

Golden Plains Shire Council

Land Capability Assessment - Bannockburn Growth Area

Project No: 122300
May 2020

Prepared For:

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Rev	Date	Details	Written	Reviewed	Approved
A	15/05/2020	Land Capability Assessment – Bannockburn Growth Area (DRAFT)	MG	SP	SP
0	29/05/2020	Land Capability Assessment – Bannockburn Growth Area (FINAL)	MG	SP	SP

Executive Summary

Introduction

Meinhardt Infrastructure & Environment Pty Ltd (**Meinhardt**) was engaged by Golden Plains Shire Council (**GPSC**) to complete a Land Capability Assessment (**LCA**) for selected land parcels comprising an area of approximate 11.3 square km within the Bannockburn Growth Area Boundary (the Study Area).

Meinhardt understands that the Victorian Planning Authority (**VPA**) and GPSC are in the process of developing the Bannockburn Growth Plan and aim to set a vision for future growth and development of Bannockburn. Specifically, GPSC is interested in the growth prospects in the southern portion of Bannockburn as a result of development constraints to the west, north and east of the township.

The overall objective of this assessment is to produce an LCA of the Study Area to understand capability of residential, commercial and industrial land uses.

The overall objective of this LCA is to understand the capability of residential, commercial and industrial land uses within the Study Area.

The purpose of the assessment is to inform strategic decisions on the future growth of the Bannockburn region, including (but not limited to) the identification of precincts for detailed planning work and the location of infrastructure such as roads and drainage.

The LCA comprised a high-level desktop investigation of the Study Area of available current and historical information relating to potential environmental contamination, hydrological and geological features. No intrusive investigation or sampling of environmental media (soil, surface water, groundwater and soil vapour/ground gas) was undertaken as part of this assessment.

Findings and Conclusions

The Study Area encompasses an area of approximately 1,133 ha and includes a total of 30 individual Properties (some with multiple parcels), of which most are largely undeveloped and used for farming and/or other agricultural uses.

The desktop review indicates the Study Area is zoned for farming use. Review of the aerial photography identified that much of the Study Area has been used for non-intensive farming of crops and possible stock grazing purposes.

Four (4) areas of easements were noted within the Study Area. Where easements are present within, some may be able to be lifted with future development, such as those on Properties 4, 7, 8, 9 and 10, however others such as the 60 m wide easement for high voltage transmission lines will likely need to remain as is, and any planning and development would need to adhere to the 60 m buffer requirement.

In general, the topography across the Study Area is relatively flat, with areas around Bruce Creek having the lowest elevation with land sloping towards this feature from the west and also east. Meinhardt does not expect there to be any significant implications of the topography for future development within the Study Area, with the exception of land around Bruce Creek being relatively steep. However, Meinhardt notes that planning, geological and ecological considerations may mean development close to Bruce Creek may not be feasible.

Meinhardt understands that there are a number of broiler farms/ boiler farm buildings to the south east of the Study Area, owned by Turi Foods Pty Ltd, along Burnside Road. The closest broiler farm-associated building is approximately 50 m south of the southern boundary of Property 30, and the next closest building is located approximately 400 m south of the southern boundary of Property 30/ the Study Area.

Overlays affecting the Study Area include a Bushfire Management Overlay (**BMO**), Environmental Significance Overlay (**ESO**), Salinity Management Overlay (**SMO**) and Land Subject to Inundation Overlay (**LSIO**). In addition, many properties within the Study area were noted to have ecological constraints (e.g. contain native vegetation and / or the potential to contain Groundwater Dependent and Ecosystems Inflow Dependent Ecosystems) and/or Cultural Heritage Constraints (e.g. contain registered Cultural Heritage Sensitivity). All properties were also located within a Bushfire Prone area and as such would need to be developed with consideration given to bushfire-tolerant design and construction practices.

The underlying geology of the Study Area is anticipated to consist of predominantly of Miocene to Pliocene aged Black Rock Sandstone in the west and Miocene to Holocene aged Newer Volcanics basalt flows exist east of Bruce Creek. Areas of Miocene aged Gellibrand Marl and Quaternary aged Alluvium are present around Bruce Creek. Based on the underlying geology, geotechnical constraints, including settlement, slope stability, bearing capacity and erosion will need to be considered prior to development.

An assessment of aerial photographs covering the Study Area noted potentially contaminating activities including:

- Earthworks / stockpiling / importation and use of possibly uncontrolled fill material;
- Structures / buildings with unknown use;
- Storage and maintenance of heavy machinery associated with farming / agricultural practices;
- Use of agricultural sprays and irrigation of crops;
- Storage of chemicals / fuel / oil, chemical mixing;
- Potential asbestos containing materials (**ACM**) in structures or buildings, especially those constructed before 1980 when the domestic use of ACM was phased out. These structures/buildings may still be present at the Property, or were demolished and/or removed; and
- Livestock grazing - though non-intensive grazing or pasturing of non-carnivorous animals is not considered to contribute to significant potential for the presence of contamination.

A Potential for Contamination (**PFC**) assessment was undertaken for each of the Properties within the Study Area. PFC Ratings were derived based on the outcomes of the high-level desktop review.

The PFC assessment for Properties located within the Study Area was completed in accordance with the Department Sustainability and Environment (**DSE**) (now Department of Environment, Land, Water Planning (DELWP)), Potentially Contaminated Land General Practice Note, 2005 (DSE 2005) and collated into the PFC assessment table located in *Appendix C* of this LCA report.

A 'traffic light' system (**Green = Low**, **Yellow = Medium** and **Red = High**) was used in the PFC assessment of the potential for contamination for each property.

Based on the findings of the desktop review, a total of 28 out of the 30 Properties were rated as having 'Low' potential for contamination whilst the remaining two (2) Properties (Property 11 and Property 20) were rated as having 'Medium' potential for contamination.

There were no Properties given a "High" potential for contamination within the Study Area.

Due the high-level nature of this assessment (time between the aerial photographs, poor resolution of some imagery, no access to individual properties for site inspections and no intrusive investigations forming part of this assessment), there is potential for actual or assumed activities not listed as occurring at an individual Property to have taken place.

Further, where potentially contaminating activities has been identified at an individual Property, Meinhardt's observations should be considered as subjective and that there is no definitive evidence that contamination actually exists or has occurred at any property. The list of potentially affected Properties and Contaminants of Potential Concern (**CoPC**) may be downgraded or upgraded as further information becomes available through more detailed and Property-specific assessment.

Properties with a 'Medium' potential for contamination rating were classified as requiring an Assessment Level 'B' as per the DSE 2005 guidance. These sites are likely to require a detailed and Property-specific desktop assessment, to be combined (where appropriate based on the findings of the desktop assessment) with limited investigation and sampling of surficial soils for CoPC, within targeted areas such as stockpile locations, imported fill, areas of storage / mixing of chemicals (in volumes larger than typical household usage) or where observations of spills or other indicators of potential contamination are made (e.g. staining of soils, scalded or degraded vegetation, hydrocarbon or methane odours, leaking drums).

Those Properties with a 'Low' potential for contamination rating were classified as requiring an Assessment Level 'C' as per the DSE 2005 guidance. Where there is some uncertainty regarding filling of dams or use of agricultural sprays, further inspection of the Property should be undertaken, and

consideration should be made regarding minor targeted assessment of surface soils for indicated CoPC.

Recommendations

Based on the conclusions detailed in this LCA, Meinhardt makes the following recommendations:

Potential Contamination of Sites

- Further investigation to assess the presence of CoPC must be undertaken for Properties assessed as having Medium potential for contamination according to the PFC Ratings.

Where known land uses having the potential to cause contamination has occurred, targeted site investigations including sampling of surficial soils, analysing for CoPC, should be undertaken.

Where potential land uses, having the potential to cause contamination, have been identified, further inspection including discussion with the land owner(s) should be undertaken to determine the risk of contamination and where appropriate targeted site investigations including sampling and analysing for CoPC would be considered as appropriate to be undertaken.

- A Property-specific detailed desktop review and site inspection may be required for Properties assigned as Low potential for contamination according to the PFC Ratings.

Due to the high-level nature of this LCA, there is potential for existing contamination, or activities that may have caused contamination to have occurred, that were not identified. A Low PFC rating does not indicate that development of the Property with no further assessment is appropriate.

Further assessment may include discussion with the land owner(s) and/or occupiers, to determine historical, recent and current uses of the Property. This will enhance the understanding of potential for contamination contained within this LCA and inform on any further assessment (e.g. targeted assessment of soils) that would be required to ensure the Property is fit for proposed redevelopment.

- During development works any contaminated soil (including those with aesthetic impacts including odour) must be managed as a Prescribed Industrial Waste where they are to be removed from site. Producers of contaminated soil must categorise their waste into one of four categories, Category A, B, C or clean fill (EPA Publication IWRG621, *Soil Hazard Categorisation and Management*, 2009) (EPA 2009). Descriptions of the threshold limit values (upper limits) of contaminants for these categories are outlined in the EPA 2009.

Broiler Farms

When completing Master Planning for the Bannockburn Growth Area, GPSC should consider the size, location and distance of broiler sheds to potential development sites within the Study Area to ensure that any future development does not encroach upon setback/separation distances to broiler farming operations. It is recommended that GPSC consult the relevant Code for broiler farms to ensure planning provisions are made to enable development to continue, and ensure the amenity of users of the development are not restricted. Based on the location of identified broiler farms near the Study Area, portions of Property 28 and 30 may be affected by their operations, subject to enquiries that should be made with the affected business(es).

Hydrology and Hydrogeology

The identified surface water features within the Study Area will require feature and level surveys to provide details of drainage patterns for urban drainage system design. Drainage paths will need to be either maintained, diverted or alternative provided to ensure all areas remain appropriately drained during and after any development.

Hazardous Materials

Hazardous materials surveys should be carried out for those structures within the Study Area identified for future demolition or relocation. Further, inspection by a suitably experience and qualified Occupational Hygienist or asbestos-specialist should be considered at those Properties containing old (e.g. pre-1980) structures/buildings, or where the desktop assessment identified that potential ACM may be or was present.

However, it is understood that these assessments would be subject to planning and OH&S processes outside the planning system.

Ecological Constraints

Many of the Properties within the Study Area were noted to contain native vegetation and / or the potential to contain Groundwater Dependent and Ecosystems Inflow Dependent Ecosystems. In addition, some of the Properties within the Study Area have Environmental Significance Overlay. It is therefore recommended that an ecological survey of the be undertaken prior to development of these areas and WSUD initiatives be considered prior to development to minimise disruption to the local terrestrial and aquatic ecological receptors around Bruce Creek.

Cultural Heritage Constraints

Nine (9) of the Properties within the Study Area were noted to contain registered Cultural Heritage Sensitivity Areas as specified in Division 3 of Part 2 of the Aboriginal Heritage Regulations 2007. It is therefore recommended that GPCC undertake further investigation (engaging a qualified cultural heritage professional if required) to assess whether development of these areas will trigger the requirement for a Cultural Heritage Management Plan or other requirements in accordance with the Aboriginal Heritage Regulations 2007.

Geotechnical Assessments

It is recommended that detailed geotechnical assessments be completed prior to the detailed design stage for any future development within the Study Area.

However, it is understood that a geotechnical assessment of proposed development sites within the Study Area would be triggered at the subdivision stage.

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1 Introduction

1.1 Background

Meinhardt Infrastructure & Environment Pty Ltd (**Meinhardt**) was engaged by Golden Plains Shire Council (**GPSC**) to complete a Land Capability Assessment (**LCA**) for selected land parcels comprising an area of approximate 11.3 square km within the Bannockburn Growth Area Boundary (the **Study Area**). A plan of the Study Area is provided in **Appendix A, Figure 1**.

The Study Area considered is bound to the west by Brisbane Road, Harvey Road and Old Base Road, to the south by a train line that runs to Inverleigh, to the east by a fence between two private properties in the south and by Burnside Road in the north, and bound to the north by boundaries between developed land that abuts against less developed, primary agricultural/ farming land. For ease of reporting, the Study Area has been sub-divided into 30 properties, each provided with a unique identified and illustrated in **Appendix A, Figure 2**.

The extent of the Study Area is based on discussions held between Meinhardt and GPSC during the project inception meeting held on 31 March 2020 via video conferencing and from email clarification provided by Geoff Alexander of GPSC on the same day.

1.2 Objectives and Purpose

Meinhardt understands that the Victorian Planning Authority (**VPA**) and GPSC are in the process of developing the Bannockburn Growth Plan and aim to set a vision for future growth and development of Bannockburn. Specifically, GPSC is interested in the growth prospects in the southern portion of Bannockburn as a result of development constrains to the west, north and east of the township.

The overall objective of this assessment is to produce an LCA of the Study Area to understand capability of residential, commercial and industrial land uses.

The purpose of the assessment is to inform strategic decisions on the future growth of the Bannockburn region, including (but not limited to) the identification of precincts for detailed planning work and the location of infrastructure such as roads and drainage.

2 Scope of Work and Methodology

2.1 Scope of Work

In order to complete the LCA, Meinhardt developed a scope of work to assess current and historical land use within the Study Area. The scope of work is summarised below.

- Attendance of a project inception meeting with GPSC and VPA via video conferencing to confirm the key objectives of the project and define the Study Area;
- Completion of a desktop assessment of the Growth Plan Investigation Area including detail on current and historical land use, geological and environmental setting as well as any other pertinent planning and ownership information; and
- Preparation of Draft and Final reports upon completion of the desktop assessment. Based on the review of the desktop information, Meinhardt has provided GPSC with Potential for Contamination (**PfC**) ratings for each parcel of land within the Growth Plan Investigation Area and all findings from the desktop assessment in this report.

2.2 Methodology

Meinhardt completed the works in general accordance with the following guidelines and current applicable industry best practice:

- Australian and New Zealand Environment and Conservation Council (ANZECC) and the National Health and Medical Research Council (NHMRC), *Australian and New Zealand Guideline for the Assessment and Management of Contaminated Sites*, January 1992 (ANZECC 1992);
- Department of Sustainability and Environment (DSE) (now Department of Environment, Land, Water and Planning (**DELWP**)), *Potentially Contaminated Land General Practice Note*, 2005 (DSE 2005);
- National Environment Protection Council, *National Environment Protection (Assessment of Site Contamination) Measure*, 1999 (as amended 2013) (NEMP 2013);
- Standards Australia, *Australian Standard AS44812.1 – Guide to the Investigation and Sampling of Sites with Potential Contaminated Soil*, 2005 (AS4482.1-2005);
- State Government of Victoria, *State Environment Protection Policy, Prevention and Management of Contaminated Land*, June 2002 (Land SEPP); and
- State Government of Victoria, *State Environment Protection Policy (Waters)*, 2018 (Waters SEPP).

2.2.1 Land Capability Desktop Assessment

The LCA was completed primarily in the form of a desk based Preliminary Site Investigation (**PSI**) as defined in the National Environment Protection Council, *National Environment Protection (Assessment of Site Contamination) Measure*, 1999 (as amended 2013) (**NEPM 2013**).

The desk-based PSI comprised a search of current and historical datasets and included:

- Review of available geological, hydrological and environmental information (i.e. geological maps, historical aerial photography, planning provisions, etc.)
- Review of regulatory and planning guidelines and applicable Australian Standards;
- Review of current Certificate of Title information;
- Review of any previous or currently publicly available reports regarding contamination, adverse amenity uses or geological/ hydrological conditions in or within the vicinity of the study area;
- Review of Australian Heritage Database specifically for historic uses related to the potential for contamination;
- Discussions with GPSC regarding known existing and historic land uses as well as planning permits in the Growth Plan Investigation Area and surrounds, where those uses may result in soil and groundwater contamination and adverse amenity land uses; and

- Other information that may be deemed appropriate for notification to GPSC.

The information obtained from the above tasks was then collated to provide an assessment of the Potential for Contamination (**PfC**) at each property, in accordance with the Department Sustainability and Environment (**DSE**) (now Department of Environment, Land, Water Planning (**DELWP**)), *Potentially Contaminated Land General Practice Note, 2005 (DSE 2005)*.

A 'traffic light' system (**Green = Low**, **Yellow = Medium** and **Red = High**) was used in the PfC assessment of the potential for contamination for each Property.

The PfC assessment also identified potential contamination sources and Contaminants of Potential Concern (**CoPC**) which may not fall completely within the remit of the DSE 2005 guidance, but which may nonetheless pose a potential risk to the future development of a property.

No sampling and analysis of soils, surface water, groundwater or soil vapour/ ground gas was performed as part of the scope of works.

2.2.2 Reporting

Meinhardt compiled the information gleaned during the desk-based assessment into this DSE 2005 compliant report, to delineate which parts of the Study Area are considered suitable (or otherwise) for the proposed development and whether further environmental assessment may be required in support of Statement or Certificates of Environmental Audit. The report also provides detail on:

- A summary of the project background and works completed;
- Review and interpretation of all information collected for the LCA;
- General discussion of site setting with regard to geology, hydrogeology and hydrology;
- Completion of a PfC assessment for each property parcel within the Study Area;
- Recommendations for future additional assessment, management and/or remediation based on the outcomes of the PfC assessment and the DSE 2005 guidance;
- Provision of a comprehensive PfC assessment table showing the findings of the LCA for each property within the Study Area;
- Provision of figures showing planning, geological, hydrogeological, hydrological and relevant overlays for the Study Area; and
- Provision of colour coded figures showing the PfC assessment rating for each property within the Study Area;

3 Land Capability Desktop Assessment

As part of the desktop component of work, Meinhardt commissioned LotSearch to conduct a comprehensive property information search for the Study Area. The information in the following sections of this report has predominantly been obtained from the LotSearch reports and other supplementary sources as detailed.

Due to the large size of the Study Area, it was necessary to divide it into four (4) areas for the purposes of conducting the LotSearch reports, each with a number of properties, as follows:

- **Area 1** – 201 ha, comprising Properties 01 to 24;
- **Area 2** – 282 ha, comprising Properties 25 and 27;
- **Area 3** – 453 ha, comprising Properties 24 to 26, 28 and 29; and
- **Area 4** – 196 ha, comprising Property 30.

The Study Area Location Plan and Study Area Layout and Property Plan are presented in **Appendix A, Figures 1 and 2**. Copies of all LotSearch reports for the Study Area are included in **Appendix B**.

3.1 Site Characterisation

3.1.1 Location and Description

The Study Area encompasses an area of approximately 1,133 ha and includes a total of 30 individual Properties (some with multiple parcels), of which most are largely undeveloped and used for farming and/or other agricultural uses.

A summary of the Property details within the Study Area is provided in **Table 3-1** and the results of the Victorian Government Title Search are presented in **Appendix C**, including registered proprietors of each Property. Meinhardt notes that most Properties are owned by sole or joint proprietors, with the exception of Properties 1 and 24, both of which are owned by local businesses in Bannockburn, and Property 2, for which GPSC is listed as Crown Land Administrator for the property.

Table 3-1 Property Details

Meinhardt LCA Property ID	Property Address	Standard Parcel Identifier
01	Bannockburn – Shelford Road, Bannockburn	6 total parcels: 1\TP621731, 10-22A\PP5723, 11-22A\PP5723, 14-22A\PP5723, 17-22A\PP5723, 20-22A\PP5723
02	Bannockburn – Shelford Road, Bannockburn	17A-22A\PP5723
03	40 Harvey Road, Bannockburn	1\TP95880
04	65 Old Base Road, Bannockburn	4\LP215258
05	50 Harvey Road, Bannockburn	1\LP215258
06	74 Harvey Road, Bannockburn	2\LP215258
07	85 Old Base Road, Bannockburn	5\LP215258
08	Harvey Road, Bannockburn	3\LP215258
09	109 Old Base Road, Bannockburn	6\LP215258
10	112 Harvey Road, Bannockburn	2\PS503162
11	100 Harvey Road, Bannockburn	1\PS503162
12	129 Old Base Road, Bannockburn	4-22A\PP5723
13	130 Harvey Road, Bannockburn	2\PS431007
14	124 Harvey Road, Bannockburn	1\PS431007
15	139 Old Base Road, Bannockburn	1-22A\PP5723

Meinhardt LCA Property ID	Property Address	Standard Parcel Identifier
16	Harvey Road, Bannockburn	2-22A\PP5723
17	30 Ormond Street, Bannockburn	1\TP174543
18	91 Harvey Road, Bannockburn	1\TP131937
19	54 Ormond Street, Bannockburn	8-22\PP5723
20	111 Harvey Road, Bannockburn	5-22B\PP5723
21	Ormond Street, Bannockburn	6-22B\PP5723
22	131 Harvey Road, Bannockburn	4-22B\PP5723
23	145 Harvey Road, Bannockburn	1\TP811453
24	Levy Road, Bannockburn	14 total parcels: 1\LP6088, 2\LP6088, 5\LP6088, 6\LP6088, 1\TP134465, 1\TP134466, 2\TP134466, 2011\PP3225 35A-21\PP3225 46A-21\PP3225 49A-21\PP3225 50A-21\PP3225 2-22B\PP5723 3-22B\PP5723
25	Harvey Road, Bannockburn	5 total parcels: 15\LP6088 17\LP6088 1\TP96373 2\TP96373 3A-15\PP3225
26	Harvey Road, Bannockburn	13\LP6088
27	Harvey Road, Murgheboluc	1\TP962977
28	430 Burnside Road, Bannockburn	2\LP97121
29	418 Burnside Road, Bannockburn	1\LP97121
30	279 Burnside Road, Bannockburn	B\PS510752

Note:

Property details were obtained from DELWP – VicPlan Mapshare tool located at <https://mapshare.vic.gov.au/vicplan/>.

3.1.2 Easements and Covenants

In addition to the Title Search completed and detailed in Section 3.1.1, Meinhardt completed a search of the Victorian Spatial Datamart¹ and obtained plans of approved easements that currently exist within the Study Area. Four (4) areas of easements were noted. These included:

- A utility easement (for high voltage transmission lines) that runs in an east-west orientation through the Study along the northern boundaries of Properties 25, 26 and 30. In plans it is listed as being the domain of the State Electricity Commission.
- Easements for power supply exist trending in a north-south orientation in the western portion of Properties 4, 7 and 9, with a branch extending eastward along the northern boundary of Property 7 and then cut across Property 8 to Harvey Road. The exact nature of the power supply (overhead or underground) is not defined, but is listed as being under the auspices of the State Electricity Commission.

¹ Department of Environment, Land, Water and Planning, *Spatial Datamart Victoria – VicMap Easements*, obtained 25/05/2020 from <https://services.land.vic.gov.au/SpatialDatamart/>

- A water supply easement is also present on Property 8, running parallel to the electrical easement, however slightly south of it. No notation of the authority responsible is evident, however it would likely be part of the Barwon Water network.
- A drainage easement is listed as being located on Property 10, connecting the dam on Property 10 to Property 11. No further details on this are available.

Meinhardt also notes that there were no covenants on Title listed in the Certificates of Title obtained.

Where easements are present, some may be able to be lifted with future development, such as those on Properties 4, 7, 8, 9 and 10, however others such as the 60 m wide easement for high voltage transmission lines will likely need to remain as is, and any planning and development would need to adhere to the 60 m buffer requirement.

3.1.3 Topography

The topography of each Area within the Study Area is summarised in **Table 3-2**. The Study Area topography is presented in **Appendix A, Figure 3**.

Table 3-2 Summary of Topography

Meinhardt LCA Property ID	Surface Elevation	General Topography
01, 02, 03, 04, 05, 06, 07, 08, 09, 10, 11, 17, 18, 19, 20, 21	101 to 109 m AHD	Generally flat with a gentle slope to the south east towards Bruce Creek
15, 16, 22, 23	99 to 109 m AHD	Generally flat with a gentle slope to the south east towards Bruce Creek
24	61 to 109 m AHD	Slopes to the centre of the property towards Bruce Creek
25	61 to 99 m AHD	Slopes to the east towards Bruce Creek, which runs inside the eastern boundary of the property
26	80 to 99 m AHD	Generally flat with a gentle slopes to the south west towards Bruce Creek
27	89 to 99 m AHD	Generally flat with a gentle slope to the east towards Bruce Creek
28	61 to 99 m AHD	Slopes to the south east towards Bruce Creek
29	81 to 89 m AHD	Generally flat
30	71 to 90 m AHD	Generally flat with a gentle slope to the south

In general, the topography across the Study Area is relatively flat, with areas around Bruce Creek having the lowest elevation with land sloping towards this feature from the west and also east. Meinhardt does not expect there to be any significant implications of the topography for future development within the Study Area, with the exception of land around Bruce Creek being relatively steep. However, Meinhardt notes that planning, geological and ecological considerations may mean development close to Bruce Creek may not be feasible.

3.1.4 Current Land Use within the Study Area

The Study Area (and much of its surrounds) is predominantly used for farming including generally non-intensive cropping and stock grazing purposes. The Bruce Creek runs from north to south through centre of the Study Area. Some Properties also contain homesteads.

3.1.5 Current Surrounding Land Use

The Bannockburn region comprises land predominantly used for agricultural uses with the majority of the region zoned for farming. Residential and commercial developments have occurred to the immediate north, north east and east of the Study Area, which make up the township of Bannockburn.

Within the broader Bannockburn township, a range of land uses exist including residential, public parks and recreation, public conservation and resource and commercial and industrial use.

Bannockburn Recreation Reserve, the Bannockburn Golf Club and another area designated as a Public Conservation and Resource Zone are located to the west of the Study Area.

A standard gauge railway line bounds the southern boundary and a water treatment plant operated by Barwon Water is located approximately 2 km to the north west of the Study Area.

In general, the Study Area is bound to the north by the Bannockburn township, and the to the south by properties predominantly used for agriculture.

Meinhardt understands that there are a number of broiler farms/ boiler farm buildings to the south east of the Study Area, owned by Turi Foods Pty Ltd, along Burnside Road. The closest broiler farm-associated building is approximately 50 m south of the southern boundary of Property 30, and the next closest building is located approximately 400 m south of the southern boundary of Property 30/ the Study Area.

Broiler farms, if poorly managed, are considered to have a high potential for contamination however given the location of the farms and no information to suggest mismanagement of wastes from these farms, they are considered unlikely to pose a risk to the use of land within the Study Area for future development. However, Council may wish to consider odour and noise when preparing a Master Plan for the Growth Area. These are likely to impact the potential development of land near existing broiler farms.

Broiler farms are bound by the State Government of Victoria, *Victorian Code for Broiler Farms*, 2009 (as amended 2018) (**The Code**) which outlines the environmental and amenity issues associated with broiler farming and sets standards that need to be met in relation to the management of the design and siting of broiler farms, as well as operational requirements, limits on animals and animal welfare.

Specifically, in relation to the siting of broiler farms, separation distances must be maintained from the nearest sensitive land use. As a minimum, this distance is 250 m, however may extend as far as 686 m for broiler farms with a capacity of up to 400,000 birds. Where the farm has greater than 400,000 birds, an odour risk assessment must be used to ensure sensitive receptors are not impacted by the farming operations.

Chapter 11 of the Code discusses the impact of broiler farms on amenity of neighbouring properties including the need to carefully assess setback/separation distances from those properties, and if necessary, directly assess the performance of broiler farms in meeting their odour, noise and dust control measures. For development around existing broiler farms, the planning authority must generally not support establishing residential zones, rural living zones or urban zones within the setback or separation distance of existing farms. However, if there are sound planning reasons and the impact of the broiler farm on those sensitive uses can be shown to be no greater within the setback/separation zone as it is outside it, or if an odour risk assessment shows that there is a minimal risk of sensitive uses being exposed to offensive odours, then encroachment into the setback/separation zone may be considered.

Given the proximity of broiler farming to the southern boundary of the Study Area, the use of land for sensitive use within the southern portion of the Study Area (which lies within an appropriate buffer based on the number of birds) from the closest broiler shed may be limited. Council may need to make enquiries about the size and layout of the broiler farm located south of the Study Area prior to entering Master Planning phase to understand the implications for future development.

3.1.6 Proposed Land Use

This LCA report has been prepared as part of the pre-planning process for the Bannockburn Growth Plan, with specific proposed land uses to be decided in the future (partly based on the outcomes of this LCA report). For the purposes of assessing the suitability of the properties for future land use, Meinhardt has considered those potential land use categories listed in the Land SEPP and Waters SEPP, to provide a comprehensive assessment and allow for potential changes which may occur during the design and planning process.

For the purposes of this LCA, a conservative approach has been adopted, assuming that potential future land use may include 'sensitive' land uses, such as residential properties with gardens and other

sensitive uses with high potential for access to soils. It is understood however that GPSC also wish to understand the capability of the Study Area for less sensitive uses such as commercial and industrial land uses.

3.2 Current Planning Zones and Overlays

The Lotsearch reports provided in **Appendix B** provides a summary of current land use and relevant planning overlays where they affect Properties within the Study Area.

Copies of Victorian State Government Department of Environment, Land, Water and Planning, *Planning Property Reports* for each Property within the Study Area are also provided in **Appendix D**.

3.2.1 Current Planning Zones

A review of the DELWP Planning Maps Online service indicated that Properties within the Study Area are all currently zoned for farming (see **Appendix A, Figure 4**).

The purpose of the **Farming Zone** is to:

- *Implement the Municipal Planning Strategy and the Planning Policy Framework;*
- *Provide for the use of land for agriculture;*
- *Encourage the retention of productive agricultural land;*
- *Ensure that non-agricultural uses, including dwellings, do not adversely affect the use of land for agriculture;*
- *Encourage the retention of employment and population to support rural communities;*
- *Encourage use and development of land based on comprehensive and sustainable land management practices and infrastructure provision; and*
- *Provide for the use and development of land for the specific purposes identified in a schedule to this zone.*

3.2.2 Current Planning Overlays

A review of the DELWP Planning Maps Online service indicated that various planning overlays exist within the Study Area. Where a planning overlay has been identified, a permit may be required before development of the Property can commence.

The following planning overlays were identified for each of the Areas in the Study Area:

- **Bushfire Management Overlay** – Ten (10) Properties (01, 04, 07, 09, 12, 15, 16, 23, 25 and 27);
- **Environmental Significance Overlay** – Four (4) Properties (24, 25, 26 and 28);
- **Salinity Management Overlay** – One (1) Property (25); and
- **Land Subject to Inundation Overlay** – Two (2) Properties (24 and 25).

The purpose of the **Bushfire Management Overlay** is to:

- *Implement the Municipal Planning Strategy and the Planning Policy Framework;*
- *Ensure that the development of land prioritises the protection of human life and strengthens community resilience to bushfire;*
- *Identify areas where the bushfire hazard warrants bushfire protection measures to be implemented; and*
- *Ensure development is only permitted where the risk to life and property from bushfire can be reduced to an acceptable level.*

The purpose of the **Environmental Significance Overlay** is to:

- *Implement the Municipal Planning Strategy and the Planning Policy Framework;*
- *Identify areas where the development of land may be affected by environmental constraints; and*
- *Ensure that development is compatible with identified environmental values.*

The purpose of the **Salinity Management Overlay** is to:

- To implement the Municipal Planning Strategy and the Planning Policy Framework;
- To identify areas subject to saline groundwater discharge or high ground water recharge;
- To facilitate the stabilisation of areas affected by salinity;
- To encourage revegetation of areas which contribute to salinity;
- To encourage development to be undertaken in a manner which brings about a reduction in salinity recharge;
- To ensure development is compatible with site capability and the retention of vegetation, and complies with the objectives of any salinity management plan for the area; and
- To prevent damage to buildings and infrastructure from saline discharge and high water table.

The purpose of the **Land Subject to Inundation Overlay** is to:

- Implement the Municipal Planning Strategy and the Planning Policy Framework;
- Identify land in a flood storage or flood fringe area affected by the 1 in 100 year flood or any other area determined by the floodplain management authority;
- Ensure that development maintains the free passage and temporary storage of floodwaters, minimises flood damage, is compatible with the flood hazard and local drainage conditions and will not cause any significant rise in flood level or flow velocity;
- Reflect any declaration under Division 4 of Part 10 of the Water Act, 1989 where a declaration has been made;
- Protect water quality and waterways as natural resources in accordance with the provisions of relevant State Environment Protection Policies, and in particular in accordance with Clauses 33 and 35 of the State Environment Protection Policy (Waters of Victoria); and
- Ensure that development maintains or improves river and wetland health, waterway protection and flood plain health.

A map showing the location of planning overlays within the Study Area is included in **Appendix A, Figure 5**.

3.3 Geology

The LotSearch reports notes that the surface geology in the Study Area comprises of a range of lithological units, however is effectively comprised of two (2) main units including Miocene to Pliocene aged Black Rock Sandstone (Nbb) in the western half of the Study Area and the Miocene to Holocene aged Newer Volcanic Basalts in the eastern half of the Study Area. In between these two areas, within the eastern margin of the Nbb unit is Bruce Creek, which is surrounded by Miocene aged Gellibrand Marl (Ntg) and areas of Quaternary Alluvium (Qa1).

A summary of the geological units identified within the Study Area is provided in **Table 3-3** and illustrated in **Appendix A, Figure 6**.

Table 3-3 Summary of Geological Units within the Study Area

Geological Unit	Geological Age	Description	Meinhardt LCA Property ID
Black Rock Sandstone (Nbb)	Miocene to Pliocene	Sand, sandstone, conglomerate, minor sandy limestone, local ironstone: pale to dark brown, reddish brown; generally, very well sorted, variably cemented; horizontally laminated to low-angle cross-laminated; glauconitic; contains shelly fossils and burrows.	01 to 25 and 27

(Continued over page...)

Geological Unit	Geological Age	Description	Meinhardt LCA Property ID
Gellibrand Marl (Ntg) in Torquay Group	Miocene	Marl, mudstone, sandstone, calcarenite, minor lignite, ligneous clay: marl blue-green and yellow; abundant carbonate nodules; contains shelly fossils and microfossils; lignite dark brown contains spores and pollen.	24, 25
Newer Volcanic Group – Basalt Flows (Neo)	Miocene to Holocene	Olivine tholeiite, quartz tholeiite, basanite, basaltic icelandite, hawaiite, mugearite, minor scoria and ash, fluvial sediments: tholeiitic to alkaline; includes sheet flows and valley flows and intercalated gravel, sand clay.	24, 26, and 28 to 30
Alluvium (Qa1)	Pleistocene to Holocene	Gravel, sand, silt: variably sorted and rounded; generally unconsolidated; includes deposits of low terraces; alluvial floodplain deposits.	25

While the aim of this report is not to provide in-depth geotechnical advice, it is noted that any future development on Gellibrand Marl may need to be considered carefully as Marl is known to have poor strength and be sensitive to water, leading to a potential need for treatment or stabilisation if built upon.

Sandstone and basalt, also observed within the Study Area, are considered stronger materials for development, especially where these units are not significantly folded or faulted, although this should be confirmed by geotechnical investigation.

3.3.1 Geological Structures

A search of geological structures reported within the LotSearch reports for the Study Area indicated there were no known geological faults or shear zones within the Study Area that would affect the future development of the Study Area. Meinhardt notes that geological information can be coarse and obtained from observations across large areas of land, and may not be based on observations made in local outcrops. Furthermore, geological conditions may change over time and as such, should be supported by local geotechnical investigation and logging as required.

3.3.2 Soil Types

The LotSearch reports indicate the soils in the Study Area to be Sodosols (Va6 and Va9) and Chromosols (Ob2) as per the Atlas of Australian Soils. This is summarised below in **Table 3-4**.

Table 3-4 Summary of Soil Types within the Study Area (Atlas of Australian Soils)

Soil Order	Symbol	Description	Meinhardt LCA Property ID
Chromosol	Ob2	River terraces and flats with plain remnants: higher terraces of hard alkaline red soils (Dr2.23) with plain remnants of (Dy5.8) and (Dy3.4) soils and with lower terraces and flats of undescribed (U) soils.	17 to 29
Sodosol	Va6	Undulating plain of hard alkaline yellow mottled soils (Dy3.43), some of which contain ironstone gravels.	1 to 18, 20, 22, 23 and 25
	Va9	Gently undulating plain with swamps, lakes, some stony rises, volcanic cones and occasional low hilly area: undulating plain of hard alkaline and neutral yellow mottled soils (Dy3.43 and Dy3.42) with smaller areas of (Dy5.4) and (Dy3.22); stony rises with shallow friable loamy soils (Um6) and often with dark cracking clays (Ug5.13) at their base.	24, 26 and 28 to 30

Further, the Department of Economic Development, Jobs, Transport and Resources (**DEDJTR**) Victorian Soil Type Mapping data indicated that the Black Sodosols and Black Vertosols were variously identified within the Study Area as summarised in **Table 3-5**.

Table 3-5 Summary of Soil Types within the Study Area (Victorian DEDJTR)

Soil Order	Symbol	Description	Meinhardt LCA Property ID
Black Sodosols	SOAE	Sodosols display a strong textural contrast between the topsoil and subsoil horizons. Sodosols have very low agricultural potential due to high sodicity leading to high erodibility, poor structure and poor permeability.	1 to 25, 27
Black Vertosols	VEAE	Characterised by a clay content of >30%, cracks >1cm wide extending downward from the ground surface and by evidence of strong vertical mixing of the soil. Vertosols contain high levels of plant nutrients, but due to their high clay content, they are not well suited to cultivation without management.	24 to 26 and 28 to 30

The presence of these soils is not considered likely to significantly alter development within the Study Area. As with any development, where required, it is expected that soils that need to be stripped due to the presence of organic matter or unsuitability for construction based on geotechnical investigation, will be removed during development and sent to a suitable site or facility for use.

3.3.3 Acid Sulfate Soils

The LotSearch reports indicate that all Properties within the Study Area have either an extremely low (1-5% chance of occurrence) to low probability (6-70% chance of occurrence) of being at risk from Acid Sulphate Soils (**ASS**) as per the Commonwealth Scientific and Industrial Research Organisation (**CSIRO**), Atlas of Australian Acid Sulfate Soils.

Properties listed as having a low probability of ASS occurrence are generally located to the west and immediately east of Harvey Road as illustrated in **Appendix A, Figure 7**.

Localised ASS may be present at the base of dams and water bodies across the Study Area, and ASS assessments may need to be conducted prior to any future dewatering, excavation or backfilling of these features.

Where ASS are found, they are usually not harmful unless exposed to air to allow for the production of sulphate minerals or sulphuric acid, which then threaten ecological receptors and be a detriment to general environmental quality. Furthermore, the acidity generated can be corrosive to building foundations that come into contact with ASS, which may require for the ASS to be excavated and removed during development or be appropriately managed by treatment or modifying building materials and/or practices.

3.3.4 Historical Mining Activity - Shafts

The LotSearch reports include a review of historical mining activity in the Study Area on the basis that mine shaft locations were collected and recorded by a variety of methods from 1869 in some areas of the state, mainly concentrating in Ballarat and Bendigo. The Historical Mining Activity Data Custodian is the State Government Victoria, Department of Economic Development, Jobs, Transport & Resources.

The LotSearch reports indicate that there is no record of historical mining activity in the Study Area.

3.3.5 Geotechnical

Based on the review of the above available geological information, Meinhardt recommends that a geotechnical assessment of the Study Area prior to development. In particular, areas consisting of alluvial deposits may be prone to differential settlement, loss of stability and/or collapse during the construction phase. Old drainage channels and those properties with a floodway or land subject to inundation overlay may also be susceptible to erosion. The areas to the west of Bruce Creek, containing Black Rock Sandstone, and to the east, containing Newer Volcanics Basalt are expected to be relatively homogeneous and a reduced testing density/frequency may suffice in these areas, however this should be discussed with a geotechnical specialist when investigated.

3.4 Hydrology

3.4.1 Surface Water

The Study Area is located within the Corangamite Catchment. Surface water runoff from likely to flow towards Bruce Creek which runs from north to south in the centre of the Study Area. Bruce Creek feeds into the Barwon River which is located approximately 3.3 km south of the Study Area. Drainage channels and other surface water bodies are illustrated in **Appendix A, Figure 3**.

A summary of the Surface Water bodies noted within the Study Area is provided in **Table 3-6**.

Meinhardt notes that a number of dams exist within the Study Area. Where development requirements mean that the dams need to be decommissioned, an experienced earthworks contractor should be utilised to complete the works. Typically, each dam will need to be pumped dry of water and any bund or dam wall razed or pushed into the dam extent. This will often be completed in stages, with compaction occurring to reduce pore space and pathways for water to enter the dam.

Removing a dam will cause water to find new flow paths in lieu of the dam and it will be important to manage this step to minimise erosion along any new flow paths. This may be managed through the form of rock armouring, erosion protection matting or dense vegetation. A revegetation and weed management program should be developed to revegetated the areas that earthworks have occurred.

Table 3-6 Summary of Surface Water Bodies within the Study Area

Meinhardt LCA Property ID	Surface Water Bodies
01	No surface water bodies are present in Property 01. A dry dam appears to be present along the western property boundary.
02	Two (2) dams/ponds are present in the northern portion of the property.
03	One (1) dam present in the north eastern portion of the property.
04	One (1) dam is present in south western portion of the property.
05	No surface water bodies are present in Property 05.
06	No surface water bodies are present in Property 06.
07	One (1) dam present in the south eastern portion of the property.
08	No surface water bodies are present in Property 08.
09	No surface water bodies are present in Property 09.
10	One (1) dam present along the southern boundary of the property.
11	One (1) dam present in the south western corner of the property.
12	No surface water bodies are present in Property 12.
13	No surface water bodies are present in Property 13.
14	No surface water bodies are present in Property 14.
15	No surface water bodies are present in Property 15.
16	No surface water bodies are present in Property 16. A dry dam appears to be present along the western property boundary.
17	No surface water bodies are present in Property 17.
18	One (1) dam is present along the northern property boundary. There appears to be soil discolouration along the southern property boundary which may indicate flooding.
19	No surface water bodies are present in Property 19
20	Four (4) large dams present on the property.
21	No surface water bodies are present in Property 21.
22	One (1) dam present in the south western portion of the property.
23	One (1) dam present in the south western portion of the property.
24	Bruce Creek runs through the centre of the property. Two (2) dams are present in the eastern portion of the property.
25	Bruce Creek runs inside the eastern property boundary. A drainage channel runs from the north western portion of the property and runs through the property to Bruce Creek. Two (2) dams are present on the property.
26	Four (4) dams present across the property.
27	One (1) dam present in the eastern portion of the property.
28	Two (2) dams present in the south western portion of the property.
29	One (1) dam along the eastern property boundary.
30	Four (4) dams present across the property.

3.4.2 Inundation Areas & Floodways

The LotSearch reports noted two (2) properties (Property 24 and Property 25) in the Study Area are subject to a Flood Overlay (**FO**) and therefore the likely to be affected by the extent of the inferred 1 in 100 Year Flood Extent as per the DELWP, 100 Year Flood Outline. In addition, the LotSearch reports noted that both properties (Property 24 and 25) are subject to a Land Subject to Inundation Overlay (**LSIO**).

3.4.3 Wetlands

Wetland classification and mapping was undertaken across Victoria from 1980 onwards culminating in a state-wide wetland inventory. The inventory lists approximately 13,000 naturally occurring wetlands (over one hectare in size) covering about 635,000 hectares. These have been classified into six (6) categories: freshwater meadows, shallow freshwater marshes, deep freshwater marshes, permanent open freshwater wetlands, semi-permanent saline wetlands and permanent saline wetlands.

LotSearch reports indicated that no wetlands were identified within the Study Area.

3.5 Hydrogeology

3.5.1 Groundwater Characteristics

The Victoria State Government Department of Environmental, Land, Water and Planning (**DELWP**), *Groundwater Resource Reports*, 2019, indicates that groundwater (**GW**) beneath the Study Area falls within the Hopkins – Corangamite GW Catchment and comprises of five (5) aquifers with variable yields and salinity.

GW characteristics of the Study Area are provided in the Lotsearch reports presented in **Appendix B**, and in the DELWP GW Resource reports provided in **Appendix E** and summarised in **Table 3-7**. Due to the largely unknown local geological stratigraphy for each Property, **Table 3-7** is broken down generically as per the LotSearch reports. This provides a generalised outline of the hydrogeological units within the Study Area.

Unless proposed developments are expected to require deep excavations (for car parking or footings), it is not expected that GW will be intersected. Where GW is intersected, management options will need to be considered with respect to the management of water during excavation, disposal of water if it needs to be pumped away and design of buildings (e.g. tanked basements, if required). If intersected, GPSC may wish for the water to be tested for a common suite of potential contaminants prior to it being pumped or reused elsewhere.

Table 3-7 Summary of Groundwater within the Study Area

Aquifer	Properties Affected	Depth to water table (m)	Water table salinity (mg/L)	Groundwater Beneficial Uses
Quaternary Aquifer – Sand, gravels, clay and silts	Properties 25 and 27	0-11	1,001 – 3,500	<ul style="list-style-type: none"> Water dependent ecosystems and species Potable mineral water supply Agriculture and irrigation (stock watering) Industrial and Commercial Water-based recreation (primary contact recreation) Traditional Owner cultural values Cultural and Spiritual Values Buildings and Structures Geothermal Properties
Upper Tertiary / Quaternary Basalt (fractured rock)	Property 30	0 – 16	1,001 – 3,500	
Upper Tertiary Aquifer – Sand	All Properties	0-39	1,001 – 13,000	<ul style="list-style-type: none"> Water dependent ecosystems and species Agriculture and irrigation (stock watering) Water-based recreation (primary contact recreation) Traditional Owner cultural values Cultural and Spiritual Values Buildings and Structures Geothermal Properties
Lower Tertiary Aquifer – Sand, gravel, clay and silt, minor coal	All Properties	209-346	3,501 – 13,000	
Mesozoic and Palaeozoic Bedrock (basement) Aquifer – sedimentary (fractured rock, sandstone, siltstone, mudstone, shale, igneous (fractured rock includes volcanics, granites, granodiorites)	All Properties	296 – 546	1,001 – 13,000	

3.5.2 Groundwater Resources and Usage

The LotSearch reports identify registered boreholes within 2 km of the designated search area. Registered bores, obtained from the Department of Environment and Primary Industries’ (DEPI) Water Measurement Information System, are also provided in the LotSearch reports (**Appendix B**). A total of 22 GW bores were reported within 2 km of the Study Area. Of these, one (1) registered GW borehole was located within the Study Area are summarised in **Table 3-8**.

Table 3-8 Registered Bores in the Study Area

Meinhardt LCA Property ID	Bore ID	Use
22	135970	Stock Watering

The remaining 21 GW boreholes located within 2 km of the Study were reported as having various uses including stock watering, observation, investigation, domestic use and also a number for unknown uses.

Should development within the Study Area mean that this bore is redundant in a future land use scenario, the bore should be decommissioned by obtaining a well decommissioning licence and engagement of licenced drilling contractor who will seal the bore from surface to prevent the ingress of

water into the underlying groundwater aquifer. This process will also inform the local water authority that the well has been decommissioned and can be removed from their records.

3.6 EPA Records

3.6.1 Waste Management Facilities and Landfills

A review of EPA Records provided in the LotSearch reports identified no EPA Prescribed Industrial Waste sites within the Study Area.

The historical map 1975 (presented in the Lot Search reports for Areas 1 to 3) shows a former landfill approximately 1.2 km west of the western property boundary (Property 15).

EPA Publication 788.3 '*Best Practice Environmental Management: Siting, Design, Operation and Rehabilitation of Landfills*' (**BPEM 2015**) specifies default landfill post-closure buffer distances to manage potential risks associated with landfill gas migration. Given the age and location of the landfill it can be assumed that the Site may have had accepted putrescible waste and therefore would be classified as a 'Type 2' landfill in accordance with the BPEM 2015 guidance. A Type 2 landfill requires a buffer distance of 500 m from buildings or structures for a minimum period of 30 years post closure of the landfill.

The proposed development of the Study Area is not expected to require further design and management practices pertaining to development in a designated landfill buffer given the distance between the former landfill Site and the western property boundary is greater than 500 m.

3.6.2 Priority Sites Register

A review of the EPA Priority Sites Register (**PSR**) information provided in the LotSearch reports identified no records for a Priority Site within the Study Area or a 1 km buffer zone.

3.6.3 Pollution Notices

A review of EPA issued pollution notices provided in the Lotsearch reports identified one (1) notice within a 1 km radius of the Study Area as follows:

- A Pollution Abatement Notice (**PAN**) was issued on 23 October 2019 for Sticky Balsamic Pty Ltd (a commercial/industrial site) located at Unit 1 55 Holder Road, which is located 22 m from the Study Area (closest to Property 1).

GPSC informed Meinhardt that the PAN related to the pollution of a stormwater system. Given this additional information, Meinhardt considers this pollution of a stormwater system to pose a low risk of contamination to Property 1 and the Study Area due to the pollution being to a discrete point source, rather than diffuse pollution at the 55 Holder Road property.

The LotSearch reports note that due to pollution notices being revoked and removed from published lists the above is not an exhaustive list of all past pollution notices.

3.6.4 EPA Audit Sites

A review of the EPA Audit Sites information provided in the LotSearch reports identified no Audit sites within the Study Area or within a 1 km radius.

3.6.5 Groundwater Quality Restricted Use Zones

A review of the EPA Quality Restricted Use Zones (**GQRUZ**) information provided in the LotSearch reports noted no GQRUZ sites within the Study Area or within 1 km radius.

3.7 Ecological Constraints

3.7.1 Native Vegetation

A search of the DELWP Native Vegetation register was conducted in the LotSearch Reports (included in **Appendix B**).

A summary of Native Vegetation identified within the Study Area is provided in **Table 3-10**.

Table 3-9 Summary of Native Vegetation

Ecological Vegetation Class	Conservation Status	Properties Affected
Plains Grassy Woodland	Endangered	1, 2, 3, 17, 18, 19, 21, 24, 25, 26, 27, 28
Plains Grassland	Endangered	1, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 23, 25, 26, 27, 28, 29, 30
Aquatic Herbland/ Plains Sedgy Wetland Mosaic	Endangered	25, 27
Creepline Grassy Woodland	Endangered	24, 25

In addition to the above a search of the DELWP Planning Maps Online service reported in the LotSearch Reports (included in **Appendix B**), the LotSearch reports also indicated that a number of properties within the Study Area are bound by Environmental Significance Overlays including Properties 24, 25, 26 and 28.

3.7.2 Groundwater Dependent Ecosystems

A search of the Bureau of Meteorology (BOM) Groundwater Dependent Ecosystems Atlas register was conducted as reported in the LotSearch Reports (included in **Appendix B**).

The result of the search identified 11 Properties (Properties 1, 2, 3, 17, 18, 19, 21, 24, 25, 27 and 28) with a high, moderate or low potential to contain Groundwater Dependent Ecosystems in the Study Area.

3.7.3 Inflow Dependent Ecosystems

A search of the BOM Inflow Dependent Ecosystems Likelihood register was conducted in the LotSearch Reports (included in **Appendix B**).

The result of the search identified 11 Properties (Properties 1, 2, 3, 17, 18, 19, 21, 24, 25, 27 and 28) with the potential to contain Inflow Dependent Ecosystems in the Study Area. The likelihood of Inflow Dependent Ecosystems to exist within these Areas ranged from 5 (medium) to 10 (high).

3.7.4 Ecological Considerations Summary

Groundwater dependent and Inflow dependent ecosystems are those where ecological receptors are reliant on groundwater or water flows for survival (directly or indirectly) of terrestrial and aquatic organisms. The effect of development in areas surrounding these ecosystems should be discussed with a suitably qualified and experienced ecologist, with consideration of the typical elements of ecosystems observed in the Bannockburn region.

In addition, development of the region is likely to affect water flows post-development, something that should be carefully managed using Water Sensitive Urban Design (**WSUD**) initiatives that take into consideration the water balance changes that are expected to occur based on the proposed land development.

3.8 Other Pertinent Information

3.8.1 Cultural Heritage Sensitivity

A search of the Department of Planning and Community Development (**DPCD**) Cultural Heritage Sensitivity register was conducted as reported in the LotSearch Reports (included in **Appendix B**).

The result of the search identified eight (8) Properties which contain registered Cultural Heritage Sensitivity Areas as specified in Division 3 of Part 2 of the Aboriginal Heritage Regulations 2007 including Properties 17, 19, 21, 24, 25, 26, 27 and 28.

These areas are defined by the Aboriginal Heritage Regulations 2018 and include registered Aboriginal cultural heritage places and landform types that are regarded as more likely to contain Aboriginal cultural heritage. These areas may be subject to the preparation of a Cultural Heritage Management Plan should development encroach upon the land.

3.8.2 Heritage Overlay

A review of the DELWP Planning Maps Online service was conducted as reported in the LotSearch Reports (included in **Appendix B**).

The results of the search identified no properties within the Study Area or within a 1 km radius for which a Heritage Overlay has been applied.

3.8.3 Bushfire Prone Areas

A search of the State Government Victoria - Department of Transport, Planning & Local Infrastructure (DTPLI) register was conducted as reported in the LotSearch Reports (included in **Appendix B**).

The result of the search identified that all 30 properties within the Study Area are within a designated Bushfire Prone Area. Any properties within these areas are subject to the Building Regulations 2018 through the application of the Building Code of Australia, which applies bushfire protection standards for developments in these areas.

3.9 Aerial Photography

Meinhardt reviewed historical aerial photography from 1947 to 2020 and compiled observations pertaining to the Study Area and surrounds.

A general summary of the results of this review are summarised in **Table 3-11**. A more comprehensive review of each Property is provided in **Appendix F**. Copies of the aerial photos are provided in the LotSearch reports in **Appendix B**.

Table 3-10 Aerial Imagery Review

Image Year	Location	Observation
1947	Study Area	Vacant land with scattered vegetation and land used for agriculture due to the presence of uniform lines that may indicate ridges and furrows along with homesteads. Several dams and/or ponds are observable within the Study Area. Bruce creek runs through the centre of Property 24 and inside the eastern property boundary of Property 25 and runs from north to south.
	Surrounds	Generally vacant and agricultural land surrounds the study area. A railway track bounds Property 27, 28 and 30 to the south.
1966	Study Area	Further development of the land for agricultural purposes is evident through the clearing of vegetation (Properties 1, 16 and 27) and the construction of dams (Properties 15, 26 and 28).
	Surrounds	Consistent with observations noted within the Study Area. The property north of Property 30 (denoted Property 30-B in Appendix F) has undergone development and a pair of sheds/workshops can be observed.
1970	Study Area	Further development of the land for agricultural purposes is evident through the clearing of vegetation (Properties 1, 2 and 16), construction of dams (Property 30) and the presence of uniform lines which may indicate ridges and furrows (Property 26, 28 and 30). Small rectangular objects are observable which may be haystacks and indicate grazing of livestock (Property 21). Soil discolouration is also observable in the 1970 image which may indicate localised flooding (Property 27).
	Surrounds	Further development of the surrounding land for agricultural purposes
1978	Study Area	Further development of the land with several possible buildings/structures observable (Property 1, 19, 29 and 30) and the backfilling of previously identified dams (Property 15 and 30). Visible discolouration of land which may indicate earthworks or flooding (Property 1, 17, 18 and 27).
	Surrounds	Distinct cropping formation visible east of Property 1 and 2

(Continued over page...)

Image Year	Location	Observation
1984	Study Area	Further development of the land for agricultural purposes is evident through the clearing of vegetation (Property 16), construction of dams and dirt tracks (Property 17 to 19, 26 and 29), the backfilling of previously identified dams (Property 15) and the presence of uniform lines which may indicate ridges and furrows (Property 10 to 14, 20, and 22 to 24). Visible discolouration of land which may indicate earthworks or flooding (Property 1). Electrical pylons have been erected within the northern property boundary of Property 25, 26 and 30.
	Surrounds	The property north of Property 30 has undergone further development and more potential sheds/workshops can be observed.
1990	Study Area	No significant development noted since the 1984 image other than a dam appears to have been backfilled (Property 29).
	Surrounds	No significant development noted since 1984 image.
2005	Study Area	Eight (8) large, several smaller structures and two (2) appear to have been constructed which may indicate large scale commercial farming on Property 20. Five (5) long rectangular structures which appear to be greenhouses have been constructed on Property 11. Further development of wider Study Area for agricultural purposes is evident through significant construction of buildings, dams and tracks. Soil discolouration which may indicate earthworks (Property 9).
	Surrounds	North of Property 1 has undergone significant development and appears to be a commercial/industrial precinct. East of Property 1 and 2 has been developed for residential land use.
2013	Study Area	Four (4) circular structures are visible on Property 20 which appear to be for liquid storage and two (2) more dams have been constructed which may indicate large scale commercial farming. Further development of the wider Study Area for agricultural purposes is evident through the clearing of vegetation (Property 8), construction of buildings (Property 6, 10 and 13), silos (Property 30) and feedlots (Property 7).
	Surrounds	North of Property 1 has undergone further development for commercial/industrial land use. East of Property 1 and 2 and north of Property 24 has undergone further development for residential land use. The property north of Property 30 has visible stockpiles of soil and scrap metal.
2019	Study Area	Further development of the wider Study Area for agricultural purposes is evident through visible machinery (Property 11), construction of structures (Property 20) and feedlots (Property 10).
	Surrounds	Further evidence of stockpiled soil and scrap metal on the property north of Property 30.
2020	Study Area	Three (3) of the long rectangular structures on Property 11 have been deconstructed. Areas of Property 11 are being used to store/dispose of what appears to be scrap metals, pieces of wood and other construction materials. Four (4) small rectangular objects can be seen next to a large structure on Property 20, which may be intermediate bulk containers (IBCs) used for chemical storage. Areas of Property 20 are being used to store/dispose of what appears to be scrap metal and other waste.
	Surrounds	Further evidence of stockpiled soil and waste construction material being stored on the property north of Property 30.

4 Contaminants of Potential Concern

Based on the desktop review, Meinhardt considers that a number of potentially contaminating activities may exist or have occurred on and/or in the vicinity of the Study Area, which may have the potential to have led to contamination of soil and/or the underlying groundwater and/or may pose a vapour risk.

These activities are summarised in **Table 4-1**, along with their location and Contaminants of Potential Concern (**CoPC**) typically associated with the types of land use noted. Typically, these activities are related to Properties that have been assigned a Low to Medium Risk.

Please note: Due the high-level nature of this assessment (time between the aerial photographs, poor resolution of some imagery and no intrusive investigations forming part of this assessment), there is potential for actual or assumed activities not listed as occurring at an individual Property to have taken place. The list of potentially affected Properties and CoPC as assessed in **Table 4-1** is not considered to be comprehensive and further activities may be assessed as having taken place in a more detailed and Property-specific assessment that should be conducted to confirm that individual Properties are in fact fit for proposed redevelopment.

Further, where potentially contaminating activities has been identified at an individual Property, Meinhardt's observations should be considered as subjective and that there is no definitive evidence that contamination actually exists or has occurred at any property. The list of potentially affected Properties and CoPC may be downgraded or upgraded as further information becomes available through more detailed and Property-specific assessment.

Table 4-1 Potentially Contaminating Activities Identified (Actual or Assumed)

Land Use	Contaminants of Potential Concern	Properties Affected
Maintenance and storage of heavy farm machinery	Metals, herbicides, pesticides (OCP/OPP), TRH	20
Cropping, other non-intensive agricultural or farming activities	Metals, herbicides, pesticides (OCP/OPP), nutrients	All Properties
Importation of fill material for earthworks / construction / filling in dams	Heavy metals, ACM, PAH, TRH, BTEXN	Potentially all Properties
Stockpiling of imported fill / excavated material / Construction and Demolition (C&D) Waste / Scrap Metal	Heavy metals, PAH, TRH, OCP/OPP, ACM	11 and 20
Possible fuel and chemical storage associated large scale commercial farming.	Heavy metals, TRH, BTEXN, OCP, OPP, PAH	20

Notes

TRH - Total Recoverable Hydrocarbons

BTEXN - Benzene, Toluene, Ethylbenzene, Xylenes and Naphthalene.

PAH - Poly-Aromatic Hydrocarbons

Heavy metals - As, Ba, Be, Bo, Cd, Co, Cr, Cu, Mn, Mo, Ni, Pb, Sb, Se, Sn, V, Zn and Hg.

OCP/OPP - Organochlorine / Organophosphate Pesticides

ACM – Asbestos-Containing Materials

Meinhardt notes that cropping alone, as observed at most of the Properties within the Study Area, is considered unlikely to contribute significant potential for contamination.

Further, Meinhardt did not observe the presence of storage of significant volumes of chemicals, or the presence of carcass burial or burning pits that would lead to requirement for assessment of potential impacts or contamination from these. It is intended that the actual or potential presence of these within the Study Area would be confirmed during any Property-specific investigations as may be required prior to any redevelopment.

It is also noted that a septic tank system is assumed to be located at any Property with identified actual or assumed rural-residential or residential uses. While noted, the assumed presence of a septic tank has not resulted in an increase in the PFC rating for that Property; if the septic system is in good condition and functioning properly, no risk to human or environmental health is expected.

5 Potential for Contamination Assessment

A Potential for Contamination (PFC) assessment was undertaken for each Property within the Study Area. PFC Ratings were derived based on the outcomes of the desktop review.

The PFC assessment for Properties located within the Study Area was completed in accordance with DSE 2005 and collated into the PFC assessment table located in **Appendix F**.

A 'traffic light' system (**Green = Low**, **Yellow = Medium** and **Red = High**) was used in the PFC assessment for each property.

5.1 Potential for Contamination (PFC)

Results obtained from the desktop review indicate the Study Area and much of the surrounding areas have been predominantly used for farming including generally non-intensive agricultural and potentially stock grazing purposes. Other current and former land uses indicated areas may have been used for more intensive agricultural purposes such as a small to large scale market gardens (Property 11 and Property 20).

Residential homesteads and associated infrastructure (sheds, water tanks etc.) were identified on several of the Properties located within the Study Area, of varying ages and composition.

Earthworks associated with the construction and alteration of dams and watercourses was identified on many of the Properties located within the Study Area. Earthworks associated with the construction/demolition of buildings and infrastructure was also present or assumed.

Many of the Properties within the Study Area were assessed to contain land uses or activities (whether actual or assumed) that have the potential to lead to contamination of soil and/or groundwater and/or pose a vapour risk. These activities included:

- Earthworks / stockpiling / importation and use of possibly uncontrolled fill material;
- Structures / buildings with unknown use;
- Storage and maintenance of heavy machinery associated with farming / agricultural practices;
- Use of agricultural sprays and irrigation of crops;
- Storage of chemicals / fuel / oil, chemical mixing;
- Potential asbestos containing materials (ACM) in structures or buildings, especially those constructed before 1980 when the domestic use of ACM was phased out. These structures/buildings may still be present at the Property, or were demolished and/or removed; and
- Livestock grazing – though stated in **Section 4**, non-intensive grazing or pasturing of non-carnivorous animals is not considered to contribute to significant potential for the presence of contamination.

The PFC assessment for Properties located within the Study Area was completed in accordance with DSE 2005 and collated into the PFC assessment table located in **Appendix F**. The PFC ratings are presented in **Appendix A, Figure 8**.

5.2 Assessment Levels

In accordance with the DSE 2005 guidance Assessment Levels can be derived using the PFC ratings. Assessment Levels based on PFC ratings and proposed land-use is summarised in **Table 5-1**.

Table 5-1 Assessment Levels Matrix

Proposed Land-Use	Potential for Contamination		
	High	Medium	Low
Sensitive Land-Use			
Childcare centre, preschool or primary school	A	B	C
Dwellings, residential buildings	A	B	C
Other Uses			
Open space	B	C	C
Agriculture	B	C	C
Retail or office	B	C	C
Industry or warehouse	B	C	C

5.2.1 Assessment Level ‘A’

DSE 2005 states the following requirements for a Site designated as Assessment Level A:

“Require an environmental audit as required by Ministerial Direction No. 1 or the Environmental Audit Overlay when a planning scheme amendment or planning permit application would allow a sensitive use to establish on potentially contaminated land.

An environmental audit is also strongly recommended by the SEPP where a planning permit application would allow a sensitive use to be established on land with ‘high potential’ for contamination”

No properties located within the Study Area were classified as requiring Assessment Level ‘A’.

5.2.2 Assessment Level ‘B’

DSE 2005 states the following requirements for a Site designated as Assessment Level B:

“Require a site assessment from a suitably qualified environmental professional if insufficient information is available to determine if an audit is appropriate. If advised that an audit is not required, default to C.”

Properties classified as requiring Assessment Level ‘B’ require further site assessment to assess suitability of the land for the proposed land use.

A total of two (2) Properties (Property 11 and Property 20) located within the Study Area were classified as requiring Assessment Level ‘B’ (i.e. requiring a site assessment from a suitably qualified environmental professional) to confirm their suitability for sensitive use as summarised in **Table 5-2**.

These sites would require Assessment Level C to confirm their suitability for less sensitive uses such as Open Space, Agriculture, Retail or Office (commercial use) or industry or Warehouse (noting that in accordance with DSE 2005, for a proposal to redevelop potentially contaminated land for a use other than a sensitive use, a planning authority can require an environmental audit if it considers it appropriate).

Table 5-2 Assessment Level B Summary

Area	Meinhardt LCA Property ID	Assessment Level	Rationale
1	11	B	Five (5) long rectangular structures which appear to be greenhouses were constructed between 1990 and 2005. Three (3) of these have been demolished with construction debris scattered around the property. Two (2) possible work/storage sheds are present on the property. Industrial machinery and liquid storage observed, with stockpiles of what appears to be scrap metal, pieces of wood and other construction materials.
	20		Nine (9) large structures, four (4) dams, four (4) circular structures which may indicate liquid storage, four (4) possible IBCs are all present on the Property which indicates medium to large scale commercial agriculture. This was confirmed in communications with GPSC which noted the property as 'Market Gardens' in 2012. Market Gardens are listed in the DSE 2005 guidance as having a medium potential for contamination.

5.2.3 Assessment Level 'C'

DSE 2005 states the following requirements for a Site designated as Assessment Level C:

“General duty under Section 12(2)(b) and Section 60(1)(a)(iii) of the Planning and Environment Act 1987.”

Properties classified as requiring Assessment Level 'C' do not require the application of an EAO, in accordance with DSE 2005, however a planning authority can require a site assessment from a suitably qualified environmental professional if it considers it appropriate.

All properties with the exception of Property 11 and 20, located within the Study Area were classified as requiring Assessment Level 'C'.

6 Conclusions and Recommendations

6.1 Conclusions

Meinhardt has reviewed information relevant to each of the Properties within the Study Area to assess the risk of contamination affecting each property and any further works required to assess the level of contamination.

The desktop review indicates the Study Area is zoned for farming use. Review of the aerial photography identified that much of the Study Area has been used for non-intensive farming of crops and possible stock grazing purposes.

Overlays affecting the Study Area include a Bushfire Management Overlay (**BMO**), Environmental Significance Overlay (**ESO**), Salinity Management Overlay (**SMO**) and Land Subject to Inundation Overlay (**LSIO**). In addition, many properties within the Study area were noted to have ecological constraints (e.g. contain native vegetation and / or the potential to contain Groundwater Dependent and Ecosystems Inflow Dependent Ecosystems) and/or Cultural Heritage Constraints (e.g. contain registered Cultural Heritage Sensitivity). All properties were also located within a Bushfire Prone area and as such would need to be developed with consideration given to bushfire-tolerant design and construction practices.

The underlying geology of the Study Area is anticipated to consist of predominantly of Miocene to Pliocene aged Black Rock Sandstone in the west and Miocene to Holocene aged Newer Volcanics basalt flows exist east of Bruce Creek. Areas of Miocene aged Gellibrand Marl and Quaternary aged Alluvium are present around Bruce Creek. Based on the underlying geology, geotechnical constraints, including settlement, slope stability, bearing capacity and erosion will need to be considered prior to development.

An assessment of aerial photographs covering the Study Area noted potentially contaminating activities including:

- Earthworks / stockpiling / importation and use of possibly uncontrolled fill material;
- Structures / buildings with unknown use;
- Storage and maintenance of heavy machinery associated with farming / agricultural practices;
- Use of agricultural sprays and irrigation of crops;
- Storage of chemicals / fuel / oil, chemical mixing;
- Potential asbestos containing materials (ACM) in structures or buildings, especially those constructed before 1980 when the domestic use of ACM was phased out. These structures/buildings may still be present at the Property, or were demolished and/or removed; and
- Livestock grazing - though as stated in **Section 4**, non-intensive grazing or pasturing of non-carnivorous animals is not considered to contribute to significant potential for the presence of contamination.

Based on the findings of the desktop review, a total of 28 out of the 30 Properties were rated as having 'Low' potential for contamination whilst the remaining two (2) Properties (Property 11 and Property 20) were rated as having 'Medium' potential for contamination.

There were no Properties given a "High" potential for contamination within the Study Area.

Due the high-level nature of this assessment (time between the aerial photographs, poor resolution of some imagery, no access to individual properties for site inspections and no intrusive investigations forming part of this assessment), there is potential for actual or assumed activities not listed as occurring at an individual Property to have taken place. The list of potentially affected Properties and contaminants of potential concern (**CoPC**) as assessed in **Table 4-1** of this LCA Report is not considered to be comprehensive and further activities may be assessed as having taken place in a more detailed and Property-specific assessment that should be conducted to confirm that individual Properties are in fact fit for proposed redevelopment.

Further, where potentially contaminating activities has been identified at an individual Property, Meinhardt's observations should be considered as subjective and that there is no definitive evidence

that contamination actually exists or has occurred at any property. The list of potentially affected Properties and CoPC may be downgraded or upgraded as further information becomes available through more detailed and Property-specific assessment.

Properties with a 'Medium' potential for contamination rating were classified as requiring an Assessment Level 'B' as per the DSE 2005 guidance. These sites are likely to require a detailed and Property-specific desktop assessment, to be combined (where appropriate based on the findings of the desktop assessment) with limited investigation and sampling of surficial soils for CoPC, within targeted areas such as stockpile locations, imported fill, areas of storage / mixing of chemicals (in volumes larger than typical household usage) or where observations of spills or other indicators of potential contamination are made (e.g. staining of soils, scalded or degraded vegetation, hydrocarbon or methane odours, leaking drums).

Those Properties with a 'Low' potential for contamination rating were classified as requiring an Assessment Level 'C' as per the DSE 2005 guidance. Where there is some uncertainty regarding filling of dams or use of agricultural sprays, further inspection of the Property should be undertaken, and consideration should be made regarding minor targeted assessment of surface soils for indicated CoPC as per the PFC table (**Appendix F**).

6.2 Recommendations

Based on the conclusions detailed in **Section 6.1**, Meinhardt makes the following recommendations:

Potential Contamination of Sites

Recommended Further Works for each property are detailed in **Appendix F**.

- Further investigation to assess the presence of CoPC must be undertaken for Properties assessed as having Medium potential for contamination according to the PFC Ratings.

Where known land uses having the potential to cause contamination has occurred, targeted site investigations including sampling of surficial soils, analysing for CoPC, should be undertaken.

Where potential land uses, having the potential to cause contamination, have been identified, further inspection including discussion with the land owner(s) should be undertaken to determine the risk of contamination and where appropriate targeted site investigations including sampling and analysing for CoPC would be considered as appropriate to be undertaken.

- A Property-specific detailed desktop review and site inspection may be required for Properties assigned as Low potential for contamination according to the PFC Ratings.

Due to the high-level nature of this LCA, there is potential for existing contamination, or activities that may have caused contamination to have occurred, that were not identified. A Low PFC rating does not indicate that development of the Property with no further assessment is appropriate.

Further assessment may include discussion with the land owner(s) and/or occupiers, to determine historical, recent and current uses of the Property. This will enhance the understanding of potential for contamination contained within this LCA and inform on any further assessment (e.g. targeted assessment of soils) that would be required to ensure the Property is fit for proposed redevelopment.

- During development works any contaminated soil (including those with aesthetic impacts including odour) must be managed as a Prescribed Industrial Waste where they are to be removed from site. Producers of contaminated soil must categorise their waste into one of four categories, Category A, B, C or clean fill (EPA Publication IWRG621, *Soil Hazard Categorisation and Management*, 2009) (**EPA 2009**). Descriptions of the threshold limit values (upper limits) of contaminants for these categories are outlined in the EPA 2009.

Broiler Farms

When completing Master Planning for the Bannockburn Growth Area, GPSC should consider the size, location and distance of broiler sheds to potential development sites within the Study Area to ensure that any future development does not encroach upon setback/separation distances to broiler farming operations. It is recommended that GPSC consult the relevant Code for broiler farms to ensure planning provisions are made to enable development to continue, and ensure the amenity of users of the development are not restricted. Based on the location of identified broiler farms near the Study Area,

portions of Property 28 and 30 may be affected by their operations, subject to enquiries that should be made with the affected business(es).

Hydrology and Hydrogeology

The identified surface water features within the Study Area will require feature and level surveys to provide details of drainage patterns for urban drainage system design. Drainage paths will need to be either maintained, diverted or alternative provided to ensure all areas remain appropriately drained during and after any development.

Hazardous Materials

Hazardous materials surveys should be carried out for those structures within the Study Area identified for future demolition or relocation. Further, inspection by a suitably experience and qualified Occupational Hygienist or asbestos-specialist should be considered at those Properties containing old (e.g. pre-1980) structures/buildings, or where the desktop assessment identified that potential ACM may be or was present.

However, it is understood that these assessments would be subject to planning and OH&S processes outside the planning system.

Ecological Constraints

Many of the Properties within the Study Area were noted to contain native vegetation and / or the potential to contain Groundwater Dependent and Ecosystems Inflow Dependent Ecosystems. In addition, some of the Properties within the Study Area have Environmental Significance Overlay. It is therefore recommended that an ecological survey of the be undertaken prior to development of these areas and WSUD initiatives be considered prior to development to minimise disruption to the local terrestrial and aquatic ecological receptors around Bruce Creek.

Cultural Heritage Constraints

Nine (9) of the Properties within the Study Area were noted to contain registered Cultural Heritage Sensitivity Areas as specified in Division 3 of Part 2 of the Aboriginal Heritage Regulations 2007. It is therefore recommended that GPCC undertake further investigation (engaging a qualified cultural heritage professional if required) to assess whether development of these areas will trigger the requirement for a Cultural Heritage Management Plan or other requirements in accordance with the Aboriginal Heritage Regulations 2007.

Geotechnical Assessments

It is recommended that detailed geotechnical assessments be completed prior to the detailed design stage for any future development within the Study Area.

However, it is understood that a geotechnical assessment of proposed development sites within the Study Area would be triggered at the subdivision stage.

7 References

- Australian and New Zealand Environment and Conservation Council (ANZECC) and the National Health and Medical Research Council (NHMRC), *Australian and New Zealand Guideline for the Assessment and Management of Contaminated Sites*, January 1992;
- Department of Environment, Land, Water and Planning, *Spatial Datamart Victoria – VicMap Easements*, obtained 25/05/2020 from <https://services.land.vic.gov.au/SpatialDatamart/>
- Department of Sustainability and Environment (DSE) (now Department of Environment, Land, Water and Planning (DELWP)), *Potentially Contaminated Land General Practice Note*, 2005 (DSE 2005);
- EPA Victoria, *Best Practice Environmental Management: Siting, Design, Operation and Rehabilitation of Landfills (BPEM)*. Environment Protection Authority Publication 788.3, August 2015;
- EPA Victoria, *EPA Publication IWRG621, Soil Hazard Categorisation and Management*, July 2009;
- LotSearch, *Bannockburn Growth Area, Bannockburn VIC 3331 (Part 1)*, LS011854 EP, 1 April 2020;
- LotSearch, *Bannockburn Growth Area, Bannockburn VIC 3331 (Part 2)*, LS011855 EP, 2 April 2020;
- LotSearch, *Bannockburn Growth Area, Bannockburn VIC 3331 (Part 3)*, LS011856 EP, 2 April 2020;
- LotSearch, *Bannockburn Growth Area, Bannockburn VIC 3331 (Part 4)*, LS011857 EP, 2 April 2020;
- National Environment Protection Council, *National Environment Protection (Assessment of Site Contamination) Measure*, 1999 (as amended 2013);
- Standards Australia, *Australian Standard AS4482.1-2005: Guide to the Investigation and Sampling of Sites with Potentially Contaminated Soil – Part 1: Non-Volatile and Semi-Volatile Compounds*, 2005;
- State Government of Victoria, *Victorian Code for Broiler Farms*, 2009 (as amended 2018)
- State Government of Victoria, *State Environment Protection Policy, Prevention and Management of Contaminated Land*, June 2002 (Land SEPP); and
- State Government of Victoria, *State Environment Protection Policy (Waters)*, 2018 (Waters SEPP).

8 Limitations

The assessment in this report was restricted to the agreed scope of works and is subject to the limitations set out below or elsewhere within this report.

The assessment has been undertaken and performed in a professional manner consistent with the skill and care ordinarily exercised by reputable consultants under similar circumstances. No other warranty, expressed or implied, is given.

Where Meinhardt Infrastructure & Environment Pty Ltd (Meinhardt) has relied on verbal information and/or documentation provided by the client and/or third parties, Meinhardt did not attempt to independently verify the accuracy or completeness of that information. To the extent that the conclusions or recommendations in this report are based in whole or in part on such information, they are contingent on its validity. Meinhardt assume no responsibility for any consequences arising from any information or condition that was inaccurate, concealed, withheld, misrepresented, or otherwise not fully disclosed or made available to Meinhardt.

Other than the visual observations and analytical data as stated in this report, no representations or warranties are made concerning the nature or quality of the soil, groundwater, surface water and/or soil vapour on the Site. On all sites varying degrees of non-uniformity of the vertical and horizontal, groundwater, surface water and/or soil vapour/landfill gas conditions are encountered. Hence no sampling technique can completely eliminate the possibility that samples are not totally representative of soil and/or groundwater conditions on a site.

It should also be recognised that site conditions, including contaminant extent and concentrations can change with time. Hence, the information in this report is only accurate as at the date of issue. If this report is used after a protracted delay, further investigation of the Site may be necessary.

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APPENDIX A

FIGURES



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0 65 130 260 390 520
Meters
Coordinate System: GDA 1994 MGA Zone 55

Legend



Study Area



Arterial Road



Railroad



Major Road



Highway

Figure 1 - Study Area Location Plan

Bannockburn Growth Area
GPSC - Bannockburn Land Capability Assessment
Golden Plains Shire Council

Job No.: 122300

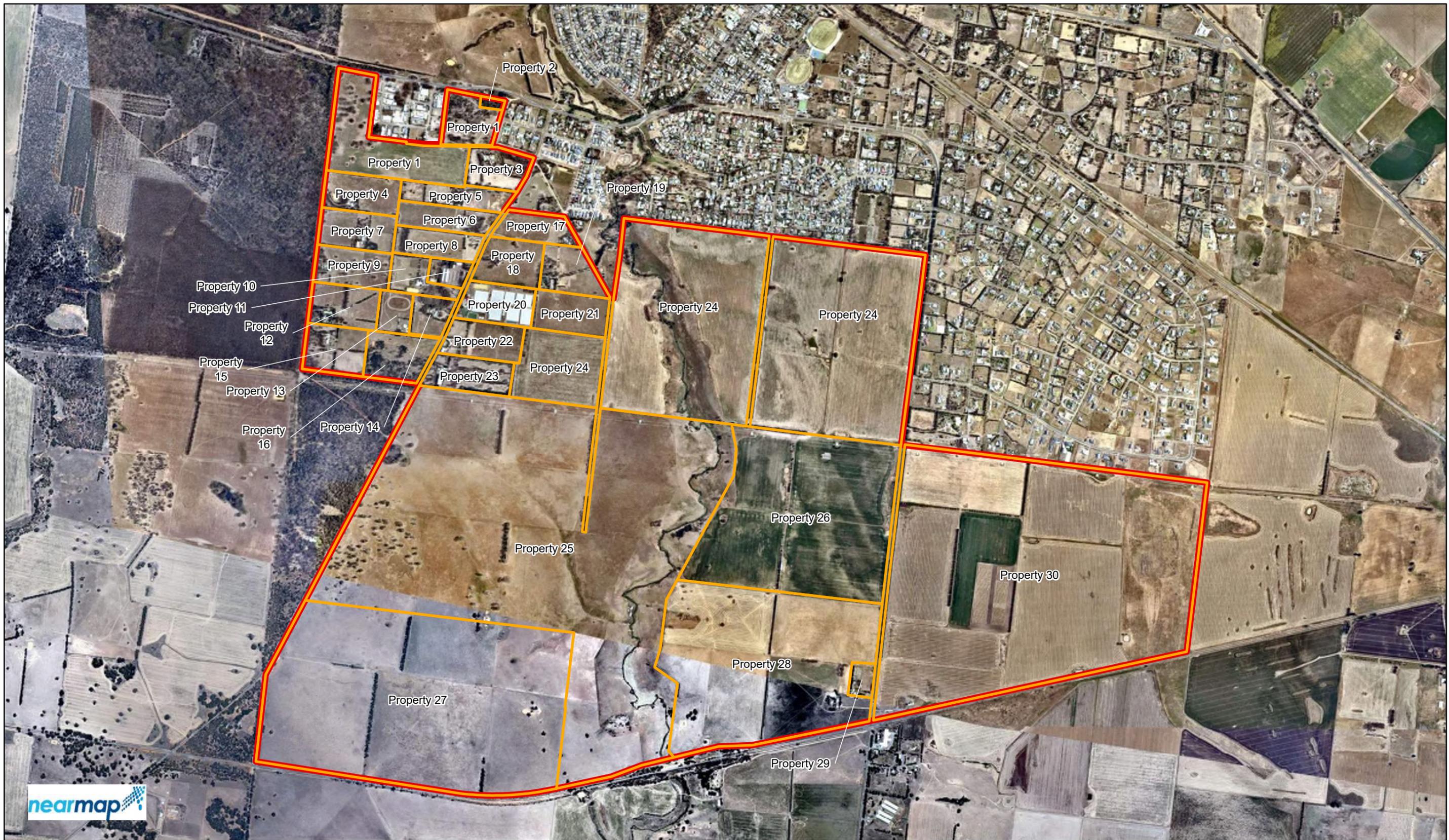
Ref No.: F0001

Rev: 0

Information Source: Aerial Imagery 2020 - NearMap; Transportation Features 2020 - Spatial Datamart (VicMap); Study Area Boundary 2020 - Meinhardt.

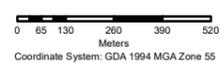
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Legend

- Study Area
- Property Boundary

Figure 2 - Study Area Layout and Property Plan

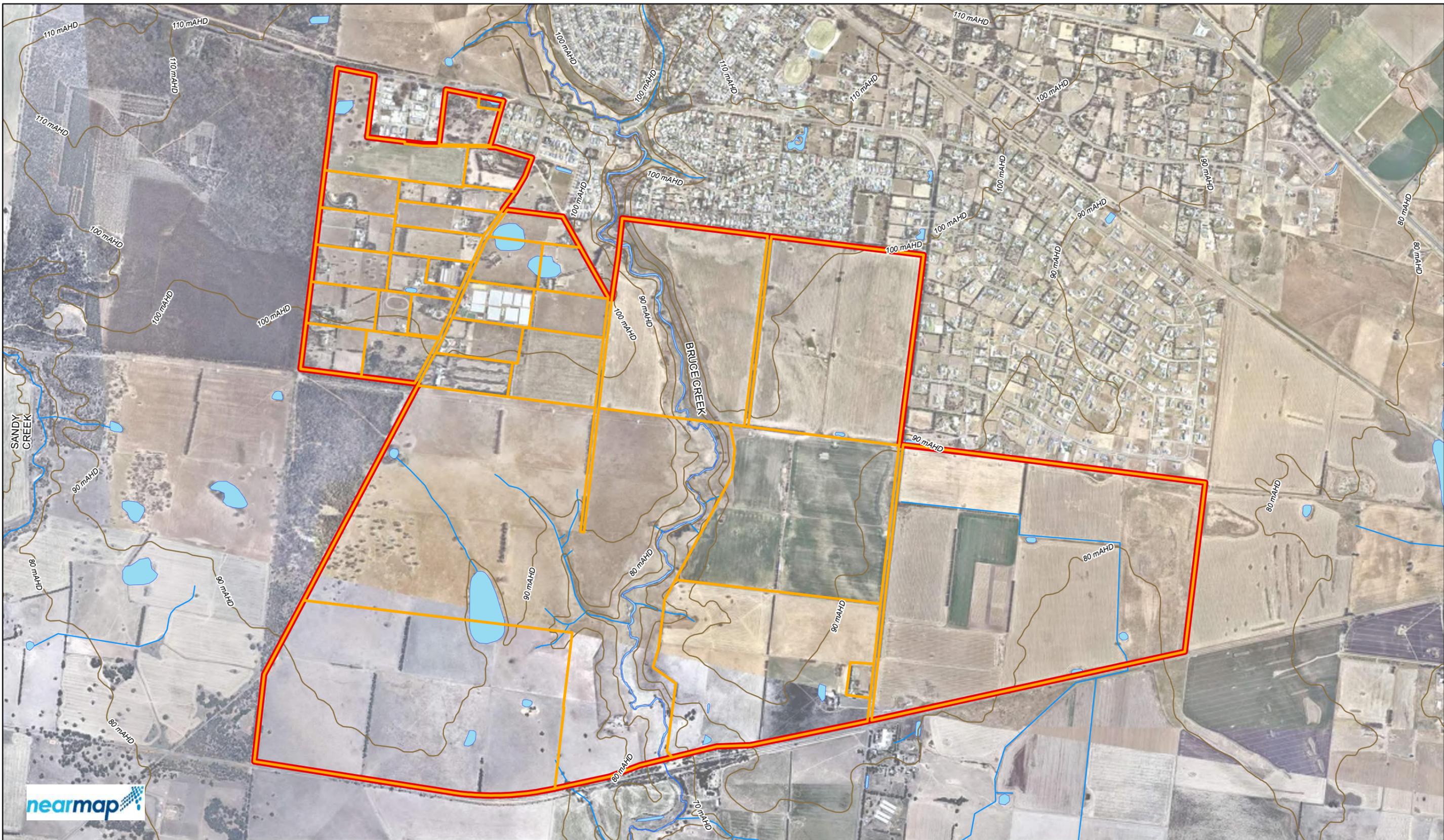
Bannockburn Growth Area
GPSC - Bannockburn Land Capability Assessment
Golden Plains Shire Council

Job No.: 122300
Ref No.: F0002
Rev: 0

Information Source: Aerial Imagery 2020 - NearMap; Cadastre 2020 - Spatial Datamart (VicMap); Study Area and Property Boundaries 2020 - Meinhardt.

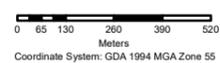
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Legend

- Property Boundary
- Study
- 10m Contours
- Water Bodies
- Watercourses

Figure 3 - Site Topography and Hydrology Plan

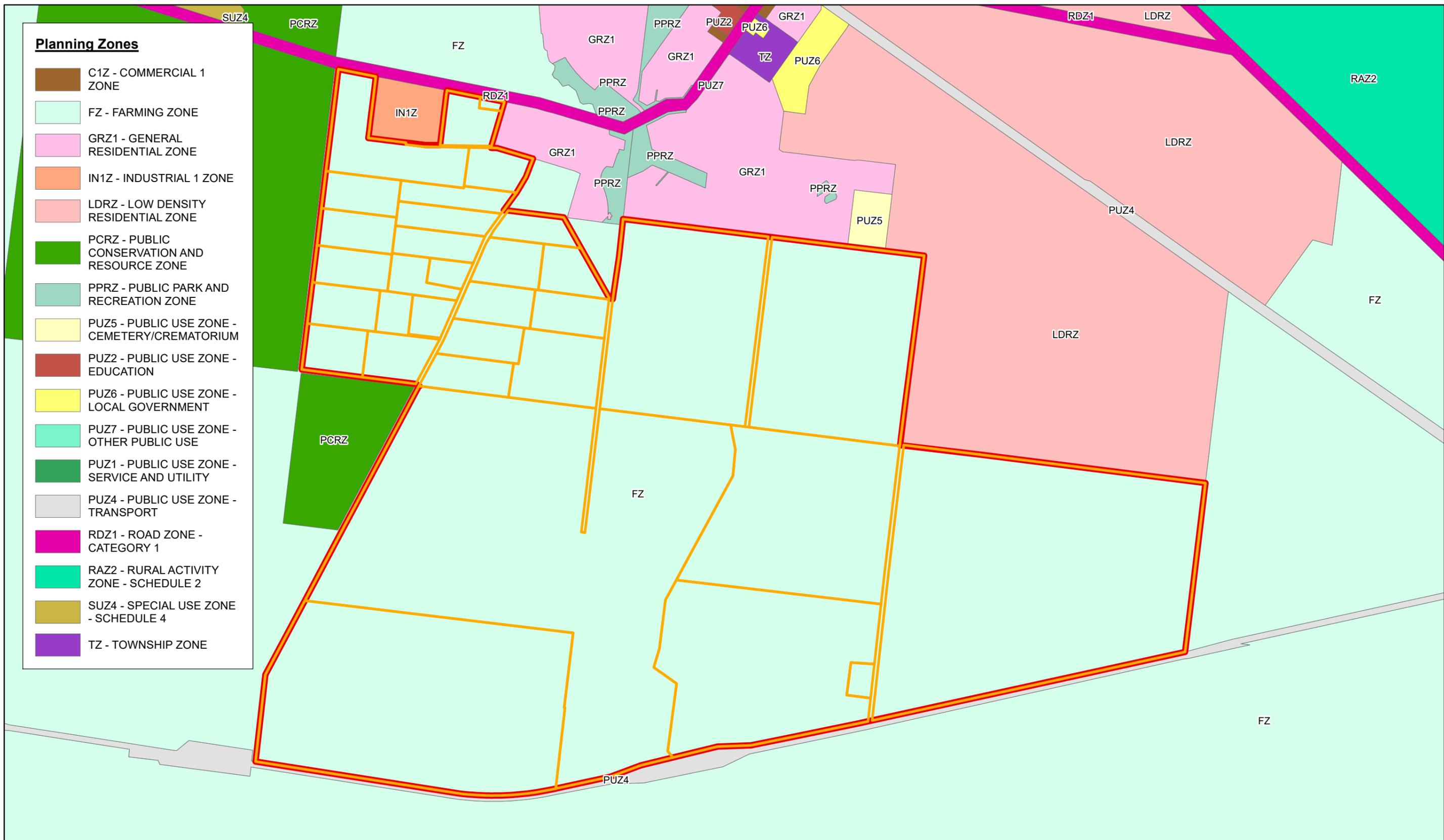
Bannockburn Growth Area
GPSC - Bannockburn Land Capability Assessment
Golden Plains Shire Council

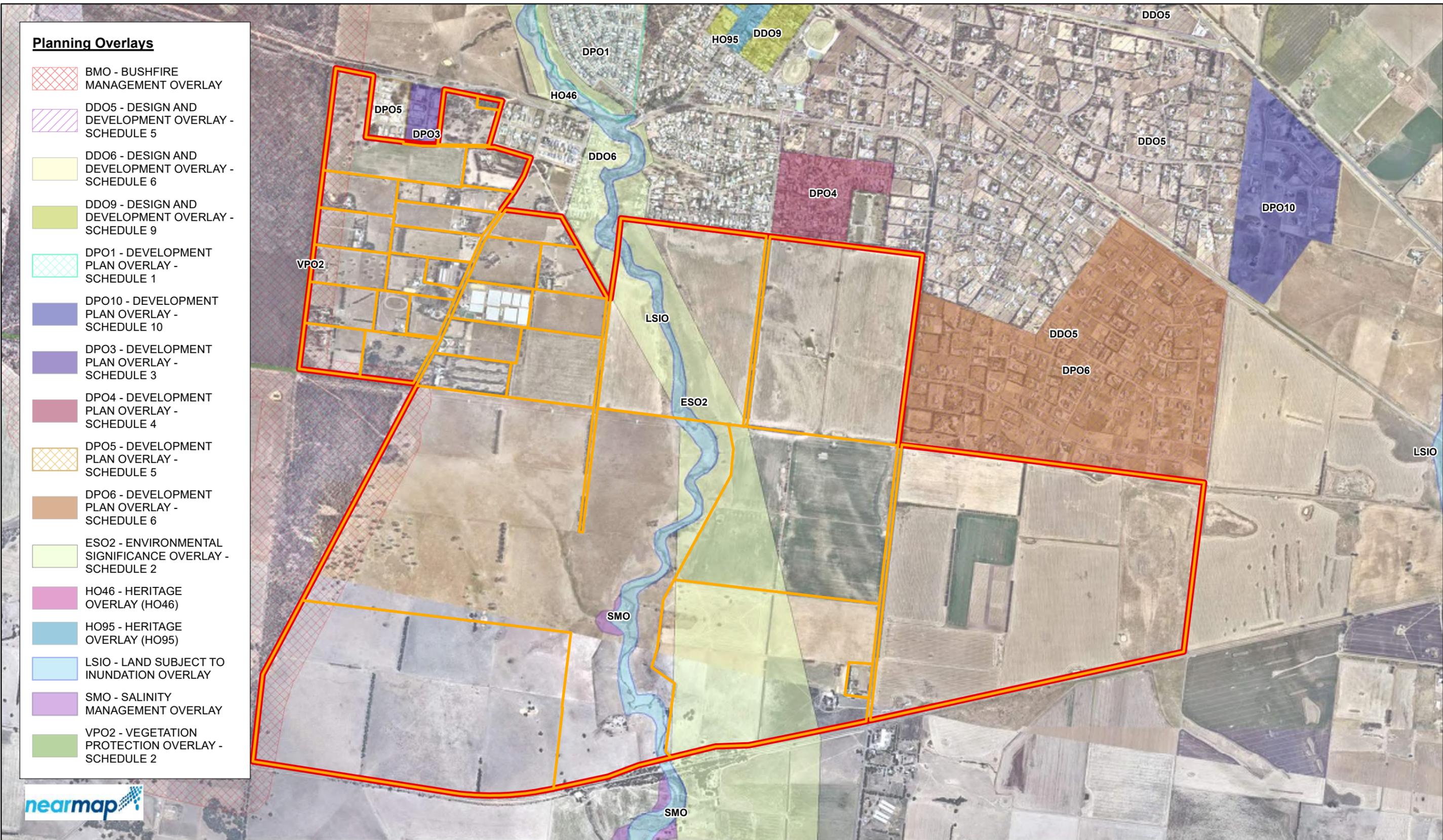
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Ref No.: F0002
Rev: 0

Information Source: Aerial Imagery 2020 - NearMap; Water Bodies and Watercourses 2020 - Spatial Datamart (VicMap); Study Area and Property Boundaries 2020 - Meinhardt.

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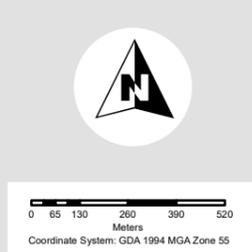


Planning Overlays

-  BMO - BUSHFIRE MANAGEMENT OVERLAY
-  DDO5 - DESIGN AND DEVELOPMENT OVERLAY - SCHEDULE 5
-  DDO6 - DESIGN AND DEVELOPMENT OVERLAY - SCHEDULE 6
-  DDO9 - DESIGN AND DEVELOPMENT OVERLAY - SCHEDULE 9
-  DPO1 - DEVELOPMENT PLAN OVERLAY - SCHEDULE 1
-  DPO10 - DEVELOPMENT PLAN OVERLAY - SCHEDULE 10
-  DPO3 - DEVELOPMENT PLAN OVERLAY - SCHEDULE 3
-  DPO4 - DEVELOPMENT PLAN OVERLAY - SCHEDULE 4
-  DPO5 - DEVELOPMENT PLAN OVERLAY - SCHEDULE 5
-  DPO6 - DEVELOPMENT PLAN OVERLAY - SCHEDULE 6
-  ESO2 - ENVIRONMENTAL SIGNIFICANCE OVERLAY - SCHEDULE 2
-  HO46 - HERITAGE OVERLAY (HO46)
-  HO95 - HERITAGE OVERLAY (HO95)
-  LSIO - LAND SUBJECT TO INUNDATION OVERLAY
-  SMO - SALINITY MANAGEMENT OVERLAY
-  VPO2 - VEGETATION PROTECTION OVERLAY - SCHEDULE 2



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0 65 130 260 390 520
 Meters
 Coordinate System: GDA 1994 MGA Zone 55

Legend

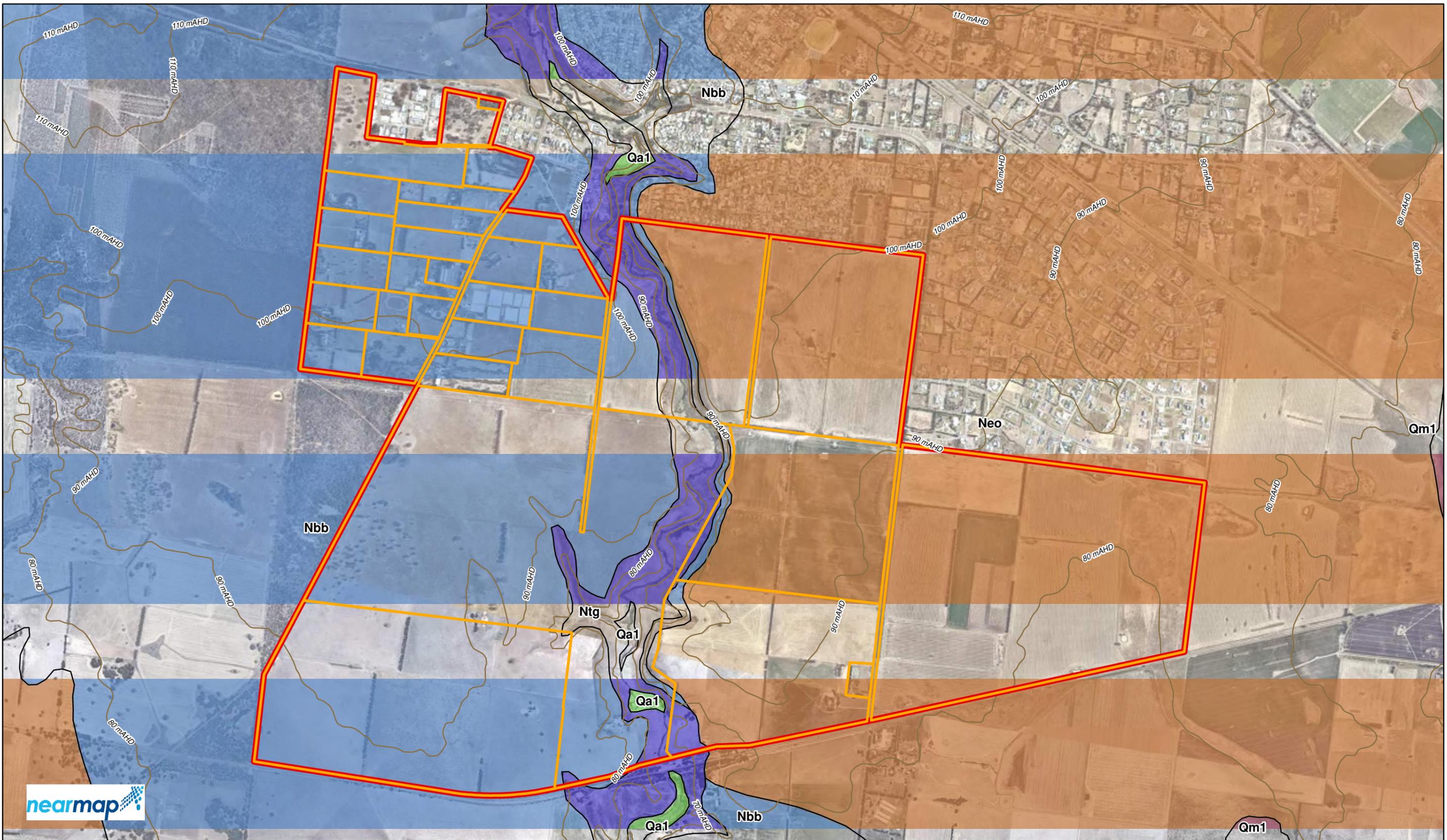
-  Study Area
-  Property Boundary

Figure 5 - Study Area Planning Overlays

Bannockburn Growth Area
 GPSC - Bannockburn Land Capability Assessment
 Golden Plains Shire Council

Job No.: 122300
 Ref No.: F0005
 Rev: 0

Information Source: Planning Schemes 2020 - Spatial Datamart (VicMap); Study Area and Property Boundaries 2020 - Meinhardt.
 File Name/ Location: X:\122300 - GPSC-Bannockburn-LCA4_Delivery\5_ENV\4_GIS\2_ArcGIS\Maps\122300_005_Site_Planning_Overlays.mxd
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- | | | | | | |
|---|-------------------|---|---|---|--|
|  | Study Area |  | Black Rock Sandstone (Nbb) |  | Quaternary Alluvium (Qa1) |
|  | Property Boundary |  | Newer Volcanic Group - basalt flows (Neo) |  | Quaternary swamp and lake deposits (Qm1) |
|  | 10m Contours |  | Gellibrand Marl (Ntg) | | |

Figure 6 - Study Area Geological Plan

Bannockburn Growth Area
GPSC - Bannockburn Land Capability Assessment
Golden Plains Shire Council

Job No.: 122300

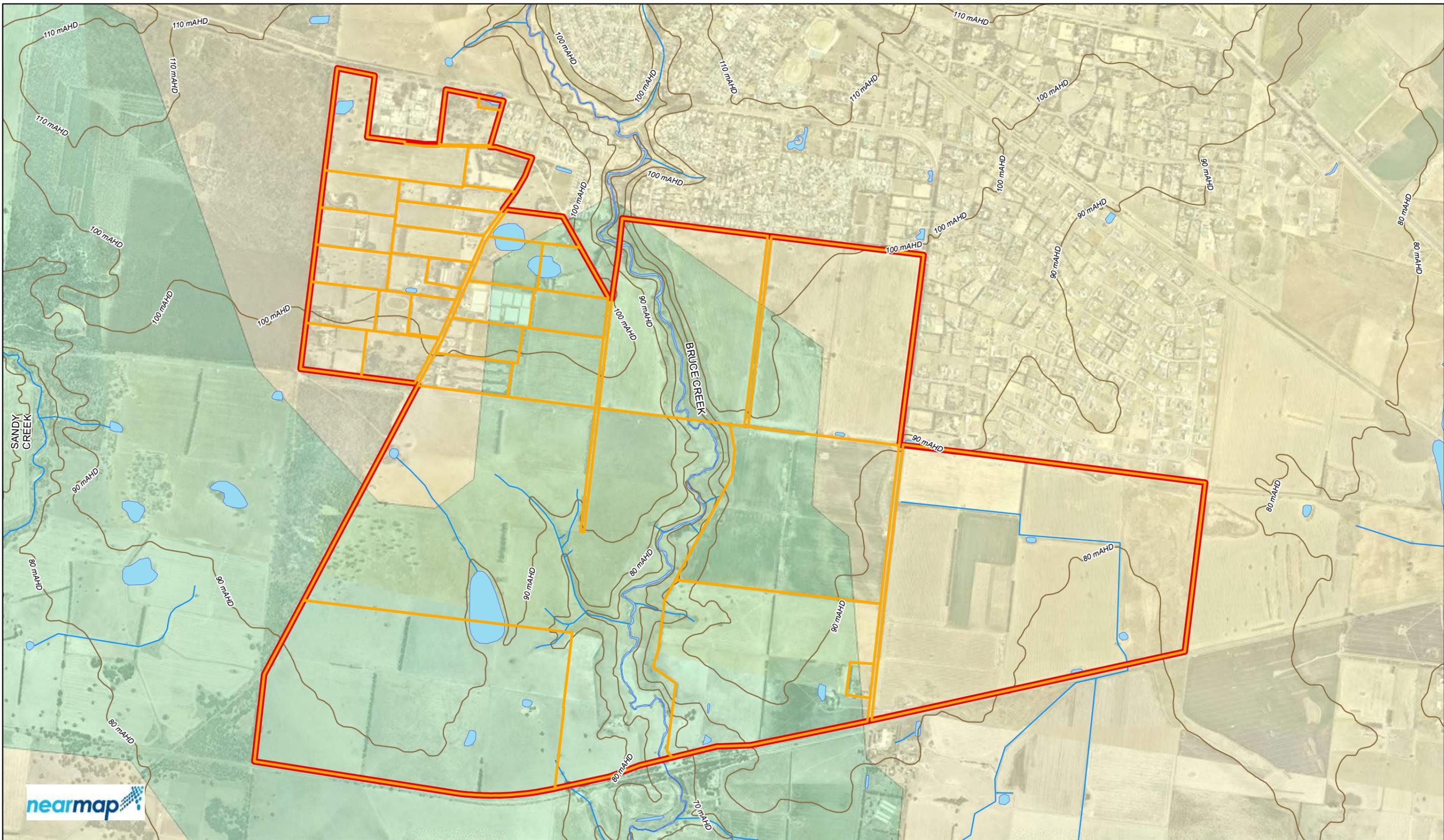
Ref No.: F0006

Rev: 0

Information Source: Aerial Imagery 2020 - NearMap; Geological Units and Boundary 2020 - Spatial Datamart (VicMap); Study Area and Property Boundaries 2020 - Meinhardt.

File Name/ Location: X:\122300 - GPSC-Bannockburn-LCA4_Delivery\5_ENV\4_GIS\2_ArcGIS\Maps\122300_006_Site_Geological_Plan.mxd

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Legend

- Property Boundary
- Study Area
- 10m Contours
- Water Bodies
- Watercourses

Acid Sulphate Soils

- B4 - Low Probability/ Very Low Confidence
- C4 - Extremely Low Probability/ Very Low Confidence

Figure 7 - Study Area Acid Sulphate Soil Potential

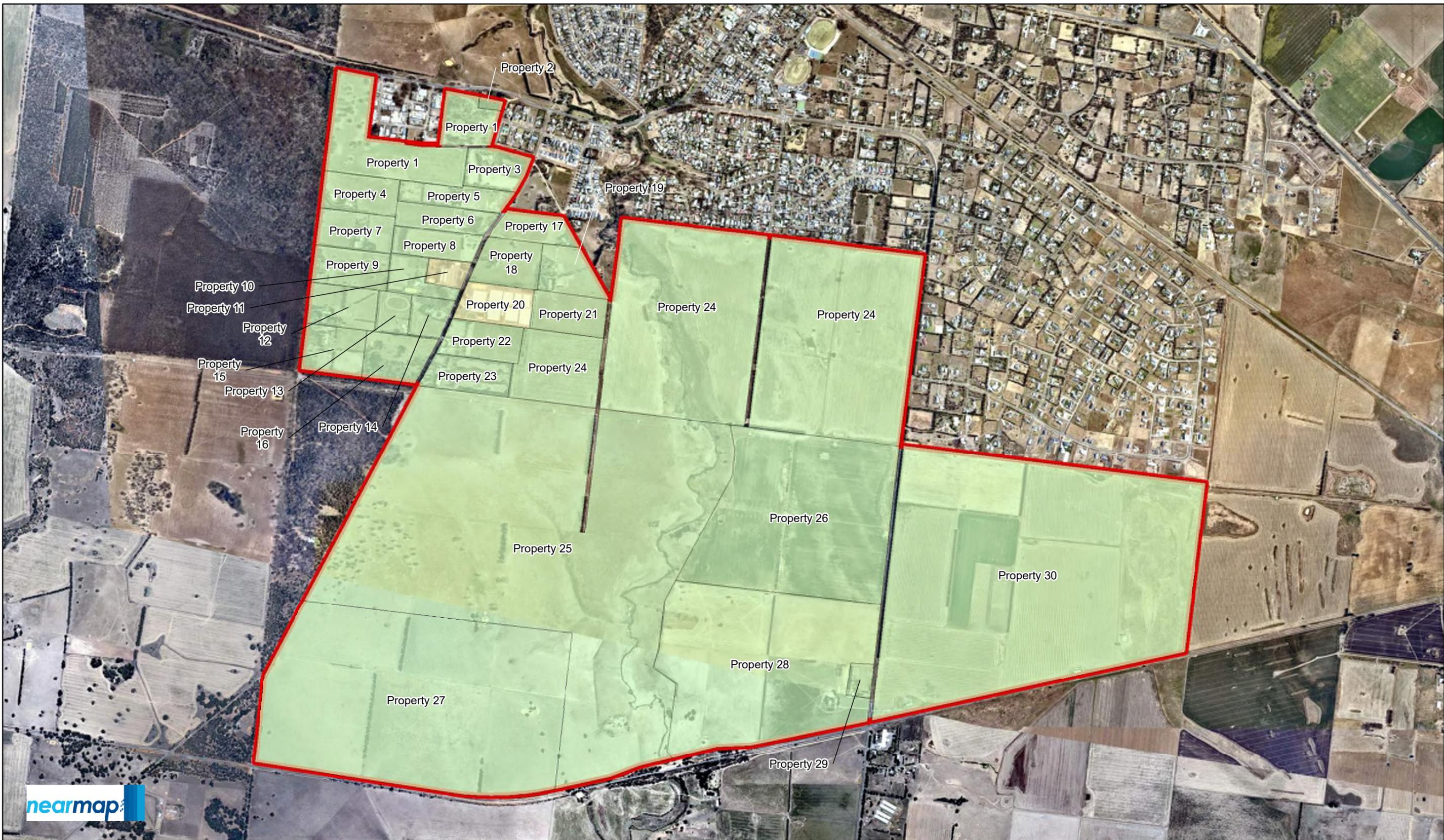
Bannockburn Growth Area
GPSC - Bannockburn Land Capability Assessment
Golden Plains Shire Council

Job No.: 122300
Ref No.: F0007
Rev: 0

Information Source: Aerial Imagery 2020 - NearMap; Water Bodies and Watercourses 2020 - Spatial Datamart (VicMap); Study Area and Property Boundaries 2020 - Meinhardt; Atlas of Acid Sulphate Soils 2020 - CSIRO.

File Name/ Location: X:\122300 - GPSC-Bannockburn-LCA4_Delivery\5_ENV\4_GIS\2_ArcGIS\Maps\122300_007_Site_ASRS_Plan.mxd

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Legend



Study Area



PFC Rating - MEDIUM



PFC Rating - LOW

Figure 8 - Potential for Contamination Plan

Bannockburn Growth Area
GPSC - Bannockburn Land Capability Assessment
Golden Plains Shire Council

Job No.: 122300

Ref No.: F0008

Rev: 0

Information Source: Aerial Imagery 2020 - NearMap; Cadastre 2020 - Spatial Datamart (VicMap); Study Area and Property Boundaries 2020 - Meinhardt; PFC Rating 2020 - Meinhardt.

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