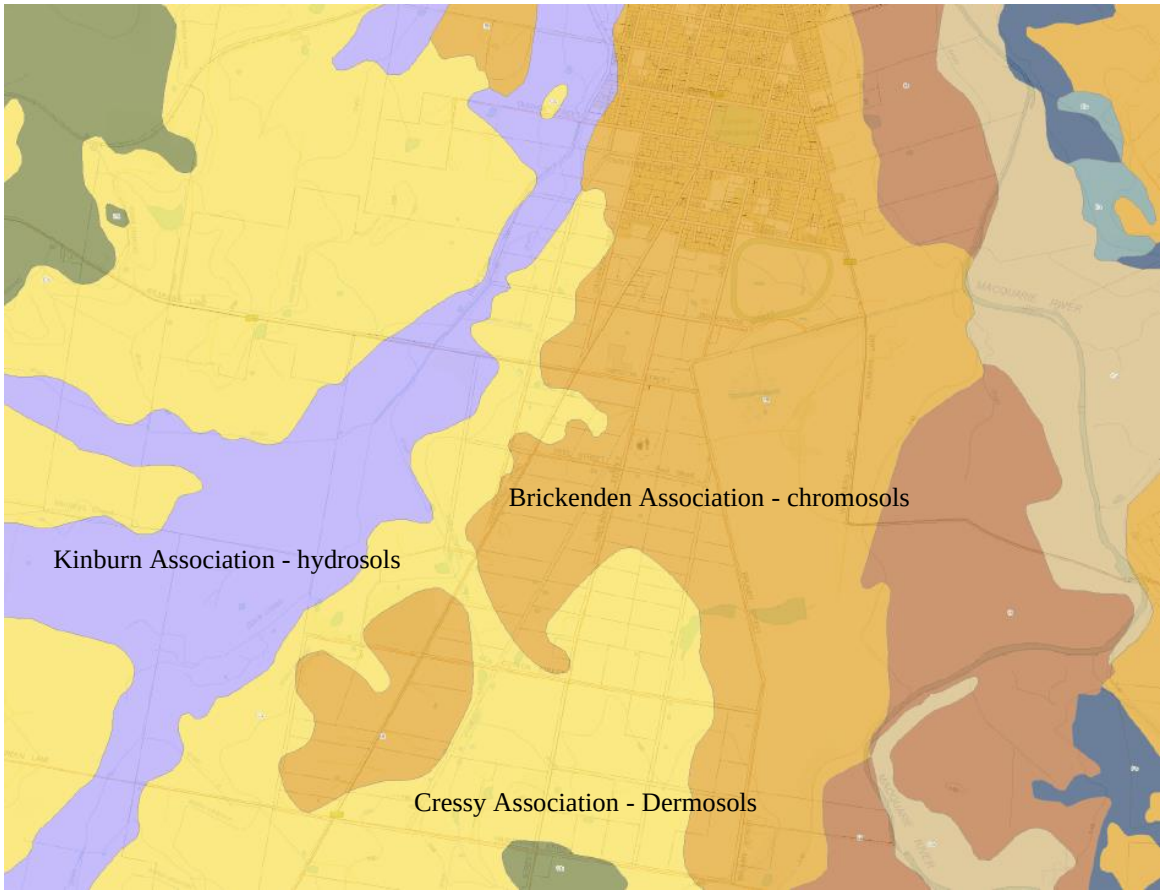

Figure 10 – Soils of the local area (DPIPWE 1:25 000)

Figure 11 - Brickendon Association soils with significant ironstone gravel content

Figure 12 - Cressy Association soils with variable gravel content

3 LAND CAPABILITY ASSESSMENT

Agricultural Land Capability assessment has been developed in Tasmania by the Department of Primary Industries Water and Environment according to the guidelines described in Noble (1992) and Grose (1999). The system uses a rating system of 7 classes to classify land according to the ability of the land to sustain a range of agricultural uses without land degradation. Agricultural land capability is generally based upon the permanent biophysical features of the land such as geology, soils, slope, climate, erosion hazard etc. The classification system assumes an average standard of land management and that production will be sustainable if the land is managed according to the guidelines of its Class. The system does not take into account the economics of production, distance from markets, social or political factors; all of which can change over time.

The agricultural land capability system in Tasmania utilizes a hierarchical framework of 7 classes which describe the degree of limitation from little to no limitations in class 1, to extreme limitations in class 7. Subclasses then describe the dominant limitation(s) within the class, i.e. erosion, wetness, soils, and climate.

Land classified as class 1 – 4 is generally suitable for cropping activities subject to the limitations of each class, class 5 & 6 land is generally suitable only for grazing with careful management, and class 7 land is unsuitable for agricultural use (Grose 1999).

According to the State Policy on the Protection of Agricultural Land 2009 land classified as class 1, 2 and 3 is defined as prime agricultural land. The revised Protection of agricultural land policy also has provision for the protection of significant agricultural land from other land classes, and in particular land within declared irrigation districts. Therefore the task of the current land capability assessment was to confirm the published land capability mapping of the area, and further define the agricultural capability of the site.

3.1 Agricultural Land Capability Classes

The Land Capability Survey of Tasmania, 1:100 000 edition 6 (Grose & Moreton 1996), indicates that the land in the study area is a mix of Class 3 and Class 4 land (Figure 13). According to Grose (1999):

CLASS 3 is defined as:

Land suitable for cropping and intensive grazing. Limitations are such that either cultivation for cropping should be limited to two to five successive crops in a rotation with pasture or equivalent to prevent damage to the soil resource, or the risk of crop failure or yield reduction with average climatic conditions is such that significant losses can be expected 5-7 years out of ten. Soil conservation practices and sound management are needed to overcome the moderate limitations to cropping use. The range of crops able to be grown is generally more restricted than on Class 1 or 2 land.

CLASS 4 is defined as:

This land is primarily suitable for grazing but which may be used for occasional cropping. Limitations restrict the length of cropping phase and/or restrict the range of crops that could be grown. Cropping rotations should be restricted to one to two years out of ten in a rotation with pasture or equivalent.

A more detailed, site specific assessment of land classification would be required to confirm this assessment of land capability. On a first pass assessment it would appear the mapping follows the soil association closely but does not take into account topographical features such as dams, drainage lines and creeks which would limit the localized land capability. This is particularly the case for the Kinburn Association soils close to Back Creek which are classified as hydrosols due to known waterlogging and flooding issues.

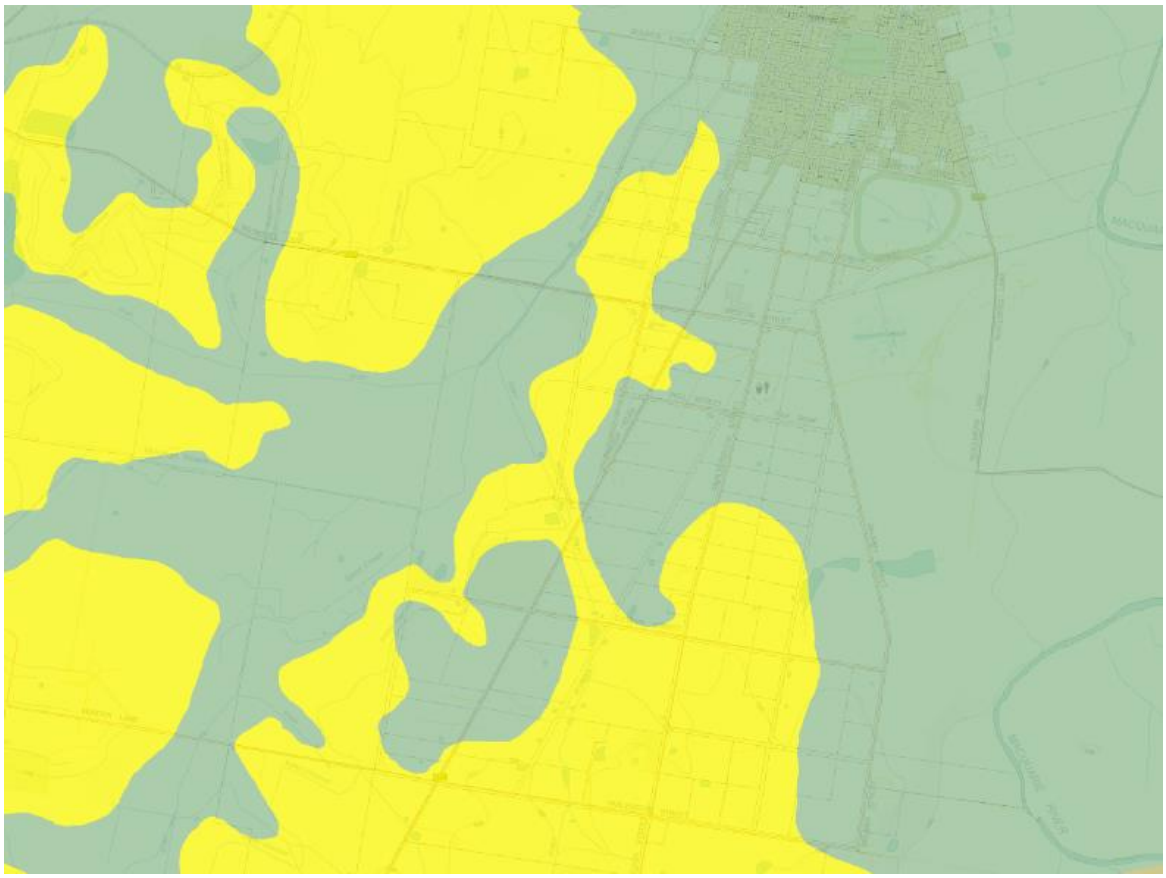

Figure 13 – Land Classification boundaries from Land Capability Survey of Tasmania, 1:100 000 (Grose & Moreton 1996). Green - Class 4, Yellow– Class 3

As the site is classified as a mix of Class 3 & Class 4 land it is primarily suitable for grazing within rotations of cropping. It is mainly limited by soil fertility with minor constraints of erosion hazard and subsoil drainage. Long term productivity will be increased if soil nutrients are regularly replenished. Cropping can readily occur due to the relatively flat land provided soil conservation techniques are utilized and the soil is rested with periods of pasture within the rotation. Perennial horticulture developments could also be undertaken on this land, providing a detailed drainage survey is undertaken prior to establishment and adequate frost protection is available.

Care would be required to maintain ground cover to minimize any potential erosion, particularly in the riparian zone close to the drainage lines which are not recommended for agricultural use. Part of the study area is located within a declared irrigation district (the Cressy-Longford Scheme) as shown in figure 14. The irrigation district is predominantly restricted to the land west of Cressy Street, with a small area in the South West corner close to Haselwood Street. The presence of the irrigation scheme allows for the agricultural land in the study area to be used for a range of agricultural enterprises.

Based upon the published information, limited field survey and historical evidence it would appear that a large area of the land examined within the study area is suitable for agriculture, consistent with the land capability mapping of class 3 and 4 land. It is noted that some of the land has been fragmented into a number of smaller titles of approximately 2 to 5 ha in size, however a number of these titles are held in ownership by one party, allowing consolidation into larger holdings. In addition, a number of the titles also support residential buildings possibly fettering agricultural use.

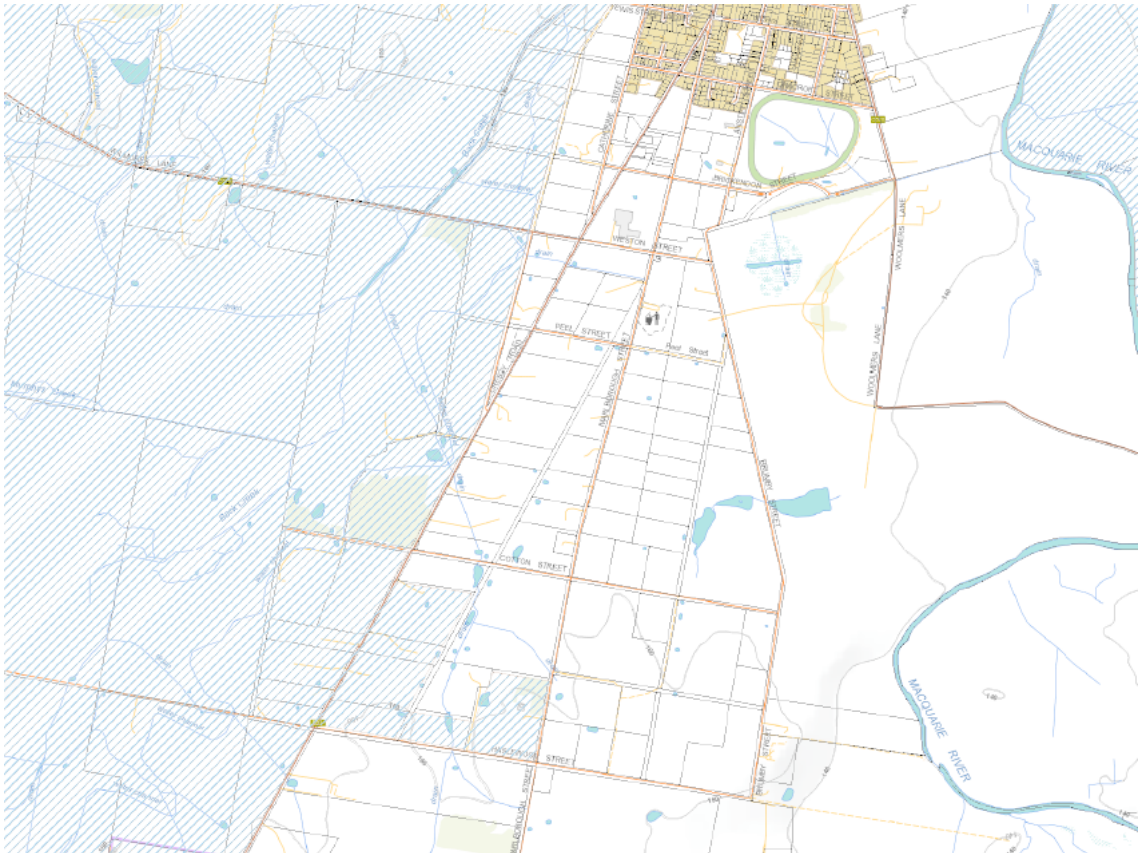

Figure 14 – Declared Irrigation District (Cressy-Longford) shown in blue hatching

In 2017 a state government project was undertaken to provide further mapping of agricultural land in Tasmania with reference to current land use, enterprise suitability, land values, and possible agriculture zoning in the Tasmanian Planning scheme. The mapping for the Longford study area (figure 15) indicates that a large portion of the study area is mapped as potentially unconstrained, with a number of smaller titles identified as potentially constrained. The criteria for assigning the potential constraints are identified in the table below (extract from background report – Department of Justice 2017).

The criteria used for the potentially constrained land is generally based upon small title areas, and where land has been fragmented between different owners. This is typical of the land located north of Cotton Street, between Cressy Road and Marlborough Street in the centre of the study area (shown in yellow on figure 15). The series of small titles located to the east of Marlborough Street is mapped as unconstrained, perhaps due to ownership amongst only a few different landowners. According to the criterial this land may be potentially constrained as the some of the titles are as small as 3ha and located within close proximity to existing dwellings. Further exploration of the actual potential constraints on the land in this area is recommended (north of Cotton Street between Marlborough and Brumby Street).

Table 1 – Summary of criteria for mapping of potential constraints

Unconstrained	*Potentially Constrained (Criteria 2A)*	*Potentially Constrained (Criteria 2B)*	*Potentially Constrained (Criteria 3)*
– an area greater than the Criteria 1 size thresholds; or – an area less than the Criteria 1 thresholds, but adjoining another title with an area greater than the Criteria 1 size thresholds and a capital value of less than $50,000/ha.	– an area less than the Criteria 1 size thresholds; – a capital value of greater than $50,000/ha; and – not adjoining a residential zone.	– an area less than the Criteria 1 size thresholds; – a capital value of less than $50,000/ha; – not adjoining a title with an area greater than the Criteria 1 size thresholds; and – not adjoining a residential zone.	– an area less than the Criteria 1 size thresholds; – a capital value of less than $50,000/ha, or not adjoining a title with an area greater than the Criteria 1 size thresholds; and – adjoining a residential zone.

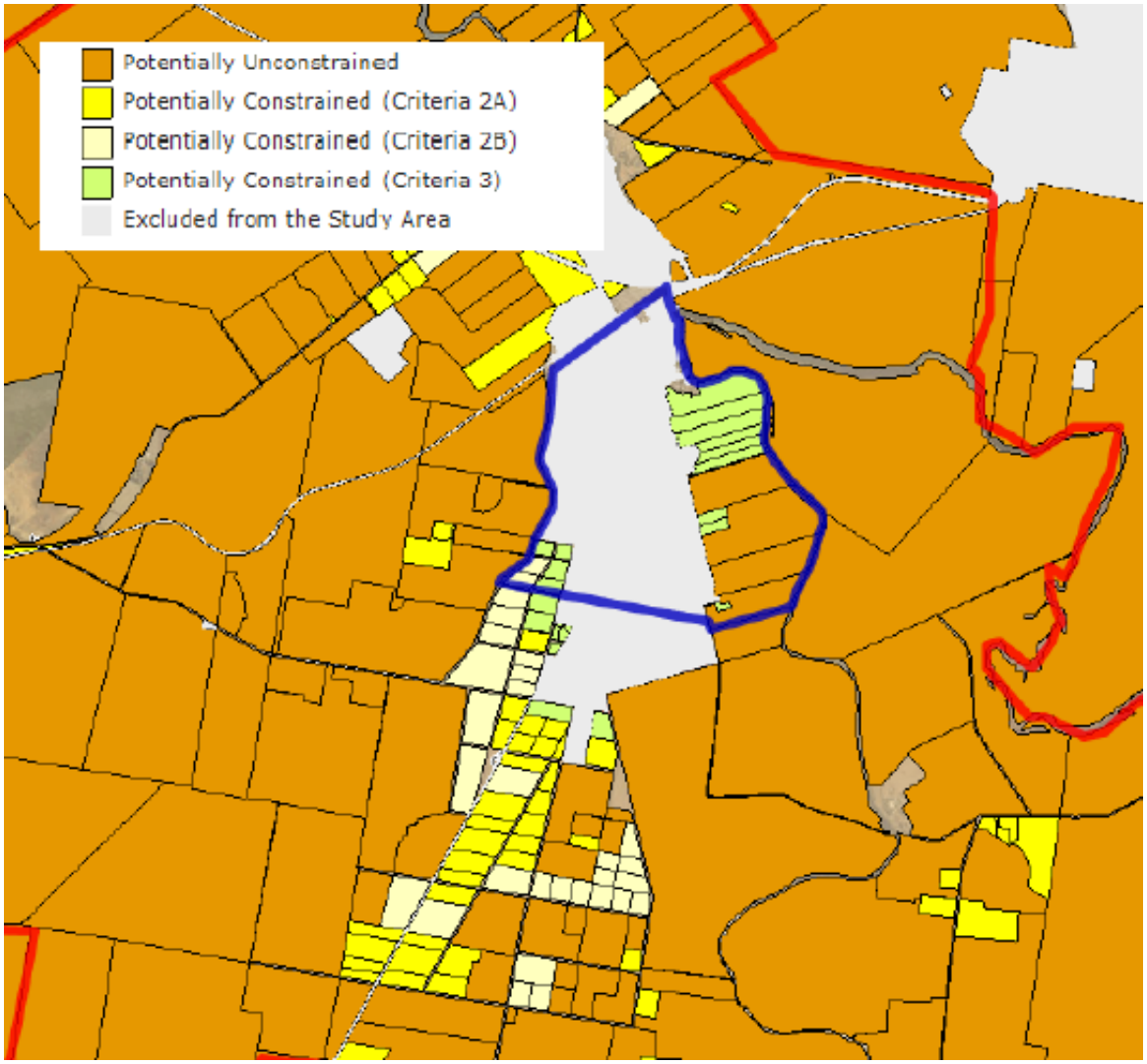

Figure 15 – Land potentially suitable for agriculture mapping

The potential land use constraints utilised in the mapping project for agricultural land repent and land suitability and not a land capability approach to the classification of agricultural land for future land use planning. The key difference is that land suitability assessment is based upon both land quality and economic factors. Whilst land capability is based upon the inherent quality of the land and the local climate only. The generally accepted approach in Australia is that future land use planning should be based upon land capability and not land suitability.

As land suitability assessment it is based upon economic factors it can only ever represent a point in time, it cannot represent the future agricultural potential of the land, without significant extrapolation or guess work. Commodity prices can fluctuate widely from year to year, markets for produce can come and go, and the range of crops or animal rearing enterprises available can change rapidly over time. This is clearly evident in the many changes experienced in the agricultural sector in Tasmania, from boom years of apple exports to the United Kingdom to the apple pulling program decades later, and other land uses like the planation forestry managed investment schemes. Likewise, the use of an arbitrary land value at a given point in time to assign a suitability to any one agricultural crop or future investment is also flawed due to the future economic assumptions required.

Therefore, whilst the constraints mapping can be a useful tool, I do not feel it should be utilised in preference to land capability assessment.

3.2 Policy on the Protection of Agricultural Land

The Protection of Agricultural Land Policy 2009 is the key instrument guiding land use planning decisions in relation to agricultural land in Tasmania.

The state policy on the Protection of Agricultural Land (2009) has a primary purpose **"*To conserve and protect agricultural land so that it remains available for the sustainable development of agriculture, recognising the particular importance of prime agricultural land*".**

With the objective
"***to enable the sustainable development of agriculture by minimising:***
(a) conflict with or interference from other land uses; and
(b) non-agricultural use or development on agricultural land that precludes the return of that land to agricultural use."

The policy has 11 key principles to be implemented through planning schemes or other relevant planning instruments. Of importance to the study area are principles 1, 2, 6, 7, and 8.

1. 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.

Comment – Any rezoning would need to address the loss of agricultural land, and also address the potential for fettering of adjacent agricultural land. In particular the large land holdings to the East of Brumby Street, to the South of Haselwood Street, and to the West of Cressy Road would all need to be provided with adequate buffers from any land rezoned for a residential or other sensitive use.

2. Use or 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.

Comment – this is a potential source of direct conflict of any future rezoning to residential use with the policy due to the presence of Class 3 land within the expansion study area. Further detailed land based mapping would be recommended to accurately define the area of Class 3 land, and as a guiding principle conversion of the Class 3 land should be avoided.

6. 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.

Comment – A study of the social, environmental, and economic costs and benefits of any rezoning would be required to allow for thorough assessment against this principle of the policy if Class 3 land is to be included in any rezoning proposal to a non-agricultural use.

7. 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.

Comment – A further detailed assessment of the land capability and land use on the local area must include refence to the local and regional land types, and in particular comment upon the relevance of class 4 land.

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.

Comment – Part of the study area is located within the Cressy-Longford Irrigation Scheme, which is a proclaimed irrigation district as defined under part 9 of the Water Management Act 1999. Permanent loss of the agricultural land to residential use would be in conflict with this principle. A more detailed assessment of irrigation infrastructure and water availability within the scheme on an individual property basis would be required to inform any future decisions.

4 CONCLUSION

As part of study area surveyed is Class 3 or prime agricultural land and is partially located within a declared irrigation district there is potential conflict with the State Protection of Agricultural Land Policy 2009 associated with any rezoning to a residential use.

A number of conclusions and recommendations have been made including:

- The study area is identified as a mix of Class 3 and Class 4 agricultural land.
- The Class 3 land identified within the study area is prime agricultural land as defined under the State Protection of Agricultural Land Policy 2009.
- Part of the land within the study area is located within a declared irrigation district as defined under part 9 of the Water Management Act 1999.
- Any change of zoning of the Class 3 land to residential or other non-agricultural land use has potential to conflict with the State Protection of Agricultural Land Policy.
- Any change of zoning of the land within the declared irrigation district to residential or other non-agricultural land use also has potential to conflict with the State Protection of Agricultural Land Policy.
- The local or regional significance of the Class 4 land in the Longford area must also be established to ensure any future land rezoning would also not conflict with principle 7 of the State Protection of Agricultural Land Policy.
- It is recommended that a more detailed land capability assessment be completed of the study area to clearly define the class boundaries, existing land uses, irrigation resources, and potential fettering of future agricultural land use in the area.
- A study of the regional economic benefit to the area of a future rezoning to residential use must also be undertaken for assessment against the State Protection of Agricultural Land Policy.

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Environmental and Engineering Soil Scientist

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