

Kennedys Creek Solar Farm

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Surface Water Assessment

24-Feb-2023
Benalla South Solar Farm

Kennedys Creek Solar Farm

Surface Water Assessment

Client: 433 Link Development Pty Ltd

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1.0 Introduction

1.1 Site Context

In September 2019, AECOM Australia Pty Ltd prepared a planning permit application on behalf of the Applicant, 433 Link Development Pty Ltd (then owned by South Energy) for the construction of a solar farm facility on land adjacent to Murray Road, Nelson Road, and Benalla-Yarrowonga Road, Benalla, Victoria. The site addresses were:

- 226 Murray Road, Benalla
- 51 Nelson Road, Benalla
- 67 Nelson Road, Benalla
- 125 Nelson Road, Benalla
- 284 Benalla-Yarrowonga Road, Benalla.

On 22 September 2021, ownership of the Project Applicant (433 Link Development Pty Ltd) was transferred from South Energy to Lightsource bp. Previous iterations of this report refer to South Energy, however all new information within this report refers to Lightsource bp to reflect current ownership of the Project Application.

Lightsource bp subsequently proposed changes to the concept designs for the Project, therefore this Surface Water Assessment has been updated to support an application under Section 72 of the *Planning and Environment Act 1987* (P&E Act) to amend the planning permit for the Project (the amendment). The amendment seeks to:

- Rearrange the layout of Kennedys Creek Solar Farm to:
 - Relocate the substation to the north-east of the site and connection to new transmission infrastructure
 - Make minor updates and design changes as a result of the above.
- Include a new transmission line from the Kennedys Creek Solar Farm to the network connection point at West Mokoan Solar Farm.

In addition to the site addresses listed above, the transmission line impact area also affects the following additional properties:

- Lake Mokoan Road, Winton North (Allotment 2020 Parish of Winton PP3843)
- 368 Benalla-Yarrowonga Road, Benalla (Lot 2 PS627741)
- 370 Benalla-Yarrowonga Road, Benalla (Lot 1 PS627741)
- 82 Snowy Lane, Benalla (Lot 2 LP123365)
- Benalla-Yarrowonga Road, Benalla (Lot 1 PS717978)
- 524 Benalla-Yarrowonga Road, Benalla (Lot 6 LP206524)
- 572-616 Benalla-Yarrowonga Road, Benalla (Lot 5 LP206524; Lot 4 LP206524 Lot 3 LP206524)
- Allotment 2019 Parish of Goorambat PP2704
- Snowy Lane, Benalla road reserve.

The initial design layout for the solar farm is presented in Appendix B of the Planning Report.

1.2 Scope of Work

The purpose of this surface water assessment is to define, at a high level, the likely changes in water quality, water quantity and stream stability as a result of the proposed development. It also outlines strategies to minimise and manage the potential impacts associated with changes in surface water quantity and quality.

The scope of this high-level surface water assessment is to:

- obtain and collate relevant GIS data from public sources;
- identify all watercourses and other surface water bodies within and adjacent to the study area;
- engage the Goulburn Broken Catchment Management Authority (GBCMA) to discuss flooding implications of development, identify designated waterways on the properties and seek development criteria;
- provide high level commentary on the existing site and likely changes (if at all) in water quantity, quality and stream stability as a result of the proposed development; and
- broadly outline strategies to minimise and manage any likely adverse impacts resulting from the discharge of stormwater from the site to the surface water receiving environment.

The scope for a more detailed flooding and water quality assessment would be developed and undertaken as part of the detailed design process.

1.3 Summary of Updates

This report has been updated to reflect the changes to the project that have occurred since the initial report was prepared in August 2019. These changes include:

- Revised project boundary
- Revised project initial design
- Updates on GBCMA engagement
- Updated references to best practice guidelines and standards
- A summary of environmental values
- High level water quality summary
- Revised mitigation measures
- Updated figures and maps

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2.0 Existing Waterways and Surface Water Features

2.1 Catchment Context

The proposed site is located in the Stockyard Creek sub-catchment of the Broken River which lies approximately 4.5km west of the site. The Stockyard Creek sub-catchment has an approximate area of 87 km² and drains surface water from the north and south of Stockyard Creek. Figure 1 shows the extent of the Stockyard Creek catchment and general surface water flow direction.

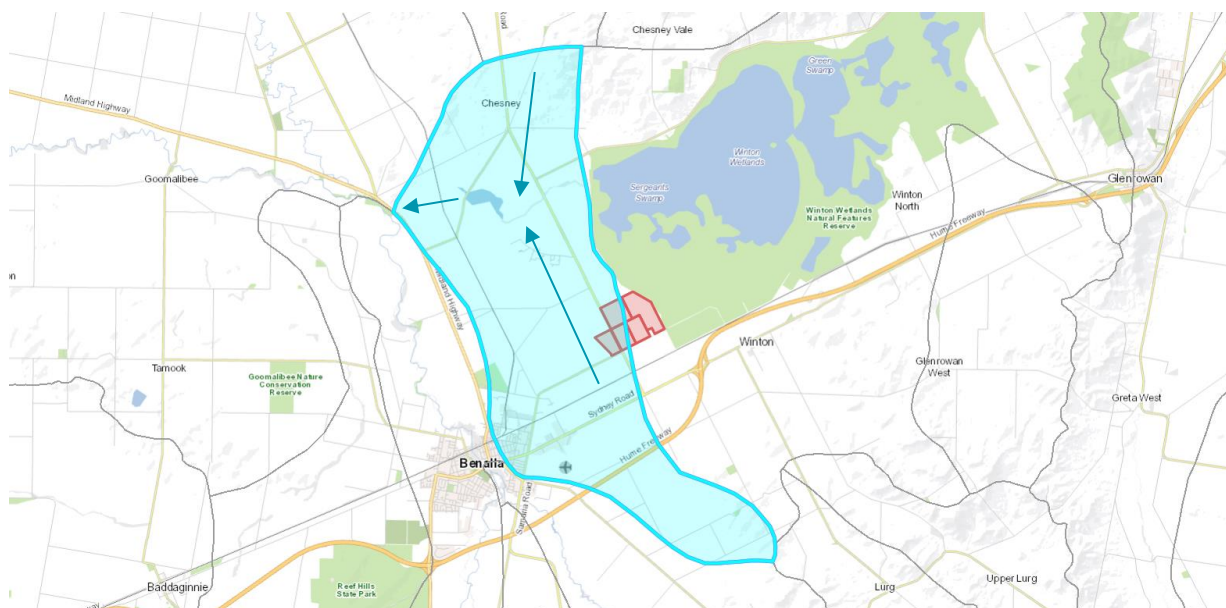


Figure 1 Stockyard Creek sub-catchment, general flow direction and site location, outlined in red, all other sub-catchment boundaries shown in grey (Source DELWP Mapshare 2022).

The Winton Wetlands Natural Features Reserve ('the Wetlands' formally known as Lake Mokoan) is located beyond the north eastern boundary of the site. This wetland is comprised of several additional swamps, with the two largest being Sergeants and Greens Swamp, collectively encompassing an approximate area of 3,198 hectares. The area has been described as a natural but largely reformed wetland, containing freshwater marshes and meadows that are periodically inundated.

These Wetlands are retained by a large dam embankment system on the western perimeter of the former lake. This dam isolates the Wetlands from the local sub-catchments that surround the project area. However, waterways that lie to the east of the embankment are able to naturally drain into the Wetlands.

It should be noted that whilst the approximate boundary of the Stockyard Creek sub-catchment presented in Figure 1 shows the eastern portion of the site draining into the Wetlands sub-catchment, it is likely that the dam wall and local drainage pathways across the site promote surface water flows north towards Stockyard Creek.

The Wetlands were previously fed by water from the Broken River via the engineered Mokoan Inlet Channel. This channel lies just beyond the site's southern boundary and flows east towards the Wetlands.

The former outlet for the Wetlands was the Stockyard Creek, located to the north of the site. This channelised creek previously flowed to Broken River from an engineered outlet on the lake dam.

Kennedy's Creek is situated to the west of the study area and flows north where it joins with several other smaller streams before eventually intersecting with the Stockyard Creek and Broken River. Figure 2 shows the location of the key regional waterways around the project area.

There are two key waterways within the boundary of the site. These are described in more detail in Section 2.2 of this report.

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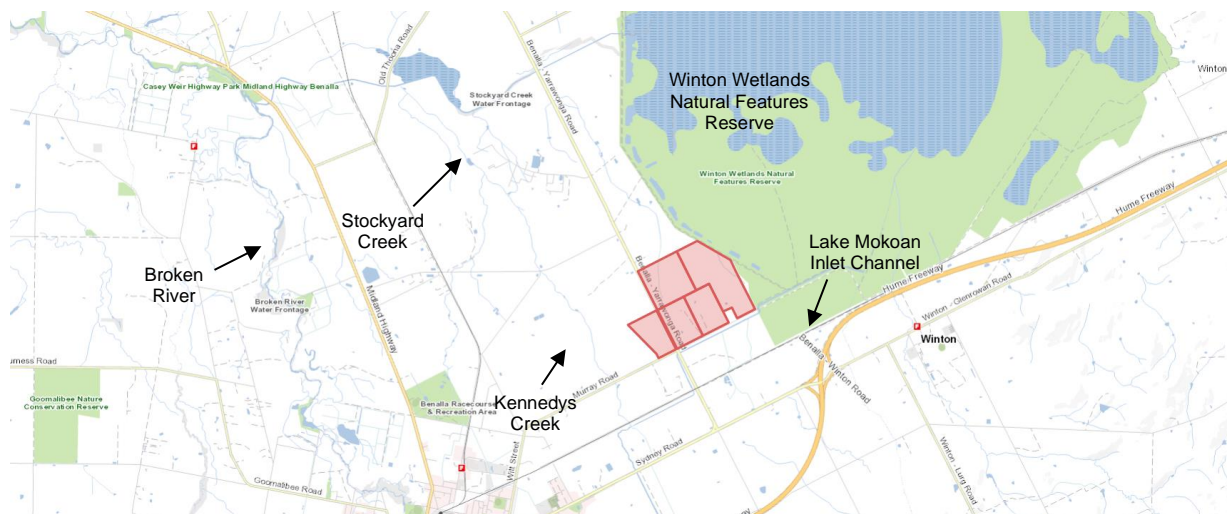


Figure 2 Key regional waterways around the project area (Source: DELWP Mapshare 2022).

2.2 Site Surface Water Features

The spatial data obtained indicated that the site is relatively flat, with a gentle gradient that falls to the north. The surface water features across the site are varied and include well defined drainage channels, shallow ditches and farm dams.

The channel on the eastern boundary of the site (Lake Mokoan Channel Inlet per Figure 2) appears to follow a former natural course with small meanders. However, this drainage pathway has no riparian vegetation, and the former, natural flow regime is potentially impacted by a large farm dam located in the north eastern corner of the site. Aerial imagery indicated that this channel on the eastern boundary of the site could be impacted by erosion or stream instability on some of the small meanders. However, these impacts appeared to be minor and no other waterways or drainage pathways across the site had visible signs of erosion.

On the western boundary of the site, a shallow, channelised waterway flows north from Benalla-Yarrawonga Road toward the Wetlands dam embankment. This waterway continues beyond the northern boundary of the site and connects with several farm dams before eventually discharging into the Stockyard Creek, approximately 4.5km to the north. All waterways and drainage pathways across the site are considered to be ephemeral and seasonally dry, with only the farm dams retaining water for extended periods through the drier months.

2.3 Environmental Values

The regional waterbodies provide a range of important environmental values. The Winton Wetlands Natural Features Reserve is the largest wetlands restoration project in Australia and has a specific objective to renew the ecology of the reserve. The site plays an important scientific, cultural and environmental role in the region and invites visitors to the wetlands for recreation and education.

Broken River is a major perennial waterway that also provides important environmental values for the region. The upper reaches of Broken River are used to provide the town of Benalla with potable water. Similarly, the minor tributaries and creeks of Broken River are utilised as private water supplies for remote properties and farms.

The Broken River also features extensive areas of habitat with mature trees and natural channels through its corridor. This habitat supports a diverse ecosystem and offers residents and visitors of the region recreational opportunities such as walking, birdwatching and fishing.

The majority of waterways and drainage pathways through the project area have been modified by agricultural use and are devoid of riparian vegetation. These waterways offer limited environmental value for ecology or habitat, however, they do form part of an extensive surface drainage network that connect farm dams and provide water for agriculture.

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2.4 Existing Surface Water Quality

Surface water quality information is limited for the waterways close to the site and the nearest water quality monitoring locations are on Broken River.

The Victorian Index of Stream Condition (ISC) Report is a state-wide river condition assessment that has occurred since 1999. The Third ISC report is the most recent publication and provides a snapshot of water quality in the Broken River during 2010. The water quality indicators used for the condition assessment were electrical conductivity (EC), pH, total phosphorous and turbidity.

The ISC concluded that around half of the waterway reaches assessed in the Broken River Basin were in moderate condition. This included the Broken River reach at the point of connection with Stockyard Creek. Water quality in this reach was considered typical for the region with elevated levels of phosphorus and high levels of turbidity. The report concluded that these elevated results were likely associated with cleared agricultural land.

2.5 Existing Flood Extent

Flood information obtained from the GBCMA included flood maps (2017) that provide a basic estimation of the 1% Annual Exceedance Probability (AEP) flood event using 1 m flood contours (Figure 3). This flood contours were established using 1993 flood data and are an estimate only, with limited accuracy. The full extent of this flood map, including the legend and site context, is provided in Appendix A.



Figure 3 Predicted 1% AEP flood contours shown green (mAHD) across the proposed site outlined in red (Source: GBCMA Flood Atlas)

The GBCMA 1% AEP flood contours (refer to Appendix A) were correlated with the site survey data to determine a rough estimate of the flood depth and extent that could occur during a 1% AEP flood event.

Using this approach, it was estimated that flood depth across the site could vary from around 1.2 m in the drainage channel on the eastern boundary, to 0.5 m in the channel of the western waterway. Many areas of the central site were below 0.2 m or potentially dry (Figure 4). The full extent of this map is provided in Appendix B.

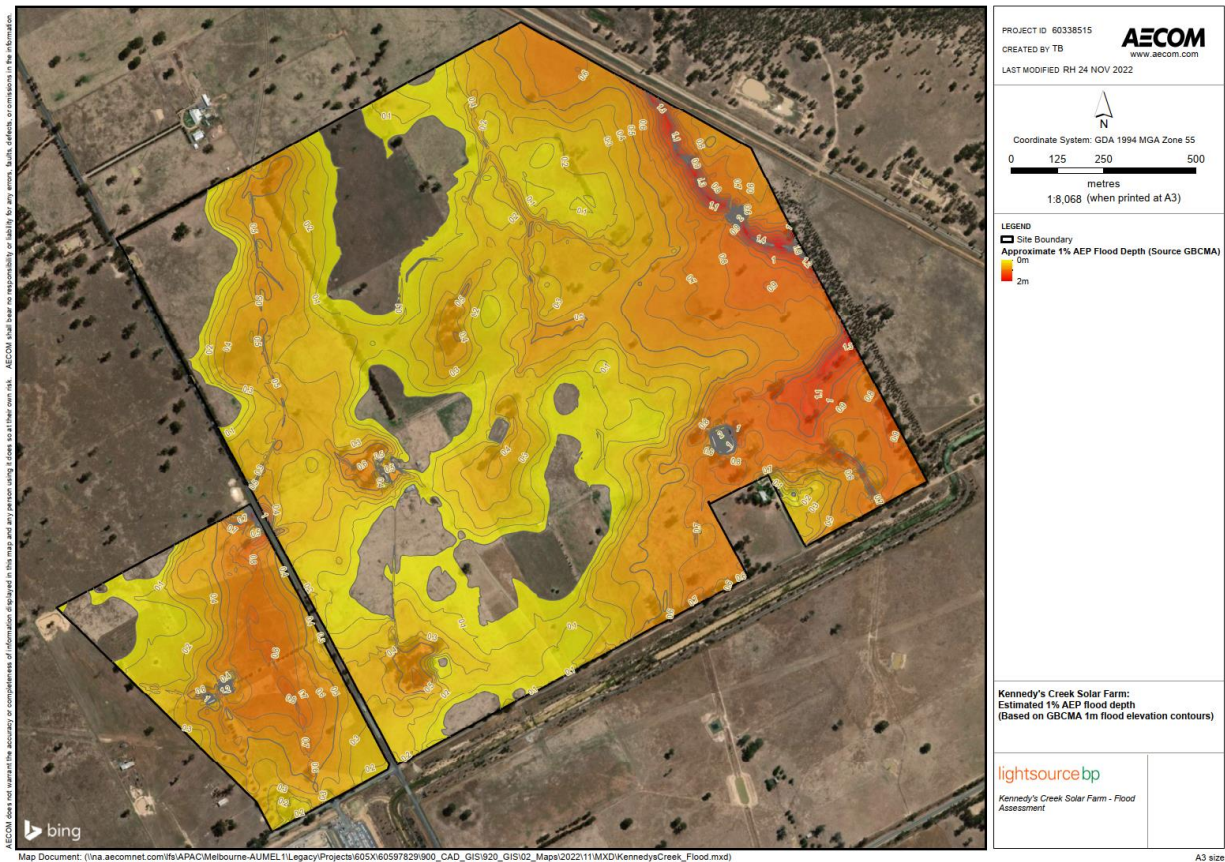


Figure 4 Estimated 1% AEP flood depth determined by the GBCMA flood contours and site survey data.

2.6 Flood Related Planning Controls

The site is not affected by a Land Subject to Inundation Overlay (LSIO) or Floodway Overlay (FO). The VicPlan (DELWP) mapping portal indicates the nearest area of FO occur in the town of Benalla and the lower reaches of Stockyard Creek (Figure 5). However, the Mapshare (DELWP) mapping portal shows an area defined as Floodway occurring east of the site in the Wetlands, behind the dam embankment (Figure 6).

However, it should be noted that the GBCMA Flood Atlas does suggest the land may be subject to some degree of inundation during significant flood events.

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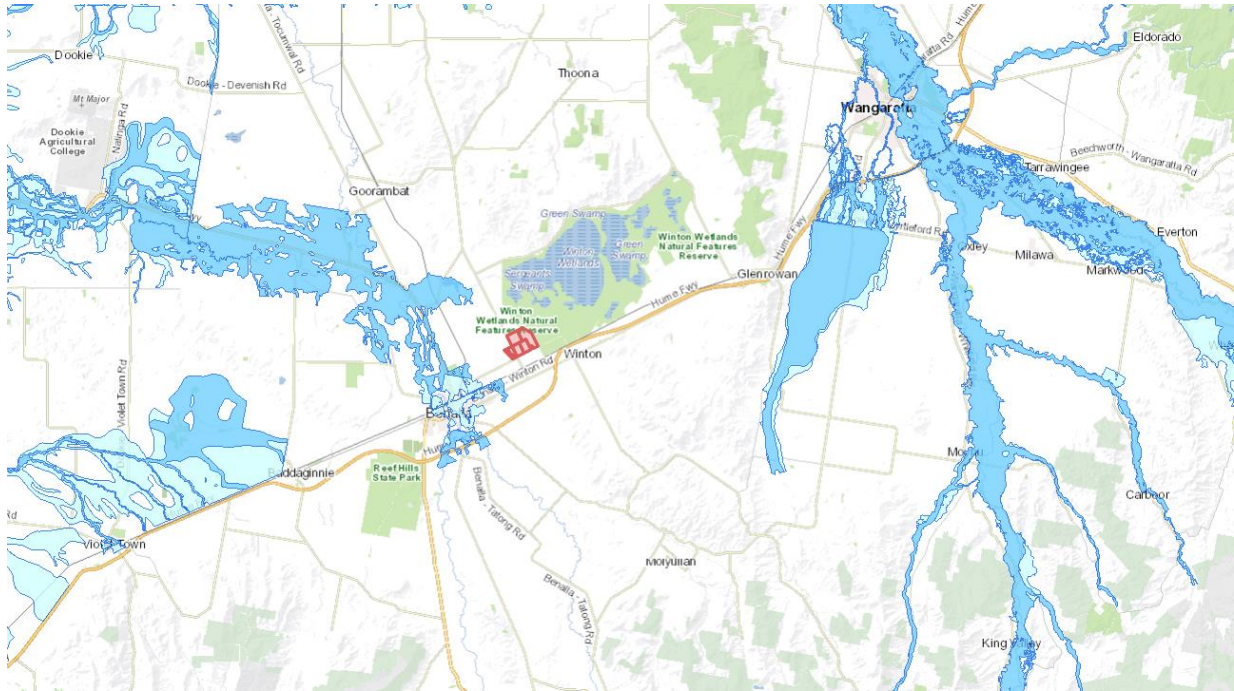


Figure 5 Proximity of Land Subject to Inundation Overlays (light blue) and Floodway Overlay (dark blue) (DELWP VicPlan 2022).

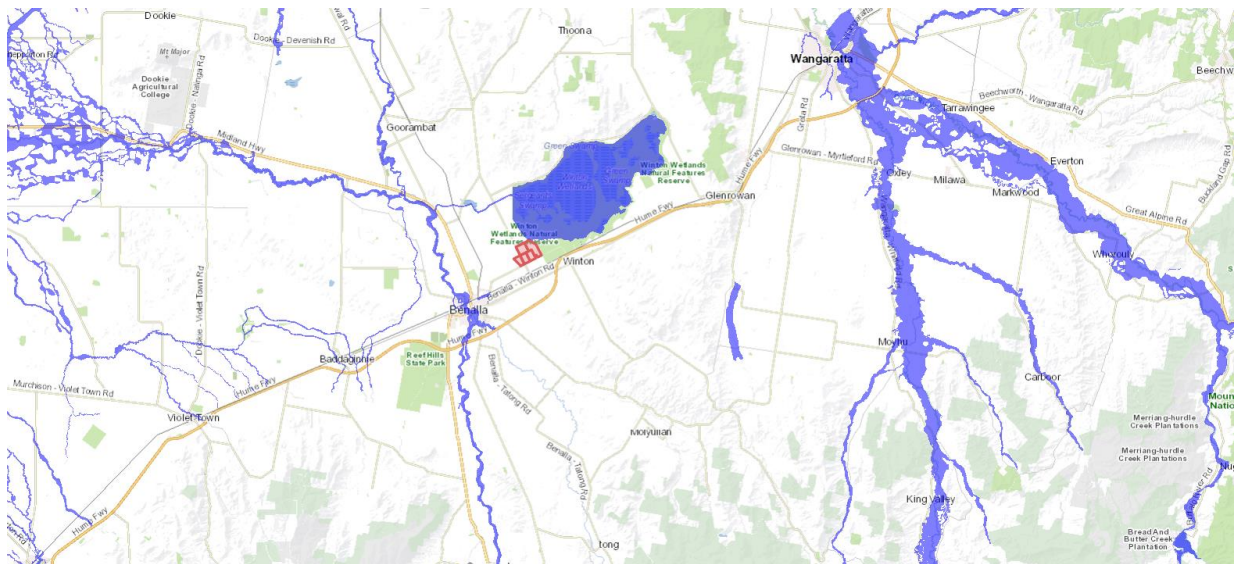


Figure 6 Proximity of Floodway (dark blue) (DELWP Mapshare 2022).

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3.0 Water Authority Engagement

3.1 Goulburn Broken CMA Engagement

The GBCMA is the region's peak natural resource management body and is responsible for the implementation of the Regional Catchment Management Strategy. In this role, the GBCMA guides development to ensure the region's land and water resources are protected for the benefit of the region.

AECOM submitted a floodplain advice application to the GBCMA on 07 February 2019. The floodplain advice application was for the proposed project location at that time. It included additional land parcels to the west of the current site but did not include the land parcel adjacent to the Winton Wetlands dam embankment.

The GBCMA provided a response to the application on 28 February 2019 outlining their observations and subsequent conditions. Further detail is provided in the sections below. The full response is provided in Appendix C of this report.

3.1.1 Goulburn Broken CMA Observations (2019 engagement)

The GBCMA estimated the 1% AEP flood levels for the site to vary between 165.5 and 168.5 metres AHD. This estimate was established from limited 1993 flood levels. The GBCMA stated they did not hold detailed ground level information to determine depths of flooding over the site.

The GBCMA also identified a number of designated waterways across the site.

3.1.2 Goulburn Broken CMA Conditions (2019 engagement)

The response from the GBCMA indicated that they would not object to the proposed solar farm, subject to the following conditions:

1. Inverter and transformer blocks, any buildings, infrastructure and solar panels must be located a minimum of 30 m from the nearest top of bank of waterways.
2. The finished floor levels of inverter and transformer blocks and any buildings are to be set at least 300 millimetres above the applicable 1% AEP flood level.
3. The corridors along all waterways shall be revegetated in accordance with the Revegetation Guide for the Goulburn Broken Catchment (<https://revegetation.gbcma.vic.gov.au/>).
4. Where fencing crosses waterways, the fencing shall be designed such that it does not obstruct flood flows. For example, farm type fencing, large open mesh (150 mm centres), vertical pool style fencing (150mm centres), fencing that lifts with the floodwater or similar.

3.1.3 Further clarification and site visit (2019 engagement)

The designated waterways detailed in the diagram provided by the GBCMA highlighted some discrepancies with site survey findings and areal imagery. Subsequently, a joint site meeting was organised with the GBCMA and Goulburn Murray Water (GMW) on 2 July 2019 to discuss these waterways and determine the next steps.

The outcomes from the meeting highlighted that some of the designated waterways were not well defined. It was recommended that a waterway determination assessment should be carried out by GMW to ascertain the purpose and status of these waterways. The findings of the GMW waterway determination are presented in Section 0.

3.1.4 2022 Updates – Goulburn Broken CMA Meeting

The project team met with the GBCMA again on 24 November 2022. The purpose of the meeting was provide an update on the project and confirm the conditions that were issued in the previous floodplain advice response. The meeting concluded that the current conditions were still applicable to this project. Section 3.2 of this assessment report summarises how the outcomes from the GBCMA engagement will be adopted into the project. Goulburn Murray Water Engagement.

Goulburn Murray Water (GMW), a statutory corporation, is Australia's largest rural water corporation. It manages around approximately 70 per cent of Victoria's stored water resources, 50 per cent of Victoria's underground water supplies and Australia's largest irrigation delivery network.

3.1.5 Goulburn Murray Water, Waterway Determination

Following the July 2019 site visit, AECOM submitted a Waterway Determination application to GMW on 15 July 2019. GMW subsequently carried out the waterway determination assessment and provided a response on 30 July 2019. The full response from GMW is provided in Appendix D of this report.

3.1.6 Waterway determination assessment findings

The waterway determination for the Kennedys Creek site identified one designated waterway within the study area. This waterway is located on the north-western section of the site and flows north across a number of land titles. Figure 7 illustrates the location of the waterway. The full map extent is presented in Appendix E. Section 3.2 of this report summarises how the outcomes from the GMW engagement were incorporated into the project.

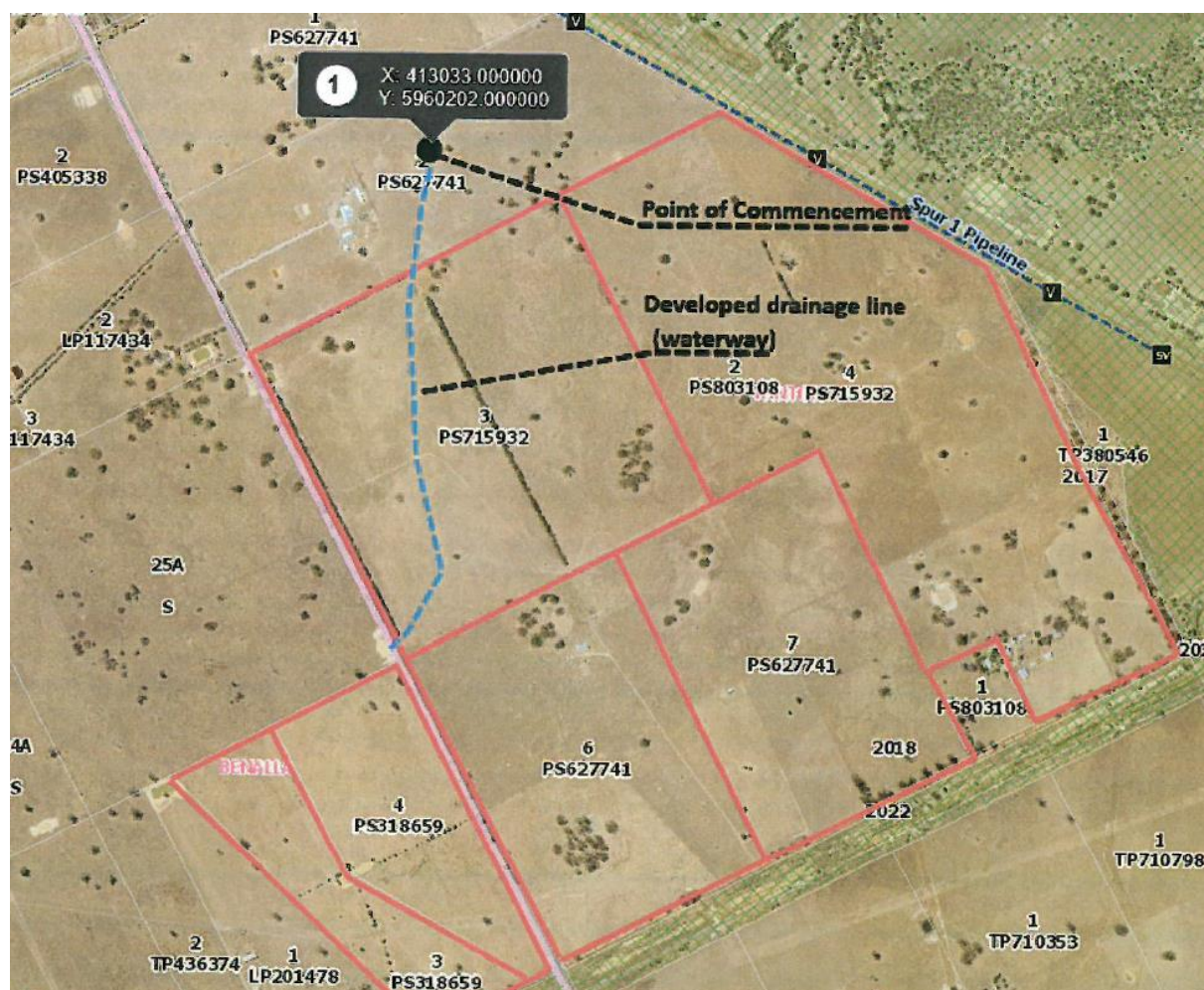


Figure 7 GMW Map illustrating the confirmed waterway on the Kennedys Creek site (shown blue).

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3.2 Summary of GBCMA and GMW Engagement.

The GMW waterway determination from 2019 concluded that only one waterway on site was identified as a designated waterway. This waterway had a relatively small catchment area inside the site and no identified upstream surface water connections beyond the site boundary.

The site visit in July 2019 revealed that the existing designated waterway, and most of the drainage pathways, were either poorly defined or featured small upstream catchments. The site visit also highlighted the limited environmental values of the existing drainage pathways due to widespread cropping, the absence of riparian vegetation and drainage modifications for agricultural use.

Discussions during the site visit acknowledged this potentially low-risk surface water context and it was suggested by GBCMA that they would consider accepting reduced setbacks from the designated waterway. This discussion also confirmed that the setback could be 5 m from the top of bank, subject to approval.

In addition, engagement with GBCMA and GMW included discussion about developing the solar arrays across some of the minor drainage pathways that were not identified as a designated waterway. In this scenario, the solar arrays would use single axis trackers that are supported by single poles. Feedback from GBCMA stated that the development should be designed to ensure the existing flow pathways are maintained and avoid any unnecessary diversions. The poles supporting the single axis trackers would typically be placed at wide intervals that span minor drainage pathways and allow the uninterrupted flow of water across the site.

Feedback received during the GBCMA and GMW consultation has been considered in the design of the project. Section 4.0 presents some of the typical management measures and mitigation strategies that will be adopted.

A surface water management plan (SWMP) will also be prepared following approval to provide specific details on the drainage, flooding and water quality management measures during the construction and operational stages of the project. This SWMP will also acknowledge the GBCMA Best Practice Principles and Standards for Drainage in Dryland Catchments.

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4.0 Managing Surface Water Impacts

4.1 Overview of Potential Impacts

The construction activities and proposed permanent infrastructure could change the local drainage and flood characteristics. This could potentially increase the flood risk for adjacent properties or impact low flows that supply farm dams to the north of the site.

Construction activities and permanent infrastructure can also impact water quality in the receiving waterways and aquatic environment. This risk is typically associated with ground disturbance, dewatering or spillage of fuels or chemicals.

Pollutants, such as high sediment loads and increased turbidity can enter aquatic habitats and impact natural processes including fish reproduction plant photosynthesis. Impacts of sedimentation may also increase the transport of nutrients such as phosphorous, leading to eutrophication and algal blooms in slow moving or shallow waterways.

Other pollutants, including soluble chemicals and hydrocarbons can have immediate impacts on aquatic environments leading to fish kills and loss of invertebrates. Recovery from changes in water chemistry or fuel contamination caused by spills can take years to recover. There is an increased risk of chemical and/or fuel spills during the construction phase, however once constructed, the water quality risks for the operational solar farm will be significantly reduced.

The following sections highlight some of these aspects for further consideration including measures on how these impacts will be managed. These mitigation measures will also be adopted into the SWMP.

4.2 Managing Surface Water Impacts During Construction

Construction activities will be effectively managed through the adoption of best practice pollution prevention strategies in accordance with; EPA publications 1834: *Civil Construction, Building and Demolition Guide* and 1896, *Working within or Adjacent to Waterways* and *International Erosion and Sediment Control Association (IECA) Australasia guidelines*.

Some of the measures outlined in these guidelines include:

- Development of a site-specific erosion and sediment control plan.
- Scheduling higher risk works to occur during the driest seasons or when the waterways are dry.
- Quick reinstatement of disturbed ground following completion.
- Sediment control fences downstream of work areas.
- Storage ponds to collect silty runoff (the use of flocculants will also be considered where appropriate).

4.3 Solar Arrays

Runoff from the proposed solar arrays will be intercepted by grassed, pervious surfaces and will not significantly change the fraction of imperviousness for the total area of the site. Nevertheless, the solar arrays may increase the risk of flooding or change local flow characteristics if they are sited in active flood pathways.

The solar panels will be set back at least 5 m from the top of bank of the identified designated waterway (as per GBCMA engagement detailed in Section 3.1). This will provide access for future waterway maintenance activities, on both sides of the channel.

Additionally, the solar panels will be set such that the lowest edge, at full tilt, is at least 300 mm above the predicted 1% AEP flood level.

4.4 Internal Access Roads

The initial design layout plan indicates an access road around the perimeter of the site with several 'lateral' connecting roads through the arrays. These access roads will be designed on grade to allow surface water flows to continue across the site during large flood events.

Local drainage may be required to convey flows captured in swale drains associated with the access tracks and at low points. All existing access tracks and local roads will be maintained at the current elevation.

A works on waterways permit will be sought where the access roads cross the designated waterway. All other waterway crossings will be designed in accordance with the guidance of the GBCMA.

Each waterway crossing will consider the following aspects in design:

- Required level of flood immunity
- Access track height
- Culvert type and width
- Invert level
- Culvert height
- Hydraulic assessment
- Crossing stabilisation
- Bed and batter protection
- Local drainage
- Alignment and location
- Fish passage

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Further details on each of these design aspects can be found at:

<https://www.gbcma.vic.gov.au/downloads/WaterwaysWorks3/Culvert.pdf>

4.5 Substation Area

Substation benches can take up valuable flood storage volume and increase flood risk across the site and to neighbouring properties.

The 2019 concept plan proposed a substation area that was located across a very minor ditch. Following changes to the concept design, the substation has been relocated to the north-eastern corner of the Kennedys Creek site. There are no waterways at this proposed location, however, the GBCMA flood atlas indicates that this site location is inside the GBCMA's predicted 1% AEP flood extent.

The finished floor levels of the substation bench will be constructed 300 mm above the 1% AEP flood level as conditioned by the GBCMA.

Substation areas also present a risk of surface water contamination due to the presence of oils contained in the substation equipment and structures. Subsequently, the substation area would feature oil containment systems in their design (as specified in the network specific technical design standards). All drainage design for the substation bench will meet the drainage requirements of the Benalla Planning Scheme¹.

¹ Including but not limited to Clause 14.02 *Water*, Clause 19.03-3S *Integrated Water Management* and Clause 53.18 *Stormwater Management in Urban Development*.

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4.6 Transformer Blocks

The transformer blocks (PCUs) will be distributed throughout the site, adjacent to the access tracks. Recognising the requirements of the GBCMA, the base for these structures will be set at least 300 mm above the predicted 1% AEP flood event.

4.7 New Impervious Areas

Impervious areas (e.g. concrete, roofing, transformer cabinets etc.) of the site could concentrate runoff or displace surface water storage. Stormwater drainage systems for all impervious areas will be designed to meet the drainage requirements of the Benalla Planning Scheme. This will include water quality considerations and possible treatment measure for total suspended solids, total phosphorous, total nitrogen and litter.

Stormwater discharges from these impervious areas will also consider measures that reduce the volume and velocity of stormwater runoff. These measures could include infiltration for small areas, vegetated swales or raingardens.

4.8 Site Fencing

Poorly designed fencing can collect debris and exacerbate local flood impacts. Site fencing will be designed so that it does not obstruct flood flows across the land and ongoing monitoring will be implemented through construction and operations stages to inspect impacts such as debris along fence lines. Mitigation measures are subject to further discussion with the GBCMA.

4.9 Land Remediation

Changes in soil characteristics occur primarily due to construction activities through compaction, erosion, leaching and contamination. The removal of vegetation, due to excavation activities and disturbance will also change the infiltration capacity of the soil, leading to increase runoff.

To manage these impacts, disturbed ground will be quickly stabilised and reinstated. Similarly, any land drains or ditches will be reinstated or replaced to maintain existing drainage characteristics.

4.10 Site Grading

Upstream and downstream boundaries of the site will be suitably graded with the site surfaces to retain the existing flood flow pathways across the site.

4.11 Localised Flows

It is not anticipated that runoff from the solar arrays will cause erosion. However, local drainage controls will be implemented where concentrated flows have been identified (e.g. aggregate filled drip lines below lowest panel edges).

4.12 Flood Resilience

The GBCMA flood contours indicate that parts of the site may be flood prone. This, combined with relatively flat gradient suggests water is slow to drain and the site may experience extended periods of waterlogging. The proposed infrastructure will be designed to withstand regular and extended periods of inundation. As discussed in Section 4.4, transformer blocks will comply with the GBCMA requirements relating to flooding.

4.13 Understanding Flood Risk

The GBCMA flood contours indicate the potential extent of flooding across the site. A flood study will be carried out to determine the extent, depth and flow hazards of surface water within the site.

This will directly inform the detailed design process for the locations, levels and setbacks of the new infrastructure, as well as identify locations for additional sediment and flow controls. The flood assessment methodology will be developed in consultation with the GBCMA.

4.14 Determining Flood Immunity and Levels of Service

Regulatory requirements and design guidelines typically provide the basis for subsequent design stages and associated management plans. Acceptable levels of flood immunity and levels of service provided by specific assets during flood events can vary depending on the type of infrastructure at risk. For example, access roads to a substation may require greater flood immunity, and higher levels of service, when compared to access roads that service non-critical infrastructure.

Levels of flood immunity, and associated levels of service, for each asset will be determined and agreed through cross sector collaboration and engagement (e.g. stakeholder workshop). The outcomes of the engagement process will directly inform the development of site-specific drainage and the SWMP.

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5.0 Summary and Conclusions

5.1 Existing Site Context

The Kennedys Creek Solar Farm site is located on agricultural land in the Stockyard Creek sub-catchment of the Broken River. Key water features in the catchment include the Winton Wetlands Natural Features Reserve to the east of the site, and Kennedys Creek to the west.

The surface water features inside the site include a designated waterway, multiple minor drainage lines, farm dams and a small waterway toward the eastern boundary of the site. Many of these waterways and drainage pathways are poorly defined and all waterways have been impacted by agricultural use and are devoid of riparian vegetation. The hydrological regime of these waterways and drainage pathways is ephemeral with only the farm dams retaining water into the drier months.

Water quality monitoring of the waterways inside or adjacent to project site has not been carried out and there does not seem to be any water quality data that is publicly available. However, the Third ISC Report summarises the receiving reach of Broken River to be in moderate condition with elevated phosphorous and turbidity that may be attributed to agricultural land use in the catchment.

5.2 Engagement

The project team engaged the GBCMA in 2019 and in 2022 following updates to the project, to gain an understanding of potential flood risks for the site and to determine the potential conditions that would be applied for the proposed development.

The GBCMA provided a flood atlas that showed the estimated flood elevation and extent for a 1% AEP flood event, based on the 1993 flood levels. The GBCMA also provided a map of designated waterways across the site.

A site meeting was held on 02 July 2019 with GBCMA and GMW to discuss the project and assess the waterways around the site. This site visit confirmed the waterways were poorly defined and a decision was made to carry out a waterway determination assessment. This assessment was carried out by GMW and it was confirmed that one of the waterways was a designated waterway, in the north western corner of the site.

The site discussion also provided an opportunity to discuss the GBCMA development conditions and the management measures that would typically be applied to meet these conditions. The upstream catchment for the waterway on the site was limited by the Mokoan Inlet Channel that traversed along the southern boundary of the site. This channel intercepts flows from the south and there do not appear to be any waterways connecting to the site from the southern boundary.

This limited catchment area, combined with the modified agricultural setting, prompted discussion on the potential to reduce the setbacks from the waterway. A reduced setback of 5 m from the top of bank was suggested by the GBCMA, subject to approval.

In November 2022, the project team met with GBCMA to present the key project updates and confirm the status of the development conditions. It was concluded that these conditions, including the potential reduced setback were still relevant and appropriate for this project.

5.3 Managing Surface Water Impacts

The Kennedys Creek Solar Farm will adopt the development conditions proposed by the GBCMA floodplain advice and the reduced setback of 5 m for the designated waterway. The project will also be developed in accordance with current regulatory requirements, industry best practice standards and guidelines to ensure the existing hydrological regime, flood risk and water quality conditions are protected.

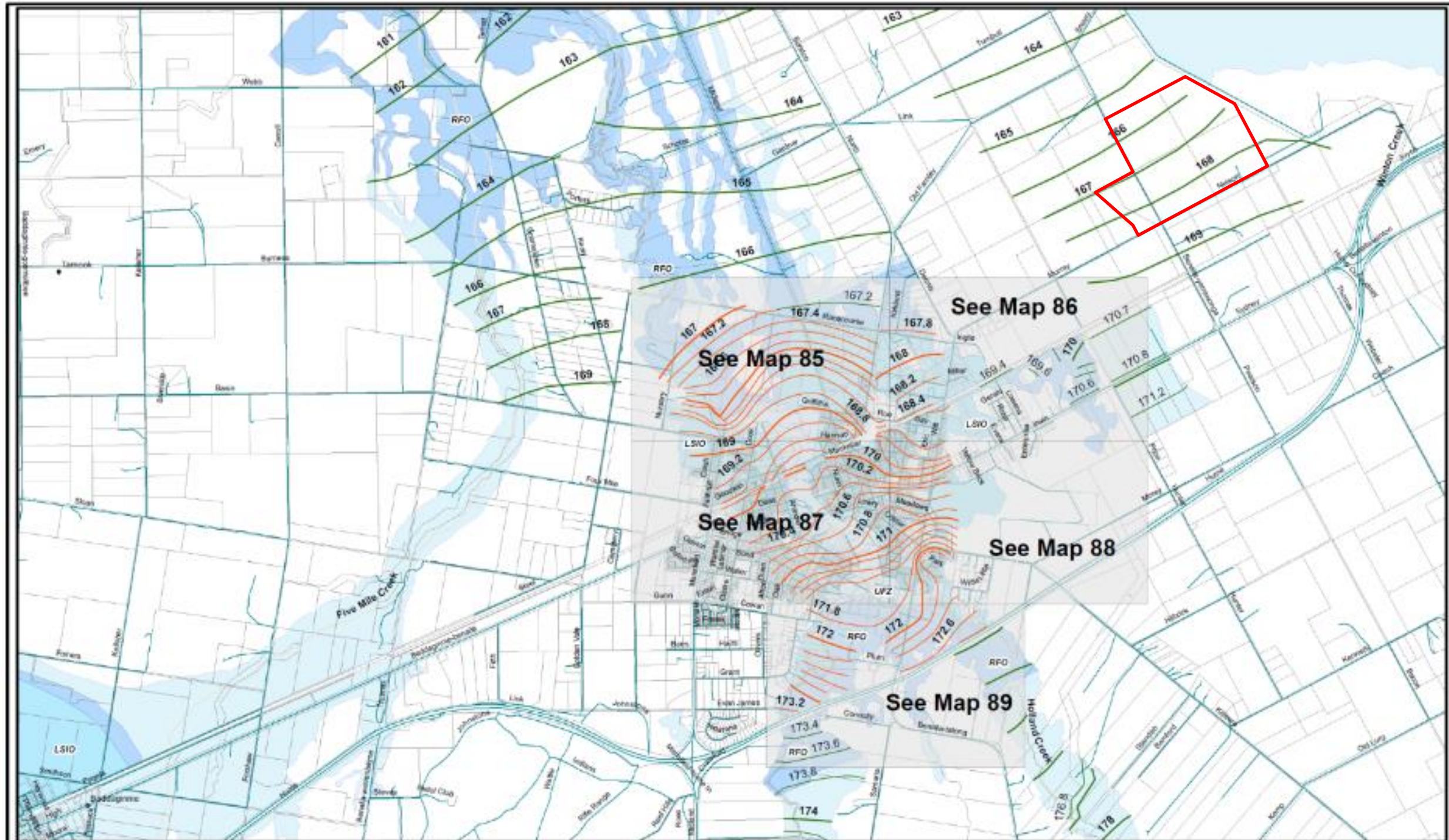
A key instrument of the project will be the development of the SWMP following the successful lodgement of the planning application. This SWMP will set out the site specific detail on how surface water will be managed and protected during construction and operation.

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Appendix A

1% Flood Level Contour Atlas

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GENERAL NOTES
The concepts and information contained in this document are the copyright of the Goulburn Broken Catchment Management Authority. Use or copying of the document in whole or in part without written permission of the Goulburn Broken CMA constitutes an infringement of copyright.
The Goulburn Broken Catchment Management Authority does not warrant that this document is definitive nor free of error and does not accept liability for any loss or cost or arising from reliance upon information provided herein.
Cadastral information is supplied by Department of Sustainability and Environment.
This map has been prepared using the best available data and mapping techniques. The accuracy of this map however, is not absolute and reflects only the accuracy of the data and techniques used. This information is subject to change where new information is found or determined from future studies.

NOTES ON DECLARATION AND BEST ESTIMATED FLOOD LEVELS
The flood level lines shown on this plan below the outside level of the "1% probability flood" where flood level declarations have occurred, this is the flood prescribed by Section 204 of the Water Act 1988 for floodplain management purposes and has a 1 in 100 chance of being equaled or exceeded in any one year. (Other flood level contours represent the best estimate of the 1% probability flood).
The declaration of these 1% flood level lines has been based on available historical flood level and flow information, hydrologic and hydraulic modelling. Areas outside the 1% probability flood limit may be inundated by other flood events.
For the purpose of determining flood levels the location between flood level lines, it can be assumed that the flood surface levels change at a uniform rate between flood level lines.
The flood level lines shown on this plan can be used to assist in the determination of designated levels in accordance with Clause 6.2 of the Building Regulations 1994. Although there may be buildings within the area covered by the flood level lines, it should not be assumed that the floor of any individual building is below flood level. Buildings should be surveyed to determine whether their floors are above or below the 1% flood level.

FLOOD OVERLAY INFORMATION
This map showing Urban Floodway Zone (UFD), Floodway Overlay (FDO) or RFD1 and LSO1 subject to Inundation Overlay (LSO1) are indicative only and not to be used as a substitute over the planning scheme maps.

- Legend**
- Declared/Designated Flood Contours (metres AHD)
 - Best Estimated Flood Contours (metres AHD)
 - Land Subject to Inundation Overlay
 - Floodway or Rural Floodway Overlay
 - Urban Floodway Zone
 - Known Lowes
 - Irrigation Channels
 - Waterways
 - Roads
 - GBCMA Waterway Boundary



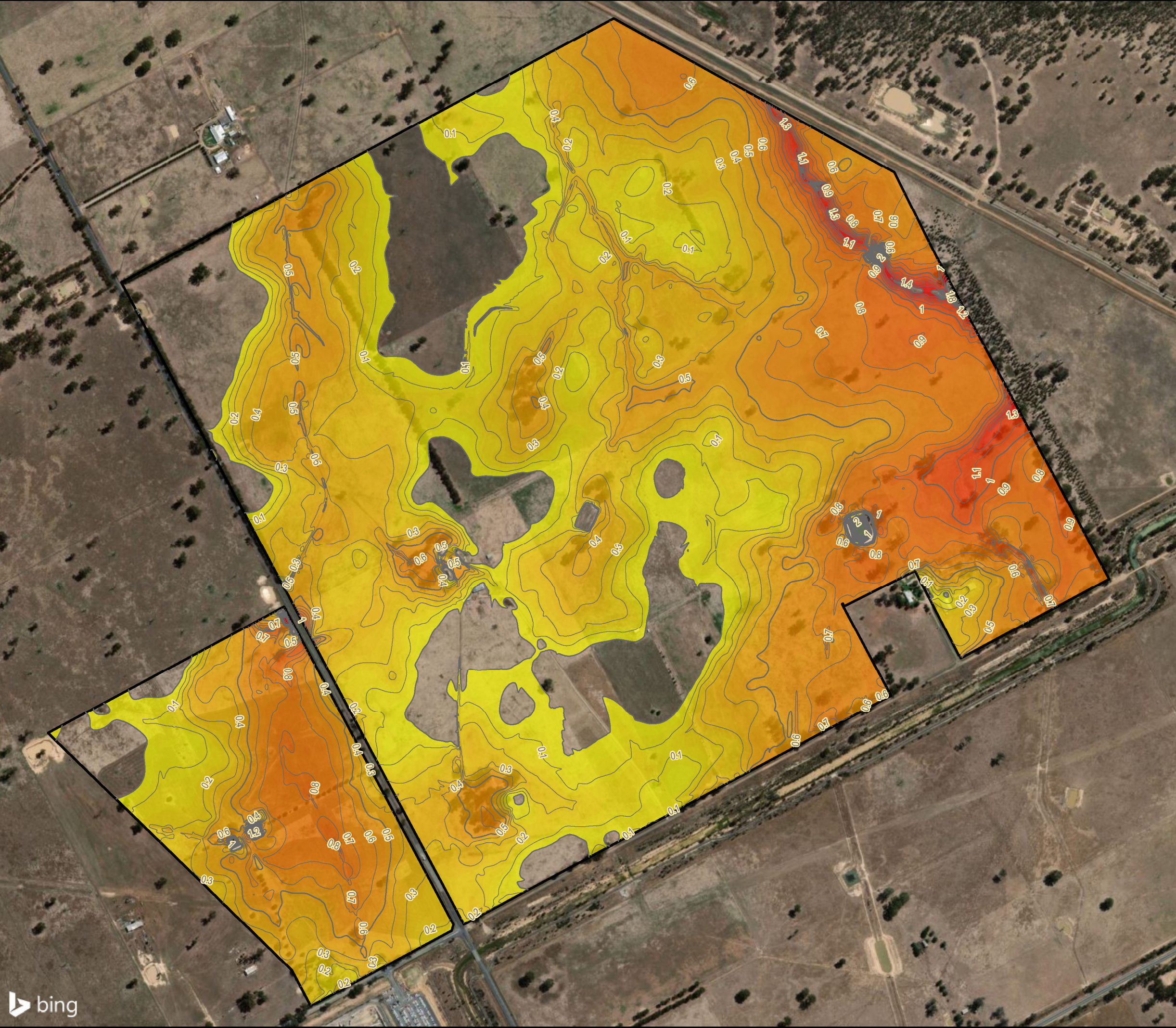
GOULBURN BROKEN CATCHMENT MANAGEMENT AUTHORITY		42 of 104
1% FLOOD LEVEL CONTOUR ATLAS		540335
Date: 30 June 2020		

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Appendix B

Estimated 1% AEP flood depth
(GBCMA flood contours and site
survey data)

AECOM does not warrant the accuracy or completeness of information displayed in this map and any person using it does so at their own risk. AECOM shall bear no responsibility or liability for any errors, faults, defects, or omissions in the information.



PROJECT ID 60338515
CREATED BY TB
LAST MODIFIED RH 24 NOV 2022



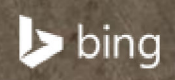
Coordinate System: GDA 1994 MGA Zone 55
0 125 250 500
metres
1:8,068 (when printed at A3)

LEGEND
Site Boundary
Approximate 1% AEP Flood Depth (Source GBCMA)
0m
2m

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**Kennedy's Creek Solar Farm:
Estimated 1% AEP flood depth
(Based on GBCMA 1m flood elevation contours)**

lightsource bp
Kennedy's Creek Solar Farm - Flood
Assessment



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Appendix C

GBCMA Floodplain Advice

Our Ref: GBCMA-F-2019-00090
Document No: 1



Date: 28 February 2019

Mr Tony Barrett
AECOM Australia Pty Ltd
727 Collins Street
Melbourne VIC 3008
tony.barrett@aecom.com

Dear Mr Barrett

**Floodplain Management Advice for
Proposed Solar Farm
Lot 4, Plan PS318659
226 Murray Road Benalla Vic 3672**

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Thank you for your application dated 07 February 2019, received by the Goulburn Broken CMA on 07 February 2019, regarding the above matter.

The Goulburn Broken CMA's assessment of the above information has determined that the proposed development location is covered by the Industrial 1 Zone, Industrial 2 Zone, Road Zone - Category 1, Road Zone - Category 2 in the Benalla Planning Scheme.

The Authority's best estimate of the 1% AEP flood levels for the location described above varies from 165.5 and 168.5 metres AHD (see Figure 1), which was established from limited 1993 flood levels. The Authority has no detailed ground level information to determine depths of flooding over the site.

Figure 1 also shows a number of designated waterways that traverse through the site. In this regard, the waterways should remain free from obstruction with vegetated corridors.

In the light of the above information, the Goulburn Broken CMA would not object to the proposed solar farm, **subject to the following conditions:**

1. Inverter and transformer blocks, any buildings, infrastructure and solar panels must be located a minimum of 30 metres from the nearest top of bank of the waterway shown in Figure 1.
2. The finished floor levels of inverter and transformer blocks and any buildings are to be set at least 300 millimetres above the applicable 1% AEP flood level as shown in Figure 1.

www.gbcm.vic.gov.au

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Shepparton VIC 3632
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Fax: (03) 5831 6254

BENALLA
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Benalla VIC 3672
Tel: (03) 5822 7700

YEA
5/10 High Street
Yea VIC 3717
Tel: (03) 5797 4400

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Healthy, resilient and increasingly productive landscapes supporting vibrant communities

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3. The corridors along all waterways, as shown in Figure 1, shall be revegetated in accordance with the Revegetation Guide for the Goulburn Broken Catchment (<https://revegetation.gbcma.vic.gov.au/>).
4. Where fencing crosses waterways, as shown in Figure 1, the fencing shall be designed such that it does not obstruct flood flows. For example, farm type fencing, large open mesh (150 mm centres), vertical pool style fencing (150mm centres), fencing that lifts with the floodwater or similar.

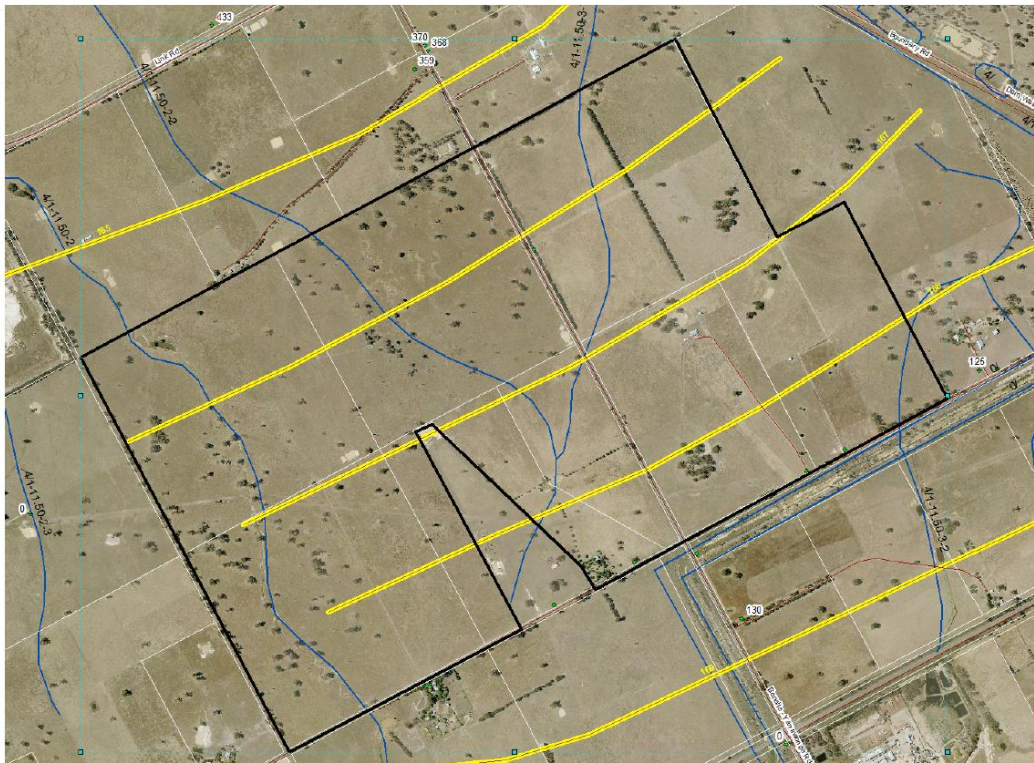


Figure 1: Showing estimated 1% AEP flood contours and designated waterways.

Note, where access roads cross the waterway shown in Figure 1 a works on waterways permit will be required from the Goulburn Broken CMA.

Please Note:

- This document contains floodplain management advice only. It does not constitute approval from any other statutory body. It is your responsibility to obtain any other required approvals.
- The 100-year ARI flood is not the maximum possible flood. There is always a possibility that a flood larger in height and extent, than the 100-year ARI flood, may occur in the future.

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If you have any queries, please contact me on **(03) 5822 7700**. To assist in handling any enquiries please quote **GBCMA-F-2019-00090** in your correspondence. Please note that all electronic correspondence should be directed to planning@gbcma.vic.gov.au.

Yours sincerely



Guy Tierney

**Statutory Planning and
Floodplain Manager**

Information contained in this correspondence is subject to the definitions and disclaimers below.

Definitions and Disclaimers

1. The area referred to in this letter as the 'proposed development location' is the land parcel(s) that, according to the Authority's assessment, represent(s) the location identified by the applicant. The identification of the 'proposed development location' on the Authority's GIS has been done in good faith and in accordance with the information given to the Authority by the applicant(s) and/or local government authority.
2. While every endeavour has been made by the Authority to identify the proposed development location on its GIS using VicMap Parcel and Address data, the Authority accepts no responsibility for or makes no warranty with regard to the accuracy or naming of this proposed development location according to its official land title description.
3. **AEP** as Annual Exceedance Probability – is the likelihood of occurrence of a flood of given size or larger occurring in any one year. AEP is expressed as a percentage (%) risk and may be expressed as the reciprocal of ARI (Average Recurrence Interval).
4. **ARI** as Average Recurrence Interval - is the likelihood of occurrence, expressed in terms of the long-term average number of years, between flood events as large as or larger than the design flood event. For example, floods with a discharge as large as or larger than the 100-year ARI flood will occur on average once every 100 years.
5. **AHD** as Australian Height Datum - is the adopted national height datum that generally relates to height above mean sea level. Elevation is in metres.
6. No warranty is made as to the accuracy or liability of any studies, estimates, calculations, opinions, conclusions, recommendations (which may change without notice) or other information contained in this letter and, to the maximum extent permitted by law, the Authority disclaims all liability and responsibility for any direct or indirect loss or damage which may be suffered by any recipient or other person through relying on anything contained in or omitted from this letter.
7. This letter has been prepared for a proposed Solar Farm and is for the use only of the party to whom it is addressed and no responsibility is accepted to any third party for the whole or any part of its contents. Neither the whole nor any part of this letter or any reference thereto may be included in any document, circular or statement without the Authority's written approval of the form and context in which it will appear.
8. The flood information provided represents the best estimates based on currently available information. This information is subject to change as new information becomes available and as further studies are carried out.
9. ***The responsible authority may use this information within 90 days of this letter.***

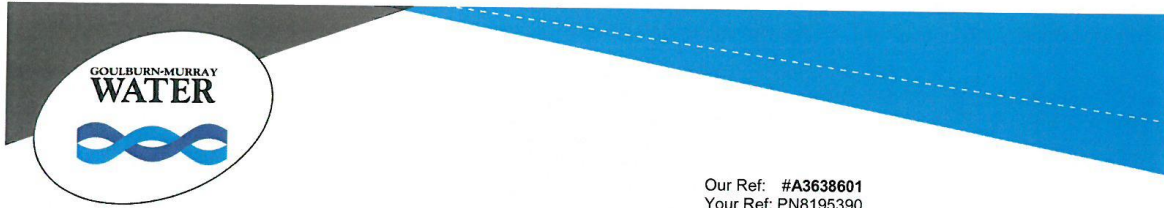
ADVERTISED PLAN

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Appendix D

GMW Waterway Determination

ADVERTISED PLAN



Our Ref: #A3638601
Your Ref: PN8195390

Tony Barrett
AECOM - c/o Link Development Pty Ltd
Collins Square, Level 10, Tower 2
727 Collins St.
MELBOURNE VIC 3008

30 July 2019

Kennedy's Creek Solar Farm proposal

Dear Tony,

I refer to a recent inspection by Goulburn-Murray Water Diversion Inspector Ben Ives on the properties listed below.

Lots 2,3,4,5, Plan of Subdivision 206524, Parish of Goorambat
Lots 3 & 4, Plan of Subdivision 318659, Parish of Winton
Lots 6 & 7, Plan of Subdivision 627741, Parish of Winton
Lot 4, Plan of Subdivision 715932, Parish of Winton
Lot 3, Plan of Subdivision 715932, Parish of Winton

The purpose of this inspection was to undertake a "Waterway Determination" on these properties to identify any existing waterways. The commencement point of a waterway was located at co-ordinates Zone 55, Eastings: 413033, Northings: 5960202, on Lot 2 PS627741, Parish of Winton.

A "Waterway Determination" is made by matching criteria used by Goulburn-Murray Water to determine if there is a waterway/watercourse at the site, as defined under Section 3 of the Water Act 1989.

As a result of the inspection, our findings show there is a waterway at the specific site inspected on this property at the above coordinates. It was identified during the inspection that the waterway traverses a number of the land titles described above. In accordance with your advice, the purpose of the Waterway Determination is in relation to a proposed Planning Permit application.

There may be additional drainage lines, depressions or gullies that may require protection from development by means of setbacks. A map showing the location of the significant drainage lines, depressions or gullies is attached for your information.

Additionally, please be advised that the application has not been assessed for potential impacts on surface or groundwater quality and this letter is not prior written approval of the development proceeding.

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GMW's interest is with the protection of surface water and groundwater and an assurance that proposed developments will not impact detrimentally on the flow and quality of surface water and groundwater. Any required water supplies must be from an available approved source.

Any proposed works planned on the waterway for the purpose of 'take and use' will require approval in the form of a Works Licence from Goulburn-Murray Water. The Goulburn Broken Catchment Management Authority are the licensing authority for any other works.

You are advised that you may require a planning permit from your Local Shire Council for the building and associated works and it is your responsibility to obtain permits as necessary.

Should you require any further information on this inspection please do not hesitate to contact Diversion Inspector Ben Ives at the Shepparton office of Goulburn-Murray Water on (03) 58 227 958 .

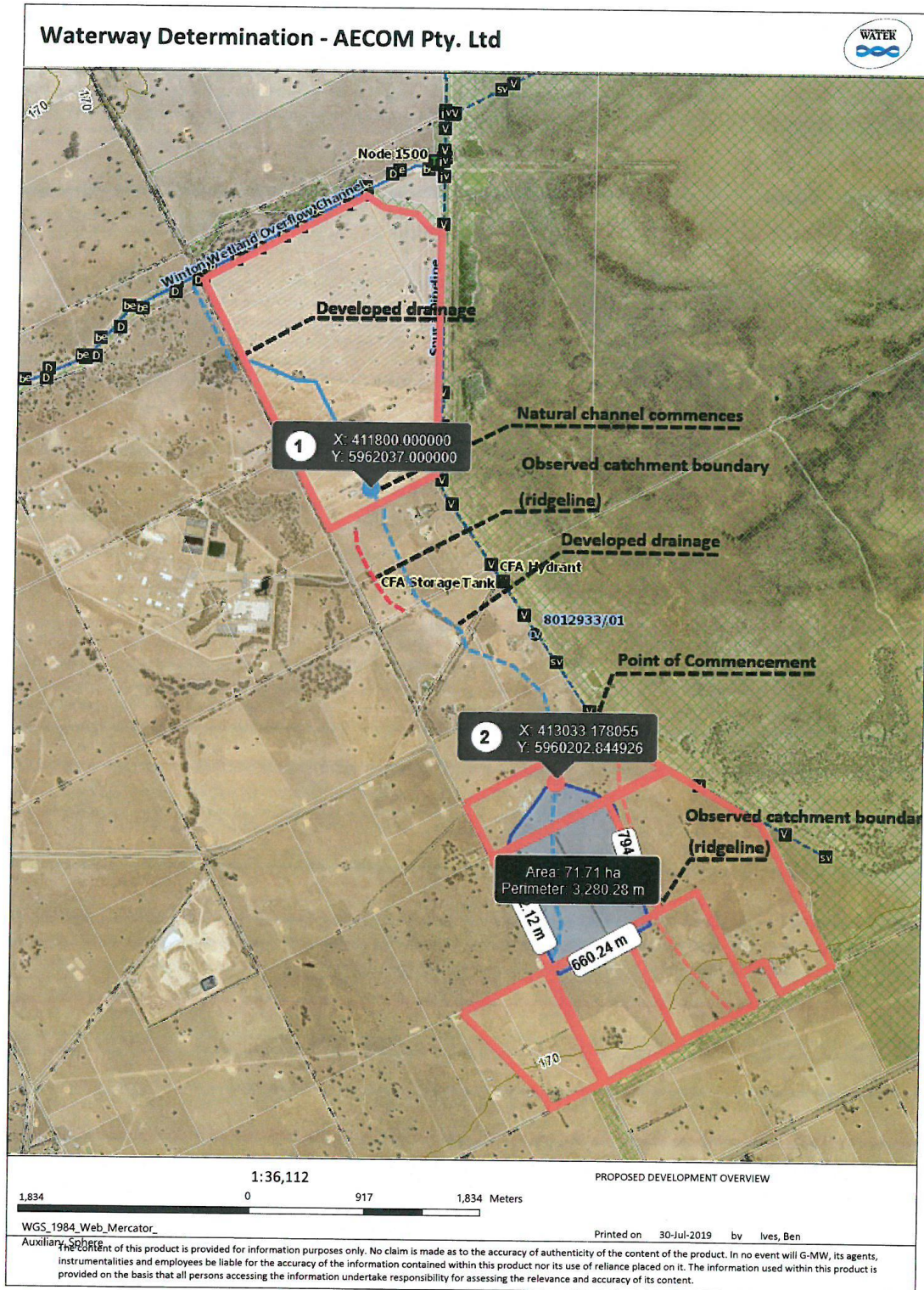
Yours sincerely



Cathy Wood
CUSTOMER SERVICE MANAGER
DIVERSIONS CENTRAL

*cc Goulburn Broken Catchment Management Authority
cc Benalla Rural City Shire
cc GMW Stat Planning Unit – Ranine McKenzie*

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